Dulles Toll Road
Traffic and Revenue Consulting Services

Comprehensive Traffic and Revenue Study

Final Report

Metropolitan Washington Airports Authority

July 2009

ENGINEERS
PLANNERS
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EXECUTIVE SUMMARY

This comprehensive traffic and revenue report summarizes the results of a comprehensive traffic and toll revenue (T&R) study for Dulles Toll Road (DTR) in Virginia. The study was conducted by Wilbur Smith Associates (WSA) between August 2007 and July 2009. Details of the study results are included in the full report herewith which reflects all current efforts requested of Wilbur Smith Associates (WSA) by the Metropolitan Washington Airports Authority (Airports Authority) to update the traffic and toll revenue forecasts in support of the construction of the Dulles Corridor Metrorail Project.

Constructed in 1984, and situated mostly in Fairfax County, the DTR is a 13.43 mile, eight-lane toll facility in the Dulles-Reston-Herndon-Tysons Corridor in Northern Virginia, shown in Figure 1-1. Toll collection is by means of cash and electronic toll collection (E-ZPass) at one main line plaza at the eastern end near the Capital Beltway (Interstate 495) and 19 ramp plazas, as shown in Figure 1-4. The majority of toll-paying customers pay both a main line and ramp toll. The tolling system is designed to capture DTR customers at one or more tolling locations except for users traveling to Washington Dulles International Airport (Dulles International). DTR links directly to the Dulles Greenway at a shared main line plaza providing rapid access to Leesburg and elsewhere in Loudon County. Currently, west-facing ramps, towards Dulles International, are toll free providing local travelers on the Dulles corridor with free access to the DTR and the Dulles Airport Access Road.

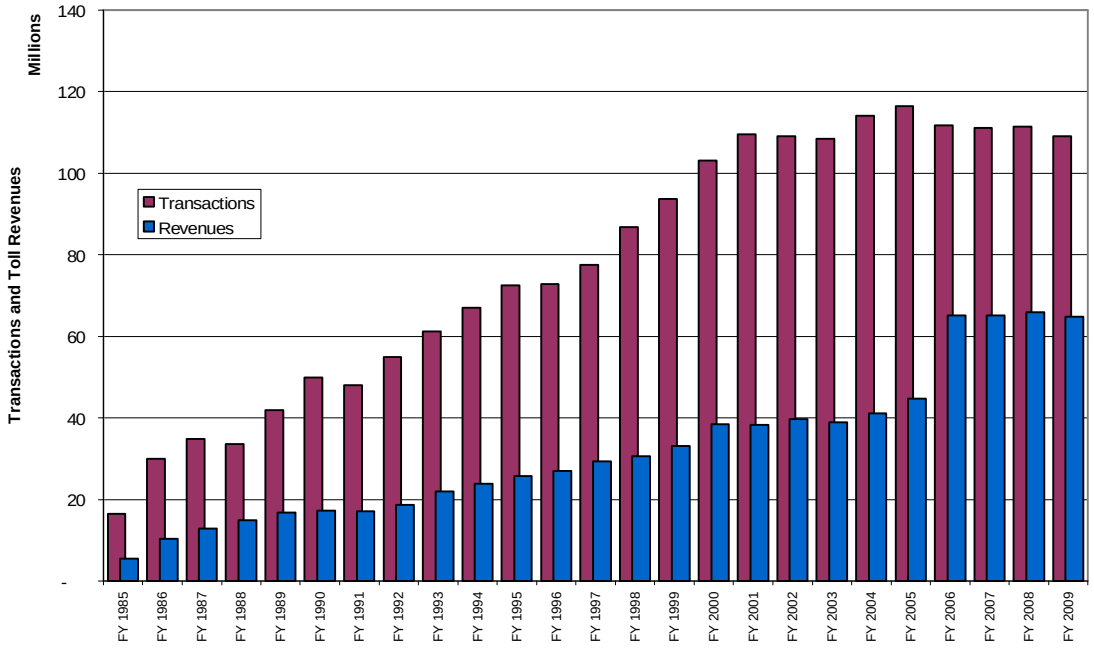
The DTR competes with a combination of non-tolled roads and highways but generally provides a superior limited-access free flow level of service. Its comparative advantage is somewhat reduced in peak hours when levels of service have begun to reach less satisfactory levels. Midday and non-peak travel is also substantial but there is headroom for growth in non-commuting trips as development along the Dulles corridor continues to expand.

Toll rates have been adjusted once in DTR's 25-year history, in 2005, in order to begin securing funds for the Metrorail Project. A 25-cent increase was applied such that the Main Line toll for two-axle vehicles is 75 cents in both directions and all ramp tolls are established at a uniform 50 cents. DTR-apportioned toll at the shared Dulles Greenway

plaza is also 50 cents. Multi-axle vehicles are charged an additional 25 cents per axle but the proportion of multi-axle vehicles is relatively small. The toll rate increase provided a sound revenue realization due to relatively inelastic impacts although ramp customers were more sensitive than the through traffic through the Main Line. Toll revenues increased from $41.9 million in 2004 to $65.2 million in 2006 despite other factors, other than toll increases, tending to reduce demand.

The customer base for the DTR is mature and extremely stable showing minimal variations during the working week and by time of year. Unlike many other commuter toll facilities the DTR exhibits strong peak demand in both directions due to the spatial spread of commercial and residential centers in its service area. Although growth has been muted, the DTR has fared relatively well during the current economic downturn compared to non-tolled routes in Virginia and comparable toll facilities throughout the nation. Historically, demand has been sensitive to economic growth but has always resumed to previous levels immediately after economic downturns as illustrated in Figure ES-1.

Figure ES-1
Dulles Toll Road Transactions and Revenues FY1985-FY2009



Source: Virginia DOT

STUDY APPROACH OVERVIEW

The T&R study was conducted at a full investment grade level and is considered suitable for use in project financing. The study benefited from the release of the latest Metropolitan Washington Council of Governments (MWCOG) travel demand model (March 2008) and socio-economic projections (January 2008) and reflects the most recently approved future transportation improvements including the impacts of the various HOT Lanes projects and Metrorail expansions. This model was the basis of the WSA T&R study and was updated and refined based on professional experience and judgment. The traffic and revenue estimates on the DTR were calculated by using the trip tables that were generated from these updated demographic datasets and taking into account estimated toll diversions.

To refine the model, WSA collected a large amount of new traffic data and information related to travel characteristics in the DTR corridor. In addition to the detailed corridor reconnaissance, speed and delay surveys and traffic counts in the DTR corridor, WSA conducted travel pattern and characteristic surveys at 12 locations at Main Line and ramp toll locations. Travel pattern data was obtained from over 9,500 motorists traveling on the DTR.

Stated preference surveys were also conducted by WSA. These surveys provided useful estimates of how travelers in the DTR corridor value time, as well as motorists' preferences regarding toll collection options and other inputs. An interactive web survey technique was used and almost 1,100 people participated in this extensive survey. The survey found average values of time generally in the range of $0.17 to $0.21 per minute, depending on trip purpose. Reflective of the relatively high incomes in the Dulles corridor, the value of time range is relatively high compared with other toll facilities. These values of time were applied in the travel demand model based on the distribution of incomes in the region.

An independent review of the socioeconomic growth of the DTR corridor was undertaken by Linden Street Associates (LSA). The original socioeconomic projections were as provided by the MWCOG, which were used in the latest version of the regional travel demand model (released March 2008). Based on the LSA review and a more recent review by WSA, some slight modifications were made to the MWCOG data, generally in the range of less than five percent of the original forecasts, which resulted in a slightly more conservative forecast. The original LSA report is included as an appendix to the traffic and revenue study.

The long term economic and demographic outlook is very favorable. Even though other notable local economists predict growth of population and jobs in excess of the MWCOG forecasts even after the recent economic downturn, WSA considers the adjusted MWCOG socio-economic forecast to be the appropriate input in the base case forecasts

contained herein. Sensitivity tests showing the impact of higher and lower growth are provided.

A detailed traffic and revenue analysis was undertaken based on a projected toll rate schedule (see Table ES-1) as follows:

- **Projected Toll Rate Schedule:** following a $0.25 increase in 2010 at both the Main Line plaza and all ramps, an increase of $0.25 occurs at Main Line plaza in six consecutive years through 2016. Ramp tolls increase by $0.25 in years 2013 and 2016. Following this, $0.75 increases occur at the Main Line plaza and $0.50 at all ramp plazas in 2019, 2023, and every five years thereafter.

Dulles Greenway tolls were also adjusted in the model based on approved increases and expectations of further escalations in future.

Base case traffic and revenue estimates were developed for the DTR, extending over a 40-year period up to 2047. Finally, a series of sensitivity tests were performed to assess the potential impacts on base case revenues associated with hypothetical changes in certain basic assumptions or other data inputs. An alternate toll rate schedule with higher future toll rates was also reviewed to assist the Airports Authority and its advisors with financial sensitivity analyses.

ESTIMATED TRAFFIC AND REVENUE

Travel demand models were obtained from MWCOG through the Airports Authority. These were updated to reflect the latest project configurations and toll operations assumptions. Trip tables were also refined to reflect small changes in socioeconomic forecasts and to better reflect observed travel patterns from the origin-destination surveys. Highway improvement information was obtained and appropriately reflected in the travel demand models.

A series of traffic assignments were made to project 2010, 2013, 2018, 2023, and 2028 levels. Separate assignments were made for morning peak, mid-day, afternoon peak and night conditions. Future toll rates were tested in selected years and no other changes in toll collection methods were assumed, e.g. all electronic tolling, peak pricing, tolling un-tolled ramps, etc. All of the traffic assignments listed above were also modeled with the prior year's toll rates (i.e. no toll rate increase) to aid traffic and revenue interpolation.

Table ES-1
Projected Toll Rate Schedule

	Main Line		Ramps	
	Tolls	Change	Tolls	Change
2009	$0.75	..	$0.50	..
2010	**1.00**	**+ $ 0.25**	**0.75**	**+ $ 0.25**
2011	1.25	**+ $ 0.25**	0.75	..
2012	1.50	**+ $ 0.25**	0.75	..
2013	**1.75**	**+ $ 0.25**	**1.00**	**+ $ 0.25**
2014	2.00	**+ $ 0.25**	1.00	..
2015	2.25	**+ $ 0.25**	1.00	..
2016	**2.50**	**+ $ 0.25**	**1.25**	**+ $ 0.25**
2017	2.50	..	1.25	..
2018	2.50	..	1.25	..
2019	**3.25**	**+ $ 0.75**	**1.75**	**+ $ 0.50**
2020	3.25	..	1.75	..
2021	3.25	..	1.75	..
2022	3.25	..	1.75	..
2023	**4.00**	**+ $ 0.75**	**2.25**	**+ $ 0.50**
2024	4.00	..	2.25	..
2025	4.00	..	2.25	..
2026	4.00	..	2.25	..
2027	4.00	..	2.25	..
2028	**4.75**	**+ $ 0.75**	**2.75**	**+ $ 0.50**
2029	4.75	..	2.75	..
2030	4.75	..	2.75	..
2031	4.75	..	2.75	..
2032	4.75	..	2.75	..
2033	**5.50**	**+ $ 0.75**	**3.25**	**+ $ 0.50**
2034	5.50	..	3.25	..
2035	5.50	..	3.25	..
2036	5.50	..	3.25	..
2037	5.50	..	3.25	..
2038	**6.25**	**+ $ 0.75**	**3.75**	**+ $ 0.50**
2039	6.25	..	3.75	..
2040	6.25	..	3.75	..
2041	6.25	..	3.75	..
2042	6.25	..	3.75	..
2043	**7.00**	**+ $ 0.75**	**4.25**	**+ $ 0.50**
2044	7.00	..	4.25	..
2045	7.00	..	4.25	..
2046	7.00	..	4.25	..
2047	7.00	..	4.25	..

Table ES-2 provides a summary of annual traffic and revenue estimates for the DTR under the Projected Toll Rate Schedule. In 2010 total annual transactions are estimated at more than 103.2 million per year. This translates to annual toll revenue of about $87.4 million in 2010.

Table ES-2
Dulles Toll Road Traffic and Toll Revenue Estimates 2009-2047
Projected Toll Rate Schedule

Forecast Year	Calendar Year	ML/Ramp Tolls	Total Transactions	% p.a.	Total Revenue	% p.a.	Average Revenue (1)
-1	2007	$0.75 / $0.50	109,417,000		$65,584,000		$0.60
0	2008	$0.75 / $0.50	109,601,000	+0.2%	65,634,000	+0.1%	0.60
1	2009	$0.75 / $0.50	108,505,000	-1.0%	64,978,000	-1.0%	0.60
2	2010	$1.00 / $0.75	103,219,000	-4.9%	87,414,000	+34.5%	0.85
3	2011	$1.25 / $0.75	103,292,000	+0.1%	97,128,000	+11.1%	0.94
4	2012	$1.50 / $0.75	103,389,000	+0.1%	107,104,000	+10.3%	1.04
5	2013	$1.75 / $1.00	100,015,000	-3.3%	127,475,000	+19.0%	1.27
6	2014	$2.00 / $1.00	100,023,000	+0.0%	136,426,000	+7.0%	1.36
7	2015	$2.25 / $1.00	100,042,000	+0.0%	145,409,000	+6.6%	1.45
8	2016	$2.50 / $1.25	97,719,000	-2.3%	166,619,000	+14.6%	1.71
9	2017	$2.50 / $1.25	99,772,000	+2.1%	170,118,000	+2.1%	1.71
10	2018	$2.50 / $1.25	101,867,000	+2.1%	173,691,000	+2.1%	1.71
11	2019	$3.25 / $1.75	93,875,000	-7.8%	216,261,000	+24.5%	2.30
12	2020	$3.25 / $1.75	95,193,000	+1.4%	219,897,000	+1.7%	2.31
13	2021	$3.25 / $1.75	96,781,000	+1.7%	224,172,000	+1.9%	2.32
14	2022	$3.25 / $1.75	98,407,000	+1.7%	228,559,000	+2.0%	2.32
15	2023	$4.00 / $2.25	93,224,000	-5.3%	271,436,000	+18.8%	2.91
16	2024	$4.00 / $2.25	94,700,000	+1.6%	275,655,000	+1.6%	2.91
17	2025	$4.00 / $2.25	96,206,000	+1.6%	279,957,000	+1.6%	2.91
18	2026	$4.00 / $2.25	97,742,000	+1.6%	284,336,000	+1.6%	2.91
19	2027	$4.00 / $2.25	99,308,000	+1.6%	288,801,000	+1.6%	2.91
20	2028	$4.75 / $2.75	94,848,000	-4.5%	331,455,000	+14.8%	3.49
21	2029	$4.75 / $2.75	95,376,000	+0.6%	333,261,000	+0.5%	3.49
22	2030	$4.75 / $2.75	95,908,000	+0.6%	335,081,000	+0.5%	3.49
23	2031	$4.75 / $2.75	96,442,000	+0.6%	336,908,000	+0.5%	3.49
24	2032	$4.75 / $2.75	96,980,000	+0.6%	338,747,000	+0.5%	3.49
25	2033	$5.50 / $3.25	93,621,000	-3.5%	382,248,000	+12.8%	4.08
26	2034	$5.50 / $3.25	94,144,000	+0.6%	384,385,000	+0.6%	4.08
27	2035	$5.50 / $3.25	94,457,000	+0.3%	385,661,000	+0.3%	4.08
28	2036	$5.50 / $3.25	94,770,000	+0.3%	386,940,000	+0.3%	4.08
29	2037	$5.50 / $3.25	95,083,000	+0.3%	388,219,000	+0.3%	4.08
30	2038	$6.25 / $3.75	92,537,000	-2.7%	432,419,000	+11.4%	4.67
31	2039	$6.25 / $3.75	92,844,000	+0.3%	433,853,000	+0.3%	4.67
32	2040	$6.25 / $3.75	93,152,000	+0.3%	435,292,000	+0.3%	4.67
33	2041	$6.25 / $3.75	93,461,000	+0.3%	436,737,000	+0.3%	4.67
34	2042	$6.25 / $3.75	93,771,000	+0.3%	438,187,000	+0.3%	4.67
35	2043	$7.00 / $4.25	91,706,000	-2.2%	482,643,000	+10.1%	5.26
36	2044	$7.00 / $4.25	92,012,000	+0.3%	484,252,000	+0.3%	5.26
37	2045	$7.00 / $4.25	92,318,000	+0.3%	485,865,000	+0.3%	5.26
38	2046	$7.00 / $4.25	92,626,000	+0.3%	487,484,000	+0.3%	5.26
39	2047	$7.00 / $4.25	92,935,000	+0.3%	489,109,000	+0.3%	5.26

(1) Average revenue per transaction.

In 2013, annual total transactions remain above 100.0 million per year with small Main Line toll increases. These transactions produce almost $127.5 million in annual toll revenues. By 2016, annual transactions are expected to be 97.7 million per year generating annual toll revenues of $166.6 million.

In 2023, annual total transactions number more than 93.2 million. In the same year, the amount of toll revenue generated is over $271.4 million. By 2028, the forecasted annual toll revenues is $331.5 million based on nearly 94.9 million annual transactions.

SENSITIVITY TESTS

A series of sensitivity tests were performed to test the potential impacts on revenue associated with hypothetical changes in certain assumptions or basic study inputs. These tests were performed at 2013 and/or 2028 levels. They covered a range of potential risk factors, such as alternative economic growth, lower values of time and gas price increases. The results of these basic sensitivity tests are shown in Table ES-3.

As indicated in Table ES-3, assuming increased growth of 25 percent, revenues would increase roughly 4.7 percent in 2013 and 11.2 percent in 2028. Assuming a decrease in growth of 25 percent would result in decreased revenues of roughly 4.5 percent in 2013 and 11.4 percent in 2028.

Assuming 25 percent reductions in values of time equates to a loss in annual revenue of 16.6 percent in 2028. The test for increases in gasoline prices resulted in an overall loss of total annual revenue equaling approximately 7.8 percent at 2028 year levels.

A summary of the traffic and revenue sensitivity test estimates for the DTR under the Alternate Toll Rate Schedule is presented in Chapter 6 of this report.

Table ES-3
Sensitivity Test Results
(thousands)

Scenario	Annual Transactions CY 2013	Annual Transactions CY 2028	Annual Toll Revenues CY 2013	Annual Toll Revenues CY 2028
Baseline T&R (1)	100,015	94,848	$127,475	$331,455
Trips Increase 25% (2)	104,991	105,603	133,484	368,503
Difference	*4,976*	*10,755*	*6,009*	*37,048*
Percent Difference	*5.0%*	*11.3%*	*4.7%*	*11.2%*
Trips Decrease 25% (3)	95,310	83,770	121,771	293,801
Difference	*(4,705)*	*(11,078)*	*(5,704)*	*(37,654)*
Percent Difference	*-4.7%*	*-11.7%*	*-4.5%*	*-11.4%*
VOT Decrease 25% (4)	-	79,089	-	276,498
Difference	-	*(15,759)*	-	*(54,957)*
Percent Difference	-	*-16.6%*	-	*-16.6%*
Gasoline Price Increase (5)	-	87,680	-	305,720
Difference	-	*(7,168)*	-	*(25,735)*
Percent Difference	-	*-7.6%*	-	*-7.8%*

(1) Projected Toll Rate Schedule
(2) Assumes increase of 25 percent over base trip table growth.
(3) Assumes decrease of 25 precent over base trip table growth.
(4) Assumes decrease of 25 percent in value of time calculation.
(5) Assumes gasoline prices increase to $5/gallon; reduce total regional trips by 4 percent.

CHAPTER 1
INTRODUCTION

Wilbur Smith Associates (WSA) was selected through a competitive procurement process to provide the Metropolitan Washington Airports Authority (Airports Authority or MWAA) with a comprehensive Traffic and Toll Revenue (T&R) Study for the Dulles Toll Road (DTR) facility in northern Virginia. The purpose of the study was to develop updated estimates of traffic and revenue over a 40-year forecast horizon with a level of detail sufficient to support a project financing effort.

Under the terms of an agreement between the Airports Authority and the Commonwealth of Virginia, the Airports Authority has now assumed responsibility for the operation and maintenance of the DTR and will provide a portion of the funding for the Dulles Corridor Metrorail Project through debt secured by DTR revenues.

The Airports Authority has the exclusive right to establish and collect tolls on the DTR and has an established process for promulgating new toll regulations that includes consultation with the Dulles Corridor Advisory committee and public hearings. No consent or approval is required, however, from any entity other than the Airports Authority. The first toll adjustment is expected to occur on or about January 1, 2010 and the rate-setting process is expected to commence in the second quarter of 2009.

This traffic and toll revenue study was initiated in August 2007, with on-going major refinements and updates as project planning for the Metrorail Project developed, culminating in this Final Report. The scope of work included new stated preference research and travel pattern surveys as well as a review of socioeconomic forecasts for the Dulles Corridor from various sources. The study analysis was conducted at an investment-grade level and is considered suitable for use in project financing. WSA believes that all information from the original data, including socioeconomic forecasts, has been updated as deemed necessary in order to make the conclusions set forth in this report current as of its date.

The study provides annual traffic and toll revenue forecasts for the DTR under two toll rate schedules developed by the financial advisor to the Airports Authority. The travel characteristic information collected during the course of the study remains valid and all

T&R estimates have been controlled and re-based to the very latest actual statistical data provided by the DTR.

DTR DESCRIPTION AND HISTORY

State Route (SR) 267 is the official designation of the route corridor on which the DTR is situated. Figure 1-1 shows the roadway in a regional context. The DTR is the major artery of the transportation network in the Dulles Corridor which is home to several of the Washington D.C. metropolitan region's most dynamic and rapidly growing activity centers, including Tysons Corner, Washington Dulles International Airport (Dulles International) and the emerging activity centers in Reston, Herndon, and eastern Loudoun County. The eastern terminus of the roadway connects with I-66 near the Fairfax County / Falls Church City border. The western terminus of the DTR is the Dulles Greenway (Greenway) and Dulles International. SR 267 continues west as the Greenway until it intersects US 15/SR 7 in the Town of Leesburg.

Originally designed to be a commuter route from northern Fairfax County into Washington D.C., the nature and characteristics of trips along the DTR changed as many residential and commercial developments were constructed in the Dulles corridor. The DTR facility has become an essential conduit for several of the most dynamic and rapidly growing activity centers in the region. Emerging centers such as Tysons Corner, the Reston-Herndon area, and eastern Loudoun County all significantly benefitted from the DTR becoming a multi-use highway.

Figure 1-2 shows the DTR, the Greenway, and the surrounding major roadway network. This portion of northern Virginia is a densely populated, high income area with a well developed roadway network. There are several parallel and intersecting roads which influence traffic on the DTR.

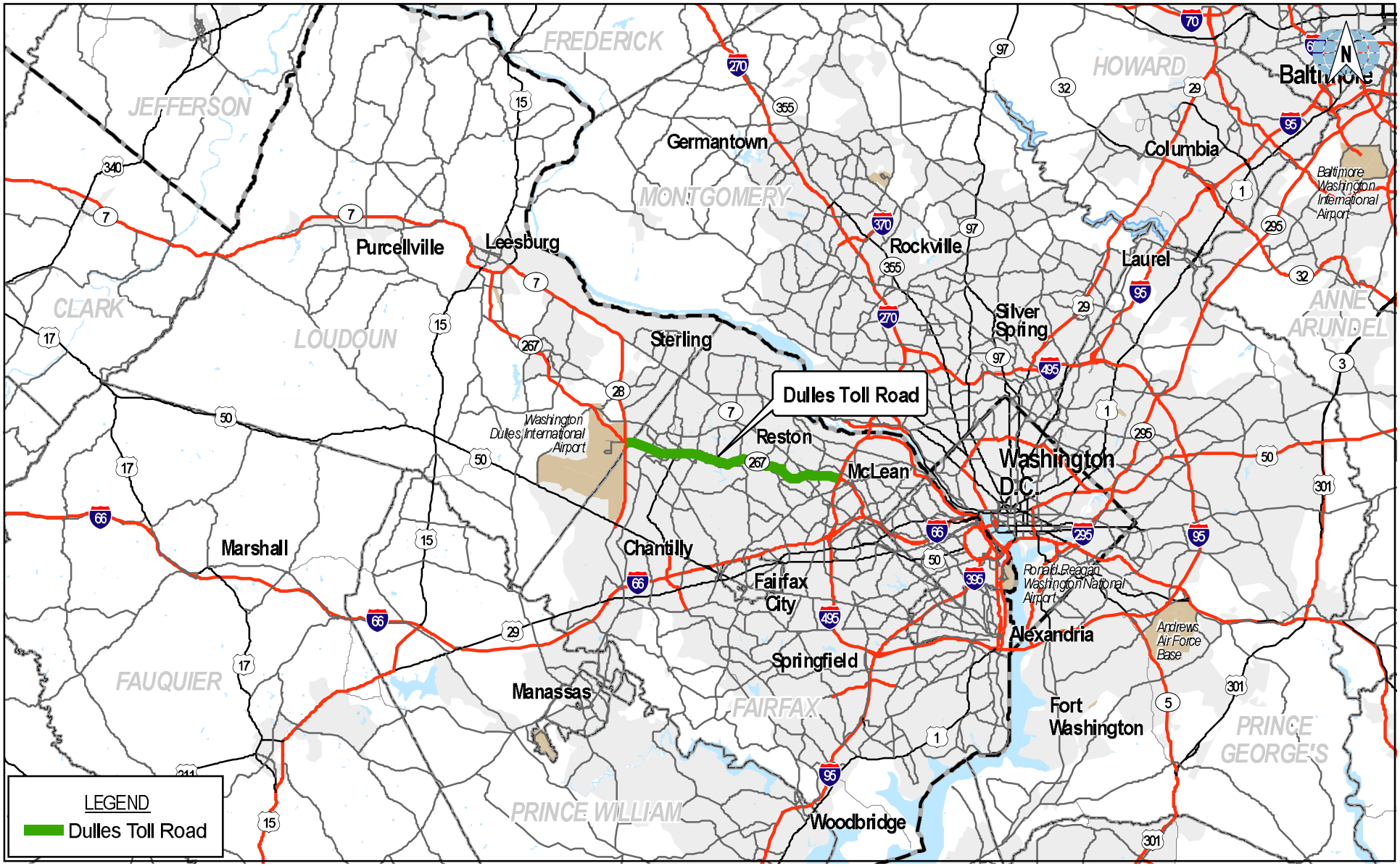
Parallel roadways include:

- Interstate 66;
- US Route 29;
- US Route 50;
- State Route 7; and
- State Route 236.

Intersecting roadways include:

- Interstate 495 (Capital Beltway);
- State Route 28;
- State Route 123; and
- State Route 7100.

VA 101784 / Arcview / RegionalLocation Map.mxd / 2-25-08

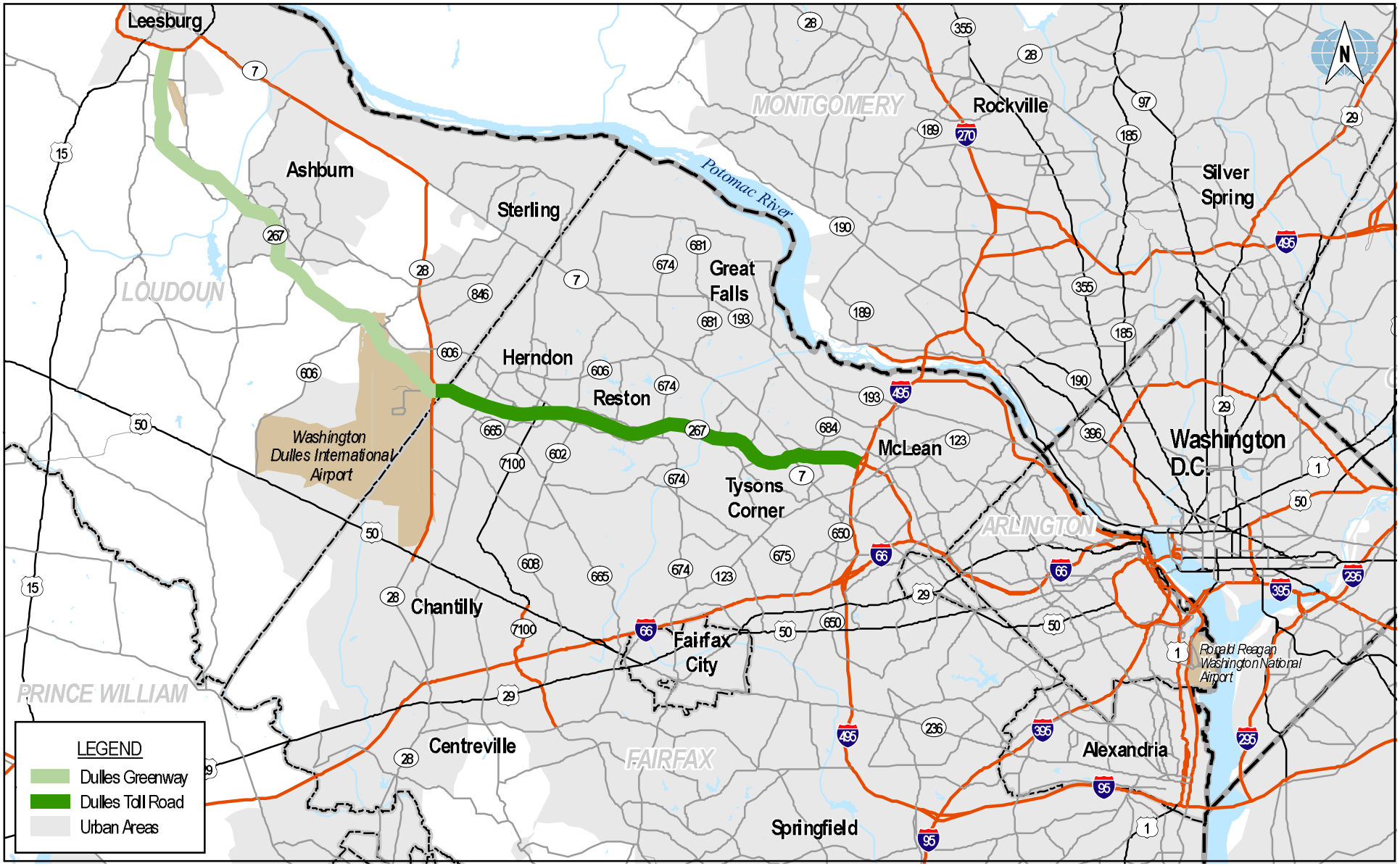


WilburSmith ASSOCIATES

REGIONAL LOCATION MAP

FIGURE 1-1

V:\A 101784 / Arcview / Study Area Major Roadway Network.mxd / 3-17-08



WilburSmith ASSOCIATES

STUDY AREA MAJOR ROADWAY NETWORK

FIGURE 1-2

Other major roadways in the area that DTR customers connect with to reach final destinations include:

- Interstate 95;
- Interstate 395;
- George Washington Memorial Parkway; and
- Interstate 270.

The Dulles Access Highway, an un-tolled, limited-access highway that is subject to the Airports Authority's jurisdiction under an agreement and deed of lease with the federal government, is the primary route to Dulles International. Prior to the opening of the DTR it became obvious that there was a need to serve growing commuting traffic along the corridor which led VDOT to sell stickers to allow commuters to access the Dulles Access Highway. The sticker program was discontinued when the DTR opened and currently only vehicles with occupants on official airport business and certain public buses may use this highway. Airports Authority police strictly enforce proper usage of the Dulles Access Highway.

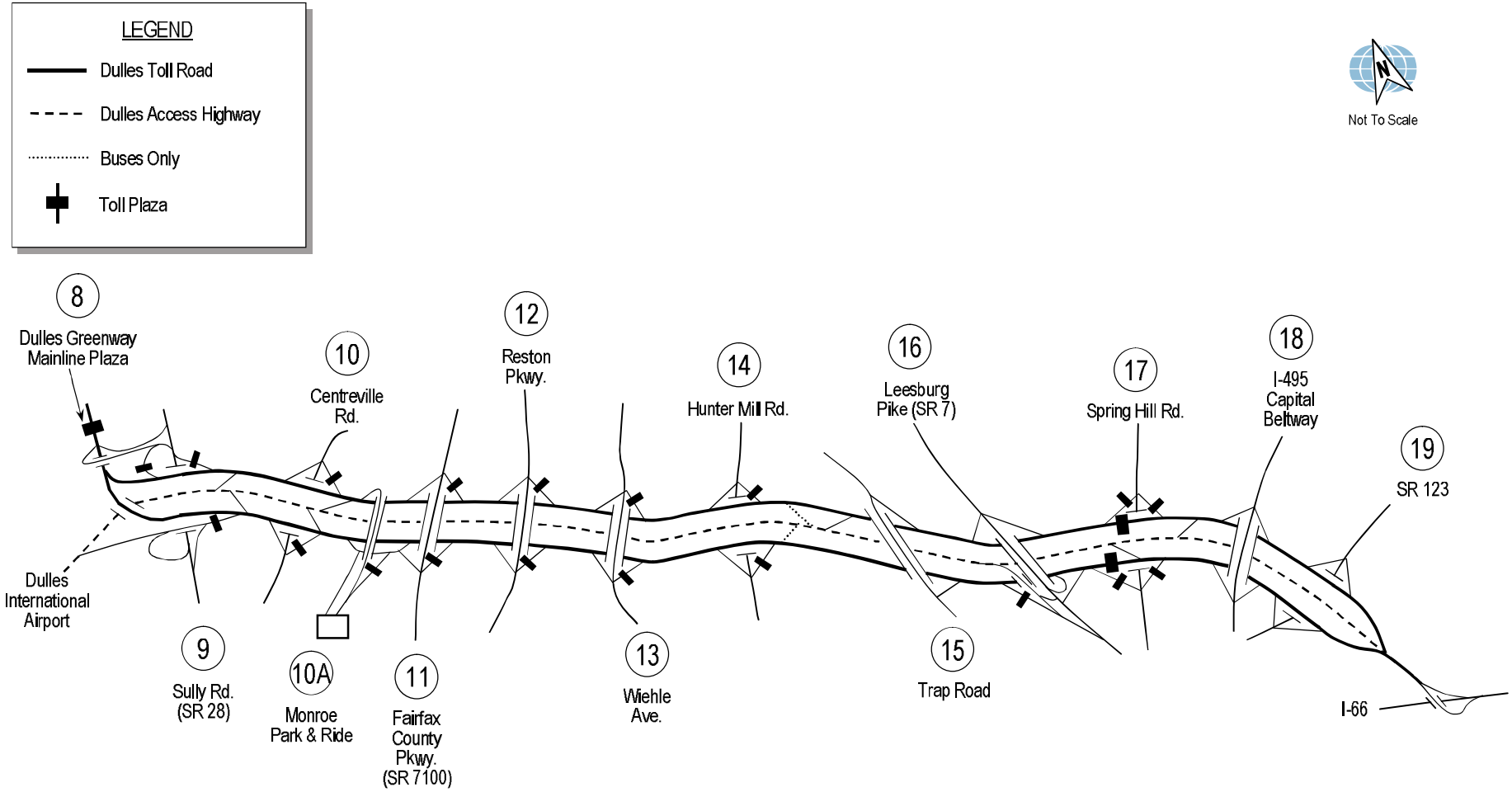
In the late 1970s, as development in Fairfax and Loudoun counties created the need for a general use highway on the Dulles Corridor providing direct access to employment centers inside the Capital Beltway, Virginia obtained permission from the Federal Aviation Administration to build a toll road within the right-of-way acquired for the Dulles Access Highway resulting in the construction of the DTR in the outer portions of the right-of-way. The new roadway provided an access-controlled toll facility for travelers to and from points in northern Fairfax County. The DTR was opened in 1984 with three lanes in each direction between SR 7 and the Capital Beltway and two lanes in each direction on the remainder of the toll facility. At the time, there were eight full-interchanges on the DTR.

After the construction of Fairfax County Parkway (State Route 7100), a north-south route intersecting the DTR, a ninth full-interchange was built. The next two interchanges, the tenth and eleventh overall, were constructed as partial-interchanges. One provided access for motorists using the Monroe Park & Ride lot to enter the DTR traveling eastbound or westbound and the other provided access to the Wolf Trap Performing Arts Center to and from the east.

Full expansion to six lanes was completed by 1992 and a fourth lane was added in each direction by 1999 resulting in the eight lane configuration seen today.

EXISTING CONDITIONS

Figure 1-3 is a schematic of the Dulles Access Highway and DTR portions of the roadway including interchange numbering.



INTERCHANGES ON THE DTR

FIGURE 1-3

The Dulles Access Highway is a 16.15-mile roadway that begins at I-66 and ends at Dulles International. Airport users may travel on this roadway at no cost. The Dulles Access Highway consists of two lanes in each direction along its entire length.

The DTR is a 13.43-mile tolled roadway from the Capital Beltway to SR 28 built in the outer portions of the Dulles Access Highway right-of-way. The DTR lanes are separated from the Dulles Access Highway lanes by grass medians or concrete barriers. The DTR is four lanes in each direction along its entire length.

There are several ramps that allow access between the DTR and the Dulles Access Highway for travelers whose origin or destination is Dulles International. These travelers are allowed to travel at no cost to and from the Airport. Additionally, there are two barrier-controlled bus-only ramps, one in each direction.

In the westbound direction, there are ramps that lead from the DTR to the Dulles Access Highway just west of the Capital Beltway; between Trap Road and Hunter Mill Road; just west of the Monroe Park & Ride lot westbound on-ramp; and west of Centreville Road. The buses-only ramp from the Dulles Access Highway to the DTR is located just east of Hunter Mill Road.

In the eastbound direction, there are ramps that lead from the Dulles Access Highway to the DTR east of SR 28; just east of Centreville Road; and just west of Spring Hill Road. There is a ramp that leads from the Dulles Access Highway directly to SR 7. The buses-only ramp from the DTR to the Dulles Access Highway is located just east of Hunter Mill Road.

The Dulles Access Highway diverges (westbound) and merges (eastbound) with the DTR just east of SR 123. From the merge to I-66, the Dulles Access Highway is two lanes in each direction.

Completing the corridor to Leesburg, the Greenway is a 12.53 mile tolled roadway that continues SR 267 from the end of the DTR at SR 28 until it reaches US 15/SR 7 in Leesburg. This roadway is owned and operated by a private corporation, Toll Road Investors Partnership II. The Greenway is three lanes in each direction.

During the peak periods, the left-most lane of the DTR is reserved for HOV-2+ (two occupants or more) vehicles in the peak direction. The HOV lane is a general-purpose lane at all other times. Motorists using the HOV lane pay the same toll as all other users of the DTR. However, the advantage for the HOV user is that peak travel speeds are significantly faster because of the peak travel period congestion on the general-purpose lanes. VDOT previously enforced its evening peak HOV restriction between the hours of 4:30 to 6:00 PM. VDOT since expanded that period to 4:00 to 6:30 PM, adding a full

hour to the evening peak period. This study assumes that HOV-2+ designation will continue.

DTR TOLL RATES

In general, the DTR tolling plan consists of ramp and main line tolls for inbound travel (towards the Capital Beltway) and the reverse trip. However, westbound trips entering at any of the DTR interchanges (towards Dulles International) and the reverse trip are generally toll free. Exceptions occur at the Spring Hill interchange to/from the West and at the eastbound exit at SR 7. These exceptions ensure that toll revenue is collected from all through traffic at the eastern end of the DTR facility and that the DTR Main Line plaza cannot be easily bypassed.

Figure 1-4 shows toll plaza locations on the DTR and the current toll rates in effect since May 2005. In general, motorists traveling eastbound on the DTR will pay to enter the system, while motorists traveling westbound will pay to exit the system.

For a 2-axle vehicle, the ramp tolls are $0.50 at each location while at the main line plaza, located between Leesburg Pike and Spring Hill Road, the toll for a 2-axle vehicle is $0.75 in each direction. There are eastbound exit tolls at two locations, Leesburg Pike and Spring Hill Road; and there is a westbound entrance toll at Spring Hill Road (these tolls are $0.50 for a 2-axle vehicle).

For multi-axle vehicles each additional axle raises the toll by $0.25. The maximum toll (for a vehicle with six or more axles) is $1.50 at a ramp plaza and $1.75 at the main line plaza.

At the western end of the DTR, the Greenway has a main line toll plaza that collects a toll in each direction of either $3.40 (base toll) or $4.00 (congestion management toll - eastbound from 6:30-9:00 am and westbound from 4:00-6:30 pm) for a 2-axle vehicle coming from or going to the DTR. In addition to this amount collected, $0.50 is collected and remitted to the DTR as toll revenue. For vehicles with more than two axles, the appropriate increased toll is collected by the Greenway and remitted to the DTR.

Figure 1-5 shows the configurations of each toll plaza on the DTR including dedicated E-ZPass lanes. It should be noted that currently there is no differential toll rate for E-ZPass. Attended lanes at ramp plazas are not staffed between 9:30pm and 5:30am so exact change is required during nighttime hours.

SCOPE OF STUDY

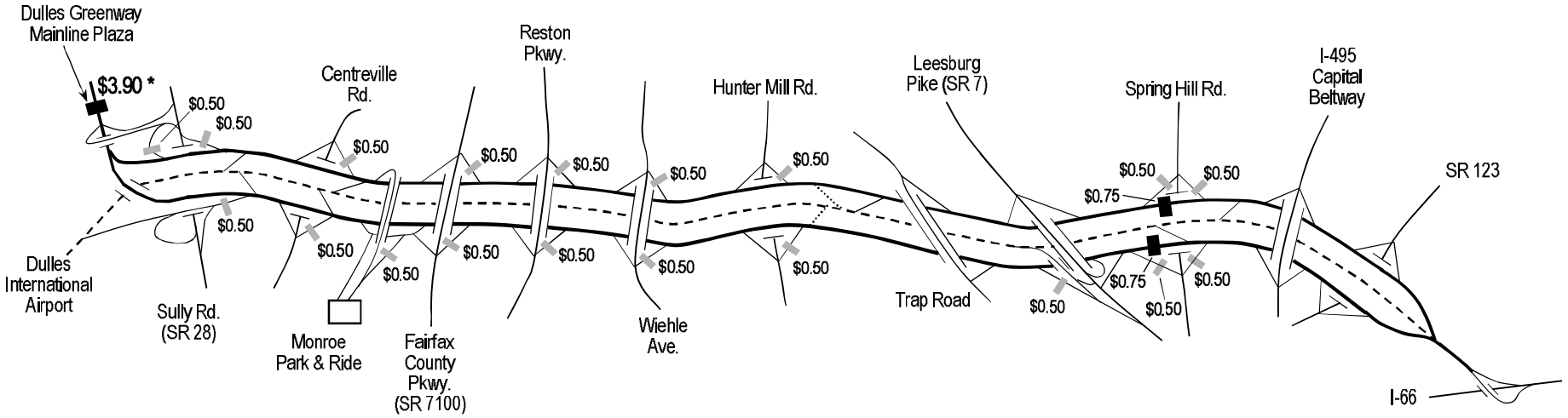
WSA conducted a comprehensive data collection program focused on evaluating current operating conditions in the DTR corridor. This included an extensive traffic count program, together with route reconnaissance and speed and delay studies throughout the

LEGEND

- Dulles Toll Road
- Dulles Access Highway
- Buses Only
- Mainline Toll Plaza-$0.75 for 2-Axle Vehicle
- Ramp Toll Plaza-$0.50 for 2-Axle Vehicle

DTR Toll Rates		
	Ramp toll	Mainline toll
2-axle vehicle	$0.50	$0.75
3-axle vehicle	$0.75	$1.00
4-axle vehicle	$1.00	$1.25
5-axle vehicle	$1.25	$1.50
6 or more-axles	$1.50	$1.75

Not To Scale



*** $3.90 collected ($4.50 during peak period in the peak direction) by the Dulles Greenway for a 2-axle vehicle; $0.50 is remitted to DTR**

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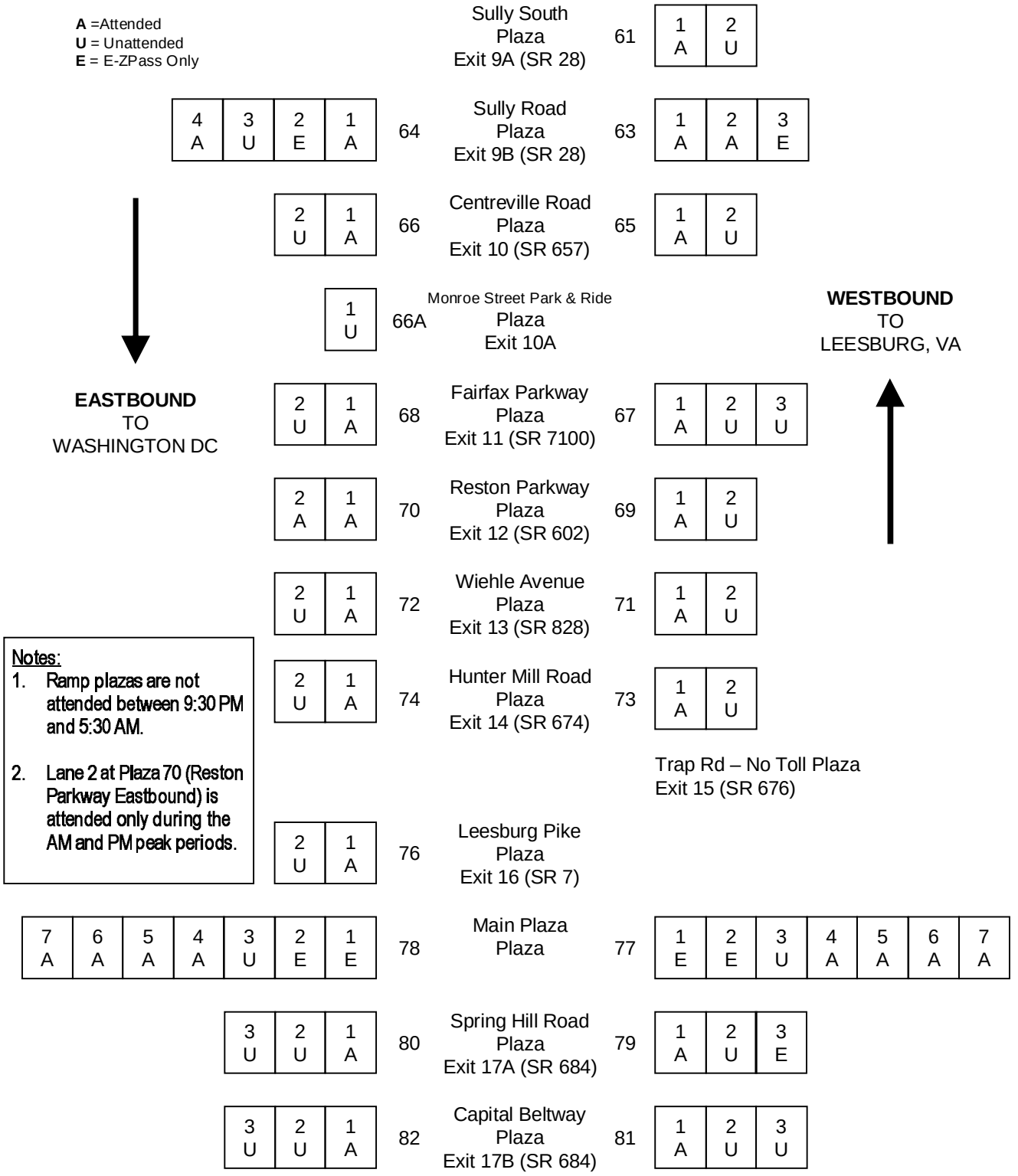
TOLL PLAZA LOCATIONS AND TOLL RATES ON THE DTR

FIGURE 1-4



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DTR PLAZA DIAGRAM

FIGURE 1-5

Dulles corridor. Historical traffic trends were reviewed and updated information on the latest Transportation Improvement Program (TIP) in the Washington Metropolitan region was obtained and reviewed.

WSA obtained and reviewed the latest travel demand model from the Metropolitan Washington Council of Governments (MWCOG). In addition, the latest underlying socioeconomic forecasts for the Dulles corridor and the entire MWCOG model region was obtained and reviewed.

An extensive program of motorists travel pattern and characteristic surveys was undertaken in the DTR corridor. Two origin-destination surveys were performed: (1) a survey of cash customers on the system; and (2) a survey of E-ZPass customers. A full description of the surveys and their results are provided in Chapter 3 of this report. These surveys were used to refine early year trip tables included with the MWCOG travel demand model amongst other things.

An independent evaluation of socioeconomic forecasts for the DTR corridor was conducted as part of the study by Linden Street Associates, Inc. The traffic model was updated to reflect the input of both the travel pattern and characteristic surveys and minor modifications to underlying socioeconomic forecasts. The project configuration was coded, and the model was calibrated to more reasonably represent observed traffic volumes throughout the Dulles corridor.

In addition to performing origin-destination surveys, a careful review of the preferences of existing DTR patrons was made. A Stated Preference (SP) survey was conducted with an Internet-based survey application. Participants for that survey were recruited from the respondents of the origin-destination surveys. The results of this survey are covered in detail in Chapter 3. These stated preference surveys were conducted along the DTR corridor to develop estimates of motorists' value of travel time in the area. The SP surveys were designed and analyzed by Dr. Mark Wardman, professor of Transport Demand Analysis and director of the Institute for Transport Studies at the University of Leeds, United Kingdom. The surveys were conducted by WSA using Internet techniques, with a dynamic computer assisted survey approach. In addition to relative measurements of willingness to pay, the surveys provided important information regarding attitudes to tolls and other background data of users in the corridor.

Finally, detailed highway networks were prepared for the base model year (2007) and for future years 2010, 2013, 2018, 2023 and 2028. The future-year networks reflect changes envisioned by the TIP and the Constrained Long-Range Plan (CLRP) which could potentially result in a reduction of motorists using the DTR. The CLRP included the following important highway improvements:

1. Expansion of Route 7 from four to six lanes west of Tysons Corner;
2. Expansion of Route 7 from six to eight lanes within Tysons Corner;
3. Expansion of the Dulles Access Highway from four to six lanes;
4. Expansion of Route 123 from six to eight lanes within Tysons Corner; and
5. Addition of HOV lanes on the Fairfax County Parkway south of the DTR.

WSA's traffic model assignments reflect tolls charged on the DTR by using proprietary toll diversion algorithms. As toll rates rise, toll roads become less desirable relative to free roads. This results in fewer motorists selecting the toll road in their route choice. Eventually, when the toll rate becomes unreasonably high, the toll road will have very few customers. The extent to which one type of road is chosen over the other is the subject of the toll diversion analysis. The toll algorithms used in this analysis have been applied successfully to a wide range of toll road projects from new construction to existing facilities. The projections made using this approach have been accepted by toll road agencies and funding authorities throughout the United States and around the world.

After re-basing models to actual 2008 traffic and revenue levels and by making the appropriate traffic model assignments in selected future years, likely volumes in intermediate years were estimated through interpolation. Multiplying volumes at plazas by tolls collected at each plaza yields the revenue at each location. The sum of all these revenues provided a cash flow for the DTR facility.

Two future year toll rate schedules were tested based on assumptions provided by financial advisors to the Airports Authority. A toll sensitivity analysis that provides an indication of toll adjustments needed to maximize annual toll revenue is also included. Traffic assignments generally were made at five-year increments – 2010, 2013, 2018, 2023 and 2028. In the near term projections, account has been taken of actual year-to-date traffic and revenues and a growth profile reflecting economic recovery. Beyond 2028, annual traffic and revenue were estimated using nominal assumed rates, traffic growth and estimated toll diversion in the project corridor.

ORDER OF PRESENTATION

Following this introductory chapter, a summary of existing traffic and operating conditions in the DTR corridor is presented in Chapter 2, Traffic and Toll Revenue Trends.

Chapter 3, DTR Travel Patterns, summarizes the results of both the travel pattern and characteristic surveys and stated preference surveys conducted for the study.

Chapter 4, Corridor Growth Assessment, presents an overview of corridor economic trends and forecasts. A report of the independent consultant is included in the Appendix to this document.

Chapter 5, Estimated Traffic and Toll Revenue, presents the results of the traffic and revenue analysis; and

Chapter 6, Sensitivity Tests, provides a summary of the results of various sensitivity test estimates.

Three appendices contain additional detail as described in this report.

CHAPTER 2

TRAFFIC AND TOLL REVENUE TRENDS

This chapter presents trends in actual traffic and revenue on the DTR.

ANNUAL TRANSACTION TRENDS

Table 2-1 shows annual transaction trends on the DTR by plaza and annual transactions for the entire system from calendar year CY2004 through CY2008. The total transactions include revenue transactions and system-wide violations.

Table 2-1
Total Annual Transactions by Plaza, 2004-2008
(in thousands)[1]

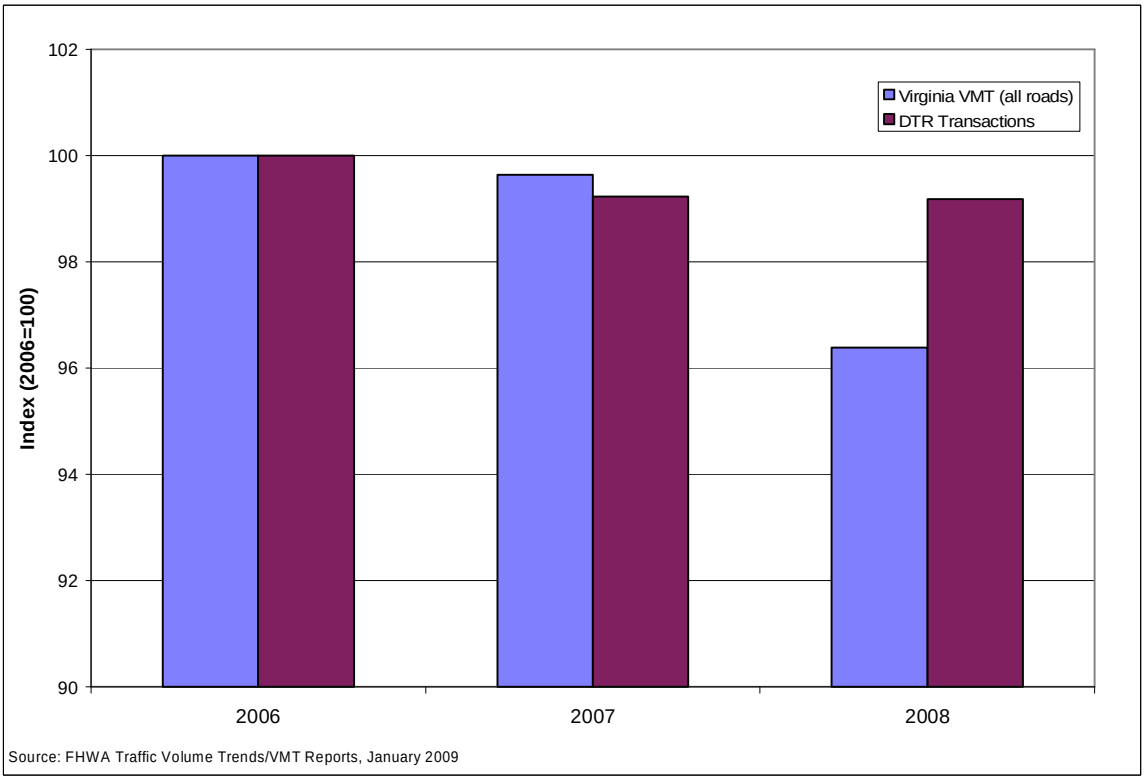
PLAZA	CY 2004	% Change CY04-CY05	CY 2005	% Change CY05-CY06	CY 2006	% Change CY06-CY07	CY 2007	% Change CY07-CY08	CY 2008	2004-2008[2] CAGR
Sully Rd, South	2,401	-5.8%	2,263	-1.4%	2,232	2.2%	2,280	-3.0%	2,211	-2.0%
Sully Rd, West	5,397	9.2%	5,893	0.7%	5,932	9.4%	6,492	9.0%	7,078	7.0%
Sully Rd, East	7,173	4.7%	7,507	3.0%	7,731	2.0%	7,884	3.8%	8,187	3.4%
Centreville Rd, West	4,313	-6.7%	4,025	-3.9%	3,867	-3.2%	3,745	-2.1%	3,666	-4.0%
Centreville Rd, East	4,255	-4.3%	4,072	-2.5%	3,972	-2.7%	3,862	-0.9%	3,829	-2.6%
Fairfax Pkwy, West	4,063	-4.9%	3,863	-0.7%	3,836	-0.9%	3,800	0.1%	3,806	-1.6%
Fairfax Pkwy, East	3,666	-4.7%	3,493	-2.2%	3,415	-1.3%	3,372	-1.1%	3,333	-2.4%
Reston Pkwy, West	4,552	-6.6%	4,251	-3.6%	4,098	-2.0%	4,017	-3.2%	3,887	-3.9%
Reston Pkwy, East	4,370	-5.6%	4,127	-3.6%	3,977	-0.7%	3,949	-2.2%	3,862	-3.0%
Wiehle Ave, West	2,259	-3.8%	2,173	-1.1%	2,149	1.0%	2,170	-0.9%	2,151	-1.2%
Wiehle Ave, East	2,385	-3.5%	2,301	-1.3%	2,272	-1.1%	2,247	-1.2%	2,220	-1.8%
Hunter Mill Rd, West	1,921	-7.2%	1,783	-1.9%	1,748	-0.2%	1,745	-4.2%	1,673	-3.4%
Hunter Mill Rd, East	2,106	-6.7%	1,965	-0.7%	1,951	1.3%	1,976	-4.3%	1,890	-2.7%
Route 7, East	3,139	-6.2%	2,944	-4.2%	2,821	-2.5%	2,750	-3.9%	2,643	-4.2%
Main Line, West	20,036	-2.9%	19,451	0.0%	19,450	1.9%	19,827	0.5%	19,919	-0.1%
Main Line, East	20,123	-1.1%	19,894	-0.4%	19,824	1.2%	20,055	0.4%	20,137	0.0%
Spring Hill Rd, West	1,972	-0.4%	1,965	-5.0%	1,867	-1.1%	1,846	-1.3%	1,821	-2.0%
Spring Hill Rd, East	2,578	-3.3%	2,493	-3.9%	2,395	-1.5%	2,358	-1.9%	2,314	-2.7%
Capital Beltway, West[3]	1,673	-13.8%	1,442	-3.0%	1,399	-3.9%	1,345	-1.7%	1,322	-5.7%
Capital Beltway, East[3]	1,912	-12.9%	1,665	-11.0%	1,481	-4.3%	1,418	-0.2%	1,415	-7.3%
Greenway	13,950	-0.7%	13,850	-4.9%	13,175	-6.8%	12,278	-0.3%	12,236	-3.2%
Revenue Transactions	**114,243**	-2.5%	**111,421**	-1.6%	**109,591**	-0.2%	**109,417**	0.2%	**109,601**	-1.0%
Violations	2,100	-1.8%	2,062	3.4%	2,132	-32.1%	1,448	-17.2%	1,198	-13.1%
Total Transactions	**116,344**	-2.5%	**113,483**	-1.6%	**111,723**	-0.8%	**110,865**	-0.1%	**110,799**	-1.2%
Total EB (no Greenway)[4]	**51,706**	-2.4%	**50,462**	-1.2%	**49,839**	0.1%	**49,871**	-0.1%	**49,830**	-0.9%
Total WB (no Greenway)[5]	**48,587**	-3.0%	**47,109**	-1.1%	**46,577**	1.5%	**47,268**	0.6%	**47,535**	-0.5%

Source: VDOT, January 2009
[1] Violations not specified by plaza.
[2] "CAGR" denotes compound annual growth rate.
[3] Capital Beltway Ramps refer to the two east-facing (nearest the I-495 Capital Beltway) ramps at the Spring Hill Rd interchange.
[4] Eastbound ramps include the Main Line eastbound plaza; the entry ramps at Sully Rd E, Centreville Rd E, Fairfax Pkwy E, Reston Pkwy E, Wiehle Ave E, Hunter Mill Rd E, and Capital Beltway E; and the exit ramps at Route 7 E, and Spring Hill Rd E.
[5] Westbound ramps include the Main Line westbound plaza; the entry ramp at Spring Hill Rd W; and the exit ramps at Sully Rd S, Sully Rd W, Centreville Rd W, Fairfax Pkwy W, Reston Pkwy W, Wiehle Ave W, Hunter Mill Rd W, and Capital Beltway W.

It should be noted that there was a toll rate adjustment in May 2005 which appears to have resulted in some toll diversion. However, several other significant factors likely contributed to reductions in travel demand. These other significant factors occurred prior to, simultaneously, and after the toll rate adjustment making it extremely difficult to isolate the impact of toll increases alone. These other factors include:

- The dot.com bubble collapse, the aftermath of September 11, 2001, and various financial scandals;
- Threat of emerging recession since 2001 (early 2000s recession);
- Toll increases on the adjoining Greenway;
- A slowdown of activity on the Greenway corridor;
- Gasoline price volatility;
- Increased carpooling resulting from toll increases on DTR and the Greenway, gas prices and other factors;
- Local military personnel away on tour duty;
- Some decentralization of federal jobs;
- Widening of I-495 Capital Beltway ramps, July 2004 through January 2006;
- Decreasing gap in suburban versus Washington D.C. house prices; and
- Increasing mortgage defaults and foreclosures due to the current economic downturn that began in late 2006.

Between CY2004 and CY2008, total transactions on the system decreased from 116.3 million to 110.8 million representing an actual decline of 4.8 percent and a compound annual growth rate of -1.2 percent. However, Sully Road West and Sully Road East had CAGRs of 7.0 percent and 3.4 percent, respectively, mostly due to the growth in the Dulles area of Loudoun County. After the 2005 toll increase the trend at the Main Line plaza has been generally positive. Given the severity of the economic and financial problems that have been growing since late 2006, the performance of the DTR has been very robust. Comparing DTR with growth on comparable toll facilities and vehicle miles traveled on non-tolled roads in Virginia, DTR is performing relatively well in recent years. Figure 2-1 compares estimated vehicle miles traveled (VMT) on all roads in Virginia compared with transactions on DTR following the DTR toll adjustment for the period 2006 to 2008. Travel by road in Virginia in general fell by almost 4 percent over this period of economic downturn. This can be compared to less than one percent reduction in transactions on the DTR.

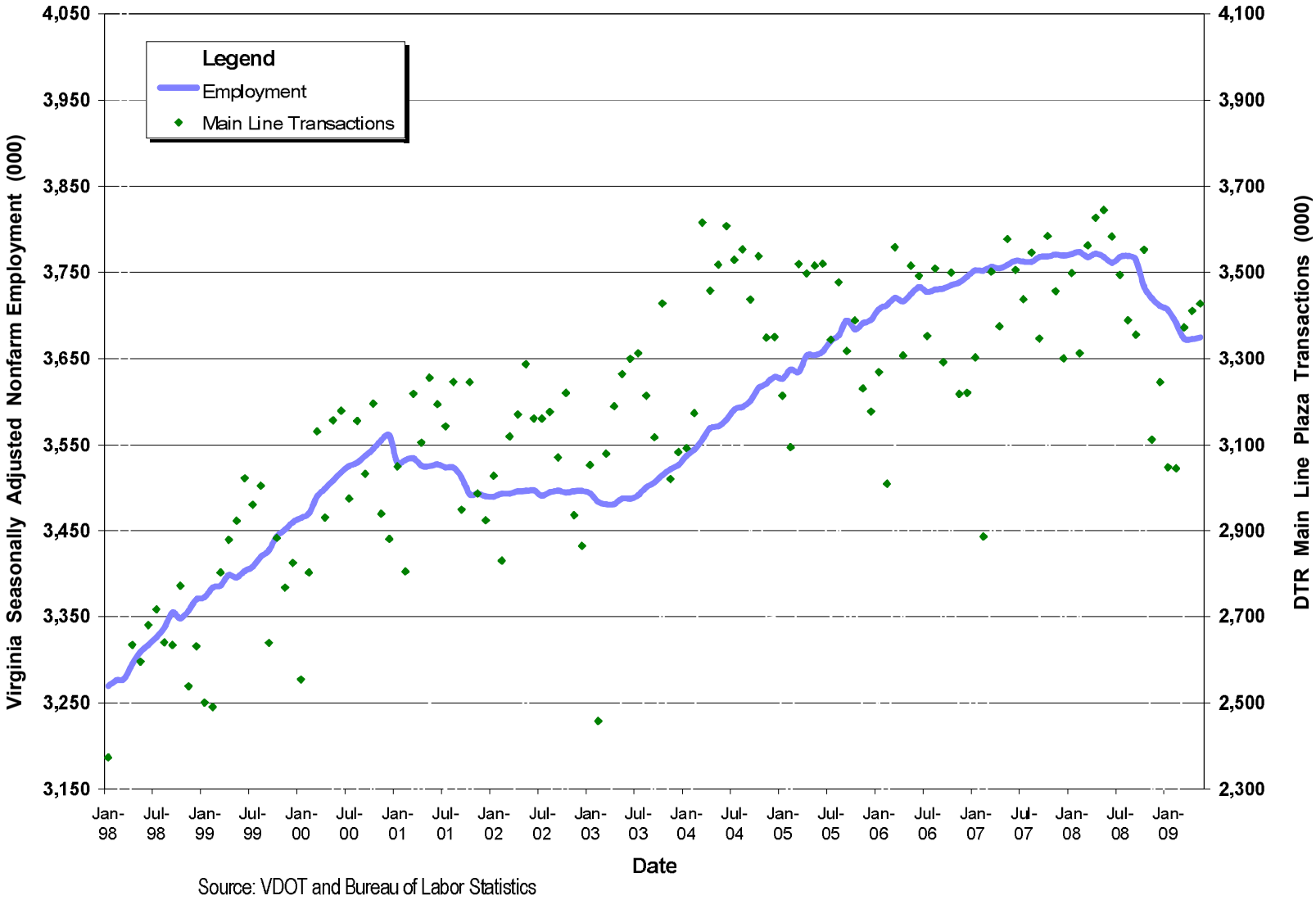


TRAVEL TRENDS – DTR TRANSACTIONS vs. VIRGINIA VMT

FIGURE 2-1

Investigating further the relationship between economic growth and travel on the DTR, Figure 2-2 provides a graphical representation of the growth in main line DTR transactions along with total nonfarm employment in Virginia since CY1998.

Between January 1998 and January 2009, nonfarm employment in Virginia grew from 3.3 million to 3.7 million, for CAGR of 1.2 percent. Over the same time period, the number of DTR main line transactions increased from 2.4 to 3.0 million, for CAGR of 2.3 percent. Over the years, the two trends have mirrored each other with main line transactions rising and falling as employment in the state has risen and fallen. The comparison continues into 2009 as statewide employment has stopped its decline, transactions at the DTR Main Line Plazas have increased.



Source: VDOT and Bureau of Labor Statistics

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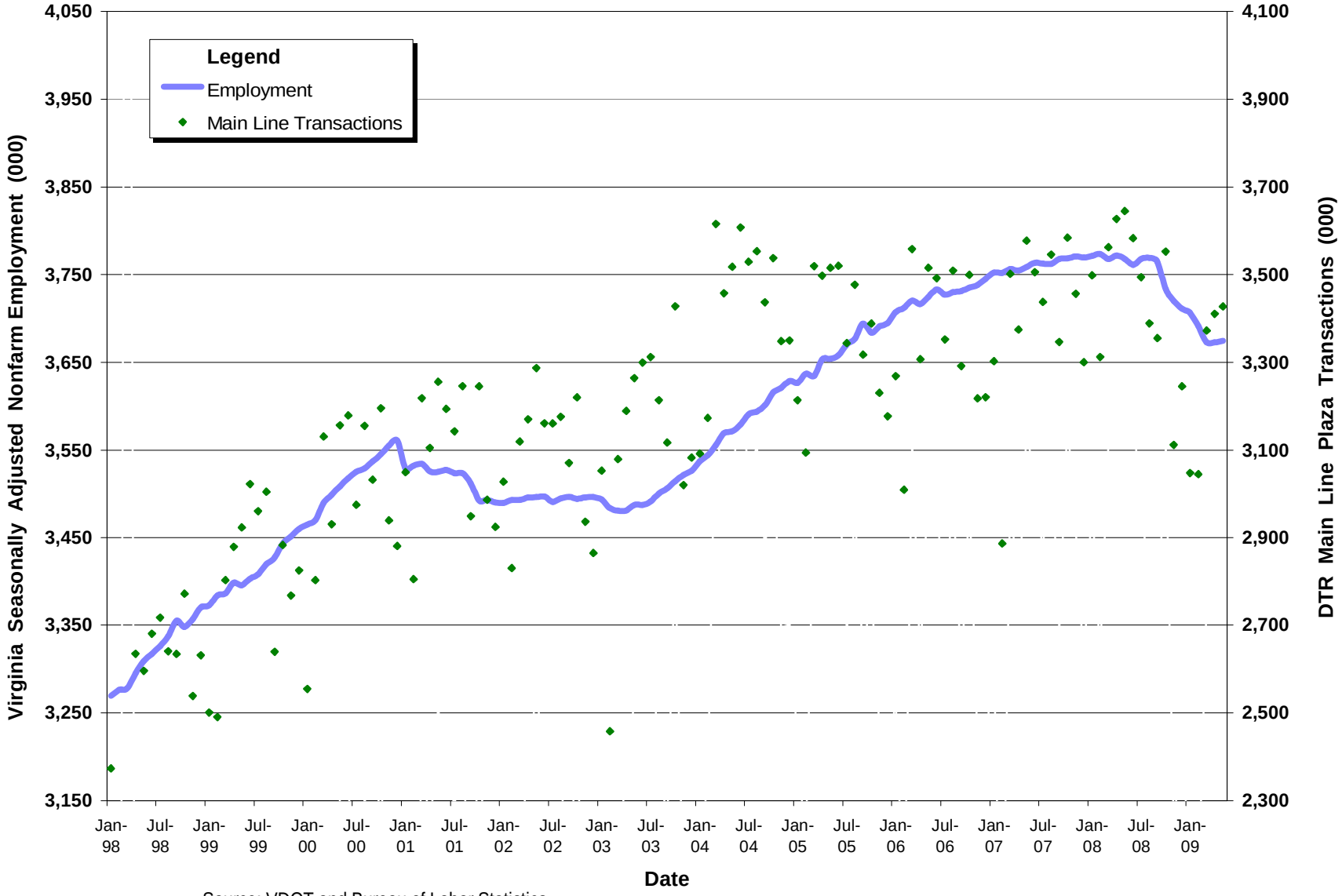
TOLL TRANSACTIONS AND EMPLOYMENT TRENDS

FIGURE 2-2



Source: VDOT and Bureau of Labor Statistics

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TOLL TRANSACTIONS AND EMPLOYMENT TRENDS

FIGURE 2-2

TRANSACTIONS BY TRAFFIC CLASS AND E-ZPASS

Table 2-2 shows the number of average daily transactions at DTR plazas in CY2008. For each plaza, revenue transactions are shown by payment type (cash or E-ZPass) and violations are also shown.

