

An Analysis of a Regional System of Variably Priced Lanes in the Washington Region – Initial Results

Presentation to the TPB Technical Committee
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Metropolitan Washington Council of Governments

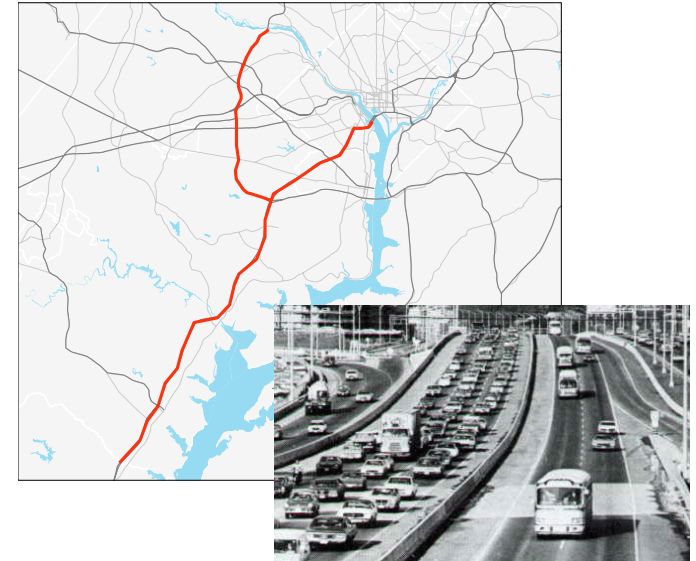
1) TPB Value Pricing Task Force

- Created Fall 2003 following June 2003 Regional Conference
- Examine the benefits of value pricing for the Washington region
- Goals approved by TPB, April 2005
- Study a regional system of variably priced lanes



Current TPB Value Pricing Analyses

- Furthering work of Value Pricing Task Force
- Assisting Virginia DOT in analyzing key corridors
 - Beltway
 - I-95/I-395
- Regional Mobility and Accessibility Study (RMAS)
 - “What If?” scenario for regional system of VPLs
 - Transit Sensitivity



