April 29, 2004

CAPITAL BELTWAY HOT LANES – VDOT SUGGESTED RECONFIGURATION

Executive Summary

VDOT staff prepared the following information in response to questions from the Advisory Panel on April 1, 2004. Although traffic data is not available at this stage, the following expands on the VDOT Suggested Reconfiguration for Beltway HOT Lanes submitted to the HOT Lanes Advisory Panel on April 1, 2004. In summary, staff suggests the following modifications to be considered for additional study by the Fluor Daniel Team:

- Add additional access points at Tysons Corner,
- Remove direct HOT lanes access at Route 123,
- Operate the northbound lanes on segment north of Dulles Access and Toll Road as HOV-3 only during PM peak hours.
- Restrict movements from I-66 Interchange to/from Tysons during peak hours, to HOV-3 only.
- Eliminate proposed direct HOT lanes access at Route 50,
- Add direct HOT lanes access at Lee Highway (Route 29),
- Add direct HOT lanes access at Little River Turnpike (Route 236),
- Drop one lane at Tysons and carry five lanes to Georgetown Pike (Route 193) to match up with Maryland’s typical section at the northern terminus, and
- Remove slip ramps.

It is estimated that these modifications will add approximately $112 million to the base cost of the proposal leading to a total cost of approximately $805 million.

<table>
<thead>
<tr>
<th>Base Price (Fluor estimate)</th>
<th>$693.4 million</th>
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<tbody>
<tr>
<td>Tysons Access:</td>
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<tr>
<td>- Jones Branch Drive</td>
<td>$34 million</td>
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<tr>
<td>- Old Courthouse Road</td>
<td>$25 million</td>
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<tr>
<td>Interchange @Lee Highway (Route 29)</td>
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<tr>
<td>Interchange @ Little River Turnpike(Route 236)</td>
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<td>Total Cost (Fluor estimate)</td>
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Supporting Information

A. TYSONS ACCESS VERSUS BYPASS

Hypothesis: Tysons Corner is an important regional employment center with planned expansion and needs more access points.

Fact 1: Tysons Corner area currently has 100,000 jobs, within about 3 square miles. For comparison purposes, the Pentagon currently has 25,000 jobs. Moreover, Tysons will add another 27,000 jobs over the next 25 years according to the Cooperative Forecast Data maintained by COG (Council of Governments). This growth alone is in excess of the number of employees at the Pentagon today. The projected growth indicates a strong need for increased access in the future. Even today, two access points from the Beltway are not adequate to serve an employment center of 100,000 jobs. Facts to support this statement are discussed later in this paper.

Hypothesis: The Fluor Daniel proposal calls for a slip ramp access into Route 123 at Tysons Corner and no other access points into Tysons Corner. With Route 123 already at capacity, more access at this point will accomplish little. Further, with no additional access into Tysons, the HOT lanes proposal may function essentially as a “Tysons Bypass” facility. The Beltway’s predominant flow does not bypass Tysons Corner, but generally accesses Tysons Corner.

Fact 2: Staff completed a “select link analysis” using the 2002 home-to-work trip table from COG and the 2000 highway network. A “select link” is a term used by transportation modelers to determine the origins, destinations, and travel paths of every trip passing through a specific link (roadway segment). The results of a select link analysis of trips on the Beltway northbound just south of Route 7 indicate that approximately 55 percent of the work trips, in the morning peak hours, exited the Tysons area (Route 7, Route 123 and Toll Road/Access Roadway). The other 45 percent of work trips continued north of the Toll Road. In the southbound direction, approximately 63 percent of these trips from just north of the Toll Road exit the Tysons area via Route 7, Route 123 or the Toll Road/Access Road southbound, leaving approximately 37 percent as bypass traffic. Following proven transportation planning principles, the predominant flow should be favored. Interestingly, many Tysons users earn high incomes. High-income users may be more likely to pay higher tolls than, perhaps lower-income users. The COG model uses income as one variable in the travel-forecasting model. This data shows approximately 40% of the Tysons area employees currently earn over $75,000 per year. Thus additional access points into Tysons Corner from the south should be considered by the Fluor Team.

