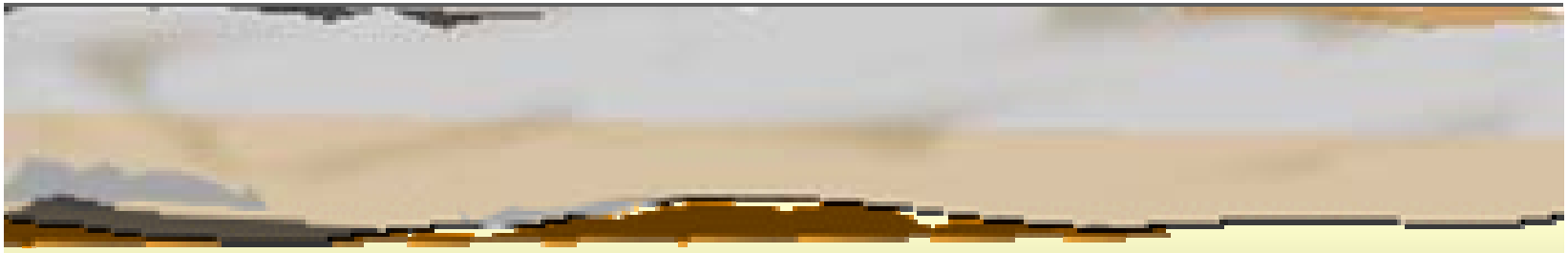


New Toll Road vs. Toll Managed Lanes On Existing Motorways: Alternatives and Impacts In Metro Washington, DC

By Michael Replogle
Environmental Defense
and Brian Grady, Smart Mobility, Inc.

April 11, 2005

Overview

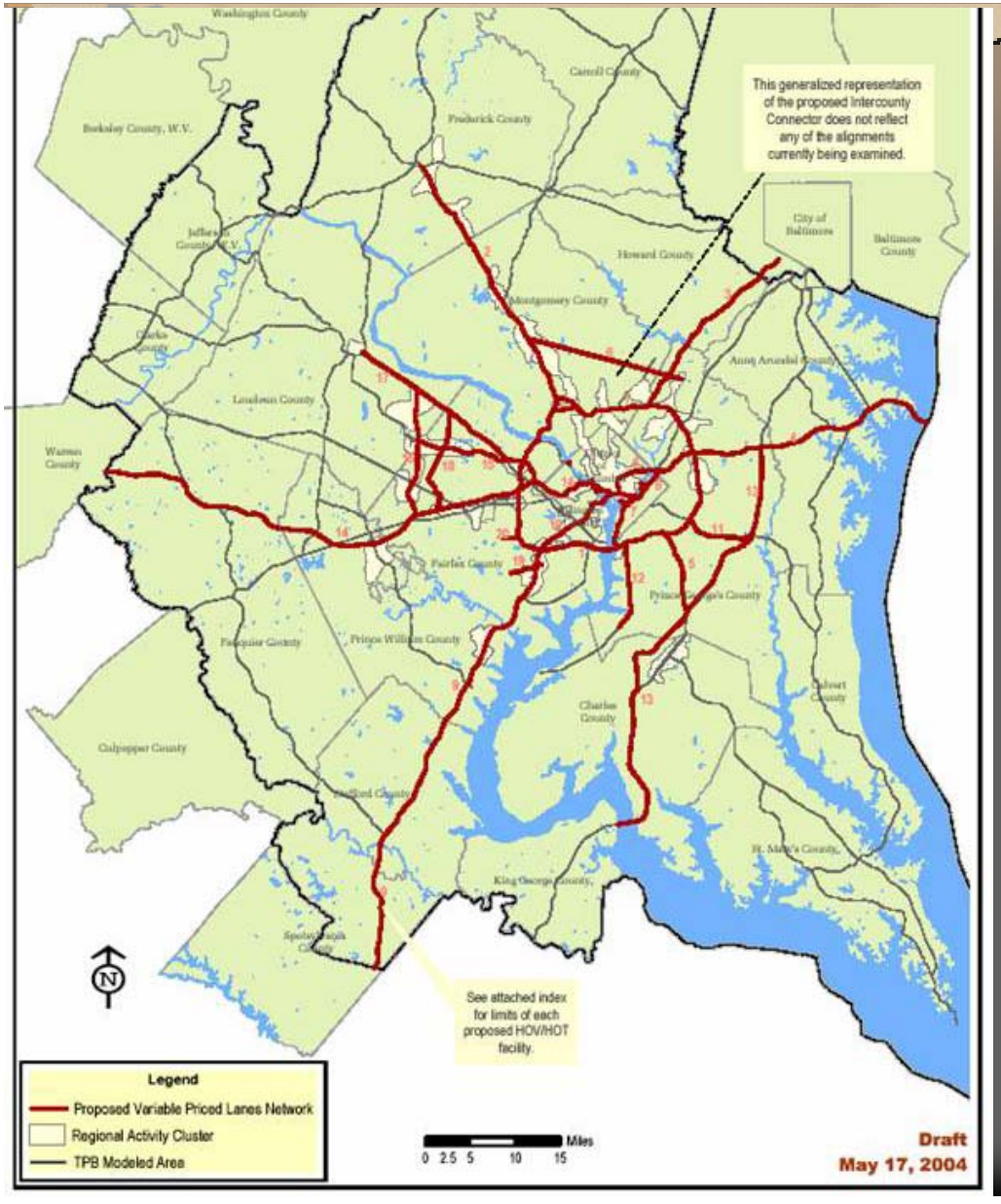
- Key emerging issues in toll lane network design
- Case studies in metro Washington, DC region
  - Regional Value Pricing Task Force
  - DeCorla-Souza studies of Northern Virginia Beltway
  - Intercounty Connector new toll road vs. converting / adding toll lanes to existing motorways with improved public transport, with or without more balanced growth
- Summary of key findings

Key Issues for Toll Network Plans

- New toll motorways vs. enhance existing roads?
- Will tolls pay only for new road lanes or help support new corridor public transport services?
- Optimize for traffic-throughput and revenue maximization vs. person-throughput and environmental/community impact minimization?

Evolving U.S. Federal Toll Policies

- Federal law barred tolling federal aid highways until 1991
- 1991: transportation law allows 15 state tolling pilot programs
- 2005: By 265-155 vote, House rejects bill that would allow tolls only for new lanes and only to pay off bonds to build new lanes
- 2005: Senate bill allows tolls on new (or existing?) lanes with revenues for any transportation purpose, with goals, monitoring, reporting on impacts on system performance, equity, environment, use of alternate modes
- Final bill pending

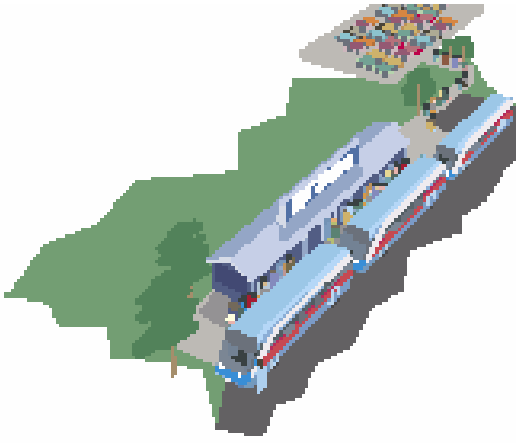


Proposed Variable Priced Toll Lane Network for Metro Washington, DC

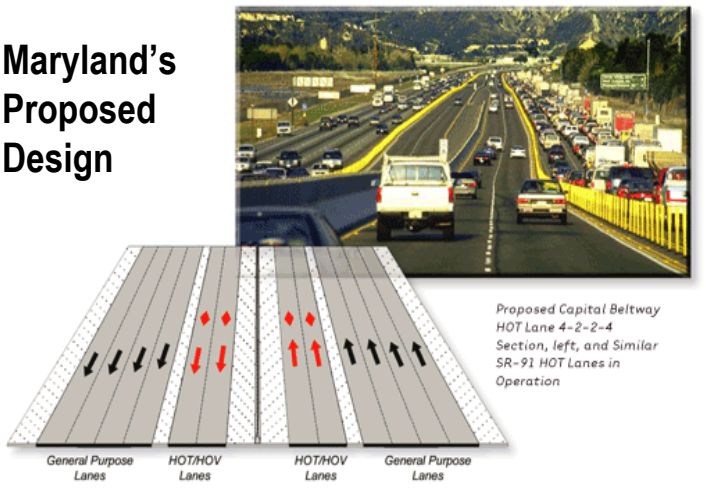
Adopted by Metropolitan Washington Transportation Planning Board for Testing in 2004-05

Current Toll Lane Planning In VA/MD

- Maryland considering add-a-lane/convert-a-lane
- No analysis of how express buses would link to public transport nodes and activity centers
- Uncertain prospects for tolls to fund transit
- Scarce ROW may be fully used for toll lane, precluding efficient Bus Rapid Transit design