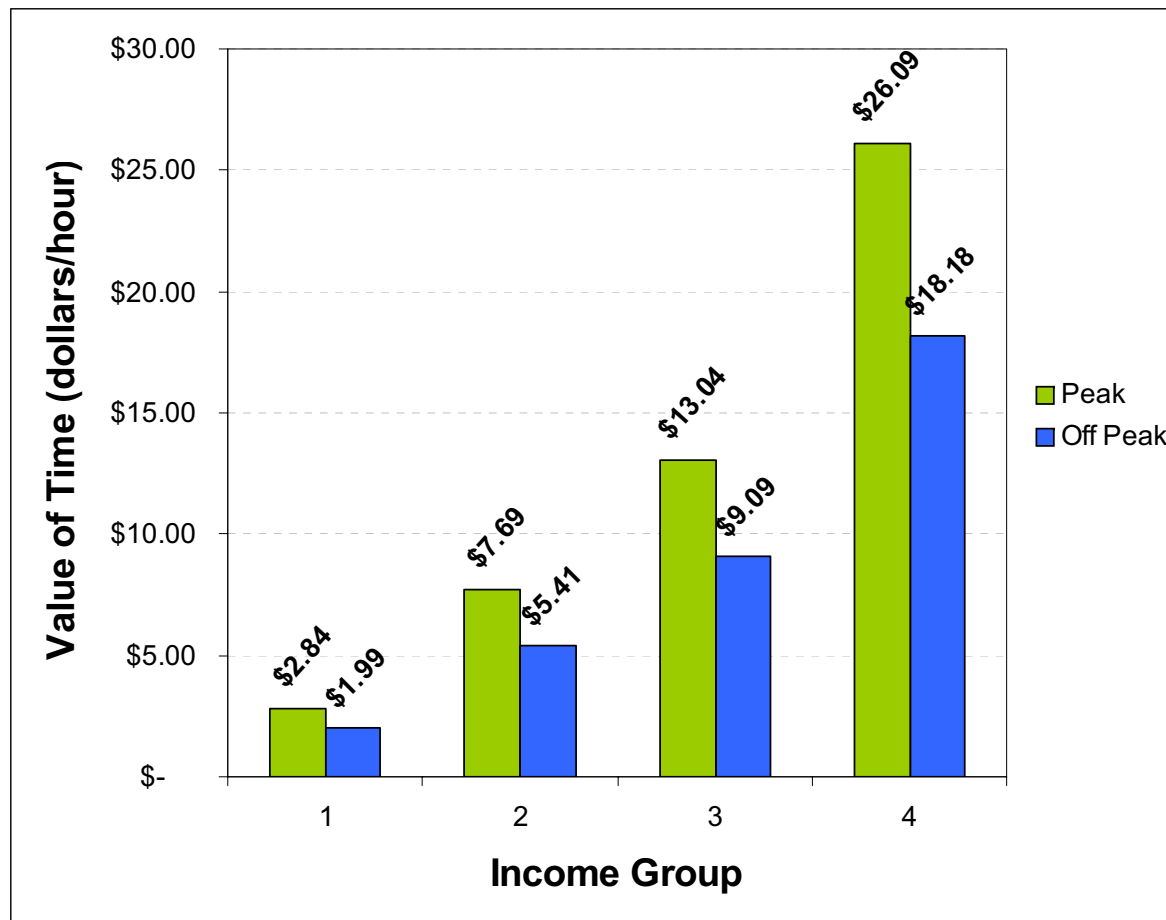
Variably Priced Lanes

2) Technical Methods

- “Toll time penalty” method
- Tolls can vary by segment, direction and time of day to ensure high level of service
- Tolls affect trip distribution, mode choice and traffic assignment

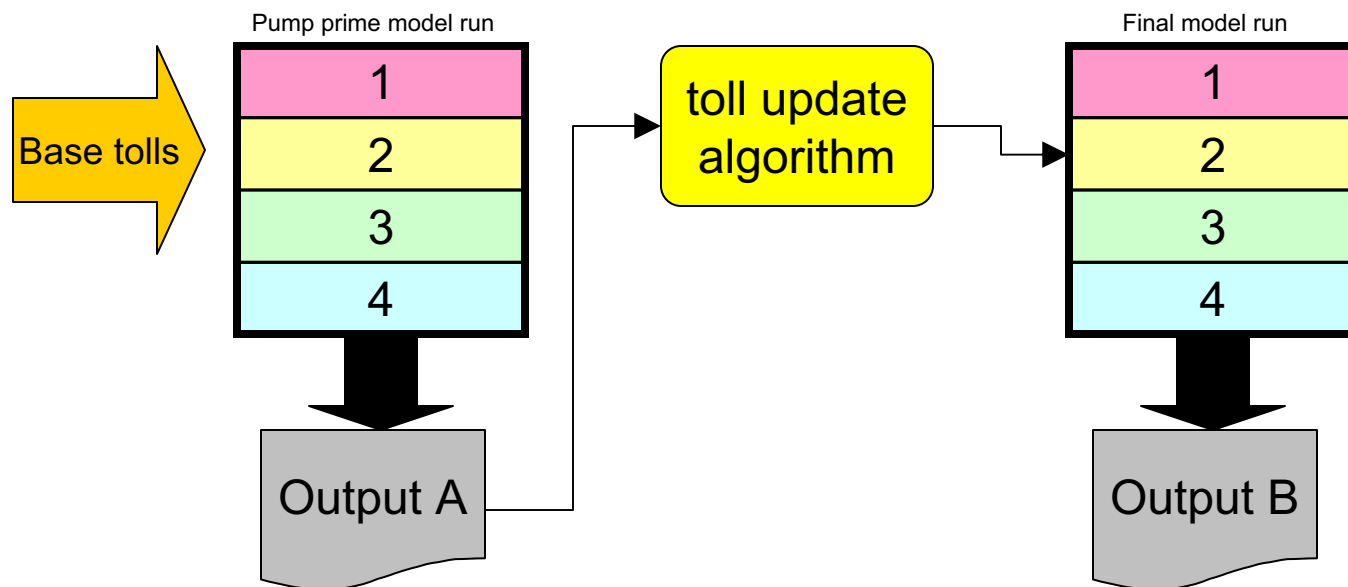
Toll Time Penalty Method

- Different values of time (“willingness to pay”) used for different income groups