The toll plazas with the highest average number of daily transactions are the Main Line Plazas with over 55,000 transactions per day in each direction. The busiest ramp plazas are Sully Road West and Sully Road East with an average of 19,560 and 22,682 daily transactions, respectively. The least busy ramp plazas are at Capital Beltway West (3,698 daily transactions) and Capital Beltway East (3,923 daily transactions). Average daily transactions at the Greenway Mainline plaza totaled 33,431.

Table 2-2
Average Daily Transactions by Plaza and Payment Type, CY2008

Plaza	Cash	E-Zpass	Violations	Total
Greenway	6,708	26,724	---	33,431
Sully Rd, South	1,879	4,163	68	6,110
Sully Rd, West	6,257	13,083	220	19,560
Sully Rd, East	7,359	15,009	314	22,682
Centreville Rd, West	3,798	6,219	145	10,162
Centreville Rd, East	3,969	6,492	148	10,609
Fairfax Pkwy, West	2,862	7,537	123	10,521
Fairfax Pkwy, East	2,746	6,362	108	9,215
Reston Pkwy, West	3,502	7,120	155	10,776
Reston Pkwy, East	3,546	7,006	126	10,677
Wiehle Ave, West	1,771	4,106	88	5,966
Wiehle Ave, East	1,775	4,292	78	6,144
Hunter Mill Rd, West	1,091	3,479	41	4,611
Hunter Mill Rd, East	1,128	4,037	44	5,209
Route 7, East	2,552	4,668	85	7,305
Main Line, West	18,225	36,198	621	55,044
Main Line, East	18,411	36,608	568	55,588
Spring Hill Rd, West	888	4,088	124	5,100
Spring Hill Rd, East	1,082	5,240	75	6,397
Capital Beltway, West[1]	1,354	2,258	86	3,698
Capital Beltway, East[1]	1,477	2,388	59	3,923
Total	**92,379**	**207,076**	**3,274**	**302,729**
% of total payments	**30.5%**	**68.4%**	**1.1%**	

Source: VDOT

[1] Capital Beltway Ramps refer to the two east-facing (nearest the I-495 Capital Beltway) ramps at the Spring Hill Rd interchange.

ANNUAL TOLL REVENUE TRENDS

Table 2-3 shows the revenue collected on the DTR from CY1998 to CY2009.

Table 2-3
Total Annual Revenue by Payment Type, 1998-2009

Calendar Year	Cash	E-Zpass	Total	Percent E-Zpass
1998	$19,797,437	$9,573,897	$29,371,334	32.6%
1999	19,214,273	12,525,594	31,739,868	39.5%
2000	19,317,961	15,131,175	34,449,136	43.9%
2001	18,275,695	16,838,929	35,114,624	48.0%
2002	17,291,901	17,569,887	34,861,789	50.4%
2003	17,143,613	18,140,117	35,283,730	51.4%
2004	18,630,558	23,315,063	41,945,621	55.6%
2005	21,110,421	34,963,825	56,074,246	62.4%
2006	22,371,086	42,809,087	65,180,173	65.7%
2007	21,401,305	44,225,461	65,626,766	67.4%
2008	20,370,348	45,263,742	65,634,091	69.0%
2009 (1)	9,493,255	22,740,253	32,233,508	70.5%

(1) Partial year, January through June

Source: VDOT/MWAA, July 2009

Toll revenues more than doubled between 1998 and 2006, with the toll rate adjustment in 2005 being a significant contributor to the incremental revenues. DTR toll revenues reached a record $65.6 million in CY2008. This represents a 56.5 percent increase over the revenues in the last full year before toll increases which was CY2004.

E-ZPASS MARKET PENETRATION

DTR is part of the E-ZPass Interagency Group (IAG) that has 30 member agencies in 13 states. Table 2-3 shows, for CY1998 to CY2009, the amount of revenue collected via cash transactions, the amount of revenue collected via E-ZPass, and the percentage of revenues that have been collected with E-ZPass. Although no discount is given to electronic toll collection (ETC) transactions on DTR, the increased use of E-ZPass in the area is reflected in the increased percentage of revenues collected via E-ZPass, from 32.6 percent to 70.5 percent, over this time period.

MONTHLY TRANSACTION AND REVENUE TRENDS

Table 2-4 shows the monthly transactions since CY2005. There has been a small decline in the number of transactions on the DTR since then. The number of transactions fell 1.6 percent between CY2005 and CY2006. The decline in transactions continued with 0.4 percent decreases between the next two years. There was a 2.9 percent decrease in transactions during the first six months of CY2009 when compared to the same period in CY2008. This is mostly due to the economic downturn and increases in the unemployment rate. However, June 2009 saw a modest increase in transactions of 2.1 percent versus June 2008.

Table 2-5 shows the monthly revenues since CY2005 when the last toll rate adjustment was made. There was little growth between CY2006 and CY2008 and toll revenues remained fairly steady during that period, with a slight increase between CY2006 and CY2007 of 0.7 percent; and virtually no change between CY2007 and 2008. Due to the recent economic downturn, the first six months of CY2009 saw a decrease of 2.4 percent in toll revenues. However June 2009 saw an increase of 2.7 percent over June 2008; this brings the monthly revenue for June 2009 nearly to the June 2005 level.

Table 2-4
Monthly Transactions, 2005-2009

	CY2005	% Change	CY2006	% Change	CY2007	% Change	CY2008	% Change	CY2009
January	9,196,216	-0.9%	9,109,306	1.0%	9,198,057	0.1%	9,207,781	-8.6%	8,412,824
February	8,786,162	-4.1%	8,422,303	-4.7%	8,023,545	8.5%	8,709,460	-3.9%	8,366,392
March	10,111,654	-1.7%	9,941,362	-2.6%	9,686,308	-3.5%	9,351,455	-1.2%	9,234,614
April	9,948,766	-8.3%	9,120,164	1.4%	9,246,736	3.7%	9,585,976	-3.2%	9,283,838
May	9,906,511	-1.3%	9,779,415	0.8%	9,856,502	-2.8%	9,578,599	-2.8%	9,306,946
June	9,872,015	-1.2%	9,756,929	-1.8%	9,581,354	-2.0%	9,385,082	2.1%	9,579,031
July	9,251,263	-0.6%	9,192,347	1.6%	9,338,507	1.5%	9,478,858	---	---
August	9,698,296	0.1%	9,706,925	-0.1%	9,698,127	-5.6%	9,158,359	---	---
September	9,228,605	-1.8%	9,066,103	0.2%	9,087,941	1.1%	9,185,049	---	---
October	9,483,395	2.2%	9,692,059	2.2%	9,903,111	-1.7%	9,731,826	---	---
November	9,041,300	-0.7%	8,976,611	0.6%	9,030,545	-6.1%	8,482,507	---	---
December	8,959,171	0.0%	8,959,341	-3.6%	8,634,873	3.6%	8,943,949	---	---
Total	113,483,354	-1.6%	111,722,865	-0.4%	111,285,606	-0.4%	110,798,901	---	---

Notes:
1) Toll rates were adjusted in May 2005.
2) Unaudited numbers; non-revenue transacitons such as police, emergency vehicles, military vehicles, etc. are not recorded.

Source: VDOT

Table 2-5
Monthly Toll Revenues, 2005-2009

	CY2005	% Change	CY2006	% Change	CY2007	% Change	CY2008	% Change	CY2009
January	$3,297,392	60.8%	$5,301,479	1.5%	$5,378,628	1.3%	$5,447,177	-7.7%	$5,026,089
February	3,157,469	55.3%	4,902,731	-4.3%	4,693,424	9.9%	5,155,941	-3.6%	4,967,856
March	3,664,214	58.2%	5,796,780	-1.8%	5,692,084	-2.9%	5,529,627	-0.9%	5,478,538
April	3,595,505	48.1%	5,323,359	2.8%	5,470,870	3.7%	5,672,881	-2.7%	5,522,113
May	4,223,085	35.0%	5,700,406	2.3%	5,828,923	-2.8%	5,668,517	-2.4%	5,535,196
June	5,740,241	-1.2%	5,672,049	-0.2%	5,661,723	-1.9%	5,553,988	2.7%	5,703,716
July	5,374,708	-0.3%	5,358,591	3.2%	5,529,010	1.6%	5,618,891	---	---
August	5,639,849	0.8%	5,685,674	0.7%	5,727,274	-5.1%	5,437,933	---	---
September	5,378,577	-1.5%	5,297,288	1.3%	5,367,839	1.3%	5,439,956	---	---
October	5,524,477	2.5%	5,663,442	3.1%	5,841,151	-1.3%	5,766,661	---	---
November	5,270,808	-0.5%	5,246,330	1.7%	5,334,025	-5.8%	5,023,350	---	---
December	5,207,921	0.5%	5,232,042	-2.5%	5,101,816	4.3%	5,319,170	---	---
Total	$56,074,246	16.2%	$65,180,171	0.7%	$65,626,767	0.0%	$65,634,092	---	---

Notes:
1) Toll rates were adjusted in May 2005.
2) Unaudited figures.

Source: VDOT

MONTHLY TRANSACTION VARIATIONS

Table 2-6 provides average daily total transactions on the DTR for each month for the period CY2005 to CY2008 and the first six months of CY2009.

To demonstrate the relatively small variation in monthly transactions, an index has been calculated for each month. This index is created by taking the average daily transactions for the month, dividing by the average daily transactions for the year, and multiplying by 100. This produces an index of 100 for any month that equals the annual average number of transactions. Months with an index greater than 100 have more than the annual average number of transactions and months with an index less than 100 have less than the annual average number of transactions. The index provides the relative size of the demand for the month, in comparison to other months for the period CY2005 to CY2008.

The monthly variation indicated by the indices has a total spread of only 15.3 points for the four year period. Although there is some seasonal variation, the variation within any one year is also small further emphasizing the strong customer base that the DTR benefits from.

Table 2-6
Monthly Variations in Average Daily Total Transactions, 2005-2009

Month	CY2005	*CY Index*	CY2006	*CY Index*	CY2007	*CY Index*	CY2008	*CY Index*	CY2009	*CY Index*
January	296,652	*95.4*	293,849	*96.0*	296,712	*97.3*	297,025	*98.1*	271,381	*90.7*
February	313,792	*100.9*	300,797	*98.3*	286,555	*94.0*	300,326	*99.2*	298,800	*99.8*
March	326,182	*104.9*	320,689	*104.8*	312,462	*102.5*	301,660	*99.6*	297,891	*99.5*
April	331,626	*106.7*	304,005	*99.3*	308,225	*101.1*	319,533	*105.6*	309,461	*103.4*
May	319,565	*102.8*	315,465	*103.1*	317,952	*104.3*	308,987	*102.1*	300,224	*100.3*
June	329,067	*105.8*	325,231	*106.3*	319,378	*104.8*	312,836	*103.3*	319,301	*106.7*
July	298,428	*96.0*	296,527	*96.9*	301,242	*98.8*	305,770	*101.0*	-	-
August	312,848	*100.6*	313,127	*102.3*	312,843	*102.6*	295,431	*97.6*	-	-
September	307,620	*98.9*	302,203	*98.7*	302,931	*99.4*	306,168	*101.1*	-	-
October	305,916	*98.4*	312,647	*102.1*	319,455	*104.8*	313,930	*103.7*	-	-
November	301,377	*96.9*	299,220	*97.8*	301,018	*98.7*	282,750	*93.4*	-	-
December	289,006	*93.0*	289,011	*94.4*	278,544	*91.4*	288,514	*95.3*	-	-
CY Average	310,913		306,090		304,892		302,729		299,357	

Source: VDOT/MWAA, July 2009

DAILY TRANSACTION VARIATIONS

Table 2-7 shows total transactions, including non-revenue transactions, by day of week for the DTR between CY2006 and CY2008. The table provides not only the number of transactions, but an index for each day of the week based on this number. This index is calculated by dividing the day's number of transactions by the average day's transactions and multiplying by 100. This calculation yields an index of 100 for a day that has the average number of transactions. Days of the week with an index greater than 100 have more than the average number of transactions and days of the week with an index less than 100 have less than the average number of transactions. The index quickly shows which days of the week are busier and which are not as busy.

Table 2-7
Total Transactions by Day of Week, CY2006-CY2008

Day	CY2006	*Index*	CY2007	*Index*	CY2008	*Index*
Monday	17,051,225	*106.0*	17,333,375	*108.3*	17,235,062	*108.4*
Tuesday	18,643,964	*115.9*	18,622,596	*116.3*	18,675,888	*117.4*
Wednesday	19,132,248	*119.0*	18,473,495	*115.4*	19,035,509	*119.7*
Thursday	19,138,106	*119.0*	19,013,431	*118.8*	18,608,678	*117.0*
Friday	18,491,658	*115.0*	18,442,204	*115.2*	17,807,452	*112.0*
Saturday	10,981,716	*68.3*	11,233,609	*70.2*	10,993,918	*69.1*
Sunday	9,127,079	*56.8*	8,936,622	*55.8*	8,973,128	*56.4*
Total	112,565,996		112,055,332		111,329,635	
Average	16,080,857		16,007,905		15,904,234	

Note: Includes non-revenue transactions.

Source: VDOT

Sunday is, by far, the lightest day of the week with a transactions index of only 56.8 in CY2006, 55.8 in CY2007, and 56.4 in CY2008. Monday, a day of the week which many workers in the Northern Virginia area have off for federal and state holidays, has indices of only 106.0 in CY2006, 108.3 in CY2007, and 108.4 in CY2008. In CY2006, Wednesday and Thursday had the highest index at 119.0. Thursday was clearly the busiest day of the year in CY2007 with an index of 118.8. In CY2008, the highest day of the year became Wednesday, with an index of 119.7. Friday has had higher indices in past with 115.0 in CY2006 and 115.2 in CY2007. However, the latest index for CY2008 is slightly lower at 112.0. This is due in part to the implementation of a program whereby federal employees may work extended hours so that the employee may accrue time off.

HOURLY TRANSACTION VARIATIONS

Table 2-8a shows the number of transactions by the hour of day for each plaza of the DTR. For purposes of comparison, this information is from Wednesday, Oct 17, 2007, one of the days on which the origin and destination survey was conducted. Table 2-8b shows the percentage of the day's total transactions for each particular hour. Portions of the day may be summed to understand the totals that occur in particular peak periods.

The busiest hour for the westbound Main Line Plaza is the hour starting at 5:00 PM when 8.7 percent of the day's transactions are processed. During the same time period, the eastbound Main Line Plaza processed 6.9 percent of the day's transactions. Similarly, the eastbound Main Line Plaza processes its maximum number of transactions (9.0 percent) during the hour beginning at 7:00 AM while the westbound Main Line Plaza processes 6.8 percent of the day's transactions.

These percentages are lower than what are often seen in studies of hourly traffic variations. The lower percentages are due to the fact that, unlike other facilities where the concentration of major employers are located in one principal direction, concentrations of major employers are located throughout the Dulles corridor resulting in traffic flows on the DTR from both the east and west throughout the day. For example, during the PM Peak Hour the number of transactions at the westbound Main Line Plaza is 55.1 percent of the total number of transactions at both main line plazas. This means that the directional split is 55/45. The directional split is often greater than 60/40 and occasionally may be higher than 70/30.

This balanced arrangement is due to the fact that a large number of employers are located along the Dulles corridor which is more than ten miles west of the downtown area requiring an outbound trip in the morning and inbound in the evening. This arrangement results in a reverse commute for the many employees living to the east of the DTR's eastern terminus while their place of employment is located west of it.

Table 2-8a
Number of Transactions by Plaza and Hour, Oct 17, 2007 - Weekday

	Hour Beginning																								
Plaza	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Total	Peak Hr
Sully Rd, South	20	16	21	11	20	104	271	559	655	473	357	370	378	457	500	721	859	881	762	387	241	164	107	37	8,371	17:00
Sully Rd, West	147	84	50	54	93	460	938	1,222	1,529	1,321	915	949	1,057	1,098	1,322	1,754	2,269	2,226	2,038	1,450	933	748	531	295	23,483	16:00
Sully Rd, East	97	65	57	68	200	902	2,551	2,138	2,175	2,318	1,490	1,292	1,409	1,224	1,449	1,565	1,684	2,059	1,732	1,051	631	532	330	228	27,247	06:00
Centreville Rd, West	91	37	35	25	42	215	476	861	1,187	1,117	657	572	620	610	643	714	928	1,081	1,045	679	461	363	315	190	12,964	08:00
Centreville Rd, East	45	27	18	29	89	362	954	829	910	872	610	562	669	687	704	707	967	1,272	1,090	627	378	232	212	102	12,954	17:00
Fairfax Pkwy, West	75	33	28	22	31	166	438	738	1,082	903	530	470	569	593	665	830	1,140	1,304	1,343	866	453	425	297	142	13,143	18:00
Fairfax Pkwy, East	25	14	18	18	74	357	1,057	1,033	1,010	867	626	581	540	514	577	658	768	731	669	470	253	202	113	79	11,254	06:00
Reston Pkwy, West	81	28	23	18	57	225	585	928	1,373	1,179	692	637	688	732	721	878	1,006	1,101	1,173	708	487	394	241	160	14,115	08:00
Reston Pkwy, East	59	17	17	19	68	252	840	1,141	1,049	826	688	693	665	751	847	807	1,028	1,154	977	718	450	327	202	112	13,707	17:00
Wiehle Ave, West	42	22	9	10	19	119	255	529	853	725	470	361	345	405	383	420	394	758	682	394	256	217	191	117	7,976	08:00
Wiehle Ave, East	26	12	8	7	26	127	480	858	765	530	380	397	401	345	445	500	676	806	634	371	222	189	88	50	8,343	07:00
Hunter Mill Rd, West	20	12	10	3	25	111	236	424	561	386	185	253	316	286	320	367	467	588	644	348	212	176	106	61	6,117	18:00
Hunter Mill Rd, East	10	5	7	7	11	94	447	1,122	1,173	648	323	333	292	295	390	384	441	403	368	222	115	133	47	15	7,285	08:00
Route 7, East	17	16	8	9	28	191	778	1,017	860	856	630	519	529	526	411	417	494	487	454	340	192	133	92	53	9,057	07:00
Main Line, West	392	221	152	120	294	1,495	2,940	4,404	5,478	4,560	2,126	1,792	2,455	2,950	3,690	4,796	5,571	5,626	5,162	3,679	2,393	1,933	1,539	844	64,612	17:00
Main Line, East	262	135	113	141	436	2,183	5,559	6,003	5,233	4,938	3,565	3,157	3,011	2,982	3,711	3,727	4,356	4,592	4,339	3,076	1,855	1,475	1,006	527	66,382	07:00
Spring Hill Rd, West	16	6	3	8	10	27	58	132	202	232	186	259	315	311	359	461	1,049	1,513	1,027	414	240	169	78	39	7,114	17:00
Spring Hill Rd, East	14	4	2	2	17	79	476	1,195	1,683	1,483	520	401	358	342	251	273	381	503	543	173	81	70	38	20	8,909	08:00
Capital Beltway, West[1]	19	9	10	12	23	54	157	436	666	548	289	228	248	284	249	237	210	235	262	160	117	108	88	49	4,698	08:00
Capital Beltway, East[1]	21	13	6	8	11	40	102	229	172	229	259	297	324	332	303	354	494	529	434	300	188	123	78	33	4,879	17:00
Total	1,479	776	595	591	1,574	7,563	19,598	25,798	28,616	25,011	15,498	14,123	15,189	15,724	17,940	20,570	25,182	27,849	25,378	16,433	10,158	8,113	5,699	3,153	332,610	

Table 2-8b
Percent of Transactions by Plaza and Hour, Oct 17, 2007 - Weekday

	Hour Beginning																								
Plaza	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Total	Peak Hr
Sully Rd, South	0.2	0.2	0.3	0.1	0.2	1.2	3.2	6.7	7.8	5.7	4.3	4.4	4.5	5.5	6.0	8.6	10.3	10.5	9.1	4.6	2.9	2.0	1.3	0.4	100.0	17:00
Sully Rd, West	0.6	0.4	0.2	0.2	0.4	2.0	4.0	5.2	6.5	5.6	3.9	4.0	4.5	4.7	5.6	7.5	9.7	9.5	8.7	6.2	4.0	3.2	2.3	1.3	100.0	16:00
Sully Rd, East	0.4	0.2	0.2	0.2	0.7	3.3	9.4	7.8	8.0	8.5	5.5	4.7	5.2	4.5	5.3	5.7	6.2	7.6	6.4	3.9	2.3	2.0	1.2	0.8	100.0	06:00
Centreville Rd, West	0.7	0.3	0.3	0.2	0.3	1.7	3.7	6.6	9.2	8.6	5.1	4.4	4.8	4.7	5.0	5.5	7.2	8.3	8.1	5.2	3.6	2.8	2.4	1.5	100.0	08:00
Centreville Rd, East	0.3	0.2	0.1	0.2	0.7	2.8	7.4	6.4	7.0	6.7	4.7	4.3	5.2	5.3	5.4	5.5	7.5	9.8	8.4	4.8	2.9	1.8	1.6	0.8	100.0	17:00
Fairfax Pkwy, West	0.6	0.3	0.2	0.2	0.2	1.3	3.3	5.6	8.2	6.9	4.0	3.6	4.3	4.5	5.1	6.3	8.7	9.9	10.2	6.6	3.4	3.2	2.3	1.1	100.0	18:00
Fairfax Pkwy, East	0.2	0.1	0.2	0.2	0.7	3.2	9.4	9.2	9.0	7.7	5.6	5.2	4.8	4.6	5.1	5.8	6.8	6.5	5.9	4.2	2.2	1.8	1.0	0.7	100.0	06:00
Reston Pkwy, West	0.6	0.2	0.2	0.1	0.4	1.6	4.1	6.6	9.7	8.4	4.9	4.5	4.9	5.2	5.1	6.2	7.1	7.8	8.3	5.0	3.5	2.8	1.7	1.1	100.0	08:00
Reston Pkwy, East	0.4	0.1	0.1	0.1	0.5	1.8	6.1	8.3	7.7	6.0	5.0	5.1	4.9	5.5	6.2	5.9	7.5	8.4	7.1	5.2	3.3	2.4	1.5	0.8	100.0	17:00
Wiehle Ave, West	0.5	0.3	0.1	0.1	0.2	1.5	3.2	6.6	10.7	9.1	5.9	4.5	4.3	5.1	4.8	5.3	4.9	9.5	8.6	4.9	3.2	2.7	2.4	1.5	100.0	08:00
Wiehle Ave, East	0.3	0.1	0.1	0.1	0.3	1.5	5.8	10.3	9.2	6.4	4.6	4.8	4.8	4.1	5.3	6.0	8.1	9.7	7.6	4.4	2.7	2.3	1.1	0.6	100.0	07:00
Hunter Mill Rd, West	0.3	0.2	0.2	0.0	0.4	1.8	3.9	6.9	9.2	6.3	3.0	4.1	5.2	4.7	5.2	6.0	7.6	9.6	10.5	5.7	3.5	2.9	1.7	1.0	100.0	18:00
Hunter Mill Rd, East	0.1	0.1	0.1	0.1	0.2	1.3	6.1	15.4	16.1	8.9	4.4	4.6	4.0	4.0	5.4	5.3	6.1	5.5	5.1	3.0	1.6	1.8	0.6	0.2	100.0	08:00
Route 7, East	0.2	0.2	0.1	0.1	0.3	2.1	8.6	11.2	9.5	9.5	7.0	5.7	5.8	5.8	4.5	4.6	5.5	5.4	5.0	3.8	2.1	1.5	1.0	0.6	100.0	07:00
Main Line, West	0.6	0.3	0.2	0.2	0.5	2.3	4.6	6.8	8.5	7.1	3.3	2.8	3.8	4.6	5.7	7.4	8.6	8.7	8.0	5.7	3.7	3.0	2.4	1.3	100.0	17:00
Main Line, East	0.4	0.2	0.2	0.2	0.7	3.3	8.4	9.0	7.9	7.4	5.4	4.8	4.5	4.5	5.6	5.6	6.6	6.9	6.5	4.6	2.8	2.2	1.5	0.8	100.0	07:00
Spring Hill Rd, West	0.2	0.1	0.0	0.1	0.1	0.4	0.8	1.9	2.8	3.3	2.6	3.6	4.4	4.4	5.0	6.5	14.7	21.3	14.4	5.8	3.4	2.4	1.1	0.5	100.0	17:00
Spring Hill Rd, East	0.2	0.0	0.0	0.0	0.2	0.9	5.3	13.4	18.9	16.6	5.8	4.5	4.0	3.8	2.8	3.1	4.3	5.6	6.1	1.9	0.9	0.8	0.4	0.2	100.0	08:00
Capital Beltway, West[1]	0.4	0.2	0.2	0.3	0.5	1.1	3.3	9.3	14.2	11.7	6.2	4.9	5.3	6.0	5.3	5.0	4.5	5.0	5.6	3.4	2.5	2.3	1.9	1.0	100.0	08:00
Capital Beltway, East[1]	0.4	0.3	0.1	0.2	0.2	0.8	2.1	4.7	3.5	4.7	5.3	6.1	6.6	6.8	6.2	7.3	10.1	10.8	8.9	6.1	3.9	2.5	1.6	0.7	100.0	17:00
Total	0.4	0.2	0.2	0.2	0.5	2.3	5.9	7.8	8.6	7.5	4.7	4.2	4.6	4.7	5.4	6.2	7.6	8.4	7.6	4.9	3.1	2.4	1.7	0.9	100.0	

Source: VDOT

[1] Capital Beltway Ramps refer to the two east-facing (nearest the I-495 Capital Beltway) ramps at the Spring Hill Rd interchange.

When comparing weekday hourly transaction variations to weekend variations, both the eastbound and westbound Main Line Plazas tell a similar story (Figure 2-3). Both directions show a double peak for weekday travel, once during the AM peak period and once during the PM peak period. While the westbound plaza's peaks are nearly identical, the eastbound PM peak is not as dramatic as the AM peak in that direction. In both directions, the weekend transaction variations have less variation throughout the day.

Looking at a comparison between weekday hourly transactions from 2004 and 2007 (Figure 2-4), the 2007 pattern at the eastbound Main Line Plaza is nearly identical to the 2004 pattern. In the AM peak hour (7:00 AM), the 2007 volume was 6,003 versus 6,096 in 2004. In the PM peak hour (5:00 PM), the 2007 volume was 4,592 compared with 4,841 in 2004.

Midday transactions in 2007 were higher than in 2004. In 2007, the midday low occurred during the hour beginning at 1:00 PM and was 2,982. In 2004, the midday low occurred during the hour beginning at 12:00 PM and was 2,706. Although described as 'midday low' the levels of midday transactions show that demand remains strong between the peak hours and that there is additional capacity as the Dulles corridor continues to grow.

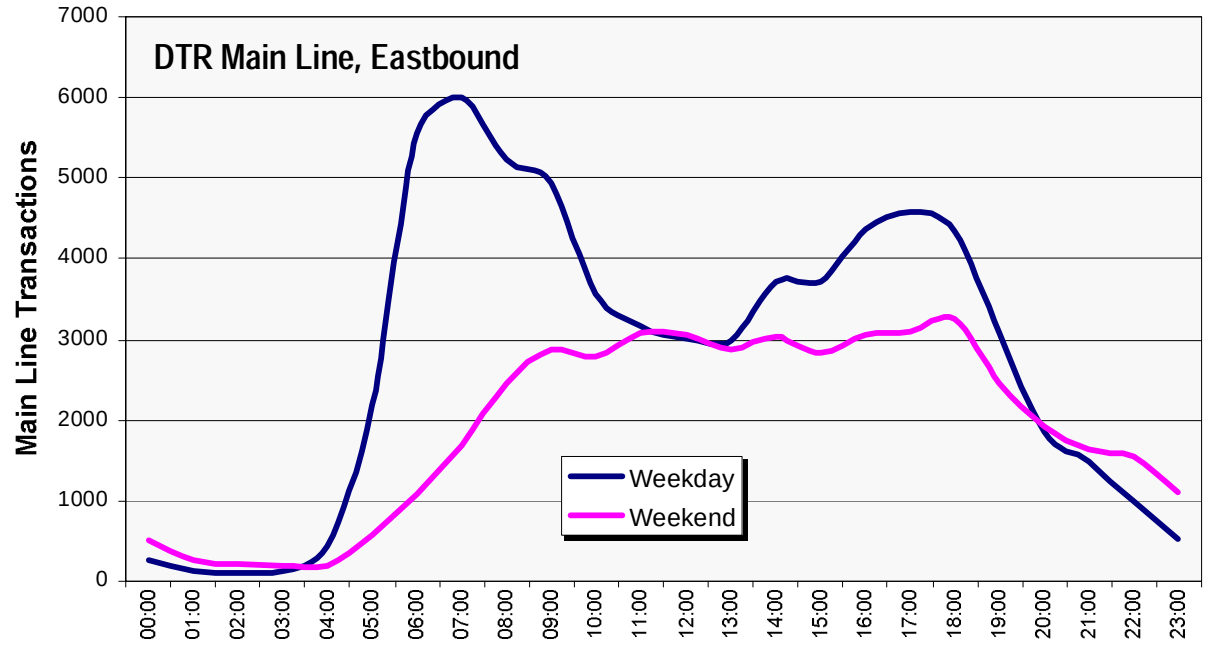
The 2007 pattern at the westbound Main Line Plaza is also nearly identical to the 2004 pattern, however, the AM and PM peaks are higher while the midday low is lower. In the AM peak hour (8:00 AM), the 2007 volume was 5,478 versus 4,863 in 2004. In the PM peak hour (5:00 PM), the 2007 volume was 5,626 compared with 5,120 in 2004.

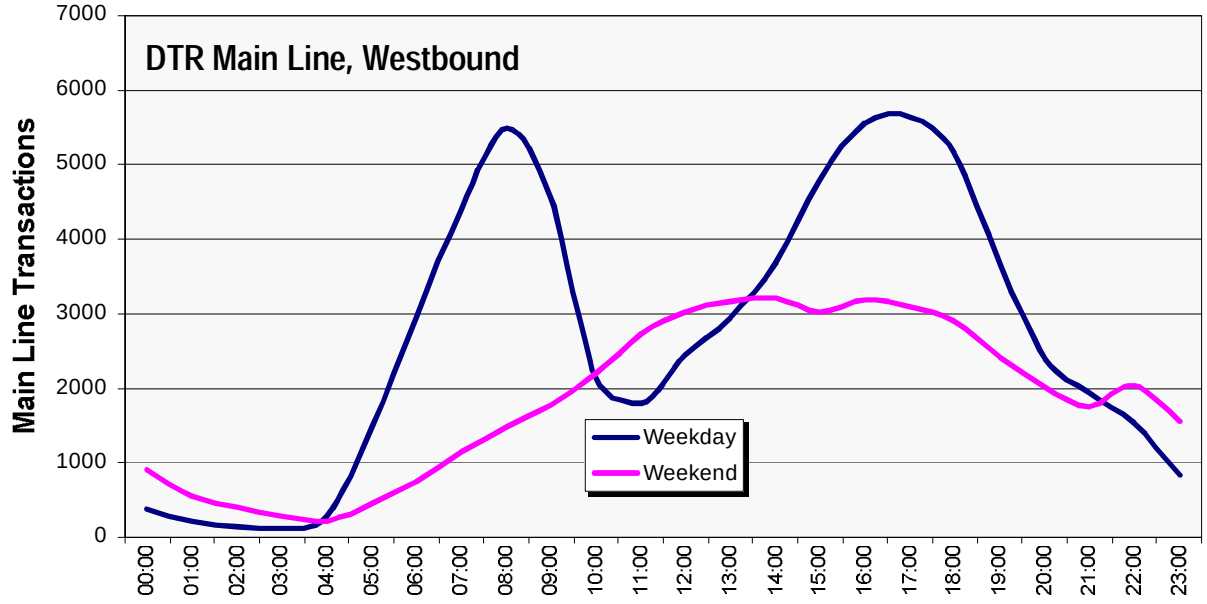
As previously noted, the midday low in 2007 was lower than it was in 2004. Unlike the eastbound plaza, the midday low at the westbound Main Line Plaza occurred during the hour beginning at 11:00 AM in both years. In 2007, the midday low was 1,792 while the midday low in 2004 was 2,113.

SPEED AND DELAY STUDIES

In order to understand the nature of operations on the DTR facility and the surrounding highway network, speed and delay studies were conducted. Due to varying levels of congestion during the day, the speeds are generally lower in the peak periods and higher in the off-peak periods. Often, congestion will result in peak traffic slowing to a standstill, causing motorists to encounter substantial delay.

Information was collected by traveling three parallel routes as described below during the AM and PM peak periods. The vehicle-mounted GPS units recorded data continually during each trip. Since the exact location and time of each vehicle were known for each datum, the travel speeds and delays are known along each route.

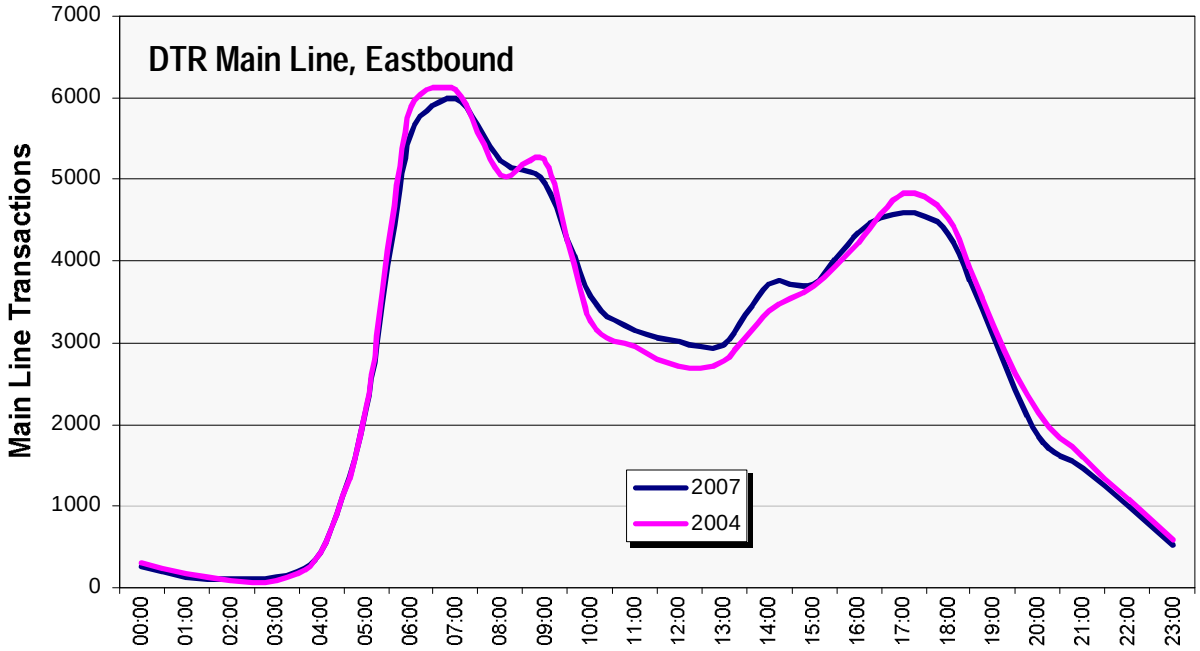


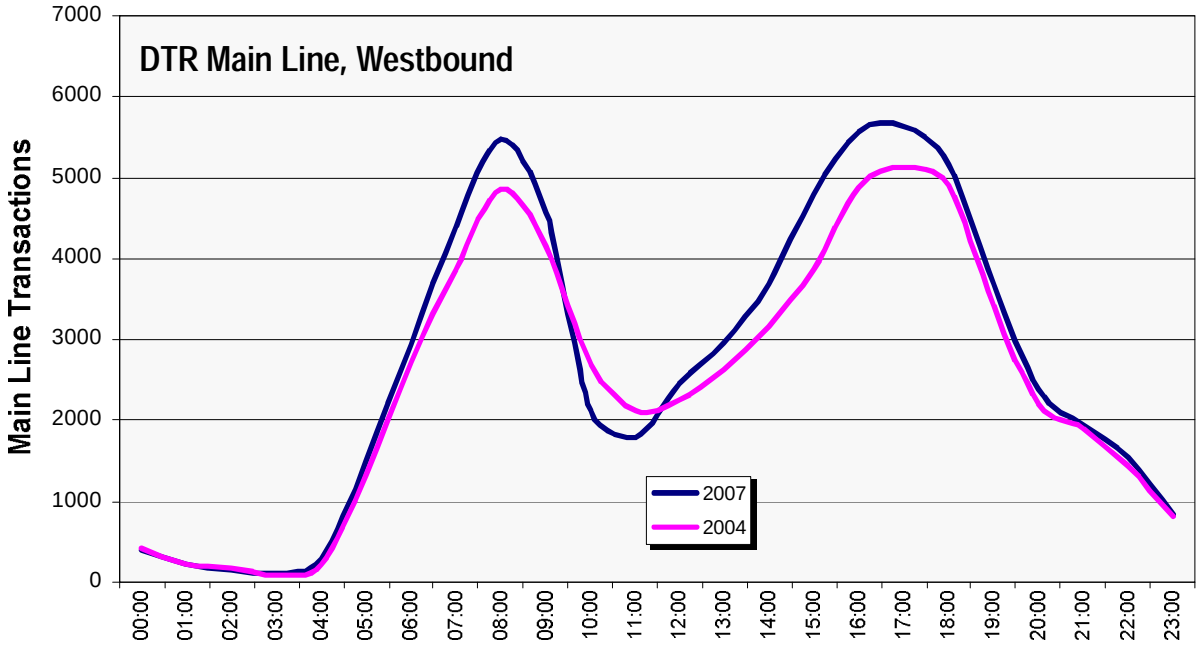


Source: VDOT/DTR

HOURLY TRANSACTION VARIATIONS, WEEKDAY vs. WEEKEND

FIGURE 2-3





Source: VDOT/DTR

HOURLY TRANSACTION VARIATIONS, 2004 vs. 2007

FIGURE 2-4

Speed and delay data were gathered through 32 separate trips along the DTR and its alternate routes in October 2007. That information was supplemented by additional data collected on eight separate trips made in February 2008. From this information, travel time required for each route in the highway network and the locations of delays and back-ups became known. Conditions on the DTR corridor have not changed significantly to warrant an update to the speed and delay surveys conducted in 2007 and 2008.

Three parallel routes, starting on Leesburg Pike/SR 7 in Ashburn and ending at the West Falls Church Metrorail Station, were selected on which to perform speed and delay studies. These routes provide an alternate means for motorists to travel the entire length of the survey corridor on non-tolled roadways. The first route continues on Leesburg Pike/ SR 7 until it reaches the West Falls Church Metrorail Station. The second route travels south on Sully Road/SR 28 then east on US 50 and finally east on I-66 into the West Falls Church Metrorail station. The third parallel route travels south on Sully Road/SR 28 and then east on I-66 into the West Falls Church Metrorail Station.

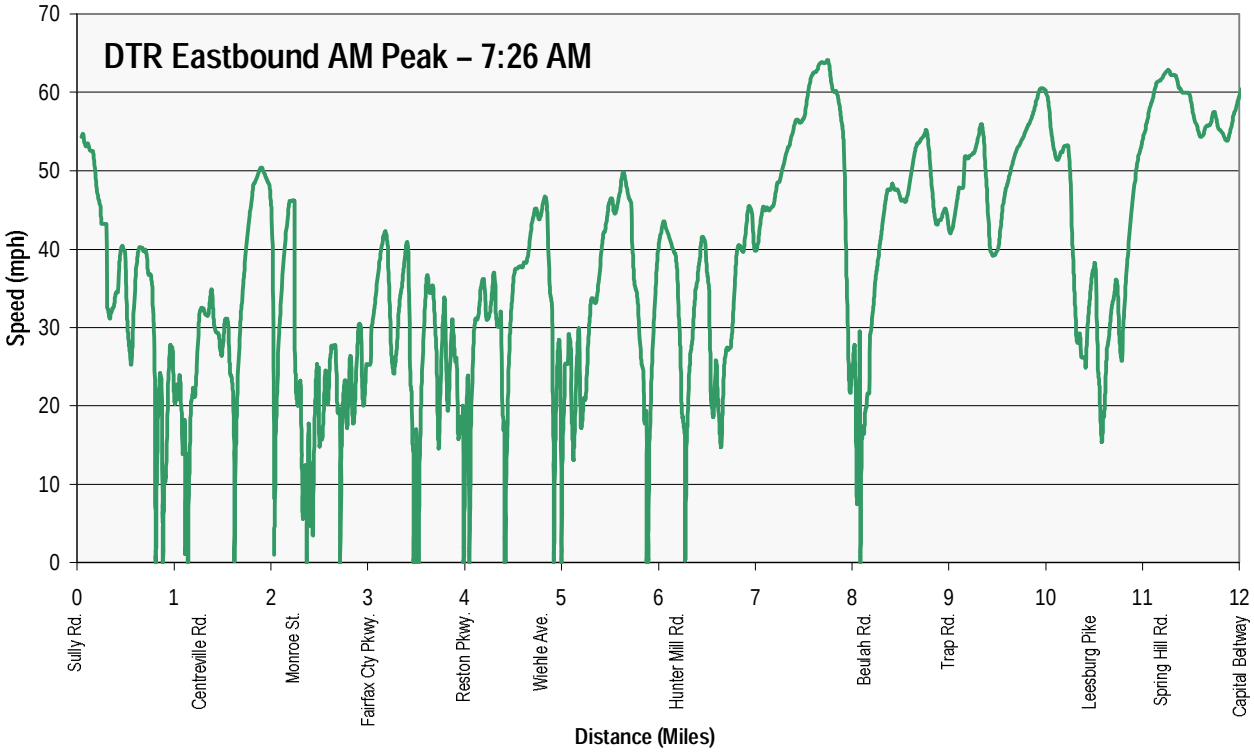
Figure 2-5 shows two plots. The top plot is a diagram of speed vs. distance for a motorist using the DTR eastbound from Sully Road/SR 28 to the Capital Beltway in the morning (the trip began at 7:26 AM). The bottom plot shows the same variables for a motorist traveling westbound in the afternoon (the trip began at 5:35 PM).

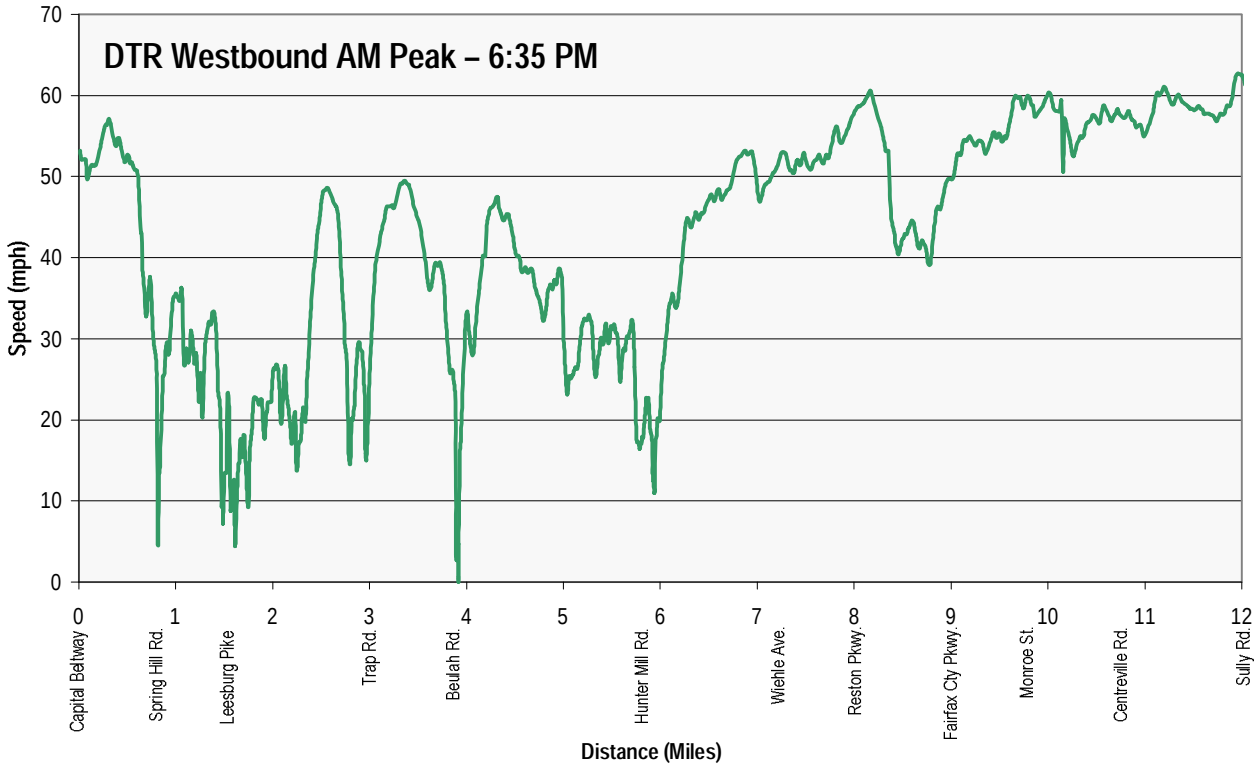
Traveling eastbound during the AM peak period, vehicle speeds in the general purpose lanes fluctuate from between a complete stop and the speed limit. It is evident that most of the bottlenecks occur at or near interchanges as vehicles merge on and off the DTR. Levels of service have deteriorated along the whole DTR in the AM peak. There are delays at the Main Line plaza which may be alleviated over time as ETC penetration increases allowing an expansion of the number of the free-flow E-ZPass Only lanes.

During the PM peak period traveling westbound, speeds fluctuate as vehicles from the Main Line, Spring Hill Road and Route 7 merge just west of the Main Line Plaza. Speeds improve west of Hunter Mill Road (from Wiehle Avenue to Sully Road/SR 28). Levels of service appear to be better than in the AM peak but are nevertheless poor on the East sections of the DTR.

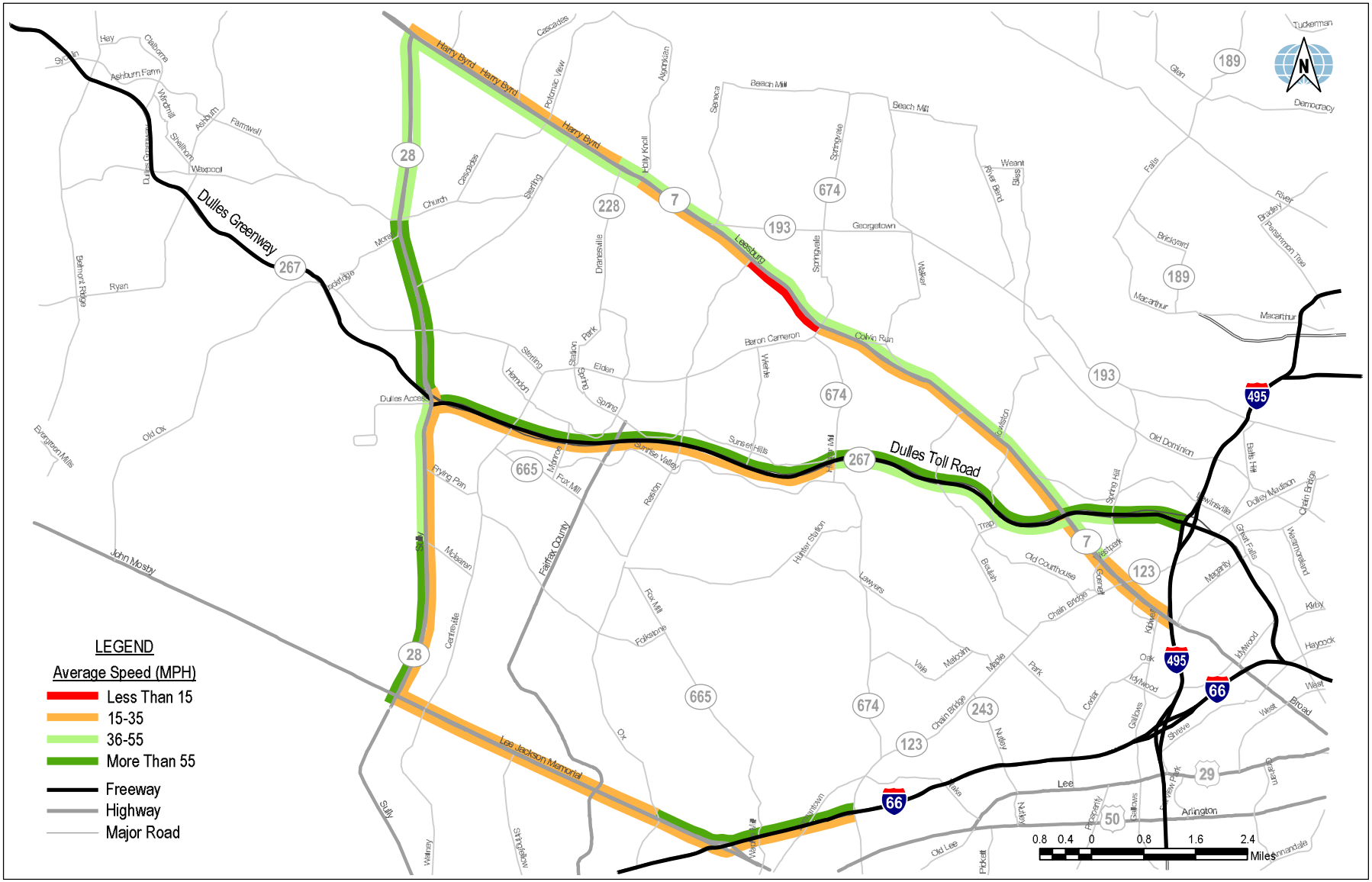
In general, the peak delays and bottlenecks identified in the surveys indicate that the DTR is reaching peak capacity and that some operational improvements and/or pricing measures are appropriate in the near term future to restore acceptable levels of service to toll-paying customers.

Figure 2-6 shows the AM Peak travel speeds on the DTR and on alternate routes. Eastbound speeds on the western section of the DTR were observed in the 15-35 mph range. However, it can be seen that, overall, eastbound travel speeds on the DTR


DTR Eastbound AM Peak – 7:26 AM
Speed (mph)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
6
7
8
9
10
11
12
Sully Rd.
Centreville Rd.
Monroe St.
Fairfax Cty Pkwy.
Reston Pkwy.
Wiehle Ave.
Hunter Mill Rd.
Beulah Rd.
Trap Rd.
Leesburg Pike
Spring Hill Rd.
Capital Beltway
Distance (Miles)


DTR Westbound AM Peak – 6:35 PM
Speed (mph)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
6
7
8
9
10
11
12
Capital Beltway
Spring Hill Rd.
Leesburg Pike
Trap Rd.
Beulah Rd.
Hunter Mill Rd.
Wiehle Ave.
Reston Pkwy.
Fairfax Cty Pkwy.
Monroe St.
Centreville Rd.
Sully Rd.
Distance (Miles)

Source: WSA



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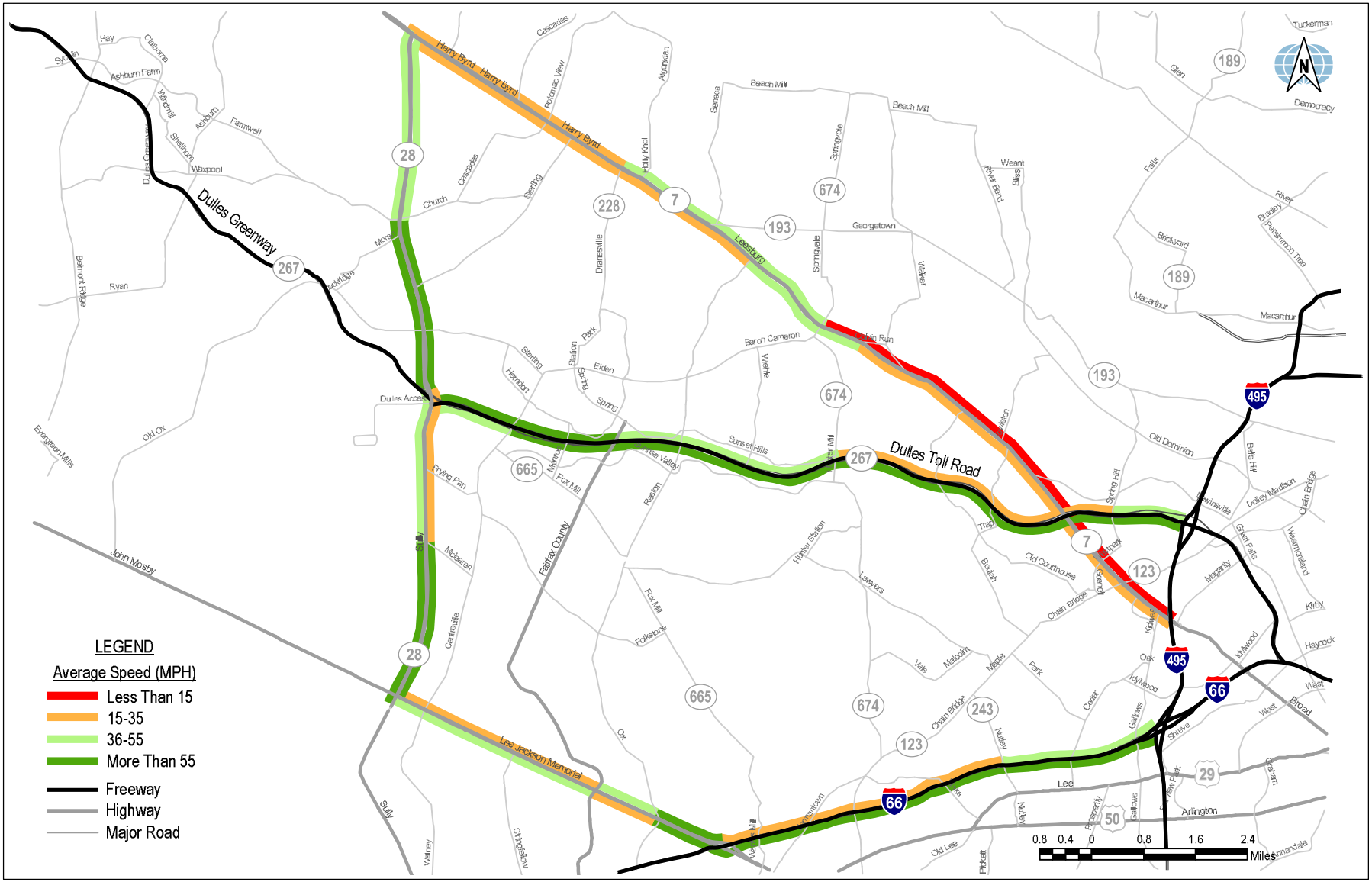
TYPICAL AVERAGE SPEEDS BY SECTION - AM PEAK

FIGURE 2-6



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TYPICAL AVERAGE SPEEDS BY SECTION - PM PEAK

FIGURE 2-7

compare favorably with the speeds on the alternate routes. In the westbound direction, the DTR is clearly the route of choice during this time period as speeds were at least 55 mph the entire length of the route.

Figure 2-7 shows the PM Peak travel speeds. For nearly the entire length of the DTR, the recorded eastbound travel speeds were at least 55 mph. Although slow in the eastern portion of the facility in the westbound direction, it can be seen that the DTR is a more desirable route when considering travel speeds than Route 7, which had recorded speeds of less than or equal to 15 mph in that direction. The DTR also had better travel speeds than the I-66/Route 50 combination in the westbound direction.

CHAPTER 3

DTR TRAVEL PATTERNS

This chapter presents the results of an origin and destination survey that was completed for DTR patrons in October and November, 2007. This survey was designed to provide detailed information on important characteristics of the customers in addition to their origins and destinations. These characteristics included county of residence, trip purpose, trip frequency, vehicle occupancy, time saved by using the DTR, reason for choosing the DTR, and likelihood of choosing transit once it becomes available. The answers to these questions were used to determine the values of variables used in the modeling process in order that future patronage of the DTR under various hypothesized conditions could be estimated. WSA believes that the results of the survey are still valid although no additional surveys were conducted since that time.

ORIGIN AND DESTINATION SURVEY ARRANGEMENTS

In order to get a good understanding of the origins, destinations and characteristics of motorists on the DTR, an origin and destination survey of the DTR facility's patrons was conducted. Figures 3-1 and 3-2 show the actual surveys used. Figure 3-1 shows the survey that was handed out to DTR customers, while Figure 3-2 shows the survey that was sent by mail to users of E-ZPass.

The survey questions show the variables that were gathered. These variables are summarized in Table 3-1, along with the purpose(s) for collecting each data element.

The mail-out survey was sent to patrons who were on the DTR the same day that the hand-out survey was conducted. However, they were asked about a "recent" trip rather than the one representing the day that the vehicle was seen. For that survey, two more questions were necessary. One gathered information on the time period during which the trip was made, the other on the direction that the vehicle was traveling while using the DTR for the reported trip.

Travel Pattern Survey - 2007

METROPOLITAN WASHINGTON AIRPORTS AUTHORITY
WWW.MWAA.COM

Dear Dulles Toll Road Customer:

The Metropolitan Washington Airports Authority (MWAA), in conjunction with the Virginia Department of Transportation (VDOT), is conducting a survey of motorists who use the Dulles Toll Road (DTR) corridor to better understand your driving experience. Your input will assist us in determining travel patterns and trip characteristics which will be used in our planning and development efforts to better serve you. Please take a few minutes to complete this survey reflecting on the trip you were making when you received this questionnaire. Once you answer all of the survey questions, please send us your response within one week on this self addressed, postage paid questionnaire. It is important to note that the answers are kept confidential and will only be used for planning purposes. Your participation in completing the survey qualifies you to win a chance to receive a Visa gift card ranging between $100 to $250 which can be used for gasoline, applied to your EZ Pass or Smart Tag monthly fee, or just for fun. By completing the survey in its entirety and providing your telephone number in the space provided below you will qualify to participate in the Visa gift card drawing.

The Metropolitan Washington Airports Authority and the Virginia Department of Transportation thanks you for taking the time to provide us with your comments related to your driving experience on the Dulles Toll Road. This survey is an essential part of our customer service outreach and we value your feedback.

A. Where did you begin this weekday trip (in this direction)? Please be as specific as possible (e.g., nearest intersection, street address, airport, shopping malls, etc.)

Street Address, Nearest Intersection or Major Landmark

City County (if known) State Zip Code (if known)

B. Where did this weekday trip end (in the same direction as Question A)? Please be as specific as possible (e.g., nearest intersection, street address, airport, shopping malls, etc.) **Should not be the same as answer to Question A**

Street Address, Nearest Intersection or Major Landmark

City County (if known) State Zip Code (if known)

C. Where did you enter the Dulles Toll Road? (Circle one - See map below for assistance)

8. Dulles Greenway
9. Sully Rd. (Rt. 28)
10. Centreville Rd.
10A. Herndon Park & Ride
11. Fairfax County Pkwy.
12. Reston Pkwy.
13. Wiehle Ave.
14. Hunter Mill Rd.
15. Trap Rd.
16. Leesburg Pike (Rt. 7)
17. Spring Hill Rd.
18. I-495
19. Route 123
67. I-66

D. What was the purpose of this trip? (Circle one)

1. Journey To or From Work
2. Company Business
3. Personal Business
4. School
5. Shopping
6. Recreation
7. Social

E. How often do you make the trip you just described? (Circle one)

1. Four or more times per week
2. Two or three times per week
3. Once per week
4. One to three times per month
5. Less than once per month but more than twice per year
6. Twice per year or less

F. How many people, including yourself, were in the vehicle? (Circle one) 1 2 3 4 5 6 or more

K. Please identify the type of vehicle you were driving. (Circle one)

1. 2-axle vehicle (Car, SUV, motorcycle)
2. 2-axle truck or bus
3. 2-axle vehicle towing 1-axle trailer
4. 2-axle vehicle towing 2-axle trailer
5. 3-axle truck or bus
6. 4-axle truck
7. 5-axle truck
8. 6 or more axle truck

G. What best describes why you chose to use the Dulles Toll Road instead of an alternate road? (Circle One)

1. Saves Time
2. Saves Distance
3. Road Condition
4. Less Congestion
5. Only route I know

H. How much time do you think you saved by using the Dulles Toll Road as compared to the next best alternative routing? **Minutes** _____

I. Please indicate your state of vehicle registration. _____

J. Please indicate your county of residence. Use "Other" to write in a county not shown here.

1. Fairfax 2. Loudoun 3. Arlington 4. Prince William 5. Montgomery 6. Prince Georges 7. Washington D.C. 8. Other_____

K. If an extension of Metrorail was made available along the Dulles Toll Road, with a park & ride lot near the home end of this trip and with other transit connections, would it be a realistic alternative for this journey? (Circle one)

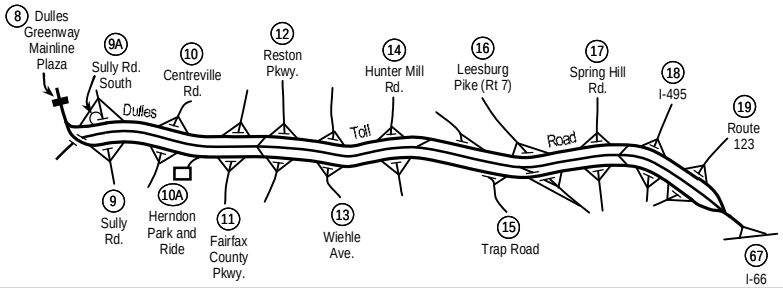
1. No, it would not be possible
2. Yes, it would be possible, but I would not consider it
3. Yes, it would be possible, and I might consider it
4. Yes, it would be possible, and I would take it

L. If you would like to participate in the supplemental follow-up Internet survey, please supply your email address below.

Email Address **(OPTIONAL)** _____

M. If you would like to participate in the Visa gift card drawing please provide your telephone number. ( ) _____

STA.		DAY	DIR.	HR.		C		D	E	F	G	H		I		J	K	L	M
0	1	3	4																



Dear Dulles Toll Road Customer:
When responding to this survey, please think about the most recent one-way trip you made on a weekday (Monday through Friday) that included the Dulles Toll Road.

A. Please indicate the time period in which you began this one-way trip. (Circle one)
1. 6:00 am to 10:00 am 2. 10:00 am to 3:00 pm 3. 3:00 pm to 7:00 pm 4. 7:00 pm to 6:00 am

B. What was your direction of travel? (Circle one) 1. Eastbound = towards Washington 2. Westbound = towards Dulles

C. Please indicate the day this one-way trip was made. (Circle one) 1. Mon 2. Tue 3. Wed 4. Thur 5. Fri

D. Where did you begin this weekday trip (in the direction indicated in Question B)? Please be as specific as possible (e.g., nearest intersection, street address, airport, shopping malls, etc.)

_____
Street Address, Nearest Intersection or Major Landmark

_____
City County (if known) State Zip Code (if known)

E. Where did this weekday trip end (in the same direction as Question D)? Please be as specific as possible (e.g., nearest intersection, street address, airport, shopping malls, etc.) **Should not be the same as answer to Question D**

_____
Street Address, Nearest Intersection or Major Landmark

_____
City County (if known) State Zip Code (if known)

F. Where did you enter the Dulles Toll Road? (Circle one - See map on reverse side for assistance)

8. Dulles Greenway
9. Sully Rd. (Rt. 28)
10. Centreville Rd.
10A. Herndon Park & Ride
11. Fairfax County Pkwy.
12. Reston Pkwy.
13. Wiehle Ave.
14. Hunter Mill Rd.
15. Trap Rd.
16. Leesburg Pike (Rt. 7)
17. Spring Hill Rd.
18. I-495
19. Route 123
67. I-66

G. Where did you exit the Dulles Toll Road? (Circle one - See map on reverse side for assistance)

8. Dulles Greenway
9. Sully Rd. North (Rt. 28)
9A. Sully Rd. South (Rt. 28)
10. Centreville Rd.
10A. Herndon Park & Ride
11. Fairfax County Pkwy.
12. Reston Pkwy.
13. Wiehle Ave.
14. Hunter Mill Rd.
15. Trap Rd.
16. Leesburg Pike (Rt. 7)
17. Spring Hill Rd.
18. I-495
19. Route 123
67. I-66

H. What was the purpose of this trip? (Circle one)

1. Journey To or From Work
2. Company Business
3. Personal Business
4. School
5. Shopping
6. Recreation
7. Social

I. How often do you make the trip you just described? (Circle one)

1. Four or more times per week 2. Two or three times per week 3. Once per week 4. One to three times per month
5. Less than once per month but more than twice per year 6. Twice per year or less

J. How many people, including yourself, were in the vehicle? (Circle one) 1 2 3 4 5 6 or more

K. Please identify the type of vehicle you were driving. (Circle one)

1. 2-axle vehicle (Car, SUV, motorcycle)
2. 2-axle truck or bus
3. 2-axle vehicle towing 1-axle trailer
4. 2-axle vehicle towing 2-axle trailer
5. 3-axle truck or bus
6. 4-axle truck
7. 5-axle truck
8. 6 or more axle truck

L. What best describes why you chose to use the Dulles Toll Road instead of an alternate road? (Circle One)

1. Saves Time 2. Saves Distance 3. Road Condition 4. Less Congestion 5. Only route I know

M. How much time do you think you saved by using the Dulles Toll Road as compared to the next best alternate route? **Minutes** _____

N. Please indicate your state of vehicle registration. _____

O. Please indicate your county of residence. Use "Other" to write in a county not shown here.
1. Fairfax 2. Loudoun 3. Arlington 4. Prince William 5. Montgomery 6. Prince Georges 7. Washington D.C. 8. Other_____

P. If an extension of Metrorail was made available along the Dulles Toll Road, with a park & ride lot near the home end of this trip and with other transit connections, would it be a realistic alternative for this journey? (Circle one)

1. No, it would not be possible
2. Yes, it would be possible, but I would not consider it
3. Yes, it would be possible, and I might consider it
4. Yes, it would be possible, and I would take it

Q. If you would like to participate in the supplemental follow-up Internet survey, please supply your email address below.
Email Address **(OPTIONAL)** _____

R. If you would like to participate in the gift card drawing please provide your phone number. ( ) _____

A	B	C	F	G	H	I	J	K	L	M	N	O	P	Q	R

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SAMPLE MAIL-OUT SURVEY FORM

FIGURE 3-2

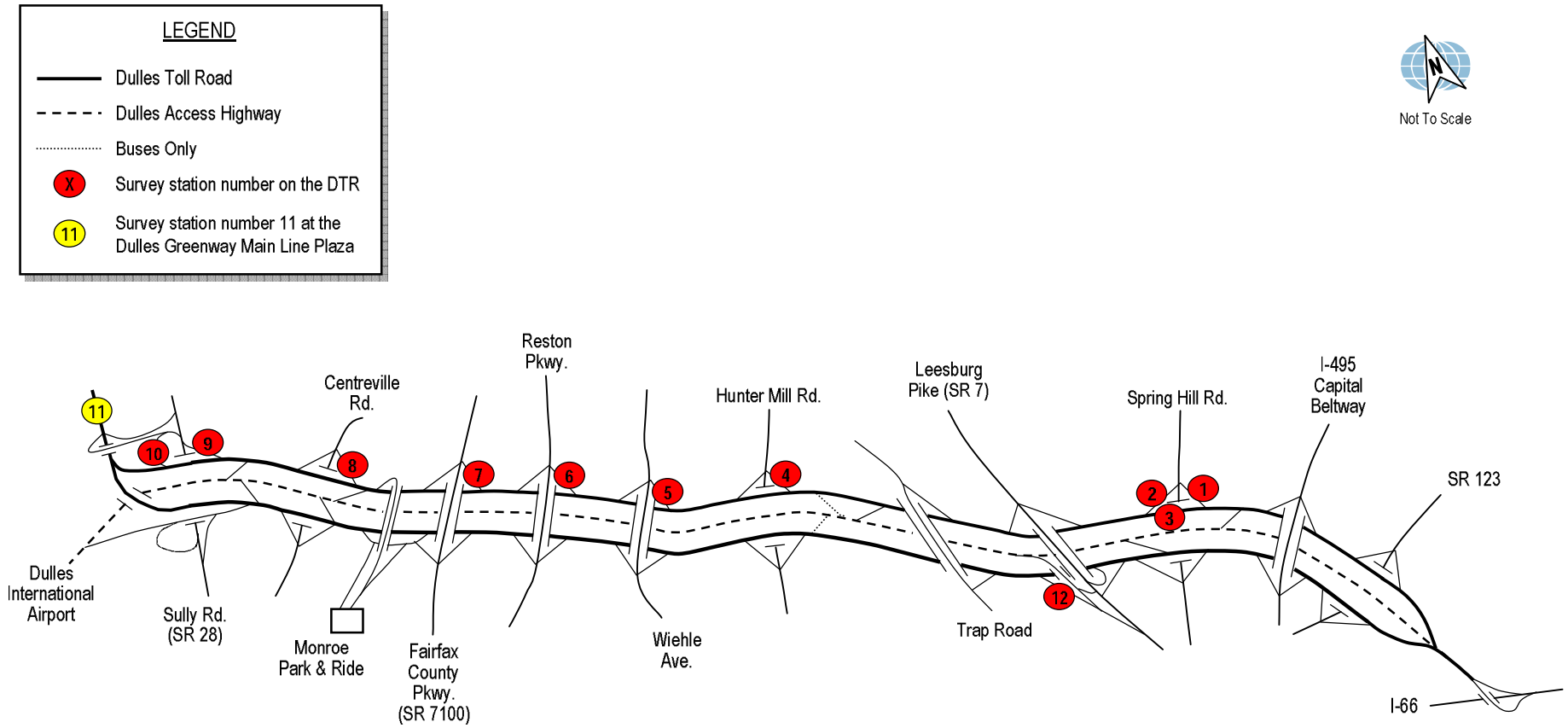
Table 3-1
Data Elements in Origin-Destination Survey

Data Element	Uses
Origin Address	Shows where the trip began
Destination Address	Shows where the trip terminated
Entry Interchange	Indicates where motorist entered the DTR
Exit Interchange	Indicates where motorist departed the DTR
Trip Purpose	Provides the reason for the trip
Days Per Week Trip is Made	Provides trip frequency
Number of People in the Vehicle	Collect data on carpooling
Vehicle Type	Indicates passenger car or commercial vehicle
Reason for Choosing the DTR	Collect data on characteristics that attract patrons
Amount of Time Saved Using DTR	Indicates time advantage for DTR over alternatives
State of Vehicle Registration	Provides indication of non-local users
County of Residence	Rough location of local users
Email Address	For follow-up survey on stated preferences

Figure 3-3 shows a schematic of the DTR, with locations for the hand-out survey marked. With the exception of the two non-tolled westbound exits to Leesburg Pike and Trap Road, which are not tolled, surveys were handed out at all the westbound exits, the westbound Main Line Plaza, and the westbound Greenway Mainline Plaza. In addition, surveys were handed out at the tolled eastbound DTR exit to eastbound Leesburg Pike.

