Regional Traffic Analysis

of the

Clark/Shirley and Fluor-Transurban

I-95/395 HOT Lanes Proposals

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Introduction

The Transportation Planning Board and Value Pricing

The National Capital Region Transportation Planning Board (TPB) at the Metropolitan Washington Council of Governments (MWCOG) is the designated Metropolitan Planning Organization (MPO) for the Washington region. The TPB prepares the Financially Constrained Long-Range Transportation Plan (CLRP), which identifies all regionally significant transportation projects and programs that are planned in the Washington metropolitan area over the next 30 years. The TPB planning area covers approximately 3,000 square miles and includes the District of Columbia, Suburban Maryland, and Northern Virginia.

In the fall of 2003, the TPB created a Value Pricing Task Force to examine the benefits of value pricing for the Washington region, and to propose a regional system of variably priced lanes. The Task Force developed a set of goals, adopted by the TPB in April 2005, "*to guide the regional development of variably priced lanes that work together as a multi-modal system, while addressing the special policy and operational issues raised by the multi-jurisdictional nature of this area*." The goals address key issues including seamless connections between jurisdictions, the transition from High-Occupancy Vehicle (HOV) to High-Occupancy Toll (HOT) lanes, and the integration and financing of transit.

The Clark/Shirley and Fluor-Transurban Proposals

Clark/Shirley and Fluor-Transurban have submitted separate proposals to the Virginia Department of Transportation (VDOT) under Virginia's Public-Private Transportation Act (PPTA) for the construction of HOT lanes along I-95/395 between the 14th Street Bridge and Massaponax. Both firms propose converting the existing 30-mile, two-lane, reversible HOV facility between the 14th Street Bridge and Route 234 (Dumfries) to a three-lane HOT facility. Clark Shirley proposes extending reversible HOT lanes from Route 234 to just north of Route 17, approximately 20 miles, and adding a fourth general purpose lane southbound from Route 3 to Route 1 and northbound from Route 1 to Route 17. The proposed HOT lane facility would be three lanes between Route 234 and Route 610, and two lanes between Route 610 and just north of Route 17. Fluor-Transurban proposes extending two reversible HOT lanes from Route 234 to south of the Route 17 Bypass, approximately 28 miles. Both firms propose variable tolling based on the time of day, with higher tolls during peak traffic periods. Proposed peak period tolls range from $0.10 to $0.30 per mile, and vary slightly from south to north. As required by current Virginia law, vehicles with three or more occupants (HOV3+) would be permitted to use the HOT lanes free of charge.

Key Issues

Key to financial analysis of these proposals is the estimation of traffic volumes on the HOT lane facility. Because HOV3+ will be allowed to use the facility free of charge, these vehicles will be using some of the capacity without contributing to revenues for the

facility, thereby reducing the capacity available for paying customers and limiting total revenue available to support the project. The other key factors influencing revenue availability are the time savings and other service attributes available to paying customers relative to travel on the conventional I-95/395 lanes. Paying customers will have to believe that the value of traveling on the HOT lanes relative to the conventional lanes is worth the toll. Furthermore, the HOV provisions outlined in the recently reauthorized transportation legislation, SAFETEA-LU, state that toll-paying vehicles must be precluded from using HOV lanes if the facility's level of service becomes degraded.

The conversion of HOV to HOT lanes may also have implications for transit funding. Currently, HOV lanes are counted as fixed guideway miles in federal transit funding formulas, but HOT lanes are not. The TPB has urged Congress and the Federal Transit Administration (FTA) to recognize variably priced lanes as fixed guideway miles so that federal transit funding does not decrease as a result of implementing variably priced lanes. In 2002, FTA administrator Jenna Dorn modified FTA policy to allow HOT lanes to count towards fixed guideway miles under the following conditions:

1. The facility must be able to control single-occupancy vehicle (SOV) use so that it does not impede the free flow and high speed of transit and HOV vehicles.
2. The toll revenues collected must be used for mass transit purposes.