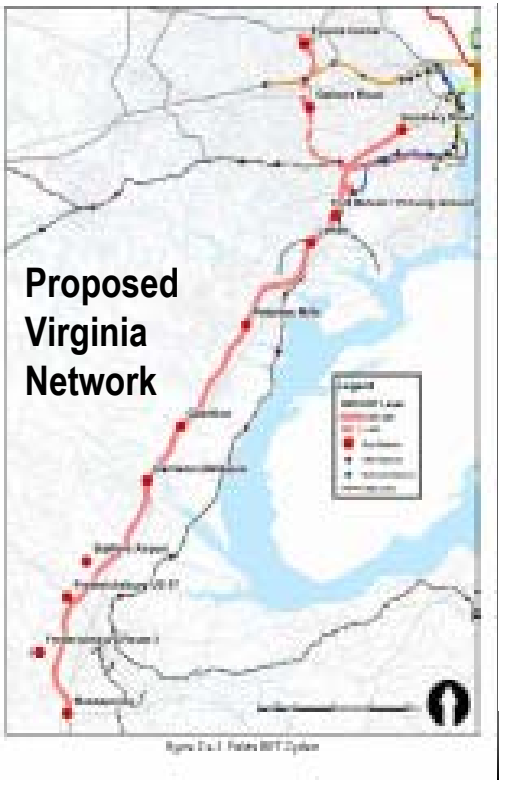


Maryland's Proposed Design



Proposed Capital Beltway HOT Lane 4-2-2-4 Section, left, and Similar SR-91 HOT Lanes in Operation

Proposed Virginia Network



Adopted Goals for Regional System

- Regional technology/policy harmonization for tolled lanes
- Design standards: 1 lane with shoulder or 2 lanes each direction
- bus service an integral element in project planning and design, to maximize people movement over vehicle throughput
- buses to have free-flow direct access from toll lanes to major activity centers, key rail stations, and park-and-ride lots, with accessible stops and signal priority or dedicated bus lanes to ensure efficient access to and from activity centers
- Toll revenues from variably-priced lane projects may finance construction, service debt, and pay for operation and maintenance of the priced lanes. Should toll lanes operate at a revenue surplus, consideration should be given to enhancing transit services

Study of VA Beltway Toll Lanes

- DeCorla-Souza (FHWA/TRB) study showed:
  - Adding two new lanes in each direction to produce a 12-lane facility with 4 High Occupancy Toll (HOT) lanes boosts traffic 12% (36,000 VPD)
  - Adding only one new HOT lane in each direction and better managing 2 of 4 existing lanes by converted them to HOT lanes (yielding a 10-lane facility with 6 HOT lanes), induces only 2% more traffic (6,400 VPD) while producing nearly equal delay reductions, less cost, 3 times more toll revenues

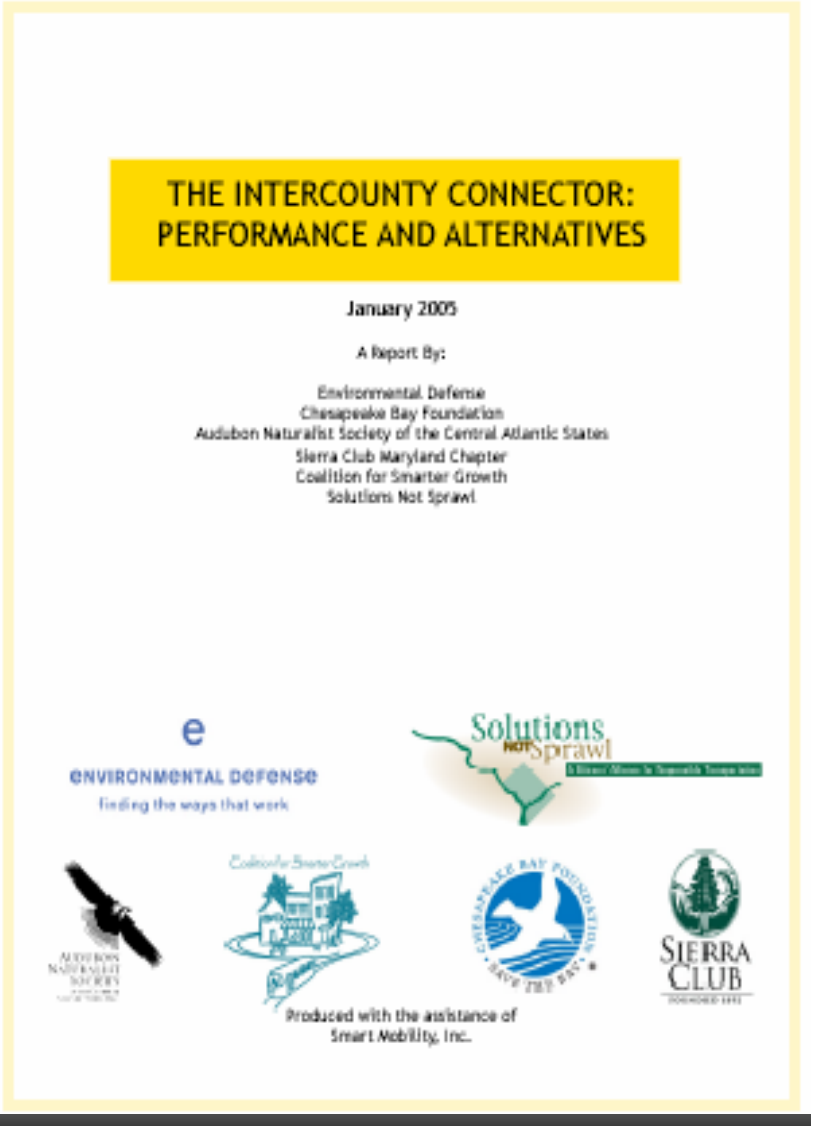
HOT vs. Express Toll Lane Tradeoffs

- *The best choice, from point of view of congestion mitigation and economic efficiency, is HOT lanes with Bus Rapid Transit*
- *If High Occupancy Vehicle (HOV) enforcement is an issue, Express Toll lanes with Bus Rapid Transit (BRT) may be the second best choice*
- *If both HOV enforcement and public tax support for new BRT service are issues, Express Toll lanes [which charge carpools] without BRT would be the third best choice*

Quoting from DeCorla-Souza, 2005 Transportation Research Board Annual Meeting

New Outer Beltway Toll Road vs. Alternatives

- Independent evaluation of alternatives subject to separate official studies but omitted from draft EIS
- Used official traffic and air quality models with peer reviewed assumptions



Alternatives Evaluated

1. **No Build:** The baseline for all comparisons as in the state's DEIS, it includes currently planned improvements.

2. **ICC Build:** This alternative would add the ICC to the region's road network.

3. **Transit Oriented Land Use and Investment:** Build additional transit including the Purple Line and express bus with more jobs and housing near stations and improve the local job-housing balance.

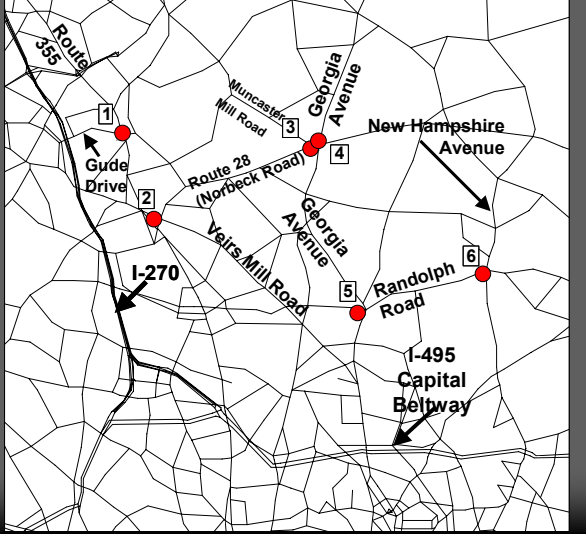
4. **Add Toll Lanes & Express Bus:** Create toll lanes from new and some existing lanes. The fees would vary, based on congestion, but would be free to buses and van pools.

5. **High Occupancy Toll (HOT) Lanes:** Create toll lanes from some existing lanes, but high occupancy carpools of 3 or more would not be charged for use of the toll lanes.

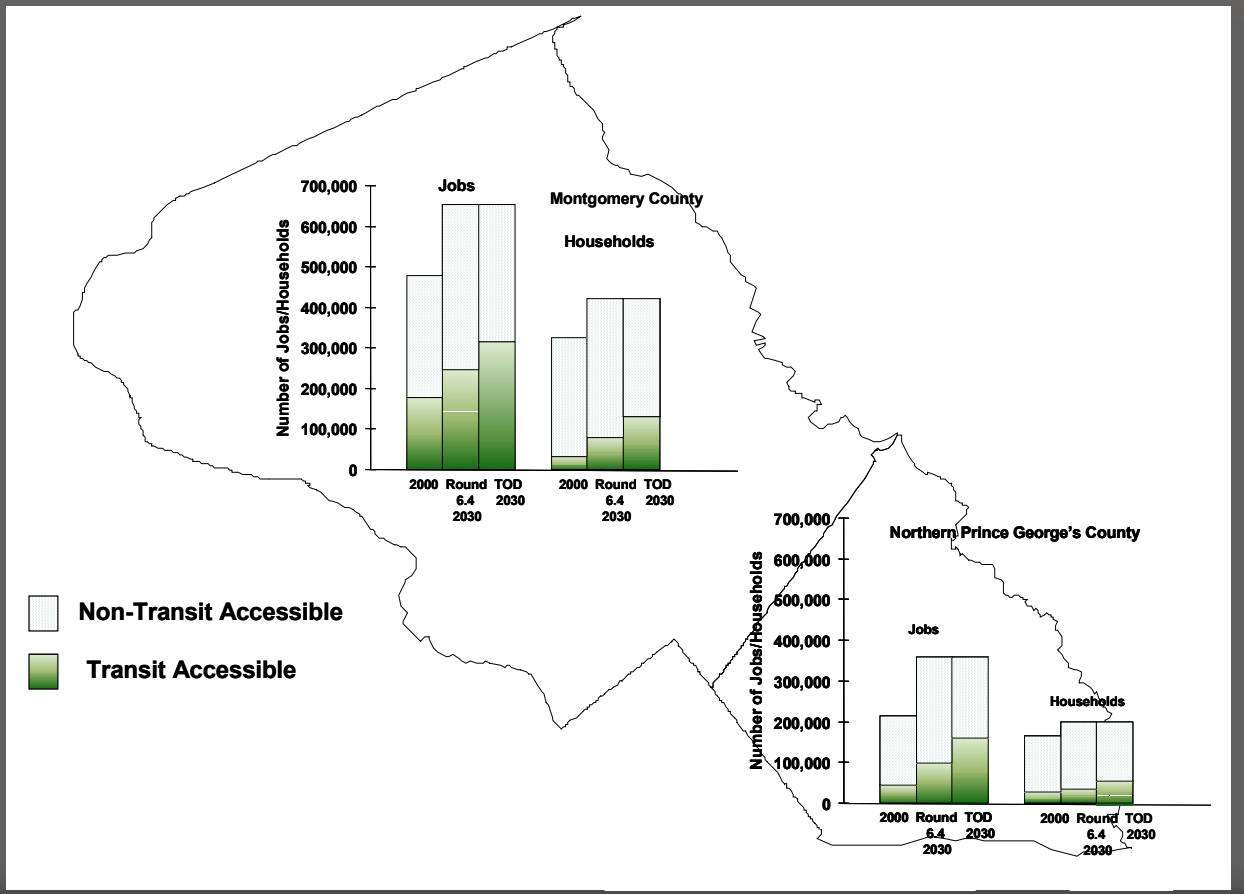
6. **Hybrid: Transit Oriented-HOT Lane-Rail and Express Bus:** A hybrid scenario that combines expanded rail transit and transit oriented land-use (*Alternative #3*) and HOT lanes (*Alternative #5*).