Hypothesis: The additional access points into Tysons could be at Jones Branch Drive and Old Courthouse Road. Interpretation of the data suggests that two new access points into Tysons are needed: potentially one at Jones Branch Drive, and the other at Old Courthouse Road. If provided, the one at Jones Branch Drive should have four (4) movements: to and from Maryland and to and from Springfield. The Old Courthouse Road access could be to and from Springfield only. Preliminary results indicate that each access point needs one-lane ramps. Direct access at Route 123 should be dropped.
This option would cost $59 million approximately, based on very preliminary estimates.

Fact 3: Both Routes 7 and 123 are 6 lane arterials with numerous turning lanes from where they intersect each other and the Beltway. According to the COG model for 2005, demand on Route 7 just west of the Beltway greatly exceeds capacity. One way to address this problem now is to plan for dispersal of traffic around Tysons and not concentrate it onto Routes 7 and 123. Dispersal of traffic could be achieved with new access points to Tysons from the HOT lanes.

B. HOT LANE SEGMENT FROM DULLES ACCESS TOLL ROAD TO GEORGETOWN PIKE (PM northbound)

Hypothesis: This Beltway segment is already heavily congested between Tysons and American Legion Memorial Bridge during rush hours. If HOT lane capacity were added to the Beltway, current conditions would be further exacerbated. To help prevent further degradation of current conditions, the HOT lanes could be terminated at the Dulles Access & Toll Road. However, since HOV-3s consume little capacity, it would be best to allow the use of this segment of the additional lanes to these HOV users during PM peak hours as it helps to achieve the region’s goal of maximizing HOV usage. *It is recommended that Northbound Beltway HOT lanes, north of Tysons, operate as HOV-3 during PM peak hours, open to all traffic during other times.*

Fact 4: The COG model shows that in 2005 the traffic demand exceeds supply by 33 percent for the Beltway from Tysons to American Legion Memorial Bridge, and demand to exceed capacity on the Bridge by 43 percent during peak periods. With this severe congestion, people may be willing to pay tolls to bypass stop and go traffic.

C. I-66 / BELTWAY INTERCHANGE (eastbound to northbound in AM)

Hypothesis: Approximately 55% (see Fact 2) of the Beltway traffic exists at Tysons Corner and the Dulles Access & Toll Road. The numerous lane changes associated with I-66 traffic merging with the Beltway traffic exiting at Tysons/Toll Road causes the Beltway to back up all the way to Braddock Road many mornings. It appears the same situation would occur if I-66 were allowed to access the HOT lanes during rush hours. If this movement was prohibited to LOVs during peak hours, it may prevent backups to Braddock Road in the HOT lanes each morning. *Consideration of restriction of movement from eastbound I-66 to northbound I-495, to HOV-3 during AM peak hours and open to all traffic during other times, is recommended.*

Fact 5: (AM Conditions): The figure below shows the volume to capacity ratio (v/c) at the Beltway/I-66 interchange. Three of the legs operate at low efficiency during AM peak hours, as indicated by v/c ratios in excess of 1(Source - MWCOG model for 2005).
Using the COG home-to-work trip table (2002) for the region, an analysis of traffic assignment showed that on the Beltway segment north of the interchange, approximately 70 percent of this northbound traffic came from the south and approximately 30 percent from the west. See figure below:

This (along with Fact 2) helps explain the turbulence in this segment of the Beltway and supports consideration prohibiting LOVs from making this movement during the AM peak hours.