Only if these criteria are met could the proposed I-95/395 HOT lanes be counted as fixed guideway miles. It is unclear at present just how the FTA will view the I-95/395 proposals with respect to federal transit funding formulas.

Overview of Sketch Assessment

Methodology

In response to a request by VDOT, TPB staff has conducted a sketch level assessment of traffic issues for the Clark/Shirley and Fluor-Transurban I-95/395 HOT lane proposals. The assessment used the TPB's current travel demand model, Version 2.1D#50.2, and MWCOG's most recent land-use forecasts, Round 7.0. These forecasts do not reflect the impact of the 2005 U.S. Department of Defense Base Realignment and Closure Commission (BRAC) recommendations, or any new development that may result from the implementation of HOT lanes along I-95/395. The assessment focuses on the 2010 milestone year, and analyzes traffic speeds and volumes along the 58-mile segment of I-95/395 between the 14th Street Bridge and Massaponax. Figure 1 illustrates the location of the analyzed facility.

The baseline 2010 highway and transit networks included in the assessment reflect the draft CLRP scheduled for adoption in 2005. (The results of an air quality analysis of the draft CLRP was released for public comment September 15, 2005.) This 2010 baseline includes four new HOT lanes along a 15-mile stretch of the Capital Beltway (I-495), between the Springfield Interchange and Georgetown Pike. Tolls are set to ensure a high level of service, and vary by time of day, segment, and direction. Similar to the I-95/395

proposals, vehicles with three or more occupants may use the Beltway HOT lanes for free.

Potential for Transit

The current assessment of the I-95/395 proposals did not include any new transit service beyond that included in the draft CLRP. Planned transit along the I-95/395 corridor includes modest improvements to bus service with direct service from Fredericksburg to Tyson's corner. The proposed HOT lanes would create new opportunities for significantly increased bus transit. Increased transit (bus and commuter rail) could improve service levels for all users along the corridor.

Travel Speeds and Toll Levels

The TPB version 2.1D#50.2 travel demand model produces forecasts of traffic volumes and speeds for three time periods: am-peak, pm-peak and off-peak. Figure 2 shows forecast 2010 travel speeds for the southbound peak period (PM) along the I-95/395 HOT lanes based on the toll levels in the Clark/Shirley and Fluor-Transurban proposals. (Because the proposed facility is reversible, all am-peak period traffic is northbound, and all pm-peak period traffic is southbound.) Results were similar for the two proposals: speeds are at or near 60 miles per hour along the southern portion of the I-95 HOT lanes, but begin to drop during peak periods north of Route 234 (Dumfries). The area just south of the Capital Beltway is particularly problematic, reaching speeds below 20 miles per hour even during the off-peak period. These results indicate that proposed tolls are not set high enough to ensure that a high level of service is maintained along all segments of the I-95/395 HOT lanes.

To illustrate the range of toll rates that may be required to maintain free-flowing conditions along the entire I-95/395 HOT lanes facility, TPB staff developed an alternative toll scenario. In this scenario, the HOT lanes were divided into 5 segments and peak-period tolls were set separately for each segment based on forecast traffic volumes. Table 1 shows an estimate of the required peak-period tolls, which range by segment from $0.23 to $1.60 per mile. The highest toll rates are required in the vicinity of the Capital Beltway.

HOV Volumes and Capacity for Toll-Paying Vehicles

To examine the capacity for toll-paying vehicles under free-flowing conditions, TPB staff calculated the forecast share of HOV traffic in the HOT lane facility based on the alternative toll scenario. As Figure 3 shows, under this scenario the volume of HOV traffic would increase along some segments of the I-95/395 corridor relative to CLRP baseline conditions. Figure 4 shows that at the southern end of the I-95 HOT lanes total volume is well below capacity and HOVs account for virtually 100% of the volume. Further north, the volume of both HOVs and toll-paying vehicles increases, with the HOV share decreasing to as little as 20%. The area just south of the Capital Beltway,

however, appears to be a chokepoint where the majority of the capacity is utilized by HOVs, leaving limited room for toll-paying vehicles.