Transit Oriented Investment Alternative With Local Road Improvements

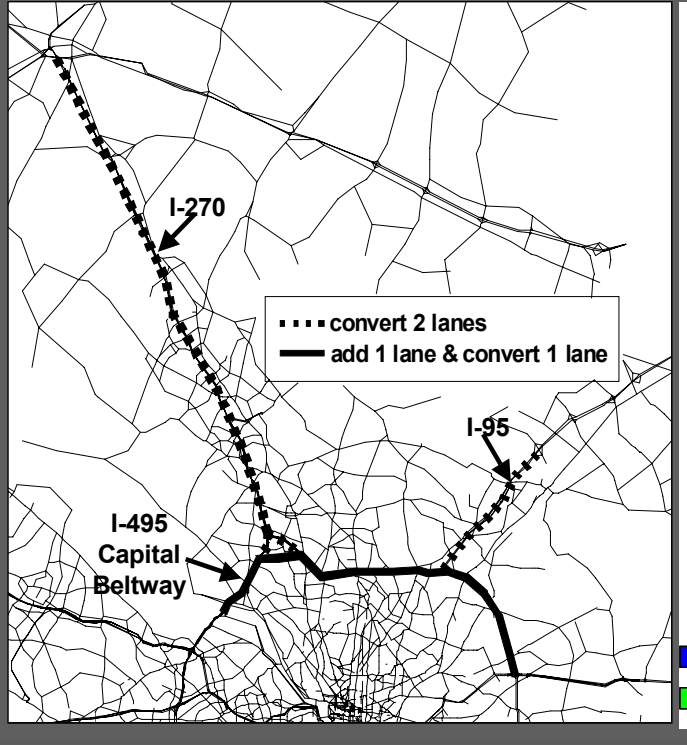
- Purple Line LRT Bethesda to College Park
- Metro extension Shady Grove to Metropolitan Grove
- New Metro station at Montgomery College
- New BRT buses on I-270 and Beltway
- Georgia Avenue Busway: Glenmont to Olney
- Rapid buses on New Hampshire, University Blvd, Viers Mill, Randolph
- Intersection improvements on local arterials

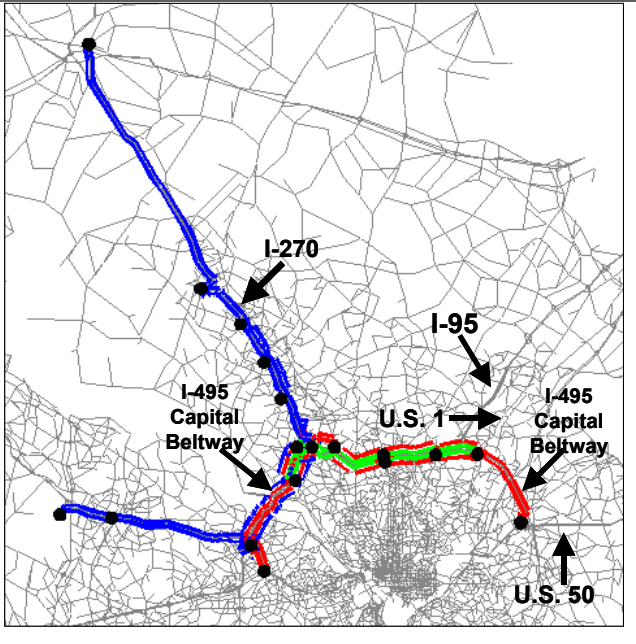


Balanced Jobs and Housing With More Transit Oriented Development



Add & Convert Toll Lanes on Existing Expressways Plus New Toll-Financed Bus Rapid Transit (BRT) Services





Express bus service between Dulles Airport and Frederick, Maryland

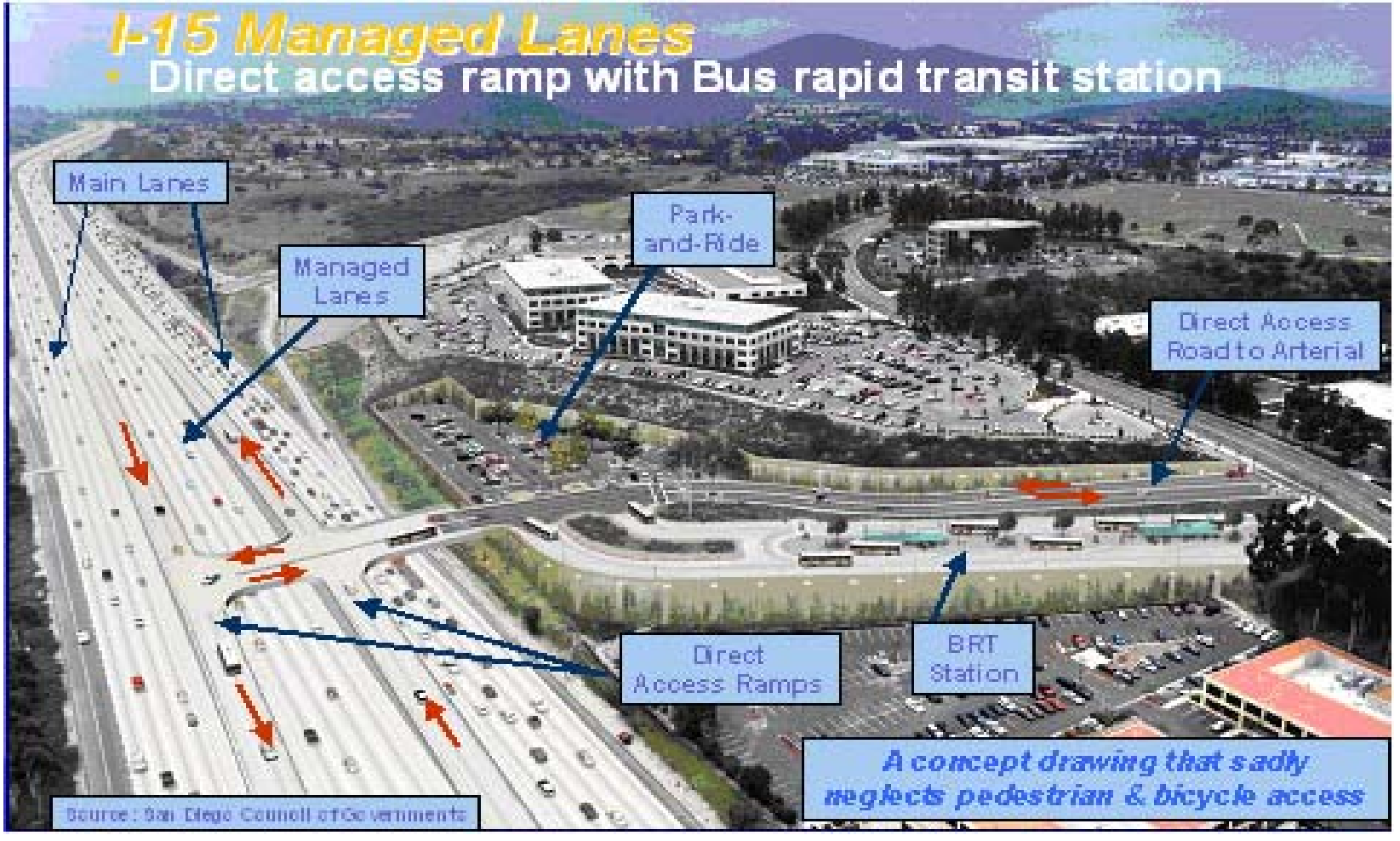
Express bus service on the Capital Beltway (I-495) between River Road and US Route 1