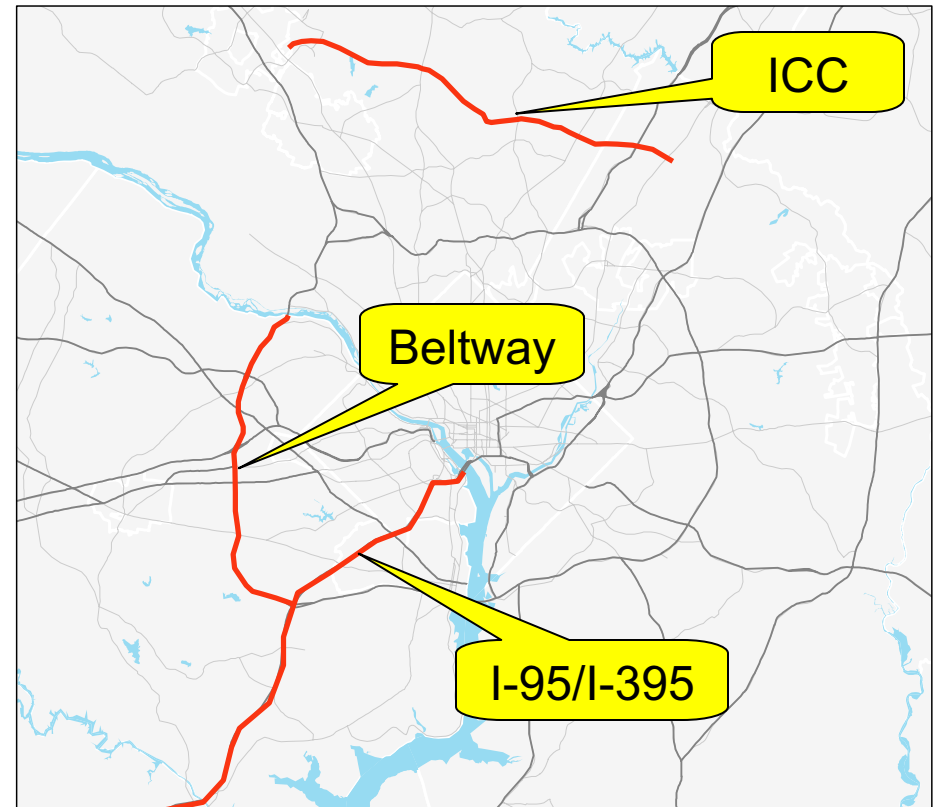
Toll Time Penalty Method

- Tolls translated into time penalties in 4-step model
 - Model run with base tolls
 - Higher tolls calculated for congested variably priced lane segments to ensure free-flow conditions
 - Model run with new tolls and travel times
- Two full model runs
 - Captures impacts of tolls on trip distribution, mode choice and traffic assignment



3) Current Value Pricing Projects

- Intercounty Connector (ICC)
 - 2004 CLRP Update*
- Beltway HOV
 - 2005 CLRP Update*
- I-95/I-395
 - Under development
- Regional Network
 - Regional Mobility and Accessibility Study