Chokepoints

To further investigate the interaction between the proposed I-95/395 HOT lanes and the Capital Beltway, TPB staff examined forecast traffic patterns where the two highways intersect at the Springfield Interchange. As Figure 5 shows, in the am-peak period approximately 42% of northbound I-95 HOT lane traffic continues on I-395 towards the District of Columbia, whereas approximately 26% and 32% of the traffic heads west and east, respectively.

Another chokepoint exists at the northern terminus of the proposed HOT lanes, at the 14th Street Bridge. Even in the 2010 baseline condition, forecast northbound am-peak period traffic speeds on the 14th Street Bridge center span (two lanes) fall below 15 miles per hour. The proposed expansion from two HOV lanes to three HOT lanes south of bridge would further add to the congestion, causing traffic to back up into the HOT lanes.

Conclusion

The TPB forecasts for 2010 using the Version 2.1D#50.2 travel demand model, Round 7.0 forecasts, and the draft 2005 CLRP show that tolls on I-95/395 HOT lanes will have to be significantly higher than assumed in the Clark/Shirley and Fluor-Transurban proposals in order to maintain high services levels along the entire facility. Forecast traffic volumes vary considerably along the entire length of the facility, with the HOV3+ share ranging from virtually 100% in the lightly traveled southern portion to 20% in more heavily traveled segments further north. HOVs also account for a high percentage of the traffic volume at a chokepoint just south of the Capital Beltway, limiting the capacity for toll-paying vehicles. An additional chokepoint at the northern terminus of the proposed HOT lanes will further exacerbate existing congestion on the 14th Street Bridge.

The alternative toll scenario developed by TPB staff suggests that tolls will have to vary by segment and may range as high as $1.60 per mile in order to maintain free-flowing conditions. This estimate may be conservative for at least two reasons. First, the land-use forecasts upon which the analysis is based do not reflect the impact of the recent BRAC recommendations, or new development that may result from the implementation of HOT lanes along I-95/395. Both of these factors may increase the demand for travel along the corridor. Second, research on HOT lanes in California suggests that drivers may be willing to pay a premium for the reliability provided by HOT lanes, in addition to the time savings. Some drivers may also pay to use the HOT lanes even when there is no congestion in the conventional lanes. These issues require further analysis. In particular, the revenue implications of alternative toll scenarios that effectively maintain high levels of service should be studied.

Two final points should be kept in mind. First, the TPB staff analysis included only the currently planned transit improvements for the I-95/395 corridor, which are fairly

modest. The potential exists to significantly increase transit service on the proposed HOT lanes, and increased bus and commuter rail could improve service levels for all users along the corridor. Transit improvements should therefore be studied as an integral part of the I-95/395 project. Second, the analysis focused primarily on the main I-95/395 HOT lane facility, and did not examine traffic patterns at entry and exit points in much detail. It is possible that capacity issues at these points may lead to backups on connecting roads or on the facility itself. Microsimulation studies should therefore be conducted to ensure that drivers can get on and off the HOT lanes without delay.