Express bus service between West Falls Church Metro and New Carrollton

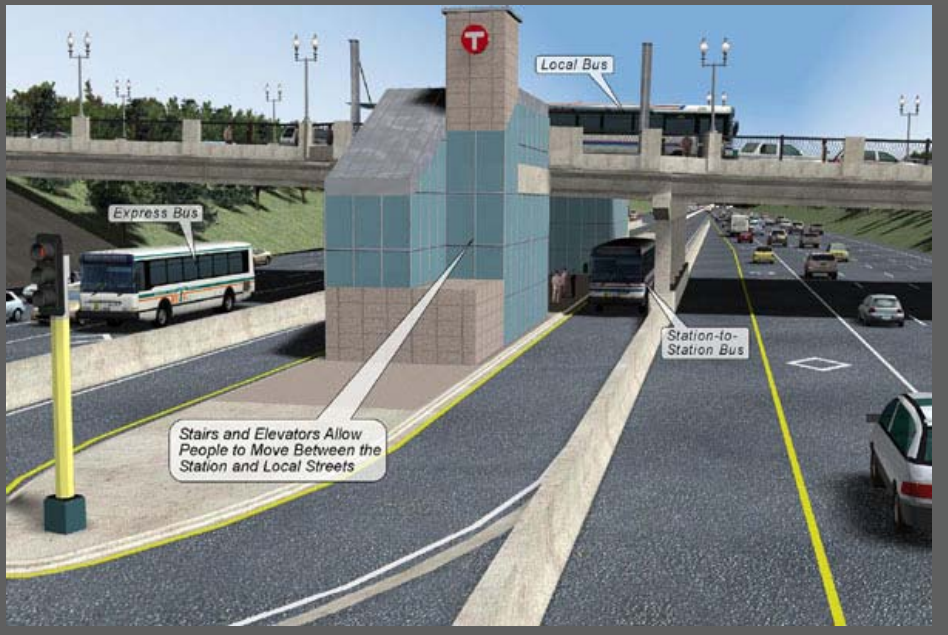
Combining HOT Lanes with BRT

- Arterial BRT: like LRT-metro in travel markets served
- HOT/BRT: more like commuter rail for station spacing, access, trip length

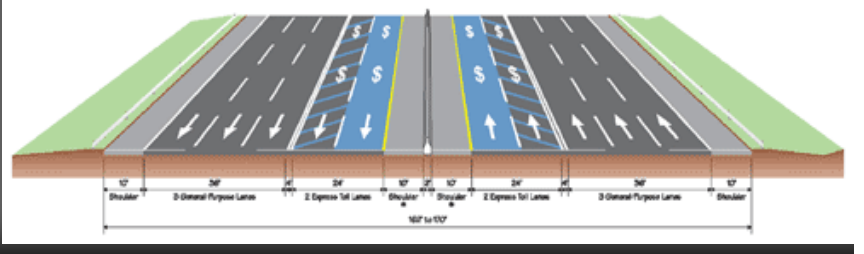
Multiple Visions for HOT/BRT Design



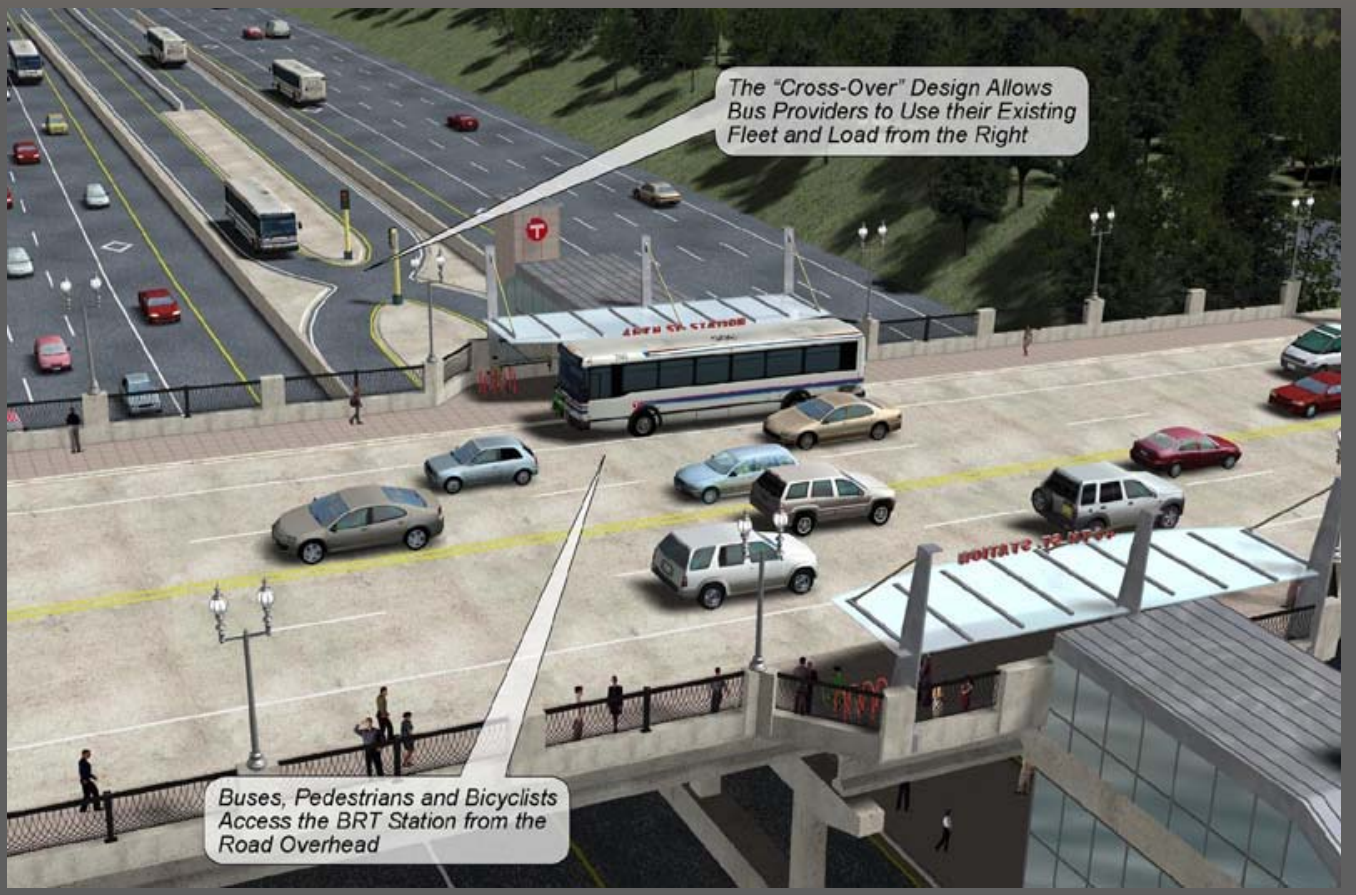
Transit Supportive Toll Lane Design



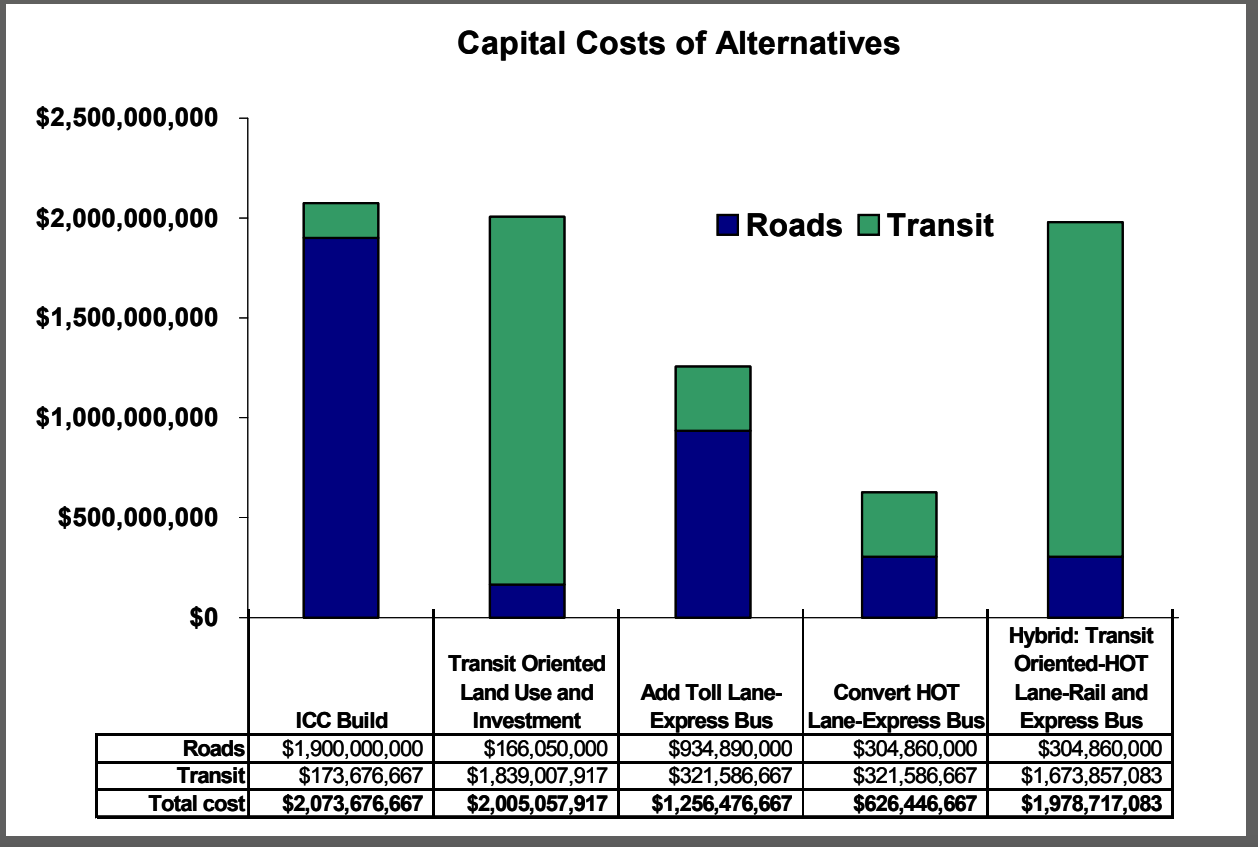
vs. MD SHA Proposed I-495 Toll Express Lanes