Table 3-2 shows the number of hand-out surveys that were distributed at each of the hand-out locations. The table also shows the number of valid responses received from each location and the ratio that it bears to the number handed out. The average valid-response return rate for the hand-out survey was 6.4 percent, with a low of 4.6 percent at Greenway Mainline Plaza and a high of 9.3 percent at Hunter Mill Road.

In addition to the hand-out survey, a mail-out survey was used to collect data from those who paid their toll using E-ZPass instead of cash. Because E-ZPass users do not stop to pay a toll, they can be surveyed only by identifying the vehicles that passed certain locations and sending a survey to each of them through the mail. The E-ZPass administrative staff were provided with the list of ramps and toll plazas where the hand-out survey were conducted. They identified the vast majority of E-ZPass users who passed one of those plazas on Thursday, October 18, 2007, and mailed a survey to



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SURVEY LOCATIONS

FIGURE 3-3

Table 3-2
Survey Response Statistics

Cash Transactions Table (Hand-Out Survey):

Station Number	Route	Direction	Survey Period	Location	Passing Traffic	Cards Distributed	Cards Returned	Valid Survey Responses	Return Rates for: Total Responses	Return Rates for: Valid Responses
1	Capital Beltway (Spring Hill Rd. E)	WB Off Ramp	10/16/2007, 0630-1830	Exit 17 (RT 684)	2,871	1,133	97	90	8.6%	7.9%
2	Spring Hill Road West	WB On Ramp	10/16/2007, 0630-1830	Exit 17 (Rt 684)	1,781	738	55	52	7.5%	7.0%
3	Mainline (Spring Hill Rd)	WB	10/10/2007, 0630-1830		15,942	10,900	740	637	6.8%	5.8%
4	Hunter Mill Road	WB Off Ramp	10/09/2007, 0630-1830	Exit 14 (Rt 674)	1,775	1,030	104	96	10.1%	9.3%
5	Wiehle Ave	WB Off Ramp	10/09/2007, 0630-1830	Exit 13 (Rt 828)	2,425	1,181	97	91	8.2%	7.7%
6	Reston Pkwy	WB Off Ramp	10/11/2007, 0630-1830	Exit 12 (Rt 602)	5,584	2,575	180	168	7.0%	6.5%
7	Fairfax Pkwy	WB Off Ramp	10/11/2007, 0600-1800	Exit 11 (Rt 7100)	4,043	2,020	161	141	8.0%	7.0%
8	Centreville Road	WB Off Ramp	10/17/2007, 0600-1800	Exit 10 (Rt 657)	4,710	2,988	240	211	8.0%	7.1%
9	Sully Rd North (Route 28)	WB to NB Off Ramp	10/17/2007, 0600-1800	Exit 9B (Rt 28)	5,784	4,233	234	210	5.5%	5.0%
10	Sully Rd South (Route 28)	WB to SB Off Ramp	10/17/2007, 0600-1800	Exit 9A (Rt 28)	2,820	1,923	182	156	9.5%	8.1%
11	Dulles Greenway MLP	WB	10/18/2007, 0600-1800	Main Toll Plaza	3,758	2,217	134	103	6.0%	4.6%
12	Leesburg Pike (Rte 7)	EB Off Ramp	10/18/2007, 0600-1800	Exit 16 (Rte 7)	3,969	2,374	201	180	8.5%	7.6%
TOTAL					55,459	33,312	2,425	2,135	7.3%	6.4%

EZ Pass Survey Results (Mail-Out Survey):

Surveys Distributed	Surveys Returned	Valid Surveys	Return Rates for: Total Resp.	Return Rates for: Valid Resp
50,000	**9,548**	**8,810**	**19.1%**	**17.6%**

each of them. These users were requested to report on their *most recent* trip on the DTR, as opposed to the trip where their presence was detected. Because the reporting is not on the same basis as the hand-out survey, a response rate by plaza cannot be computed for these respondents. For that reason, only a total response rate can be reported. Of the 50,000 mail-out surveys distributed, 8,810 valid ones were received, for a response rate of 17.6 percent.

A combined total of the hand-out and mail-out surveys distributed amounted to 83,312. Returned surveys consisted of responses where all the data could be interpreted in a valid way and were reported earlier to get an understanding of the valid response rate. In addition, many responses were processed, but for one reason or another did not contain sufficiently valid information to be included. Adding both valid and invalid returns, there were 11,973 of them returned for further processing. This total response rate of 14.37 percent compares well with the usual range of 10 to 20 percent. Of the total number of responses, the number of valid responses is very good.

TRIP CHARACTERISTICS

Figures 3-4 and 3-5 show seven pie charts developed from the survey's data. These include the following:

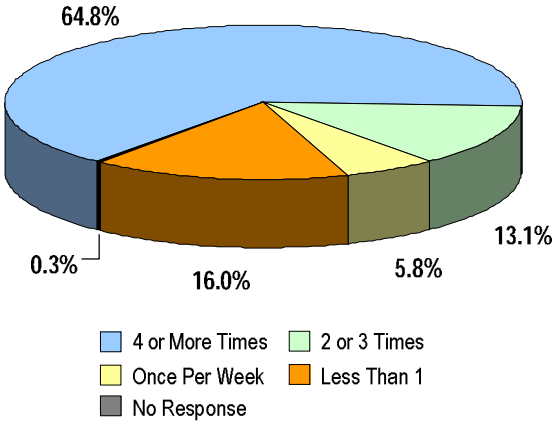
- **Trips per Week (Trip Frequency).** Nearly two-thirds (64.8 percent) of the respondents answered that the trip being surveyed occurs four or more times per week indicating a high percentage of regular customers.

- **Trip Purpose.** Each respondent was requested to provide the reason for having made the trip during which they had received the survey card. As the pie chart shows, 73.2 percent of the respondents were using the DTR facility for a journey to or from work while 8.9 percent were traveling on business unrelated to their commute. The remaining 17.9 percent of respondents reported trip purposes split among, social, recreational, shopping, school, and personal business or did not respond to the question. This indicates a high percentage of non-discretionary travel and therefore tend to exhibit lower toll sensitivity.

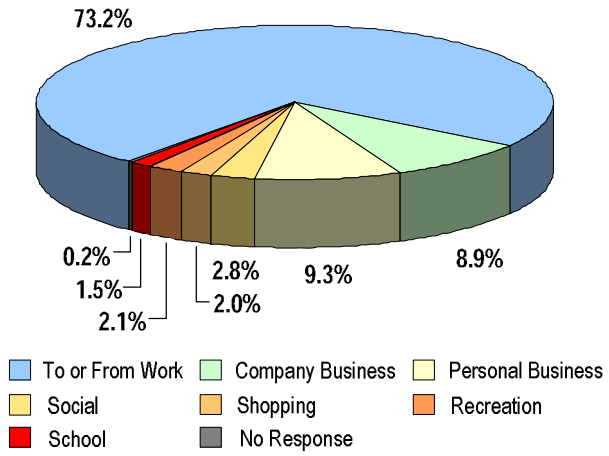
- **Time Saved (on the DTR).** When asked how much time the DTR saved, 83.7 percent of respondents indicated that the DTR would save them more than 10 minutes. 38.9 percent of the respondents indicated that the amount was 20 minutes or more. High travel time savings will also tend to result in lower toll sensitivity.

- **Vehicle Occupancy.** The vast majority of DTR users (84.8 percent) are the only occupants of their vehicles. Of the remaining respondents, 11.0 percent are in

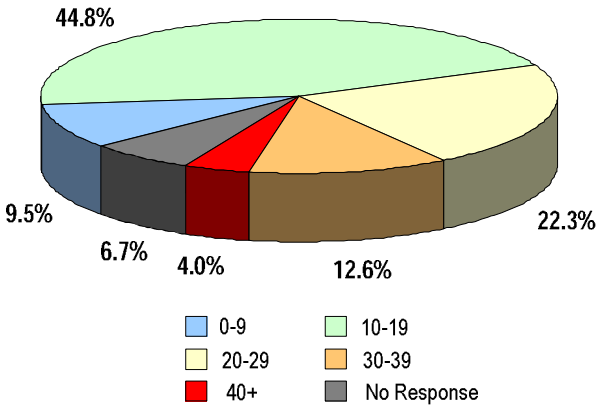
Trips Per Week



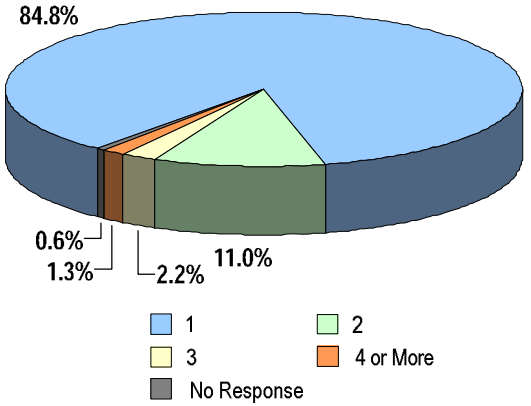
Trip Purpose



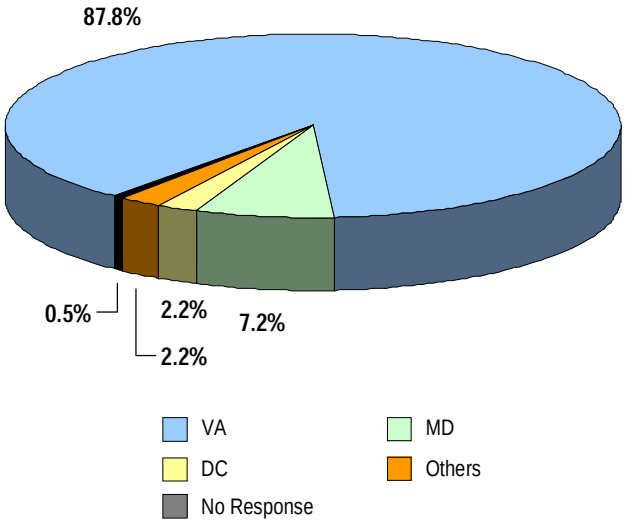
Time Saved (Minutes)



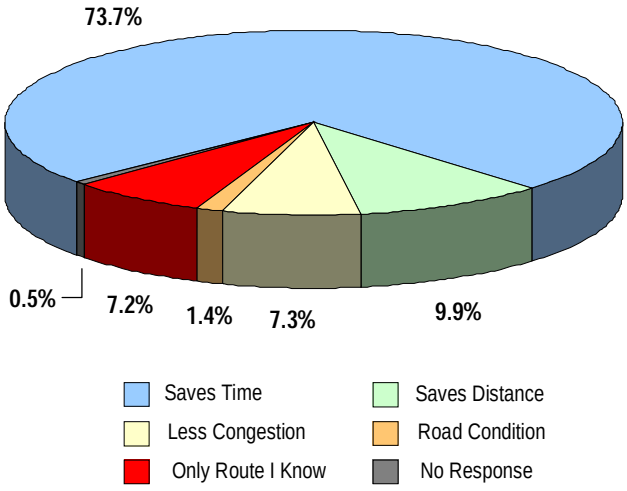
Vehicle Occupancy



Vehicle Registration



Reason



cars with two persons. Only 3.4 percent of respondents reported having three or more occupants in the vehicle.

- **Vehicle Registration.** Most of the DTR patrons surveyed, 87.8 percent, have vehicles registered in Virginia. Of the remaining respondents, 7.2 percent are registered in Maryland and 2.2 percent are registered in the District of Columbia.

- **Reason (for using the DTR).** Nearly three-fourths (73.7 percent) of the respondents indicated that they selected the DTR over other routes because using the DTR saves time.

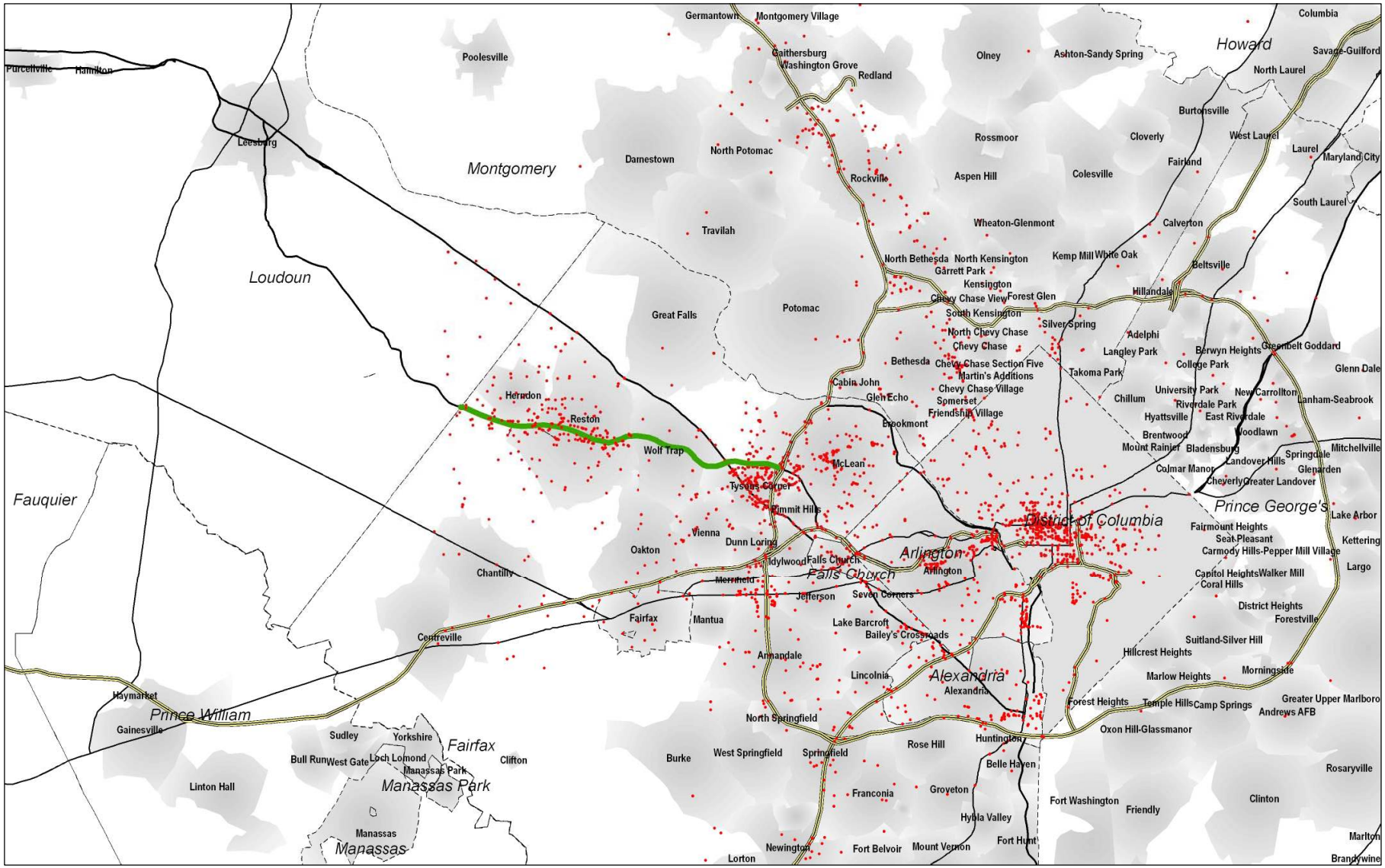
The last question on each of the surveys was optional. Users were provided the opportunity to list an email address if they had a desire to participate in a follow-up survey regarding their preferences for travel mode choice. Over 35 percent of the respondents provided an email address.

PATTERNS OF SURVEYED TRIPS

The evening peak pattern for the surveyed trip origins and destinations is shown in Figures 3-6 and 3-7 respectively. These figures are each a dot-density chart. A dot-density map places a uniformly sized dot that represents a fixed number of trips at a location within the zone where the trip originates or terminates. When viewed as shading, the map shows heavier shading where the density of trips is heaviest. The geographic zones used in this case were the transportation analysis zones (TAZs).

Figure 3-6 provides the pattern of originations and Figure 3-7 provides the pattern of destinations for all motorists traveling west on the DTR facility in the PM peak period. In this case, it represents trips taken by respondents who received a survey card at any of the hand-out locations, plus responses from mail out surveys, where the respondent indicates that the trip being described was westbound on the DTR facility during the PM peak.

In the PM peak period, travel on the DTR facility is dominated by commuters returning home from work. For that reason, the pattern of origins would be dominated by work site locations and the pattern of destinations would be dominated by home locations. Figure 3-6, the origins map, shows a distribution that is more typical of work site locations. The clustering is denser and the locations tend to be more on the east side than on the west side. For example, Figure 3-6 shows a very dense set of trip origins in downtown DC, the Arlington I-66 Corridor, Tysons Corner, Reston and Herndon. These all represent major employment centers for DTR patrons at work sites where DTR patrons will begin their trips in the afternoon peak.



Note: One red dot equals one trip origin

WilburSmith ASSOCIATES

PM WESTBOUND ORIGINS

FIGURE 3-6

In Figure 3-7, destinations, which are predominantly residential, are shown to be very scattered throughout Western Fairfax County and Loudoun County. It is worth noting that customers have diverse destinations even to locations that would be better served by DTR's competing routes, notably Route 7, in the absence of congestion.

Table 3-3 shows the percentage of DTR customers intercepted at ramp plazas that also passed through the Main Line plaza as summarized from the hand-out and mail-out surveys. The estimated proportions indicate that, in general, through traffic reduces with distance from the Main Line and that less-frequent customers paying by cash are more dominant at exits closer to the Main Line.

Table 3-3
DTR Through Traffic by Ramp Plaza

	Cash	ETC
Dulles Greenway	30.1%	54.4%
Sully Rd	27.0%	54.3%
Centreville Rd	38.7%	59.0%
Fairfax County Pkwy	35.0%	58.5%
Reston Pkwy	43.0%	60.7%
Wiehle Av	33.5%	58.9%
Hunter Mill Rd	30.4%	53.6%

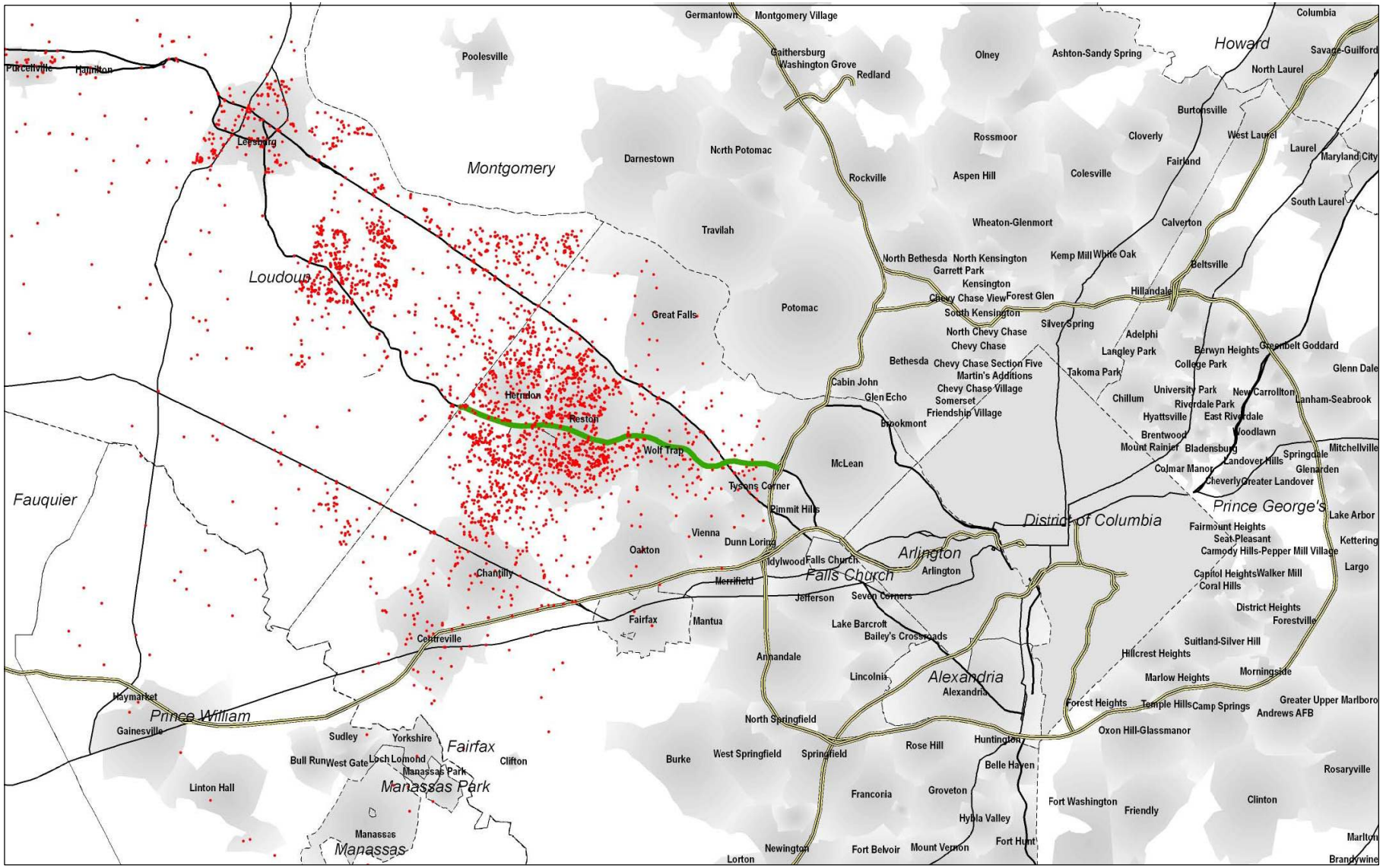
Source: WSA O-D Surveys

The Hunter Mill Road exit, although an option for Reston, is not the preferred exit for traffic to/from that destination. The remaining traffic, by default, must be between Hunter Mill Road and the Tysons Corner exits of Leesburg Pike and Spring Hill Road.

STATED PREFERENCE SURVEYS

One of the many inputs required for understanding traveler behavior and thereby developing revenue estimates for a toll facility is the drivers' value of time.

Within the modeling process, travel times are estimated on competing non-tolled facilities and compared with the travel time on the tolled facility for various travel movements (origin-destination pairs). The portion of the corridor travel demand comprising motorists willing to pay for the calculated time savings is then allocated to the toll facility. From this, traffic and toll revenue estimates are calculated for the DTR. These estimates of traffic are produced within an iterative equilibrium assignment process, to incorporate the effects of congestion on traveler route choice.



Note: One red dot equals one trip destination

WilburSmith ASSOCIATES

PM WESTBOUND DESTINATIONS

FIGURE 3-7

Critical to this process is the ability to estimate the amount of money that members of the travel demand cohort would be willing to pay for a given amount of time savings. This "value of time" may be derived from the analysis of SP surveys conducted within the DTR corridor.

SP SURVEY ADMINISTRATION PLAN

For the present study, a survey panel was created from respondents of the O/D surveys. These respondents had voluntarily provided their email addresses when completing the O/D survey. They were then sent an email invitation to participate in an on-line SP survey. The initial email invitations were sent on February 28, 2008. A second email invitation was sent on March 21, 2008.

From all the surveys that were returned, 659 email addresses were obtained from the hand-out surveys and 3,706 email addresses were obtained from the mail-out surveys. Therefore the on-line SP survey panel began with a base of 4,365 participants.

The initial email invitations sent on February 28, 2008 went to approximately 8 percent of the panel (52 hand-out respondents and 298 mail-out respondents). This group represented a test group for the on-line data recording and processing procedures. As there were no problems with the process and no changes to the on-line survey were required, the responses from the test group were saved and merged with the responses from the main group.

The main group (607 hand-out respondents and 3,408 mail-out respondents) were invited on March 21, 2008 to participate in the on-line survey. Four email addresses were invalid, thus the total number of SP survey invitations sent was 4,361 (658 hand-out respondents and 3,703 mail-out respondents).

By March 31, 2008 enough responses were received to properly model the respondents' preferences. The on-line survey was closed on that day. The number of SP survey responses was 1,067 for a response rate of 24.5 percent.

SP SURVEY QUESTIONNAIRE

The SP survey was comprised of four main sections:

- Trip Information
- Travel Choice SP Survey
- Driving Conditions SP Survey
- Demographic Information.

These sections are discussed in greater detail in the following sections.

TRIP INFORMATION

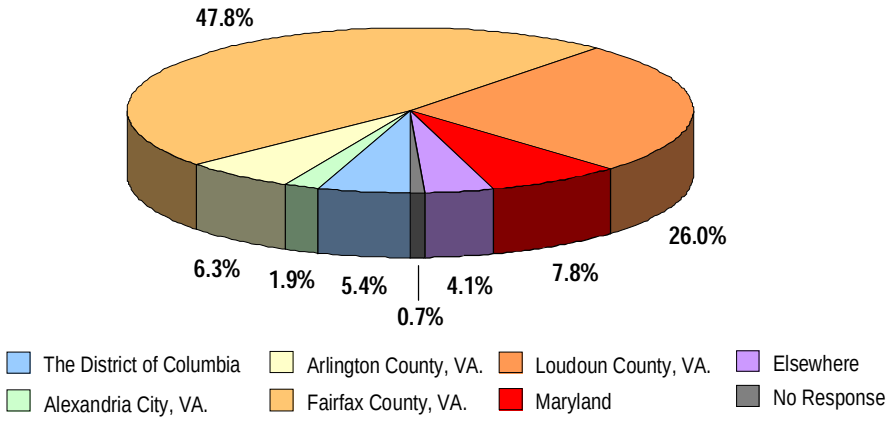
Details concerning respondents' trips were gathered for two purposes. First, this information was used to evaluate the possibility of bias in the survey sample, by comparing such attributes as trip end-points, departure time, and purpose with data from other sources such as traffic counts, origin-destination surveys, and prior studies. Trip information data was also used as an integral part of the survey's design and logic: parameters of questions in subsequent sections of the survey were varied based on the responses to these questions, to ensure a realistic frame of reference for hypothetical travel options.

General trip information collected was:

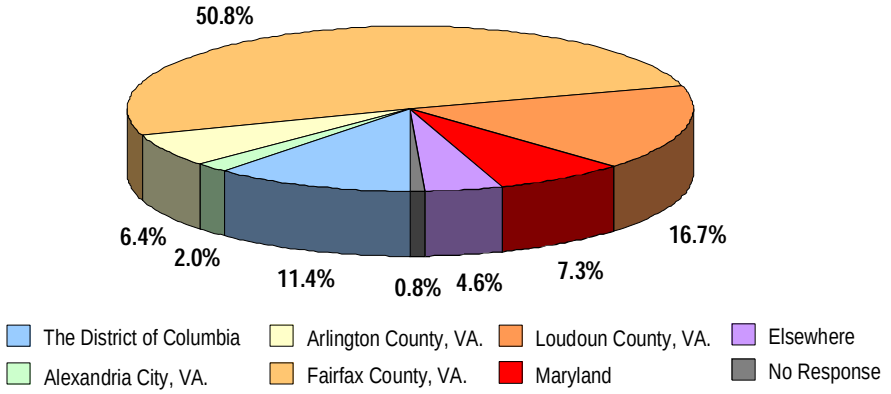
- Trip origin and destination
- 5-digit zip code of the origin and destination
- Direction of travel on the DTR
- Type of vehicle
- DTR entry interchange and exit interchange
- Day of trip
- Trip purpose
- Trip frequency
- Start time of trip
- Trip length (time) of trip and time spent on the DTR
- Estimated trip length (time) if alternate route is used
- Vehicle occupancy
- HOV use and E-ZPass use
- Transfer price (i.e. at what toll rate would someone not use the DTR)
- Transfer time (i.e. at what time delay would someone not use the DTR).

Figure 3-8 shows the breakdown of origins, destinations, and direction of travel of the respondents to the SP survey. Nearly one-half of the respondents, 47.8 percent, began their trip in Fairfax County. The next most popular trip origin was Loudoun County (26.0 percent). Origins that were noted other than those offered in the survey choices included: Clark County, Falls Church, Fauquier County, Fredrick County, Fredericksburg, Manassas, Prince William County, Purceville, and Winchester in Virginia.

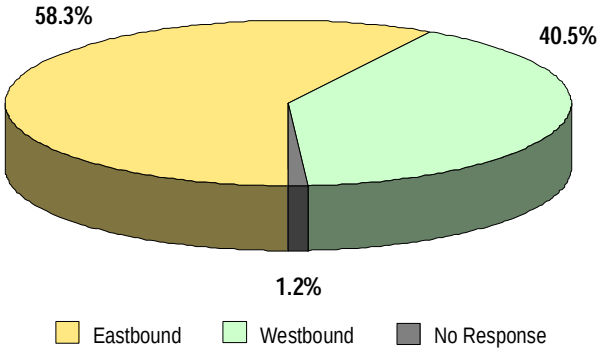
Trip Origin



Trip Destination



Direction of Travel



Fairfax County was reported as the destination for 50.8 percent of the respondents. Loudoun County was the second most reported destination (16.7 percent) with Washington DC close behind (11.4 percent).

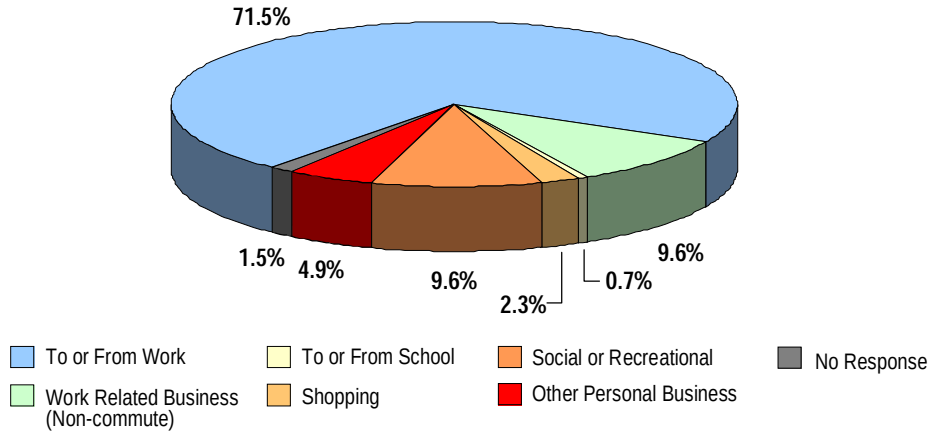
The direction of travel for the respondents was somewhat evenly distributed as 58.3 percent were traveling eastbound and 40.5 percent were traveling westbound.

Figure 3-9 shows the trip purpose, trip frequency, and vehicle occupancy of the SP survey respondents. A majority of respondents (71.5 percent) reported that the purpose of the trip was to commute to and from work. Another 9.6 percent reported that the trip was work related.

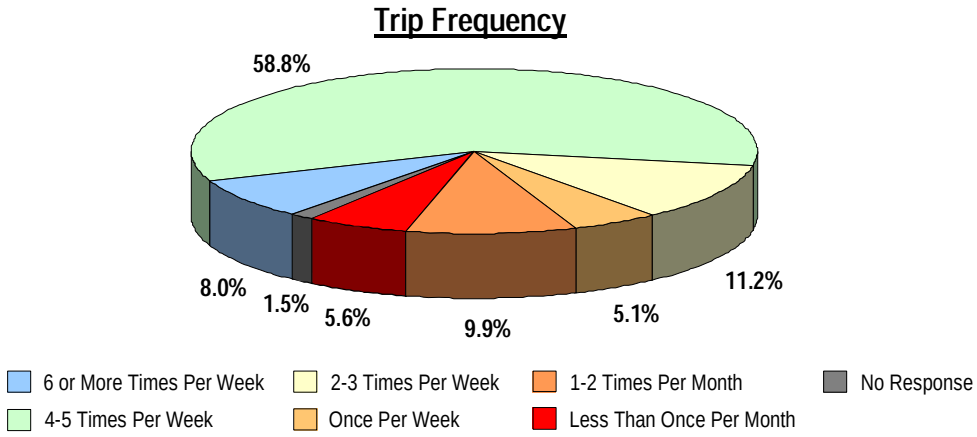
As expected, because of the large number of commuting trips and work related trips, the trip frequencies were very high. Slightly over two thirds (66.8 percent) of the respondents said they use the DTR for this trip purpose four or more times per week.

Details of background questions and responses can be found in Appendix B.

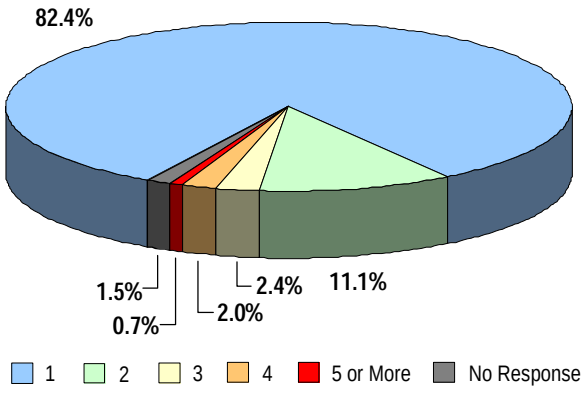
Trip Purpose



Trip Frequency



Vehicle Occupancy



TRAVEL CHOICE SP SURVEY

All respondents (regardless of payment mode) completed a series of choice experiments in which they were presented with alternative travel options for the trip they had described earlier in the survey. Depending on the length of time (four different time groups) of the respondent's trip, each respondent within the specific group was presented with a random set of nine scenarios which came from a base of sixty-four scenarios developed for each group.

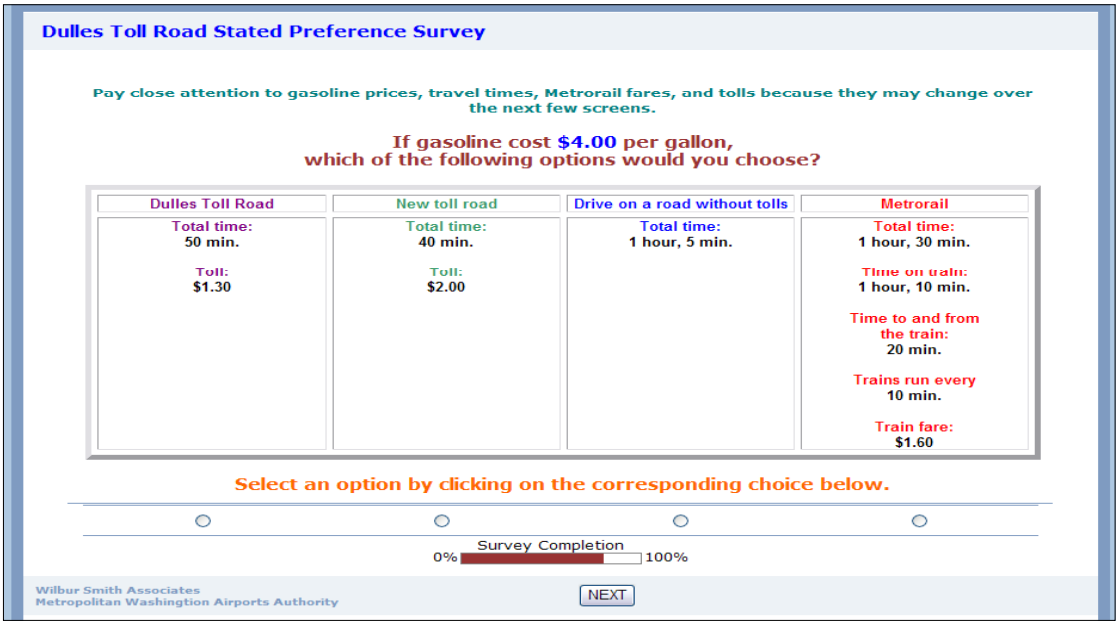
Trip characteristics varied to produce these scenarios. Not all respondents were presented with all of the following (see details below):

- Fuel cost per gallon
- General purpose (GP) lane travel time
- GP lane toll cost
- HOV lane travel time
- HOV lane toll cost
- New toll road travel time
- New toll road toll cost
- Time-displaced trip travel time
- Time-displaced trip toll cost
- Trip departure time displacement
- Toll-free route travel time
- Metrorail total travel time
- Metrorail, on-board travel time
- Metrorail, travel time to and from the station
- Metrorail fare
- Metrorail train frequency.

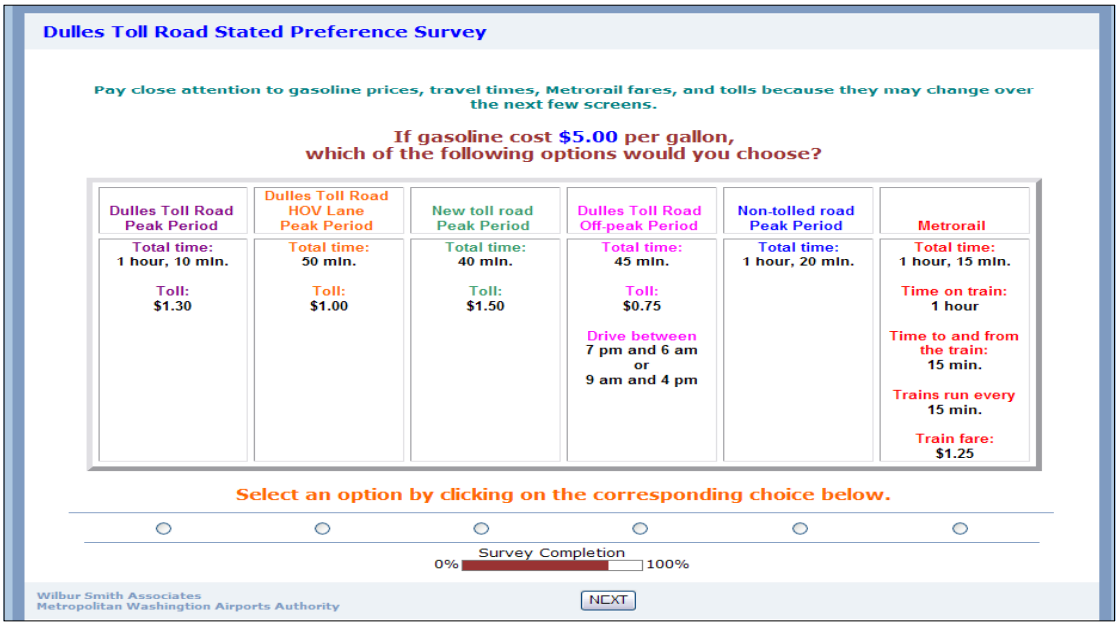
For respondents who used the DTR during the AM or PM peak periods, their scenarios contained all six of the following alternatives. Off-peak period patrons (weekday off-peak periods and weekends) were presented with four of the following alternatives. Figure 3-10 shows sample screenshots of the two types of Travel Choice SP Surveys. The top screenshot shows what an off-peak traveler was presented (four alternative choices) and the bottom screenshot shows what a peak traveler was presented (six alternative choices).

1. *DTR, Same Time as Current Trip* – always shown.

2. *DTR, HOV Lane* – shown only to travelers who travelled during the AM or PM peak periods.



Off-Peak Traveler



Peak Traveler

3. *New Toll Road* – always shown, although there is no implication that a new toll road would be constructed, oftentimes a respondent reacts positively to the thought of a new toll road versus upgrades to an existing roadway.

4. *DTR, Off-Peak Trip* – shown only for trips taking place during the AM or PM peak periods.

5. *Non-Tolled Road* – always shown.

6. *Metrorail Service* – always shown.

DRIVING CONDITIONS SP SURVEY

In this section, respondents were asked to choose between two roadways. One would have a mix to two different driving conditions, e.g. free-flowing traffic for a portion of the trip and stop-and-go traffic for another portion of the trip, while the other roadway would be consistent in its driving condition, e.g. light congestion. Figure 3-11 shows a sample screenshot presented to respondents.

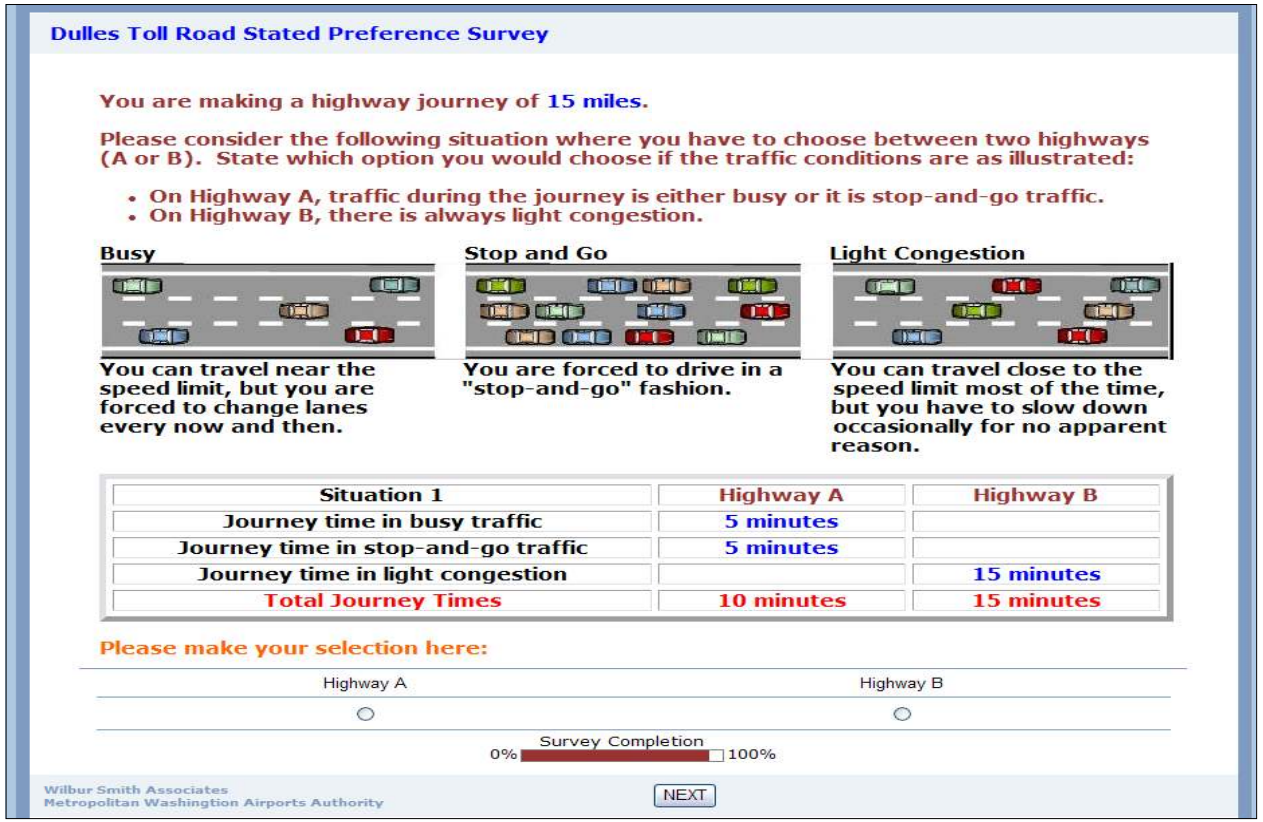
Eight sets of scenarios were created with the variables between the sets being distance of trip and driving conditions on each roadway. Each set contained nine scenarios where the only variables were the amounts of time which the respondent would spend under a particular driving condition. Chapter 4 contains detailed analyses of the results of both the Travel Choice SP Survey and the Driving Conditions SP Survey portions of the on-line survey.

DEMOGRAPHIC INFORMATION

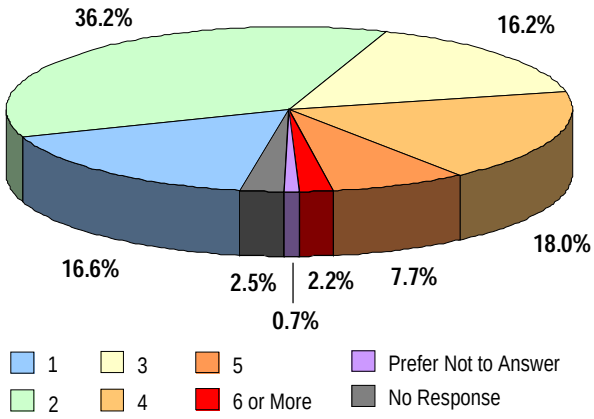
Finally, several general demographic questions were asked so that demographic variables could be included during model estimation and to assist the application of the model to different population segments. The demographic questions included household size, number of vehicles, age, employment status, and annual household income.

Figure 3-12 shows the results to the questions regarding the size of the respondent's household, the respondent's age, and the annual household gross income. A majority of the respondents either live alone (16.6 percent) or live in a 2-person household (36.2 percent). The largest age groups represented by the respondents are 45 to 54 (28.9 percent) and 35 to 44 (27.6 percent). Keeping these two facts in mind, it should come as no surprise that more than half of the respondents had an annual household income of over $100,000.

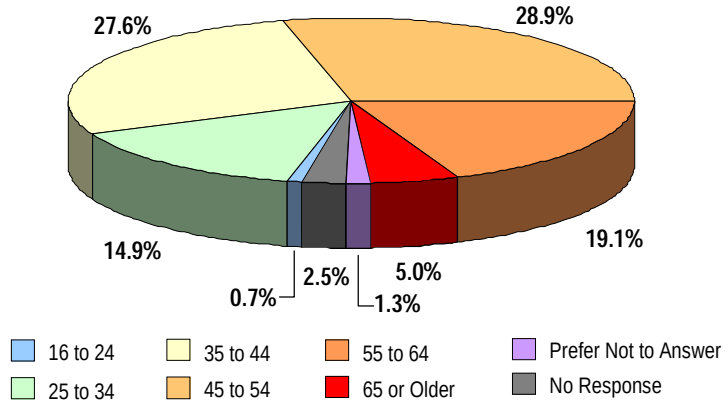
More details regarding all the demographic questions can be found in Appendix B.


Dulles Toll Road Stated Preference Survey
You are making a highway journey of 15 miles.
Please consider the following situation where you have to choose between two highways (A or B). State which option you would choose if the traffic conditions are as illustrated:
• On Highway A, traffic during the journey is either busy or it is stop-and-go traffic.
• On Highway B, there is always light congestion.
Busy
You can travel near the speed limit, but you are forced to change lanes every now and then.
Stop and Go
You are forced to drive in a "stop-and-go" fashion.
Light Congestion
You can travel close to the speed limit most of the time, but you have to slow down occasionally for no apparent reason.
Situation 1 | Highway A | Highway B
Journey time in busy traffic | 5 minutes |
Journey time in stop-and-go traffic | 5 minutes |
Journey time in light congestion | | 15 minutes
Total Journey Times | 10 minutes | 15 minutes
Please make your selection here:
Highway A
Highway B
Survey Completion
0%
100%
Wilbur Smith Associates
Metropolitan Washington Airports Authority
NEXT

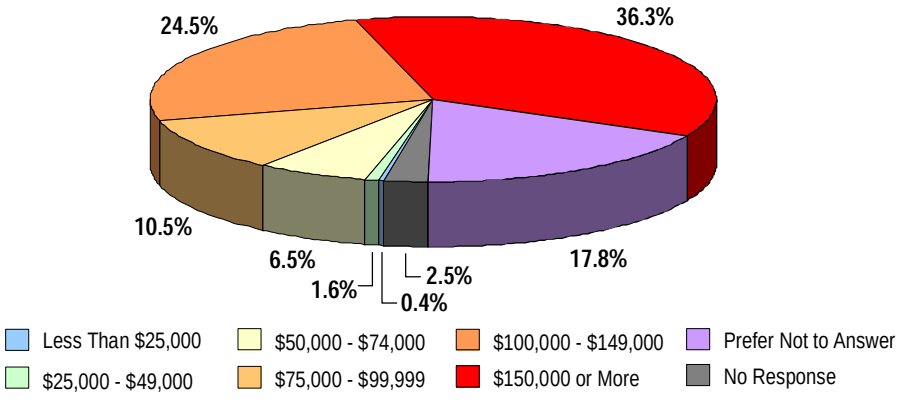
Household Size



Age



Annual Household Gross Income



CHAPTER 4

CORRIDOR GROWTH ASSESSMENT

The MWCOG in conjunction with the local governments in the area forecasted a new set of regional demographics approved in January 2008. This most recent Round 7.1 forecast incorporates the anticipated effects of DoD's Base Realignment and Closure (BRAC) and the proposed High Occupancy Toll (HOT) Lanes projects on the region. The forecast projects population, employment and households for the five counties and independent cities in the vicinity of Dulles Toll Road.

The forecasts of population, employment and households are a key input for the trip generation step in building travel demand model trip tables. These trip tables are at the foundation of the travel demand model in key forecasting years and accordingly future traffic and revenue estimates for the DTR. It is therefore vital to review these underlying demographic assumptions.

As part of this study, an independent firm, Linden Street Associates, Inc. was retained in 2008 to review and update the demographic information forecasted by MWCOG on the DTR corridor. A separate report has been prepared by them and is included in Appendix C of this report.

This chapter of the report provides a summary of the demographic information from MWCOG and other sources and further explores trends in development and other socioeconomic data as available in 2009. The first section of this chapter defines current DTR corridor development. Subsequently, the historical and projected growth trends of population and employment are reviewed at both the County and Corridor level. The income trends of the region are analyzed as well as the anticipated direction of future development in the DTR corridor.

CORRIDOR DESCRIPTION AND CURRENT DEVELOPMENT

For the purposes of modeling the DTR corridor was defined as parts of Fairfax County, Arlington and Loudoun Counties, represented by 175 traffic analysis zones (TAZs) as defined by the MWCOG travel demand model.

MAJOR EMPLOYERS

A review of the region's major employers was undertaken to understand the current location and size of those traffic generators. Table 4-1 lists the 50 largest private sector employers in Washington DC. Tables 4-2 through 4-7 list the 50 largest employers in the following Virginia areas: Alexandria City, Arlington County, Fairfax City, Fairfax County, Falls Church City, and Loudoun County, respectively. Table 4-8 lists the 61 largest employers in Montgomery County, Maryland. This list includes 61 employers because the top 50 could not be discerned from the information available.

Many large employers have located close to the current interstate highway network providing good access for their employees.

Table 4-1
Fifty Largest Employers in Each Community of the DTR Study Area
Washington DC (private sector)

Howard University	Computer Science Corporation
Georgetown University	AARP
George Washington University	Renaissance Hotel
Washington Hospital Center	National Geographic Society
Children's National Hospital	Potomac Electric Power Company
Fannie Mae	Hale and Dorr LLP
Georgetown University Hospital	MGMC, LLC.
American University	Bureau of National Affairs
Howard University Hospital	Blue Cross Blue Shield
Providence Hospital	DC Water & Sewer Authority
The Catholic University of America	Unico Service Company
The Washington Post Newspaper	Aramark Sports, Inc.
Marriott Hotel Services, Inc.	Hogan & Hartson
Corporate Executive Board (Advisory Board)	Sodexho Services, LLC.
Sibley Memorial Hospital	Pricewaterhouse Coopers
The George Washington Hospital	KPMG Peat Marwick
American National Red Cross	Wackenhut Services, Inc.
National Rehabilitation Hospital	Macy's (Hecht)
Safeway, Inc.	ABM, Inc.
Gallaudet University	Miller & Long Company, Inc.
Admiral Security Service	Academy for Educational Development
Hyatt Corporation	Verizon
Greater Southeast Community Hospital	Arnold & Porter
The National Academies of Science	Coastal International
The Capital Hilton	Starbucks Coffee Corporation

Source: *2007 Directory of Major Employers in the District of Columbia* , DC Department of Employment Services

Table 4-2
Fifty Largest Employers in Each Community of the DTR Study Area
Alexandria City, Virginia

	Employees		Employees
US Department of Commerce	1000 and over	Fitness First	250-499
US Department of Defense	1000 and over	Robbins Gioia	250-499
City of Alexandria	1000 and over	Catholic Diocese of Arlington	250-499
Alexandria City Public Schools	1000 and over	Giant Food	250-499
The Alexandria Hospital	1000 and over	Coca Cola	250-499
Washington Metro Area Transit Authority	1000 and over	Goodwin House, Inc.	250-499
ABM Janitorial Services, Inc.	1000 and over	Resource Management	250-499
Institute for Defense Analysis	500-999	Vanguard Car Rental USA, Inc.	250-499
Northern Virginia Community College	500-999	American Diabetes Association	250-499
CNA Corporation	500-999	Target Corporation	250-499
US Army Non-Appropriated Funds Division	500-999	Hilton Alexandria	250-499
Gali Service Industries	500-999	Michael Baker Jr.	250-499
Grant Thornton LLP	500-999	Pentagon Federal Credit Union	250-499
United Parcel Service, Inc.	500-999	Nat'l Ctr for Missing & Exploited Children	250-499
Oblon Spivak McClelland PC	500-999	Clinical Oncology	250-499
Public Broadcasting Services	250-499	Systems Research and Application	250-499
US Department of Agriculture	250-499	Computer Sciences Corporation	250-499
Harris IT Services Corporation	250-499	AB Car Rental Services, Inc.	100-249
System Plan and Analysis	250-499	Fresh Fields Whole Food Market	100-249
Woodbine Rehabilitation & Heal	250-499	Trawick & Associates	100-249
Comcast Cablevision	250-499	The Titan Corporation	100-249
Inter Con Security System	250-499	Crs Facilities Services	100-249
Ace Temporaries	250-499	May Department Stores Company	100-249
US Postal Service	250-499	Cuisine Solutions, Inc.	100-249
Boat America Corporation	250-499	Old Town Hotel	100-249

Source: Virginia Employment Commission; 4th Quarter 2008

Table 4-3
Fifty Largest Employers in Each Community of the DTR Study Area
Arlington County, Virginia

	Employees		Employees
US Department of Defense	1000 and over	Catholic Diocese of Arlington	500-999
Arlington County School Board	1000 and over	Anser	500-999
County of Arlington	1000 and over	National Rural Electric Cooperative Assn.	500-999
United Air Lines	1000 and over	US Fish & Wildlife Service	500-999
US Department of Homeland Defense	1000 and over	AES Services, Inc.	500-999
Virginia Hospital Center	1000 and over	Holiday Inn Hotel and Suites	500-999
US Department of Justice	1000 and over	Nordstrom	500-999
Science Applicatins International Corp.	1000 and over	Administaff	250-499
National Science Foundation	1000 and over	Unisys Corporation	250-499
US Airways	1000 and over	Washington Metro Area Transit Authority	250-499
Pearson Government Solutions, Inc.	1000 and over	Caci	250-499
Strayer College	1000 and over	Lockheed Martin	250-499
US Environmental Protection Agency	1000 and over	The Nature Conservancy	250-499
Systems Research and Application	1000 and over	Watson Wyatt Worldwide	250-499
The Titan Corporation	1000 and over	Friedman Billings Ramsey, Inc.	250-499
US Postal Service	500-999	George Mason University	250-499
US General Services Administration	500-999	Costco	250-499
Bureau of National Affair, Inc.	500-999	PAE Government Services, Inc.	250-499
American Airlines, Inc.	500-999	CMS Information Services, Inc.	250-499
Metro Washington Airports Authority	500-999	Corporate Executive Board	250-499
May Department Store Company	500-999	Computer Sciences Corporation	250-499
Marriott Hotel Services	500-999	McDonnell Douglas Corporation	250-499
Integrated Microcomputer Systems	500-999	Raytheon Company	250-499
Harris Teeter Supermarket	500-999	Miller and Long Company, Inc.	250-499
Marymount University	500-999	Allbritton Communications	250-499

Source: Virginia Employment Commission; 4th Quarter 2008

Table 4-4
Fifty Largest Employers in Each Community of the DTR Study Area
Fairfax City, Virginia

	Employees		Employees
City of Fairfax, Inc.	250-499	Virginia Dept of Alcoholic Beverage Control	100-249
Fairfax Nursing Center	250-499	Farrish of Fairfax, Inc.	100-249
Virginia Electric & Power Compnay, Inc.	250-499	Jumbo Food Stores	100-249
The Wackenhut Corporation	250-499	Super H Mart	100-249
The Home Depot	250-499	Farifax Chrysler, Plymouth	100-249
Zeta Associates	250-499	Chenega Integrated System	100-249
A&L Service Industries	100-249	Trident Systems, Inc.	100-249
Fairfax Volkswagen, Honda	100-249	Qwest Government Services	100-249
Carfax	100-249	Army Navy Country Club	50-99
Ted Britt Ford Sales, Inc.	100-249	Red Lobster & The Olive Garden	50-99
US General Services Administration	100-249	Fairfax Surgery Center	50-99
Catholic Diocese of Arlington	100-249	Bank of America	50-99
Inova Fairfax Hospital	100-249	Capital Investments Impro, Inc.	50-99
Integrated Microcomputer System	100-249	Medforce Incorporated	50-99
Commonwealth Care Center	100-249	W R Systems Ltd.	50-99
US Department of Homeland Defense	100-249	Home Health Option Group	50-99
US Postal Service	100-249	Caring Nurses Advocates for Patients	50-99
Multivision, Inc.	100-249	Comfort Keepers	50-99
D.A. Foster Company	100-249	Giant Food	50-99
Ourisman Fairfax Toyota	100-249	Omni Resource, Inc.	50-99
Burton & Robinson, Inc.	100-249	Technical Analysis Center, Inc.	50-99
Tetra Tech	100-249	BB & T Corp.	50-99
Verizon of Virginia, Inc.	100-249	Danneman Fabrics	50-99
Fantastic Fritzbes	100-249	Trinity Christian School of Fairfax, Inc.	50-99
Job Discovery	100-249	US Department of the Treasury	50-99

Source: Virginia Employment Commission; 4th Quarter 2008

Table 4-5
Fifty Largest Employers in Each Community of the DTR Study Area
Fairfax County, Virginia

	Employees		Employees
Fairfax County Public Schools	1000 and over	Anteon Corporation	1000 and over
County of Fairfax	1000 and over	US Department of Homeland Defense	1000 and over
Inova Fairfax Hospital	1000 and over	Target Corporation	1000 and over
Booz, Allen and Hamilton	1000 and over	Administaff	1000 and over
US Department of Defense	1000 and over	Safeway	1000 and over
George Mason University	1000 and over	Electronic Data Systems Corporation	1000 and over
Science Applications International Corp.	1000 and over	pricewaterhousecoopers	1000 and over
Federal Home Loan Mortgage	1000 and over	Northern Virginia Community College	1000 and over
Lockheed Martin	1000 and over	General Dynamics Advanced, Inc.	1000 and over
Navy Federal Credit Union	1000 and over	Systems Research and Application	1000 and over
The Mitre Corporation	1000 and over	Wal-Mart	1000 and over
Sprint United Management	1000 and over	May Department Stores Company	1000 and over
Computer Sciences Corporation	1000 and over	Gannett Satellite Information Network	1000 and over
US Postal Service	1000 and over	The Home Depot	1000 and over
Giant Food	1000 and over	J.D. Edwars World Sol Co	1000 and over
The Analytic Sciences Corporation	1000 and over	Sunrise of Falls Church	1000 and over
IBM Corporation	1000 and over	Exxonmobil Corporation	1000 and over
Bearing Point	1000 and over	Unisys Corporation	1000 and over
Northrop Grumman, Inc.	1000 and over	United Parcel Service, Inc.	1000 and over
Raytheon Company	1000 and over	Mantech Strategic Associates Ltd.	1000 and over
ITT Industries	1000 and over	MetPath	1000 and over
Accenture Consulting	1000 and over	Cathonlic Diocese of Arlington	1000 and over
BAE Systems Enterprise, Inc.	1000 and over	US Social Security Administration	1000 and over
TRW, Inc.	1000 and over	US Department of the Interior	1000 and over
The Titan Corporation	1000 and over	Reston Medical Facility	1000 and over

Source: Virginia Employment Commission; 4th Quarter 2008

Table 4-6
Fifty Largest Employers in Each Community of the DTR Study Area
Falls Church City, Virginia

	Employees		Employees
US Department of Defense	1000 and over	Knowlogy Corporation	50-99
City of Falls Church School Board	250-499	Sunrise of Falls Church	50-99
Reston Medical Facility	250-499	Capital Home Health Dip	50-99
City of Falls Church	250-499	Wallace Enterprises	50-99
Penguin Service Group, Inc.	100-249	Virginia Tech Cooperative Extension Office	50-99
Tax Analysis	100-249	VL Home Health Care, Inc.	50-99
Systems Research and Application	100-249	Spring Cleaning & Maintenance, Inc.	50-99
US Postal Service	100-249	Yellow Cab	50-99
Medcall of Virginia	100-249	Capital Legal Solutions	50-99
United Air Temp	100-249	Applebee's Neightborhood Grill	50-99
Koons Ford	100-249	Northern Virginia Pediatrics PC	20-49
Planned Systems International	100-249	L.F. Jennings, Inc.	20-49
Don Beyer Motors	100-249	US Department of Justice	20-49
Giant Food	100-249	International Motors Limited	20-49
Metropolitan Home Care, Inc.	100-249	Starbucks Coffee	20-49
Falls Church Medical Facility	50-99	Michael's	20-49
Corestaff Services	50-99	Richards Air Conditioning Company	20-49
Ann E. O'Neill, Inc.	50-99	Falls Church Auto Body Corp	20-49
Administaff	50-99	Network Security Systems	20-49
Home Instead Senior Care	50-99	Coleman Powersport	20-49
BG Healthcare Services	50-99	Noland Company, Inc.	20-49
Catholic Diocese of Arlington	50-99	United Hospitality Solutions	20-49
Univerisity of Virginia/Blue Ridge Hospital	50-99	Original Pancake House	20-49
Case Design and Remodeling	50-99	The State Theatre	20-49
The Falls Church	50-99	Blue Salt Restaurant	20-49

Source: Virginia Employment Commission; 4th Quarter 2008

Table 4-7
Fifty Largest Employers in Each Community of the DTR Study Area
Loudoun County, Virginia

	Employees		Employees
Loudoun County Schools	1000 and over	Wegmans Store #07	500-999
County of Loudoun	1000 and over	Loudoun Medical Group	500-999
AOL LLC	1000 and over	National Electronics Warr Corporation	500-999
Worldcom	1000 and over	Harris Teeter Supermarket	500-999
M.C. Dean, Inc.	1000 and over	Neustar, Inc.	250-499
US Department of Homeland Defense	1000 and over	Northern Virginia Community College	250-499
United Air Lines	1000 and over	Prospect Waterproofing Company	250-499
Loudoun Hospital Center	1000 and over	McDonald's	250-499
Orbital Sciences Corporation	1000 and over	Swissport U.S.A., Inc.	250-499
US Postal Service	1000 and over	Town of Leesburg	250-499
United Express Airtran Jet Con	1000 and over	Dynalectric Company	250-499
Wal-Mart	1000 and over	NLX Corporation	250-499
US Department of Transportation	500-999	George Washington University	250-499
Southland Concrete Corporation	500-999	Food Lion	250-499
Gate Gourmet	500-999	Arministaff	250-499
Giant Food	500-999	Airline Tarriff Publishers	250-499
Target Corporation	500-999	Mastec Services Company, Inc.	250-499
God Bless America, Inc.	500-999	Falcons Landing	250-499
Costco	500-999	Hunt Leigh USA Corp	250-499
Metro Washington Airports Authority	500-999	J.K. Moving & Storage	250-499
Verisign	500-999	NALC Health Benefit Plan	250-499
Founder's Inn and Lansdowne Resort	500-999	Southland Industries of Virginia	250-499
Toll Brothers, Inc.	500-999	Telos Corporation	250-499
Club Demonstration Service	500-999	Computer Sciences Corporation	250-499
The Home Depot	500-999	Federal Express	250-499

Source: Virginia Employment Commission; 4th Quarter 2008

Table 4-8
Fifty Largest Employers in Each Community of the DTR Study Area
Montgomery County, Maryland

	Employees		Employees
Admiral Security	1000 and over	Best Buy	500-999
Adventist Healthcare, Inc.	1000 and over	Chi Centers, Inc.	500-999
Booz Allen & Hamilton	1000 and over	Clark Construction Group LLC	500-999
Chevy Chase Federal Savings Bank	1000 and over	Comcast	500-999
Darcars of Rockville, Inc.	1000 and over	Comm Svs for Autistic Adults & Children	500-999
Discovery Communications LLC	1000 and over	Costar Realty Information	500-999
Geico	1000 and over	CVS	500-999
Giant Food Stores	1000 and over	Hebrew Home of Greater Washington	500-999
Heartland Employment Services, Inc.	1000 and over	Human Genome Sciences, Inc.	500-999
Henry M Jackson Foundation	1000 and over	Kelly Services	500-999
Holy Cross Hospital of Silver Spring	1000 and over	LM Support, Inc.	500-999
Home Depot	1000 and over	Macy's	500-999
Hughes Network Systems	1000 and over	Marriott Hotels	500-999
IBM Corporation	1000 and over	Marriott Senior Living Services	500-999
Kaiser Permanente	1000 and over	McDonald's Restaurants of Maryland	500-999
Lockheed Martin Corporation	1000 and over	Miller & Long Company, Inc.	500-999
Marriott Int'l Adminstrative Services	1000 and over	NASD Regulation, Inc.	500-999
Medimmune, Inc.	1000 and over	Nordstrom	500-999
Montgomery General Hospital, Inc.	1000 and over	Potomac Minute Maid, Inc.	500-999
Safeway	1000 and over	Professional Staff Leasing/HR Systems	500-999
Suburban Hospital	1000 and over	RGIS Inventory Specialists	500-999
Target	1000 and over	Rider Wood Village, Inc.	500-999
Verizon Maryland	1000 and over	Sandy Spring National Bank of Maryland	500-999
Verizon Services Corporation	1000 and over	Sears	500-999
Westat Research, Inc.	1000 and over	Shoppers Food Warehouse	500-999
Administaff Companies	500-999	Starbucks Coffee Company	500-999
ARC of Montgomery County, Inc.	500-999	Thales Communications, Inc.	500-999
Asbury Methodist Village	500-999	United Healthcare Management Corp.	500-999
BAE Systems Applied Technologies	500-999	Verizon Data Services, Inc.	500-999
Bank of America	500-999	Wal-Mart/Sam's Club	500-999
		Whole Foods Markets	500-999

Note: There are 61 employers shown because the source listed the firms alphbetically and the top 50 could not be determined.

Source: Maryland Department of Labor, Licensing & Regulation; March 2008

POPULATION TRENDS AND PROJECTIONS

Population trends and projections for the five counties in the service area of the DTR were reviewed. The following provides a summary of the analysis.

HISTORICAL POPULATION TRENDS

Table 4-9 shows the historical population trends for selected counties in the States of Maryland and Virginia, and for the District of Columbia. The total population in the study area has increased by an annual rate of 1.2 percent from 1970 to 2000, adding approximately 850,000 additional residents to the area.

Table 4-9
Population in the Study Area for Years of 1970 to 2000
(thousands)

	1970	1980	CAGR	1990	CAGR	2000	CAGR	CAGR 1970-2000
Fairfax County[1]	489.63	631.42	2.6%	851.11	3.0%	1,007.14	1.7%	2.4%
Loudoun County	37.41	57.77	4.4%	87.21	4.2%	173.88	7.1%	5.3%
Arlington County[2]	285.09	256.88	-1.0%	282.65	1.0%	319.03	1.2%	0.4%
District of Columbia	755.41	637.16	-1.7%	605.32	-0.5%	571.80	-0.6%	-0.9%
Montgomery County	525.07	581.95	1.0%	765.48	2.8%	877.71	1.4%	1.7%
	2,092.61	**2,165.18**	**0.3%**	**2,591.77**	**1.8%**	**2,949.56**	**1.3%**	**1.2%**

Notes:
[1]Fairfax County includes the county, Fairfax City, and Falls Church City.
[2]Arlington County includes the county and Alexandria City.