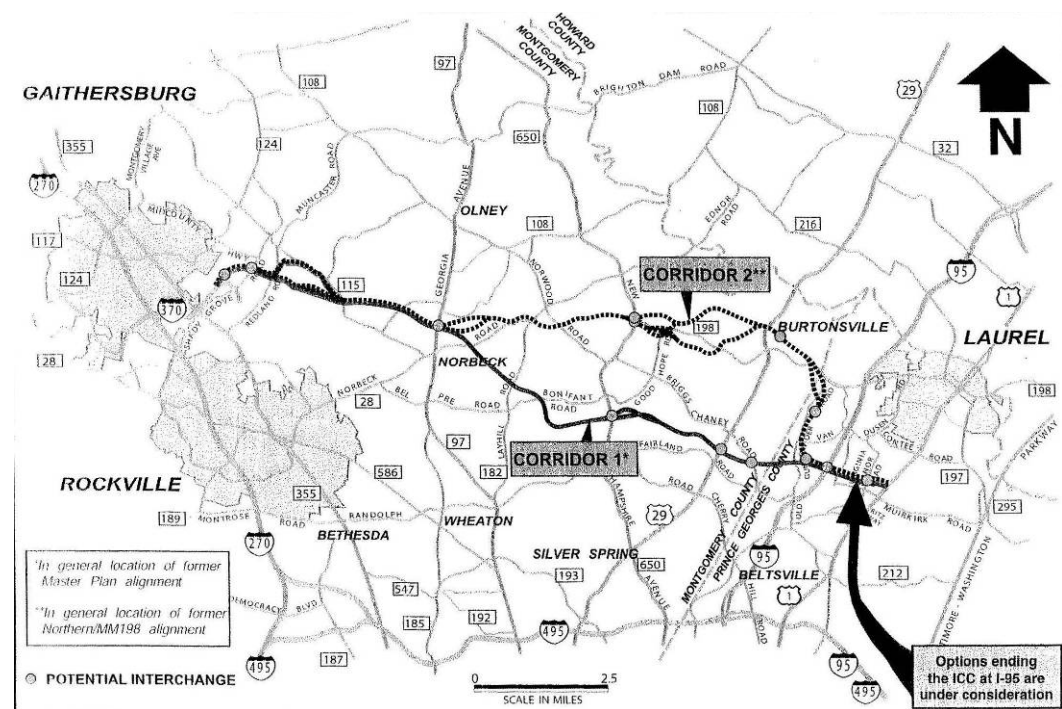


* Federal Record of Decision approved

Maryland Intercounty Connector (ICC)

(Added to CLRP November 2004)

- 18 miles, 6 lanes, 9 interchanges
- Tolls vary by time of day (peak, off-peak)
- Express bus service



HOT lanes on the Capital Beltway in Northern Virginia

9

(Added to the CLRP October 2005)

- 4 new lanes added along 15-mile stretch
- Public-private partnership
- Free for HOV 3+, others pay toll that varies by time of day



–Proposed tolls range from \$0.10 to \$0.35 per mile

TPB Analysis: Capital Beltway Proposal in Northern Virginia



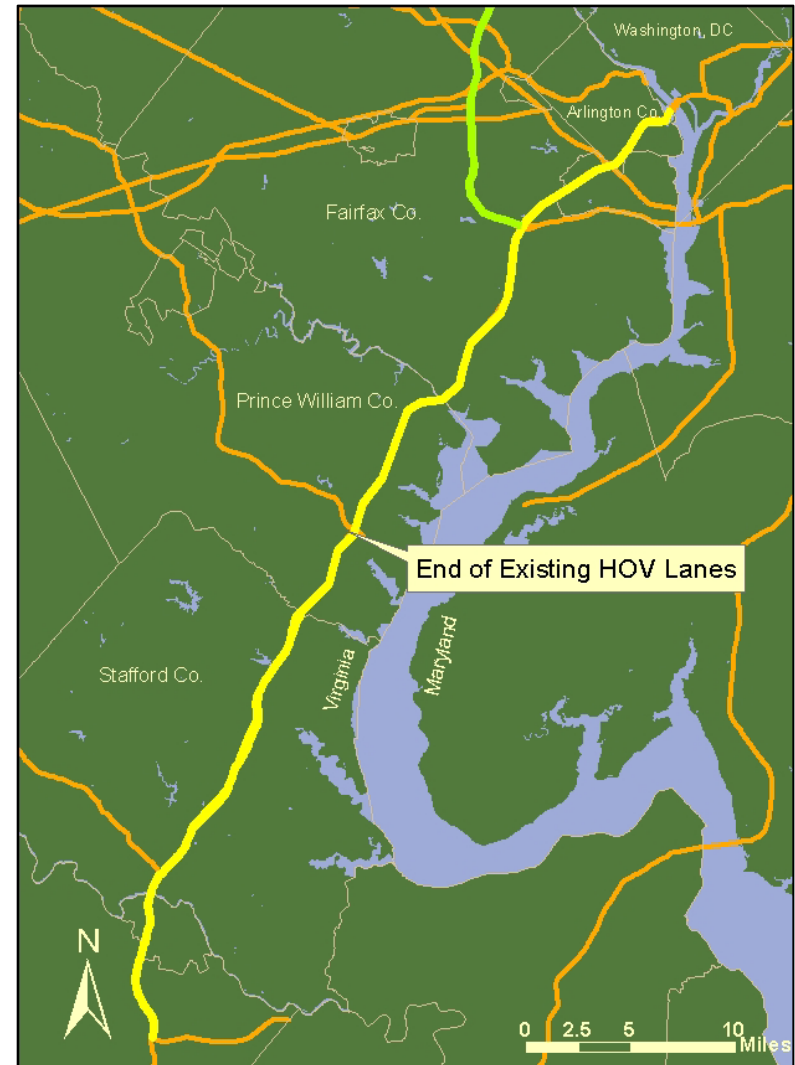
- Tolls will vary by time of day, segment, and direction to ensure high level of service