Transit Supportive Toll Lane Design

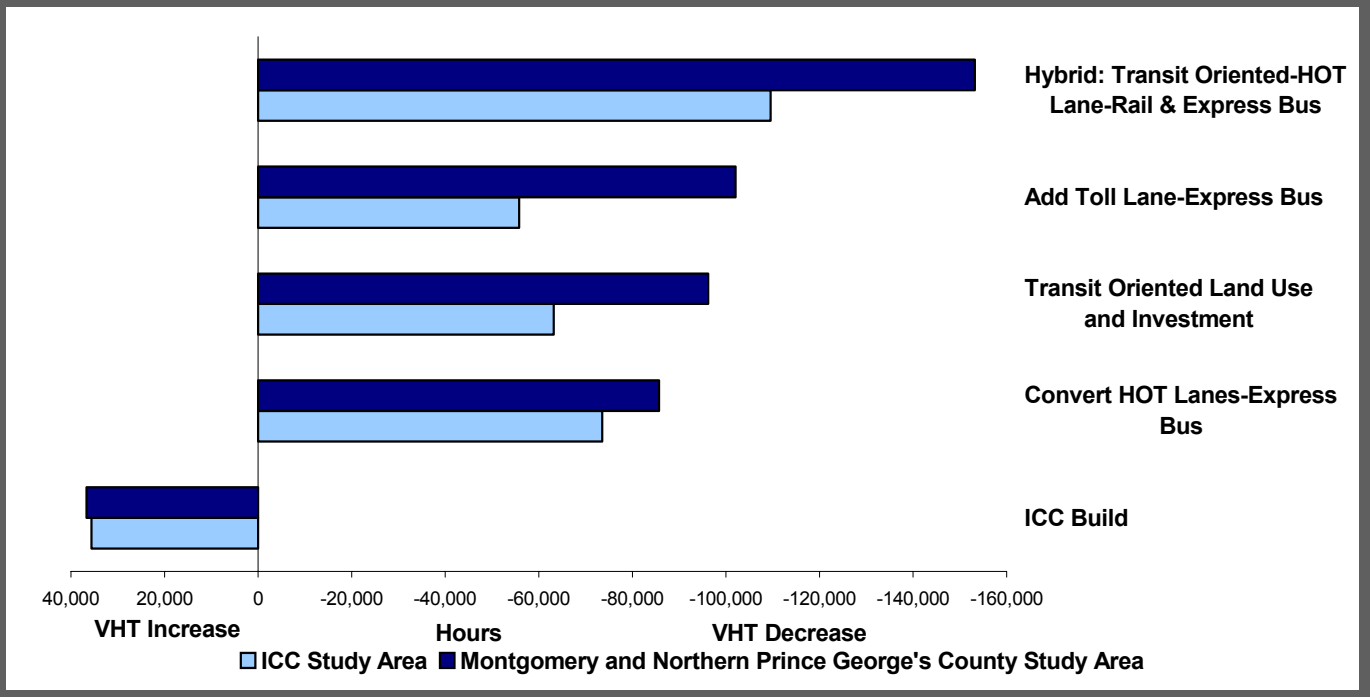


Convert Lanes Cheaper than New Toll Road, Transit, Integrated Strategies

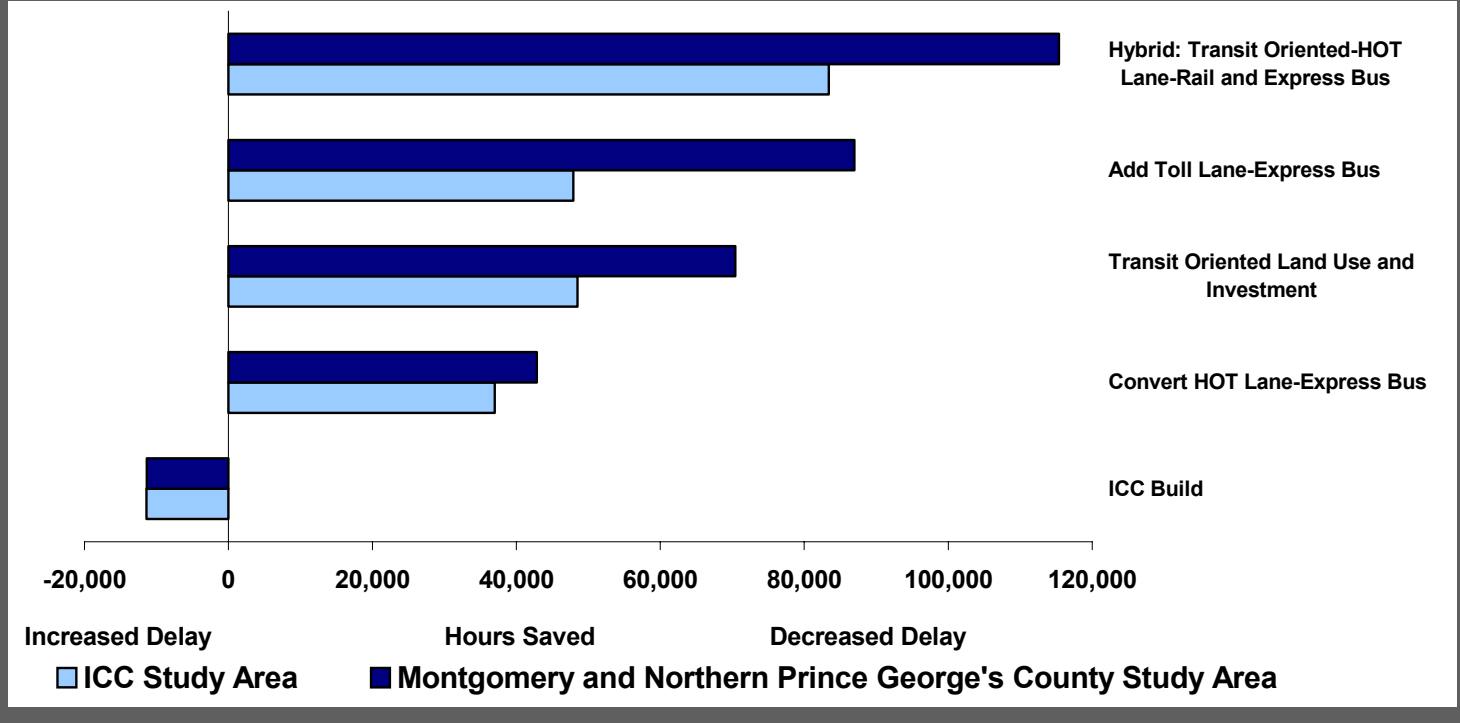


	ICC Build	Transit Oriented Land Use and Investment	Add Toll Lane-Express Bus	Convert HOT Lane-Express Bus	Hybrid: Transit Oriented-HOT Lane-Rail and Express Bus
Roads	$1,900,000,000	$166,050,000	$934,890,000	$304,860,000	$304,860,000
Transit	$173,676,667	$1,839,007,917	$321,586,667	$321,586,667	$1,673,857,083
Total cost	**$2,073,676,667**	**$2,005,057,917**	**$1,256,476,667**	**$626,446,667**	**$1,978,717,083**