Source: Woods and Poole Economics, Inc; September 2008 (data obtained June 2009)

Over the 30-year period, Fairfax and Loudoun Counties in Virginia grew at a faster pace (CAGRs of 2.4 percent and 5.3 percent, respectively) than Montgomery County in Maryland (1.7 percent CAGR). Arlington County experienced a small compound annual growth rate of 0.4 percent during this time period. Washington D.C. had a negative CAGR or -0.9 percent.

Montgomery County grew from 525,070 residents in 1970 to 877,710 residents in 2000. The addition of over 350,000 residents in the 30-year period was second to only Fairfax County (517,500) which includes the Cities of Fairfax and Falls Church for this analysis.

PROJECTED POPULATION GROWTH

Population growth forecasts in the service area of the DTR are obviously an important determinant of future growth in travel demand. Forecasts were obtained and reviewed at the county level. Table 4-10 presents a summary of corridor population projections through 2030.

Table 4-10
Population Forecast up to Year 2030
(thousands)

	2000	2010	CAGR	2020	CAGR	2030	CAGR	CAGR 2000-2030
Fairfax County[1]	1,007.14	1,113.76	1.0%	1,348.11	1.9%	1,586.10	1.6%	1.5%
Loudoun County	173.88	321.54	6.3%	463.61	3.7%	605.71	2.7%	4.2%
Arlington County[2]	319.03	347.99	0.9%	361.60	0.4%	377.16	0.4%	0.6%
District of Columbia	571.80	587.18	0.3%	587.77	0.0%	591.96	0.1%	0.1%
Montgomery County	877.71	951.42	0.8%	1,025.64	0.8%	1,104.70	0.7%	0.8%
	2,949.56	**3,321.89**	**1.2%**	**3,786.73**	**1.3%**	**4,265.63**	**1.2%**	**1.2%**

Notes:
[1]Fairfax County includes the county, Fairfax City, and Falls Church City.
[2]Arlington County includes the county and Alexandria City.

Source: Woods and Poole Economics, Inc; September 2008 (data obtained June 2009)

By 2010, corridor population is expected to increase by 372,330 with a CAGR of 1.2 percent, resulting in over 3.32 million residents in the area. Loudoun County has the highest projected per annum growth between 2000 and 2010, i.e., 6.3 percent, and it has the highest growth for the entire forecast period as well, 4.2 percent. Fairfax County stands next with per annum increases of 1.5 percent until 2030. Montgomery County is anticipated to add nearly 270,000 residents from 2000 to 2030 growing at a rate of 0.8 percent per year.

EMPLOYMENT TRENDS AND PROJECTIONS

Similar to the population data review outlined in the previous section, historical and projected employment in the region was also analyzed. Employment growth in an area is typically followed by a proportional increase in demand on transportation infrastructure.

HISTORICAL EMPLOYMENT TRENDS

The historical employment trend in the region by county is shown in Table 4-11. Between 1990 and 2000 the region gained approximately 300,000 jobs reflecting a growth rate of 3.2 percent. The maximum increase was in Loudoun County, 7.6 percent for 1990-2000 period, and 6.7 percent for 1970-2000. Fairfax stood next with a 5.5 percent growth rate for the same period.

Table 4-11
Employment in the Study Area for Years of 1970 to 2000
(thousands)

	1970	1980	CAGR	1990	CAGR	2000	CAGR	CAGR 1970-2000
Fairfax County[1]	148.82	303.38	7.4%	561.13	6.3%	747.72	2.9%	5.5%
Loudoun County	15.76	25.77	5.0%	53.57	7.6%	111.17	7.6%	6.7%
Arlington County[2]	213.79	240.11	1.2%	306.30	2.5%	315.49	0.3%	1.3%
District of Columbia	673.76	706.56	0.5%	788.47	1.1%	756.98	-0.4%	0.4%
Montgomery County	235.40	349.95	4.0%	517.14	4.0%	598.30	1.5%	3.2%
	1,287.53	**1,625.77**	**2.4%**	**2,226.61**	**3.2%**	**2,529.66**	**1.3%**	**2.3%**

Notes:
[1]Fairfax County includes the county, Fairfax City, and Falls Church City.
[2]Arlington County includes the county and Alexandria City.

Source: Woods and Poole Economics, Inc; September 2008 (data obtained June 2009)

The District of Columbia showed the smallest increase in employment adding just over 83,000 jobs from 1970 to 2000. Despite this, the District continued to lead the region in employment contributing a 29.9 percent share of the region's total employment. Fairfax County was second with 29.6 percent share of region's employment in 2000.

PROJECTED EMPLOYMENT GROWTH

Table 4-12 shows the projected employment estimates for the region. For the 30-year period from 2000 to 2030 the region is expected to add approximately 1.38 million jobs growing at an annual average rate of 1.5 percent.

Table 4-12
Employment Forecast up to Year 2030
(thousands)

	2000	2010	CAGR	2020	CAGR	2030	CAGR	CAGR 2000-2030
Fairfax County[1]	747.72	901.64	1.9%	1,072.04	1.7%	1,273.16	1.7%	1.8%
Loudoun County	111.17	186.55	5.3%	260.90	3.4%	365.81	3.4%	4.1%
Arlington County[2]	315.49	332.04	0.5%	358.36	0.8%	383.38	0.7%	0.7%
District of Columbia	756.98	841.17	1.1%	926.76	1.0%	1,009.62	0.9%	1.0%
Montgomery County	598.30	691.51	1.5%	782.25	1.2%	882.58	1.2%	1.3%
	2,529.66	**2,952.91**	**1.6%**	**3,400.31**	**1.4%**	**3,914.55**	**1.4%**	**1.5%**

Notes:
[1]Fairfax County includes the county, Fairfax City, and Falls Church City.
[2]Arlington County includes the county and Alexandria City.

Source: Woods and Poole Economics, Inc; September 2008 (data obtained June 2009)

In 2000, the corridor had over 2.5 million jobs. Over 423,000 jobs are expected to be added by 2010, with an average annual growth rate of 1.6 percent. The most rapid growth in employment is projected in Fairfax and Montgomery Counties. In absolute

terms, Fairfax and Montgomery Counties are expected to add over 809,000 jobs through 2030. The rate of employment growth is expected to remain generally steady between 2010 and 2030, with projected per-annum increases of 1.4 percent followed by 1.4 percent through 2020 and 2030 respectively.

By 2030, employment levels in the region are expected to reach almost 3.9 million, with maximum contribution made by Virginia counties.

PERSONAL INCOME TRENDS

Travel demand on a toll facility is sensitive to, among other things, the amount of disposable income available in a household. A reliable indicator of an individual's propensity to pay tolls instead of a free alternative is their personal income; this is a key input into the calculation of the value of time for a motorist as there is typically a relationship between value of time, income and the motorists' willingness to pay.

In 1990, as shown in Table 4-13, total personal income for the study area was $105.29 million, with Fairfax County contributing over one-third. Total incomes increased by an annual rate of 5.0 percent between 1990 and 2000, with Loudoun having the greatest annual growth of 7.1 percent and with Fairfax County retaining the largest share. Further, Table 4-14 shows the forecasts of personal incomes in the region through 2030. Growth in incomes is expected to be lower but positive in the future years, with an annual percent growth of 2.6 percent.

Looking at personal rather than regional income, Figure 4-1 depicts per capita income for the region. It is evident from the bar chart that there has been consistent growth in per capita personal income historically, which is expected to continue to increase in a similar manner in the future. In 2000, Fairfax County residents' per capita income was the greatest in the region. Montgomery County is next followed by Arlington County. The per capita income for the region rose to around $51,380 (in 2004 dollars) in 2000 which reflects a 2.4 percent growth per annum compared to per capita income in 1990. Personal incomes in the study area are significantly higher than the U.S. average. For example, the 2000 per capita U.S. income was $32,008 (in 2004 dollars) compared to $54,235 (2004 dollars) in Fairfax County.

Per capita incomes are projected to rise at a rate of a low 1.2 percent per annum from 2010 to 2020. Per capita income for year 2030 is expected to be $77,789 (in 2004 dollars), equivalent to a 1.4 percent per annum growth from year 2000.

Table 4-13
Personal Income in the Study Area for Years of 1970 to 2000
(in millions of 2004 dollars)

	1970	1980	CAGR	1990	CAGR	2000	CAGR	CAGR 1970-2000
Fairfax County[1]	10,892	19,517	6.0%	35,477	6.2%	54,622	4.4%	5.5%
Loudoun County	673	1,513	8.4%	2,999	7.1%	7,754	10.0%	8.5%
Arlington County[2]	7,079	8,645	2.0%	11,975	3.3%	16,899	3.5%	2.9%
District of Columbia	15,389	16,329	0.6%	21,578	2.8%	25,041	1.5%	1.6%
Montgomery County	14,170	18,888	2.9%	33,259	5.8%	47,232	3.6%	4.1%
	48,203	**64,891**	**3.0%**	**105,288**	**5.0%**	**151,548**	**3.7%**	**3.9%**

Notes:
[1]Fairfax County includes the county, Fairfax City, and Falls Church City.
[2]Arlington County includes the county and Alexandria City.

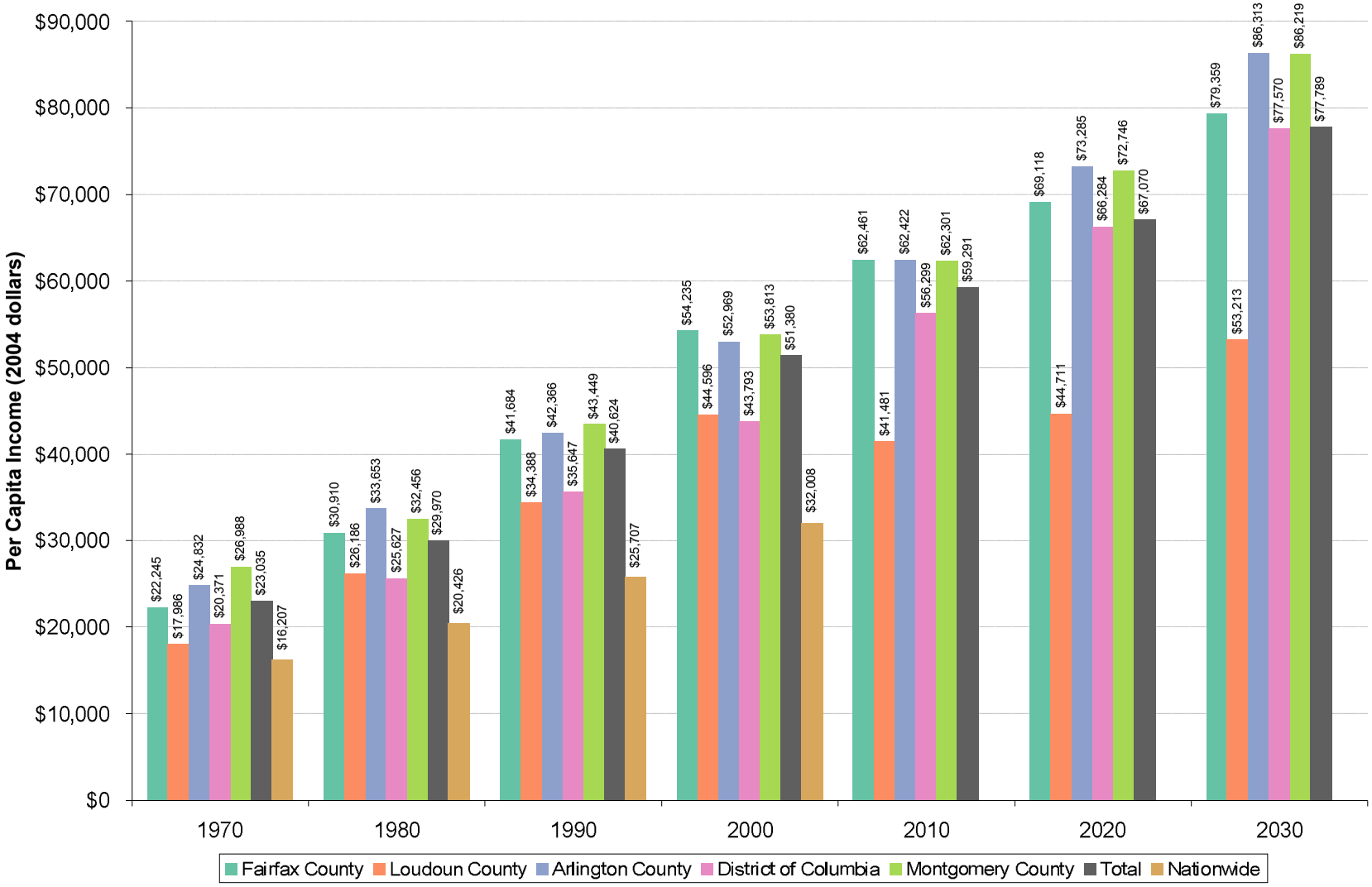
Source: Woods and Poole Economics, Inc; September 2008 (data obtained June 2009)

Table 4-14
Personal Income Forecast up to Year 2030
(in millions of 2004 dollars)

	2000	2010	CAGR	2020	CAGR	2030	CAGR	CAGR 2000-2030
Fairfax County[1]	54,622	69,566	2.4%	93,178	3.0%	125,871	3.1%	2.8%
Loudoun County	7,754	13,338	5.6%	20,729	4.5%	32,232	4.5%	4.9%
Arlington County[2]	16,899	21,722	2.5%	26,500	2.0%	32,554	2.1%	2.2%
District of Columbia	25,041	33,058	2.8%	38,960	1.7%	45,918	1.7%	2.0%
Montgomery County	47,232	59,275	2.3%	74,611	2.3%	95,246	2.5%	2.4%
	151,548	**196,959**	**2.7%**	**253,977**	**2.6%**	**331,821**	**2.7%**	**2.6%**

Notes:
[1]Fairfax County includes the county, Fairfax City, and Falls Church City.
[2]Arlington County includes the county and Alexandria City.

Source: Woods and Poole Economics, Inc; September 2008 (data obtained June 2009)



Source: Woods and Poole, Inc.; September 2008 (data obtained June 2009)

WilburSmith ASSOCIATES

COMPARISON OF PER CAPITA PERSONAL INCOME

FIGURE 4-1

FUTURE DIRECTION OF DEVELOPMENT IN THE PROJECT CORRIDOR

Previous sections discussed population and employment forecasts at the county and the regional level. In support of the forecasts, proposed development data was gathered and analyzed. This data was collected for both residential and commercial developments.

With the expected population growth, the area will demand residential development. Significant residential developments in Fairfax County include new developments close to existing major commercial development and Dulles International in the service area of DTR. A detailed description of the real estate submarkets is highlighted in Appendix C. Table 4-15 shows new residential developments in Arlington and Loudoun counties. Further, major commercial developments in Fairfax, Arlington and Loudoun counties are listed and discussed in Appendix C.

Table 4-15
Large Residential Construction Projects for Arlington and Loudoun Counties

County	Submarket	Project Name	Size
Arlington	Ballston	Liberty Corner	469 units
	Courthouse	The Park at Courthouse	571 units
	Crystal City	The Camden/The Eclipse	865 units
	Crystal City	The Concord	412 units
	East Falls Church	Easton	205 single family homes
	Pentagon City	Two Metropolitan Park	308 units
	Rosslyn	Turnberry Tower	337 units
	Rosslyn	Waterview	185 units, plus hotel
	Virginia Square	The Hawthorne	143 units
Loudoun	Ashburn	Potomac Green	251 units
	Ashburn	Brambelton (Ashburn section)	236 units
	Ashburn	Lansdowne Village Greens	225 units
	Ashburn	Belmont	220 units
	Dulles	Kirkpatrick Farms	223 units
	Dulles	Brambelton (Dulles section)	153 units
	Dulles	Stone Ridge	124 units
	Dulles	South Riding	107 units
	Potomac	Cascades	103 units
	Leesburg	Red Cedar	91 units

Source: Linden Street Associates

SUMMARY OF CORRIDOR GROWTH CHARACTERISTICS

The Washington D.C. region has been growing steadily over recent history as is evident from the historical socio-economic data. More recent growth has been greater in the suburban communities and as the communities adjacent to the urban core of Washington D.C. become saturated, the trend is for growth to occur at even further distances from the core. As population moves further out, employment has tended to follow.

Forecasting population and employment at the TAZ level is an important step in the creation of a travel demand model that will predict future traffic. For this study, the MWCOG's most recent forecasts were reviewed and refined by an independent consultant to ensure the most current trends and developments would be reflected. Since the detailed review, the national and local economies have undergone significant economic shocks. WSA reviewed in the first quarter of 2009 other local independent forecasters' updated views of the long term local economic and demographic outlook. In the views of such experts, it is believed that the local Washington Metro D.C. region is likely to grow at an even faster rate than the MWCOG forecast. For example the March 30, 2009 "Washington Area Economic Outlook" by Professor Steven Fuller of the GMU Center for Regional Analysis (CRA), predicts strong growth in gross regional product above 4% for the next four years for Northern Virginia. Most significantly CRA predict a higher growth in employment for Northern Virginia through 2013, averaging more than 20,000 additional jobs every year. Their long-term forecast for population meets or exceeds the projections of MWCOG for the region and significantly exceeds MWCOG's projections for Fairfax and Loudoun. CRA also predicts higher growth in jobs than MWCOG for the whole forecast period. NPA Data Services Inc. also predicts an increase of approximately 1 million in jobs and population for Fairfax and Loudoun through 2030.

At this time, WSA takes a more conservative view of economic recovery and continues to estimate DTR's traffic and revenue potential on the basis of MWCOG's assessments with appropriate adjustments as detailed in Appendix C. In addition, WSA has been able to adjust base year T&R forecasts to represent actual T&R in CY2008 and an estimated CY2009 based on first quarter results. It has also been possible to reflect a longer view of economic recovery through 2015 at which point WSA believes socio-economic development of the corridor will again be consistent with previously forecasted levels.

SOCIOECONOMIC FORECASTS

The Cooperative Forecasting Program launched by MWCOG, back in 1975, has allowed the local governments of the Washington region to develop neighborhood level forecasts of population, employment, and households. This effort provides necessary data for several regional planning activities. As described previously in this chapter, the forecasts of population, employment and households are a key input for the trip generation step in building travel demand model trip tables. MWCOG has available socioeconomic projections based on both traffic analysis zones (TAZ) and traffic analysis districts (TAD). This section details out region-wide population and employment forecasts developed until year 2030.

POPULATION GROWTH

The forecasted population growth by TAD in the vicinity of DTR is shown in Tables 4-16, 4-17, 4-18, and 4-19. Forecasts are included for 2005, 2010, 2020, and 2030. Figures 4-2 and 4-3 show the total population growth by TAD in the area around the toll road. Figure 4-2 shows the projected growth from 2007 to 2020, wherein we can see higher growth projected for outer suburbs mainly in Loudoun County. Figure 4-3 shows the projected growth in population from 2020 to 2030. It can be seen from the map that outer suburbs are still projected to grow, but at a relatively lower rate.

EMPLOYMENT GROWTH

The forecasted employment growth by TAD in the vicinity of DTR is shown in Tables 4-20, 4-21, 4-22, and 4-23. It can be seen TADs falling in Loudoun County are projected to grow at maximum pace in the region. Arlington county and D.C. areas have been projected to grow very minimally, including some areas having decrease in employment. Fairfax County is projected to have a moderate growth with some high growth patches around the Fairfax city and Tyson's Corner. These areas could be seen on the maps in Figures 4-4 and 4-5 showing growth in employment from 2005 to 2020 and 2020 to 2030 respectively. Employment growth in outer years (Figure 4-5) is projected to almost flat or negative, whereas suburban locations in Fairfax and Loudoun counties, particularly Reston, Herndon, and Route 28 Corridor, are expected to grow more as compared to Figure 4-4.

Table 4-16
Forecasted Population Growth by Traffic Analysis District (TAD)

COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Fairfax	25	14,784	1.0%	15,519	1.1%	17,299	1.0%	19,036	1.0%
Fairfax	41	22,885	1.4%	24,531	0.4%	25,491	0.2%	25,986	0.5%
Fairfax	49	11,937	-1.2%	11,260	0.0%	11,313	0.1%	11,456	-0.2%
Fairfax	63	43,961	-2.1%	39,603	-0.1%	39,182	0.0%	39,151	-0.5%
Fairfax	105	11,861	2.4%	13,356	3.4%	18,671	1.4%	21,510	2.4%
Fairfax	106	10,722	0.0%	10,719	0.0%	10,675	-0.1%	10,598	0.0%
Fairfax	256	31,649	1.1%	33,506	0.5%	35,077	0.3%	36,210	0.5%
Fairfax	257	14,932	1.2%	15,861	1.0%	17,536	0.0%	17,551	0.6%
Fairfax	258	19,148	0.5%	19,648	0.4%	20,359	0.2%	20,724	0.3%
Fairfax	259	23,200	0.1%	23,360	0.1%	23,664	0.1%	23,813	0.1%
Fairfax	260	10,554	0.1%	10,588	0.0%	10,613	0.1%	10,755	0.1%
Fairfax	266	8,036	1.5%	8,659	1.1%	9,657	0.3%	9,925	0.8%
Fairfax	269	18,193	2.4%	20,465	0.8%	22,206	1.3%	25,293	1.3%
Fairfax	270	35,931	0.4%	36,720	1.3%	41,694	1.2%	47,110	1.1%
Fairfax	271	27,320	0.7%	28,339	0.0%	28,441	0.0%	28,487	0.2%
Fairfax	277	14,142	2.0%	15,639	1.5%	18,102	0.8%	19,516	1.3%
Fairfax	278	21,930	0.3%	22,283	0.7%	23,778	0.2%	24,338	0.4%
Fairfax	279	35,663	0.1%	35,907	0.7%	38,440	0.4%	39,857	0.4%
Fairfax	280	38,105	0.2%	38,542	0.9%	42,013	0.3%	43,397	0.5%
Fairfax	281	49,752	0.8%	51,840	0.9%	56,894	0.3%	58,494	0.6%
Fairfax	282	26,204	0.6%	26,966	1.0%	29,792	0.4%	31,153	0.7%
Fairfax	283	29,561	0.7%	30,666	1.4%	35,345	0.3%	36,268	0.8%
Fairfax	284	42,572	2.0%	47,102	1.5%	54,692	1.0%	60,597	1.4%
Fairfax	285	22,400	0.4%	22,867	0.7%	24,471	0.1%	24,761	0.4%
Fairfax	286	34,016	1.1%	35,884	0.8%	38,690	0.2%	39,372	0.6%
Fairfax	287	19,703	0.8%	20,479	1.3%	23,259	0.6%	24,572	0.9%
Fairfax	288	27,934	0.4%	28,453	0.3%	29,445	0.1%	29,696	0.2%
Fairfax	289	22,158	0.1%	22,283	0.4%	23,207	0.1%	23,421	0.2%
Fairfax	290	39,021	3.1%	45,457	2.7%	59,308	0.9%	64,651	2.0%
Fairfax	291	13,949	1.7%	15,202	0.6%	16,155	0.1%	16,331	0.6%
Fairfax	292	8,042	5.8%	10,660	7.5%	21,956	1.7%	25,967	4.8%
Fairfax	293	8,794	1.3%	9,397	2.2%	11,722	0.2%	12,013	1.3%
Fairfax	294	44,766	1.8%	48,961	1.0%	54,262	0.1%	54,951	0.8%
Fairfax	296	22,030	1.0%	23,199	2.4%	29,495	0.8%	32,049	1.5%
Fairfax	297	37,392	0.5%	38,333	0.6%	40,519	0.1%	40,945	0.4%
Fairfax	298	32,621	0.2%	32,869	0.3%	34,025	0.1%	34,320	0.2%
Fairfax	299	40,192	0.3%	40,802	0.3%	42,204	0.1%	42,550	0.2%
Fairfax	300	43,255	1.8%	47,246	0.9%	51,660	0.2%	52,835	0.8%
Fairfax	301	23,329	0.8%	24,243	0.7%	25,969	0.4%	26,961	0.6%
Fairfax	302	11,810	0.7%	12,238	1.1%	13,648	0.2%	13,857	0.6%
Fairfax	303	14,335	2.1%	15,866	0.9%	17,400	0.1%	17,640	0.8%
Fairfax	306	4,919	3.5%	5,835	0.5%	6,152	0.1%	6,214	0.9%
Fairfax	307	3,573	1.9%	3,926	1.3%	4,472	0.2%	4,550	1.0%
Fairfax	308	16,112	1.3%	17,166	1.8%	20,578	0.2%	21,021	1.1%
Fairfax	309	39,363	3.8%	47,486	0.7%	50,974	0.4%	52,799	1.2%
Fairfax	310	32,088	0.5%	32,908	1.5%	38,048	0.5%	40,124	0.9%
Fairfax	311	58,481	2.6%	66,548	0.8%	71,737	0.5%	75,766	1.0%
Fairfax	312	31,870	0.6%	32,880	1.8%	39,487	0.4%	41,119	1.0%
Fairfax	313	39,629	0.7%	41,085	1.7%	48,534	0.7%	51,877	1.1%
Fairfax	314	63,972	3.2%	74,727	1.9%	89,807	0.7%	96,110	1.6%
Fairfax	315	28,177	0.3%	28,540	0.5%	29,919	0.1%	30,211	0.3%
Fairfax	316	8,074	1.0%	8,506	1.4%	9,753	0.2%	9,927	0.8%
Fairfax	322	57	0.0%	57	0.0%	57	0.0%	57	0.0%
Fairfax	323	2,215	2.1%	2,453	5.8%	4,311	1.5%	5,001	3.3%
Fairfax	324	27,725	0.6%	28,566	0.4%	29,616	0.9%	32,545	0.6%
Fairfax	325	45,732	0.4%	46,616	0.5%	49,001	0.7%	52,697	0.6%
Fairfax	326	15,540	8.8%	23,639	3.5%	33,500	0.7%	35,748	3.4%
Fairfax	355	7,745	5.5%	10,142	0.8%	10,942	2.0%	13,390	2.2%
Fairfax	356	22,279	3.2%	26,068	0.9%	28,649	0.6%	30,458	1.3%
Fairfax	358	31,139	1.6%	33,794	0.4%	35,285	1.2%	39,645	1.0%
Fairfax	366	15,895	6.0%	21,290	2.3%	26,604	1.5%	30,828	2.7%
Total Fairfax County[1]		**1,523,374**	**1.3%**	**1,627,750**	**1.1%**	**1,815,755**	**0.5%**	**1,908,204**	**0.9%**

[1] Fairfax County includes the County, Fairfax City and Falls Church City.

Source: MWCOG

Table 4-17
Forecasted Population Growth by Traffic Analysis District (TAD)

COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Loudoun	63	43,961	-2.1%	39,603	-0.1%	39,182	0.0%	39,151	-0.5%
Loudoun	70	584	0.7%	606	0.6%	645	1.3%	731	0.9%
Loudoun	71	6,428	-0.5%	6,265	1.3%	7,114	0.6%	7,554	0.6%
Loudoun	310	32,088	0.5%	32,908	1.5%	38,048	0.5%	40,124	0.9%
Loudoun	312	31,870	0.6%	32,880	1.8%	39,487	0.4%	41,119	1.0%
Loudoun	314	63,972	3.2%	74,727	1.9%	89,807	0.7%	96,110	1.6%
Loudoun	315	28,177	0.3%	28,540	0.5%	29,919	0.1%	30,211	0.3%
Loudoun	316	8,074	1.0%	8,506	1.4%	9,753	0.2%	9,927	0.8%
Loudoun	322	57	0.0%	57	0.0%	57	0.0%	57	0.0%
Loudoun	323	2,215	2.1%	2,453	5.8%	4,311	1.5%	5,001	3.3%
Loudoun	324	27,725	0.6%	28,566	0.4%	29,616	0.9%	32,545	0.6%
Loudoun	325	45,732	0.4%	46,616	0.5%	49,001	0.7%	52,697	0.6%
Loudoun	326	15,540	8.8%	23,639	3.5%	33,500	0.7%	35,748	3.4%
Loudoun	327	4,594	16.6%	9,922	6.7%	18,964	3.0%	25,489	7.1%
Loudoun	328	11,557	11.8%	20,218	6.3%	37,265	0.6%	39,654	5.1%
Loudoun	329	3,917	21.1%	10,216	7.7%	21,422	3.4%	29,835	8.5%
Loudoun	330	43,948	2.8%	50,512	1.6%	59,305	0.1%	59,857	1.2%
Loudoun	331	6,225	5.8%	8,245	11.9%	25,458	3.4%	35,624	7.2%
Loudoun	332	25,508	3.3%	29,936	2.2%	37,049	0.7%	39,639	1.8%
Loudoun	333	7,415	1.4%	7,961	1.7%	9,460	1.4%	10,854	1.5%
Loudoun	334	14,556	0.2%	14,686	0.6%	15,603	0.8%	16,951	0.6%
Loudoun	335	2,738	2.8%	3,142	4.2%	4,757	3.8%	6,924	3.8%
Loudoun	366	15,895	6.0%	21,290	2.3%	26,604	1.5%	30,828	2.7%
Loudoun	368	4,934	0.8%	5,136	0.7%	5,528	0.6%	5,857	0.7%
Total Loudoun County		**447,710**	**2.5%**	**506,630**	**2.2%**	**631,855**	**0.9%**	**692,487**	**1.8%**
Arlington	7	8,816	1.8%	9,648	0.6%	10,253	0.7%	10,952	0.9%
Arlington	14	-	-	-	-	-	-	-	-
Arlington	15	32,957	0.4%	33,683	0.5%	35,555	0.5%	37,524	0.5%
Arlington	24	12,531	3.1%	14,586	1.6%	17,112	0.9%	18,636	1.6%
Arlington	25	14,784	1.0%	15,519	1.1%	17,299	1.0%	19,036	1.0%
Arlington	35	11,041	2.4%	12,455	0.2%	12,750	0.3%	13,187	0.7%
Arlington	105	11,861	2.4%	13,356	3.4%	18,671	1.4%	21,510	2.4%
Arlington	245	-	-	-	-	-	-	-	-
Arlington	246	5,196	-0.7%	5,005	0.4%	5,191	1.5%	6,003	0.6%
Arlington	247	7,045	4.2%	8,644	1.8%	10,363	1.1%	11,592	2.0%
Arlington	248	-	-	-	-	-	-	-	-
Arlington	249	2,930	15.4%	5,985	1.6%	6,999	0.0%	6,999	3.5%
Arlington	250	21,587	1.5%	23,251	1.4%	26,821	0.1%	27,051	0.9%
Arlington	251	9,710	2.0%	10,716	1.2%	12,129	0.1%	12,244	0.9%
Arlington	252	7,282	3.6%	8,689	0.8%	9,395	1.0%	10,365	1.4%
Arlington	253	33,601	3.0%	38,969	1.4%	44,586	0.3%	45,959	1.3%
Arlington	254	4,938	1.2%	5,249	0.0%	5,223	0.0%	5,241	0.2%
Arlington	255	7,479	0.7%	7,745	0.2%	7,878	0.1%	7,971	0.3%
Arlington	256	31,649	1.1%	33,506	0.5%	35,077	0.3%	36,210	0.5%
Arlington	257	14,932	1.2%	15,861	1.0%	17,536	0.0%	17,551	0.6%
Arlington	258	19,148	0.5%	19,648	0.4%	20,359	0.2%	20,724	0.3%
Arlington	259	23,200	0.1%	23,360	0.1%	23,664	0.1%	23,813	0.1%
Arlington	260	10,554	0.1%	10,588	0.0%	10,613	0.1%	10,755	0.1%
Arlington	266	8,036	1.5%	8,659	1.1%	9,657	0.3%	9,925	0.8%
Arlington	267	10,587	1.6%	11,446	1.7%	13,601	1.3%	15,522	1.5%
Arlington	268	35,787	0.6%	36,959	0.9%	40,589	1.0%	44,749	0.9%
Arlington	269	18,193	2.4%	20,465	0.8%	22,206	1.3%	25,293	1.3%
Arlington	270	35,931	0.4%	36,720	1.3%	41,694	1.2%	47,110	1.1%
Arlington	271	27,320	0.7%	28,339	0.0%	28,441	0.0%	28,487	0.2%
Arlington	277	14,142	2.0%	15,639	1.5%	18,102	0.8%	19,516	1.3%
Arlington	278	21,930	0.3%	22,283	0.7%	23,778	0.2%	24,338	0.4%
Arlington	280	38,105	0.2%	38,542	0.9%	42,013	0.3%	43,397	0.5%
Arlington	281	49,752	0.8%	51,840	0.9%	56,894	0.3%	58,494	0.6%
Arlington	283	29,561	0.7%	30,666	1.4%	35,345	0.3%	36,268	0.8%
Arlington	284	42,572	2.0%	47,102	1.5%	54,692	1.0%	60,597	1.4%
Arlington	285	22,400	0.4%	22,867	0.7%	24,471	0.1%	24,761	0.4%
Total Arlington County[1]		**645,557**	**1.3%**	**687,990**	**1.0%**	**758,957**	**0.6%**	**801,780**	**0.9%**

[1] Arlington County includes the County and Alexandria City.

Source: MWCOG

Table 4-18
Forecasted Population Growth by Traffic Analysis District (TAD)

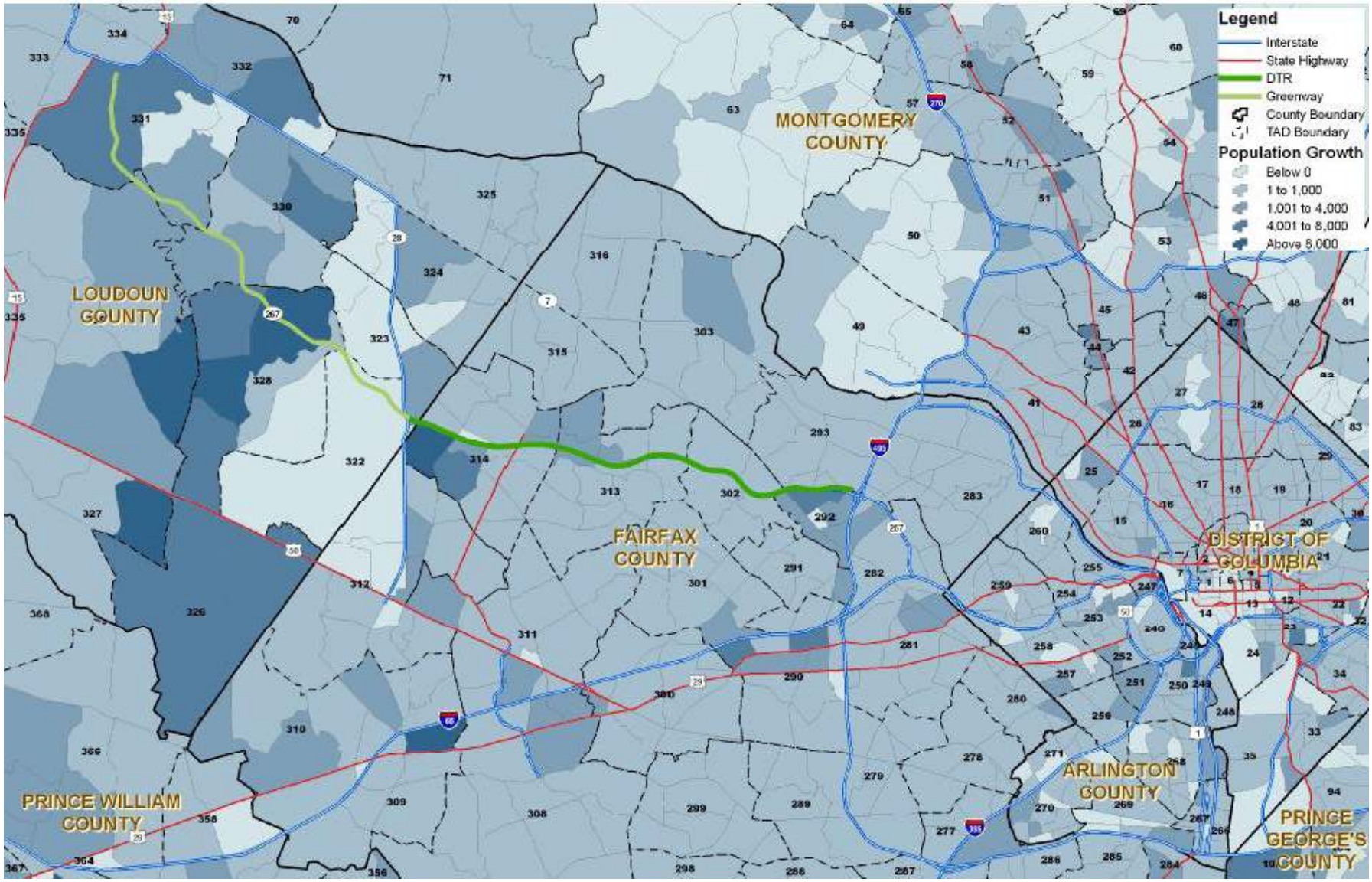
COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Prince William	306	4,919	3.5%	5,835	0.5%	6,152	0.1%	6,214	0.9%
Prince William	307	3,573	1.9%	3,926	1.3%	4,472	0.2%	4,550	1.0%
Prince William	308	16,112	1.3%	17,166	1.8%	20,578	0.2%	21,021	1.1%
Prince William	309	39,363	3.8%	47,486	0.7%	50,974	0.4%	52,799	1.2%
Prince William	310	32,088	0.5%	32,908	1.5%	38,048	0.5%	40,124	0.9%
Prince William	326	15,540	8.8%	23,639	3.5%	33,500	0.7%	35,748	3.4%
Prince William	327	4,594	16.6%	9,922	6.7%	18,964	3.0%	25,489	7.1%
Prince William	355	7,745	5.5%	10,142	0.8%	10,942	2.0%	13,390	2.2%
Prince William	356	22,279	3.2%	26,068	0.9%	28,649	0.6%	30,458	1.3%
Prince William	357	36,836	0.5%	37,824	0.6%	40,347	0.3%	41,765	0.5%
Prince William	358	31,139	1.6%	33,794	0.4%	35,285	1.2%	39,645	1.0%
Prince William	364	8,655	6.8%	12,032	6.7%	22,929	4.0%	33,838	5.6%
Prince William	365	22,301	6.3%	30,261	1.5%	35,234	0.6%	37,530	2.1%
Prince William	366	15,895	6.0%	21,290	2.3%	26,604	1.5%	30,828	2.7%
Prince William	367	9,501	12.5%	17,105	4.1%	25,680	2.1%	31,695	4.9%
Prince William	368	4,934	0.8%	5,136	0.7%	5,528	0.6%	5,857	0.7%
Total Prince William County		**275,474**	**4.0%**	**334,534**	**1.9%**	**403,886**	**1.1%**	**450,951**	**2.0%**
District of Columbia	1	2,959	1.1%	3,131	1.2%	3,512	0.8%	3,794	1.0%
District of Columbia	2	6,267	0.5%	6,432	0.7%	6,894	0.6%	7,336	0.6%
District of Columbia	3	2,123	2.5%	2,401	0.3%	2,481	0.4%	2,594	0.8%
District of Columbia	4	3,488	12.2%	6,210	0.2%	6,355	0.3%	6,524	2.5%
District of Columbia	5	1,910	2.1%	2,114	0.2%	2,166	0.4%	2,248	0.7%
District of Columbia	6	-	-	-	-	-	-	-	-
District of Columbia	7	8,816	1.8%	9,648	0.6%	10,253	0.7%	10,952	0.9%
District of Columbia	8	11,200	0.2%	11,288	0.4%	11,704	0.5%	12,314	0.4%
District of Columbia	9	24,242	0.9%	25,375	0.6%	26,963	0.4%	28,040	0.6%
District of Columbia	10	7,371	0.6%	7,604	1.4%	8,776	0.6%	9,350	1.0%
District of Columbia	11	8,869	4.0%	10,782	5.5%	18,432	3.1%	25,068	4.2%
District of Columbia	12	1,739	0.2%	1,755	0.4%	1,824	0.5%	1,918	0.4%
District of Columbia	13	31	80.5%	594	0.1%	600	0.2%	613	12.7%
District of Columbia	14	-	-	-	-	-	-	-	-
District of Columbia	15	32,957	0.4%	33,683	0.5%	35,555	0.5%	37,524	0.5%
District of Columbia	16	18,774	0.2%	18,921	0.4%	19,719	0.5%	20,643	0.4%
District of Columbia	17	35,900	0.2%	36,239	0.5%	38,071	0.5%	39,869	0.4%
District of Columbia	18	38,416	0.5%	39,337	1.1%	44,036	0.4%	45,661	0.7%
District of Columbia	19	22,935	0.8%	23,830	1.0%	26,216	2.5%	33,586	1.5%
District of Columbia	20	9,577	1.2%	10,156	0.9%	11,149	0.4%	11,566	0.8%
District of Columbia	21	32,800	0.5%	33,644	0.9%	36,798	0.4%	38,333	0.6%
District of Columbia	22	17,414	0.1%	17,527	1.6%	20,640	0.3%	21,305	0.8%
District of Columbia	23	8,603	1.6%	9,329	8.3%	20,721	0.3%	21,327	3.7%
District of Columbia	24	12,531	3.1%	14,586	1.6%	17,112	0.9%	18,636	1.6%
District of Columbia	25	14,784	1.0%	15,519	1.1%	17,299	1.0%	19,036	1.0%
District of Columbia	26	6,915	0.8%	7,203	1.5%	8,330	0.8%	9,045	1.1%
District of Columbia	27	18,773	0.2%	18,918	0.3%	19,461	0.4%	20,269	0.3%
District of Columbia	28	47,416	0.2%	47,832	0.5%	50,302	0.6%	53,388	0.5%
District of Columbia	29	27,564	0.5%	28,223	0.7%	30,351	0.2%	31,087	0.5%
District of Columbia	30	8,167	0.0%	8,182	2.4%	10,421	0.2%	10,628	1.1%
District of Columbia	32	28,442	0.3%	28,801	0.4%	29,917	0.4%	31,101	0.4%
District of Columbia	33	27,935	1.8%	30,486	0.3%	31,411	0.6%	33,442	0.7%
District of Columbia	34	47,753	0.3%	48,512	0.6%	51,585	0.8%	55,642	0.6%
District of Columbia	35	11,041	2.4%	12,455	0.2%	12,750	0.3%	13,187	0.7%
District of Columbia	41	22,885	1.4%	24,531	0.4%	25,491	0.2%	25,986	0.5%
District of Columbia	42	20,042	1.9%	22,047	0.8%	23,871	0.6%	25,406	1.0%
District of Columbia	46	18,697	3.1%	21,804	0.7%	23,416	0.2%	23,795	1.0%
District of Columbia	47	10,110	11.0%	17,036	3.6%	24,222	1.9%	29,130	4.3%
District of Columbia	48	47,591	0.6%	49,022	0.0%	48,824	0.4%	50,913	0.3%
District of Columbia	82	34,892	0.1%	35,001	-0.1%	34,771	-0.1%	34,575	0.0%
District of Columbia	83	40,470	2.1%	44,889	0.3%	46,352	0.1%	46,602	0.6%
District of Columbia	94	43,459	0.1%	43,725	0.3%	44,866	-0.1%	44,300	0.1%
District of Columbia	105	11,861	2.4%	13,356	3.4%	18,671	1.4%	21,510	2.4%
District of Columbia	245	-	-	-	-	-	-	-	-
District of Columbia	246	5,196	-0.7%	5,005	0.4%	5,191	1.5%	6,003	0.6%
District of Columbia	247	7,045	4.2%	8,644	1.8%	10,363	1.1%	11,592	2.0%
District of Columbia	248	-	-	-	-	-	-	-	-
District of Columbia	249	2,930	15.4%	5,985	1.6%	6,999	0.0%	6,999	3.5%
District of Columbia	255	7,479	0.7%	7,745	0.2%	7,878	0.1%	7,971	0.3%
District of Columbia	260	10,554	0.1%	10,588	0.0%	10,613	0.1%	10,755	0.1%
District of Columbia	266	8,036	1.5%	8,659	1.1%	9,657	0.3%	9,925	0.8%
District of Columbia	268	35,787	0.6%	36,959	0.9%	40,589	1.0%	44,749	0.9%
Total District of Columbia		**874,746**	**1.1%**	**925,713**	**0.9%**	**1,013,578**	**0.6%**	**1,076,237**	**0.8%**

Source: MWCOG

Table 4-19
Forecasted Population Growth by Traffic Analysis District (TAD)

COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Montgomery	25	14,784	1.0%	15,519	1.1%	17,299	1.0%	19,036	1.0%
Montgomery	26	6,915	0.8%	7,203	1.5%	8,330	0.8%	9,045	1.1%
Montgomery	27	18,773	0.2%	18,918	0.3%	19,461	0.4%	20,269	0.3%
Montgomery	28	47,416	0.2%	47,832	0.5%	50,302	0.6%	53,388	0.5%
Montgomery	41	22,885	1.4%	24,531	0.4%	25,491	0.2%	25,986	0.5%
Montgomery	42	20,042	1.9%	22,047	0.8%	23,871	0.6%	25,406	1.0%
Montgomery	43	24,864	1.5%	26,721	0.6%	28,471	0.2%	28,972	0.6%
Montgomery	44	10,497	4.3%	12,945	3.8%	18,782	2.0%	22,935	3.2%
Montgomery	45	15,374	1.5%	16,579	0.5%	17,447	0.6%	18,513	0.7%
Montgomery	46	18,697	3.1%	21,804	0.7%	23,416	0.2%	23,795	1.0%
Montgomery	47	10,110	11.0%	17,036	3.6%	24,222	1.9%	29,130	4.3%
Montgomery	48	47,591	0.6%	49,022	0.0%	48,824	0.4%	50,913	0.3%
Montgomery	49	11,937	-1.2%	11,260	0.0%	11,313	0.1%	11,456	-0.2%
Montgomery	50	33,929	-0.6%	32,970	0.2%	33,720	0.2%	34,446	0.1%
Montgomery	51	35,327	3.8%	42,626	1.8%	51,060	1.3%	58,206	2.0%
Montgomery	52	30,325	4.0%	36,926	1.0%	40,799	0.6%	43,235	1.4%
Montgomery	53	31,029	-0.4%	30,474	1.0%	33,521	1.2%	37,925	0.8%
Montgomery	54	48,900	-0.9%	46,754	1.0%	51,845	0.7%	55,665	0.5%
Montgomery	55	17,928	-0.7%	17,293	0.1%	17,406	0.0%	17,477	-0.1%
Montgomery	56	53,446	-0.2%	52,912	-0.1%	52,404	0.1%	52,740	-0.1%
Montgomery	57	15,095	1.4%	16,207	0.1%	16,431	0.1%	16,529	0.4%
Montgomery	58	28,342	3.4%	33,455	2.8%	44,016	1.4%	50,424	2.3%
Montgomery	59	26,128	-0.8%	25,057	0.0%	25,166	-0.1%	24,957	-0.2%
Montgomery	60	37,386	-0.5%	36,478	0.1%	36,769	0.1%	36,957	0.0%
Montgomery	61	22,528	-2.0%	20,415	0.2%	20,756	0.1%	21,042	-0.3%
Montgomery	62	24,672	0.7%	25,495	0.0%	25,437	0.0%	25,373	0.1%
Montgomery	63	43,961	-2.1%	39,603	-0.1%	39,182	0.0%	39,151	-0.5%
Montgomery	64	38,793	1.4%	41,656	1.4%	47,757	1.8%	57,351	1.6%
Montgomery	65	78,667	0.9%	82,218	0.6%	87,127	0.8%	93,979	0.7%
Montgomery	67	18,947	0.2%	19,178	-0.1%	18,949	0.1%	19,188	0.1%
Montgomery	69	37,754	-0.7%	36,385	0.5%	38,410	0.5%	40,337	0.3%
Montgomery	70	584	0.7%	606	0.6%	645	1.3%	731	0.9%
Montgomery	71	6,428	-0.5%	6,265	1.3%	7,114	0.6%	7,554	0.6%
Montgomery	73	2,844	3.0%	3,296	13.1%	11,326	0.8%	12,252	6.0%
Montgomery	81	42,029	1.1%	44,441	0.5%	46,496	0.1%	46,771	0.4%
Montgomery	82	34,892	0.1%	35,001	-0.1%	34,771	-0.1%	34,575	0.0%
Montgomery	283	29,561	0.7%	30,666	1.4%	35,345	0.3%	36,268	0.8%
Montgomery	293	8,794	1.3%	9,397	2.2%	11,722	0.2%	12,013	1.3%
Montgomery	303	14,335	2.1%	15,866	0.9%	17,400	0.1%	17,640	0.8%
Montgomery	316	8,074	1.0%	8,506	1.4%	9,753	0.2%	9,927	0.8%
Montgomery	325	45,732	0.4%	46,616	0.5%	49,001	0.7%	52,697	0.6%
Montgomery	332	25,508	3.3%	29,936	2.2%	37,049	0.7%	39,639	1.8%
Total Montgomery County		**1,111,823**	**0.8%**	**1,158,115**	**0.8%**	**1,258,606**	**0.6%**	**1,333,893**	**0.7%**
Prince George's	28	47,416	0.2%	47,832	0.5%	50,302	0.6%	53,388	0.5%
Prince George's	29	27,564	0.5%	28,223	0.7%	30,351	0.2%	31,087	0.5%
Prince George's	30	8,167	0.0%	8,182	2.4%	10,421	0.2%	10,628	1.1%
Prince George's	32	28,442	0.3%	28,801	0.4%	29,917	0.4%	31,101	0.4%
Prince George's	33	27,935	1.8%	30,486	0.3%	31,411	0.6%	33,442	0.7%
Prince George's	34	47,753	0.3%	48,512	0.6%	51,585	0.8%	55,642	0.6%
Prince George's	35	11,041	2.4%	12,455	0.2%	12,750	0.3%	13,187	0.7%
Prince George's	48	47,591	0.6%	49,022	0.0%	48,824	0.4%	50,913	0.3%
Prince George's	56	53,446	-0.2%	52,912	-0.1%	52,404	0.1%	52,740	-0.1%
Prince George's	62	24,672	0.7%	25,495	0.0%	25,437	0.0%	25,373	0.1%
Prince George's	81	42,029	1.1%	44,441	0.5%	46,496	0.1%	46,771	0.4%
Prince George's	82	34,892	0.1%	35,001	-0.1%	34,771	-0.1%	34,575	0.0%
Prince George's	83	40,470	2.1%	44,889	0.3%	46,352	0.1%	46,602	0.6%
Prince George's	94	43,459	0.1%	43,725	0.3%	44,866	-0.1%	44,300	0.1%
Prince George's	104	28,219	0.7%	29,195	1.4%	33,624	0.6%	35,803	1.0%
Prince George's	105	11,861	2.4%	13,356	3.4%	18,671	1.4%	21,510	2.4%
Prince George's	106	10,722	0.0%	10,719	0.0%	10,675	-0.1%	10,598	0.0%
Prince George's	266	8,036	1.5%	8,659	1.1%	9,657	0.3%	9,925	0.8%
Prince George's	284	42,572	2.0%	47,102	1.5%	54,692	1.0%	60,597	1.4%
Prince George's	294	44,766	1.8%	48,961	1.0%	54,262	0.1%	54,951	0.8%
Total Prince George's County		**631,053**	**0.8%**	**657,968**	**0.6%**	**697,468**	**0.4%**	**723,133**	**0.5%**

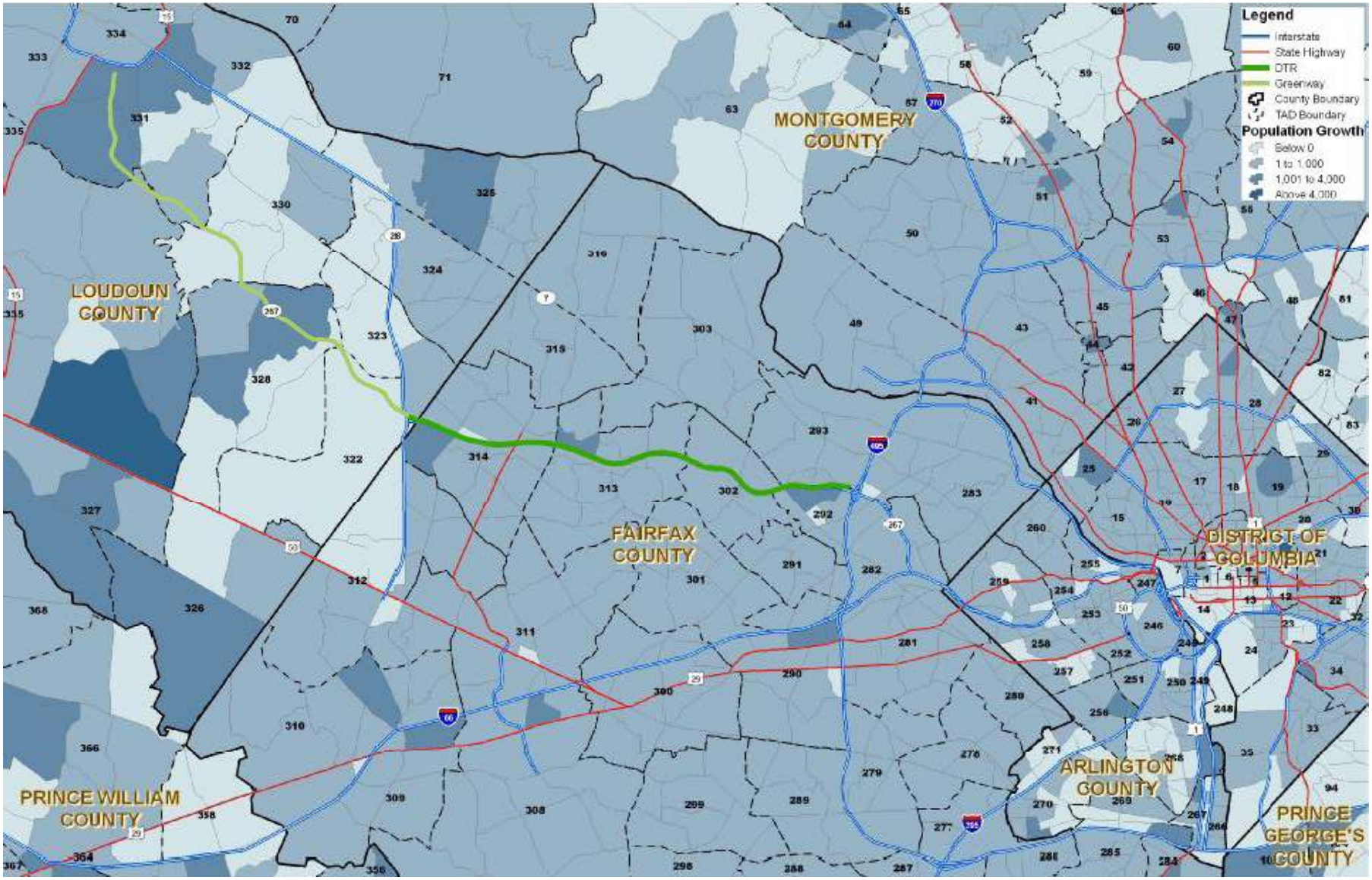
Source: MWCOG



WilburSmith ASSOCIATES

TOTAL GROWTH IN POPULATION – 2005 to 2020

FIGURE 4-2



WilburSmith ASSOCIATES

TOTAL GROWTH IN POPULATION – 2020 to 2030

FIGURE 4-3

Table 4-20
Forecasted Employment Growth by Traffic Analysis District (TAD)

COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Fairfax	25	12,770	0.4%	13,030	0.6%	13,830	0.8%	14,930	0.6%
Fairfax	41	7,390	0.2%	7,454	-1.0%	6,711	0.4%	7,003	-0.2%
Fairfax	49	3,215	-1.7%	2,953	0.1%	2,972	0.1%	2,998	-0.3%
Fairfax	63	5,634	1.7%	6,142	0.5%	6,450	0.5%	6,775	0.7%
Fairfax	105	4,561	11.9%	7,995	4.9%	12,851	1.3%	14,631	4.8%
Fairfax	106	2,737	0.5%	2,802	0.7%	2,996	1.5%	3,466	0.9%
Fairfax	256	9,403	1.9%	10,331	0.9%	11,301	0.0%	11,292	0.7%
Fairfax	257	3,372	-0.1%	3,354	5.8%	5,921	0.0%	5,921	2.3%
Fairfax	258	9,564	1.7%	10,387	1.8%	12,399	0.4%	12,920	1.2%
Fairfax	259	9,922	0.1%	9,988	0.7%	10,676	0.2%	10,901	0.4%
Fairfax	260	2,370	0.8%	2,463	0.3%	2,539	0.0%	2,532	0.3%
Fairfax	266	18,187	0.0%	18,180	0.0%	18,224	0.1%	18,374	0.0%
Fairfax	269	24,120	1.2%	25,634	1.8%	30,684	2.3%	38,535	1.9%
Fairfax	270	16,680	0.2%	16,874	2.4%	21,489	1.8%	25,720	1.7%
Fairfax	271	16,488	0.0%	16,488	2.6%	21,327	0.6%	22,585	1.3%
Fairfax	277	16,415	0.7%	16,980	0.3%	17,414	0.2%	17,780	0.3%
Fairfax	278	7,687	0.7%	7,943	0.6%	8,401	0.4%	8,773	0.5%
Fairfax	279	8,247	1.9%	9,064	0.7%	9,751	0.5%	10,233	0.9%
Fairfax	280	24,921	1.1%	26,386	0.3%	27,293	0.2%	27,803	0.4%
Fairfax	281	28,293	2.1%	31,423	2.2%	39,050	1.0%	42,942	1.7%
Fairfax	282	18,545	3.0%	21,505	1.5%	24,903	0.6%	26,386	1.4%
Fairfax	283	24,077	0.3%	24,399	0.2%	24,916	0.1%	25,228	0.2%
Fairfax	284	10,499	2.2%	11,708	1.5%	13,592	1.9%	16,331	1.8%
Fairfax	285	3,541	0.4%	3,611	0.5%	3,786	0.4%	3,944	0.4%
Fairfax	286	11,805	3.4%	13,973	1.3%	15,894	1.0%	17,541	1.6%
Fairfax	287	14,161	1.4%	15,196	1.7%	18,040	0.7%	19,361	1.3%
Fairfax	288	3,603	2.4%	4,056	0.6%	4,293	0.2%	4,358	0.8%
Fairfax	289	5,498	0.3%	5,574	0.2%	5,698	0.2%	5,796	0.2%
Fairfax	290	41,433	2.2%	46,249	1.1%	51,352	0.7%	55,134	1.1%
Fairfax	291	11,871	1.2%	12,585	0.4%	13,046	0.1%	13,236	0.4%
Fairfax	292	75,608	3.4%	89,366	1.7%	105,396	1.2%	118,448	1.8%
Fairfax	293	1,331	0.7%	1,377	1.0%	1,516	0.8%	1,639	0.8%
Fairfax	294	8,406	1.6%	9,099	1.1%	10,114	1.2%	11,395	1.2%
Fairfax	296	19,016	4.6%	23,760	4.6%	37,156	0.3%	38,258	2.8%
Fairfax	297	2,472	0.9%	2,590	0.9%	2,834	0.7%	3,027	0.8%
Fairfax	298	5,283	0.4%	5,387	0.4%	5,580	0.2%	5,721	0.3%
Fairfax	299	8,385	0.4%	8,549	0.9%	9,370	0.4%	9,789	0.6%
Fairfax	300	45,498	1.4%	48,721	1.1%	54,260	0.9%	59,182	1.1%
Fairfax	301	5,891	0.5%	6,030	0.6%	6,425	0.3%	6,602	0.5%
Fairfax	302	1,362	1.9%	1,496	0.7%	1,597	0.7%	1,704	0.9%
Fairfax	303	2,865	0.4%	2,918	0.7%	3,124	0.5%	3,277	0.5%
Fairfax	306	355	2.6%	403	0.9%	441	0.6%	466	1.1%
Fairfax	307	263	0.5%	270	0.7%	289	0.7%	310	0.7%
Fairfax	308	1,866	1.3%	1,989	0.8%	2,161	0.8%	2,349	0.9%
Fairfax	309	6,534	3.5%	7,765	2.2%	9,641	1.9%	11,685	2.4%
Fairfax	310	3,459	4.4%	4,299	0.9%	4,725	0.3%	4,883	1.4%
Fairfax	311	37,810	2.3%	42,438	1.2%	48,030	1.0%	53,210	1.4%
Fairfax	312	53,460	4.0%	64,921	1.9%	78,443	1.5%	90,888	2.1%
Fairfax	313	32,195	2.6%	36,535	0.8%	39,407	0.6%	41,958	1.1%
Fairfax	314	67,519	3.8%	81,532	1.5%	94,212	1.0%	103,691	1.7%
Fairfax	315	2,575	1.6%	2,793	1.0%	3,073	0.3%	3,156	0.8%
Fairfax	316	670	5.3%	869	0.9%	954	0.6%	1,014	1.7%
Fairfax	322	14,563	1.9%	15,980	1.2%	17,936	0.9%	19,584	1.2%
Fairfax	323	27,224	3.3%	32,019	2.3%	40,122	1.0%	44,154	2.0%
Fairfax	324	20,136	3.9%	24,410	2.5%	31,364	1.3%	35,514	2.3%
Fairfax	325	8,981	3.6%	10,707	2.1%	13,175	1.4%	15,144	2.1%
Fairfax	326	3,814	10.6%	6,301	5.8%	11,108	3.8%	16,160	5.9%
Fairfax	355	1,660	1.2%	1,765	5.3%	2,964	5.2%	4,935	4.5%
Fairfax	356	4,651	6.1%	6,240	0.2%	6,369	0.3%	6,569	1.4%
Fairfax	358	17,587	1.2%	18,626	1.0%	20,555	1.2%	23,067	1.1%
Fairfax	366	1,919	5.2%	2,467	6.8%	4,745	3.4%	6,623	5.1%
Total Fairfax County[1]		**860,367**	**2.4%**	**966,349**	**1.5%**	**1,124,885**	**1.0%**	**1,237,831**	**1.5%**

[1] Fairfax County includes the County, Fairfax City and Falls Church City.

Source: MWCOG

Table 4-21
Forecasted Employment Growth by Traffic Analysis District (TAD)

COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Loudoun	63	5,634	1.7%	6,142	0.5%	6,450	0.5%	6,775	0.7%
Loudoun	70	399	0.1%	400	0.0%	402	0.1%	405	0.1%
Loudoun	71	949	0.5%	971	0.1%	977	0.1%	990	0.2%
Loudoun	310	3,459	4.4%	4,299	0.9%	4,725	0.3%	4,883	1.4%
Loudoun	312	53,460	4.0%	64,921	1.9%	78,443	1.5%	90,888	2.1%
Loudoun	314	67,519	3.8%	81,532	1.5%	94,212	1.0%	103,691	1.7%
Loudoun	315	2,575	1.6%	2,793	1.0%	3,073	0.3%	3,156	0.8%
Loudoun	316	670	5.3%	869	0.9%	954	0.6%	1,014	1.7%
Loudoun	322	14,563	1.9%	15,980	1.2%	17,936	0.9%	19,584	1.2%
Loudoun	323	27,224	3.3%	32,019	2.3%	40,122	1.0%	44,154	2.0%
Loudoun	324	20,136	3.9%	24,410	2.5%	31,364	1.3%	35,514	2.3%
Loudoun	325	8,981	3.6%	10,707	2.1%	13,175	1.4%	15,144	2.1%
Loudoun	326	3,814	10.6%	6,301	5.8%	11,108	3.8%	16,160	5.9%
Loudoun	327	1,129	9.4%	1,772	3.1%	2,398	1.5%	2,785	3.7%
Loudoun	328	11,262	7.7%	16,287	7.4%	33,205	3.3%	46,078	5.8%
Loudoun	329	1,347	27.0%	4,458	6.9%	8,665	1.3%	9,868	8.3%
Loudoun	330	11,373	7.5%	16,327	4.8%	25,988	1.7%	30,693	4.1%
Loudoun	331	2,627	15.6%	5,412	9.9%	13,907	3.2%	19,103	8.3%
Loudoun	332	10,803	3.6%	12,901	2.9%	17,114	1.7%	20,241	2.5%
Loudoun	333	764	1.9%	840	1.7%	998	1.2%	1,125	1.6%
Loudoun	334	10,430	1.6%	11,267	0.9%	12,311	0.7%	13,195	0.9%
Loudoun	335	151	3.6%	180	2.8%	238	2.8%	313	3.0%
Loudoun	366	1,919	5.2%	2,467	6.8%	4,745	3.4%	6,623	5.1%
Loudoun	368	530	0.4%	540	0.1%	545	0.0%	547	0.1%
Total Loudoun County		**261,718**	**4.3%**	**323,795**	**2.7%**	**423,055**	**1.5%**	**492,929**	**2.6%**
Arlington	7	26,327	0.4%	26,807	0.0%	26,892	0.0%	26,967	0.1%
Arlington	14	2,854	0.0%	2,854	0.0%	2,854	0.0%	2,854	0.0%
Arlington	15	20,801	0.0%	20,811	0.0%	20,846	0.0%	20,881	0.0%
Arlington	24	15,564	-0.2%	15,444	2.8%	20,294	2.0%	24,644	1.9%
Arlington	25	12,770	0.4%	13,030	0.6%	13,830	0.8%	14,930	0.6%
Arlington	35	10,185	0.0%	10,185	0.4%	10,600	0.4%	11,015	0.3%
Arlington	105	4,561	11.9%	7,995	4.9%	12,851	1.3%	14,631	4.8%
Arlington	245	21,597	0.0%	21,597	-0.6%	20,271	0.0%	20,271	-0.3%
Arlington	246	2,697	0.0%	2,697	-1.3%	2,358	-0.6%	2,231	-0.8%
Arlington	247	35,801	1.8%	39,166	1.3%	44,668	1.4%	51,196	1.4%
Arlington	248	880	0.0%	880	0.0%	880	0.0%	880	0.0%
Arlington	249	19,354	4.3%	23,935	0.3%	24,764	1.3%	28,294	1.5%
Arlington	250	19,519	0.3%	19,842	2.0%	24,138	0.2%	24,667	0.9%
Arlington	251	1,404	0.8%	1,464	4.6%	2,286	1.2%	2,588	2.5%
Arlington	252	4,915	0.6%	5,065	3.4%	7,064	0.2%	7,242	1.6%
Arlington	253	50,281	3.7%	60,396	1.2%	67,814	0.6%	72,296	1.5%
Arlington	254	1,853	0.1%	1,864	2.9%	2,491	1.5%	2,892	1.8%
Arlington	255	1,943	0.7%	2,014	1.3%	2,286	0.2%	2,326	0.7%
Arlington	256	9,403	1.9%	10,331	0.9%	11,301	0.0%	11,292	0.7%
Arlington	257	3,372	-0.1%	3,354	5.8%	5,921	0.0%	5,921	2.3%
Arlington	258	9,564	1.7%	10,387	1.8%	12,399	0.4%	12,920	1.2%
Arlington	259	9,922	0.1%	9,988	0.7%	10,676	0.2%	10,901	0.4%
Arlington	260	2,370	0.8%	2,463	0.3%	2,539	0.0%	2,532	0.3%
Arlington	266	18,187	0.0%	18,180	0.0%	18,224	0.1%	18,374	0.0%
Arlington	267	20,657	0.5%	21,140	0.4%	22,053	0.1%	22,325	0.3%
Arlington	268	9,609	-0.3%	9,484	1.3%	10,749	2.6%	13,957	1.5%
Arlington	269	24,120	1.2%	25,634	1.8%	30,684	2.3%	38,535	1.9%
Arlington	270	16,680	0.2%	16,874	2.4%	21,489	1.8%	25,720	1.7%
Arlington	271	16,488	0.0%	16,488	2.6%	21,327	0.6%	22,585	1.3%
Arlington	277	16,415	0.7%	16,980	0.3%	17,414	0.2%	17,780	0.3%
Arlington	278	7,687	0.7%	7,943	0.6%	8,401	0.4%	8,773	0.5%
Arlington	280	24,921	1.1%	26,386	0.3%	27,293	0.2%	27,803	0.4%
Arlington	281	28,293	2.1%	31,423	2.2%	39,050	1.0%	42,942	1.7%
Arlington	283	24,077	0.3%	24,399	0.2%	24,916	0.1%	25,228	0.2%
Arlington	284	10,499	2.2%	11,708	1.5%	13,592	1.9%	16,331	1.8%
Arlington	285	3,541	0.4%	3,611	0.5%	3,786	0.4%	3,944	0.4%
Total Arlington County[1]		**509,111**	**1.3%**	**542,819**	**1.2%**	**609,001**	**0.8%**	**658,668**	**1.0%**

[1] Arlington County includes the County and Alexandria City.