TPB Analysis Results, Tolls per Mile, 2010

Segment	Southbound		Northbound	
	AM	PM	AM	PM
1	\$0.20	\$0.20	\$0.20	\$0.60
⋮	⋮	⋮	⋮	⋮
3	\$0.20	\$1.10	\$0.70	\$0.60
⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮
6	\$0.20	\$0.40	\$0.20	\$0.60

Currently Under Development: I-95/395 HOT Lanes Proposal

- HOT lanes proposed by two private consortia in 2004/2005
- Assumes Northern Virginia Beltway HOT Lanes
- Add new capacity
 - Widen existing reversible HOV lanes to Dumfries from 2 to 3 lanes (30 miles)
 - Extend 2 reversible HOT lanes from Dumfries to Fredricksburg area (20 – 28 miles)
- Free for HOV3+, others pay toll
 - Proposed peak period tolls range from \$0.10 to \$0.30 per mile



TPB Analysis: I-95/I-395 Proposal



- Tolls will vary by time of day, segment, and direction to ensure high level of service

TPB Analysis Results, Tolls per Mile, 2010

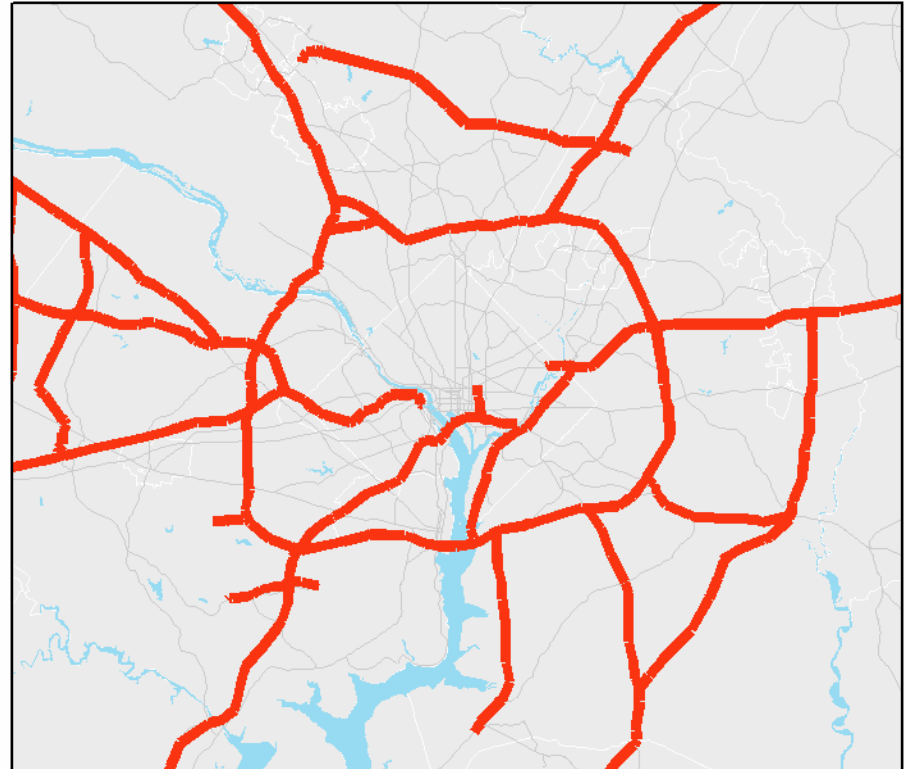
Segment	Southbound (PM Peak)	Northbound (AM Peak)
1	\$1.10	\$0.80
2	\$1.00	\$1.10
3	\$1.60	\$1.00
4	\$0.80	\$0.80
5	\$0.23	\$0.23