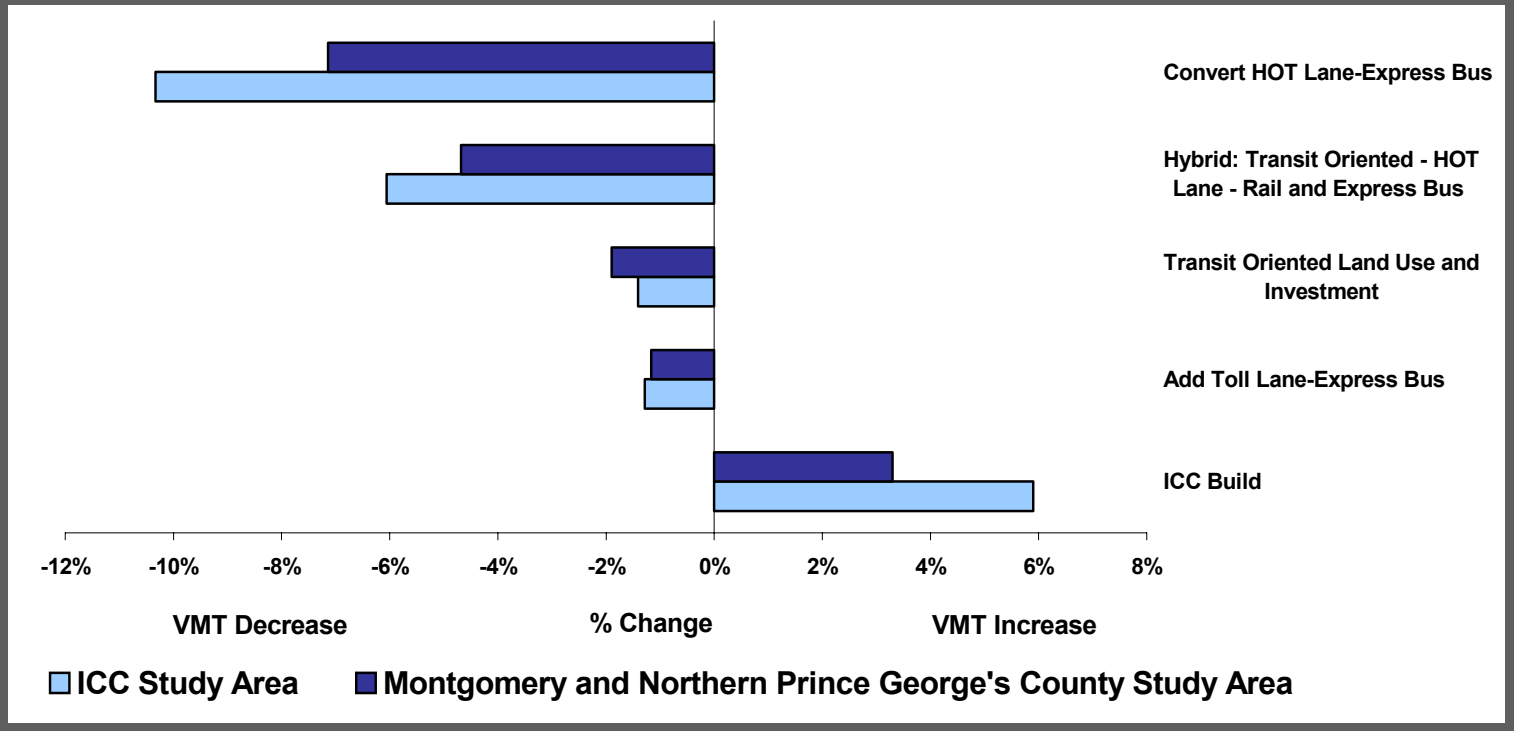
New Toll Road Means More Time Driving, Alternatives Cut Vehicle Hours



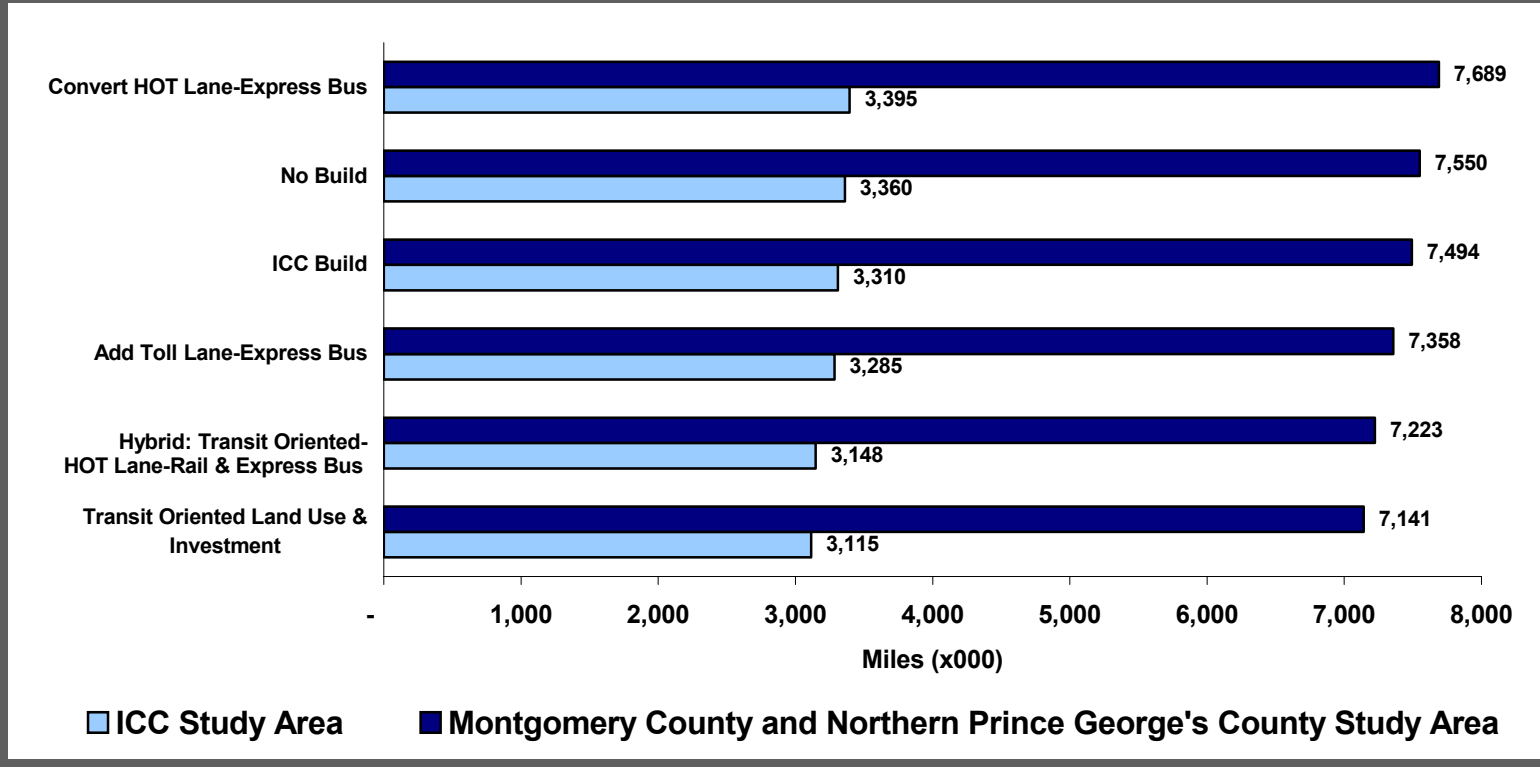
Alternatives Cut Time Stuck in Traffic, New Toll Road Increases Traffic Delays



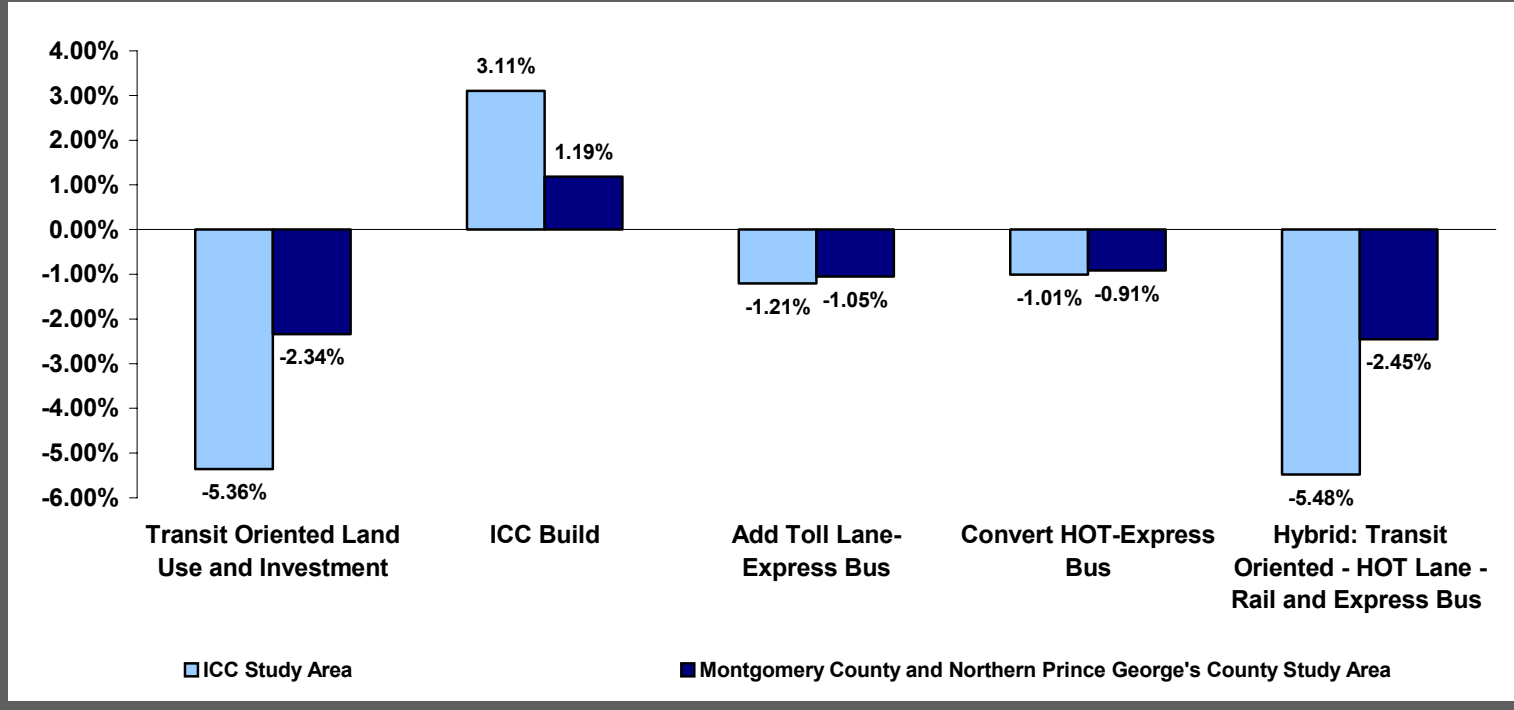
New Toll Road Spurs More Vehicle Miles of Travel, Convert Lanes Cuts VMT