Figure 1
Freeway Segment Analyzed

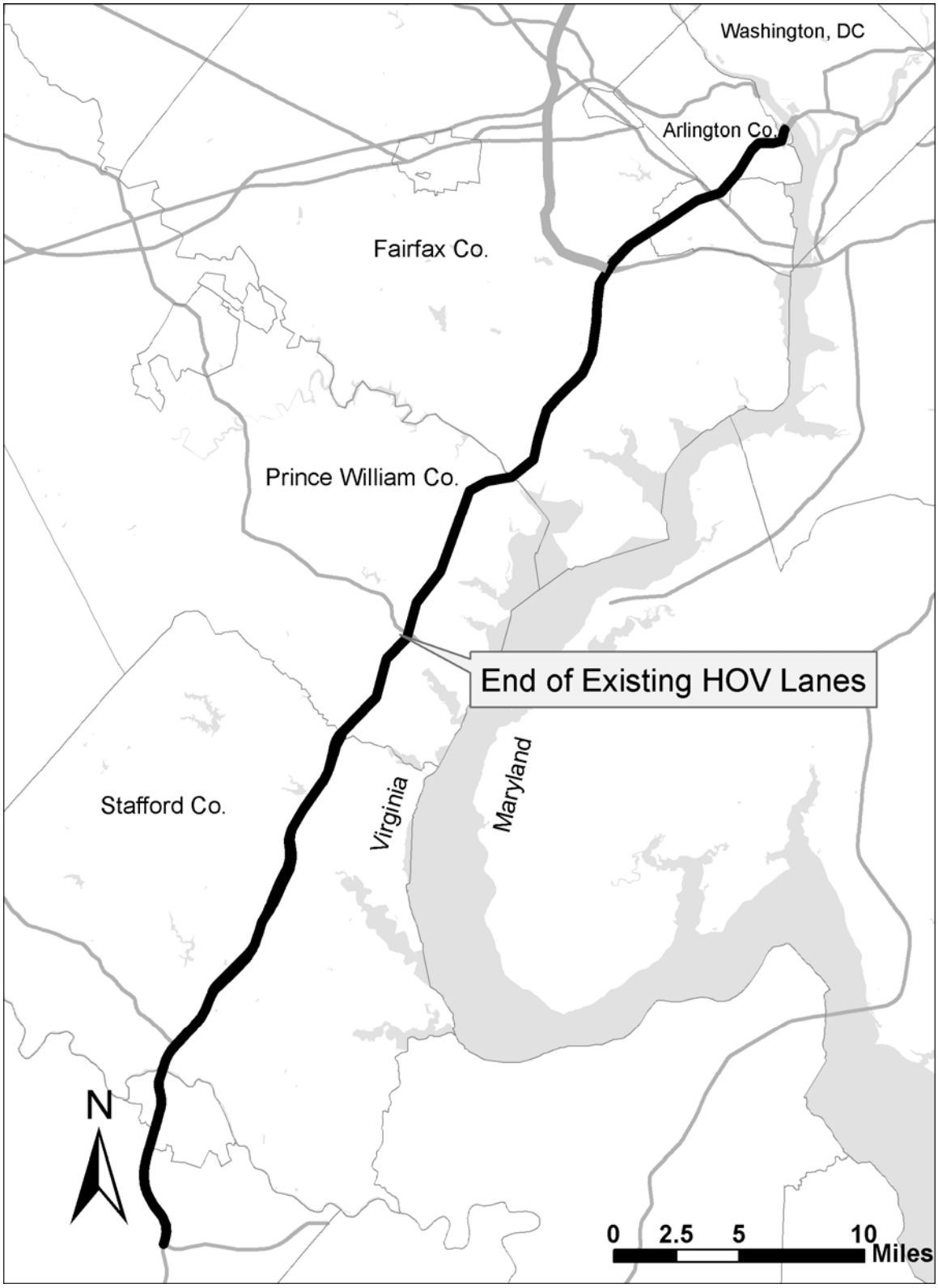


Figure 2
2010 Travel Speeds with Proposed Tolls
Southbound Peak Period (PM)