4) Analyzing a Regional System of Variably Priced Lanes

- Develop “starting point” scenario
- Analyze “starting point” scenario
- Conduct sensitivity tests, including impacts of enhanced transit
- Identify high potential corridors for first phase regional network
- Access and Egress Issues

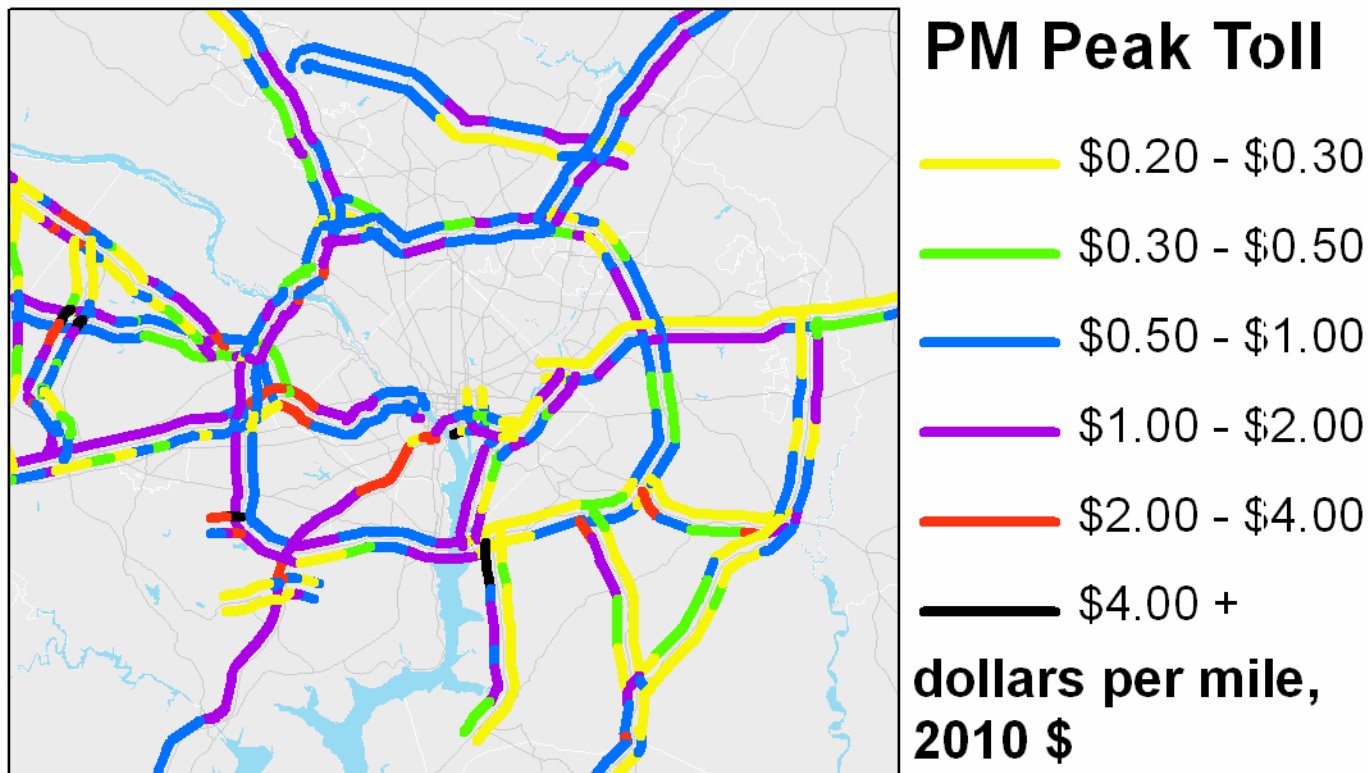
Develop “Starting Point” Scenario

- Variably Priced Lanes (VPL)
 - VA: HOT lanes, HOV 3+ free
 - DC, MD: Express Toll Lanes (ETL), all pay
- All Freeways:
 - Add 2 VPLs
- Arterials outside of beltway:
 - Add 1 VPL
- Existing HOV lanes:
 - Convert to VPLs
- Direct access ramps at key interchanges
- Incorporate existing transit service



Initial Analysis of “Starting Point” Scenario

- To ensure free flow, toll rates vary significantly by segment, direction and time of day