Source: MWCOG

Table 4-22
Forecasted Employment Growth by Traffic Analysis District (TAD)

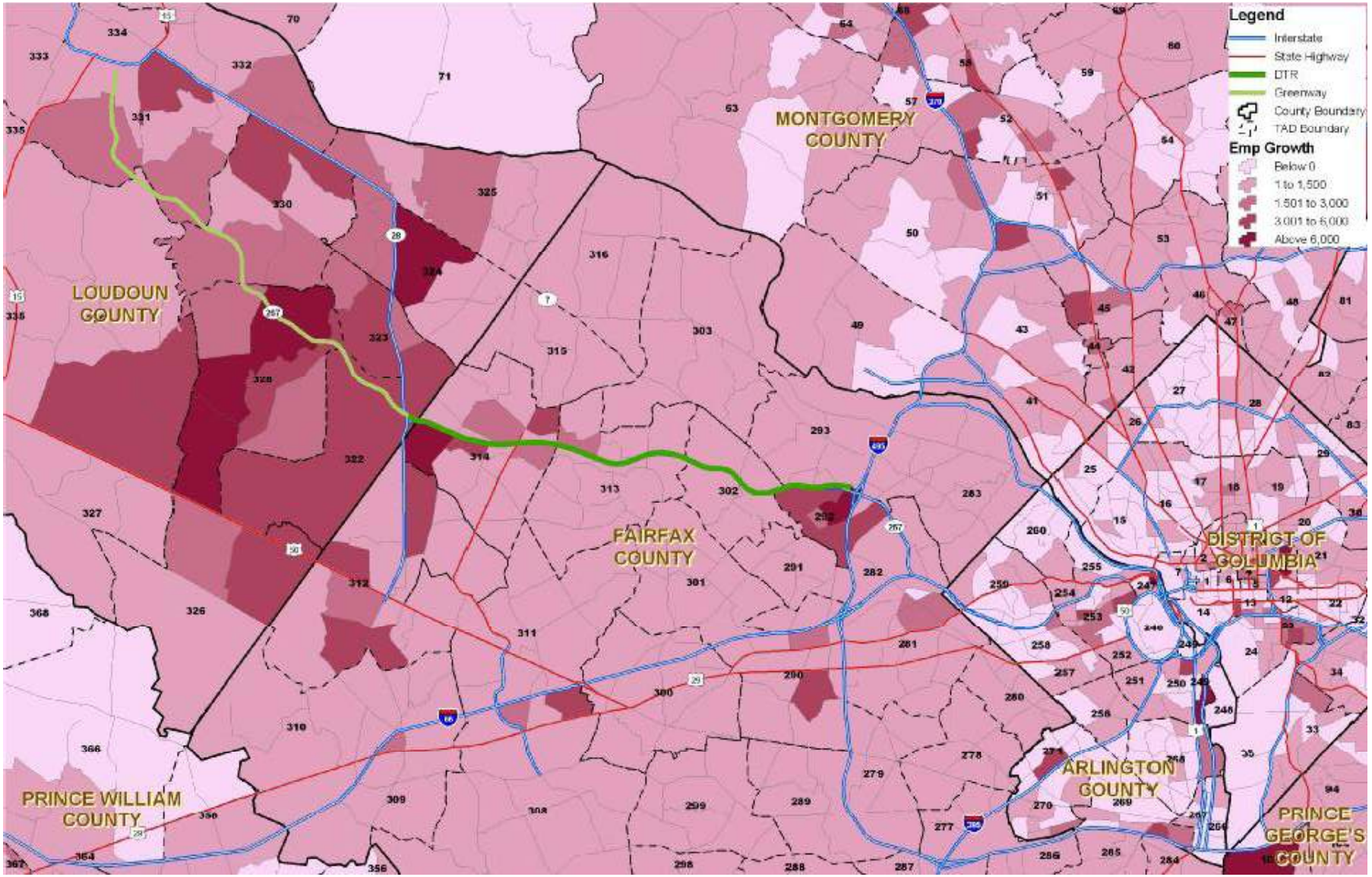
COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Prince William	306	355	2.6%	403	0.9%	441	0.6%	466	1.1%
Prince William	307	263	0.5%	270	0.7%	289	0.7%	310	0.7%
Prince William	308	1,866	1.3%	1,989	0.8%	2,161	0.8%	2,349	0.9%
Prince William	309	6,534	3.5%	7,765	2.2%	9,641	1.9%	11,685	2.4%
Prince William	310	3,459	4.4%	4,299	0.9%	4,725	0.3%	4,883	1.4%
Prince William	326	3,814	10.6%	6,301	5.8%	11,108	3.8%	16,160	5.9%
Prince William	327	1,129	9.4%	1,772	3.1%	2,398	1.5%	2,785	3.7%
Prince William	355	1,660	1.2%	1,765	5.3%	2,964	5.2%	4,935	4.5%
Prince William	356	4,651	6.1%	6,240	0.2%	6,369	0.3%	6,569	1.4%
Prince William	357	23,706	0.5%	24,268	0.3%	25,031	0.3%	25,829	0.3%
Prince William	358	17,587	1.2%	18,626	1.0%	20,555	1.2%	23,067	1.1%
Prince William	364	14,955	7.0%	20,989	3.2%	28,857	1.5%	33,630	3.3%
Prince William	365	1,373	5.5%	1,797	4.0%	2,669	1.0%	2,958	3.1%
Prince William	366	1,919	5.2%	2,467	6.8%	4,745	3.4%	6,623	5.1%
Prince William	367	2,090	11.4%	3,584	7.1%	7,110	2.3%	8,884	6.0%
Prince William	368	530	0.4%	540	0.1%	545	0.0%	547	0.1%
Total Prince William County		**85,891**	**3.7%**	**103,075**	**2.3%**	**129,608**	**1.6%**	**151,680**	**2.3%**
District of Columbia	1	50,253	0.0%	50,253	0.0%	50,403	0.0%	50,483	0.0%
District of Columbia	2	79,078	0.5%	81,128	0.1%	82,128	0.0%	82,453	0.2%
District of Columbia	3	78,893	1.0%	82,938	0.2%	84,213	0.0%	84,583	0.3%
District of Columbia	4	31,755	2.4%	35,765	1.2%	40,415	0.2%	41,145	1.0%
District of Columbia	5	44,896	0.3%	45,546	0.1%	45,886	0.0%	45,996	0.1%
District of Columbia	6	31,479	0.0%	31,479	0.0%	31,574	0.0%	31,649	0.0%
District of Columbia	7	26,327	0.4%	26,807	0.0%	26,892	0.0%	26,967	0.1%
District of Columbia	8	11,340	0.0%	11,340	0.0%	11,375	0.0%	11,410	0.0%
District of Columbia	9	11,854	2.4%	13,319	0.6%	14,094	0.3%	14,519	0.8%
District of Columbia	10	2,954	0.0%	2,954	2.3%	3,694	0.8%	4,014	1.2%
District of Columbia	11	46,527	4.7%	58,647	3.4%	81,837	0.7%	87,392	2.6%
District of Columbia	12	19,815	0.3%	20,065	0.0%	20,065	0.0%	20,065	0.1%
District of Columbia	13	67,863	0.7%	70,323	0.7%	75,138	0.1%	75,703	0.4%
District of Columbia	14	2,854	0.0%	2,854	0.0%	2,854	0.0%	2,854	0.0%
District of Columbia	15	20,801	0.0%	20,811	0.0%	20,846	0.0%	20,881	0.0%
District of Columbia	16	17,676	0.0%	17,676	0.3%	18,266	0.2%	18,556	0.2%
District of Columbia	17	11,698	0.0%	11,698	0.1%	11,873	0.1%	11,948	0.1%
District of Columbia	18	5,894	3.3%	6,939	2.3%	8,739	0.4%	9,139	1.8%
District of Columbia	19	24,182	0.3%	24,567	0.5%	25,867	0.8%	28,137	0.6%
District of Columbia	20	10,056	1.0%	10,576	0.3%	10,911	0.1%	11,071	0.4%
District of Columbia	21	13,772	0.1%	13,822	0.9%	15,087	0.7%	16,222	0.7%
District of Columbia	22	5,575	-3.9%	4,575	-0.6%	4,300	5.0%	7,000	0.9%
District of Columbia	23	20,272	6.7%	28,047	2.5%	35,822	1.5%	41,602	2.9%
District of Columbia	24	15,564	-0.2%	15,444	2.8%	20,294	2.0%	24,644	1.9%
District of Columbia	25	12,770	0.4%	13,030	0.6%	13,830	0.8%	14,930	0.6%
District of Columbia	26	5,497	0.0%	5,497	0.6%	5,817	0.9%	6,337	0.6%
District of Columbia	27	2,732	0.0%	2,732	0.1%	2,767	0.1%	2,802	0.1%
District of Columbia	28	20,060	0.2%	20,215	-1.7%	17,080	1.8%	20,320	0.1%
District of Columbia	29	8,152	0.0%	8,152	1.0%	8,972	0.6%	9,497	0.6%
District of Columbia	30	9,380	0.0%	9,380	1.5%	10,890	0.3%	11,200	0.7%
District of Columbia	32	3,040	0.0%	3,040	0.0%	3,055	0.0%	3,070	0.0%
District of Columbia	33	8,763	1.3%	9,363	1.3%	10,673	1.9%	12,933	1.6%
District of Columbia	34	6,303	2.5%	7,133	2.8%	9,383	1.8%	11,193	2.3%
District of Columbia	35	10,185	0.0%	10,185	0.4%	10,600	0.4%	11,015	0.3%
District of Columbia	41	7,390	0.2%	7,454	-1.0%	6,711	0.4%	7,003	-0.2%
District of Columbia	42	10,814	1.2%	11,505	0.9%	12,529	0.9%	13,741	1.0%
District of Columbia	46	7,304	0.2%	7,373	0.8%	7,967	0.3%	8,221	0.5%
District of Columbia	47	30,434	0.9%	31,875	0.5%	33,526	0.6%	35,564	0.6%
District of Columbia	48	5,880	0.6%	6,064	-1.0%	5,463	0.9%	5,982	0.1%
District of Columbia	82	5,625	0.3%	5,720	-0.7%	5,313	1.3%	6,031	0.3%
District of Columbia	83	13,920	1.9%	15,322	1.5%	17,834	0.9%	19,445	1.3%
District of Columbia	94	10,015	0.1%	10,074	0.2%	10,239	0.4%	10,680	0.3%
District of Columbia	105	4,561	11.9%	7,995	4.9%	12,851	1.3%	14,631	4.8%
District of Columbia	245	21,597	0.0%	21,597	-0.6%	20,271	0.0%	20,271	-0.3%
District of Columbia	246	2,697	0.0%	2,697	-1.3%	2,358	-0.6%	2,231	-0.8%
District of Columbia	247	35,801	1.8%	39,166	1.3%	44,668	1.4%	51,196	1.4%
District of Columbia	248	880	0.0%	880	0.0%	880	0.0%	880	0.0%
District of Columbia	249	19,354	4.3%	23,935	0.3%	24,764	1.3%	28,294	1.5%
District of Columbia	255	1,943	0.7%	2,014	1.3%	2,286	0.2%	2,326	0.7%
District of Columbia	260	2,370	0.8%	2,463	0.3%	2,539	0.0%	2,532	0.3%
District of Columbia	266	18,187	0.0%	18,180	0.0%	18,224	0.1%	18,374	0.0%
District of Columbia	268	9,609	-0.3%	9,484	1.3%	10,749	2.6%	13,957	1.5%
Total District of Columbia		**946,641**	**1.1%**	**1,000,098**	**0.7%**	**1,074,812**	**0.5%**	**1,133,089**	**0.7%**

Source: MWCOG

Table 4-23
Forecasted Employment Growth by Traffic Analysis District (TAD)

COUNTY	TAD	2005	CAGR	2010	CAGR	2020	CAGR	2030	2005-2030 CAGR
Montgomery	25	12,770	0.4%	13,030	0.6%	13,830	0.8%	14,930	0.6%
Montgomery	26	5,497	0.0%	5,497	0.6%	5,817	0.9%	6,337	0.6%
Montgomery	27	2,732	0.0%	2,732	0.1%	2,767	0.1%	2,802	0.1%
Montgomery	28	20,060	0.2%	20,215	-1.7%	17,080	1.8%	20,320	0.1%
Montgomery	41	7,390	0.2%	7,454	-1.0%	6,711	0.4%	7,003	-0.2%
Montgomery	42	10,814	1.2%	11,505	0.9%	12,529	0.9%	13,741	1.0%
Montgomery	43	4,460	0.4%	4,539	0.4%	4,702	0.5%	4,938	0.4%
Montgomery	44	35,770	0.6%	36,798	0.5%	38,559	0.6%	40,841	0.5%
Montgomery	45	29,818	0.8%	30,979	1.7%	36,757	0.1%	37,093	0.9%
Montgomery	46	7,304	0.2%	7,373	0.8%	7,967	0.3%	8,221	0.5%
Montgomery	47	30,434	0.9%	31,875	0.5%	33,526	0.6%	35,564	0.6%
Montgomery	48	5,880	0.6%	6,064	-1.0%	5,463	0.9%	5,982	0.1%
Montgomery	49	3,215	-1.7%	2,953	0.1%	2,972	0.1%	2,998	-0.3%
Montgomery	50	9,036	1.5%	9,722	2.1%	12,023	0.5%	12,693	1.4%
Montgomery	51	53,565	1.1%	56,648	1.1%	63,013	0.9%	68,900	1.0%
Montgomery	52	36,959	2.7%	42,239	1.2%	47,604	1.1%	53,074	1.5%
Montgomery	53	15,143	1.4%	16,197	0.3%	16,734	0.5%	17,544	0.6%
Montgomery	54	6,599	-0.3%	6,503	0.1%	6,595	0.3%	6,773	0.1%
Montgomery	55	2,217	0.4%	2,259	0.4%	2,348	0.6%	2,493	0.5%
Montgomery	56	23,010	5.1%	29,569	1.8%	35,491	1.0%	39,199	2.2%
Montgomery	57	21,665	2.3%	24,317	0.5%	25,589	0.0%	25,589	0.7%
Montgomery	58	50,523	3.1%	58,918	1.6%	69,110	0.5%	72,800	1.5%
Montgomery	59	4,198	0.1%	4,226	0.1%	4,286	0.3%	4,404	0.2%
Montgomery	60	2,150	1.1%	2,266	0.2%	2,307	0.3%	2,377	0.4%
Montgomery	61	2,592	0.6%	2,675	0.1%	2,715	0.2%	2,768	0.3%
Montgomery	62	4,055	0.5%	4,152	0.5%	4,372	0.8%	4,747	0.6%
Montgomery	63	5,634	1.7%	6,142	0.5%	6,450	0.5%	6,775	0.7%
Montgomery	64	40,735	3.0%	47,248	1.1%	52,848	0.9%	57,537	1.4%
Montgomery	65	36,516	0.7%	37,813	1.0%	41,725	0.8%	45,313	0.9%
Montgomery	67	9,502	1.1%	10,044	0.9%	11,026	1.2%	12,382	1.1%
Montgomery	69	5,821	0.6%	5,991	0.3%	6,153	0.4%	6,418	0.4%
Montgomery	70	399	0.1%	400	0.0%	402	0.1%	405	0.1%
Montgomery	71	949	0.5%	971	0.1%	977	0.1%	990	0.2%
Montgomery	73	435	11.9%	763	19.3%	4,440	5.9%	7,859	12.3%
Montgomery	81	17,973	0.9%	18,793	1.4%	21,671	1.8%	25,790	1.5%
Montgomery	82	5,625	0.3%	5,720	-0.7%	5,313	1.3%	6,031	0.3%
Montgomery	283	24,077	0.3%	24,399	0.2%	24,916	0.1%	25,228	0.2%
Montgomery	293	1,331	0.7%	1,377	1.0%	1,516	0.8%	1,639	0.8%
Montgomery	303	2,865	0.4%	2,918	0.7%	3,124	0.5%	3,277	0.5%
Montgomery	316	670	5.3%	869	0.9%	954	0.6%	1,014	1.7%
Montgomery	325	8,981	3.6%	10,707	2.1%	13,175	1.4%	15,144	2.1%
Montgomery	332	10,803	3.6%	12,901	2.9%	17,114	1.7%	20,241	2.5%
Total Montgomery County		**580,172**	**1.6%**	**627,761**	**1.0%**	**692,671**	**0.8%**	**750,174**	**1.0%**
Prince George's	28	20,060	0.2%	20,215	-1.7%	17,080	1.8%	20,320	0.1%
Prince George's	29	8,152	0.0%	8,152	1.0%	8,972	0.6%	9,497	0.6%
Prince George's	30	9,380	0.0%	9,380	1.5%	10,890	0.3%	11,200	0.7%
Prince George's	32	3,040	0.0%	3,040	0.0%	3,055	0.0%	3,070	0.0%
Prince George's	33	8,763	1.3%	9,363	1.3%	10,673	1.9%	12,933	1.6%
Prince George's	34	6,303	2.5%	7,133	2.8%	9,383	1.8%	11,193	2.3%
Prince George's	35	10,185	0.0%	10,185	0.4%	10,600	0.4%	11,015	0.3%
Prince George's	48	5,880	0.6%	6,064	-1.0%	5,463	0.9%	5,982	0.1%
Prince George's	56	23,010	5.1%	29,569	1.8%	35,491	1.0%	39,199	2.2%
Prince George's	62	4,055	0.5%	4,152	0.5%	4,372	0.8%	4,747	0.6%
Prince George's	81	17,973	0.9%	18,793	1.4%	21,671	1.8%	25,790	1.5%
Prince George's	82	5,625	0.3%	5,720	-0.7%	5,313	1.3%	6,031	0.3%
Prince George's	83	13,920	1.9%	15,322	1.5%	17,834	0.9%	19,445	1.3%
Prince George's	94	10,015	0.1%	10,074	0.2%	10,239	0.4%	10,680	0.3%
Prince George's	104	5,957	0.4%	6,091	0.7%	6,516	1.5%	7,548	1.0%
Prince George's	105	4,561	11.9%	7,995	4.9%	12,851	1.3%	14,631	4.8%
Prince George's	106	2,737	0.5%	2,802	0.7%	2,996	1.5%	3,466	0.9%
Prince George's	266	18,187	0.0%	18,180	0.0%	18,224	0.1%	18,374	0.0%
Prince George's	284	10,499	2.2%	11,708	1.5%	13,592	1.9%	16,331	1.8%
Prince George's	294	8,406	1.6%	9,099	1.1%	10,114	1.2%	11,395	1.2%
Total Prince George's County		**196,708**	**1.6%**	**213,037**	**1.0%**	**235,329**	**1.1%**	**262,847**	**1.2%**

Source: MWCOG



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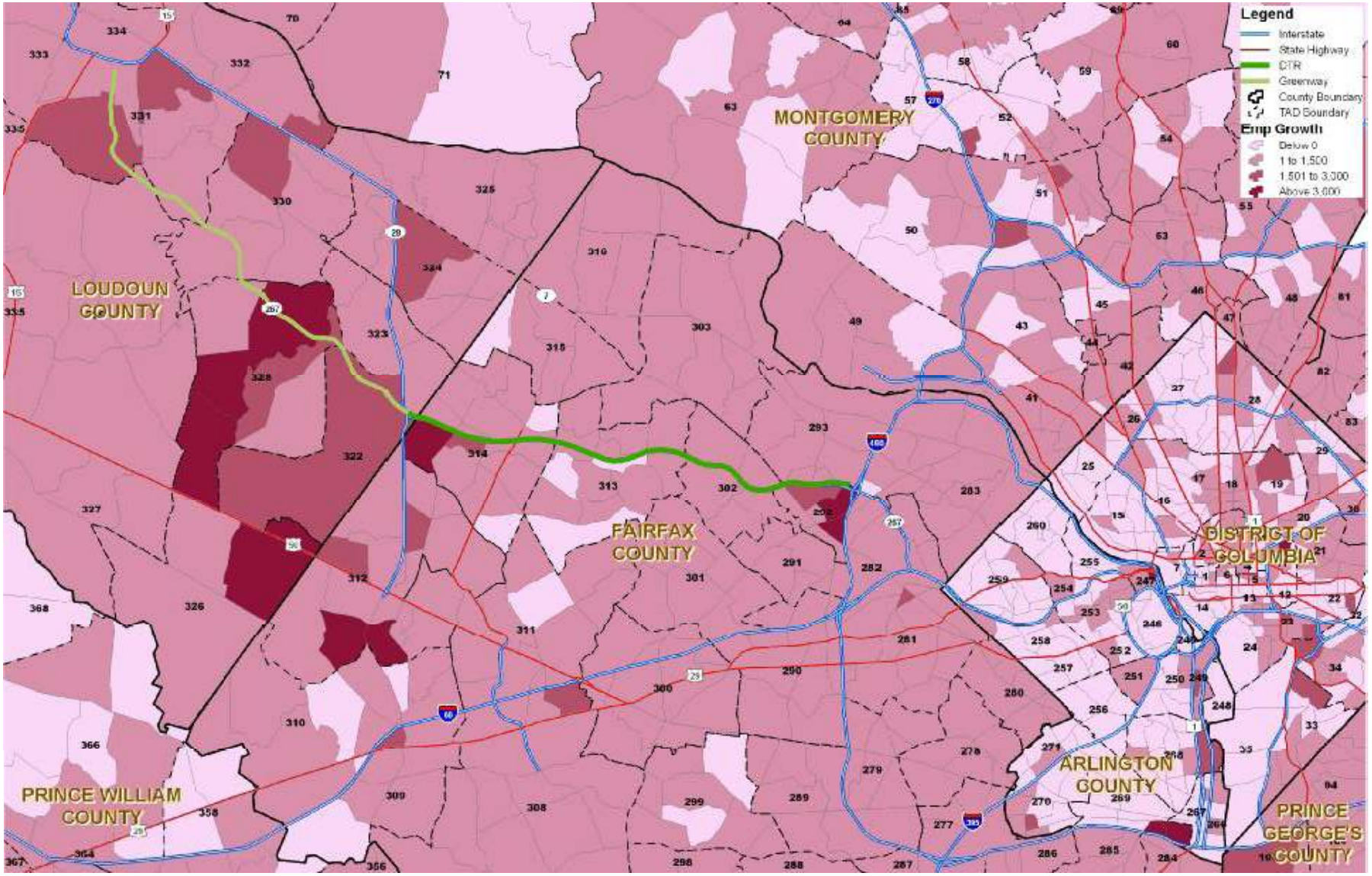
TOTAL GROWTH IN EMPLOYMENT – 2005 to 2020

FIGURE 4-4



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TOTAL GROWTH IN EMPLOYMENT – 2020 to 2030

FIGURE 4-5

CHAPTER 5

ESTIMATED TRAFFIC AND TOLL REVENUE

Chapter 5 presents an overview of the modeling methodology and general approach used to estimate traffic and revenue (T&R) taking into account the projected toll rate schedule. It also includes the discussion of toll rates, toll sensitivity, weekday traffic estimates for selected years, and annual traffic and revenue forecasts for DTR. Sensitivity tests to key forecasting inputs have been undertaken and are provided for reference in Chapter 6.

The primary objective of this study was to develop annual traffic and toll revenue forecasts for the DTR. In developing these estimates, a comprehensive computerized transportation demand forecasting model provided by the MWCOG requested through the Airports Authority was used. The model was reviewed for accuracy in the immediate project study area and refined and enhanced to investment grade standards using WSA toll diversion algorithms.

The study benefits from a recently updated round of MWCOG socio-economic growth forecasts. These are somewhat more conservative than previous versions. WSA's resulting T&R forecasts reflect these conservative assumptions of future growth in the very latest MWCOG planning forecasts and adjustments as assessed in an independent review of their socioeconomic forecasts.

BASIC ASSUMPTIONS

Base-case traffic and toll revenue estimates for DTR are predicated on the following basic assumptions, all of which are considered reasonable for purposes of this traffic and toll revenue study:

1. DTR is assumed to provide four travel lanes in each direction, or a total of eight lanes, over its entire length. No expansion has been considered in the forecast period;

2. The physical configuration of the DTR, will remain broadly unchanged throughout the forecast period;

3. Toll rates on the DTR facility are in future year dollars and will be as set forth subsequently in this chapter. Commercial vehicle rates will continue to be proportionately higher than passenger cars. Greenway tolls will also be adjusted as assumed;

4. An inflation rate of 2.5 percent per year has been assumed for the purposes of escalating values of time and vehicle operating costs. Annual toll revenue estimates, and per mile toll rates are expressed in future year dollars;

5. Future toll rates assumed in this study were developed on the instructions and judgment of MWAA and its Financial Advisor. No dynamic, variable or peak congestion pricing have been investigated at this stage;

6. No toll collection technology or method of payment changes has been assumed. Toll collection operations are assumed to continue to be actively monitored and strictly enforced to minimize potential revenue losses due to toll evasion and/or system failure;

7. No adjustments have been made to annual toll revenue estimates included in this report to reflect the impacts associated with future enforcement, changes in toll evasion, or other form of uncollectible tolls. Any improvements made by MWAA would be an upside benefit. Public relation programs will be undertaken by MWAA to ensure customer satisfaction and minimum diversion;

8. Annual transactions and toll revenue have not been adjusted to reflect "ramp-up" characteristics as the DTR is a mature toll road facility;

9. Only those highway improvements which are committed in the regional Transportation Improvement Plan (TIP) will be implemented during the projection period. Specific improvements assumed in future year networks are described below. For the purpose of this study, no other competing highway projects, toll or tax supported toll-free or other significant competing improvements are assumed to be constructed in the DTR corridor during the forecast period. Diversion to Dulles Metrorail will be adequately represented by the adjustments made in the MWCOG highway trip tables;

10. Regional and corridor socioeconomic growth is generally in accordance with forecasts provided by MWCOG, as reviewed and adjusted by the independent

consultant, Linden Street Associates, Inc. Sensitivity tests varying the growth in travel demand have been performed and summarized in Chapter 6;

11. Travel demand modeling was performed by estimating weekday travel on the DTR and study area. For purposes of annualization of transactions and revenue, the base relationship between weekday and annual trips at each toll plaza was applied as observed, including violations and non-revenue transactions;

12. The DTR will continue to be well-maintained, efficiently-operated and effectively signed and promoted to encourage maximum usage;

13. Motor fuel will continue to remain in adequate supply and its price will not increase significantly in real terms; the rate of price increase will not significantly exceed the overall rate of inflation. Fuel cost sensitivity tests have been performed and summarized in Chapter 6; and

14. No local, regional or national emergency will arise which would abnormally restrict the use of motor vehicles, or substantially alter economic activity or freedom of mobility.

Any significant departure from the above basic assumptions could materially affect the estimates for traffic and toll revenue on the DTR presented in this report.

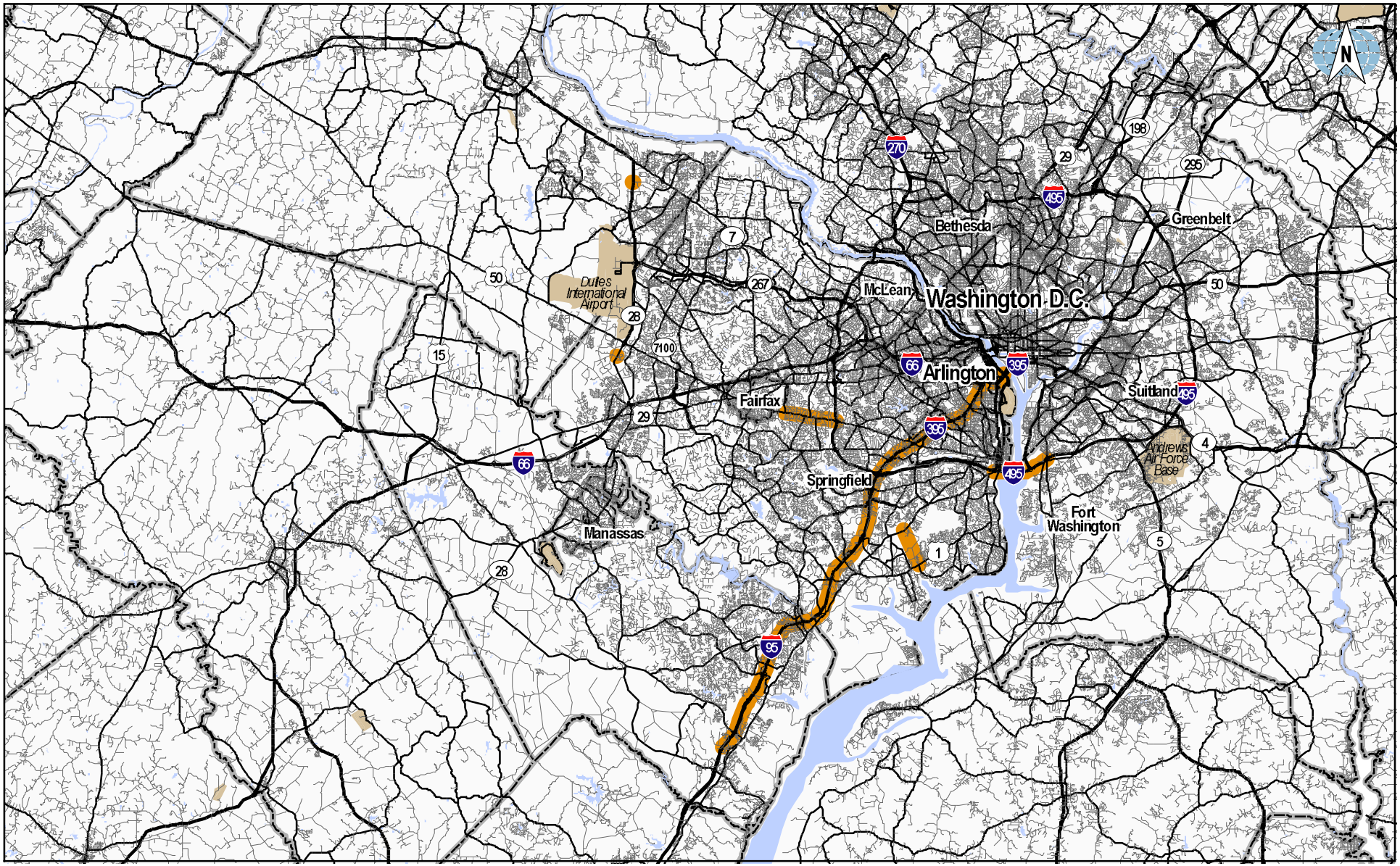
HIGHWAY IMPROVEMENTS

The most recent regional transportation improvement plan was obtained and reviewed to identify any committed improvements which could potentially impact traffic and revenue on the DTR. Corresponding adjustments were made to the regional transportation model.

Figures 5-1 through 5-5 show, as shaded, the links where significant future roadway improvement projects are assumed to occur. No other significant improvements in the DTR corridor were included in the committed TIP.

PROJECTED TOLL RATE SCHEDULE

The projected toll rate schedule shown in Figure 5-1 was analyzed: following a $0.25 increase in 2010 at both the main line plaza and all ramps, an increase of $0.25 occurs at the main line plaza in six consecutive years through 2016. Ramps continue to grow periodically by $0.25 in years 2013 and 2016. Following this, a $0.75 increase occurs at the main line plaza and $0.50 at all ramp plazas in 2019, 2023, and every five years thereafter.



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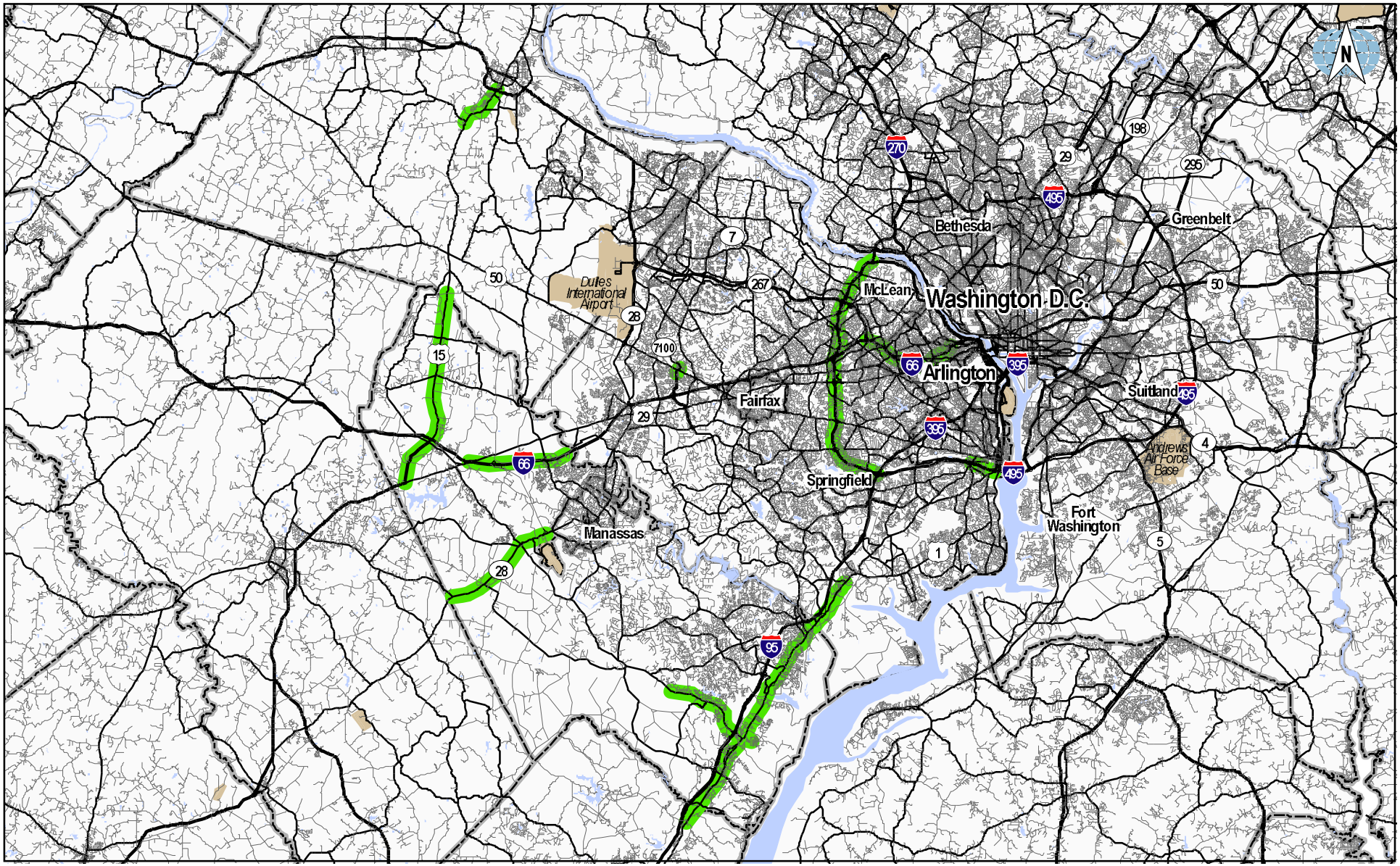
FUTURE PROJECT UPDATES COMMENCING IN THE 2010 NETWORK

FIGURE 5-1



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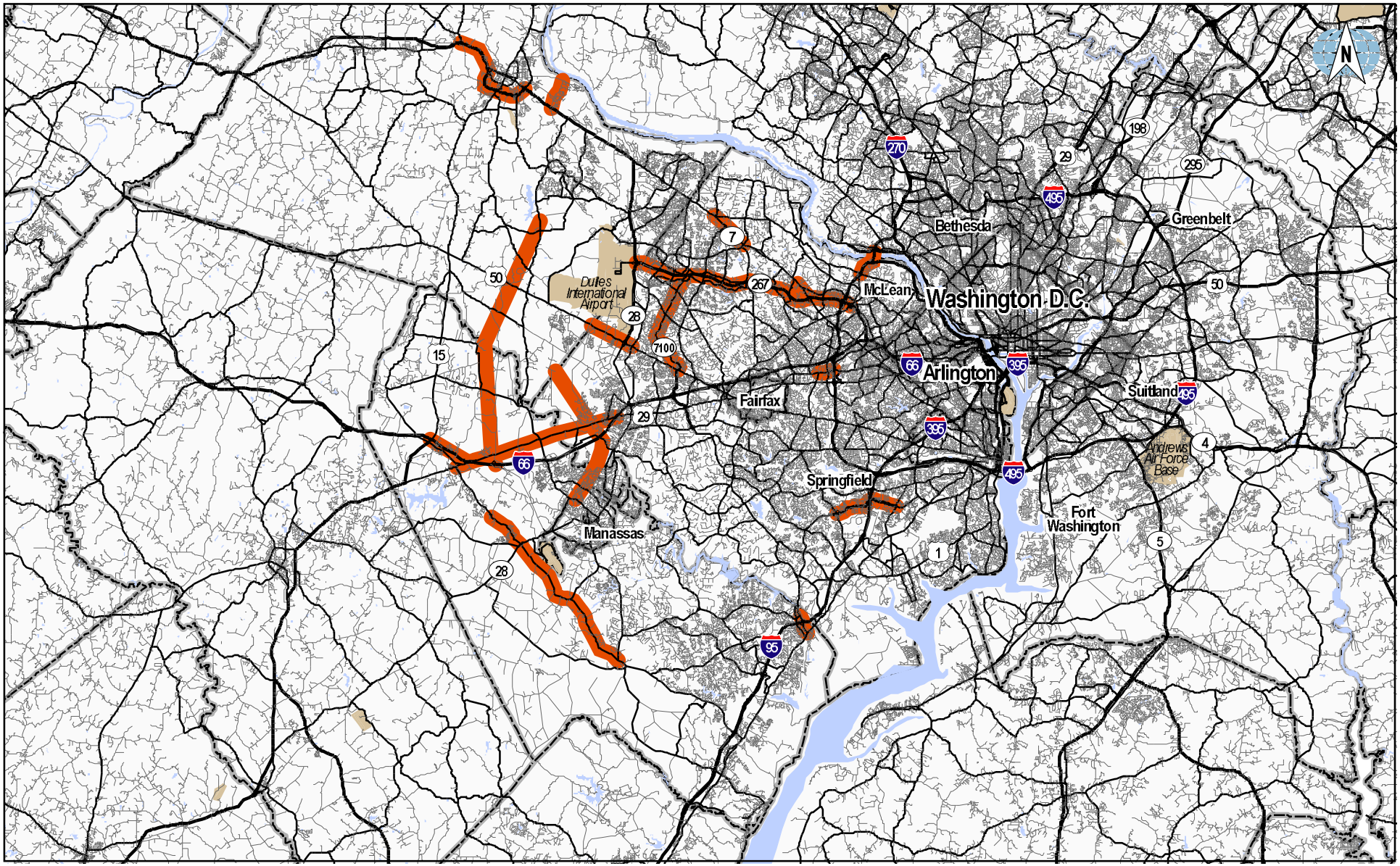
FUTURE PROJECT UPDATES COMMENCING IN THE 2013 NETWORK

FIGURE 5-2



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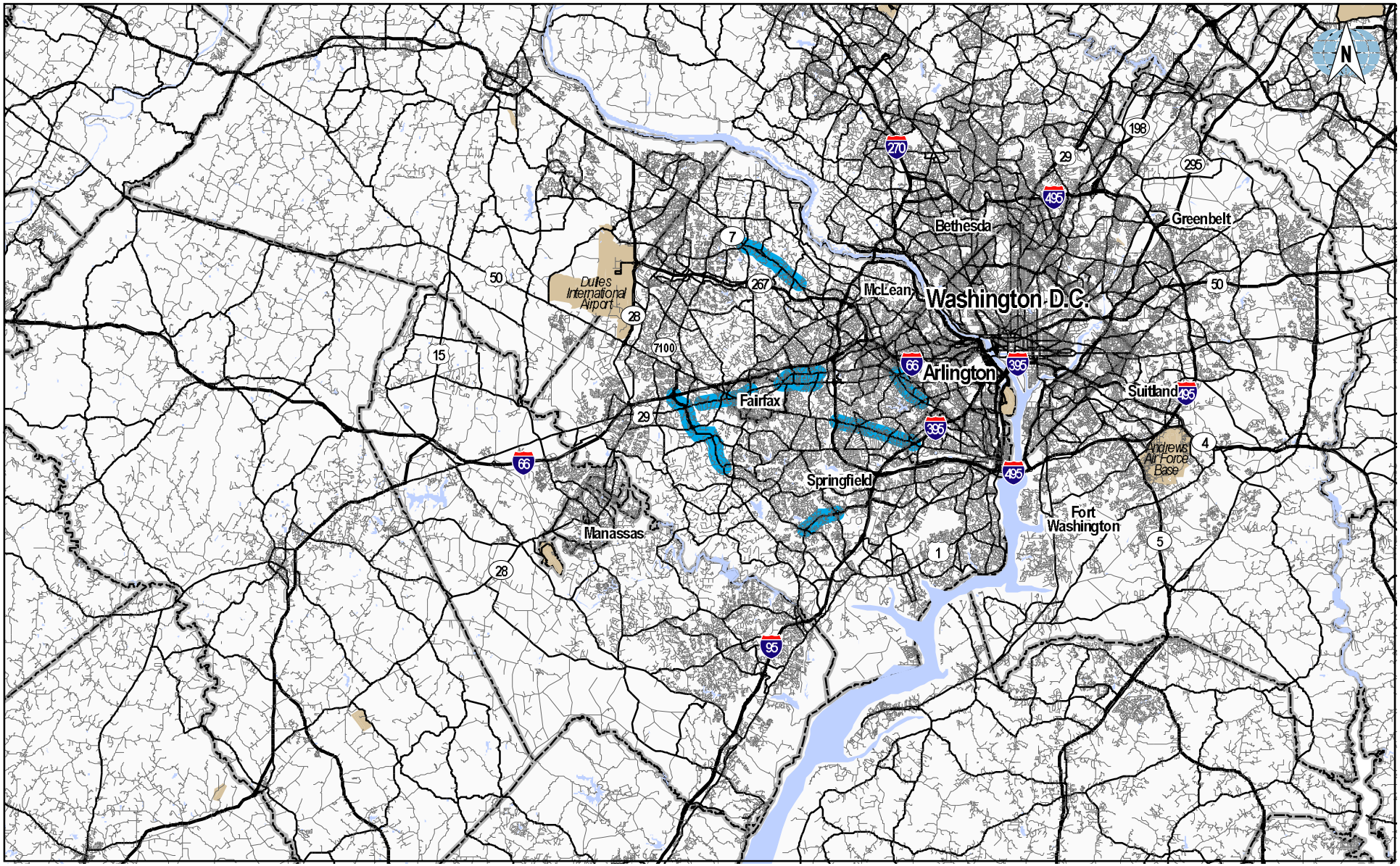
FUTURE PROJECT UPDATES COMMENCING IN THE 2018 NETWORK

FIGURE 5-3



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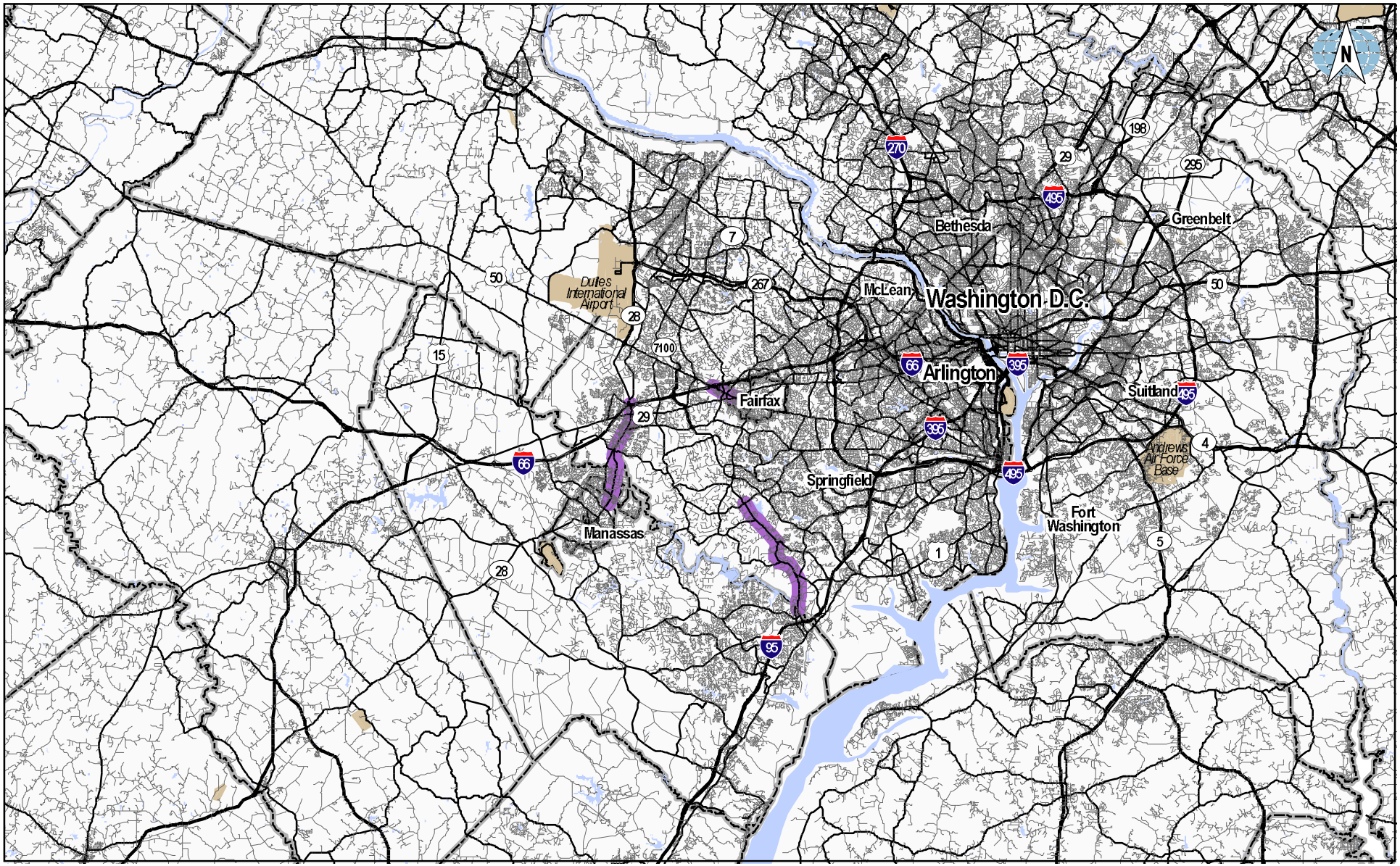
FUTURE PROJECT UPDATES COMMENCING IN THE 2023 NETWORK

FIGURE 5-4



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FUTURE PROJECT UPDATES COMMENCING IN THE 2028 NETWORK

FIGURE 5-5

Table 5-1
Projected Toll Rate Schedule

	Main Line		Ramps	
	Tolls	**Change**	**Tolls**	**Change**
2009	$0.75	..	$0.50	..
2010	**1.00**	**+ $ 0.25**	**0.75**	**+ $ 0.25**
2011	1.25	**+ $ 0.25**	0.75	..
2012	1.50	**+ $ 0.25**	0.75	..
2013	**1.75**	**+ $ 0.25**	**1.00**	**+ $ 0.25**
2014	2.00	**+ $ 0.25**	1.00	..
2015	2.25	**+ $ 0.25**	1.00	..
2016	**2.50**	**+ $ 0.25**	**1.25**	**+ $ 0.25**
2017	2.50	..	1.25	..
2018	2.50	..	1.25	..
2019	**3.25**	**+ $ 0.75**	**1.75**	**+ $ 0.50**
2020	3.25	..	1.75	..
2021	3.25	..	1.75	..
2022	3.25	..	1.75	..
2023	**4.00**	**+ $ 0.75**	**2.25**	**+ $ 0.50**
2024	4.00	..	2.25	..
2025	4.00	..	2.25	..
2026	4.00	..	2.25	..
2027	4.00	..	2.25	..
2028	**4.75**	**+ $ 0.75**	**2.75**	**+ $ 0.50**
2029	4.75	..	2.75	..
2030	4.75	..	2.75	..
2031	4.75	..	2.75	..
2032	4.75	..	2.75	..
2033	**5.50**	**+ $ 0.75**	**3.25**	**+ $ 0.50**
2034	5.50	..	3.25	..
2035	5.50	..	3.25	..
2036	5.50	..	3.25	..
2037	5.50	..	3.25	..
2038	**6.25**	**+ $ 0.75**	**3.75**	**+ $ 0.50**
2039	6.25	..	3.75	..
2040	6.25	..	3.75	..
2041	6.25	..	3.75	..
2042	6.25	..	3.75	..
2043	**7.00**	**+ $ 0.75**	**4.25**	**+ $ 0.50**
2044	7.00	..	4.25	..
2045	7.00	..	4.25	..
2046	7.00	..	4.25	..
2047	7.00	..	4.25	..

MODELING METHODOLOGY

The National Capital Region Transportation Planning Board (TPB) is the federally designated Metropolitan Planning Organization (MPO) for the region. The TPB models obtained from MWCOG were used as the basis for the current estimates of traffic and revenue. The model inputs are version 2.2 which was released in March 2008. This version replaces the previous Version 2.1D, #50 released November 2004. The models use as part of the inputs socioeconomic data at the traffic analysis zone level (TAZ).

The following sections discuss the modeling framework, highway network and trip table development and give an overview of the parameters and traffic assignment and toll diversion process used in this study.

MWCOG MODEL FRAMEWORK

The MWCOG/TPB regional transportation model is a computer-based traffic forecasting model designed to forecast traffic volumes in the Washington, D.C. region, which includes parts of Maryland and Virginia as well as the District. WSA was provided with trip tables and networks for a base year as well as forecast years at ten-year increments through 2030.

The model has a sequential procedure for generating trips based on the traditional four-step transportation demand modeling process (trip generation, trip distribution, person-to-vehicle trip factoring, and highway assignment) with several loop-back steps to take congestion levels into account. Trip tables representing a.m. peak period, p.m. peak period, midday, and overnight travel are developed in the MWCOG model using factors from regional household surveys.

New trip tables for each of the forecast years (2010, 2013, 2018, 2023 and 2028) were generated using the Round 7.1 (January 2008) socioeconomic forecasts, but with DTR corridor study area adjustments recommended as detailed in Appendix C.

HIGHWAY NETWORK ASSUMPTIONS

The MWCOG model contains highway networks for each forecast year representing the highways, arterial and local streets of the region. The year 2007 roadway network, in combination with 2007 traffic assignments, were reviewed and adjusted based on current travel speed observations and the type and number of roadway lanes.

The future year networks were then reviewed against the approved transportation improvement plans to confirm that committed and funded improvements were included.

TRIP TABLE ADJUSTMENTS TO REFLECT DTR TRAVEL PATTERNS

WSA ran a series of 2007 traffic assignments initially using trips generated solely by the MWCOG model to understand the underlying model output. Adjustments were made to

attempt to obtain a better fit between the ground counts at three screenline locations and traffic volumes assigned by the model.

The base year trip tables were then adjusted to better reflect the travel pattern information obtained from the origin-destination surveys. Trips passing through links that represent locations where the travel pattern surveys were collected were extracted and adjusted to match the trip patterns from the survey. This ensures that adjusted trip tables are a better reflection of actual travel patterns observed from the surveys.

Overview of Toll Diversion Assignment Process

A series of tolled diversion assignments at the years 2007, 2010, 2013, 2018, 2023 and 2028 were run for the projected toll rate for DTR.

Trip tables were divided into market segments based on different trip purposes including airport trips, passenger car SOV, passenger car HOV-2, passenger car HOV-3, and commercial vehicle traffic. These market segments were assigned to the network using a modified version of a multi-class user equilibrium assignment process. Appropriate toll rates and fees were used for each of these categories of vehicles.

The MWCOG model was updated to include WSA tolling algorithms designed to estimate the share of traffic for each travel movement which would be expected to choose the toll routing at each toll rate. This is specifically designed to assess motorists' willingness to pay tolls at varying toll levels and congestion conditions. The process builds two sets of minimum time paths for each origin-destination zone pair: one using the DTR (where appropriate) and the other using competing toll-free facilities. A proportion of the total trips moving between the zones are assigned to each network path based on the relative total cost between the two paths considering vehicle operating costs, travel time costs, and tolls. As the cost of the tolled routing increases as compared to the competing toll-free routing, the share of traffic using the DTR decreases; and vice versa.

The time cost is equal to the time spent traveling between two zones, multiplied by the weighted average value-of-time of the two zones. The total number of households in each of the two zones is used as the weighting criteria for the calculation of the average value-of-time. The distance cost for each of the two paths is equal to the vehicle operating cost multiplied by the distance traveled for each path.

Values-of-Time and Vehicle Operating Costs

Traffic and revenue on a toll facility is dependent on motorists' willingness to pay a toll for benefits received in using the toll facility. These benefits can include mileage savings, improved quality of travel, safety, and reduced congestion. The motorist's value–of-time, vehicle operating cost, and toll charges are the three key elements in determining the cost of making a particular trip and, therefore, the share of traffic assigned to tolled vs. toll-free paths to travel from the origin to the destination of the trip.

As described in Appendix B, based on the results of a new stated preference survey for the DTR corridor, the year 2007 overall average value-of-time (VOT) for trips in the corridor was calculated to be $0.21 per minute for motorists traveling for work/business trip purposes. VOT for commuting trips was calculated at $0.20 per minute. Finally, VOT's were calculated to be $0.17 for leisure trip purposes. Reflective of the relatively high incomes in the corridor, the value of time range is relatively high compared with other areas of the United States. These VOT's were assumed to inflate 2.5 percent each year through the forecast period.

As a further refinement, WSA developed differential values-of-time for the traffic assignments estimated by traffic analysis zone (TAZ), which were developed using income distributions from the MWCOG socioeconomic data files. For each zone, there is a field containing factors that represents the ratio of median household income in that zone as compared to the regional average. This factor was applied to the average value-of-time for the region to develop an estimate of current VOT for each Travel Analysis Zone (TAZ) in the model. In general, zones in the DTR corridor tend to have median household incomes that are greater than the regional average. This enables the modeling process to recognize the variance in incomes in the corridor and throughout the region.

Vehicle operating costs used in the analysis were calculated by taking into account the average per-mile costs of gasoline and oil, and to a lesser extent, maintenance, and wear and tear of tires for the regions' vehicles.

The values-of-time and vehicle operating costs used in the analysis were inflated to future year levels also assuming a 2.5 percent annual inflation rate for all future year traffic assignments.

ASSUMED ETC MARKET SHARES

Since electronic toll collection (ETC) on DTR is not assumed to have different toll rates, ETC market share is not an important factor in estimating traffic and revenue for the DTR. However, reasonable assumptions regarding the share of motorists which might be expected to use ETC were made for testing of future operational improvements at toll plazas.

TOLL DIFFERENTIAL ASSUMPTIONS

As indicated, it was assumed that there will continue to be no toll differential between ETC and cash collection. Despite the lack of a differential the market share of E-ZPass continues to grow.

However, there is and will be a toll differential between passenger cars and commercial vehicles. Appropriate commercial vehicle toll rates were applied. The share of commercial vehicles on DTR is extremely low.

TOLL SENSITIVITY

Toll sensitivity analysis tests a series of toll rates to aid in the selection of toll rate for the DTR corridor. Future year toll sensitivity curves are based on changes in traffic characteristics in the corridor including increasing congestion, value of time, competing facilities, and inflationary trends. These curves are essential in estimating the viability of future toll rate increases.

In general, the toll sensitivity curve suggests that when toll rates increase, a portion of travelers will leave the toll facility in favor of other routes. Therefore, as the toll rate increases transactions would tend to decrease. However, as the toll rates increase, toll revenues increases until a point where a maximum revenue is generated after which additional toll rate increases would generate a decrease in toll revenues.

Toll sensitivity analyses were conducted for the years 2010 and 2023. Figure 5-6 illustrates the daily toll sensitivity curves for these years estimated for the DTR. Main line toll rates, in nominal year dollars, ranging from $1.00 to $12.00 were analyzed for both 2010 and 2023.

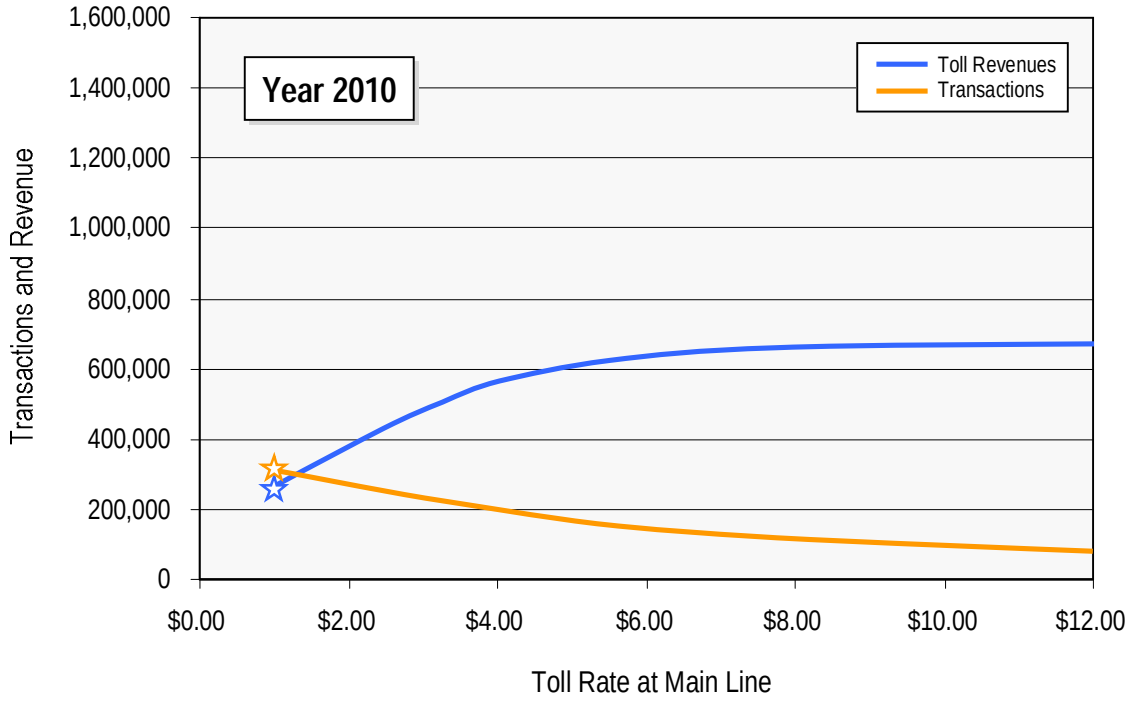
The sensitivity analyses results indicate that the projected toll rates of DTR are well below the estimated theoretical revenue maximization point. This demonstrates that there would be considerable potential for revenue enhancement through toll increases above current rates and even for those assumed for forecasting purposes, if needed.

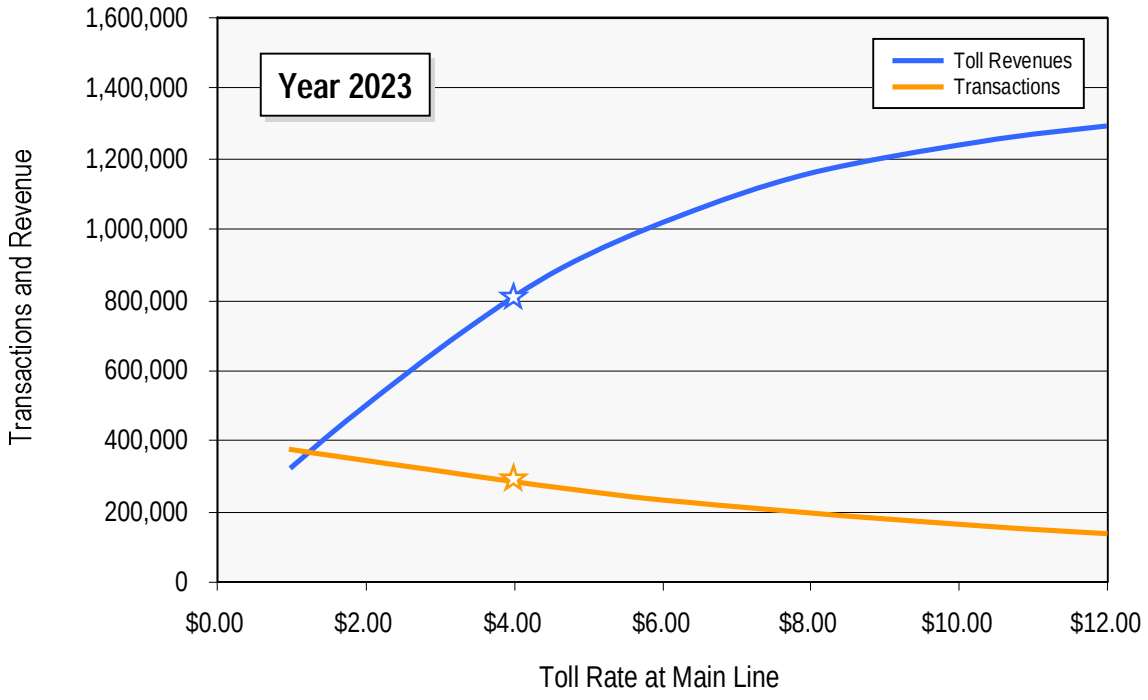
Revenue-maximizing main line tolls are estimated to be somewhere above $7.00 in 2010 and somewhere above $12.00 in 2023. For ease of reference, each curve has been labeled at projected toll rates in each year.

ESTIMATED AVERAGE WEEKDAY TRAFFIC

As noted previously, traffic assignments were run using trip table information supplied by MWCOG and modified for this study by WSA. Future year traffic assignments were run at 2010, 2013, 2018, 2023 and 2028 levels in the years when toll rate increases are assumed to occur. To assist in interpolation before each successive increase, a second set of future year traffic assignment was undertaken in these years using toll rates from the prior period.

The assignment results were reviewed for reasonableness, using both select link and screenline corridor share analyses. In the screenline review, special attention was paid to the overall level of growth in traffic throughout the projection period, and the relative share of total screenline demand expected to be accommodated by DTR.





Note: Stars indicate the proposed main line toll rate for a 2-axle vehicle in that year.

TOLL SENSITIVITY ANALYSIS
SYSTEM TRANSACTIONS AND REVENUE

WilburSmith ASSOCIATES

FIGURE 5-6

The traffic assignment process utilized the projected toll rate schedule described previously. The toll rate increases announced for the adjacent Dulles Greenway toll road were also assumed.

ESTIMATED WEEKDAY TRANSACTIONS AND REVENUE

PROJECTED TOLL RATE SCHEDULE

For the projected toll rate schedule, estimates of average weekday transactions and revenue under 2010, 2013, 2018, 2023, and 2028 assumptions are presented in Table 5-2.

As shown in Table 5-2 the DTR would produce a total of 313,300 tolled transactions on an average weekday in 2010. These average weekday trip levels would produce $263,400 in average weekday toll revenue.

During 2013, average weekday total transactions reduce to 298,800 following three years of annual toll adjustments of $0.25 each. Total toll revenue of $378,400 is expected to be generated based on these transaction levels at increased toll rates.

By 2019, total transactions are expected to reduce to 276,900 on an average weekday generating total revenues of $634,900. By 2023, average weekday total transactions are expected to be 276,500, comparable to 2019 levels despite a toll rate adjustment. This results in daily revenues of $801,200.

In 2028, average weekday total transactions increase to 280,400 generating $975,700 in toll revenues.

ESTIMATED ANNUAL TRANSACTIONS AND REVENUE

T&R ESTIMATES, PROJECTED TOLL RATE SCHEDULE

Estimates of annual toll revenue for the DTR under the projected toll rate schedule are presented in Table 5-3. Total revenue for DTR is presented from 2007 through 2047.

In 2010 total annual transactions are estimated at more than 103.2 million per year. This translates to annual toll revenue of about $87.4 million in 2010. In 2013, annual total transactions remain above 100.0 million per year with small, frequent main line toll increases. These transactions produce almost $127.5 million in annual toll revenues.

Table 5-2
Average Weekday Transactions by Model Years
Projected Toll Rate Schedule

Plaza	2010		2013		2019		2023		2028	
	Transactions	Revenue	Transactions	Revenue	Transactions	Revenue	Transactions	Revenue	Transactions	Revenue
CAPITAL, E, W [1]	7,900	$6,000	8,200	$8,200	7,200	$12,500	8,000	$17,800	7,700	$21,000
SPRING HL, E, W	13,800	10,300	14,700	14,700	12,900	22,600	10,900	24,600	11,100	30,700
MAIN LINE, EAST	57,500	57,500	54,000	94,400	50,500	164,300	52,300	209,200	52,300	248,500
MAIN LINE, WEST	56,500	56,500	52,200	91,400	49,400	160,600	50,100	200,500	50,100	237,800
ROUTE 7, EAST	8,100	6,000	7,700	7,700	7,900	13,800	7,800	17,500	8,600	23,500
HUNTER ML, E, W	11,200	8,400	10,400	10,400	8,300	14,700	8,000	18,100	8,100	22,300
WIEHLE AV, E, W	13,200	9,900	11,700	11,700	10,400	18,200	9,800	22,000	9,800	27,000
RESTON PK, E, W	23,200	17,500	21,200	21,200	18,000	31,600	16,800	37,800	17,100	47,100
FAIRFAX PK,E, W	22,100	16,500	22,000	22,000	18,300	32,000	17,800	39,900	18,200	50,200
CENTREVIL, E, W	22,200	16,600	20,600	20,600	18,200	31,800	17,300	39,000	17,700	48,600
SULLY RD, E, W, S	51,900	38,900	50,100	50,100	47,700	83,600	49,200	110,700	48,100	132,200
GREENWAY, EAST	13,400	10,100	13,700	13,700	14,800	25,900	14,900	33,500	15,900	43,800
GREENWAY, WEST	12,300	9,200	12,300	12,300	13,300	23,300	13,600	30,600	15,700	43,000
Total	**313,300**	**$263,400**	**298,800**	**$378,400**	**276,900**	**$634,900**	**276,500**	**$801,200**	**280,400**	**$975,700**

[1] Capital Beltway Ramps refer to the two east-facing (nearest the I-495 Capital Beltway) ramps at the Spring Hill Interchange.

Table 5-3
Dulles Toll Road Traffic and Toll Revenue Estimates 2009-2047
Projected Toll Rate Schedule

Forecast Year	Calendar Year	ML/Ramp Tolls	Total Transactions	% p.a.	Total Revenue	% p.a.	Average Revenue (1)
-1	2007	$0.75 / $0.50	109,417,000		$65,584,000		$0.60
0	2008	$0.75 / $0.50	109,601,000	+0.2%	65,634,000	+0.1%	0.60
1	2009	$0.75 / $0.50	108,505,000	-1.0%	64,978,000	-1.0%	0.60
2	2010	$1.00 / $0.75	103,219,000	-4.9%	87,414,000	+34.5%	0.85
3	2011	$1.25 / $0.75	103,292,000	+0.1%	97,128,000	+11.1%	0.94
4	2012	$1.50 / $0.75	103,389,000	+0.1%	107,104,000	+10.3%	1.04
5	2013	$1.75 / $1.00	100,015,000	-3.3%	127,475,000	+19.0%	1.27
6	2014	$2.00 / $1.00	100,023,000	+0.0%	136,426,000	+7.0%	1.36
7	2015	$2.25 / $1.00	100,042,000	+0.0%	145,409,000	+6.6%	1.45
8	2016	$2.50 / $1.25	97,719,000	-2.3%	166,619,000	+14.6%	1.71
9	2017	$2.50 / $1.25	99,772,000	+2.1%	170,118,000	+2.1%	1.71
10	2018	$2.50 / $1.25	101,867,000	+2.1%	173,691,000	+2.1%	1.71
11	2019	$3.25 / $1.75	93,875,000	-7.8%	216,261,000	+24.5%	2.30
12	2020	$3.25 / $1.75	95,193,000	+1.4%	219,897,000	+1.7%	2.31
13	2021	$3.25 / $1.75	96,781,000	+1.7%	224,172,000	+1.9%	2.32
14	2022	$3.25 / $1.75	98,407,000	+1.7%	228,559,000	+2.0%	2.32
15	2023	$4.00 / $2.25	93,224,000	-5.3%	271,436,000	+18.8%	2.91
16	2024	$4.00 / $2.25	94,700,000	+1.6%	275,655,000	+1.6%	2.91
17	2025	$4.00 / $2.25	96,206,000	+1.6%	279,957,000	+1.6%	2.91
18	2026	$4.00 / $2.25	97,742,000	+1.6%	284,336,000	+1.6%	2.91
19	2027	$4.00 / $2.25	99,308,000	+1.6%	288,801,000	+1.6%	2.91
20	2028	$4.75 / $2.75	94,848,000	-4.5%	331,455,000	+14.8%	3.49
21	2029	$4.75 / $2.75	95,376,000	+0.6%	333,261,000	+0.5%	3.49
22	2030	$4.75 / $2.75	95,908,000	+0.6%	335,081,000	+0.5%	3.49
23	2031	$4.75 / $2.75	96,442,000	+0.6%	336,908,000	+0.5%	3.49
24	2032	$4.75 / $2.75	96,980,000	+0.6%	338,747,000	+0.5%	3.49
25	2033	$5.50 / $3.25	93,621,000	-3.5%	382,248,000	+12.8%	4.08
26	2034	$5.50 / $3.25	94,144,000	+0.6%	384,385,000	+0.6%	4.08
27	2035	$5.50 / $3.25	94,457,000	+0.3%	385,661,000	+0.3%	4.08
28	2036	$5.50 / $3.25	94,770,000	+0.3%	386,940,000	+0.3%	4.08
29	2037	$5.50 / $3.25	95,083,000	+0.3%	388,219,000	+0.3%	4.08
30	2038	$6.25 / $3.75	92,537,000	-2.7%	432,419,000	+11.4%	4.67
31	2039	$6.25 / $3.75	92,844,000	+0.3%	433,853,000	+0.3%	4.67
32	2040	$6.25 / $3.75	93,152,000	+0.3%	435,292,000	+0.3%	4.67
33	2041	$6.25 / $3.75	93,461,000	+0.3%	436,737,000	+0.3%	4.67
34	2042	$6.25 / $3.75	93,771,000	+0.3%	438,187,000	+0.3%	4.67
35	2043	$7.00 / $4.25	91,706,000	-2.2%	482,643,000	+10.1%	5.26
36	2044	$7.00 / $4.25	92,012,000	+0.3%	484,252,000	+0.3%	5.26
37	2045	$7.00 / $4.25	92,318,000	+0.3%	485,865,000	+0.3%	5.26
38	2046	$7.00 / $4.25	92,626,000	+0.3%	487,484,000	+0.3%	5.26
39	2047	$7.00 / $4.25	92,935,000	+0.3%	489,109,000	+0.3%	5.26

(1) Average revenue per transaction.

By 2016, annual transactions are expected to be 97.7 million per year generating annual toll revenue of almost $166.6 million. The annual transactions in 2019 are expected to be 93.9 million per year generating annual toll revenue of $216.3 million.

After 2023, toll rate adjustments will be made at regular five-year intervals. Total annual revenues in 2023 would equal more than $271.4 million generated by 93.2 million transactions after the first regular toll rate adjustments. By 2028, total annual transactions are estimated to be 94.9 million per year producing total annual revenue of more than $331.5 million.