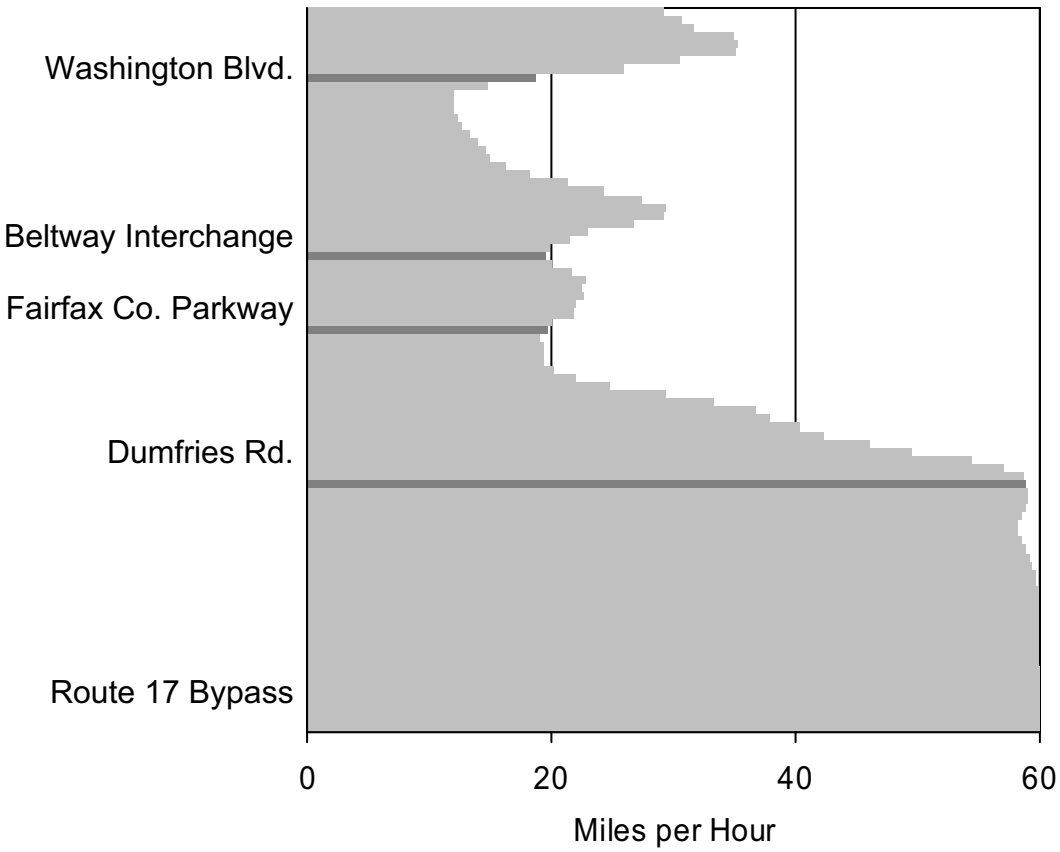
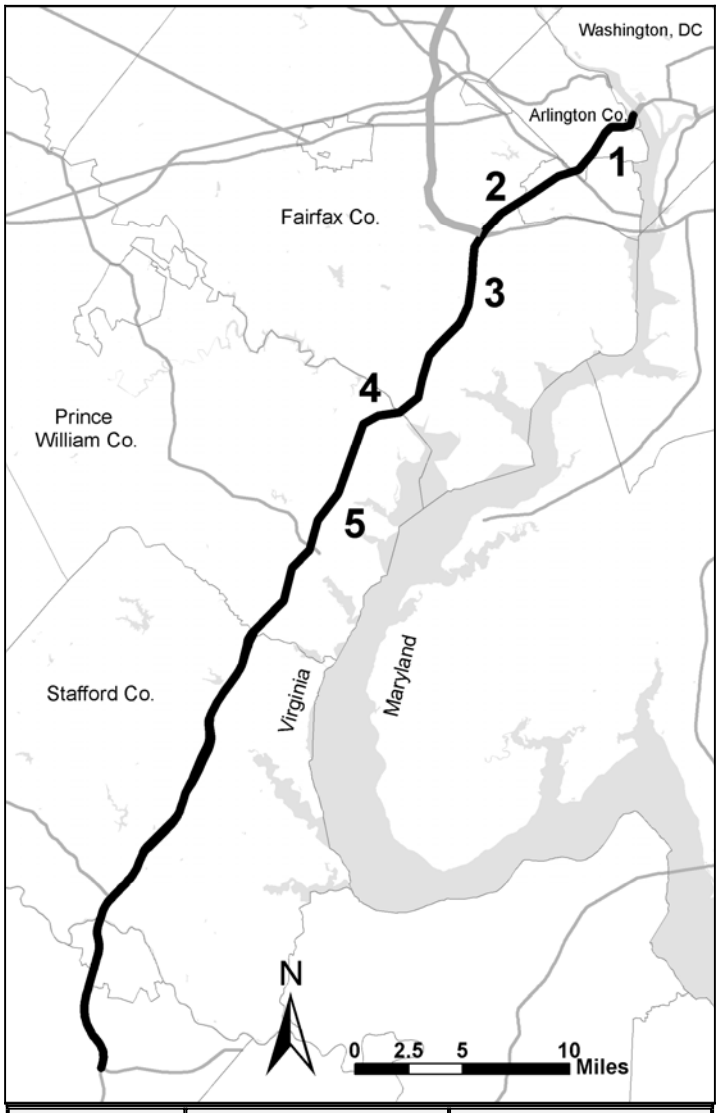