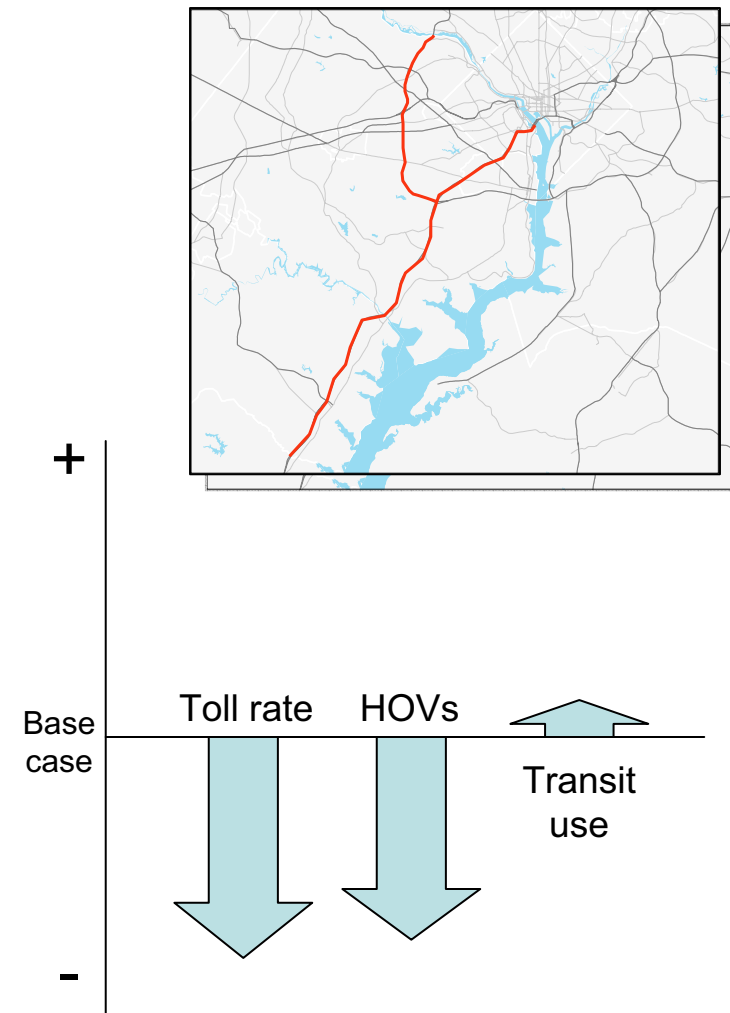


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- ```
graph LR; A[Base tolls] --> B[Pump prime model run]; C[Enhanced transit] --> B; B --> D[Output A']; D --> E[toll update algorithm]; E --> F[Final model run]; F --> G[Output B']
```
- The flowchart illustrates the toll update algorithm. It begins with a 'Pump prime model run' which takes two inputs: 'Base tolls' (represented by an orange arrow) and 'Enhanced transit' (represented by a green arrow). The 'Pump prime model run' is depicted as a vertical stack of four colored boxes labeled 1 (pink), 2 (yellow), 3 (light green), and 4 (light blue). Below this stack is a thick black arrow pointing to a grey box labeled 'Output A\''. An arrow from 'Output A\'' leads to a yellow rounded rectangle labeled 'toll update algorithm'. An arrow from this algorithm points to a second vertical stack of four colored boxes labeled 1 (pink), 2 (yellow), 3 (light green), and 4 (light blue), which is labeled 'Final model run' above it. Below this second stack is a thick black arrow pointing to a grey box labeled 'Output B\''.

# Initial Results: Impacts of Enhanced Transit

Transit service levels increased on Beltway and I-95/395 HOT Lane transit routes

- Decrease in toll rates and HOV use
- Increase in transit use
- Slight increase in VMT
- Total revenue essentially unchanged