Annual toll revenues are estimated to reach nearly one-half billion dollars by the end of the forecast period. Transactions remain below current-day levels throughout the whole forecast period thus improving and maintaining the level of service for DTR customers.

* * *

DISCLAIMER

Current accepted professional practices and procedures were used in the development of these traffic and revenue forecasts. However, as with any forecast of the future, it should be understood that there may be differences between forecasted and actual results caused by events and circumstances beyond the control of the forecasters. In formulating its forecasts, WSA has reasonably relied upon the accuracy and completeness of information provided (both written and oral) by the Metropolitan Washington Airports Authority and other local and state agencies. WSA also has relied upon the reasonable assurances of some independent parties and are not aware of any facts that would make such information misleading.

WSA has made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue forecasts that must be considered as a whole; therefore selecting portions of any individual result without consideration of the intent of the whole may create a misleading or incomplete view of the results and the underling methodologies used to obtain the results. WSA gives no opinion as to the value or merit to partial information extracted from this report.

All estimates and projections reported herein are based on WSA' experience and judgment. These estimates and projections may not be indicative of actual or future values, and are therefore subject to substantial uncertainty. Future developments cannot be predicted with certainty, and may affect the estimates or projections expressed in this report, such that WSA does not specifically guarantee or warrant any estimate or projections contained within this report.

While WSA believes that some of the projections or other forward-looking statements contained within the report are based on reasonable assumptions as of the date in the report, such forward looking statements involve risks and uncertainties that may cause actual results to differ materially from the results predicted. Therefore, following the date of this report, WSA will take no responsibility or assume any obligation to advise of changes that may affect its assumptions contained within the report, as they pertain to: socioeconomic and demographic forecasts, proposed residential or commercial land use development projects and/or potential improvements to the regional transportation network.

CHAPTER 6

SENSITIVTY TESTS AND ALTERNATE TOLL RATE SCHEDULE

SENSITIVITY TESTS

A series of sensitivity tests were performed to provide a measure of the sensitivity of transactions and toll revenue to changes in key study assumptions. The sensitivity tests were conducted at 2013 and/or 2028 year levels. The sensitivity tests included the following conditions:

- Lower Economic Growth – Assumes a 25 percent reduction in growth of the baseline trip table in 2013;
- Higher Economic Growth – Assumes increase of 25 percent above the baseline trip table growth in 2013;
- Lower Value of Time – Assumes a reduced willingness to pay tolls in 2028; and
- Gasoline Price Increase – Assumes gasoline pump prices increase to $5 per gallon in real terms reflected in vehicle operating costs (VOC).

The results of the sensitivity tests are presented in Table 6-1.

As indicated in Table 6-1, assuming an increase in growth of 25 percent, revenues would increase roughly 4.7 percent in 2013 and 11.2 percent in 2028. Conversely, assuming a decrease in growth of 25 percent would result in decreased revenue of roughly 4.5 percent in 2013 and 11.4 percent in 2028.

Assuming a 25 percent reduction in values of time results in a reduced willingness to pay tolls and equates to a reduction in annual revenue of 16.6 percent in 2028.

The increase in gasoline price test resulted in an increase in vehicle operating costs and a reduced propensity to travel resulting in an overall loss of total annual revenue equaling approximately 7.8 percent at 2028 year levels.

Table 6-1
Sensitivity Test Results
(thousands)

Scenario	Annual Transactions CY 2013	Annual Transactions CY 2028	Annual Toll Revenues CY 2013	Annual Toll Revenues CY 2028
Baseline T&R (1)	100,015	94,848	$127,475	$331,455
Trips Increase 25% (2)	104,991	105,603	133,484	368,503
Difference	*4,976*	*10,755*	*6,009*	*37,048*
Percent Difference	*5.0%*	*11.3%*	*4.7%*	*11.2%*
Trips Decrease 25% (3)	95,310	83,770	121,771	293,801
Difference	*(4,705)*	*(11,078)*	*(5,704)*	*(37,654)*
Percent Difference	*-4.7%*	*-11.7%*	*-4.5%*	*-11.4%*
VOT Decrease 25% (4)	-	79,089	-	276,498
Difference	-	*(15,759)*	-	*(54,957)*
Percent Difference	-	*-16.6%*	-	*-16.6%*
Gasoline Price Increase (5)	-	87,680	-	305,720
Difference	-	*(7,168)*	-	*(25,735)*
Percent Difference	-	*-7.6%*	-	*-7.8%*

(1) Projected Toll Rate Schedule
(2) Assumes increase of 25 percent over base trip table growth.
(3) Assumes decrease of 25 precent over base trip table growth.
(4) Assumes decrease of 25 percent in value of time calculation.
(5) Assumes gasoline prices increase to $5/gallon; reduce total regional trips by 4 percent.

ALTERNATE TOLL RATE SCHEDULE

An alternate toll rate schedule, as shown in Table 6-2, was tested to assist the Airports Authority and its advisors with financial sensitivity analyses: following a $0.25 increase in 2010 at both the main line plaza and all ramps, an increase of $0.25 occurs at the main line plaza in 2011 and 2012. In 2013 and 2018, a $1.25 increase occurs at the main line plaza and a $1.00 increase occurs at all ramp plazas. Beginning in 2023, and occurring every five years thereafter, there is an increase of $1.00 at the main line plaza and at all ramp plazas.

Table 6-2
Alternate Toll Rate Schedule

	Main Line		Ramps	
	Tolls	Change	Tolls	Change
2009	$0.75	..	$0.50	..
2010	**1.00**	**+ $ 0.25**	**0.75**	**+ $ 0.25**
2011	1.25	**+ $ 0.25**	0.75	..
2012	1.50	**+ $ 0.25**	0.75	..
2013	**2.75**	**+ $ 1.25**	**1.75**	**+ $ 1.00**
2014	2.75	..	1.75	..
2015	2.75	..	1.75	..
2016	2.50	..	1.75	..
2017	2.50	..	1.75	..
2018	**4.00**	**+ $ 1.25**	**2.75**	**+ $ 1.00**
2019	4.00	..	2.75	..
2020	4.00	..	2.75	..
2021	4.00	..	2.75	..
2022	4.00	..	2.75	..
2023	**5.00**	**+ $ 1.00**	**3.75**	**+ $ 1.00**
2024	5.00	..	3.75	..
2025	5.00	..	3.75	..
2026	5.00	..	3.75	..
2027	5.00	..	3.75	..
2028	**6.00**	**+ $ 1.00**	**4.75**	**+ $ 1.00**
2029	6.00	..	4.75	..
2030	6.00	..	4.75	..
2031	6.00	..	4.75	..
2032	6.00	..	4.75	..
2033	**7.00**	**+ $ 1.00**	**5.75**	**+ $ 1.00**
2034	7.00	..	5.75	..
2035	7.00	..	5.75	..
2036	7.00	..	5.75	..
2037	7.00	..	5.75	..
2038	**8.00**	**+ $ 1.00**	**6.75**	**+ $ 1.00**
2039	8.00	..	6.75	..
2040	8.00	..	6.75	..
2041	8.00	..	6.75	..
2042	8.00	..	6.75	..
2043	**9.00**	**+ $ 1.00**	**7.75**	**+ $ 1.00**
2044	9.00	..	7.75	..
2045	9.00	..	7.75	..
2046	9.00	..	7.75	..
2047	9.00	..	7.75	..

ESTIMATED TRANSACTIONS AND REVENUE

Estimates of annual toll revenue for the DTR under larger toll rate increases are presented in Table 6-3. Total revenue for DTR is presented from 2007 through 2047.

In 2010, total annual transactions are estimated at more than 103.2 million per year. This translates to annual toll revenue of about $87.4 million in 2010. This is the same as in the projected toll rate schedule as the toll rates are the same in each scenario up through 2012.

Table 6-3
Dulles Toll Road Traffic and Toll Revenue Estimates 2009-2047
Alternate Toll Rate Schedule

Forecast Year	Calendar Year	ML/Ramp Tolls	Total Transactions	% p.a.	Total Revenue	% p.a.	Average Revenue (1)
-1	2007	$0.75 / $0.50	109,417,000		$65,584,000		$0.60
0	2008	$0.75 / $0.50	109,601,000	+0.2%	65,634,000	+0.1%	0.60
1	2009	$0.75 / $0.50	108,505,000	-1.0%	64,978,000	-1.0%	0.60
2	2010	$1.00 / $0.75	103,219,000	-4.9%	87,414,000	+34.5%	0.85
3	2011	$1.25 / $0.75	103,292,000	+0.1%	97,128,000	+11.1%	0.94
4	2012	$1.50 / $0.75	103,389,000	+0.1%	107,104,000	+10.3%	1.04
5	2013	$2.75 / $1.75	84,302,000	-18.5%	178,798,000	+66.9%	2.12
6	2014	$2.75 / $1.75	86,354,000	+2.4%	183,015,000	+2.4%	2.12
7	2015	$2.75 / $1.75	88,464,000	+2.4%	187,345,000	+2.4%	2.12
8	2016	$2.75 / $1.75	90,634,000	+2.5%	191,794,000	+2.4%	2.12
9	2017	$2.75 / $1.75	92,864,000	+2.5%	196,361,000	+2.4%	2.11
10	2018	$4.00 / $2.75	79,932,000	-13.9%	257,237,000	+31.0%	3.22
11	2019	$4.00 / $2.75	81,876,000	+2.4%	263,701,000	+2.5%	3.22
12	2020	$4.00 / $2.75	83,878,000	+2.4%	270,357,000	+2.5%	3.22
13	2021	$4.00 / $2.75	85,938,000	+2.5%	277,209,000	+2.5%	3.23
14	2022	$4.00 / $2.75	88,058,000	+2.5%	284,264,000	+2.5%	3.23
15	2023	$5.00 / $3.75	78,025,000	-11.4%	331,314,000	+16.6%	4.25
16	2024	$5.00 / $3.75	80,002,000	+2.5%	339,584,000	+2.5%	4.24
17	2025	$5.00 / $3.75	82,032,000	+2.5%	348,079,000	+2.5%	4.24
18	2026	$5.00 / $3.75	84,121,000	+2.5%	356,810,000	+2.5%	4.24
19	2027	$5.00 / $3.75	86,268,000	+2.6%	365,780,000	+2.5%	4.24
20	2028	$6.00 / $4.75	78,284,000	-9.3%	410,886,000	+12.3%	5.25
21	2029	$6.00 / $4.75	78,704,000	+0.5%	413,077,000	+0.5%	5.25
22	2030	$6.00 / $4.75	79,127,000	+0.5%	415,286,000	+0.5%	5.25
23	2031	$6.00 / $4.75	79,552,000	+0.5%	417,502,000	+0.5%	5.25
24	2032	$6.00 / $4.75	79,979,000	+0.5%	419,730,000	+0.5%	5.25
25	2033	$7.00 / $5.75	75,987,000	-5.0%	475,527,000	+13.3%	6.26
26	2034	$7.00 / $5.75	76,397,000	+0.5%	478,090,000	+0.5%	6.26
27	2035	$7.00 / $5.75	76,640,000	+0.3%	479,611,000	+0.3%	6.26
28	2036	$7.00 / $5.75	76,883,000	+0.3%	481,135,000	+0.3%	6.26
29	2037	$7.00 / $5.75	77,127,000	+0.3%	482,661,000	+0.3%	6.26
30	2038	$8.00 / $6.75	73,891,000	-4.2%	537,036,000	+11.3%	7.27
31	2039	$8.00 / $6.75	74,126,000	+0.3%	538,744,000	+0.3%	7.27
32	2040	$8.00 / $6.75	74,362,000	+0.3%	540,460,000	+0.3%	7.27
33	2041	$8.00 / $6.75	74,599,000	+0.3%	542,183,000	+0.3%	7.27
34	2042	$8.00 / $6.75	74,837,000	+0.3%	543,916,000	+0.3%	7.27
35	2043	$9.00 / $7.75	72,448,000	-3.2%	599,002,000	+10.1%	8.27
36	2044	$9.00 / $7.75	72,680,000	+0.3%	600,913,000	+0.3%	8.27
37	2045	$9.00 / $7.75	72,912,000	+0.3%	602,835,000	+0.3%	8.27
38	2046	$9.00 / $7.75	73,146,000	+0.3%	604,766,000	+0.3%	8.27
39	2047	$9.00 / $7.75	73,380,000	+0.3%	606,702,000	+0.3%	8.27

(1) Average revenue per transaction.

In 2013, the main line plaza rate is increase by $1.25 and the ramp plaza rates are increased by $1.00. The toll rate adjustment results in annual total transactions of 84.3 million. These transactions produce over $178.8 million in annual toll revenues.

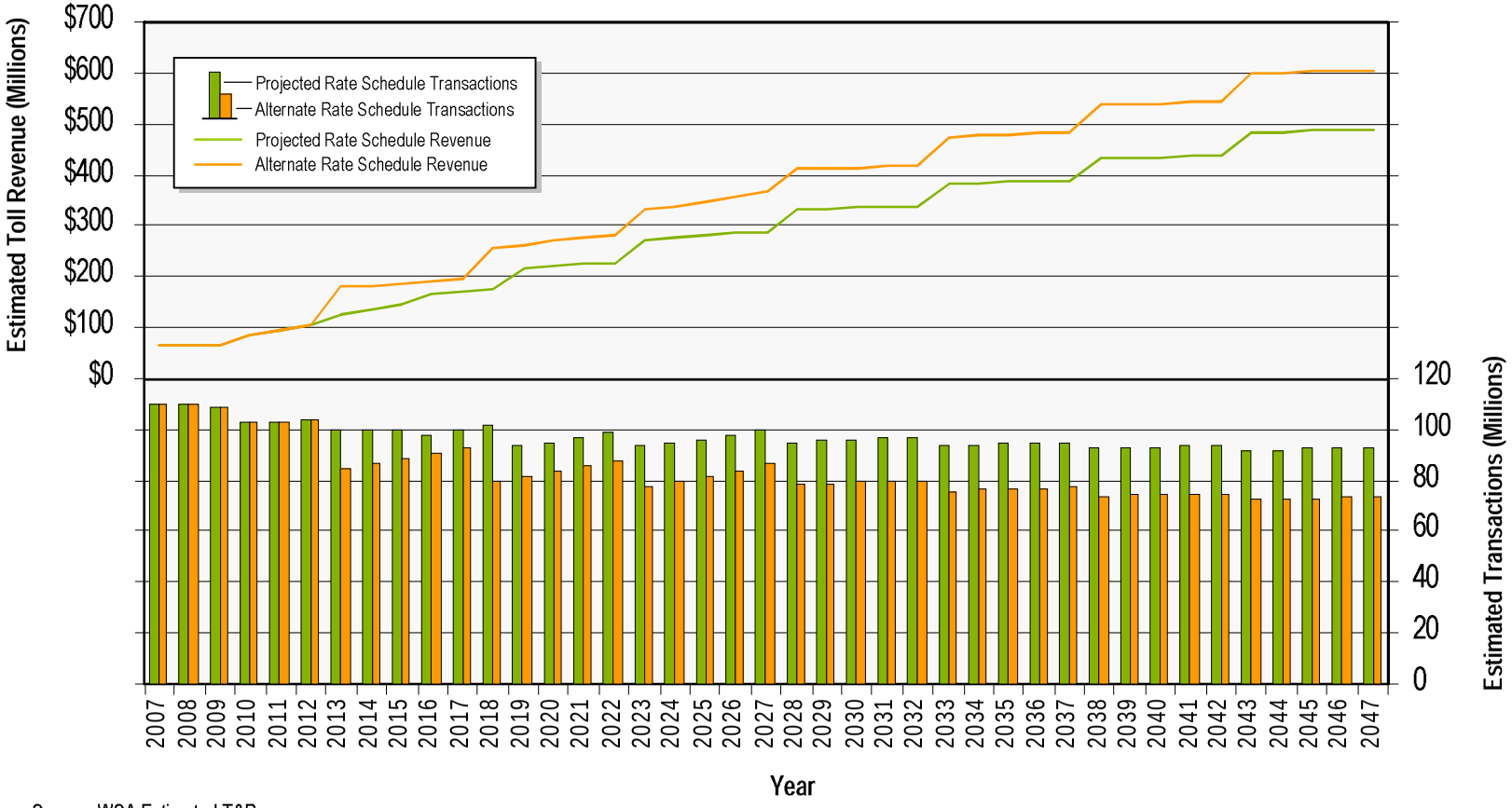
By 2018, annual transactions are expected to be 79.9 million per year generating annual toll revenue of over $257.2 million. After 2018, both the main line and the ramp plazas will increase $1.00 every five years.

Total annual 2023 revenue would equal over $331.3 million after further toll rate adjustments based on 78.0 million transactions. By 2028 total annual transactions are estimated to be almost 78.3 million per year producing total annual revenue of $410.9 million.

By the end of the forecast period, estimated annual revenues are well over one-half billion dollars ($606.7 million). As with the projected toll rate schedule, annual transactions throughout the forecast period for the alternate toll rate schedule remain below current-day levels thus improving and maintaining the level of service for DTR customers.

COMPARISON OF TOLL RATE SCHEDULES

Figure 6-1 shows graphically the revenue potential of the two toll rate schedules considered – projected and alternate. It also shows estimates of toll transactions and illustrates the demand management effects of the successive periodic toll rate increases ensuring that customers paying the higher tolls will receive the benefits of faster and more consistent travel speeds on the DTR.



Source: WSA Estimated T&R

Appendix A

Dulles Toll Road
2008 Stated Preference Survey

DULLES TOLL ROAD STATED PREFERENCE EXERCISE

Mark Wardman and Nicolás Ibáñez

April 2008

1. INTRODUCTION

This work was undertaken on behalf of Wilbur Smith Associates.

Jonathan Pagan of Wilbur Smith Associates commissioned Mark Wardman and Nicolás Ibáñez to design, analyze, and report a stated preference experiment whose purpose was to estimate the value that current toll road users place upon time savings.

The data collection was the responsibility of Wilbur Smith Associates.

The research involved two SP exercises. The first, and main, SP exercise offered time-toll trade-offs between different routes and also a new Metro. This would yield monetary valuations. The second SP exercise offered trade-offs amongst different types of driving time, with the aim of detecting how the value of time varies according to driving conditions.

2. DESIGN

2.1 Main SP Exercise

The main SP exercise offered choices between six alternatives. These were:

- The current freeway
- A new tolled freeway
- An existing but untolled road
- The current freeway at a different time
- A high occupancy vehicle (HOV) lane
- A new Metro service

Peak travelers were offered all alternatives. Thus they were able to achieve a faster journey and sometimes benefit from a lower toll by using the HOV lane whilst there was also the possibility to travel in an off-peak period and experience less congested conditions and also save on the toll.

Off-peak travelers were not offered the alternatives of travelling at a different time or of using the HOV.

Whilst it would have been possible to obtain values of time from an SP exercise that simply offered choices between two alternatives, say the existing freeway and the next best of the listed alternatives, there were two main reasons why we offered this broader range of attributes. Firstly, the purpose of the study might be less obvious and therefore be less likely to attract response bias. Offering a range of options might make the study to appear to be about travel in general rather than simply

increasing the toll on an existing route. Secondly, a wider range of time-cost trade-offs can be offered which supports the more precise estimation of model parameters.

The current freeway, new freeway and HOV lane were described in terms of toll and travel time. Additionally, the possibility of travelling at a different time denoted the off-peak times when the toll would be lower and how much lower this toll would be along with the generally quicker journey time. The untolled road was characterized simply in terms of travel time. The fuel cost was offered for all routes, in terms of the cost per gallon. This was not varied across routes. Finally, a Metro option was offered. This was characterized in terms of in-vehicle time, time to and from the Metro, fare and service frequency.

Our view was that we could offer an atypically large number of alternatives, in order to achieve the advantages set out above, because each alternative had only a few attributes and these attributes were often the same across alternatives.

Standard fractional factorial designs were adopted. This ensures that there are no correlations amongst the attributes that characterize each option. Each respondent was offered 10 choice scenarios randomly selected from the total of 64.

Separate designs were used according to the current journey time. This was to ensure that the times offered to respondents related to their current journey in which context the SP exercise was set. The designs centered around 30 minutes, 45 minutes, 60 minutes and 75 minutes, and each of them was comprised of 64 alternatives.

The basic concept behind the SP exercises was that faster alternatives would cost more and that the toll on the existing freeway would be increased to determine behavioural response to it. Thus the existing freeway had its toll increased, with variation in journey time around the current level. The new freeway would generally offer faster times but at the cost of higher tolls whilst the untolled road was cheaper but at the expense of a longer journey. Travelling in the off-peak involves the inconvenience of travelling at a less than desired time but saves on toll and sometimes offers faster journeys. The HOV lane offered faster journey in the peak but this could be at the expense of higher tolls and would only be available to those drivers with other occupants.

The four designs used for the first SP exercise are reproduced in Section 8.

2.2 Supplementary SP Exercise

The purpose of this second SP exercise was to determine whether the disutility of motorists' travel time varies with the conditions in which the time is spent.

Increasingly, SP studies are distinguishing between different types of car travel time. This is because time spent in different conditions will have a different value with implications for valuations of time over time as, due to increasing congestion, the mix between different traffic conditions will vary.

The crudest distinction that can be made is between time spent in free flow traffic and time spent in congested conditions however defined. We here go beyond this, using six categories of time. The same exercise was presented as we have recently used successfully in a study of inter-urban car travelers.

The basic concept is that motorists are offered a choice between two routes for a hypothetical journey. One route has the same travel conditions throughout. The other route has a mix of two types of travel time, one better and one worse than the route with a single type of time.

The six types of time between which we distinguish are:

- Free Flow
- Busy
- Light Congestion
- Heavy Congestion
- Stop Start
- Gridlock

However, any respondent was only offered three types of time. This was in the context of either a 15 or a 25 mile journey.

Section 9 contains more details of this supplementary SP exercise.

3. DATA COLLECTION

A pilot survey was conducted prior to the main survey using 350 survey panel members. This resulted in 95 responses. Models were estimated to this data indicating a value of time of around 20¢ per minute. This seemed reasonable. Given that the results were reasonable and that respondents did not appear to have undue difficulty with the SP exercise, no changes were made prior to the main survey.

The main surveys were conducted in March 2008. The final data set totalled 1,045 respondents from a total survey pool of 4,361 (including responses from the pilot survey). They all completed the SP1 exercise on time-toll trade-offs between different modes, whereas only 1040 of them completed the supplementary SP exercise on travel time valuations. Details of the number of responses obtained from each individual in each exercise are included in Table 1.

Table 1: Number of Choices per Respondent in each SP Exercise

Main SP

Choice sets	Individuals
1	1
2	1
8	1
9	749
10	293
Individuals	1045
Observations	9682

Supplementary

Choice sets	Individuals
1	0
2	0
8	1
9	1039
10	0
Individuals	1040
Observations	9359

The breakdown of these total number of respondents (1,045) by travel purpose is detailed in Table 2.

Table 2: Number of Respondents per Purpose and Departure Time

Departure Time	Purpose	Individuals
Peak	Commuting	597
Peak	Employer's business	40
Peak	Leisure	51
Offpeak	Commuting	161
Offpeak	Employer's business	61
Offpeak	Leisure	135
Total_		1045

More detail on the data collection stage is provided in the main report to this study.

4. ESTIMATION METHOD

We have here estimated discrete choice models to determine the relative importance attached to each of the attributes in our SP exercises. The BIOGEME package has been used.

Decision makers make choices between a set of n alternatives which are each characterized by their utility (U). The alternative with highest utility is chosen. Thus the decision maker i chooses alternative 1 if:

$$U_{i1} > U_{in} \quad for\ all\ n, n \neq 1$$

In turn, the utility for each alternative is made up of the part-worth utilities associated with a vector (**X**) of explanatory variables. Travel alternatives are characterised in terms of the main attributes, which in this context are toll, time, departure time shift and the aspects of the train service. Thus we have:

$$U_{in} = f(a, \mathbf{X})$$

where the vector of parameters (a) denotes the relative importance of each attribute.

Although the utility function can contain a large number of variables, the demand analyst cannot possibly observe all the influences on each decision maker's choices, whilst others are too difficult to measure or too minor to merit inclusion. A residual term (ε_{in}) is therefore introduced to represent the net effect of the unobserved influence on an individual's choices. Hence as far as we are concerned, individual i bases decision making on overall utility (U_{in}) which is made up of an observable component (V_{in}) and the residual:

$$U_{in} = V_{in} + e_{in}$$

The analyst can, by definition, proceed only by observation of V_{in}, yet this ignores the influence of what is unobservable but a very real influence on choice. We cannot be sure that alternative 1 is preferred if it has the highest V_{in}, yet the analysis must proceed on the basis of this observable component of utility alone.

The way forward is to specify the problem as one of explaining the probability of an individual choosing a particular alternative. We would expect the likelihood of choosing alternative 1 to increase as its overall random utility increases. The probability that an individual chooses alternative 1 (P_{i1}) from the n on offer can be represented as:

$$P_{i1} = \Pr ob[(V_{i1} + e_{i1}) > (V_{in} + e_{in})] \quad for\ all\ n, n \neq 1$$

By assuming some probability distribution for the ε_n, the probability of choosing alternative 1 can be specified solely as a function of the observable component of utility. Assuming that the errors associated with each alternative have a type I extreme value distribution and are independently and identically distributed yields the familiar multinomial logit model (MNL):

$$P_{i1} = \frac{e^{\Omega V_{i1}}}{\sum_{k=1}^{n} e^{\Omega V_{ik}}}$$

A feature of this discrete choice model is that the parameters estimated to the components of utility are scaled relative to the residual component as:

$$\Omega = \frac{\Pi}{\sqrt{6} s_k}$$

where σ_k is the standard deviation of the residual component associated with each alternative.

The purpose of Ω is to allow for the effects of the unobserved factors on choices. The greater the unobserved influence on choices, the smaller is Ω and hence the observable variables will have less influence on behaviour.

Note that when we come to calculate relative valuations, such as values of time, then this scale cancels out.

The utility function can take any number of forms. In practice, the most common form is linear-additive with the utility weights assumed to be the same across alternatives. If time (T) and cost (C) influence (route choice) behaviour, then the utility function would take the form:

$$V_{in} = a T_{in} + b C_{im}$$

The coefficients themselves have no absolute meaning but instead indicate the relative importance of the different attributes. A relative valuation, such as the money value of time, is derived as the ratio of the marginal utility of the variable in question and the marginal utility of the numeraire variable (here cost). In this special case of a linear-additive function, the marginal value of time is α/β and is constant.

The estimated model can also be used to forecast demand for scenarios that can be depicted by attributes in the choice model along with the choice context it covers. It can also be used to estimate elasticities, which are useful in demand forecasting.

The own point elasticity of demand for alternative 1 with respect to attribute X (η_{1x1}) is:

$$h_{1x1} = (1 - P_1) \frac{\partial V_1}{\partial X_1} X_1$$

Choice models, by their very nature of being based on competition between alternatives, are particularly useful for estimating cross-elasticities. The cross elasticity of demand for alternative 1 with respect to attribute X on alternative 2 (η_{1x2}) implied by the logit model is:

$$h_{1x2} = - P_2 \frac{\partial V_2}{\partial X_2} X_2$$

The cross-elasticity would depend upon the market share of alternative 2. It will in general also depend upon the level of X on alternative 2.

5. ANALYSIS OF MAIN SP DATA

Table 3 presents the results of the main SP exercise. The variables are specified in dollars and minutes. The goodness of fit (ρ^2) is similar to a value of around 0.1 typically obtained from discrete choice models of travel behavior of the multinomial logit (MNL) type based on similar sample sizes. Almost all of the reported coefficient estimates are highly statistically significant.

We can specify five main alternative specific constants (ASCs) given that we have six alternatives. The base was set to be the existing freeway. The new freeway was not significantly different to the existing freeway and was therefore dropped. The ASC for Metro showed high correlations with other attributes and its inclusion had a generally deleterious effect on several other parameter estimates. It was not therefore retained.

The ASCs for the HOV (ASCHOV), different travel time (ASCDIFF) and untolled road (ASCNON) are all negative. These alternatives, as might be expected, are regarded to be inferior, all other things equal, to the existing freeway.

The time coefficients for car are similar for commuting and employer's business (EB). Surprisingly, the coefficient is somewhat larger for leisure traveler, denoting that the marginal utility of time is higher for this group. The same pattern is true for Metro. This may be an unaccounted for difference in scale between leisure and non-leisure travel. However, we see that there is a counteracting effect on the toll coefficients such that the values of time for leisure turn out reasonable relative to the other values.

The time coefficients are lower for Metro than car. It seems that there is a preference for spending a time in a train than in a car. The difficulties of driving in congested traffic conditions and the possibility to use time on train usefully, such as reading, might be a factor here.

As expected, out-of-vehicle time (OVT) is valued more highly than in-vehicle time for business and commuting. Headway is relatively highly valued by these respondents. It tends to have a value somewhat nearer a half in-vehicle time. Whilst it may be that

this sample of travelers does genuinely have high values of frequency, we must treat the coefficients related to Metro with some caution given that the ASC is not retained, because of correlation problems, and hence the coefficient estimates for Metro could detect, as proxy, elements of the genuine ASC relating to Metro.

Table 3: Main SP Results

	Coeff.	T-ratio
ASCHOV	-1.0470	-23.39
ASCDIFF	-2.2178	-32.35
ASCNON	-0.7189	-8.31
ASCNONLeis	-0.1709	-1.20
TimeCarComm	-0.0572	-28.90
TimeCarEB	-0.0567	-11.01
TimeCarLeis	-0.0882	-18.63
Time_METComm	-0.0381	-16.92
Time_METEB	-0.0327	-6.27
Time_METLeis	-0.0723	-15.20
OVTMET	-0.0535	-9.62
Headway	-0.0333	-5.68
TollComm	-0.2828	-4.06
TollEB	-0.2657	-2.91
TollLeis	-0.5224	-5.52
TollPlus	-0.9812	-14.03
Fuel	-0.1996	-8.21
D1	0.6581	6.83
Fare	-0.7869	-10.43

LL	14106.38	
LL_ASCs	15448.92	0.087
LL_Zeros	16051.14	0.121
Observations		9682

VoTComm	20.23	¢/min
VoTEB	21.34	¢/min
VoTLeis	16.88	¢/min

Turning to the toll, business travelers and commuters have a similar sensitivity to toll. Leisure travelers are somewhat more sensitive, which might be expected on the grounds of generally lower incomes amongst this category.

What is more important here is the coefficient we have termed Tollplus. Motorists tend not to like paying toll, and we understand that an increase in toll to fund the Metro in this context is a highly contentious issue. The Tollplus coefficient is considered when the difference between the toll in the SP exercise and the currently paid toll is positive.

It can be seen that this incremental toll effect is very large and highly significant. It would seem that there is a large protest against paying higher tolls. This is confirmed in the record of responses regarding attitudes to paying Tolls provided at the end of the questionnaire.

The retention of the Tollplus term is justified on a number of grounds. Firstly, we would expect a large amount of hostility to toll increases in this context, although the extent of the effect is perhaps surprising. Secondly, other studies detect such effects. Thirdly, if this effect is not isolated, the values of time become implausibly low. Finally, the toll coefficients and the fuel coefficient are broadly sensible in relation to each other when the incremental toll effect is specified. We would expect the fuel coefficient to be less than toll since not all motorists consider fuel costs when making travel decisions. Nonetheless, the removal of the incremental toll effect would make the toll coefficients around five times the fuel coefficient and this seems less reasonable.

The fare coefficient is quite large, larger than the toll and fuel coefficients. This may be detecting some of the effect attributable to the ASC for Metro as discussed above.

Finally, two terms were specified as to whether the offpeak was 7pm-6am and 9am-4pm (D1) or 7pm-6am and 11am-3pm (D2) relative to a base of the off-peak just being 7pm-6am. D2 was not significant, and presumably the 11am-3pm time period offers little benefit to most travelers. However, there was value in extending the daytime off-peak period to between 9am and 4pm.

As far as the values of time are concerned, these are 20.23 cents per minute for commuting, 21.34 cents per minute for business and 16.88 cents per minute for leisure.

The commuting value of time seems highly plausible. It is typically found that the leisure value of time is not much lower than the commuting value. The leisure value of time also seems plausible. The business value of time is hardly different to the commuting value, when we might expect a much larger premium on the basis of employers' willingness to pay. This is not an uncommon finding in SP studies. Respondents might not have borne in mind that the employer would pay or, more likely, the effort involved in claiming back the toll is not deemed to be worth it and hence the respondent effectively pays for the toll themselves. In this respect, it is not surprising that the value of time for business is similar to commuting. The business value of time might therefore represent a lower bound to willingness to pay for time savings amongst business travelers. For social economic appraisal, the benefits of the time savings can be approximated by the wage rate of those impacted.

6. ANALYSIS OF SUPPLEMENTARY SP DATA

The results of the supplementary SP exercise are reported in Table 4. The goodness of fit, in excess of 0.30, is excellent, although we have removed those who consistently chose the same alternative throughout. The coefficient estimates are all highly significant. There is a slight preference of around a minute in favor of route B, which has just the one type of time.

The results are presented in order of what we expect to be ascending disutility. Parameters (q**)** have been estimated to allow for scale differences amongst the four SP exercises and two distance bands. The 15 mile band is denoted A and the 25 mile band denoted B. The base is arbitrarily taken to be the first exercise for 15 miles whereupon q_{1A} is implicitly one. It was found that the scale did not vary much by SP type but it did vary between time band. Hence the reported model constrains the scale to be the same for each SP type but to vary by time band. The results denote that the longer SP has about 60% more random error. If we did not account

for this variation in random error, the effect would be incorrectly attributed to the coefficient estimates.

What is noticeable about the results is that there is a monotonic relationship between the time coefficient and what we expect to be the disutility of driving time. This is an impressive finding, and in line with the results obtained in the same application in Great Britain. The increase in the value of time is of the order of 60%. Not only does this seem plausible, but it is in line with studies which simply distinguish between free flow and an unspecified type of time spent in congested traffic where the premium is around 40%.

Table 4: Supplementary SP Results

	Coeff.	T-ratio	TimeRatio
ASCB	-0.1919	-2.43	
Free Flow	-0.2272	-25.44	1.00
Busy	-0.2297	-25.95	1.11
Light Congestion	-0.2433	-27.09	1.17
Heavy Congestion	-0.2659	-26.33	1.28
StopGo	-0.3244	-21.34	1.57
Gridlock	-0.3341	-18.77	1.61
q_{1A}	1.0000	Base	
q_{1B}	0.4102	21.36	
q_{2A}	1.0000	-	
q_{2B}	0.4102	21.36	
q_{3A}	1.0000	-	
q_{3B}	0.4102	21.36	
q_{4A}	1.0000	-	
q_{4B}	0.4102	21.36	

LL	3801.89	
LL_ASCs	5531.94	0.313
LL_Zeros	5532.70	0.313
Observations		7982

7. CONCLUSIONS

Route and mode choice multinomial logit models have been estimated to a large data set of travelers. This model can be used to forecast mode and route choice. However, the primary purpose is to derive values of time for use in network models. The values of time for commuting and leisure travel seem highly plausible. Those for business travel are found to be little different to commuting values. This is often the case in SP studies.

A supplementary SP exercise was conducted to examine how the disutility of travel varies with driving conditions. This has obtained an impressive monotonic relationship between the estimated and expected disutility of time with a maximum premium on the value of time according to driving conditions of 60%.

8. ADDITIONAL INFORMATION: MAIN SP DESIGN

The alternatives offered along with their attributes are:

- Existing Freeway: characterized by toll (TOLLEX) and time (TIMEEX)
- New Freeway: characterized by toll (TOLLNEW) and time (TIMENEW)
- High Occupancy Vehicle (HOV) Lane: characterized by toll (TOLLHOV) and time (TIMEHOV)
- Existing Freeway but off-peak departure: characterized by toll (TOLLDIFF), time (TIMEDIFF) and definition of off-peak period (OFFPEAK).
- Untolled road: characterized by time (TIMENON)
- New Metro service: characterized by train fare (TRNFARE), train time (TRNTIME), train frequency (TRNFREQ) and train out-of-vehicle time (TRNOVT).

TOLLEX covers required toll levels up to $2.20 from $1.

TOLLNEW is generally higher than TOLLEX given that it offers time savings on the existing freeway.

TOLLHOV is sometimes higher than TOLLEX because a time saving can be obtained on HOV (and in any event costs are shared) but it can also be lower sometimes to induce people to switch to this option.

TOLLDIFF is lower to compensate for having to depart at a less desirable time and induce behavioral change.

TIMEEX offers both increases and reductions around the actual (design) journey time of 30, 45, 60 and 75 minutes.

TIMENEW is generally quicker than TIMEEX due to less congestion.

TIMEDIFF is often less than for TIMEEX because of less congestion in the off-peak.

TIMEHOV is less than TIMEEX because there is less congestion on the HOV lane.

TRNFARE is relatively cheap in order to compensate for the longer time

TRNTIME is higher than for car time, which is to be expected.

TRNFREQ is a service headway of every 5, 10 or 15 minutes.

OFFPEAK is specified at three levels. These are 7pm-6am (1), 7pm-6am and 9am-4pm (2), and 7pm-6am and 11am-3pm (3).

Table 5: 30-Minute SP Design

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	trnovt
130	75	200	100	25	25	25	20	2	40	130	45	5	4	15
220	100	250	100	25	20	20	20	1	35	100	35	5	3	10
130	50	250	200	30	20	18	25	1	40	100	50	5	3	10
170	75	250	200	25	20	20	20	1	35	175	50	15	5	10
100	50	150	150	30	30	25	20	2	35	130	35	5	5	10
100	50	150	200	35	20	18	25	3	40	175	45	5	3	15
130	75	200	150	30	20	20	20	1	45	100	50	5	3	20
220	100	250	150	30	25	18	20	3	35	175	35	5	4	10
100	75	250	150	25	25	20	25	2	40	100	35	10	3	10
220	75	150	100	30	20	25	25	1	40	175	35	10	4	10
130	50	250	250	25	30	20	25	3	45	130	45	5	4	10
170	75	250	250	30	30	18	20	2	35	100	45	15	3	10
100	100	200	200	25	30	25	20	3	45	100	35	15	3	15
100	50	150	100	25	20	20	20	1	35	100	35	5	3	10
170	50	200	100	30	25	20	25	3	35	100	45	10	3	20
130	100	200	200	25	25	25	20	1	45	175	35	10	3	10
100	75	200	250	25	20	18	25	1	35	100	35	5	3	20
220	75	200	150	35	20	20	20	3	40	130	50	5	3	10
100	75	200	200	30	25	20	25	3	35	130	35	5	5	15
220	100	250	200	35	20	25	25	2	45	130	50	5	3	20
170	75	250	100	35	20	25	25	3	40	100	35	15	4	20
170	75	200	200	35	25	20	25	1	35	100	35	5	4	10
220	75	150	250	35	25	18	20	1	35	130	50	10	3	15
170	75	200	250	25	20	25	25	2	35	130	35	5	3	10
170	75	200	150	30	20	20	20	1	40	100	45	5	3	15
100	75	250	250	35	30	25	20	1	35	175	45	10	3	20
170	50	200	150	25	20	25	25	1	35	175	50	10	5	15
100	50	150	250	25	25	20	25	1	45	100	50	5	4	20
100	100	200	150	25	20	18	25	2	35	100	50	15	4	10
130	75	150	150	25	30	20	25	1	40	175	35	15	3	20
100	75	250	100	30	20	18	25	1	45	130	35	10	5	10
100	75	200	100	25	30	25	20	1	40	100	50	5	4	10
130	75	150	250	30	25	25	20	3	35	100	50	15	3	10
170	75	250	150	25	25	20	25	1	45	130	35	15	3	15
130	100	200	150	25	20	18	25	1	35	130	45	10	4	20
220	50	200	100	35	30	20	25	1	35	130	50	15	3	10
220	50	200	250	30	20	20	20	1	45	175	35	15	4	15
220	75	200	250	25	20	25	25	1	35	100	35	5	3	15
130	50	250	100	25	20	20	20	2	35	175	35	5	3	15
170	50	200	250	35	20	20	20	2	45	100	35	10	4	10
170	100	150	200	30	20	25	25	1	45	100	45	5	3	10
220	75	150	200	25	20	20	20	2	35	100	45	10	5	20
220	75	200	100	25	25	18	20	1	45	100	45	5	5	10
130	75	200	200	35	30	20	25	1	35	100	35	5	5	10
170	50	200	200	25	30	18	20	1	40	130	35	10	3	10
220	100	250	250	25	30	20	25	1	40	100	45	5	5	15
130	75	150	200	25	20	20	20	1	35	130	45	15	4	10
130	50	250	150	35	25	25	20	1	35	100	35	5	5	20
100	75	250	200	25	20	20	20	3	35	100	50	10	4	15
130	75	200	250	25	20	18	25	3	35	175	35	5	3	10
130	100	200	250	35	20	20	20	3	40	100	35	10	5	10
170	100	150	250	25	25	20	25	2	40	175	50	5	5	10
170	75	200	100	25	30	18	20	3	45	175	50	5	5	20
220	75	200	200	30	30	20	25	2	35	175	35	5	4	20
100	100	200	250	30	20	20	20	1	40	130	35	15	5	20
220	50	200	150	25	20	25	25	3	35	100	45	15	5	10
100	75	200	150	35	20	20	20	2	45	175	45	5	3	10
220	75	150	150	25	30	20	25	3	45	100	35	10	3	10
130	75	150	100	35	20	18	25	2	45	100	35	15	5	15
220	50	200	200	25	25	18	20	2	40	100	35	15	3	20
170	100	150	100	25	20	20	20	3	35	130	35	5	3	20
130	100	200	100	30	30	20	25	2	35	100	50	10	3	15
100	100	200	100	35	25	20	25	1	35	175	45	15	3	10
170	100	150	150	35	30	18	20	1	35	100	35	5	4	15

Table 6: 45-Minute SP Design

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	trnovt
130	75	200	100	40	40	40	35	2	55	130	50	5	4	15
220	100	250	100	40	35	35	35	1	50	100	45	5	3	10
130	50	250	200	45	35	30	40	1	55	100	60	5	3	10
170	75	250	200	40	35	35	35	1	50	175	60	15	5	10
100	50	150	150	45	45	40	35	2	50	130	45	5	5	10
100	50	150	200	50	35	30	40	3	55	175	50	5	3	15
130	75	200	150	45	35	35	35	1	60	100	60	5	3	20
220	100	250	150	45	40	30	35	3	50	175	45	5	4	10
100	75	250	150	40	40	35	40	2	55	100	45	10	3	10
220	75	150	100	45	35	40	40	1	55	175	45	10	4	10
130	50	250	250	40	45	35	40	3	60	130	50	5	4	10
170	75	250	250	45	45	30	35	2	50	100	50	15	3	10
100	100	200	200	40	45	40	35	3	60	100	45	15	3	15
100	50	150	100	40	35	35	35	1	50	100	45	5	3	10
170	50	200	100	45	40	35	40	3	50	100	50	10	3	20
130	100	200	200	40	40	40	35	1	60	175	45	10	3	10
100	75	200	250	40	35	30	40	1	50	100	45	5	3	20
220	75	200	150	50	35	35	35	3	55	130	60	5	3	10
100	75	200	200	45	40	35	40	3	50	130	45	5	5	15
220	100	250	200	50	35	40	40	2	60	130	60	5	3	20
170	75	250	100	50	35	40	40	3	55	100	45	15	4	20
170	75	200	200	50	40	35	40	1	50	100	45	5	4	10
220	75	150	250	50	40	30	35	1	50	130	60	10	3	15
170	75	200	250	40	35	40	40	2	50	130	45	5	3	10
170	75	200	150	45	35	35	35	1	55	100	50	5	3	15
100	75	250	250	50	45	40	35	1	50	175	50	10	3	20
170	50	200	150	40	35	40	40	1	50	175	60	10	5	15
100	50	150	250	40	40	35	40	1	60	100	60	5	4	20
100	100	200	150	40	35	30	40	2	50	100	60	15	4	10
130	75	150	150	40	45	35	40	1	55	175	45	15	3	20
100	75	250	100	45	35	30	40	1	60	130	45	10	5	10
100	75	200	100	40	45	40	35	1	55	100	60	5	4	10
130	75	150	250	45	40	40	35	3	50	100	60	15	3	10
170	75	250	150	40	40	35	40	1	60	130	45	15	3	15
130	100	200	150	40	35	30	40	1	50	130	50	10	4	20
220	50	200	100	50	45	35	40	1	50	130	60	15	3	10
220	50	200	250	45	35	35	35	1	60	175	45	15	4	15
220	75	200	250	40	35	40	40	1	50	100	45	5	3	15
130	50	250	100	40	35	35	35	2	50	175	45	5	3	15
170	50	200	250	50	35	35	35	2	60	100	45	10	4	10
170	100	150	200	45	35	40	40	1	60	100	50	5	3	10
220	75	150	200	40	35	35	35	2	50	100	50	10	5	20
220	75	200	100	40	40	30	35	1	60	100	50	5	5	10
130	75	200	200	50	45	35	40	1	50	100	45	5	5	10
170	50	200	200	40	45	30	35	1	55	130	45	10	3	10
220	100	250	250	40	45	35	40	1	55	100	50	5	5	15
130	75	150	200	40	35	35	35	1	50	130	50	15	4	10
130	50	250	150	50	40	40	35	1	50	100	45	5	5	20
100	75	250	200	40	35	35	35	3	50	100	60	10	4	15
130	75	200	250	40	35	30	40	3	50	175	45	5	3	10
130	100	200	250	50	35	35	35	3	55	100	45	10	5	10
170	100	150	250	40	40	35	40	2	55	175	60	5	5	10
170	75	200	100	40	45	30	35	3	60	175	60	5	5	20
220	75	200	200	45	45	35	40	2	50	175	45	5	4	20
100	100	200	250	45	35	35	35	1	55	130	45	15	5	20
220	50	200	150	40	35	40	40	3	50	100	50	15	5	10
100	75	200	150	50	35	35	35	2	60	175	50	5	3	10
220	75	150	150	40	45	35	40	3	60	100	45	10	3	10
130	75	150	100	50	35	30	40	2	60	100	45	15	5	15
220	50	200	200	40	40	30	35	2	55	100	45	15	3	20
170	100	150	100	40	35	35	35	3	50	130	45	5	3	20
130	100	200	100	45	45	35	40	2	50	100	60	10	3	15
100	100	200	100	50	40	35	40	1	50	175	50	15	3	10
170	100	150	150	50	45	30	35	1	50	100	45	5	4	15

Table 7: 60-Minute SP Design

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	trnovt
130	75	200	100	50	50	50	45	2	75	160	70	5	4	15
220	100	250	100	50	45	45	45	1	65	125	60	5	3	10
130	50	250	200	60	45	40	50	1	75	125	80	5	3	10
170	75	250	200	50	45	45	45	1	65	200	80	15	5	10
100	50	150	150	60	60	50	45	2	65	160	60	5	5	10
100	50	150	200	70	45	40	50	3	75	200	70	5	3	15
130	75	200	150	60	45	45	45	1	80	125	80	5	3	20
220	100	250	150	60	50	40	45	3	65	200	60	5	4	10
100	75	250	150	50	50	45	50	2	75	125	60	10	3	10
220	75	150	100	60	45	50	50	1	75	200	60	10	4	10
130	50	250	250	50	60	45	50	3	80	160	70	5	4	10
170	75	250	250	60	60	40	45	2	65	125	70	15	3	10
100	100	200	200	50	60	50	45	3	80	125	60	15	3	15
100	50	150	100	50	45	45	45	1	65	125	60	5	3	10
170	50	200	100	60	50	45	50	3	65	125	70	10	3	20
130	100	200	200	50	50	50	45	1	80	200	60	10	3	10
100	75	200	250	50	45	40	50	1	65	125	60	5	3	20
220	75	200	150	70	45	45	45	3	75	160	80	5	3	10
100	75	200	200	60	50	45	50	3	65	160	60	5	5	15
220	100	250	200	70	45	50	50	2	80	160	80	5	3	20
170	75	250	100	70	45	50	50	3	75	125	60	15	4	20
170	75	200	200	70	50	45	50	1	65	125	60	5	4	10
220	75	150	250	70	50	40	45	1	65	160	80	10	3	15
170	75	200	250	50	45	50	50	2	65	160	60	5	3	10
170	75	200	150	60	45	45	45	1	75	125	70	5	3	15
100	75	250	250	70	60	50	45	1	65	200	70	10	3	20
170	50	200	150	50	45	50	50	1	65	200	80	10	5	15
100	50	150	250	50	50	45	50	1	80	125	80	5	4	20
100	100	200	150	50	45	40	50	2	65	125	80	15	4	10
130	75	150	150	50	60	45	50	1	75	200	60	15	3	20
100	75	250	100	60	45	40	50	1	80	160	60	10	5	10
100	75	200	100	50	60	50	45	1	75	125	80	5	4	10
130	75	150	250	60	50	50	45	3	65	125	80	15	3	10
170	75	250	150	50	50	45	50	1	80	160	60	15	3	15
130	100	200	150	50	45	40	50	1	65	160	70	10	4	20
220	50	200	100	70	60	45	50	1	65	160	80	15	3	10
220	50	200	250	60	45	45	45	1	80	200	60	15	4	15
220	75	200	250	50	45	50	50	1	65	125	60	5	3	15
130	50	250	100	50	45	45	45	2	65	200	60	5	3	15
170	50	200	250	70	45	45	45	2	80	125	60	10	4	10
170	100	150	200	60	45	50	50	1	80	125	70	5	3	10
220	75	150	200	50	45	45	45	2	65	125	70	10	5	20
220	75	200	100	50	50	40	45	1	80	125	70	5	5	10
130	75	200	200	70	60	45	50	1	65	125	60	5	5	10
170	50	200	200	50	60	40	45	1	75	160	60	10	3	10
220	100	250	250	50	60	45	50	1	75	125	70	5	5	15
130	75	150	200	50	45	45	45	1	65	160	70	15	4	10
130	50	250	150	70	50	50	45	1	65	125	60	5	5	20
100	75	250	200	50	45	45	45	3	65	125	80	10	4	15
130	75	200	250	50	45	40	50	3	65	200	60	5	3	10
130	100	200	250	70	45	45	45	3	75	125	60	10	5	10
170	100	150	250	50	50	45	50	2	75	200	80	5	5	10
170	75	200	100	50	60	40	45	3	80	200	80	5	5	20
220	75	200	200	60	60	45	50	2	65	200	60	5	4	20
100	100	200	250	60	45	45	45	1	75	160	60	15	5	20
220	50	200	150	50	45	50	50	3	65	125	70	15	5	10
100	75	200	150	70	45	45	45	2	80	200	70	5	3	10
220	75	150	150	50	60	45	50	3	80	125	60	10	3	10
130	75	150	100	70	45	40	50	2	80	125	60	15	5	15
220	50	200	200	50	50	40	45	2	75	125	60	15	3	20
170	100	150	100	50	45	45	45	3	65	160	60	5	3	20
130	100	200	100	60	60	45	50	2	65	125	80	10	3	15
100	100	200	100	70	50	45	50	1	65	200	70	15	3	10
170	100	150	150	70	60	40	45	1	65	125	60	5	4	15

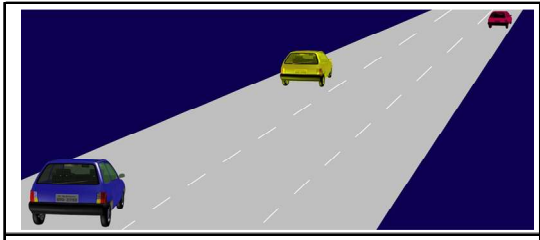
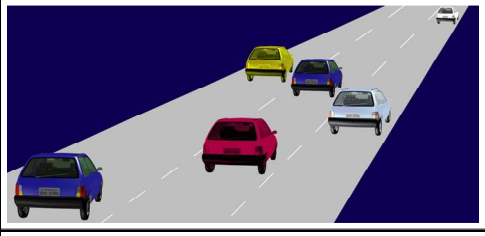
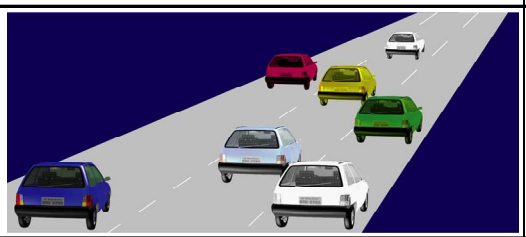
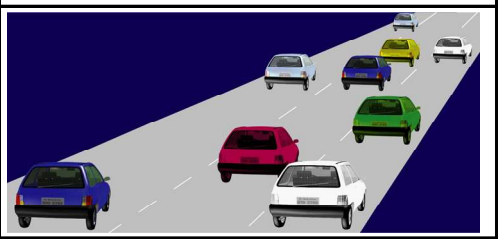
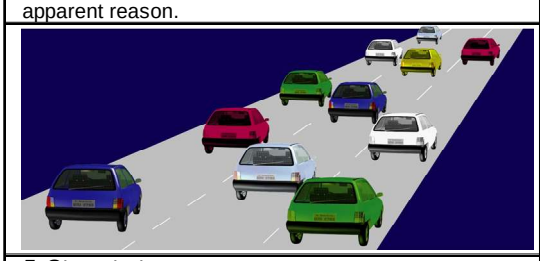
Table 8: 75-Minute SP Design

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	trnovt
130	75	200	100	70	60	60	55	2	110	160	80	5	4	15
220	100	250	100	70	50	50	55	1	90	125	75	5	3	10
130	50	250	200	75	50	40	65	1	110	125	90	5	3	10
170	75	250	200	70	50	50	55	1	90	200	90	15	5	10
100	50	150	150	75	75	60	55	2	90	160	75	5	5	10
100	50	150	200	90	50	40	65	3	110	200	80	5	3	15
130	75	200	150	75	50	50	55	1	120	125	90	5	3	20
220	100	250	150	75	60	40	55	3	90	200	75	5	4	10
100	75	250	150	70	60	50	65	2	110	125	75	10	3	10
220	75	150	100	75	50	60	65	1	110	200	75	10	4	10
130	50	250	250	70	75	50	65	3	120	160	80	5	4	10
170	75	250	250	75	75	40	55	2	90	125	80	15	3	10
100	100	200	200	70	75	60	55	3	120	125	75	15	3	15
100	50	150	100	70	50	50	55	1	90	125	75	5	3	10
170	50	200	100	75	60	50	65	3	90	125	80	10	3	20
130	100	200	200	70	60	60	55	1	120	200	75	10	3	10
100	75	200	250	70	50	40	65	1	90	125	75	5	3	20
220	75	200	150	90	50	50	55	3	110	160	90	5	3	10
100	75	200	200	75	60	50	65	3	90	160	75	5	5	15
220	100	250	200	90	50	60	65	2	120	160	90	5	3	20
170	75	250	100	90	50	60	65	3	110	125	75	15	4	20
170	75	200	200	90	60	50	65	1	90	125	75	5	4	10
220	75	150	250	90	60	40	55	1	90	160	90	10	3	15
170	75	200	250	70	50	60	65	2	90	160	75	5	3	10
170	75	200	150	75	50	50	55	1	110	125	80	5	3	15
100	75	250	250	90	75	60	55	1	90	200	80	10	3	20
170	50	200	150	70	50	60	65	1	90	200	90	10	5	15
100	50	150	250	70	60	50	65	1	120	125	90	5	4	20
100	100	200	150	70	50	40	65	2	90	125	90	15	4	10
130	75	150	150	70	75	50	65	1	110	200	75	15	3	20
100	75	250	100	75	50	40	65	1	120	160	75	10	5	10
100	75	200	100	70	75	60	55	1	110	125	90	5	4	10
130	75	150	250	75	60	60	55	3	90	125	90	15	3	10
170	75	250	150	70	60	50	65	1	120	160	75	15	3	15
130	100	200	150	70	50	40	65	1	90	160	80	10	4	20
220	50	200	100	90	75	50	65	1	90	160	90	15	3	10
220	50	200	250	75	50	50	55	1	120	200	75	15	4	15
220	75	200	250	70	50	60	65	1	90	125	75	5	3	15
130	50	250	100	70	50	50	55	2	90	200	75	5	3	15
170	50	200	250	90	50	50	55	2	120	125	75	10	4	10
170	100	150	200	75	50	60	65	1	120	125	80	5	3	10
220	75	150	200	70	50	50	55	2	90	125	80	10	5	20
220	75	200	100	70	60	40	55	1	120	125	80	5	5	10
130	75	200	200	90	75	50	65	1	90	125	75	5	5	10
170	50	200	200	70	75	40	55	1	110	160	75	10	3	10
220	100	250	250	70	75	50	65	1	110	125	80	5	5	15
130	75	150	200	70	50	50	55	1	90	160	80	15	4	10
130	50	250	150	90	60	60	55	1	90	125	75	5	5	20
100	75	250	200	70	50	50	55	3	90	125	90	10	4	15
130	75	200	250	70	50	40	65	3	90	200	75	5	3	10
130	100	200	250	90	50	50	55	3	110	125	75	10	5	10
170	100	150	250	70	60	50	65	2	110	200	90	5	5	10
170	75	200	100	70	75	40	55	3	120	200	90	5	5	20
220	75	200	200	75	75	50	65	2	90	200	75	5	4	20
100	100	200	250	75	50	50	55	1	110	160	75	15	5	20
220	50	200	150	70	50	60	65	3	90	125	80	15	5	10
100	75	200	150	90	50	50	55	2	120	200	80	5	3	10
220	75	150	150	70	75	50	65	3	120	125	75	10	3	10
130	75	150	100	90	50	40	65	2	120	125	75	15	5	15
220	50	200	200	70	60	40	55	2	110	125	75	15	3	20
170	100	150	100	70	50	50	55	3	90	160	75	5	3	20
130	100	200	100	75	75	50	65	2	90	125	90	10	3	15
100	100	200	100	90	60	50	65	1	90	200	80	15	3	10
170	100	150	150	90	75	40	55	1	90	125	75	5	4	15

9. ADDITIONAL INFORMATION: SUPPLEMENTARY SP DESIGN

Verbal and pictorial definitions were used to represent each type of driving condition. These are set out in Table 9 for each of the six driving conditions.

Table 9: Driving Conditions – Pictorial and Verbal Description

	
1: Free flowing You can travel at your own speed with no problems over-taking.	***2: Busy*** You can travel pretty much at the speed limit, but you are forced to change lanes every now and then.
	
3: Light congestion You can travel close to the speed limit most of the time, but you have to slow down every so often for no apparent reason.	***4: Heavy congestion*** Your speed is noticeably restricted frequent gear changes required.
	
5: Stop start You are forced to drive in a "stop-start" fashion.	***6: Gridlock*** You are only able to move at a crawl at best, and spend quiet a lot of time stationary

Respondents were assigned to one of the four designs in Table 10 below. Option B always has the same type of time whilst option A has two types of time, one of which is better than that in Option B and one of which is worse. In addition, the journey could be of 15 miles or 25 miles.

This approach has the advantage that any individual is only offered three types of time and avoids the tasks becoming too complex which could well occur if all six types of time were offered.

Table 10: Driving Conditions Offered

Option A	Option B
Free Flowing **(I)** and Stop Start **(II)**	Light Congestion
Busy **(I)** and Gridlock **(II)**	Heavy Congestion
Busy **(I)** and Stop Start **(II)**	Light Congestion
Free Flowing **(I)** and Heavy Congestion **(II)**	Busy

Tables 11 and 12 detail the designs used for the 15 mile and 25 mile journeys respectively. Respondents were offered all nine scenarios to evaluate.

Table 11: Design for Shorter Journeys

Option A		Option B
Better **(I)**	Worse **(II)**	
5	5	15
5	10	20
5	15	25
10	5	20
10	10	25
10	15	15
15	5	25
15	10	15
15	15	20

Table 12: Design for Longer Journeys

Option A		Option B
Better **(I)**	Worse **(II)**	
40	20	60
40	25	75
40	30	90
50	20	75
50	25	90
50	30	60
60	20	90
60	25	60
60	30	75

Appendix B

Dulles Toll Road
2008 Stated Preference Survey
Results

APPENDIX B

STATED PREFERENCE SURVEY RESULTS

This appendix contains the script and the survey results from the on-line stated preference survey.

MWAA Title	Metropolitan Washington Airports Authority www.mwaa.com METROPOLITAN WASHINGTON AIRPORTS AUTHORITY STATED PREFERENCE SURVEY – 2008
Intro Page 1	Dear Dulles Toll Road Customer: The Metropolitan Washington Airports Authority (MWAA), in conjunction with the Virginia Department of Transportation (VDOT), are working to improve your driving experience on the Dulles Toll Road (DTR) corridor. As part of this effort, the MWAA previously conducted an origin/destination survey. On that survey, you supplied your e-mail address indicating you would be interested in participating in a follow-up survey. This new survey is intended to seek your input on travel preferences in the DTR corridor. At the end of the survey, you will be given an opportunity to enter into a random drawing for a Visa gift card.
Intro Page 2	The survey has three parts. Part 1. Background Travel Information • This is similar to the survey you responded to before. Part 2. Stated Preference Study • You will be asked to choose between various travel options.

	Part 3. Demographic Information • This is to ensure a representative sample is collected. Individual survey responses will not be reported. The survey will take 15-20 minutes to complete.
Part 1 Intro	STATED PREFERENCE SURVEY PART 1 – Background Information For this part of the survey, please think about the most recent one-way trip you made which included the Dulles Toll Road (e.g. either from home to work or from work to home). All the questions in this part of the survey will ask you about this trip.
Origin	Where did this trip begin?

	Frequency	Percentage
The District of Columbia	58	5.4%
Alexandria City, Virginia	20	1.9%
Arlington County, Virginia	67	6.3%
Fairfax County, Virginia	510	47.8%
Loudoun County, Virginia	277	26.0%
Maryland	83	7.8%
Elsewhere	44	4.1%
No answer	8	0.7%

"Elsewhere" answers included:
Dover, DE
Pennsylvania
North Carolina
Ohio
San Antonio, TX
Charles Town, VA
Clarke County, VA
Falls Church City, VA
Fauquier County, VA
Fredrick County, VA
Fredericksburg, VA
Gainesville, VA
Herndon, VA
Manassas, VA
Purceville [sic], VA
Prince William County, VA
Reston, VA
Richmond, VA
Springfield, VA
Winchester, VA

	Woodbridge, VA Harpers Ferry, WV Jefferson County, WV Shepherdstown, WV
Destination	Where did this trip end?

	Frequency	Percentage
The District of Columbia	122	11.4%
Alexandria City, Virginia	21	2.0%
Arlington County, Virginia	68	6.4%
Fairfax County, Virginia	542	50.8%
Loudoun County, Virginia	178	16.7%
Maryland	78	7.3%
Elsewhere	49	4.6%
No answer	9	0.8%

Origin Zip

What is the 5-digit zip code in where you began this trip?

If you do not know the zip code, please enter 00000.

Zip codes reported:

10058	18470	19901	20001
20002	20003	20004	20005
20006	20007	20008	20009
20010	20012	20016	20018
20024	20036	20041	20043
20071	20105	20110	20111
20120	20121	20124	20131
20132	20135	20141	20147
20148	20151	20152	20155
20158	20164	20165	20166
20169	20170	20171	20175
20176	20180	20190	20191
20194	20250	20374	20503
20523	20531	20544	20554
20591	20593	20677	20706
20707	20708	20715	20716
20736	20737	20744	20746
20772	20783	20785	20812
20814	20815	20816	20817
20818	20832	20841	20850
20851	20852	20853	20854
20855	20866	20876	20878
20879	20889	20892	20895
20901	20902	20910	20911
21035	21043	21045	21070
21122	21227	21702	21703
21788	21793	22003	22015
22027	22030	22031	22032

	22033 22037 22041 22042 22043 22044 22046 22066 22092 22101 22102 22103 22104 22108 22122 22124 22134 22151 22152 22171 22180 22181 22182 22191 22201 22202 22203 22204 22205 22206 22207 22209 22213 22215 22226 22292 22301 22302 22303 22304 22306 22307 22308 22310 22312 22314 22315 22405 22408 22508 22601 22611 22624 22625 22742 25414 25425 27949 30194 45440 78216
Dest Zip	What is the 5-digit zip code in where your trip ended in <DESTINATION>? If you do not know the zip code, please enter 00000. Zip codes reported: 19901 19958 19966 20001 20002 20003 20004 20005 20006 20007 20008 20009 20010 20015 20016 20018 20024 20026 20032 20036 20037 20049 20066 20105 20109 20110 20120 20122 20124 20139 20141 20142 20142 20147 20148 20151 20152 20163 20164 20165 20166 20170 20171 20172 20175 20176 20180 20184 20190 20191 20192 20194 20196 20197 20212 20220 20223 20229 20240 20250 20271 20301 20311 20319 20374 20375 20388 20418 20426 20431 20433 20460 20502 20515 20520 20523 20530 20536 20540 20544 20546 20552 20560 20571 20580 20585 20590 20591 20593 20706 20742 20747 20755 20760 20770 20783 20794 20814 20815 20816 20817 20818 20837 20850

	20852 20853 20854 20876 20878 20879 20882 20886 20891 20892 20894 20895 20902 20906 20910 20914 20993 21000 21030 21043 21047 21202 22003 22010 22015 22030 22031 22033 22036 22037 22041 22042 22043 22044 22046 22060 22061 22066 22067 22070 22079 22091 22101 22102 22103 22106 22107 22108 22124 22150 22151 22153 22159 22175 22180 22181 22182 22191 22193 22201 22202 22203 22204 22205 22206 22207 22209 22213 22226 22302 22304 22308 22311 22312 22314 22315 22332 22554 22611 22625 23850 25411 25414 25425 25427 25428 26851 28182
Direction	What was your direction of travel on the Dulles Toll Road?

	Frequency	Percentage
Eastbound	622	58.3%
Westbound	432	40.5%
No Answer	13	1.2%

Vehicle

What type of vehicle were you driving?

	Frequency	Percentage
2-axle vehicle (car, SUV, motorcycle)	1037	97.2%
2-axle bus, truck, or RV	14	1.3%
2-axle vehicle towing a 1-axle trailer	0	0.0%
2-axle vehicle towing a 2-axle trailer	0	0.0%
3-axle bus or truck	2	0.2%
4-axle truck	1	0.1%
5-axle truck	0	0.0%
6 or more-axle truck	0	0.0%
No Answer	13	1.2%

DTR Entry

For this trip between <ORIGIN> and <DESTINATION>, where did you enter the Toll Road?

	Frequency	Percentage
Dulles Greenway	140	13.1%
Sully Road/Route 28 (Exit 9)	150	14.1%
Centreville Road (Exit 10)	55	5.2%
Fairfax County Parkway/Route 7100 (Exit 11)	86	8.1%
Reston Parkway (Exit 12)	79	7.4%
Wiehle Avenue (Exit 13)	71	6.7%
Hunter Mill Road (Exit 14)	60	5.6%
Trap Road (Exit 15)	5	0.5%
Leesburg Pike/Route 7 (Exit 16)	56	5.2%
Spring Hill Road (Exit 17)	34	3.2%
Capital Beltway/I-495 (Exit 18)	193	18.1%
Route 123 (Exit 19)	25	2.3%
I-66	100	9.4%
No Answer	13	1.2%

DTR Exit

You indicated that you entered the Dulles Toll Road at <DTR ENTRY>. Where did you exit the Toll Road?

	Frequency	Percentage
Dulles Greenway	55	5.2%
Sully Road/Route 28 (Exit 9)	133	12.5%
Centreville Road (Exit 10)	40	3.7%
Fairfax County Parkway/Route 7100 (Exit 11)	80	7.5%
Reston Parkway (Exit 12)	81	7.6%
Wiehle Avenue (Exit 13)	45	4.2%
Hunter Mill Road (Exit 14)	52	4.9%
Trap Road (Exit 15)	4	0.4%
Leesburg Pike/Route 7 (Exit 16)	70	6.6%
Spring Hill Road (Exit 17)	85	8.0%
Capital Beltway/I-495 (Exit 18)	187	17.5%
Route 123 (Exit 19)	68	6.4%
I-66	151	14.2%
No Answer	16	1.5%

Day

What day of the week did you make your trip?

	Frequency	Percentage
Monday	256	24.0%
Tuesday	95	8.9%
Wednesday	106	9.9%
Thursday	193	18.1%
Friday	337	31.6%
Saturday	41	3.8%
Sunday	23	2.2%
No Answer	16	1.5%

Purpose

What was the primary purpose of this trip between <ORIGIN> and <DESTINATION>?

	Frequency	Percentage
Go to/from work	763	71.5%
Work related business (non-commute)	102	9.6%
Go to/from school	7	0.7%
Shopping	25	2.3%
Social or recreational	102	9.6%
Other personal business	52	4.9%
No Answer	16	1.5%

Frequency

How often do you make this trip from <ORIGIN> to <DESTINATION> in this direction?

	Frequency	Percentage
6 or more times per week	85	8.0%
4 - 5 times per week	627	58.8%
2 - 3 times per week	119	11.2%
Once per week	54	5.1%
1 - 2 times per month	106	9.9%
Less than once per month	60	5.6%
No Answer	16	1.5%

Time Trip Started

What time (approximately) did you begin your trip from <ORIGIN> to <DESTINATION>?

	Frequency	Percentage
Before 06:00 am	72	6.7%
06:00 am	70	6.6%
07:00 am	177	16.6%
08:00 am	180	16.9%
09:00 am	86	8.1%
10:00 am	59	5.5%
11:00 am	35	3.3%
12:00 pm	30	2.8%
01:00 pm	25	2.3%
02:00 pm	25	2.3%
03:00 pm	28	2.6%
04:00 pm	66	6.2%
05:00 pm	75	7.0%
06:00 pm	63	5.9%
07:00 pm	28	2.6%
08:00 pm	17	1.6%
09:00 pm	4	0.4%
After 09:00 pm	11	1.0%
No Answer	16	1.5%

Time of Trip

How long did the entire trip from <ORIGIN> to <DESTINATON> take?