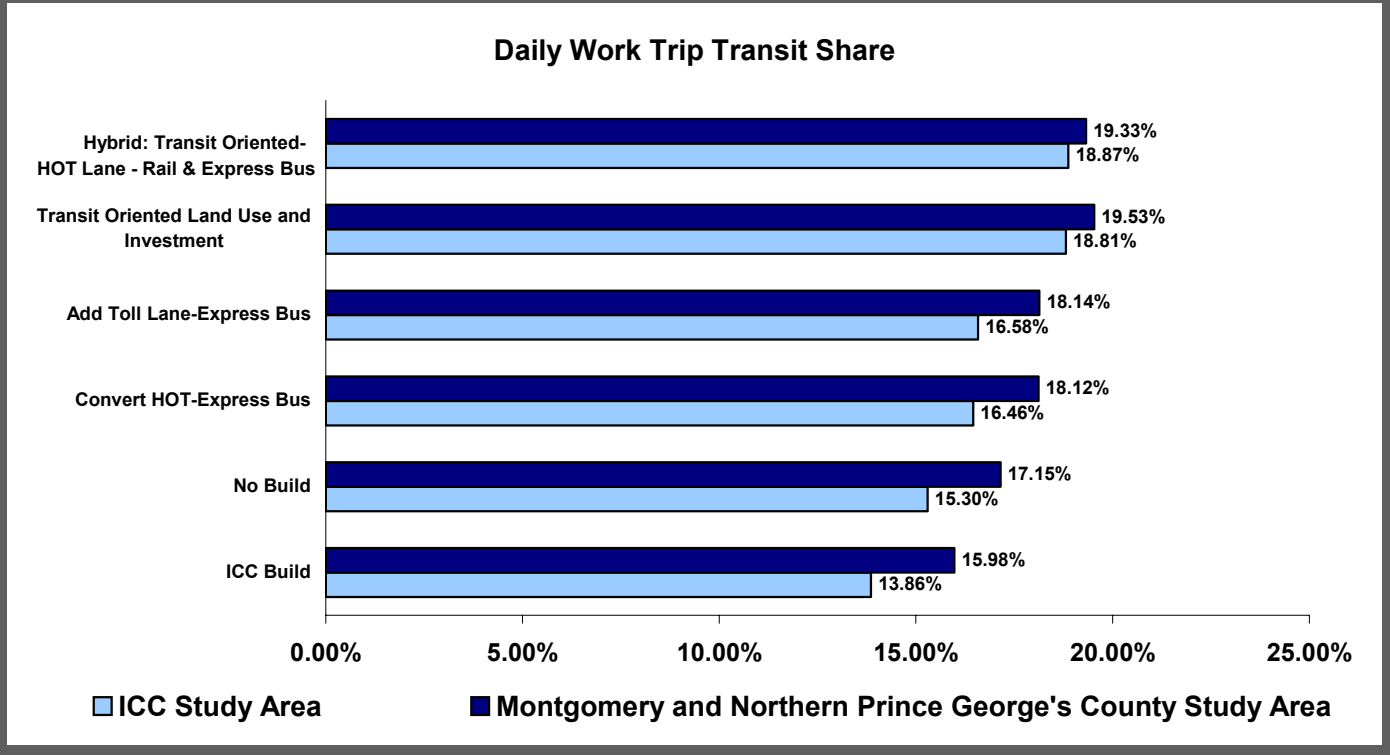
Convert Lanes Boosts VMT on Local Roads, Others Cut Local Road VMT



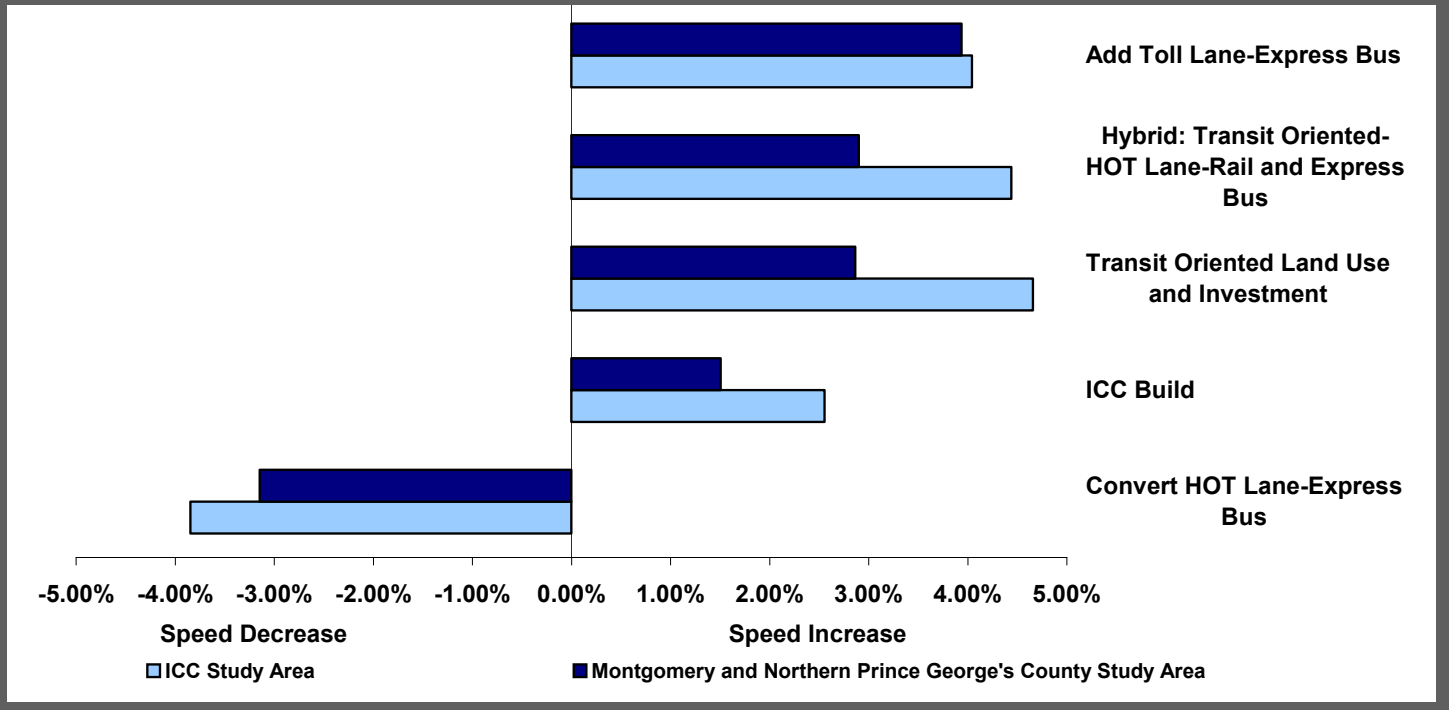
New Toll Road Spurs More Daily Vehicle Trips Compared to Alternatives



New Toll Road Cuts Public Transport Use vs. Alternatives



Convert Lanes Cuts Traffic Speed, Public Transport Alternatives Boost Speeds



Alternatives Produce 4x More Total Toll Revenue Than New Toll Road

Alternative	Toll Paying AM VMT	Toll Paying PM VMT	Toll Paying Off Peak VMT	Toll Paying 24hr VMT
ICC Build	242,881	406,813	505,225	1,154,919
Add Toll Lane-Express Bus	511,394	929,251	1,133,882	2,574,528
Hybrid: Transit Oriented-HOT Lane–Rail and Express Bus	546,895	925,093	1,617,092	3,089,080

Per Mile Toll Rates	AM Peak	PM Peak	Off Peak
ICC Tolls	$ 0.20	$ 0.20	$ 0.15
Express Lane Tolls	$ 0.40	$ 0.40	$ 0.20