- Slight increase in speeds on mixed use lanes

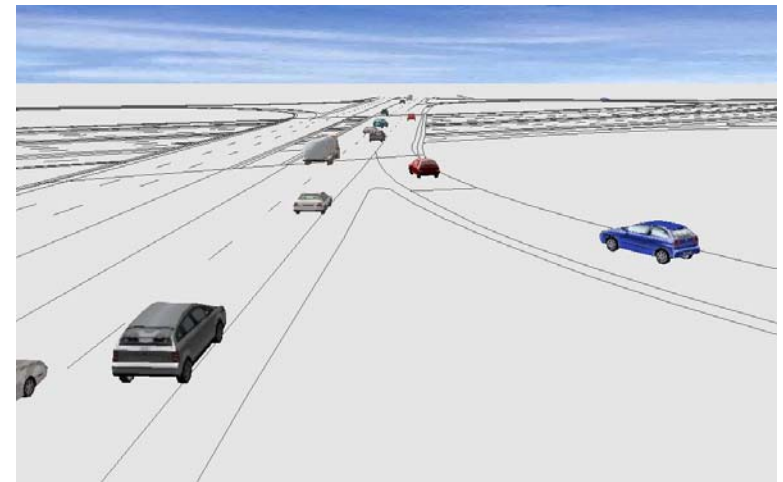
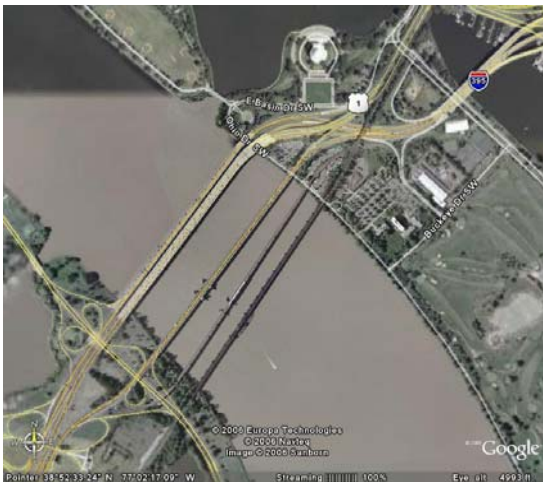


# Identify High Potential Corridors for First Phase Regional Network

- Based on starting point scenario, define “first phase” regional network of high potential corridors
- Regional network will have higher tolls and usage than sum of individual, stand-alone segments (the “network effect”)
- Land use impacts of regional network will need to be assessed and incorporated

# Access and Egress Issues

- Can vehicles get on and off the toll lanes without delay?
  - Some locations of potential concern:
    - 14<sup>th</sup> Street Bridge
    - Beltway/I-95/I-395 Interchange
    - Tysons Corner
  - Planned use of microsimulation tools to analyze potential chokepoints



## 6) Findings to Date

- Toll levels will have to vary by segment, direction and time of day
- Transit services will affect demand and toll levels, and need to be explicitly incorporated
- Full network of VPLs has higher value than the sum of the individual segments (the “network effect”)
- Access and egress issues need to be addressed

## 7) Next Steps

- Incorporate DC bridges and other facilities into an expanded test network
  - Under grant from FHWA Value Pricing Pilot Program
- Additional sensitivity tests
- Microsimulation studies
- Land use impacts (RMAS)