	Frequency	Percentage
Less than 15 minutes	42	3.9%
15 - 30 minutes	279	26.1%
31 - 45 minutes	347	32.5%
45 minutes - 1 hour	239	22.4%
1 hour, 1 minute - 1 hour 30 minutes	107	10.0%
1 hour, 31 minutes - 2 hours	23	2.2%
More than 2 hours	14	1.3%
No Answer	16	1.5%

Time on DTR

How much of this time was spent on the Dulles Toll Road?

	Frequency	Percentage
10 minutes or less	253	23.7%
15 minutes	317	29.7%
20 minutes	199	18.7%
25 minutes	114	10.7%
30 minutes	81	7.6%
35 minutes	34	3.2%
40 minutes	27	2.5%
45 minutes	10	0.9%
50 minutes	6	0.6%
55 minutes	4	0.4%
60 minutes or more	6	0.6%
No Answer	16	1.5%

Time Diff Route

If you were to us a different route instead of the Dulles Toll Road, how long do you think your trip from <ORIGIN> to <DESTINATION> would take, door-to-door?

	Frequency	Percentage
Less than 15 minutes	11	1.0%
15 - 30 minutes	97	9.1%
31 - 45 minutes	231	21.6%
46 minutes - 1 hour	287	26.9%
1 hour, 1 minute - 1 hour, 30 minutes	261	24.5%
1 hour, 31 minutes - 2 hours	105	9.8%
More than 2 hours	33	3.1%
I am no aware of another route	20	1.9%
There is no alternate route available	6	0.6%
No Answer	16	1.5%

Why Off Peak

[This was presented only to those whose trip began during the weekday off-peak periods.]

For this trip <DAY> beginning at <ORIGIN>, did you choose to make this trip during an off-peak time period in order to avoid peak period traffic congestion?

	Frequency	Percentage
Yes	202	56.1%
No	158	43.9%

Along or Others

For the majority of this trip from <ORIGIN> to <DESTINATION>, did you ...

	Frequency	Percentage
Drive alone	879	82.4%
Drive with others	146	13.7%
Ride with others	26	2.4%
No Answer	16	1.5%

Vehicle Occupancy

[This was presented only to those who did not drive alone.]

How many people were in the vehicle on this trip including yourself?

	Frequency	Percentage
2	118	68.6%
3	26	15.1%
4	21	12.2%
5 or more	7	4.1%

Type of Occupants

[This was presented only to those who did not drive alone.]

Who was in the vehicle for this trip?

	Frequency	Percentage
Members of household	109	63.4%
Friends or relatives who live elsewhere	21	12.2%
Co-workers	27	15.7%
Other pre-arranged carpoolers	12	7.0%
Casual carpoolers; "Slugs"	3	1.7%

Carpool Formation

[This was presented only to those who did not drive alone.]

Where was the carpool formed for this trip between <ORIGIN> and <DESTINATION>?

	Frequency	Percentage
At my home	119	69.2%
At someone else's home	12	7.0%
At work	20	11.6%
Reston South Park & Ride (Lawyers Road and Fox Mill Road)	0	0.0%
Reston North Park & Ride (Sunset Hills Road and Wiehle Avenue)	2	1.2%
Reston East Park & Ride (Wiehle Avenue and the Dulles Toll Road)	1	0.6%
Tysons West Park Transit Station (International Drive and Spring Hill Road)	0	0.0%
Herndon-Monroe Park & Ride (between Fairfax County Parkway and Monroe Street)	7	4.1%
Another Park & Ride	0	0.0%
Elsewhere	11	6.4%

HOV Use

[This was presented only to those who did not drive alone and travelled on the DTR when the HOV lane was operational in their travel direction.]

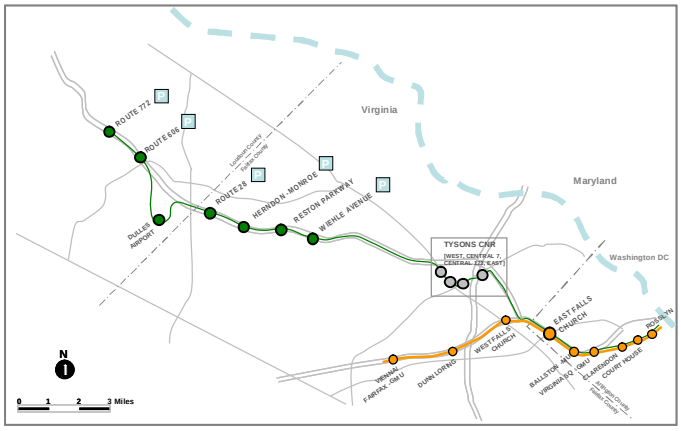
Did you use the High Occupancy Vehicle (HOV) lane while you were on the Dulles Toll Road?

	Frequency	Percentage
Yes	62	82.7%
No	13	17.3%

Cash or EZ

How was the toll paid for on this trip from <ORIGIN> to <DESTINATION>?

	Frequency	Percentage
Cash	87	8.2%
E-ZPass	964	90.3%
No Answer	16	1.5%

Txfr Price Journey Time	Under current conditions, what increase in the journey time on the Dulles Toll Road would be sufficient to make you switch to an alternate mode of transportation or an alternate, non-tolled route? Please enter the length of time (in minutes) here: 0 1 2 3 5 7 8 10 15 20 30 35 40 45 50 55 60 70 75 80 90 100 120 125 160 180 240
SP2A Intro	STATED PREFERENCE SURVEY PART 2A – Travel Preferences  As the plans for new Metrorail service in the Dulles Toll Road corridor progress, this may become a viable option to driving. The new Metrorail service will extend from the existing Orange Line just east of the West Falls Church station in Fairfax County. The station locations are listed below and shown on the map. • Tysons East (Route 123 at Scotts Crossing Rd/Colshire Dr) • Tysons Center 123 (Route 123 at Tysons Blvd) • Tysons Center 7 (Route 7 just northwest of Route 123) • Wiehle Avenue (Dulles Toll Road just west of Wiehle Ave) • Reston Parkway (Dulles Toll Road near Reston Pkwy) • Herndon-Monroe (Dulles Toll Road and Monroe St) • Route 28 (Dulles Toll Road near Route 28) • Dulles Airport (near passenger terminal) • Route 606 (Dulles Greenway at Route 606) • Route 772/Ryan Road (Dulles Greenway at Route 772) For more information on the Dulles Corridor Metrorail, go to

	www.dullesmetro.com.
SP2A Intro 2	You will be presented with nine different scenarios. Each scenario contains different options for travelling through the Dulles Toll Road Corridor. The travel time for each option is your total travel time for a particular trip, not just the time spent on the Dulles Toll Road. The options may include: • Dulles Toll Road peak period • Dulles Toll Road HOV peak period carpool • New toll road peak period • Dulles Toll Road off-peak period • Non-tolled road peak period • Metrorail service peak period Please pay close attention to each screen as gasoline prices, toll prices, travel times, and Metrorail prices may differ in each scenario that is presented to you. Assume that all the alternatives shown are available to you. Choose the one you prefer the most.

OP 30

[Off-peak period SP questions for 15-30 minute trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tollnew	timeex	timenew	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	200	25	25	40	130	45	5	4	15
220	250	25	20	35	100	35	5	3	10
130	250	30	18	40	100	50	5	3	10
170	250	25	20	35	175	50	15	5	10
100	150	30	25	35	130	35	5	5	10
100	150	35	18	40	175	45	5	3	15
130	200	30	20	45	100	50	5	3	20
220	250	30	18	35	175	35	5	4	10
100	250	25	20	40	100	35	10	3	10
220	150	30	25	40	175	35	10	4	10
130	250	25	20	45	130	45	5	4	10
170	250	30	18	35	100	45	15	3	10
100	200	25	25	45	100	35	15	3	15
100	150	25	20	35	100	35	5	3	10
170	200	30	20	35	100	45	10	3	20
130	200	25	25	45	175	35	10	3	10
100	200	25	18	35	100	35	5	3	20
220	200	35	20	40	130	50	5	3	10
100	200	30	20	35	130	35	5	5	15
220	250	35	25	45	130	50	5	3	20
170	250	35	25	40	100	35	15	4	20
170	200	35	20	35	100	35	5	4	10
220	150	35	18	35	130	50	10	3	15
170	200	25	25	35	130	35	5	3	10
170	200	30	20	40	100	45	5	3	15
100	250	35	25	35	175	45	10	3	20
170	200	25	25	35	175	50	10	5	15
100	150	25	20	45	100	50	5	4	20
100	200	25	18	35	100	50	15	4	10
130	150	25	20	40	175	35	15	3	20
100	250	30	18	45	130	35	10	5	10
100	200	25	25	40	100	50	5	4	10
130	150	30	25	35	100	50	15	3	10
170	250	25	20	45	130	35	15	3	15
130	200	25	18	35	130	45	10	4	20
220	200	35	20	35	130	50	15	3	10
220	200	30	20	45	175	35	15	4	15
220	200	25	25	35	100	35	5	3	15
130	250	25	20	35	175	35	5	3	15
170	200	35	20	45	100	35	10	4	10
170	150	30	25	45	100	45	5	3	10
220	150	25	20	35	100	45	10	5	20
220	200	25	18	45	100	45	5	5	10
130	200	35	20	35	100	35	5	5	10
170	200	25	18	40	130	35	10	3	10
220	250	25	20	40	100	45	5	5	15
130	150	25	20	35	130	45	15	4	10
130	250	35	25	35	100	35	5	5	20
100	250	25	20	35	100	50	10	4	15
130	200	25	18	35	175	35	5	3	10
130	200	35	20	40	100	35	10	5	10
170	150	25	20	40	175	50	5	5	10
170	200	25	18	45	175	50	5	5	20
220	200	30	20	35	175	35	5	4	20
100	200	30	20	40	130	35	15	5	20
220	200	25	25	35	100	45	15	5	10
100	200	35	20	45	175	45	5	3	10
220	150	25	20	45	100	35	10	3	10
130	150	35	18	45	100	35	15	5	15
220	200	25	18	40	100	35	15	3	20
170	150	25	20	35	130	35	5	3	20
130	200	30	20	35	100	50	10	3	15
100	200	35	20	35	175	45	15	3	10
170	150	35	18	35	100	35	5	4	15

Key:

TOLLEX ..... Toll to use the existing roadway
TOLLNEW ..... Toll to use a new toll road
TIMEEX ..... Time of trip to use the existing roadway
TIMENEW ..... Time of trip to use a new toll road
TIMENON ..... Time of trip to use a non-tolled road
TRNFARE ..... Metrorail fare for equivalent trip
TRNTIME ..... Time of trip on Metrorail
TRNFREQ ..... Frequency of trains on Metrorail
FUEL ..... Hypothetical gasoline price
OVT ..... Time it takes to go to and from the Metrorail station

OP 45

[Off-peak period SP questions for 45 minute trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tollnew	timeex	timenew	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	200	40	40	55	130	50	5	4	15
220	250	40	35	50	100	45	5	3	10
130	250	45	30	55	100	60	5	3	10
170	250	40	35	50	175	60	15	5	10
100	150	45	40	50	130	45	5	5	10
100	150	50	30	55	175	50	5	3	15
130	200	45	35	60	100	60	5	3	20
220	250	45	30	50	175	45	5	4	10
100	250	40	35	55	100	45	10	3	10
220	150	45	40	55	175	45	10	4	10
130	250	40	35	60	130	50	5	4	10
170	250	45	30	50	100	50	15	3	10
100	200	40	40	60	100	45	15	3	15
100	150	40	35	50	100	45	5	3	10
170	200	45	35	50	100	50	10	3	20
130	200	40	40	60	175	45	10	3	10
100	200	40	30	50	100	45	5	3	20
220	200	50	35	55	130	60	5	3	10
100	200	45	35	50	130	45	5	5	15
220	250	50	40	60	130	60	5	3	20
170	250	50	40	55	100	45	15	4	20
170	200	50	35	50	100	45	5	4	10
220	150	50	30	50	130	60	10	3	15
170	200	40	40	50	130	45	5	3	10
170	200	45	35	55	100	50	5	3	15
100	250	50	40	50	175	50	10	3	20
170	200	40	40	50	175	60	10	5	15
100	150	40	35	60	100	60	5	4	20
100	200	40	30	50	100	60	15	4	10
130	150	40	35	55	175	45	15	3	20
100	250	45	30	60	130	45	10	5	10
100	200	40	40	55	100	60	5	4	10
130	150	45	40	50	100	60	15	3	10
170	250	40	35	60	130	45	15	3	15
130	200	40	30	50	130	50	10	4	20
220	200	50	35	50	130	60	15	3	10
220	200	45	35	60	175	45	15	4	15
220	200	40	40	50	100	45	5	3	15
130	250	40	35	50	175	45	5	3	15
170	200	50	35	60	100	45	10	4	10
170	150	45	40	60	100	50	5	3	10
220	150	40	35	50	100	50	10	5	20
220	200	40	30	60	100	50	5	5	10
130	200	50	35	50	100	45	5	5	10
170	200	40	30	55	130	45	10	3	10
220	250	40	35	55	100	50	5	5	15
130	150	40	35	50	130	50	15	4	10
130	250	50	40	50	100	45	5	5	20
100	250	40	35	50	100	60	10	4	15
130	200	40	30	50	175	45	5	3	10
130	200	50	35	55	100	45	10	5	10
170	150	40	35	55	175	60	5	5	10
170	200	40	30	60	175	60	5	5	20
220	200	45	35	50	175	45	5	4	20
100	200	45	35	55	130	45	15	5	20
220	200	40	40	50	100	50	15	5	10
100	200	50	35	60	175	50	5	3	10
220	150	40	35	60	100	45	10	3	10
130	150	50	30	60	100	45	15	5	15
220	200	40	30	55	100	45	15	3	20
170	150	40	35	50	130	45	5	3	20
130	200	45	35	50	100	60	10	3	15
100	200	50	35	50	175	50	15	3	10
170	150	50	30	50	100	45	5	4	15

Key:

TOLLEX ..... Toll to use the existing roadway
TOLLNEW ..... Toll to use a new toll road
TIMEEX ..... Time of trip to use the existing roadway
TIMENEW ..... Time of trip to use a new toll road
TIMENON ..... Time of trip to use a non-tolled road
TRNFARE ..... Metrorail fare for equivalent trip
TRNTIME ..... Time of trip on Metrorail
TRNFREQ ..... Frequency of trains on Metrorail
FUEL ..... Hypothetical gasoline price
OVT ..... Time it takes to go to and from the Metrorail station

OP 60

[Off-peak period SP questions for 60 minute trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tollnew	timeex	timenew	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	200	50	50	75	160	70	5	4	15
220	250	50	45	65	125	60	5	3	10
130	250	60	40	75	125	80	5	3	10
170	250	50	45	65	200	80	15	5	10
100	150	60	50	65	160	60	5	5	10
100	150	70	40	75	200	70	5	3	15
130	200	60	45	80	125	80	5	3	20
220	250	60	40	65	200	60	5	4	10
100	250	50	45	75	125	60	10	3	10
220	150	60	50	75	200	60	10	4	10
130	250	50	45	80	160	70	5	4	10
170	250	60	40	65	125	70	15	3	10
100	200	50	50	80	125	60	15	3	15
100	150	50	45	65	125	60	5	3	10
170	200	60	45	65	125	70	10	3	20
130	200	50	50	80	200	60	10	3	10
100	200	50	40	65	125	60	5	3	20
220	200	70	45	75	160	80	5	3	10
100	200	60	45	65	160	60	5	5	15
220	250	70	50	80	160	80	5	3	20
170	250	70	50	75	125	60	15	4	20
170	200	70	45	65	125	60	5	4	10
220	150	70	40	65	160	80	10	3	15
170	200	50	50	65	160	60	5	3	10
170	200	60	45	75	125	70	5	3	15
100	250	70	50	65	200	70	10	3	20
170	200	50	50	65	200	80	10	5	15
100	150	50	45	80	125	80	5	4	20
100	200	50	40	65	125	80	15	4	10
130	150	50	45	75	200	60	15	3	20
100	250	60	40	80	160	60	10	5	10
100	200	50	50	75	125	80	5	4	10
130	150	60	50	65	125	80	15	3	10
170	250	50	45	80	160	60	15	3	15
130	200	50	40	65	160	70	10	4	20
220	200	70	45	65	160	80	15	3	10
220	200	60	45	80	200	60	15	4	15
220	200	50	50	65	125	60	5	3	15
130	250	50	45	65	200	60	5	3	15
170	200	70	45	80	125	60	10	4	10
170	150	60	50	80	125	70	5	3	10
220	150	50	45	65	125	70	10	5	20
220	200	50	40	80	125	70	5	5	10
130	200	70	45	65	125	60	5	5	10
170	200	50	40	75	160	60	10	3	10
220	250	50	45	75	125	70	5	5	15
130	150	50	45	65	160	70	15	4	10
130	250	70	50	65	125	60	5	5	20
100	250	50	45	65	125	80	10	4	15
130	200	50	40	65	200	60	5	3	10
130	200	70	45	75	125	60	10	5	10
170	150	50	45	75	200	80	5	5	10
170	200	50	40	80	200	80	5	5	20
220	200	60	45	65	200	60	5	4	20
100	200	60	45	75	160	60	15	5	20
220	200	50	50	65	125	70	15	5	10
100	200	70	45	80	200	70	5	3	10
220	150	50	45	80	125	60	10	3	10
130	150	70	40	80	125	60	15	5	15
220	200	50	40	75	125	60	15	3	20
170	150	50	45	65	160	60	5	3	20
130	200	60	45	65	125	80	10	3	15
100	200	70	45	65	200	70	15	3	10
170	150	70	40	65	125	60	5	4	15

Key:

TOLLEX ..... Toll to use the existing roadway
TOLLNEW ..... Toll to use a new toll road
TIMEEX ..... Time of trip to use the existing roadway
TIMENEW ..... Time of trip to use a new toll road
TIMENON ..... Time of trip to use a non-tolled road
TRNFARE ..... Metrorail fare for equivalent trip
TRNTIME ..... Time of trip on Metrorail
TRNFREQ ..... Frequency of trains on Metrorail
FUEL ..... Hypothetical gasoline price
OVT ..... Time it takes to go to and from the Metrorail station

OP 75

[Off-peak period SP questions for 75 minute or longer trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tollnew	timeex	timenew	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	200	70	60	110	160	80	5	4	15
220	250	70	50	90	125	75	5	3	10
130	250	75	40	110	125	90	5	3	10
170	250	70	50	90	200	90	15	5	10
100	150	75	60	90	160	75	5	5	10
100	150	90	40	110	200	80	5	3	15
130	200	75	50	120	125	90	5	3	20
220	250	75	40	90	200	75	5	4	10
100	250	70	50	110	125	75	10	3	10
220	150	75	60	110	200	75	10	4	10
130	250	70	50	120	160	80	5	4	10
170	250	75	40	90	125	80	15	3	10
100	200	70	60	120	125	75	15	3	15
100	150	70	50	90	125	75	5	3	10
170	200	75	50	90	125	80	10	3	20
130	200	70	60	120	200	75	10	3	10
100	200	70	40	90	125	75	5	3	20
220	200	90	50	110	160	90	5	3	10
100	200	75	50	90	160	75	5	5	15
220	250	90	60	120	160	90	5	3	20
170	250	90	60	110	125	75	15	4	20
170	200	90	50	90	125	75	5	4	10
220	150	90	40	90	160	90	10	3	15
170	200	70	60	90	160	75	5	3	10
170	200	75	50	110	125	80	5	3	15
100	250	90	60	90	200	80	10	3	20
170	200	70	60	90	200	90	10	5	15
100	150	70	50	120	125	90	5	4	20
100	200	70	40	90	125	90	15	4	10
130	150	70	50	110	200	75	15	3	20
100	250	75	40	120	160	75	10	5	10
100	200	70	60	110	125	90	5	4	10
130	150	75	60	90	125	90	15	3	10
170	250	70	50	120	160	75	15	3	15
130	200	70	40	90	160	80	10	4	20
220	200	90	50	90	160	90	15	3	10
220	200	75	50	120	200	75	15	4	15
220	200	70	60	90	125	75	5	3	15
130	250	70	50	90	200	75	5	3	15
170	200	90	50	120	125	75	10	4	10
170	150	75	60	120	125	80	5	3	10
220	150	70	50	90	125	80	10	5	20
220	200	70	40	120	125	80	5	5	10
130	200	90	50	90	125	75	5	5	10
170	200	70	40	110	160	75	10	3	10
220	250	70	50	110	125	80	5	5	15
130	150	70	50	90	160	80	15	4	10
130	250	90	60	90	125	75	5	5	20
100	250	70	50	90	125	90	10	4	15
130	200	70	40	90	200	75	5	3	10
130	200	90	50	110	125	75	10	5	10
170	150	70	50	110	200	90	5	5	10
170	200	70	40	120	200	90	5	5	20
220	200	75	50	90	200	75	5	4	20
100	200	75	50	110	160	75	15	5	20
220	200	70	60	90	125	80	15	5	10
100	200	90	50	120	200	80	5	3	10
220	150	70	50	120	125	75	10	3	10
130	150	90	40	120	125	75	15	5	15
220	200	70	40	110	125	75	15	3	20
170	150	70	50	90	160	75	5	3	20
130	200	75	50	90	125	90	10	3	15
100	200	90	50	90	200	80	15	3	10
170	150	90	40	90	125	75	5	4	15

Key:

TOLLEX ..... Toll to use the existing roadway
TOLLNEW ..... Toll to use a new toll road
TIMEEX ..... Time of trip to use the existing roadway
TIMENEW ..... Time of trip to use a new toll road
TIMENON ..... Time of trip to use a non-tolled road
TRNFARE ..... Metrorail fare for equivalent trip
TRNTIME ..... Time of trip on Metrorail
TRNFREQ ..... Frequency of trains on Metrorail
FUEL ..... Hypothetical gasoline price
OVT ..... Time it takes to go to and from the Metrorail station

PP 30

[Peak period SP questions for 15-30 minute trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	75	200	100	25	25	25	20	2	40	130	45	5	4	15
220	100	250	100	25	20	20	20	1	35	100	35	5	3	10
130	50	250	200	30	20	18	25	1	40	100	50	5	3	10
170	75	250	200	25	20	20	20	1	35	175	50	15	5	10
100	50	150	150	30	30	25	20	2	35	130	35	5	5	10
100	50	150	200	35	20	18	25	3	40	175	45	5	3	15
130	75	200	150	30	20	20	20	1	45	100	50	5	3	20
220	100	250	150	30	25	18	20	3	35	175	35	5	4	10
100	75	250	150	25	25	20	25	2	40	100	35	10	3	10
220	75	150	100	30	20	25	25	1	40	175	35	10	4	10
130	50	250	250	25	30	20	25	3	45	130	45	5	4	10
170	75	250	250	30	30	18	20	2	35	100	45	15	3	10
100	100	200	200	25	30	25	20	3	45	100	35	15	3	15
100	50	150	100	25	20	20	20	1	35	100	35	5	3	10
170	50	200	100	30	25	20	25	3	35	100	45	10	3	20
130	100	200	200	25	25	25	20	1	45	175	35	10	3	10
100	75	200	250	25	20	18	25	1	35	100	35	5	3	20
220	75	200	150	35	20	20	20	3	40	130	50	5	3	10
100	75	200	200	30	25	20	25	3	35	130	35	5	5	15
220	100	250	200	35	20	25	25	2	45	130	50	5	3	20
170	75	250	100	35	20	25	25	3	40	100	35	15	4	20
170	75	200	200	35	25	20	25	1	35	100	35	5	4	10
220	75	150	250	35	25	18	20	1	35	130	50	10	3	15
170	75	200	250	25	20	25	25	2	35	130	35	5	3	10
170	75	200	150	30	20	20	20	1	40	100	45	5	3	15
100	75	250	250	35	30	25	20	1	35	175	45	10	3	20
170	50	200	150	25	20	25	25	1	35	175	50	10	5	15
100	50	150	250	25	25	20	25	1	45	100	50	5	4	20
100	100	200	150	25	20	18	25	2	35	100	50	15	4	10
130	75	150	150	25	30	20	25	1	40	175	35	15	3	20
100	75	250	100	30	20	18	25	1	45	130	35	10	5	10
100	75	200	100	25	30	25	20	1	40	100	50	5	4	10
130	75	150	250	30	25	25	20	3	35	100	50	15	3	10
170	75	250	150	25	25	20	25	1	45	130	35	15	3	15
130	100	200	150	25	20	18	25	1	35	130	45	10	4	20
220	50	200	100	35	30	20	25	1	35	130	50	15	3	10
220	50	200	250	30	20	20	20	1	45	175	35	15	4	15
220	75	200	250	25	20	25	25	1	35	100	35	5	3	15
130	50	250	100	25	20	20	20	2	35	175	35	5	3	15
170	50	200	250	35	20	20	20	2	45	100	35	10	4	10
170	100	150	200	30	20	25	25	1	45	100	45	5	3	10
220	75	150	200	25	20	20	20	2	35	100	45	10	5	20
220	75	200	100	25	25	18	20	1	45	100	45	5	5	10
130	75	200	200	35	30	20	25	1	35	100	35	5	5	10
170	50	200	200	25	30	18	20	1	40	130	35	10	3	10
220	100	250	250	25	30	20	25	1	40	100	45	5	5	15
130	75	150	200	25	20	20	20	1	35	130	45	15	4	10
130	50	250	150	35	25	25	20	1	35	100	35	5	5	20
100	75	250	200	25	20	20	20	3	35	100	50	10	4	15
130	75	200	250	25	20	18	25	3	35	175	35	5	3	10
130	100	200	250	35	20	20	20	3	40	100	35	10	5	10
170	100	150	250	25	25	20	25	2	40	175	50	5	5	10
170	75	200	100	25	30	18	20	3	45	175	50	5	5	20
220	75	200	200	30	30	20	25	2	35	175	35	5	4	20
100	100	200	250	30	20	20	20	1	40	130	35	15	5	20
220	50	200	150	25	20	25	25	3	35	100	45	15	5	10
100	75	200	150	35	20	20	20	2	45	175	45	5	3	10
220	75	150	150	25	30	20	25	3	45	100	35	10	3	10
130	75	150	100	35	20	18	25	2	45	100	35	15	5	15
220	50	200	200	25	25	18	20	2	40	100	35	15	3	20
170	100	150	100	25	20	20	20	3	35	130	35	5	3	20
130	100	200	100	30	30	20	25	2	35	100	50	10	3	15
100	100	200	100	35	25	20	25	1	35	175	45	15	3	10
170	100	150	150	35	30	18	20	1	35	100	35	5	4	15

Key:

TOLLEX ..... *Toll to use the existing roadway*
TOLLDIFF ..... *Toll to use the existing roadway during the off-peak*
TOLLNEW ..... *Toll to use a new toll road*
TOLHOV ..... *Toll to use the HOV lane*
TIMEEX ..... *Time of trip to use the existing roadway*
TIMEDIFF ..... *Time of trip to use the existing roadway during the off-peak*
TIMENEW ..... *Time of trip to use a new toll road*
TIMEHOV ..... *Time to use the HOV lane*
DISPLACE ..... *1 = 7 pm – 6 am; 2 = 7 pm – 6 am and 9 am – 4 pm; 3 = 9 pm – 6 am and 11 am – 3 pm*
TIMENON ..... *Time of trip to use a non-tolled road*
TRNFARE ..... *Metrorail fare for equivalent trip*
TRNTIME ..... *Time of trip on Metrorail*
TRNFREQ ..... *Frequency of trains on Metrorail*
FUEL ..... *Hypothetical gasoline price*
OVT ..... *Time it takes to go to and from the Metrorail station*

PP 45

[Peak period SP questions for 45 minute trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	75	200	100	40	40	40	35	2	55	130	50	5	4	15
220	100	250	100	40	35	35	35	1	50	100	45	5	3	10
130	50	250	200	45	35	30	40	1	55	100	60	5	3	10
170	75	250	200	40	35	35	35	1	50	175	60	15	5	10
100	50	150	150	45	45	40	35	2	50	130	45	5	5	10
100	50	150	200	50	35	30	40	3	55	175	50	5	3	15
130	75	200	150	45	35	35	35	1	60	100	60	5	3	20
220	100	250	150	45	40	30	35	3	50	175	45	5	4	10
100	75	250	150	40	40	35	40	2	55	100	45	10	3	10
220	75	150	100	45	35	40	40	1	55	175	45	10	4	10
130	50	250	250	40	45	35	40	3	60	130	50	5	4	10
170	75	250	250	45	45	30	35	2	50	100	50	15	3	10
100	100	200	200	40	45	40	35	3	60	100	45	15	3	15
100	50	150	100	40	35	35	35	1	50	100	45	5	3	10
170	50	200	100	45	40	35	40	3	50	100	50	10	3	20
130	100	200	200	40	40	40	35	1	60	175	45	10	3	10
100	75	200	250	40	35	30	40	1	50	100	45	5	3	20
220	75	200	150	50	35	35	35	3	55	130	60	5	3	10
100	75	200	200	45	40	35	40	3	50	130	45	5	5	15
220	100	250	200	50	35	40	40	2	60	130	60	5	3	20
170	75	250	100	50	35	40	40	3	55	100	45	15	4	20
170	75	200	200	50	40	35	40	1	50	100	45	5	4	10
220	75	150	250	50	40	30	35	1	50	130	60	10	3	15
170	75	200	250	40	35	40	40	2	50	130	45	5	3	10
170	75	200	150	45	35	35	35	1	55	100	50	5	3	15
100	75	250	250	50	45	40	35	1	50	175	50	10	3	20
170	50	200	150	40	35	40	40	1	50	175	60	10	5	15
100	50	150	250	40	40	35	40	1	60	100	60	5	4	20
100	100	200	150	40	35	30	40	2	50	100	60	15	4	10
130	75	150	150	40	45	35	40	1	55	175	45	15	3	20
100	75	250	100	45	35	30	40	1	60	130	45	10	5	10
100	75	200	100	40	45	40	35	1	55	100	60	5	4	10
130	75	150	250	45	40	40	35	3	50	100	60	15	3	10
170	75	250	150	40	40	35	40	1	60	130	45	15	3	15
130	100	200	150	40	35	30	40	1	50	130	50	10	4	20
220	50	200	100	50	45	35	40	1	50	130	60	15	3	10
220	50	200	250	45	35	35	35	1	60	175	45	15	4	15
220	75	200	250	40	35	40	40	1	50	100	45	5	3	15
130	50	250	100	40	35	35	35	2	50	175	45	5	3	15
170	50	200	250	50	35	35	35	2	60	100	45	10	4	10
170	100	150	200	45	35	40	40	1	60	100	50	5	3	10
220	75	150	200	40	35	35	35	2	50	100	50	10	5	20
220	75	200	100	40	40	30	35	1	60	100	50	5	5	10
130	75	200	200	50	45	35	40	1	50	100	45	5	5	10
170	50	200	200	40	45	30	35	1	55	130	45	10	3	10
220	100	250	250	40	45	35	40	1	55	100	50	5	5	15
130	75	150	200	40	35	35	35	1	50	130	50	15	4	10
130	50	250	150	50	40	40	35	1	50	100	45	5	5	20
100	75	250	200	40	35	35	35	3	50	100	60	10	4	15
130	75	200	250	40	35	30	40	3	50	175	45	5	3	10
130	100	200	250	50	35	35	35	3	55	100	45	10	5	10
170	100	150	250	40	40	35	40	2	55	175	60	5	5	10
170	75	200	100	40	45	30	35	3	60	175	60	5	5	20
220	75	200	200	45	45	35	40	2	50	175	45	5	4	20
100	100	200	250	45	35	35	35	1	55	130	45	15	5	20
220	50	200	150	40	35	40	40	3	50	100	50	15	5	10
100	75	200	150	50	35	35	35	2	60	175	50	5	3	10
220	75	150	150	40	45	35	40	3	60	100	45	10	3	10
130	75	150	100	50	35	30	40	2	60	100	45	15	5	15
220	50	200	200	40	40	30	35	2	55	100	45	15	3	20
170	100	150	100	40	35	35	35	3	50	130	45	5	3	20
130	100	200	100	45	45	35	40	2	50	100	60	10	3	15
100	100	200	100	50	40	35	40	1	50	175	50	15	3	10
170	100	150	150	50	45	30	35	1	50	100	45	5	4	15

Key:

TOLLEX ..... *Toll to use the existing roadway*
TOLLDIFF ..... *Toll to use the existing roadway during the off-peak*
TOLLNEW ..... *Toll to use a new toll road*
TOLHOV ..... *Toll to use the HOV lane*
TIMEEX ..... *Time of trip to use the existing roadway*
TIMEDIFF ..... *Time of trip to use the existing roadway during the off-peak*
TIMENEW ..... *Time of trip to use a new toll road*
TIMEHOV ..... *Time to use the HOV lane*
DISPLACE ..... *1 = 7 pm – 6 am; 2 = 7 pm – 6 am and 9 am – 4 pm; 3 = 9 pm – 6 am and 11 am – 3 pm*
TIMENON ..... *Time of trip to use a non-tolled road*
TRNFARE ..... *Metrorail fare for equivalent trip*
TRNTIME ..... *Time of trip on Metrorail*
TRNFREQ ..... *Frequency of trains on Metrorail*
FUEL ..... *Hypothetical gasoline price*
OVT ..... *Time it takes to go to and from the Metrorail station*

PP 60

[Peak period SP questions for 60 minute trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	75	200	100	50	50	50	45	2	75	160	70	5	4	15
220	100	250	100	50	45	45	45	1	65	125	60	5	3	10
130	50	250	200	60	45	40	50	1	75	125	80	5	3	10
170	75	250	200	50	45	45	45	1	65	200	80	15	5	10
100	50	150	150	60	60	50	45	2	65	160	60	5	5	10
100	50	150	200	70	45	40	50	3	75	200	70	5	3	15
130	75	200	150	60	45	45	45	1	80	125	80	5	3	20
220	100	250	150	60	50	40	45	3	65	200	60	5	4	10
100	75	250	150	50	50	45	50	2	75	125	60	10	3	10
220	75	150	100	60	45	50	50	1	75	200	60	10	4	10
130	50	250	250	50	60	45	50	3	80	160	70	5	4	10
170	75	250	250	60	60	40	45	2	65	125	70	15	3	10
100	100	200	200	50	60	50	45	3	80	125	60	15	3	15
100	50	150	100	50	45	45	45	1	65	125	60	5	3	10
170	50	200	100	60	50	45	50	3	65	125	70	10	3	20
130	100	200	200	50	50	50	45	1	80	200	60	10	3	10
100	75	200	250	50	45	40	50	1	65	125	60	5	3	20
220	75	200	150	70	45	45	45	3	75	160	80	5	3	10
100	75	200	200	60	50	45	50	3	65	160	60	5	5	15
220	100	250	200	70	45	50	50	2	80	160	80	5	3	20
170	75	250	100	70	45	50	50	3	75	125	60	15	4	20
170	75	200	200	70	50	45	50	1	65	125	60	5	4	10
220	75	150	250	70	50	40	45	1	65	160	80	10	3	15
170	75	200	250	50	45	50	50	2	65	160	60	5	3	10
170	75	200	150	60	45	45	45	1	75	125	70	5	3	15
100	75	250	250	70	60	50	45	1	65	200	70	10	3	20
170	50	200	150	50	45	50	50	1	65	200	80	10	5	15
100	50	150	250	50	50	45	50	1	80	125	80	5	4	20
100	100	200	150	50	45	40	50	2	65	125	80	15	4	10
130	75	150	150	50	60	45	50	1	75	200	60	15	3	20
100	75	250	100	60	45	40	50	1	80	160	60	10	5	10
100	75	200	100	50	60	50	45	1	75	125	80	5	4	10
130	75	150	250	60	50	50	45	3	65	125	80	15	3	10
170	75	250	150	50	50	45	50	1	80	160	60	15	3	15
130	100	200	150	50	45	40	50	1	65	160	70	10	4	20
220	50	200	100	70	60	45	50	1	65	160	80	15	3	10
220	50	200	250	60	45	45	45	1	80	200	60	15	4	15
220	75	200	250	50	45	50	50	1	65	125	60	5	3	15
130	50	250	100	50	45	45	45	2	65	200	60	5	3	15
170	50	200	250	70	45	45	45	2	80	125	60	10	4	10
170	100	150	200	60	45	50	50	1	80	125	70	5	3	10
220	75	150	200	50	45	45	45	2	65	125	70	10	5	20
220	75	200	100	50	50	40	45	1	80	125	70	5	5	10
130	75	200	200	70	60	45	50	1	65	125	60	5	5	10
170	50	200	200	50	60	40	45	1	75	160	60	10	3	10
220	100	250	250	50	60	45	50	1	75	125	70	5	5	15
130	75	150	200	50	45	45	45	1	65	160	70	15	4	10
130	50	250	150	70	50	50	45	1	65	125	60	5	5	20
100	75	250	200	50	45	45	45	3	65	125	80	10	4	15
130	75	200	250	50	45	40	50	3	65	200	60	5	3	10
130	100	200	250	70	45	45	45	3	75	125	60	10	5	10
170	100	150	250	50	50	45	50	2	75	200	80	5	5	10
170	75	200	100	50	60	40	45	3	80	200	80	5	5	20
220	75	200	200	60	60	45	50	2	65	200	60	5	4	20
100	100	200	250	60	45	45	45	1	75	160	60	15	5	20
220	50	200	150	50	45	50	50	3	65	125	70	15	5	10
100	75	200	150	70	45	45	45	2	80	200	70	5	3	10
220	75	150	150	50	60	45	50	3	80	125	60	10	3	10
130	75	150	100	70	45	40	50	2	80	125	60	15	5	15
220	50	200	200	50	50	40	45	2	75	125	60	15	3	20
170	100	150	100	50	45	45	45	3	65	160	60	5	3	20
130	100	200	100	60	60	45	50	2	65	125	80	10	3	15
100	100	200	100	70	50	45	50	1	65	200	70	15	3	10
170	100	150	150	70	60	40	45	1	65	125	60	5	4	15

Key:

TOLLEX ..... *Toll to use the existing roadway*
TOLLDIFF ..... *Toll to use the existing roadway during the off-peak*
TOLLNEW ..... *Toll to use a new toll road*
TOLHOV ..... *Toll to use the HOV lane*
TIMEEX ..... *Time of trip to use the existing roadway*
TIMEDIFF ..... *Time of trip to use the existing roadway during the off-peak*
TIMENEW ..... *Time of trip to use a new toll road*
TIMEHOV ..... *Time to use the HOV lane*
DISPLACE ..... *1 = 7 pm – 6 am; 2 = 7 pm – 6 am and 9 am – 4 pm; 3 = 9 pm – 6 am and 11 am – 3 pm*
TIMENON ..... *Time of trip to use a non-tolled road*
TRNFARE ..... *Metrorail fare for equivalent trip*
TRNTIME ..... *Time of trip on Metrorail*
TRNFREQ ..... *Frequency of trains on Metrorail*
FUEL ..... *Hypothetical gasoline price*
OVT ..... *Time it takes to go to and from the Metrorail station*

PP 75

[Peak period SP questions for 75 minute or longer trip times. Listed are the possible scenarios, 9 of which were presented at random.]

tollex	tolldiff	tollnew	tollhov	timeex	timediff	timenew	timehov	displace	timenon	trnfare	trntime	trnfreq	fuel	ovt
130	75	200	100	70	60	60	55	2	110	160	80	5	4	15
220	100	250	100	70	50	50	55	1	90	125	75	5	3	10
130	50	250	200	75	50	40	65	1	110	125	90	5	3	10
170	75	250	200	70	50	50	55	1	90	200	90	15	5	10
100	50	150	150	75	75	60	55	2	90	160	75	5	5	10
100	50	150	200	90	50	40	65	3	110	200	80	5	3	15
130	75	200	150	75	50	50	55	1	120	125	90	5	3	20
220	100	250	150	75	60	40	55	3	90	200	75	5	4	10
100	75	250	150	70	60	50	65	2	110	125	75	10	3	10
220	75	150	100	75	50	60	65	1	110	200	75	10	4	10
130	50	250	250	70	75	50	65	3	120	160	80	5	4	10
170	75	250	250	75	75	40	55	2	90	125	80	15	3	10
100	100	200	200	70	75	60	55	3	120	125	75	15	3	15
100	50	150	100	70	50	50	55	1	90	125	75	5	3	10
170	50	200	100	75	60	50	65	3	90	125	80	10	3	20
130	100	200	200	70	60	60	55	1	120	200	75	10	3	10
100	75	200	250	70	50	40	65	1	90	125	75	5	3	20
220	75	200	150	90	50	50	55	3	110	160	90	5	3	10
100	75	200	200	75	60	50	65	3	90	160	75	5	5	15
220	100	250	200	90	50	60	65	2	120	160	90	5	3	20
170	75	250	100	90	50	60	65	3	110	125	75	15	4	20
170	75	200	200	90	60	50	65	1	90	125	75	5	4	10
220	75	150	250	90	60	40	55	1	90	160	90	10	3	15
170	75	200	250	70	50	60	65	2	90	160	75	5	3	10
170	75	200	150	75	50	50	55	1	110	125	80	5	3	15
100	75	250	250	90	75	60	55	1	90	200	80	10	3	20
170	50	200	150	70	50	60	65	1	90	200	90	10	5	15
100	50	150	250	70	60	50	65	1	120	125	90	5	4	20
100	100	200	150	70	50	40	65	2	90	125	90	15	4	10
130	75	150	150	70	75	50	65	1	110	200	75	15	3	20
100	75	250	100	75	50	40	65	1	120	160	75	10	5	10
100	75	200	100	70	75	60	55	1	110	125	90	5	4	10
130	75	150	250	75	60	60	55	3	90	125	90	15	3	10
170	75	250	150	70	60	50	65	1	120	160	75	15	3	15
130	100	200	150	70	50	40	65	1	90	160	80	10	4	20
220	50	200	100	90	75	50	65	1	90	160	90	15	3	10
220	50	200	250	75	50	50	55	1	120	200	75	15	4	15
220	75	200	250	70	50	60	65	1	90	125	75	5	3	15
130	50	250	100	70	50	50	55	2	90	200	75	5	3	15
170	50	200	250	90	50	50	55	2	120	125	75	10	4	10
170	100	150	200	75	50	60	65	1	120	125	80	5	3	10
220	75	150	200	70	50	50	55	2	90	125	80	10	5	20
220	75	200	100	70	60	40	55	1	120	125	80	5	5	10
130	75	200	200	90	75	50	65	1	90	125	75	5	5	10
170	50	200	200	70	75	40	55	1	110	160	75	10	3	10
220	100	250	250	70	75	50	65	1	110	125	80	5	5	15
130	75	150	200	70	50	50	55	1	90	160	80	15	4	10
130	50	250	150	90	60	60	55	1	90	125	75	5	5	20
100	75	250	200	70	50	50	55	3	90	125	90	10	4	15
130	75	200	250	70	50	40	65	3	90	200	75	5	3	10
130	100	200	250	90	50	50	55	3	110	125	75	10	5	10
170	100	150	250	70	60	50	65	2	110	200	90	5	5	10
170	75	200	100	70	75	40	55	3	120	200	90	5	5	20
220	75	200	200	75	75	50	65	2	90	200	75	5	4	20
100	100	200	250	75	50	50	55	1	110	160	75	15	5	20
220	50	200	150	70	50	60	65	3	90	125	80	15	5	10
100	75	200	150	90	50	50	55	2	120	200	80	5	3	10
220	75	150	150	70	75	50	65	3	120	125	75	10	3	10
130	75	150	100	90	50	40	65	2	120	125	75	15	5	15
220	50	200	200	70	60	40	55	2	110	125	75	15	3	20
170	100	150	100	70	50	50	55	3	90	160	75	5	3	20
130	100	200	100	75	75	50	65	2	90	125	90	10	3	15
100	100	200	100	90	60	50	65	1	90	200	80	15	3	10
170	100	150	150	90	75	40	55	1	90	125	75	5	4	15

Key:

TOLLEX ..... *Toll to use the existing roadway*
TOLLDIFF ..... *Toll to use the existing roadway during the off-peak*
TOLLNEW ..... *Toll to use a new toll road*
TOLHOV ..... *Toll to use the HOV lane*
TIMEEX ..... *Time of trip to use the existing roadway*
TIMEDIFF ..... *Time of trip to use the existing roadway during the off-peak*
TIMENEW ..... *Time of trip to use a new toll road*
TIMEHOV ..... *Time to use the HOV lane*
DISPLACE ..... *1 = 7 pm – 6 am; 2 = 7 pm – 6 am and 9 am – 4 pm; 3 = 9 pm – 6 am and 11 am – 3 pm*
TIMENON ..... *Time of trip to use a non-tolled road*
TRNFARE ..... *Metrorail fare for equivalent trip*
TRNTIME ..... *Time of trip on Metrorail*
TRNFREQ ..... *Frequency of trains on Metrorail*
FUEL ..... *Hypothetical gasoline price*
OVT ..... *Time it takes to go to and from the Metrorail station*

SP2A Reasonable

You have just completed Part 2A of the Stated Preference Survey – 2008. We would like to receive feedback on these questions.

Please think about the nine state preference questions you just answered. How reasonable were the journey times for each option offered?

Dulles Toll Road (existing road option)	Frequency	Percentage
Very Reasonable	137	12.8%
Quite Reasonable	630	59.0%
Not at all Reasonable (too long)	132	12.4%
Not at all Reasonable (too short)	57	5.3%
Not at all Reasonable (varied too much)	64	6.0%
No Answer	47	4.4%

HOV Lane Use (carpool option)	Frequency	Percentage
Very Reasonable	127	11.9%
Quite Reasonable	589	55.2%
Not at all Reasonable (too long)	134	12.6%
Not at all Reasonable (too short)	47	4.4%
Not at all Reasonable (varied too much)	69	6.5%
No Answer	101	9.5%

Off-peak Travel (different time period option)	Frequency	Percentage
Very Reasonable	147	13.8%
Quite Reasonable	600	56.2%
Not at all Reasonable (too long)	120	11.2%
Not at all Reasonable (too short)	34	3.2%
Not at all Reasonable (varied too much)	77	7.2%
No Answer	89	8.3%

Non-tolled Road	Frequency	Percentage
Very Reasonable	73	6.8%
Quite Reasonable	471	44.1%
Not at all Reasonable (too long)	245	23.0%
Not at all Reasonable (too short)	133	12.5%
Not at all Reasonable (varied too much)	69	6.5%
No Answer	76	7.1%

SP2A Difficulty

For the state preference questions answered in this part of the survey, was it difficult to make choices between the options offered?

	Frequency	Percentage
Very Difficult	64	6.0%
Difficult	189	17.7%
Somewhat Difficult	484	45.4%
Not at all Difficult	305	28.6%
No Answer	25	2.3%

<table>
<tr><td>SP2B Intro</td><td>STATED PREFERENCE SURVEY
PART 2B – Driving Conditions

In this section, you will be shown driving conditions on two highways. You will be asked to choose between the two highways depending on the length of the trip and the amount of time spent in various driving conditions on each highway.

Example: For a 15 mile trip, you may be asked to choose between

• Highway A with a mix of Free Flowing Traffic and Stop and Go Traffic; or
• Highway B with Light Congestion during the entire length of the trip

For the scenario which you are presented, you will be given nine different situations. Each situation will have different travel times on the two highways.</td></tr>
<tr><td>Free Flow, Stop and Go, Light Congestion, 15 mi</td><td>[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

<table>
<tr><th colspan="4">Journey length = 15 miles</th></tr>
<tr><th>Situation number</th><th>Hwy A Free Flowing</th><th>Hwy A Stop and Go</th><th>Hwy B Light Congestion</th></tr>
<tr><td>1</td><td>5 minutes</td><td>5 minutes</td><td>15 minutes</td></tr>
<tr><td>2</td><td>15 minutes</td><td>10 minutes</td><td>15 minutes</td></tr>
<tr><td>3</td><td>10 minutes</td><td>15 minutes</td><td>15 minutes</td></tr>
<tr><td>4</td><td>10 minutes</td><td>5 minutes</td><td>20 minutes</td></tr>
<tr><td>5</td><td>5 minutes</td><td>10 minutes</td><td>20 minutes</td></tr>
<tr><td>6</td><td>15 minutes</td><td>15 minutes</td><td>20 minutes</td></tr>
<tr><td>7</td><td>15 minutes</td><td>5 minutes</td><td>25 minutes</td></tr>
<tr><td>8</td><td>10 minutes</td><td>10 minutes</td><td>25 minutes</td></tr>
<tr><td>9</td><td>5 minutes</td><td>15 minutes</td><td>25 minutes</td></tr>
</table>
</td></tr>
</table>

Free Flow, Stop and Go, Light Congestion, 25 mi

[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

Journey length = 25 miles			
Situation number	Hwy A Free Flowing	Hwy A Stop and Go	Hwy B Light Congestion
1	40 minutes	20 minutes	1 hour
2	1 hour	25 minutes	1 hour
3	50 minutes	30 minutes	1 hour
4	50 minutes	20 minutes	1 hour and 15 minutes
5	40 minutes	25 minutes	1 hour and 15 minutes
6	1 hour	30 minutes	1 hour and 15 minutes
7	1 hour	20 minutes	1 hour and 30 minutes
8	50 minutes	25 minutes	1 hour and 30 minutes
9	40 minutes	30 minutes	1 hour and 30 minutes

Busy Traffic, Gridlock, Heavy Congestion, 15 mi

[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

Journey length = 15 miles			
Situation number	Hwy A Busy Traffic	Hwy A Gridlock	Hwy B Heavy Congestion
1	5 minutes	5 minutes	15 minutes
2	15 minutes	10 minutes	15 minutes
3	10 minutes	15 minutes	15 minutes
4	10 minutes	5 minutes	20 minutes
5	5 minutes	10 minutes	20 minutes
6	15 minutes	15 minutes	20 minutes
7	15 minutes	5 minutes	25 minutes
8	10 minutes	10 minutes	25 minutes
9	5 minutes	15 minutes	25 minutes

Busy Traffic, Gridlock, Heavy Congestion, 25 mi

[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

Journey length = 25 miles			
Situation number	Hwy A Busy Traffic	Hwy A Gridlock	Hwy B Heavy Congestion
1	40 minutes	20 minutes	1 hour
2	1 hour	25 minutes	1 hour
3	50 minutes	30 minutes	1 hour
4	50 minutes	20 minutes	1 hour and 15 minutes
5	40 minutes	25 minutes	1 hour and 15 minutes
6	1 hour	30 minutes	1 hour and 15 minutes
7	1 hour	20 minutes	1 hour and 30 minutes
8	50 minutes	25 minutes	1 hour and 30 minutes
9	40 minutes	30 minutes	1 hour and 30 minutes

Busy Traffic, Stop and Go, Light Congestion, 15 mi

[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

Journey length = 15 miles			
Situation number	Hwy A Busy Traffic	Hwy A Stop and Go	Hwy B Light Congestion
1	5 minutes	5 minutes	15 minutes
2	15 minutes	10 minutes	15 minutes
3	10 minutes	15 minutes	15 minutes
4	10 minutes	5 minutes	20 minutes
5	5 minutes	10 minutes	20 minutes
6	15 minutes	15 minutes	20 minutes
7	15 minutes	5 minutes	25 minutes
8	10 minutes	10 minutes	25 minutes
9	5 minutes	15 minutes	25 minutes

Busy Traffic, Stop and Go, Light Congestion, 25 mi

[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

Journey length = 25 miles			
Situation number	Hwy A Busy Traffic	Hwy A Stop and Go	Hwy B Light Congestion
1	40 minutes	20 minutes	1 hour
2	1 hour	25 minutes	1 hour
3	50 minutes	30 minutes	1 hour
4	50 minutes	20 minutes	1 hour and 15 minutes
5	40 minutes	25 minutes	1 hour and 15 minutes
6	1 hour	30 minutes	1 hour and 15 minutes
7	1 hour	20 minutes	1 hour and 30 minutes
8	50 minutes	25 minutes	1 hour and 30 minutes
9	40 minutes	30 minutes	1 hour and 30 minutes

Free Flow, Heavy Congestion, Busy Traffic, 15 mi

[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

Journey length = 15 miles			
Situation number	Hwy A Free Flowing	Hwy A Heavy Congestion	Hwy B Busy Traffic
1	5 minutes	5 minutes	15 minutes
2	15 minutes	10 minutes	15 minutes
3	10 minutes	15 minutes	15 minutes
4	10 minutes	5 minutes	20 minutes
5	5 minutes	10 minutes	20 minutes
6	15 minutes	15 minutes	20 minutes
7	15 minutes	5 minutes	25 minutes
8	10 minutes	10 minutes	25 minutes
9	5 minutes	15 minutes	25 minutes

Free Flow, Heavy Congestion, Busy Traffic, 25 mi

[This is one of eight sets of situations. Each respondent was given a set of situations randomly. Each situation within the set was presented to the respondent.]

Journey length = 25 miles			
Situation number	Hwy A Free Flowing	Hwy A Heavy Congestion	Hwy B Busy Traffic
1	40 minutes	20 minutes	1 hour
2	1 hour	25 minutes	1 hour
3	50 minutes	30 minutes	1 hour
4	50 minutes	20 minutes	1 hour and 15 minutes
5	40 minutes	25 minutes	1 hour and 15 minutes
6	1 hour	30 minutes	1 hour and 15 minutes
7	1 hour	20 minutes	1 hour and 30 minutes
8	50 minutes	25 minutes	1 hour and 30 minutes
9	40 minutes	30 minutes	1 hour and 30 minutes

Attitude

We would like to ask for your opinion on paying highway tolls. We will be asking several questions about tolls and the Dulles Toll Road.

Please tell us how you feel about each of the following statements.

I object to paying tolls to use a highway.	Frequency	Percentage
Strongly Agree	185	17.3%
Agree	191	17.9%
Neither Agree nor Disagree	272	25.5%
Disagree	321	30.1%
Strongly Disagree	71	6.7%
No Answer	27	2.5%

I think tolls are a sensible way of funding roadway infrastructure (e.g. to maintain the existing roads or to build new roads).	Frequency	Percentage
Strongly Agree	90	8.4%
Agree	495	46.4%
Neither Agree nor Disagree	173	16.2%
Disagree	170	15.9%
Strongly Disagree	112	10.5%
No Answer	27	2.5%

I would object to paying new tolls on existing toll-free roadways.	Frequency	Percentage
Strongly Agree	523	49.0%
Agree	248	23.2%
Neither Agree nor Disagree	134	12.6%
Disagree	106	9.9%
Strongly Disagree	29	2.7%
No Answer	27	2.5%

Demo Intro

YOU'RE ALMOST DONE!

Demo Intro 2

STATED PREFERENCE SURVEY
PART 3 – Demographic Information

The following questions are used for demographic purposes only. This information will have no bearing on your survey answers, comments, or eligibility in the random drawing for a Visa gift card.

Household

How many people live in your household?

	Frequency	Percentage
1	177	16.6%
2	386	36.2%
3	173	16.2%
4	192	18.0%
5	82	7.7%
6 or more	23	2.2%
Prefer Not to Answer	7	0.7%
No Answer	27	2.5%

Number of Vehicles

How many cars, motorcycles, pickup trucks, minivans, etc. do you have in your household?

	Frequency	Percentage
0	5	0.5%
1	180	16.9%
2	495	46.4%
3	231	21.6%
4	83	7.8%
5 or more	39	3.7%
Prefer Not to Answer	7	0.7%
No Answer	27	2.5%

Age

What is your age?

	Frequency	Percentage
16 to 24	8	0.7%
25 to 34	159	14.9%
35 to 44	294	27.6%
45 to 54	308	28.9%
55 to 64	204	19.1%
65 or older	53	5.0%
Prefer Not to Answer	14	1.3%
No Answer	27	2.5%

Employment	What is your employment status? **Frequency / Percentage** Full-time employed: 885 / 82.9% Part-time employed: 39 / 3.7% Self-employed: 45 / 4.2% Student: 0 / 0.0% Student and employed: 3 / 0.3% Retired: 35 / 3.3% Homemaker: 20 / 1.9% Unemployed: 1 / 0.1% Prefer Not to Answer: 12 / 1.1% No Answer: 27 / 2.5%
Income	What is your household's annual gross income? **Frequency / Percentage** Less than $25,000: 4 / 0.4% $25,000 - $49,999: 17 / 1.6% $50,000 - $74,999: 69 / 6.5% $75,000 - $99,999: 112 / 10.5% $100,000 - $149,999: 261 / 24.5% $150,000 or more: 387 / 36.3% Prefer Not to Answer: 190 / 17.8% No Answer: 27 / 2.5%
Comments	Please enter any additional comments you have for this survey, then click on "NEXT." This question is optional; if you do not have any comments, click on "NEXT." *[Comments received are displayed in separate tables grouped by topic after this table.]*
Random Drawing Information	Thank you for completing the Dulles Toll Road on-line survey. Please enter your information below if you wish to be entered into a random drawing for a Visa gift card. This information is entirely OPTIONAL. It is not necessary to enter this information if you do not want to be entered into the random drawing.

Thank You	Thank you for participating in the Dulles Toll Road State Preference Survey – 2008 conducted by Wilbur Smith Associates www.wilbursmith.com on behalf of Metropolitan Washington Airports Authority www.mwaa.com

Appendix C

Dulles Toll Road
2008 Independent
Corridor Growth Assessment

Supporting Analysis for the Dulles Toll Road (DTR) Corridor Growth Assessment

March 2008

Prepared for:

Wilbur Smith Associates
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Fairfax, VA 22031

Prepared by:

Linden Street Associates, Inc.
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Alexandria, VA 22301

TABLE OF CONTENTS

CHAPTER 1—INTRODUCTION

STUDY OVERVIEW AND OBJECTIVES

This study presents supporting analysis for the Dulles Toll Road (DTR) Corridor growth assessment being completed by Wilbur Smith Associates (WSA). WSA is currently supporting the Metropolitan Washington Airports Authority (MWAA) and its financial advisor, Mercator Advisor (MA) in their efforts to forecast traffic and revenue on the DTR. Linden Street Associates, Inc. has been engaged to perform an independent economic analysis of expected population, employment, and economic effects from prior analyses and to provide a small area analysis of impacts within Traffic Analysis Zones (TAZs) from which additional traffic and revenue models can be developed.

This study involves a business and economic review of various potential impacts on DTR use, drawing from regional data from the Metropolitan Washington Council of Governments (MWCOG), the George Mason University Center for Regional Analysis (CRA), the National Association of Realtors (NAR), and other data sources. The focus of the study includes socioeconomic, demographic data, and real estate market research on the Dulles Corridor, as well as other economic factors that have the potential of impacting commuter use of the DTR. Linden Street's analysis will be used for comparison purposes to previous forecasts with the goal of offering insight that can enhance existing models.

STUDY APPROACH

This study involved a four-step approach for completing the supporting analysis, summarized below.

Project Kick-off

The Project Kick-off was held on December 12, 2007 at WSA offices in Fairfax, VA. The kick-off addressed the scope of the project and confirmed key considerations. Meeting notes were provided afterwards, outlining the results of the discussion, including confirmation of project time frames and schedules, identification of stakeholders, definition of deliverable expectations, and collection of existing data related to the study.

Market Economic Data Collection and Analysis

This step involved analysis of market and economic information that has been developed by MWCOG, local governments, Virginia Department of Transportation (VDOT), and other parties. The intent of the study was to support a small area analysis, or "micro" approach, that focused on the MWCOG Traffic Analysis Zones (TAZ) level, which would facilitate the business and economic review of potential growth in trip production and attractions along the corridor. Additional information reviewed during this step included real estate market trends and forecasts for commercial, residential, and industrial development anticipated for the DTR area.

Employer and Business Data Collection and Analysis

This third step of the project was envisioned to develop additional information about commercial entities operating in the DTR Corridor, and to report on the current condition and future trends of key industries. These include the government contracting industry, the financial services industry, construction, and information

technology. The goal of this analysis was to identify major Department of Defense (DOD) contractors with substantial operations in the corridor and assess the potential impact of slower growth in federal spending. A second objective was to determine the potential impact of Base Realignment and Closure (BRAC) activities in the metropolitan area with regard to the relocation of government organizations from the DTR Corridor.

Report Findings

This report is the final product of the study. We used a *national-regional-small area* hierarchy to examine the data and trends affecting business and economic activities in the DTR Corridor, with the goal of providing economic and demographic analysis useful for comparison purposes.

The findings section reports the results of the analysis within the original framework of five questions:

- What are the forecast and trends of commercial, residential, and industrial/flex real estate in the DTR Corridor?
- What is the potential impact of BRAC activities on DTR Corridor traffic?
- What is the prospect for growth in the government contracting industry and other key industries within the DTR Corridor?
- Have other factors had an impact on the DTR Corridor?

ASSUMPTIONS

The following basic assumptions guided this analysis.

1. The focus of the small area analysis will be Arlington, Fairfax, and Loudoun Counties, since they are contiguous to DTR and the residents and businesses within them are the primary users and benefactors of the DTR.
2. This analysis and any forecasts within the report are based on recent data sets from MWCOG and CRA, among others. Regular, periodic updates from these sources will have the impact of requiring updates or further review of these findings.
3. The configuration of the DTR facility, including toll collection capabilities, tolling zones, and the number of lanes will remain as it currently exists throughout the period reviewed in this analysis.
4. No new vehicular technology will arrive that will seriously alter the demand for automobile travel.
5. No significant change will occur in the extent to which people need to travel.
6. No local, regional, or national emergency will arise that would abnormally restrict the use of motor vehicles, or substantially alter economic activity or freedom of mobility.
7. This analysis has not assessed the impact of the potential Metrorail Project on DTR traffic.

CHAPTER 2—NATIONAL, REGIONAL, AND SMALL AREA ECONOMIC FACTORS

NATIONAL ECONOMIC FACTORS

ECONOMIC CYCLE

Recent commentary from a variety of sources differs on the state of the US economy. Some say it will slow down; others say that it has entered a recession; and still others say it will soon enter a recession. Estimates of the severity of and duration of this downward cycle vary. On a national level, increased energy prices, the ongoing housing market decline, and tightened credit from the subprime mortgage crisis and its impact on the credit markets, are among the factors that contribute to the general view that the US economy will experience a slowdown or a recession during 2008.

Those that forecast a slowdown, rather than a recession, include the UCLA Anderson School of Business and other economists. Analysts at Wells Fargo & Co. were recently quoted in a CoStar Realty Information, Inc. article, saying that "…significant job losses and a resulting increase in unemployment, a decrease in exports, and decreased business spending are the factors that will make the difference between a slowdown and recession.[1] "

Table 1, which summarizes GDP growth for the period of 2001-2007, shows that GDP growth has been slowing since 2004, a trend that is expected to continue into the first half of calendar 2008.

Year	US GDP Growth %
2001	0.75%
2002	1.60%
2003	2.51%
2004	3.64%
2005	3.07%
2006	2.87%
2007	2.20%

Table 1. US GDP Growth Rate Percentage 2001-2007.

Note: Source is BEA data; 2007 GDP annual growth rate was released on February 28, 2008.

FUEL PRICES

One factor that has a potential impact on the national economy as well as a potential impact on traffic within the DTR Corridor is the level of fuel prices and the rate those prices are changing. In this section on national trends, we consider the impact of the increasing oil price per barrel, which increased from approximately $65 per barrel at the start of 2007 to just under $100 per barrel at year end.

Figure 1 below is a 36-month average retail fuel price chart prepared from www.gasbuddy.com data. This comparison includes the average US price, the average Virginia and Washington, DC price, and the price per barrel. As indicated by the graph, Morgan Stanley estimated that as of January 2008 only half of this cost had shown up at the pump: "…that 30 cents per gallon increase has cost consumers $39 billion in annualized discretionary spending power; full escalation…would hammer consumer wherewithal at a time when soaring food costs are also draining spending power, jobs are slipping, consumer lenders are cautious, and household wealth is under pressure."[2]

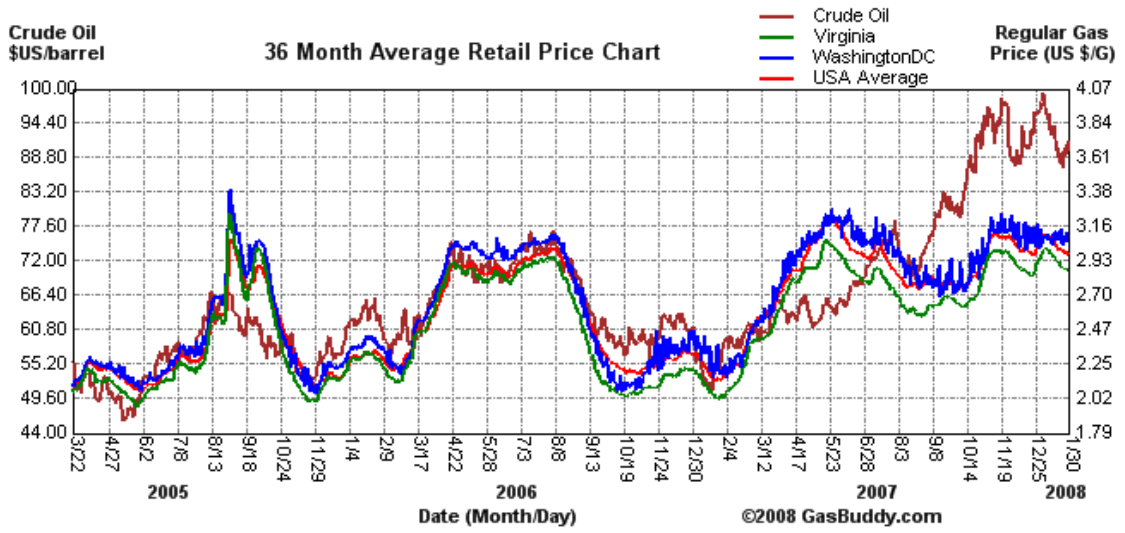

Figure 1. Comparing the US average retail price per gallon, Virginia average retail price per gallon, Washington, DC average retail price per gallon, and the crude oil price per barrel.

In its 2007 annual report to investors, Integra Realty Resources, Inc. (IRR) estimated that each $10 increase in the price per barrel produces a negative impact of 0.4% on GDP growth. The price increases experienced in 2007 potentially could create a drag of 1.4% on growth as the full impact of the price increase is felt.[3]

HOUSING MARKET DECLINE

During the five years ending in 2005, the housing market was a top economic performer, both nationally and within the Northern Virginia region. During that timeframe, rapid house price appreciation supported economic growth by powering consumer spending by homeowners. Since 2005, slowing sales and smaller price increases, as well as price declines in many areas, have contributed to a slower pace of business growth throughout the country.

As the inventory of unsold homes grows and approaches nine months of housing demand, two factors will impact the national economy: a decrease in home construction, and slowing of consumer purchases of goods and services related to furnishing new homes.

The slowing market has resulted in lower average sales prices in many regions of the country, which puts additional pressure on the mortgage markets and other consumer lending, and has, in part, led to the current

subprime mortgage crisis. The subprime mortgage issue has resulted in repercussions ranging from significant earnings pressure on larger financial services companies, and a tightening of credit overall—affecting other sectors of the economy. As the housing inventory starts to fall and the mortgage credit market recovers, any slowdown or recession the national economy experiences will begin to ease.

TIGHTENING CREDIT

Brought on by escalating levels of bad debt among U.S. mortgage lenders as home owners defaulted on their loans, and especially within the subprime mortgage market, where borrowers tend to be higher credit risk households, tightening credit markets impact other sectors of the economy beyond the housing market. An example of the credit market's impact is limiting the capital available to business for new ventures and expansions.

Thus the consensus view appears to be that the U.S. economy will experience a slowdown, and possibly a recession in early 2008, while the housing and credit markets resolve these issues.

REGIONAL ECONOMIC FACTORS

ECONOMIC CYCLE

Turning from national issues to a regional view, in December 2007, CRA published its Washington Leading Index, a forecast of the area's economic performance for the next six to eight months. From March to October 2007, the index had declined seven months out of eight.[4] This index includes consumer expectations, initial claims for unemployment, the Help Wanted Index, and durable goods sales, which all showed a worsening condition, and residential building permits, which showed an increase.

In its discussion, CRA noted that the Washington area's economy reflected national trends that included turbulence in the financial markets, slowing housing construction and rising fuel prices, but that Washington continued to outperform the national economy. With a slowing economy since March, CRA's conclusion was for a continuing slowdown through the June to August 2008 timeframe.

Among the factors that CRA noted would contribute to an improving economy beginning in the second quarter of 2008 were the potential reduction in the inventory of unsold houses and energy price moderation. Improvement in two factors were seen as key to a recovery: the unsold house inventory, a significant factor in the slowdown preventing new housing construction starts; and the mortgage crisis , which is making it difficult for qualified buyers to purchase houses . CRA's report ends with a forecast of 2.8% growth overall in 2008, compared to a growth rate of 1.9% for the national economy.

POPULATION GROWTH

MWCOG Round 7.1 forecasts population and household growth, fueled by the region's consistent economic growth, for the Washington MSA through the year 2030. That round of estimates forecasted average growth in

population at 64,000 per year, while the number of households was forecast to grow by more than 26,000 per year. The region's population and household growth are summarized in Table 2.

According to Round 7.1 estimates, within Northern Virginia, Loudoun and Fairfax Counties will see fast growth, with Loudoun forecast to grow fastest within the MSA, increasing population by 89 percent and households by 90 percent, an average of 3.56 percent and 3.6 percent per year, respectively. Table 2 below summarizes forecast growth for the MSA.

Item	2005	2010	2015	2020	2025	2030
Population	4,986,900	5,410,400	5,778,400	6,107,700	6,372,000	6,579,800
Households	1,876,800	2,044,000	2,201,700	2,335,300	2,446,300	2,533,900

Table 2. Estimated Washington MSA population and households, from MWCOG Round 7.1.[5]

The local area analysis that follows includes a revised estimate for population and households developed by Linden Street based on the analysis included in this report. This analysis is based on MWCOG 7.1a data, and focuses on Arlington, Fairfax, and Loudoun counties, and has been prepared for the 2010, 2020, and 2030 years.