D. I-66/BELTWAY INTERCHANGE (southbound to westbound in PM)

Hypothesis: Because I-66 westbound from this interchange is severely congested, a HOT lane access from Tysons to I-66 would provide little benefit to HOT lane users. It is possible that traffic would potentially queue back to Tysons. Assuming 50 percent of HOT lane users would exit onto I-66, this could cause an approximate 50 percent under utilization of capacity in the HOT lanes south of the interchange during PM peak hours. Consideration of restriction of movement from southbound I-495 to westbound I-66 to HOV-3 during PM peak and open to all traffic during other times, is recommended. All other movements of I-66 to and from I-495 south should be for all traffic at all times. They are: eastbound I-66 to/from southbound I-495 and westbound I-66 to/from I-495 south.

Fact 6: The COG model shows approximately 30 percent of the Beltway users north of this interchange exit at I-66, to the west. (See Fact 5 for the AM opposite flow). With preferential treatment for HOT lane users entering I-66 westbound, the percent from the Beltway southbound could increase from approximately 30 percent to approximately 50 percent. This means that south of the interchange, the HOT lanes would run at only approximately 50 percent of capacity during PM peak hours.
E. ROUTE 50/29 INTERCHANGES (eastbound to northbound in AM)

**Hypothesis:** Route 50 eastbound to Beltway northbound in the AM is already heavily congested; adding additional Beltway capacity without also adding more arterial capacity on Route 50 is not likely to improve traffic flow. *Consideration of provision of direct HOT lanes access at Lee Highway (Route 29) is recommended for the movements in all directions for all traffic, instead of at Route 50.*

Based on very preliminary estimates, this would cost approximately $28 million.

**Fact 7:** The COG model shows demand on Route 50 exceeding supply by approximately 70 percent during AM peak hours. Thus without having upstream capacity on Route 50, adding more downstream capacity on the Beltway benefits little. Instead it may be far more beneficial to add interchange capacity at Lee Highway (Route 29), since a widening of Lee Highway is already in the Constrained Long Range Plan.

F. LITTLE RIVER TURNPIKE AND BRADDOCK ROAD INTERCHANGE

**Hypothesis:** Providing direct HOT lanes access at Little River Turnpike (Route 236) appears to be a better choice because:

- Braddock Road experiences more congestion than Little River Turnpike, and
- Little River Turnpike may produce more bus riders to Tysons than Braddock Road. Little River Turnpike has many condominiums between the Beltway and Annandale, whereas Braddock Road is mostly low-density single-family homes. As a result, higher bus ridership potential exists along Little River Turnpike. Additionally, Fairfax County has plans for a transit center there.

Based on very preliminary estimates, this would cost approximately of $25 million.

**Fact 8:** The COG model shows Braddock Road running at approximately 130 percent over capacity while Little River Turnpike is running at approximately 40 percent over capacity. Fairfax County’s Comprehensive Plan calls for widening Little River Turnpike to six (6) lanes. Thus, HOT lane traffic could possibly be better served by Little River Turnpike than by Braddock Road, both now and in the future. Also, the higher density housing along Little River Turnpike better supports transit. In addition, transit along Little River Turnpike could serve the Northern Virginia Community College, located just west of the Beltway along Little River Turnpike.

G. PROPOSED SLIP RAMPS AT ROUTE 50 AND BRADDOCK ROAD

**Hypothesis:** Due to a good level of service on the Beltway south of Route 50, slip ramps will allow HOT lanes users and Beltway users to switch facilities freely. As a result, they will use the general purpose Beltway lanes south of Route 50 and the HOT lanes north of Route 50. Consequently, slip ramps may lead to the following unfavorable results:
• Low utilization of HOT lanes south of Route 50, and

• Potential for reduced toll revenues.

*Strong consideration of removal of all slip ramps along the facility is recommended.*

**Fact 9:** The COG model shows the Beltway segments between Route 50 and Springfield Interchange during peak hours operating at capacity today. Adding four (4) HOT lanes here would allow the Beltway to operate at a higher level of service during peak hours. So, with slip ramps, most of the HOT lanes traffic south of Route 50 would divert to the general purpose lanes leaving the HOT lanes under utilized. To maximize toll revenues and maximize usage of the entire HOT lane facility, it appears eliminating these slip ramps would be prudent.