Table 1
Alternative Toll Scenario
(Tolls per mile)



Segment	Southbound (PM Peak)	Northbound (AM Peak)
1	$1.10	$0.80
2	$1.00	$1.10
3	$1.60	$1.00
4	$0.80	$0.80
5	$0.23	$0.23

Figure 3
2010 HOV Traffic Volumes with Alternative Toll Scenario
Southbound Peak Period (PM)

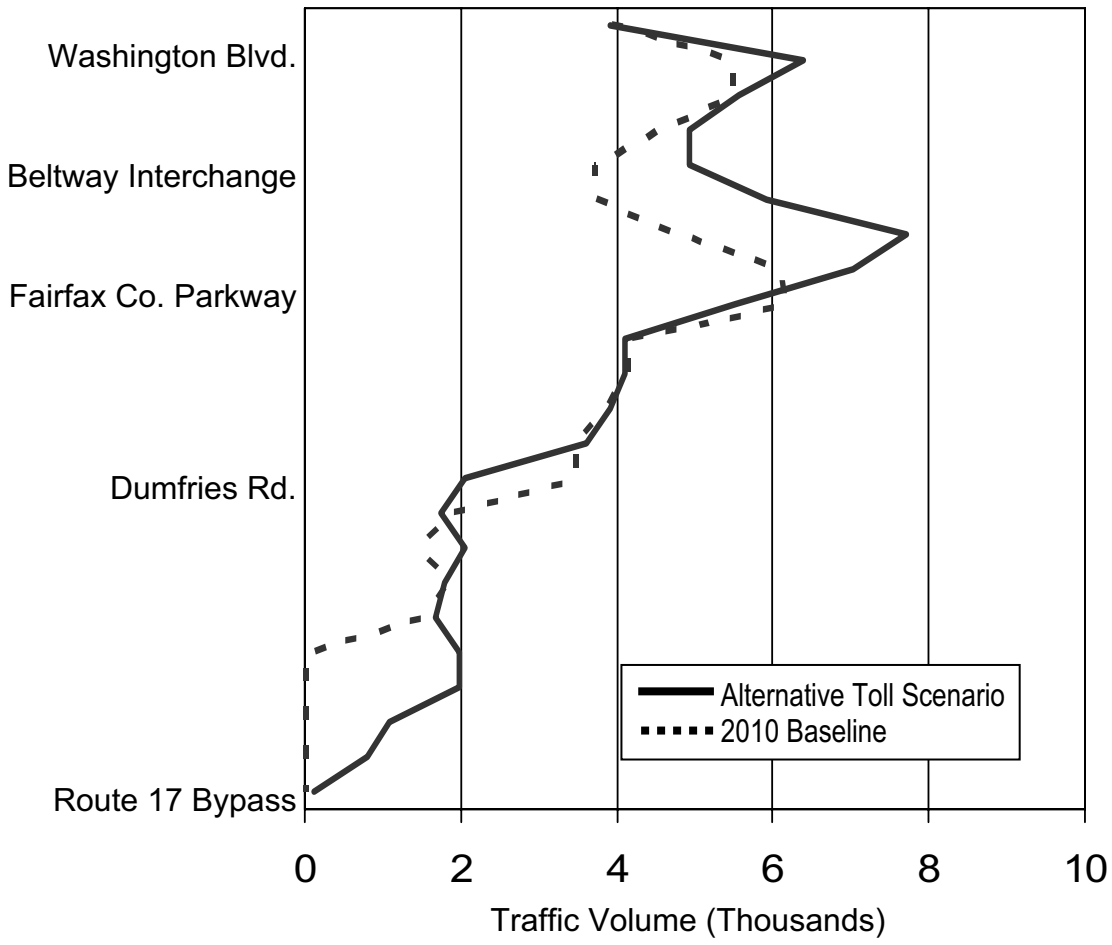


Figure 4
2010 Volumes with Alternative Toll Scenario
Southbound Peak Period (PM)

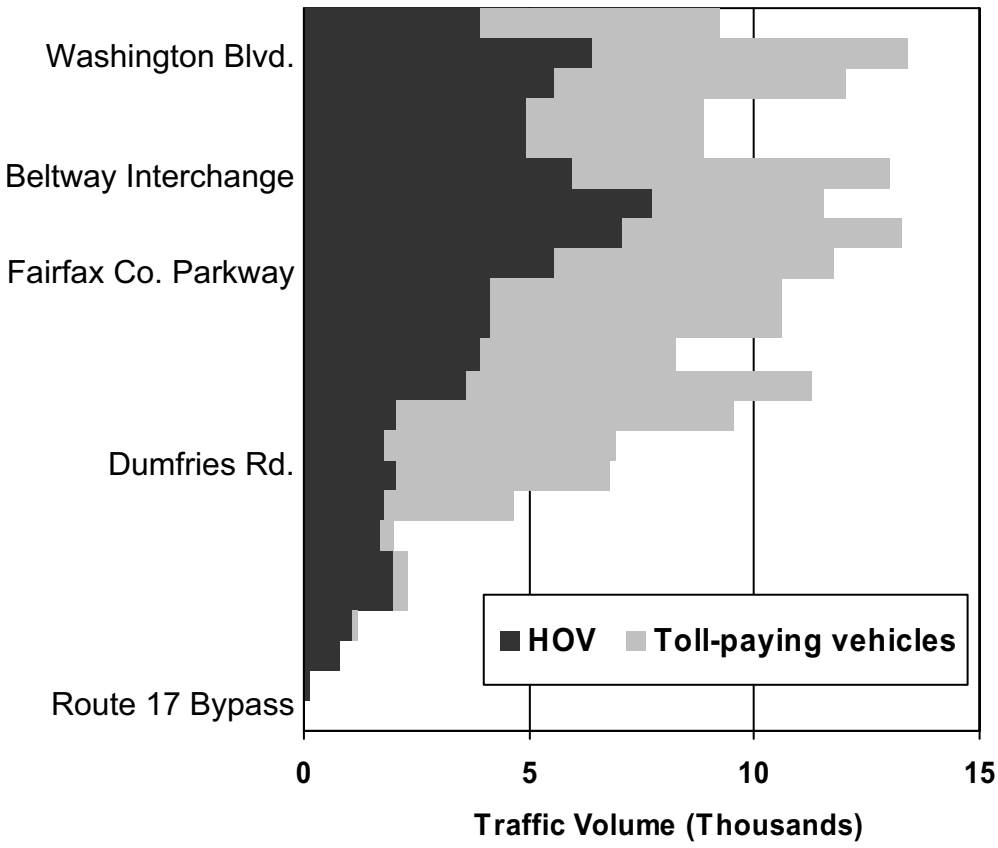


Figure 5
2010 HOT Lane Traffic Volumes
Northbound Peak Period (AM)