ECONOMIC GROWTH

Regional economic growth, measured in the growth of the number of jobs, is also forecast to be strong during the 2005-2030 timeframe covered in MWCOG round 7.1. In fact, MWCOG forecast that the growth in employment, summarized in Table 3, at 39 percent, will exceed the overall growth in population and households. Measured by percentage growth, Northern Virginia will fare better than the District of Columbia and Maryland suburbs, but the number of jobs added in the District will be the highest in the area.

Within the DTR Corridor area, just as with population and household growth, Fairfax and Loudoun Counties are expected to have higher than average growth among the MSA jurisdictions. MWCOG forecast that the majority of this job growth will occur in engineering, data processing, business services, and medical research.

Item	2005	2010	2015	2020	2025	2030
Employment	3,051,000	3,350,900	3,595,400	3,829,500	4,043,000	4,225,300

Table 3. Estimated Washington MSA employment, from MWCOG Round 7.1.[6]

As with the population and household growth forecasts, the following local area analysis includes a revised estimate for employment growth, based on MWCOG Round 7.1a data and using the analysis included in this report. The local area analysis focuses on Arlington, Fairfax, and Loudoun counties, and has been prepared for the 2010, 2020, and 2030 years.

STATUS OF REAL ESTATE MARKETS

This regional real estate market snapshot, as well as those that follow for the small area analysis component of this report, draw from the CoStar Industrial Report, the CoStar Office Report, annual publications from IRR, and market

reports from the National Association of Realtors (NAR), the Fairfax County Economic Development Authority, and the firms Caldwell Banker, Jones Lang LaSalle, and Grubb & Ellis, among others.

CoStar is a leading real estate market information provider, maintaining a master data base of properties nationwide. CoStar maintains information on 1.2 million properties comprising 33.6 billion square feet, and provides regularly published information about inventory, leasing, sales, and prices on a subscriber basis to real estate professionals.

IRR is a specialty real estate valuation consultant that provides annual data to assist investor decision-making. In addition to providing an annual assessment of the national market, IRR provides regional information on commercial, retail, residential, and industrial properties in the nation's largest markets. IRR uses vacancy rate trends, new construction starts, forecast absorption figures, and employment growth forecast to evaluate cyclical condition for each sector of the real estate market. The four phases of the market cycle are recovery, expansion, hypersupply, and recession, characterized by the following conditions:

Recovery	Expansion	Hypersupply	Recession
• Decreasing vacancy rates • Low new construction • Moderate absorption • Low/moderate employment growth	• Decreasing vacancy rates • Moderate/high new construction • High absorption • Moderate/high employment growth	• Increasing vacancy rates • Moderate/high new construction • Low/negative absorption • Moderate/low employment growth	• Increasing vacancy rates • Moderate/low new construction • Low absorption • Low/negative employment growth

Table 4. Real estate market cycles and their defining conditions[7].

Below, we provide regional summary data for the four-year period of 2004-2007 for each of the four real estate market segments: commercial, retail, residential and industrial. The Washington MSA includes the District of Columbia and selected suburban counties in Maryland and Virginia. Rolling averages for the average absorption, under construction, and forecast average absorption provide additional insight for these market segments.

COMMERCIAL

As summarized in Tables 5 and 6, the commercial market segment was in the recession stage of the economic cycle in both the Central Business District and Suburban District during 2004-2005, moving to Recovery and Expansion in 2006 and 2007, respectively. Comparing average absorption for the 2004-2007 timeframe to the forecast absorption for 2008-2010 suggests that a period of hypersupply is ahead, beginning as soon as 2008. The area around Dulles Airport is likely to feel the impact of the hypersupply phase most strongly, since it has experienced high construction activity of the last few years, and new deliveries will be coming to market during a period of slowing economic growth.

Central Business District

Year	Phase	Inventory (SF)	Vacancy Rate (%)	Vacancy (SF)	Average Absorption (SF)	Under Construction (SF)	Forecast Average Absorption (SF)
2007	Expansion	127,947,249	7.30%	9,384,043	(2004-2007) 2,709,761	(2008-2011) 9,694,934	(2008-2010) 1,585,667
2006	Recovery	125,798,844	7.18%	9,032,357	(2003-2006) 2,511,372	(2007-2010) 13,819,564	(2007-2009) 2,881,667
2005	Recession	104,575,770	7.50%	8,261,486	(2002-2005) 1,697,535	(2006-2009) 8,149,139	(2006-2008) 3,300,000
2004	Recession	105,000,000	7.50%	7,875,000	(2001-2004) 1,497,500	(2004-2007) 8,856,000	(2005-2007) 2,337,333

Table 5. Central Business District commercial real estate summary.

Suburban

Year	Phase	Inventory (SF)	Vacancy Rate (%)	Vacancy (SF)	Average Absorption (SF)	Under Construction (SF)	Forecast Average Absorption (SF)
2007	Expansion	267,579,685	9.84%	26,316,517	(2004-2007) 6,111,873	(2008-2011) 22,058,536	(2008-2010) 3,671,333
2006	Recovery	252,695,736	9.96%	25,160,007	(2003-2006) 6,739,660	(2007-2010) 29,902,058	(2007-2009) 4,185,000
2005	Recession	218,252,670	11.50%	25,105,971	(2002-2005) 5,070,647	(2006-2009) 17,848,937	(2006-2008) 5,061,000
2004	Recession	202,850,000	13.58%	27,538,650	(2001-2004) 2,602,500	(2004-2007) 13,723,000	(2005-2007) 4,040,000

Table 6. Suburban commercial real estate summary.

The hypersupply cycle is characterized by stable or decreasing rent rates brought on by growing inventories. A potential benefit to the DTR Corridor economy is the attractiveness of new office space to existing businesses currently located in the Central Business District or other areas in the MSA, businesses that may consider relocation to the DTR Corridor to reduce costs or for other reasons.

RETAIL

The Washington MSA retail segment has been in the hypersupply stage of the market cycle for the period 2004-2006, moving into the expansion cycle during 2007. Retail net absorption is strong, although the vacancy rate is increasing as new properties are delivered. Older properties in the region are expected to be renovated or replaced during the next few years, with a continuing emphasis on mixed-use development, and in areas of past housing growth where retail development has not kept pace.

Year	Phase	Inventory (SF)	Vacancy Rate (%)	Vacancy (SF)	Average Absorption (SF)	Under Construction (SF)	Forecast Average Absorption (SF)
2007	Expansion	138,663,195	3.23%	4,473,672	(2004-2007) 1,263,246	(2008-2011) 8,050,222	(2008-2010) 786,667
2006	Hyper-supply	109,714,910	3.10%	3,400,051	(2003-2006) 770,716	(2007-2010) 7,618,876	(2007-2009) 596,333
2005	Hyper-supply	105,937,637	3.50%	3,704,893	(2002-2005) 1,773,011	(2006-2009) 4,283,000	(2006-2008) 1,033,000
2004	Hyper-supply	111,633,300	5.80%	4,384,766	(2001-2004) 1,251,850	(2004-2007) 6,755,000	(2005-2007) 665,333

Table 7. Retail real estate summary.

RESIDENTIAL

This data focuses on multifamily residential – apartments–development and single family home sales. As with other sectors of the real estate market, the stable economy enjoyed by the Washington MSA provides insulation against major downturns because of continued population and job growth.

Multifamily residential real estate sector is in the hypersupply phase, as shown in Table 8. As a result, the sector is experiencing a tenant's market, characterized by favorable lease terms and concessions.

Year	Phase	Inventory (Units)	Vacancy Rate (%)	Vacancy (Units)	Average Net Absorption (Units)	Under Construction (Units)	Forecast Average Absorption (Units)
2007	Hyper-supply	370,888	4.73%	17,560	(2004-2007) -40	(2008-2011) 17,558	(2008-2010) 6,486
2006	Expansion	365,579	3.90%	13,899	(2003-2006) 146	(2007-2010) 29,176	(2007-2009) 7,314
2005	Expansion	361,834	4.07%	14,728	(2002-2005) 345	(2006-2009) 26,400	(2006-2008) 6,930
2004	Hyper-supply	368,000	5.07%	18,642	(2001-2004) 1,485	(2004-2007) 29,400	(2005-2007) 7,733

Table 8. Multifamily residential real estate summary.

The Northern Virginia Association of Realtors (NVAR) presented a year-end report on the condition of single family housing on December 11, 2007. The briefing highlights the changes in this market, with a nine month supply of houses on the market, with an average listing period of 99 days[8]. The average price of homes sold in Northern Virginia has been relatively stable since 2005; in 2007 the average price was $538,000, down slightly from $539,998 in 2006. The total of units sold during 2007 was approximately 18,000, down nearly 20 percent from 2006, when the total was 22,377.

Within the Northern Virginia area, three main factors appear to be affecting home sales volume and pricing: the increase in gasoline prices, which impacted commuters' choices of where to live; the subprime mortgage crisis,

which resulted in stricter mortgage guidelines and standards and impacted buyers' ability to purchase homes; and price stabilization, which affected buyers' perspective of homes as an investment.

Commenting on the housing recession, the NVAR cited foreclosure data from the U.S. Department of Housing and Urban Development, which noted that 5,800 homes in Virginia were subject to foreclosure during the summer of 2007, and 4,000 of these involved subprime loans. In Northern Virginia, these problems were concentrated in Prince William and Loudoun Counties.

INDUSTRIAL/FLEX

As summarized in Table 9, forecast absorption continues to climb during the 2008-2010, so the Industrial/Flex market sector is in the recovery stage of the market cycle. CoStar data indicates that rent rates rose for available industrial space by 2 percent during the first nine months of 2007[9]. The rates for Flex and Warehouse space were up only slightly during this period.

Year	Phase	Inventory (SF)	Vacancy Rate (%)	Vacancy (SF)	Average Absorption (SF)	Under Construction (SF)	Forecast Average Absorption (SF)
2007	Recovery	115,079,210	7.88%	9,068,474	(2004-2007) 1,050,263	(2008-2011) 959,131	(2008-2010) 2,797,333
2006	Recovery	103,814,524	8.06%	8,369,104	(2003-2006) 948,225	(2007-2010) 6,581,520	(2007-2009) 2,648,333
2005	Recovery	135,250,000	9.36%	12,663,680	(2002-2005) 780,943	2006-2009) 3,930,671	(2006-2008) 2,571,667
2004	Recovery	113,900,000	8.98%	10,222,930	(2001-2004) 1,222,930	(2004-2007) 1,185,500	(2005-2007) 2,216,667

Table 9. Industrial/Flex real estate summary.

BRAC AND FEDERAL SPENDING

BRAC

Within the MSA, the main result of the 2005 round of BRAC recommendations will be a realignment of jobs, rather than a net gain or loss of jobs. The region's two main destinations for realigned jobs are Fort Belvoir, in Fairfax County, Virginia, and Fort Meade, in Anne Arundel County, Maryland, but the region is not likely to experience significant impact from BRAC until the 2010 timeframe, as the deadline for BRAC moves approaches in 2011.

A large realignment is destined for Fort Belvoir, which was slated to gain approximately 18,500 jobs, mainly from other Northern Virginia locations in Arlington and Fairfax Counties. Of these, approximately 8,500 of the jobs will relocate to the base itself, while the remainder appears destined for excess General Services Administration (GSA) property in Springfield, Virginia. Except for the Springfield GSA site, the planned locations are not accessible to public transportation, and significant investment in transportation improvements will be needed near the base.

The main highways areas to be affected will be the Route 1 Corridor, Interstate 95 Corridor, Telegraph Road, and the southern portion of the Fairfax County Parkway. Except in the case of BRAC-affected employees currently residing in Northern Fairfax and Loudoun Counties, BRAC should have limited impact on the DTR corridor. The impact with be among employees who currently commute via the DTR and are likely to change their travel patterns, reorienting from a west to east commute to one that runs in a north to south direction, reducing or eliminating travel on the DTR.

Of more significance to the DTR Corridor is the BRAC -recommended consolidation of 8,500 employees of the National Geospatial-Intelligence Agency (NGA) from locations in Virginia, the District of Columbia, and Maryland. NGA has a large facility in Reston, within the DTR Corridor, and 30 percent of the BRAC impacted employees reside in Fairfax County. The impact to the DTR Corridor will be the reduction of the regular inbound commuters to the Reston facility. Other notable impacts are similar to those discussed above.

About 5,700 jobs from Northern Virginia, the District of Columbia, and Maryland suburbs are scheduled to relocate to Fort Meade, Maryland, including 4,300 from the Defense Systems Information Agency (DISA) in Arlington, Virginia. The majority of the DISA employees, approximately 70 percent of them, live in Northern Virginia. As in the case of the Fort Belvoir realignment, the impact to the DTR corridor is likely to be minimal, affecting the subset of DISA employees who live in Northern Fairfax and Loudoun Counties.

During MWCOG Round 6.4a, employment and transportation estimates were developed to gauge the impact from BRAC. Looking forward to 2010 and 2020, MWCOG estimated an increase of 14,506 jobs and 21,400 jobs, respectively, in Fairfax County. The impact to transportation for 2010 was estimated as reducing transit trips by 18,528, increasing total vehicle trips by 26,760, and increasing vehicle miles traveled by 73,829. In 2020, the transportation impact was estimated as a 6,097 reduction in transit trips, and an additional 84,932 vehicle trips and 133,435 vehicle miles traveled. Note that the transportation impacts include all BRAC activities in the region.

Subsequent MWCOG forecasts have included the impact of BRAC 2005. MWCOG Round 7.1a estimates are analyzed in further detail below, in the Small Area Analysis section of the report.

Thus, prospective impacts from BRAC will likely begin to be felt in late 2009 and 2010, since BRAC implementation must be completed by 2011. Construction and other preparation have begun at Forts Meade and Belvoir, but affected employees are not yet required to make a decision about moving. In the case of DISA, employees have until mid-2008 to make their decisions, so BRAC traffic impacts may be further delayed.

FEDERAL SPENDING

Much has been said about the impact of federal procurement on the economy within the Washington MSA. It is a stabilizing force that serves as a foundation for steady economic performance. GMU's CRA found that the value of federal contracts performed in the MSA grew at an average rate of 2.5 percent during the 1995-2000 timeframe, and calculated a total value of $54.5 billion in contracts performed in 2006.

The federal government procurement data base tracks contracts performed at the Congressional District level, and, since the DTR lies within the Commonwealth of Virginia, we analyzed the value of contracts performed there,

shown below. An aggregate value for the Commonwealth is provided, followed by values for Congressional Districts 8, 10, and 11, all of which are contiguous to the DTR Corridor, as shown in Figure 2.

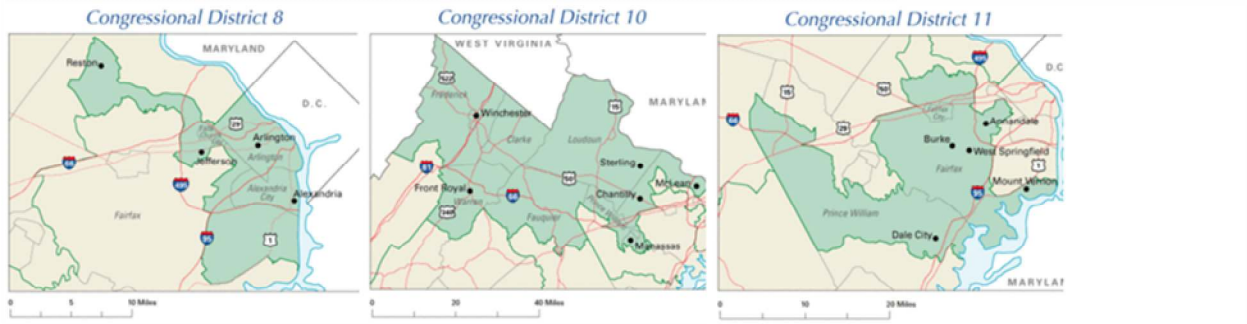

Figure 2. Maps of the 8th, 10th, and 11th Virginia Congressional Districts. [10]

Jurisdiction	GFY 2005	GFY 2006	GFY 2007
Virginia	$61,992,656,213	$63,923,496,542	$44,091,899,430
8th District (Moran)	$2,715,453,029	$7,739,707,576	$15,112,404,895
10th District (Wolf)	$1,079,343,188	$2,151,044,760	$4,868,359,645
11th District (Davis)	$713,957,765	1,664,813,738	$2,486,870,859

Table 10. Federal Contracts performed in Virginia and Northern Virginia Congressional Districts[11].

While there was a reduction in the total value of contracts performed within the Commonwealth, this spending has continued to grow in Northern Virginia. CRA forecast that during 2007-2011, MSA-wide federal contracts spending will grow at an average rate of between 1.5 to 1.9 percent[12]. Northern Virginia will continue to see the value of contracts grow, but future growth will be at a lower rate than the triple-digit growth seen during the 2005-2007 timeframe. New priorities following the 2008 elections will probably result in growth rates of five to ten percent through 2009, and continuing to trend downwards to the two to five percent range through 2012. The tables below summarize the top five contracting agencies and the top ten contractors by volume for 2007 within each Congressional District.

Agency (8th District)	2007 Procurement	Agency (10th District)	2007 Procurement	Agency (11th District)	2007 Procurement
U.S. Army (excluding Corps of Engineers)	$4,441,099,823	U.S. Air Force	$1,351,658,875	U.S. Army (excluding Corps of Engineers)	$571,531,849
Defense Logistics Agency	$1,501,526,181	U.S. Navy	$898,996,222	U.S. Navy	$551,751,560
Defense Information Systems Agency	$1,255,450,433	U.S. Army (excluding Corps of Engineers)	$873,768,690	Defense Information Systems Agency	$246,661,836
U.S. Navy	$1,008,433,815	Defense Information Systems Agency	$371,583,425	U.S. Customs Service	$214,661,836
Missile Defense Agency	$680,620,152	Federal Technology Service	$122,235,423	Federal Technology Service	$105,417,791

Table 11. Top five contracting agencies and Northern Virginia Congressional Districts[13].

Contractor (8th District)	2007 Contracts	Contractor (10th District)	2007 Contracts	Contractor (11th District)	2007 Contracts
Kemyong Farm Ltd.	$1,034,449,010	Evergreen International Airlines Inc.	$944,610,547	General Dynamics Corporation	$288,111,745
Booz Allen Hamilton, Inc.	$700,133,433	EDS Corp.	$428,862,992	Maritime Helicopter Support Company	$171,558,947
SAIC Inc.	$687,598,809	CACI International Inc.	$376,673,227	Northrup Grumman Corporation	$147,010,567
L-3 Communications Holdings, Inc.	$669,607,201	Booz Allen Hamilton Inc.	$206,195,165	AT&T Inc.	$120,838,125
Northrup Grumman Corporation	$646,383,516	Lockheed Martin Corporation	$177,743,837	Qinetiq North American Operations LLC	$111,058,828
Institute for Defense Analysis	$599,513,211	GTSI Corporation	$127,841,306	CACI International Inc.	$90,853,723
VSE Corporation	$431,725,203	Northrup Grumman Corporation	$104,835,651	Verizon Communications Inc.	$77,544,927
Mitre Corporation	$413,940,223	CSC	$102,992,621	SAIC Inc.	$67,817,181
Unisys Corporation	$389,880,348	Mantech International Corporation	$101,716,661	Lockheed Martin Corporation	$51,081,561
Raytheon Company	$319,060,483	Unisys Corportation	$98,455,708	ICF International Inc.	$51,048,758

Table 12. Top ten federal contractors by dollar value in Northern Virginia Congressional Districts[14].

SMALL AREA ECONOMIC FACTORS

Following the *national-regional-small area* hierarchy of this report, this section provides supporting analysis that is focused on the DTR Corridor. There are a number of publicly available data resources from MWCOG, CRA, CoStar and IRR that can be used to examine population growth, job creation, and other factors that may impact the DTR Corridor. The analysis that follows reviews these items seeking insight on future population and economic growth within the DTR Corridor.

Loudoun, Fairfax, and Arlington Counties are immediately contiguous to the DTR Corridor. MWCOG has identified Regional Activity Centers (RAC) within the counties, and uses Traffic Analysis Zones (TAZ) as a second approach for geographic division. Finally, CoStar has identified markets and submarkets that align to these approaches. All of these sources will be used in the small area analysis.

Due to variations in how these sources report data, Linden Street has grouped the data by county. Table 13 shows the logic we have used to organize and associate the MWCOG RAC and TAZ data and the CoStar data to the three counties. For reference, a map of the DTR Corridor showing the toll road and contiguous TAZs appears on the next page as Figure 3. Also, during January 2008, MWCOG published a small area analysis report on traffic growth

based on MWCOG Round 7.1a data. MWCOG provided the raw data that formed the basis of the January 2008. Linden Street has provided a summary of that data in the Annex to this report.

County	MWCOG RAC	MWCOG TAZ	CoStar Submarket
Arlington	Ballston/Virginia Square, Clarendon/Court House, Crystal City, Pentagon City, Ronald Reagan Washington National Airport, Rosslyn, The Pentagon	1,230-1,311	Ballston, Clarendon/Courthouse, Crystal City, Pentagon City, Rosslyn, Virginia Square
Fairfax	Baileys Crossroads/Skyline, Beltway South, City of Fairfax/GMU, Dulles Corner, Dulles East, Dulles West, I-95 Corridor/Engineer Proving Ground, Merrifield/Dun Loring, Reston East, Reston West, Tysons Corner	1,400-1,755	Annandale, Fairfax Center, Fairfax City, Falls Church, Great Falls, Herndon, McLean, Merrifield, Oakton, Reston, Route 28 Corridor South, Tysons Corner, Vienna
Loudoun	Corporate Dulles, Downtown Leesburg, Route 28 North, Washington Dulles International Airport	1,780-1,905	Leesburg/West Loudoun, Route 28 Corridor North, Route 7 Corridor

Table 13. Organizing matrix of County, MWCOG RAC and TAZ, and CoStar Submarket information.

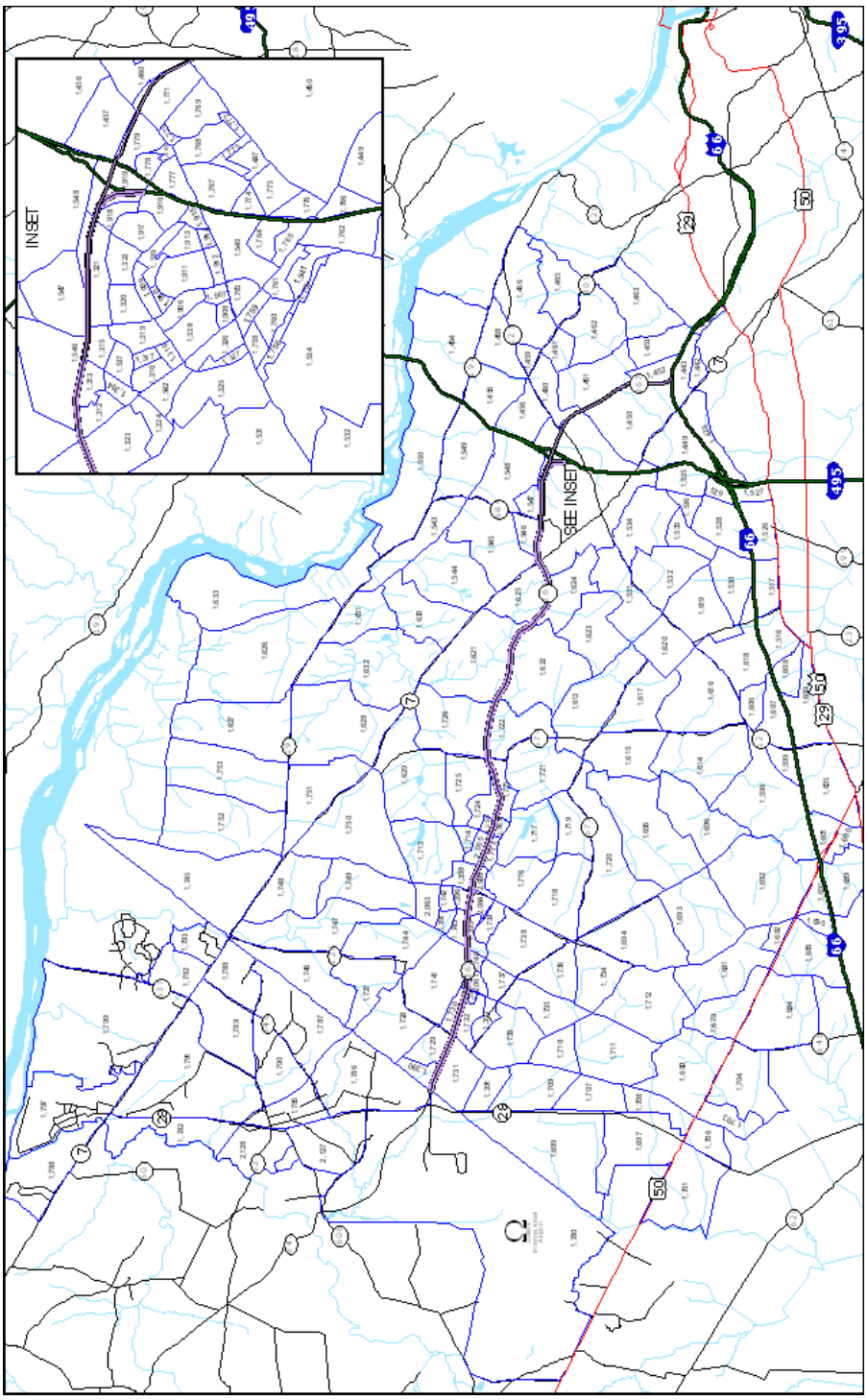

Figure 3. Map of the DTR Corridor Showing Contiguous TAZs.

MWCOG outlines five types of RACs: DC Core, Mixed-Use Centers, Employment Centers, Suburban Employment Centers, and Emerging Employment Centers. A description of each type, along with employment and residential criteria, are included in Table 14 below. The designation of each of the RACs listed above is included in the County discussions that follow the table.

RAC Type	MWCOG Description	Employment Criteria	Residential Criteria
DC Core	Primary focal point of Metropolitan Washington, comprised of major centers within the District of Columbia.	Not Applicable (N/A)	N/A
Mixed-Use Centers	Generally urban in character, areas up to two square miles that contain either a dense mix of retail, employment and residential activities or significant levels of employment and housing. Accessible by transit or commuter rail and by major highways.	Greater than 15,000 jobs and greater than 25 jobs per acre in 2025.	Greater than 10 units per acre.
Employment Centers	Higher-density areas up to 3.5 square miles that contain significant concentrations of employment. Generally urban or becoming more urban in character.	Greater than 20,000 jobs and greater than 30 jobs per acre in 2025.	N/A
Suburban Employment Centers	More dispersed, lower-density areas, less than 6 square miles.	Greater than 15,000 jobs and greater than 10 jobs per acre in 2025.	N/A
Emerging Employment Centers	Rapidly developing "campus-style" suburban employment areas less than 6 square miles in total area.	Greater than 15,000 jobs in 2025, and greater than 50 percent job growth between 2000 and 2025 or less than 50 percent commercial build out in 2025.	N/A

Table 14. Types of MWCOG RACs.

ARLINGTON COUNTY

Arlington County is located east of the DTR Corridor. It is an urban area located within the Capital Beltway and is also referred to as an inner suburb of Washington, DC. Population, job growth, and real estate market information is summarized below.

In MWCOG Round 7.0, seven RACs were identified within Arlington County, including Ballston/Virginia Square, Clarendon/Court House, Crystal City, Pentagon City, Ronald Reagan Washington National Airport, Rosslyn, and the Pentagon. The Pentagon is categorized as a regional employment center, while Reagan National Airport is a regional airport center that handles an estimated 18.5 million passengers annually. The other RACs are categorized as mixed-use centers. Arlington National Cemetery is a cultural and historical attraction that attracts 4 million visitors annually, based on MWCOG estimates.

POPULATION GROWTH

The Washington MSA has high rates of migration from other parts of the country as well as international immigration. With a strong regional economy, the entire region will see growth over the 2005-2030 timeframe. Higher percentage growth will take place in the outer suburbs, but Arlington County is expected to grow by 22 percent over this period.

MWCOG round 7.1a estimates for population growth and households in Arlington County are summarized below, along with an adjusted estimate that was prepared based on the factors identified in this report. For Arlington County, the MWCOG Round 7.1a estimated growth rates for each TAZ has been reduced by up to 20 percent for the 2005-2010 period. The MWCOG estimated growth rate for the 2010-2020 period was reduced by up to 10 percent, for Arlington County TAZs, while there was no adjustment for the 2020-2030 period. This estimating approach was designed to take into account the slowing overall economic conditions prevalent at the current time, and an estimated recovery period that will extend into the early part of the next decade.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Population	217,228	214,058	235,846	230,240	242,493	236,607
Households	103,038	101,166	114,261	110,848	117,807	114,210

Table 15. Comparison of MWCOG Round 7.1a estimates with adjusted estimates for Arlington County population and household growth.

Source: Data for Table 15 and for those that follow discussing MWCOG Round 7.1a provided by MWCOG.

The data for MWCOG Round 7.1a includes an in- depth look at growth estimates for population and households in the 82 TAZs enumerated 1,230 to 1,311, summarized at five-year intervals. A summary of the population and household data at ten-year intervals is included in the two tables below.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Population Growth	---	---	18,618	16,182	6,647	6,367
Largest TAZ (count)	10,716	10,515	12,129	11,763	12,244	11,875
Smallest TAZ	5	5	5	5	7	6
Median TAZ	2,086	2,084	2,226	2,131	2,250	2,138

Table 16. Comparison of MWCOG Round 7.1a and adjusted estimates for Arlington County population growth.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Households Growth	---	---	11,223	9,682	3,546	3,362
Largest TAZ (count)	5,655	5,433	6,117	5,873	6,233	6,009
Smallest TAZ	1	1	1	1	1	1
Median TAZ	871	870	981	934	1,104	954

Table 17. Comparison of MWCOG Round 7.1a and adjusted estimates of Arlington County household growth.

ECONOMIC GROWTH

Northern Virginia is expected to continue its track record of strong employment growth during the 2005-2030 timeframe. MWCOG estimated that employment growth will be higher during the 2005-2010 timeframe, with main growth sectors being service industries, such as engineering, computer and data processing, business services, and medical research. Northern Virginia is anticipated to outpace the District of Columbia and Maryland.

Round 7.1a incorporates the impact of BRAC in all Washington MSA jurisdictions. Employment in Arlington County is projected to continue growing through 2030, as highlighted below.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Employment	215,442	211,328	241,856	233,944	258,449	249,907

Table 18. Comparison of MWCOG Round 7.1a and adjusted estimates of Arlington County employment count.

The data for MWCOG Round 7.1a includes an in-depth look at growth estimates for employment in the 82 TAZs enumerated 1,230 to 1,311, summarized at five-year intervals. A summary of the population and household data is included in the table below. Impacts from BRAC 2005 have been incorporated in the 2010-2020 interval.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Employment Growth	---	---	26,413	22,616	16,593	15,963
Largest TAZ (count)	21,597	21,597	21,022	20,882	22,998	21,792
Smallest TAZ	0	0	0	0	0	0
Median TAZ	826	824	917	917	917	917

Table 19. Comparison of MWCOG Round 7.1a and adjusted summary of Arlington County employment growth.

COMMUTING FROM ARLINGTON COUNTY

While the scope of this report is focused on the business and demographic factors related to population, household, and employment growth in the counties contiguous with the DTR Corridor, our research included a review of data from previous MWCOG Rounds. A commuting study from a previous MWCOG Rounds calculated that workers comprise approximately 58 percent of the population of Arlington County. Of these, about 30 percent work in the county, and 69 percent commute elsewhere to work. A subset of these, about 20 percent, commutes to Fairfax County, Fairfax City, or Loudoun County, destinations that are conducive to DTR commuting. For comparative purposes, the previous commuting ratios have been applied to the population estimates from this report. Table 20 provides an analysis resulting in the estimated number of commuter trips generated by Arlington County residents, and the prospects for growth through 2030, using MWCOG Round 7.1a and adjusted estimates.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Population	217,200	214,058	235,800	230,240	242,500	236,607
Workers	116,048	114,369	125,986	123,015	129,566	126,417
Live/Work in Arlington	34,380	33,882	37,324	36,444	38,384	37,417
Commute/non-DTR	57,130	56,303	62,022	60,559	63,784	62,234
Commute to DTR Destinations	22,750	22,421	24,698	24,116	25,400	24,783
Ten-year Net Increase (Count)	---	---	2,277	1,695	1,284	667
Ten-Year Net Increase (Percentage)	---	---	10.16%	6.86%	5.32%	2.63%

Table 20. Analysis of Arlington County worker DTR commuting.

STATUS OF REAL ESTATE MARKETS

COMMERCIAL

There are two primary areas within the commercial property sector in Arlington: the Crystal City/Pentagon City area in South Arlington, and the densely developed, mixed use area known as the Rosslyn-Ballston Corridor. As a whole, Arlington enjoys steady employment and population growth that is constrained by its density. Vacancy rates are typically low in Arlington because of its access to the Central Business District, good public transportation, and proximity to the regional activity centers above.

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Ballston	37	6,847,465	403,503	480,591	7.0%	266,990	247,436	177,046
Clarendon/ Courthouse	59	5,525,353	429,306	558,720	10.1%	-79,384	0	0
Crystal City	42	11,300,092	1,809,023	1,899,419	16.8%	-101,332	0	0
East Falls Church	38	801,857	20,121	20,121	2.5%			
Pentagon City	6	1,449,379	0	0	0%	0	0	0
Rosslyn	44	8,002	465,882	540,066	6.7%	-5,874	0	633,000
Virginia Square	25	1,547,008	145,050	150,703	9.7%	-2,047	93,712	0
Total	251	27,479,156	3,272,885	3,649,620	13.28%	91,162	341,148	810,046

Table 21. Arlington commercial real estate summary.

RETAIL

The factors that have made Arlington an attractive business and residential location have also contributed to its attractiveness as a site for retail development. Tables 22 and 23 summarize the state of the retail market.

Name	SF
Fashion Center at Pentagon City	819,950
Potomac Yard Center	589,856
Ballston Common Mall	580,000
Total	1,989,806

Table 22. Largest retail properties in Arlington.

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Ballston	8	657,918	15,500	15,500	2.4%	-3,500	0	0
Clarendon/ Courthouse	56	1,234,840	93,779	93,779	7.6%	-32,602	0	0
Crystal City	5	2,150,478	3,005	3,005	0.1%	0	0	0
East Falls Church	103	845,300	14,401	17,201	2.0%	12,935	0	5,460
Pentagon City	4	2,288,640	6,359	6,359	0.3%	-4,276	0	0
Rosslyn	5	38,408	0	0	0.0%	3,500	0	0
Virginia Square	8	97,578	0	0	0.0%	2,446	0	0
Total	189	7,313,162	133,044	135,844	1.86%	-21,497	0	5,460

Table 23. Arlington retail real estate summary.

RESIDENTIAL

With forecast population growth of 22 percent through 2030, this dense area will continue to require residential development. Most recently completed projects are mixed-use, featuring a combination of residential, commercial, and retail square footage. Table 24 summarizes ten projects underway in Arlington, according to Arlington County Economic Development Authority.

Submarket	Project Name	Size
Ballston	Liberty Center	469 units
Ballston	800/900 Glebe Road	24 townhomes
Courthouse	The Park at Courthouse	571 units
Crystal City	The Camden/The Eclipse	865 units
Crystal City	The Concord	412 units
East Falls Church	Easton	205 single family homes
Pentagon City	Two Metropolitan Park	308 units
Rosslyn	Turnberry Tower	337 units
Rosslyn	Waterview	185 units, plus hotel
Virginia Square	The Hawthorne	143 units

Table 24. Selected residential projects in Arlington.

INDUSTRIAL/FLEX

There is a traditional industrial and warehouse area in South Arlington, along the Potomac River and a former railroad marshalling yard that is currently being redeveloped. With competition for open land very high in this dense urban region, potential development for industrial real estate uses is limited. Table 25 provides a summary of this sector in Arlington.

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Arlington County Industrial	12	218,274	12,000	12,000	5.5%	-13,778	0	0
Crystal City Industrial	16	1,097,462	54,567	54,567	5.0%	50,562	0	0
Total	28	1,315,736	66,567	66,567	5.1%	36,784	0	0

Table 25. Arlington industrial real estate summary.

FAIRFAX COUNTY

Fairfax County is a suburban area within the Washington MSA, bisected by major highways including the DTR, which lies within the county. The Capital Beltway runs through the county from north to south. It is a fast growth area that includes *edge cities* such as Tysons Corner and Fairfax City. Population, job growth, and real estate market information is summarized below.

In MWCOG Round 7.0, eleven RACs were identified within Fairfax County, including Baileys Crossroads/Skyline, Beltway South, City of Fairfax/GMU, Dulles Corner, Dulles East, Dulles West, I-95 Corridor/Engineer Proving Ground, Merrifield/Dunn Loring, Reston East, Reston West, and Tysons Corner. The Baileys Crossroads/Skyline RAC is identified as a mixed-use center. Herndon, Merrifield/Dunn Loring, and Reston East and West are identified as employment centers, and Beltway South, Dulles Corner, Dulles East, Dulles West, and I-95 Corridor/Engineer Proving Ground are identified as suburban employment centers.

Three colleges and university centers are located in Fairfax County: George Mason University, with 29,728 enrolled; Northern Virginia Community College/Annandale, with 26,655 enrolled; and the Northern Virginia Center of the University of Virginia/Virginia Tech, with 9,111 enrolled, according to MWCOG.

Historical and cultural attractions include the Steven F. Udvar-Hazy Center, attracting approximately 1 million visitors annually; Mount Vernon, also attracting approximately 1 million visitors; and the Wolf Trap National Park for the Performing Arts, attracting 554,000 visitors per year.

POPULATION GROWTH

The Washington MSA has high rates of migration from other parts of the country as well as international immigration. With a strong regional economy, the entire region will see growth over the 2005-2030 timeframe. Higher percentage growth will take place in the outer suburbs, but Fairfax County, which has been one of the fastest growing counties in the United States in recent years, will also see significant growth.

MWCOG round 7.1a estimates for population growth and households in Fairfax County are summarized below, along with an adjusted estimate that was prepared based on the factors identified in this report. For Fairfax County, the MWCOG Round 7.1a estimated growth rates for each TAZ has been reduced by up to 20 percent for the 2005-2010 period. The MWCOG estimated growth rate for the 2010-2020 period was reduced by up to 10 percent, for Fairfax County TAZs, while there was no adjustment for the 2020-2030 period. This estimating approach was designed to take into account the slowing overall economic conditions prevalent at the current time, and an estimated recovery period that will extend into the early part of the next decade.

Item	Jurisdiction	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Population	Fairfax County	1,171,296	1,152,406	1,319,111	1,283,634	1,375,912	1,337,307
Households	Fairfax County	426,019	418,982	479,218	466,298	500,121	485,997

Table 26. Comparison of MWCOG Round 7.1 and adjusted estimates of Fairfax County population and household growth.

The data for MWCOG Round 7.1a includes an in-depth look at growth estimates for population and households in the 356 TAZs enumerated 1,400 to 1,755, summarized at five-year intervals. A summary of the population and household data, in ten-year intervals, is included in the two tables below.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Population Growth	---	---	147,815	131,266	56,801	53,673
Largest TAZ (count)	15,353	15,335	15,766	15,706	17,300	15,830
Smallest TAZ	0	0	0	0	0	0
Median TAZ	2,714	2,633	3,082	3,003	3,200	3,084

Table 27. Comparison of MWCOG Round 7.1a and adjusted estimates of Fairfax County population growth data.

Source: Data for Table 27 and for those that follow discussing MWCOG Round 7.1a provided by MWCOG.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Households Growth	---	---	53,199	47,316	20,903	19,699
Largest TAZ (count)	5,747	5,486	6,437	5,854	7,442	6,591
Smallest TAZ	0	0	0	0	0	0
Median TAZ	959	948	1,069	1,048	1,098	1,080

Table 27. Comparison of MWCOG Round 7.1a and adjusted estimates of Fairfax County household growth data.

ECONOMIC GROWTH

Northern Virginia is expected to continue its track record of strong employment growth during the 2005-2030 timeframe. Estimated employment growth will be higher during the 2005-2010 timeframe. According to MWCOG estimates in Round 7.1, within the Washington MSA the main growth sectors will be in service industries, such as engineering, computer and data processing, business services, and medical research. Northern Virginia is anticipated to outpace the District of Columbia and Maryland.

Round 7.1a incorporates the impact of BRAC in all Washington MSA jurisdictions. Fairfax County will continue to add high numbers of new jobs between 2005 and 2030, as highlighted below.

Jurisdiction	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Fairfax County	726,660	709,869	835,258	803,576	907,211	871,730

Table 28. Comparison of MWCOG Round 7.1a and adjusted estimates of Fairfax County employment growth.

The data for MWCOG Round 7.1a includes an in -depth look at growth estimates for employment in the 356 TAZs enumerated 1,400 to 1,755, summarized at five-year intervals. A summary of the population and household data, summarized at ten-year intervals, is included in the table below.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Employment Growth	---	---	108,598	93,707	71,593	68,154
Largest TAZ (count)	18,440	18,151	23,122	21,417	28,966	26,830
Smallest TAZ	10	10	10	10	11	11
Median TAZ	775	768	841	823	877	849

Table 29. Comparison of MWCOG Round 7.1a and adjusted estimates summary of Fairfax County employment growth data.

COMMUTING FROM FAIRFAX COUNTY

While the scope of this report is focused on the business and demographic factors related to population, household, and employment growth in the counties contiguous with the DTR Corridor, our research included a review of data from previous MWCOG Rounds. A commuting study from a previous MWCOG Rounds calculated that workers comprise approximately 51 percent of the population of Fairfax County. Of these, about 53 percent work in the county, and 47 percent commute elsewhere to work. A subset of these, about 27 percent, commutes to Loudoun County, Arlington, or the District of Columbia, destinations that are conducive to DTR commuting. Additionally, we have estimated that 10 percent of Fairfax County's resident employees commute via the DTR.

For comparative purposes, the previous commuting ratios have been applied to the population estimates from this report. Table 30 provides an analysis resulting in the estimated number of commuter trips generated by Fairfax County residents, and the prospects for growth through 2030, using MWCOG Round 7.1a and adjusted estimates.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Population	1,171,296	1,152,406	1,319,111	1,283,634	1,375,912	1,337,307
Workers	591,856	582,311	666,547	648,620	725,381	705,028
Live/Work in Fairfax County	312,026	306,994	351,403	341,953	382,421	371,691
Commute/non-DTR	120,916	118,966	136,176	132,513	148,195	144,037
Commute to DTR Destinations	158,913	156,350	178,968	174,155	194,765	189,300
Resident Commuters on DTR	59,186	58,231	66,655	64,862	72,528	70,503
Ten-year Net Increase (Count)	---	---	27,524	24,435	21,680	20,786

Ten-year Net Increase (Percentage)	---	---	12.83%	9.95%	9.07%	7.78%

Table 30. Analysis of Fairfax County worker DTR commuting.

STATUS OF REAL ESTATE MARKETS

COMMERCIAL

Within the Washington MSA, Fairfax County is typically characterized by economic and population growth. The analysis below includes independent cities that are located within the county. With nearly 100 million square feet of commercial real estate, another 4 million is under construction. While the transportation network is extensive, it is characterized by high use, both because of the concentration of commercial real estate, employers, and residential areas, and because it lies on the route between outer areas, the CBD, and inner suburbs.

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Fairfax Center	65	6,894,206	549,181	860,923	12.5%	-371,584	0	0
Fairfax City	149	4,201,517	357,045	381,227	9.1%	-20,656	97,387	45,306
Falls Church	101	2,433,567	395,864	397,382	16.3%	46,936	0	32,000
Great Falls	8	198,187	2,166	2,166	1.1%	-816	0	0
Herndon	154	11,307,077	1,580,513	1,732,127	15.3%	138,213	632,185	812,185
McLean	97	1,888,262	92,373	107,368	5.7%	11,568	0	0
Merrifield	102	8,826,693	401,736	522,723	5.9%	-98,472	0	206,047
Reston	188	16,884135	1,401,335	1,615,073	9.6%	157,218	165,355	1,232,831
Route 28 Corridor South	147	11,328,836	2,110,313	2,167,304	19.1%	680,273	1,469,586	911,014
Route 29/I-66 Corridor	87	2,548,393	374,090	388,043	15.2%	129,967	226,081	261,271
Route 7 Corridor	56	3,671,542	496,489	547,852	14.9%	105,115	152,641	463,146
Tysons Corner	205	27,504,999	2,400,005	2,853,066	10.4%	-241,281	0	323,698
Vienna	66	1,737,809	233,468	243,792	14.0%	9,041	0	0
Total	1,425	99,425,223	10,394,578	11,819,046	11.89%	545,522	2,743,235	4,287,498

Table 31. Fairfax County commercial real estate summary.

RETAIL

Fairfax County's growing population and employment make it a desirable location for retail development, as summarized in the two tables below, which highlight the larger retail properties and summarize the state of the retail real estate market.

Name	SF
Tysons Corner Center	2,100,000
Springfield Mall	1,700,000
Fair Oaks Shopping Center	1,600,000
Fair Lakes Center	882,869
Tysons Galleria	820,886
Seven Corners Center	560,998
Total	7,664,753

Table 32. Fairfax County retail facilities with over 500,000 square feet.

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Fairfax Center	22	4,186,132	64,820	116,137	2.8%	-1,483	0	0
Fairfax City	47	2,490,111	40,250	40,250	1.6%	-13,659	0	17,000
Falls Church	48	1,825,405	135,162	135,162	7.4%	-4,225	62,000	21,000
Great Falls	8	200,434	4,065	4,065	2.0%	11,448	0	0
Herndon	30	1,085,155	42,023	42,023	3.9%	142,343	156,000	0
McLean	64	692,985	1,045	1,045	0.2%	3,805	0	0
Merrifield	23	791,891	85,310	85,310	10.8%	-49,579	4,378	0
Reston	27	1,550,920	37,406	38,556	2.5%	3,975	0	0
Route 28 Corridor South	60	3,353,790	69,015	71,015	2.1%	3,625	0	0
Route 29/I-66 Corridor	64	5,087,759	151,730	151,730	3.0%	110,126	178,510	1,116,786
Route 7 Corridor	17	818,238	31,662	31,662	3.9%	144,340	150,494	166,000
Tysons Corner	97	5,873,739	36,350	38,850	0.7%	-18,550	0	0
Vienna	24	678,340	4,925	4,925	0.7%	-3,460	0	5,725
Total	531	28,634,899	703,763	760,730	2.66%	328,706	551,382	1,326,511

Table 33. Fairfax County retail real estate summary.

RESIDENTIAL

Fairfax County has traditionally been a fast growth location within the Washington MSA, and MWCOG Round 7.1 forecasted that growth would continue through 2030, with 37 percent growth in this area. The area is desirable because of good schools, accessible transportation, and a convenient location with proximity to employment centers in the county itself, the central business district, and other parts of the MSA. The following is a summary of the residential communities contiguous or accessible from the DTR Corridor, as described on the Fairfax County EDA website[15]:

- Centreville: Located close to Washington Dulles International Airport, Ellanor C. Lawrence Park and Fair Oaks Mall, Centreville offers a blend of the old and the new with an historic district, modern homes, new shopping areas, and a view of the Blue Ridge Mountains.

- Fairfax Station: This secluded community is located east of Clifton near Burke Lake Park in an area featuring rolling hills and wooded countryside. It includes many new subdivisions with custom-designed homes.
- Great Falls: An area of large homes and lots, Great Falls is located along the Potomac River, next to scenic Great Falls National Park and near Tysons Corner. It includes wooded lots, winding roads, riding trails, an equestrian center, country clubs, and a small village center with restaurants and shopping.
- Town of Herndon: Located along the Dulles Toll Road, this community includes an historic town center with older homes as well as newer homes and commercial developments.
- McLean: Located near Tysons Corner and Great Falls and only eight miles from Washington, D.C., McLean features large, custom-designed homes, multi-million dollar estates, and smaller, more traditional homes. It also includes its own business center with boutiques, restaurants, gourmet food stores and a community center that is home to the Fairfax Symphony.
- Oakton: Oakton, which features a variety of housing, is located only 13 miles west of Washington, D.C., and is close to shopping, I-66, and the Vienna Metro station.
- Reston: One of the nation's best known planned communities, this lush, wooded area is located along the Dulles Toll Road. It features a broad variety of housing, extensive retail centers, trails, lakes, golf courses, and other recreational facilities.
- Tysons Corner: The "downtown" of Fairfax County, this urban area near the Dulles Toll Road, Capital Beltway and I-66 features high-rise apartments, condominiums and townhouses conveniently located among shopping malls and office centers.
- Town of Vienna: This residential community located near Tysons Corner boasts a small-town atmosphere, its own central business district, and convenient access to Washington, D.C. via the Vienna Metro station. In 2005 Vienna was named one of the best places to live in the U.S. by Money Magazine.

INDUSTRIAL/FLEX

Fairfax County has a large inventory of industrial real estate that has been developed and is maintained because of the county's transportation network and proximity to business and population centers in the Washington MSA. Like other areas in the MSA, this real estate sector is currently in a recovery mode, featuring decreasing vacancy rates, low new construction, and moderate absorption. The sector is summarized in Table 34, below:

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Chantilly/ Fairfax	29	669,452	19,600	19,600	2.9%	-1,900	0	0
Falls Church/ Baileys	38	700,752	33,910	33,910	4.8%	-21,450	0	0
Herndon	34	401,386	10,898	10,898	2.7%	6,102	0	0
1-395 Corridor	99	3,967,925	266,106	266,106	7.1%	64,024	0	0
Merrifield	81	2,164,643	67,607	78,937	3.6%	24,369	0	0
Oakton/ Vienna	17	332,518	19,750	19,750	5.5%	-50	0	0
Reston	19	1,233,982	35,704	45,462	3.7%	-10,608	0	0
Route 28/ Dulles South	194	11,179,844	1,221,494	1,350,940	12.1%	-84,327	194,193	57,840

Route 29/I-66 Corridor	171	8,120,392	564,083	618,026	7.6%	-171,687	11,210	787,607
Springfield	145	9,277,563	365,370	490,977	5.3%	100,015	42,086	5,200
Tysons Corner/ McLean	21	971,557	72,688	72,688	7.5%	10,800	0	0
Total	848	39,020,014	2,677,210	3,007,294	7.71%	-84,712	247,489	850,647

Table 34. Fairfax County industrial/flex real estate summary.

LOUDOUN COUNTY

Loudoun County is located west of the DTR Corridor. It is considered an outer suburb within the Washington MSA. The Dulles Greenway, a toll facility within the county, connects to the DTR, providing a continuous commuting route between Loudoun County and other destinations. Population, job growth, and real estate market information is summarized below.

In MWCOG Round 7.0, four RACs were identified within Loudoun County, including Corporate Dulles, Downtown Leesburg, Route 28 North, and Washington Dulles International Airport. Washington Dulles is a regional airport center that handles an estimated 23 million passengers annually. Corporate Dulles and Downtown Leesburg were classified as suburban employment centers, while the Route 28 North area was categorized as an emerging employment center.

The Northern Virginia Community College Loudoun Campus is located here with enrollment of 9,620. No cultural or historic resources were identified as being located in Loudoun County.

POPULATION GROWTH

The Washington MSA has high rates of migration from other parts of the country as well as international immigration. With a strong regional economy, the entire region will see growth over the 2005-2030 timeframe. Higher percentage growth will take place in the outer suburbs, including Loudoun County.

MWCOG round 7.1a estimates for population growth and households in Loudoun County are summarized below, along with an adjusted estimate that was prepared based on the factors identified in this report. For Loudoun County, the MWCOG Round 7.1a estimated growth rates for each TAZ has been reduced by up to 40 percent for the 2005-2010 period. The MWCOG estimated growth rate for the 2010-2020 period was reduced by up to 20 percent, for Loudoun County TAZs, while there was no adjustment for the 2020-2030 period. This estimating approach was designed to take into account the slowing overall economic conditions prevalent at the current time, and an estimated recovery period that will extend into the early part of the next decade.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Population	301,129	279,619	409,908	354,936	468,544	403,982
Households	106,301	98,771	146,031	126,375	165,872	143,068

Table 35. MWCOG Round 7.1 estimates of Loudoun County population and household growth.

A summary of the population and household data is included in two tables below.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Population Growth	---	---	108,779	75,317	58,636	49,046
Largest TAZ (count)	14,098	14,024	19,142	14,591	21,282	15,712
Smallest TAZ	0	0	0	0	0	0
Median TAZ	833	732	1,200	1,000	1,567	1,397

Table 36. MWCOG Round 7.1a summary of Loudoun County population growth data.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Ten-Year Households Growth	---	---	39,730	27,604	19,841	16,693
Largest TAZ (count)	4,995	4,960	7,183	5,242	8,232	6,008
Smallest TAZ	0	0	0	0	0	0
Median TAZ	279	256	396	348	506	447

Table 37. MWCOG Round 7.1a summary of Loudon County household growth data.

ECONOMIC GROWTH

Northern Virginia is expected to continue its track record of strong employment growth during the 2005-2030 timeframe. Estimated employment growth will be higher during the 2005-2010 timeframe. According to MWCOG estimates in Round 7.1a, within the Washington MSA the main growth sectors will be in service industries, such as engineering, computer and data processing, business services, and medical research. Northern Virginia is anticipated to outpace the District of Columbia and Maryland.

Round 7.1a incorporates the impact of BRAC in all Washington MSA jurisdictions, including Loudoun County, where the impact from BRAC will be minimal.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Employment	166,865	152,248	241,324	204,174	290,749	243,779

Table 38. MWCOG Round 7.1a estimates of Loudoun County employment growth.

The data for MWCOG Round 7.1a includes an in-depth look at growth estimates for employment in the 126 TAZs enumerated 1,780 to 1,905, summarized at five-year intervals. A summary of the employment data, at ten-year intervals, is included in the table below. Impacts from BRAC 2005 are evident in the 2010-2020 interval.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Five-Year Employment Growth	---	---	74,459	51,296	49,425	39,605
Largest TAZ (count)	15,980	15,413	18,592	16,922	20,794	18,717
Smallest TAZ	8	8	11	11	14	14
Median TAZ	165	139	254	212	303	244

Table 39. MWCOG Round 7.1a summary of Loudoun County employment growth data.

COMMUTING FROM LOUDOUN COUNTY

While the scope of this report is focused on the business and demographic factors related to population, household, and employment growth in the counties contiguous with the DTR Corridor, our research included a review of data from previous MWCOG Rounds. A commuting study from a previous MWCOG Rounds calculated that workers comprise approximately 37 percent of the population of Loudoun County. Of these, about 42 percent work in the county, and 58 percent commute elsewhere to work. A subset of these, about 49 percent, commutes to Fairfax County, Arlington County, the City of Alexandria, or the District of Columbia, destinations that are conducive to DTR commuting.

For comparative purposes, the previous commuting ratios have been applied to the population estimates from this report. Table 40 provides an analysis resulting in the estimated number of commuter trips generated by Loudoun County residents, and the prospects for growth through 2030, using MWCOG Round 7.1a and adjusted estimates.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Population	301,100	279,619	409,900	354,936	468,500	403,982
Workers	92,315	85,729	125,672	108,821	143,639	123,858
Live/Work in Loudoun	38,321	35,587	52,168	45,173	59,626	51,415
Commute/non-DTR	8,790	8,163	11,966	10,362	13,677	11,793
Commute to DTR Destinations	45,204	41,979	61,538	53,286	70,336	60,650
Net Increase (Count)	---	---	19,559	11,307	17,049	7,363
Net Increase (Percentage)	---	---	46.59%	18.37%	32.00%	10.47%

Table 40. Analysis of Loudoun County worker DTR commuting.

STATUS OF REAL ESTATE MARKETS

COMMERCIAL

Loudoun County, along with Prince William County, is one of two counties in the Washington MSA that are experiencing the most severe repercussions from the housing market downturn. The effects are far-reaching and have had an impact on other real estate market sectors. The county has two major commercial corridors, Leesburg/West Loudoun and the Route 28 Corridor North. Using the definitions above, the two corridors are currently in the recession and hypersupply phases of the market cycle.

Loudoun County has benefited from the federal contracting industry, especially from the Departments of Defense and Homeland Security. The Route 28 Corridor North is home to many area technology companies. With federal contracting expected to slow because of the 2008 election, the technology industry in a cyclical phase of slowing earnings, and the Loudoun housing market in a recession, the next year or two will likely be a difficult economic period for this area.

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Leesburg/ West Loudoun	175	1,744,300	119,253	121,618	7.0%	48,667	94,801	375,584
Route 28 Corridor North	135	7,754,978	1,075,753	1,247,097	16.1%	85,012	264,407	466,510
Total	310	9,499,278	1,195,006	1,368,715	14.41%	133,679	359,208	842,094

Table 41. Loudoun commercial real estate summary.

RETAIL

Loudoun County has been a prime development area for most of the 2000's. With forecast population and employment growth, and proximity to Washington Dulles International Airport and the Route 28 technology corridor, it is a desirable location for retail development, as summarized in the two tables below, which highlight the larger retail properties and summarize the state of the retail real estate market.

Name	SF
Dulles Town Center	1,300,000
Dulles Town Crossing	1,200,000
Total	2,500,000

Table 42. Loudoun retail facilities with over 500,000 square feet.

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Leesburg/ West Loudoun	79	3,771,123	127,862	127,862	3.5%	-662	77,586	61,120
Route 28 Corridor North	103	8,301,405	182,560	190,194	2.3%	140,427	197,414	1,864,876
Total	182	12,072,528	310,422	318,056	2.63%	139,765	275,000	1,925,996

Table 43. Loudoun retail real estate summary.

RESIDENTIAL

Loudoun County residential real estate enjoyed growth rates ranging from 6.5 percent to more than 10 percent during the 2000 to 2006 timeframe. The county forecast growth in the three to four percent range from 2007 through 2018, which coincides with the population growth forecast by MWCOG Round 7.1. A survey of new residential construction building permits revealed that construction continues in more than 50 developments. Table 44 highlights the top ten developments in terms of building permits issued in 2006.

Planning Subarea	Project Name	Size
Ashburn	Potomac Green	251 units
Ashburn	Brambelton (Ashburn section)	236 units
Ashburn	Lansdowne Village Greens	225 units
Dulles	Kirkpatrick Farms	223 units
Ashburn	Belmont	220 units
Dulles	Brambelton (Dulles section)	153 units
Dulles	Stone Ridge	124 units
Dulles	South Riding	107 units
Potomac	Cascades	103 units
Leesburg	Red Cedar	91 units

Table 44. Loudoun County large residential construction projects.

INDUSTRIAL/FLEX

Loudoun County has a large inventory of industrial real estate that has been developed and is maintained because of its proximity to Dulles Airport and the county's transportation network. Like most of the areas in the MSA, Loudoun's industrial sector is currently in a recovery mode, featuring decreasing vacancy rates, low new construction, and moderate absorption. The sector is summarized in Table 45, below:

Market	No. Bldgs	Total Rentable SF	Direct Vacancy SF	Total Vacancy SF	Vacancy %	YTD Absorption	YTD Deliveries	Under Con-struction
Leesburg	19	740,383	10,067	10,067	1.4%	4,022	0	58,271
Route 28/ Dulles North	330	17,563,969	2,611,132	2,656,672	15.1%	550,552	972,101	810,761
Total	349	18,304,362	2,621,199	2,666,739	14.57%	554,572	972,101	869,032

Table 45. Loudoun County retail real estate summary.

CHAPTER 3—SUMMARY OF FINDINGS

FORECAST AND TRENDS FOR COMMERCIAL, RETAIL, RESIDENTIAL, AND INDUSTRIAL/FLEX REAL ESTATE IN THE DTR CORRIDOR

Current Washington MSA inventories and planned deliveries indicate that capacity is available in each sector of the real estate market for expansion when the economic cycle returns to a growth phase. In recent years, planners have aligned development with MWCOG forecasts, with a larger percentage of new building taken place in western Fairfax County and Loudoun County. Coincidentally, these areas are feeling the strongest impact from the current phase of slowing economic growth, especially within the residential sector, and will continue to do so during any prospective downturn or recession.

The effect of growing infrastructure in the western portions of the DTR Corridor has the potential for positive and negative impacts for the Dulles corridor. On the positive side, inventory and capacity in these areas create a situation for attractive rent rates that can act as an incentive for closer-in businesses to locate there. If this type of relocation activity grows, it could result in additional *reverse commute* DTR drivers.

There are at least two potentially negative impacts from this trend. The first is, with additional capacity in the western area, more residents of Fairfax and Loudoun Counties will be located in proximity to their workplaces. These commutes that otherwise would use the DTR are likely to be reoriented from the west to east direction to one that is more north to south in direction, or alternative routes are likely to be available. Either will have the effect of being a substitute for driving on the DTR, and will reduce the potential for future growth, which is further discussed below.

A second potentially negative impact is exemplified by the trend of larger Washington MSA employers locating alternative offices in the western parts of the DTR Corridor. This trend of alternative officing is a benefit to commuting employees, reducing the time and distance they must travel to get to a workplace. If this trend continues to grow, it will have similar impacts: making alternative routes a viable alternative to the DTR, and reorienting commuting direction.

A summary of the current trends for each sector of the Washington MSA real estate is shown below in Table 46.

Sector	Phase	Inventory (SF)	Vacancy Rate (%)	Vacancy (SF)	Average Absorption (SF)	Under Construction (SF)	Forecast Average Absorption (SF)
Commercial (Suburban)	Expansion	127,947,249	7.30%	9,384,043	(2004-2007) 2,709,761	(2008-2011) 9,694,934	(2008-2010) 1,585,667
Sector	Phase	Inventory (SF)	Vacancy Rate (%)	Vacancy (SF)	Average Absorption (SF)	Under Construction (SF)	Forecast Average Absorption (SF)
Retail	Expansion	138,663,195	3.23%	4,473,672	(2004-2007) 1,263,246	(2008-2011) 8,050,222	(2008-2010) 786,667
Sector	Phase	Inventory (Units)	Vacancy Rate (%)	Vacancy (Units)	Average Net Absorption (Units)	Under Construction (Units)	Forecast Average Absorption (Units)

Multifamily Residential	Hypersupply	370,888	4.73%	17,560	(2004-2007) -40	(2008-2011) 17,558	(2008-2010) 6,486
Sector	Phase	Inventory (SF)	Vacancy Rate (%)	Vacancy (SF)	Average Absorption (SF)	Under Construction (SF)	Forecast Average Absorption (SF)
Industrial/ Flex	Recovery	115,079,210	7.88%	9,068,474	(2004-2007) 1,050,263	(2008-2011) 959,131	(2008-2010) 2,797,333

Table 46. Summary of Washington MSA real estate sectors.

ESTIMATING DTR CORRIDOR COMMUTER GROWTH

While the scope of this report is focused on the business and demographic factors related to population, household, and employment growth in the counties contiguous with the DTR Corridor, our research included a review of data from previous MWCOG Rounds. The small area analysis sections of this report, which review factors within the three DTR Corridor contiguous counties of Arlington, Fairfax, and Loudoun, used MWCOG population forecasts to estimate potential growth of DTR Corridor commuting. Consistent with the approach of this report, a comparison of MWCOG and adjusted estimates is provided for the years 2010, 2020, and 2030, a period of forecasted continuing growth for the Washington MSA.

The growth should be stronger in the earlier decade of the forecast period, gradually slowing towards 2030. Table 47 summarizes the estimated growth of potential DTR commuters during this period. This estimate is provided for comparison purposes only, based on earlier MWCOG studies.

Item	2010 (MWCOG)	2010 (Adjusted)	2020 (MWCOG)	2020 (Adjusted)	2030 (MWCOG)	2030 (Adjusted)
Population	1,689,596	1,646,083	1,964,811	1,868,810	2,086,912	1,977,896
Resident Workers	800,219	782,409	918,205	880,456	998,585	955,303
Live/Work in County	384,727	374,464	440,895	423,569	480,431	460,557
Commute Elsewhere	186,836	183,432	210,164	203,434	225,656	218,065
Commute to DTR Destination	286,053	278,981	331,859	316,419	363,038	345,235
Estimated Growth in DTR Commuters	---	---	49,360	37,437	40,014	28,816

Table 47. Summary of Washington MSA population and economic growth impacts on DTR commuting.

THE POTENTIAL IMPACT OF BRAC ACTIVITIES ON DTR

As discussed above in the regional analysis section of the report, within the MSA, the main result of the 2005 round of BRAC recommendations will be a realignment of jobs, rather than a net gain or loss of jobs. A large realignment is destined for Fort Belvoir, which was slated to gain approximately 18,500 jobs, mainly from other

Northern Virginia locations in Arlington and Fairfax Counties. Of these, approximately 8,500 of the jobs will relocate to the base itself, while the remainder appears destined for excess General Services Administration (GSA) property in Springfield, Virginia. Except for the Springfield GSA site, the planned locations are not accessible to public transportation, and significant investment in transportation improvements will be needed near the base.

The main highways areas to be affected will be the Route 1 Corridor, Interstate 95 Corridor, Telegraph Road, and the southern portion of the Fairfax County Parkway. Except in the case of BRAC-affected employees currently residing in Northern Fairfax and Loudoun Counties, BRAC should have limited impact on DTR. Employees who currently commute via the DTR are likely to change their travel patterns, reorienting from a west to east commute to one that runs in a north to south direction, reducing or eliminating travel on the DTR.

The NGA and DISA realignments have potential significance to the DTR Corridor, since they affect 8,500 Reston and 4,300 Arlington jobs, respectively. For NGA, the number of regular inbound commuters to the Reston facility will be reduced. The majority of the DISA employees, approximately 70 percent of them, live in Northern Virginia, and relatively few of them are DTR commuters. Thus, the impact to the DTR corridor is likely to be minimal, affecting the subset of DISA employees who live in Northern Fairfax and Loudoun Counties.

Going forward from MWCOG Round 6.4a, BRAC impacts are incorporated in employment forecasts for the region. Fairfax County is forecast to add 14,506 and 21,400 jobs, respectively, in 2010 and 2020. On the whole, as a result of BRAC, transit trips within the region will be reduced, while total vehicle trips and miles traveled will increase, mainly on the commuting corridors listed above.

GROWTH PROSPECTS FOR THE GOVERNMENT CONTRACTING INDUSTRY WITHIN THE DTR CORRIDOR

Federal procurement is a cornerstone of the Washington MSA economy, a stabilizing force that serves as a foundation for steady economic performance. GMU's CRA found that the value of federal contracts performed in the entire MSA grew at an average rate of 2.5 percent during the 1995-2000 timeframe, and calculated a total value of $54.5 billion in contracts performed in 2006. Within Virginia Congressional Districts 8, 10, and 11, which are contiguous to the DTR Corridor, the growth in federal procurement has exceeded this average, as summarized in Table 48.

Jurisdiction	GFY 2005	GFY 2006	GFY 2007
8th District (Moran)	$2,715,453,029	$7,739,707,576	$15,112,404,895
10th District (Wolf)	$1,079,343,188	$2,151,044,760	$4,868,359,645
11th District (Davis)	$713,957,765	1,664,813,738	$2,486,870,859

Table 48. Summary of federal contracts performed in Northern Virginia Congressional Districts[16].

CRA forecast that during 2007-2011, MSA-wide federal contracts spending will grow at an average rate of between 1.5 to 1.9 percent. Northern Virginia will continue to see the value of contracts grow, but future growth will be at a significantly lower rate than the triple-digit growth seen during the 2005-2007 timeframe. It is likely that new Executive and Congressional priorities following the 2008 elections will probably result in growth rates of five to ten percent through 2009, and trending down to the two to five percent range through 2012.

SUMMARY

This study was designed to provide supporting analysis for the Dulles Toll Road (DTR) Corridor growth assessment being completed by Wilbur Smith Associates (WSA). The objective has been to conduct an independent analysis of expected population, employment, and economic effects from prior analyses, and to provide a small area analysis of impacts within TAZs.

This study involved a business and economic review of various potential impacts on DTR use, drawing from regional data from the Metropolitan Washington Council of Governments (MWCOG), the George Mason University Center for Regional Analysis (CRA), the National Association of Realtors (NAR), and other data sources. The study focused on socioeconomic, demographic data, and real estate market research within the Dulles Corridor, as well as other economic factors that have the potential of impacting use of the DTR.

[1] CoStar Group, *Tightening Credit Could Hurt U.S. Commercial Real Estate and Housing*, January 2, 2008.

[2] Berner, Richard and Greenlaw, Richard, Morgan Stanley, *Is Recession Now in the Price?*, January 7, 2008.

[3] Integra Realty Resources, Inc., Viewpoint 2008. Reports for 2005 through 2007 were also referenced.

[4] GMU CRA, *The Current State of the Washington Area Economy*, Volume XVII, Number 11, December 2007.

[5] MWCOG, *Growth Trends to 2030: Cooperative Forecasting in the Washington Region*, Fall 2007. A number of MWCOG resources from past forecasting rounds have been used, as indicated in the text.

[6] Ibid.

[7] Integra Realty Resources, Inc., *Viewpoint 2008*. Reports for 2005 through 2007 were also referenced.

[8] Northern Virginia Association of Realtors, *Year-End Real Estate Report*, December 11, 2007.

[9] CoStar Group, *Industrial Real Estate Report for the Washington, DC Region, Third Quarter 2007*. CoStar reports for the Office and Retail real estate sectors were also referenced in the analysis.

[10] www.nationalatlas.gov

[11] Source www.USASpending.gov

[12] GMU CRA, *The Current State of the Washington Area Economy*, Volume XVII, Number 11, December 2007.

[13] Source www.USASpending.gov

[14] Source www.USASpending.gov

[15] www.fairfaxcountyeda.org

[16] Source www.USASpending.gov