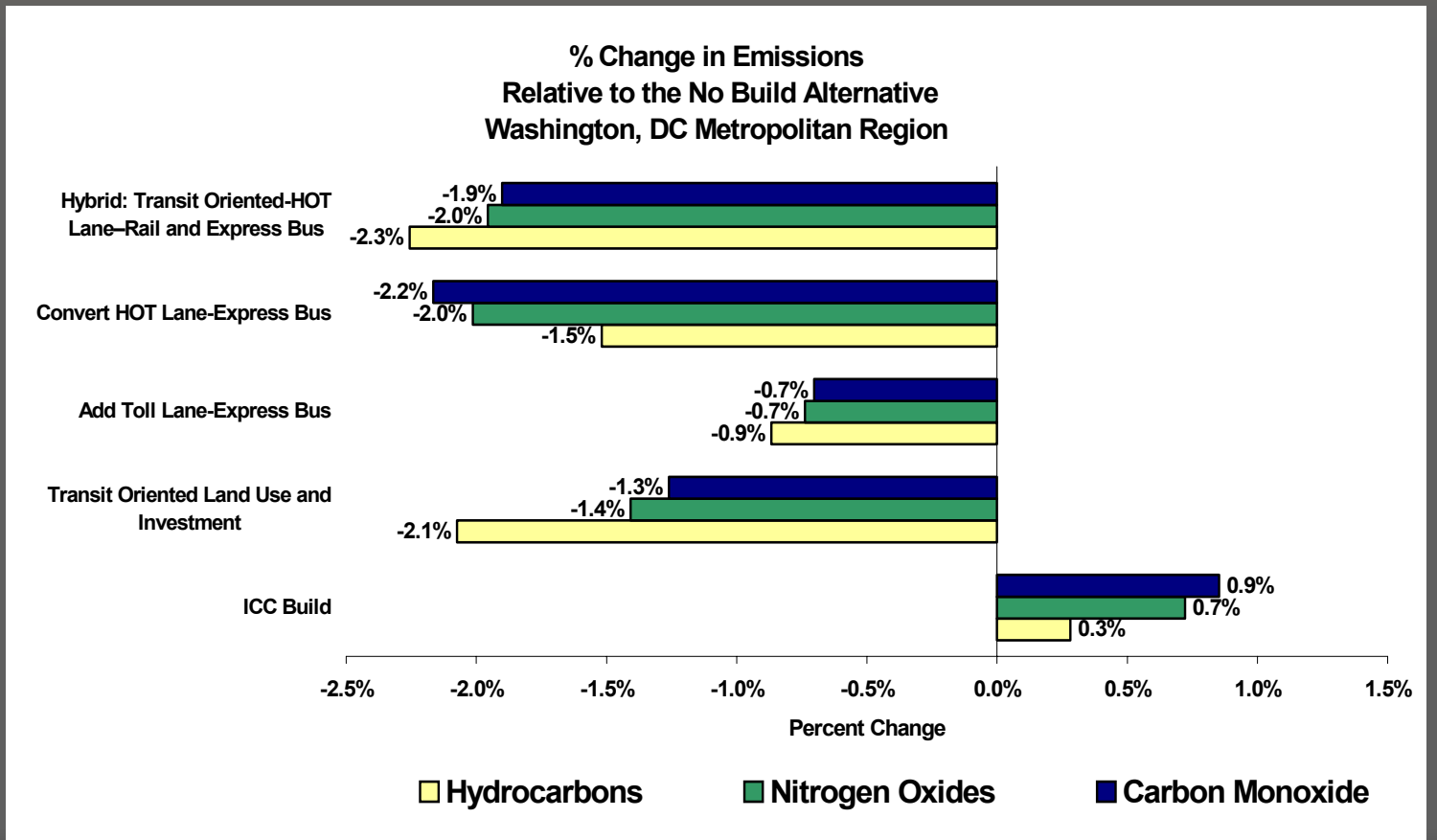
Alternative	Gross 2030 Daily Revenue	Gross Yearly Toll Revenue (day x 300)
ICC Build	$205,723	$61,716,791
Add Toll Lane-Express Bus	$803,035	$240,910,382
Transit Oriented-HOT Lane–Rail and Express Bus[4]	$912,214	$273,664,125

New Toll Road Increases Oil Dependence, Greenhouse Gas Emissions

- Alternatives could save 260,000 metric tons of CO_2 and $31M annually in crude oil costs by 2030
- Money saved boosts local economy and jobs, not foreign oil producers

Scenario	Regional impacts (Projections for 2030)					
	Vehicle Miles Traveled (million miles per yr)	Change vs. no-build (%)	Petroleum Fuel Demand (million gals/yr)[i]	Fuel used vs. no-build (million gals/yr)	CO_2 Emissions (MMT/yr)[ii]	CO_2 emitted vs. no-build (1000 metric tons/yr)
No-build	7,955	--	265		2.4	
ICC	8,351	5%	278	+13	2.5	+117
Efficient alternative[iii]	7,474	-6%	249	-16	2.2	-143

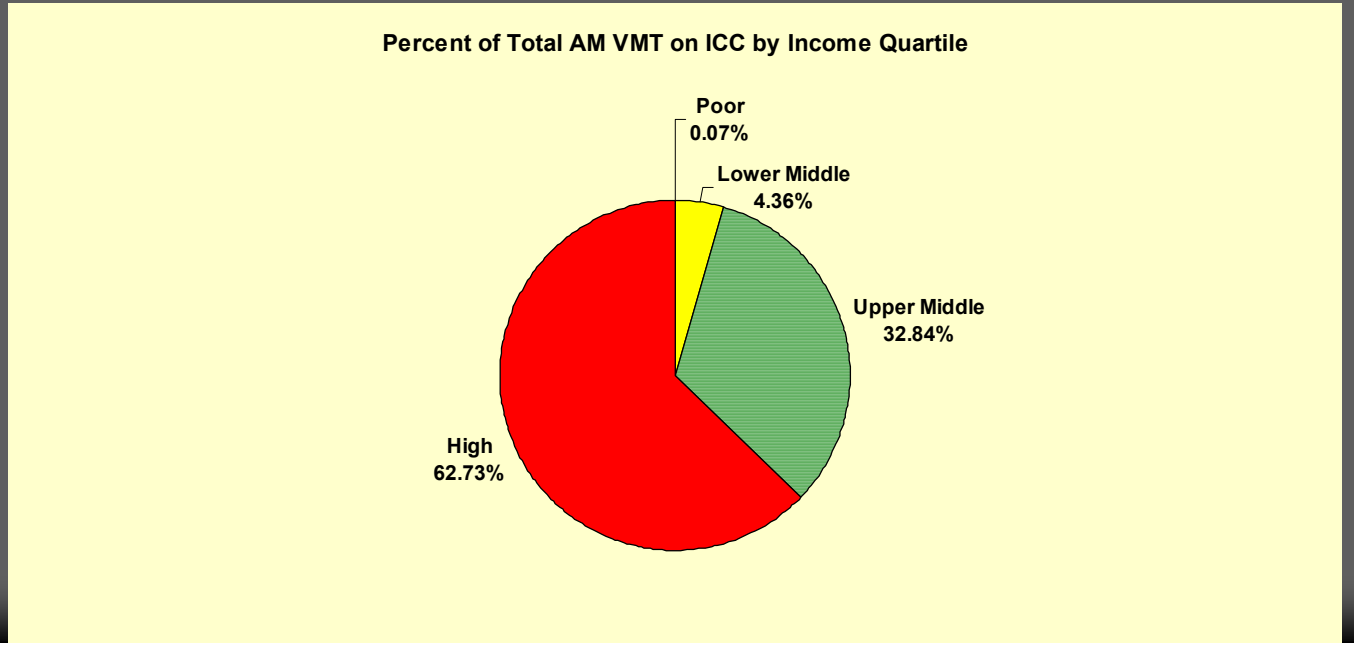
New Toll Road Boosts Air Pollution, Hybrid/Convert Lanes Cuts Pollution Most



New Toll Road May Create Mobile Source Air Toxic & Fine Particulate Hotspots

Low/Moderate Income Travelers Benefit Little From New Toll Road

Independent analysis shows ICC benefits go almost entirely to high income travelers, reducing access to jobs for low income households compared to other alternatives



Alternatives Beat the New Toll Road in Boosting Access to Jobs

Number of Jobs Within 45 Minutes Total Travel Time

Mode Share Weighted Regional Average	Differences from Constrained 2003 Long Range Plan		
	Transit-Oriented Land Use and Investment	ICC Build (Master Plan Alignment)	Add HOT Lane-Express Bus
Automobile			
Income 1 HH residents	21,336	17,156	12,386
Income 2 HH residents	18,808	20,313	11,623
Income 3 HH residents	17,118	22,705	11,414
Income 4 HH residents	14,298	28,058	10,444
Public Transportation			
Income 1 HH residents	16,759	4,027	13,177
Income 2 HH residents	16,380	4,780	13,705
Income 3 HH residents	18,041	5,109	14,728
Income 4 HH residents	21,452	5,340	21,177
Composite Automobile and Public Transportation			
Income 1 HH residents	38,095	21,182	25,563
Income 2 HH residents	35,188	25,092	25,328
Income 3 HH residents	35,159	27,814	26,143
Income 4 HH residents	35,750	33,396	31,621

New Toll Road Has Huge Adverse Natural Resource Impacts

Irreparable harm to:

- Stream valley parks
- Rare species
- Forest interior habitat
- Vernal pools
- Trout streams.

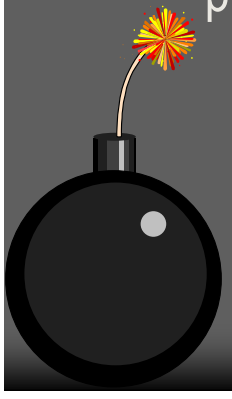
Many of these impacts cannot be mitigated

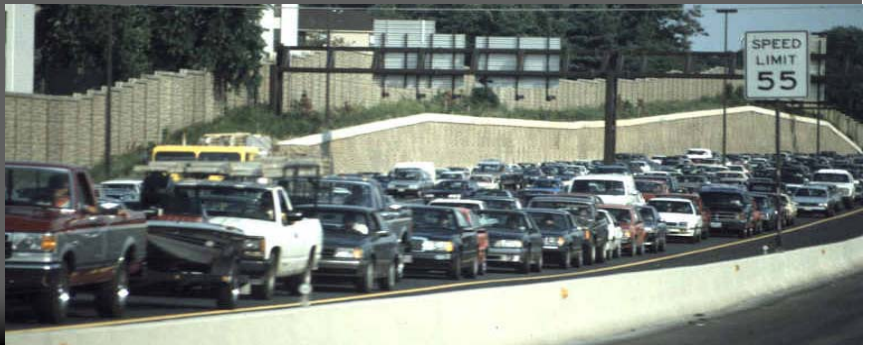
Rank Ordering of Alternatives

Cardinal Scale Rankings											
1=Best 6=Worst SCENARIOS	Avg. Rank	Vehicle Hours Of Travel	Vehicle Hours Of Delay	Vehicle Miles Traveled (VMT) All Facilities	VMT Local Roads	VMT Major Arte-rials	Total Transit Trips	Work Trip Transit Share	Travel Speed	Air Quality	Total Cost
Hybrid: Transit Oriented Hot Lane Rail and Express Bus	1.8	1	1	2	2	2	1	1	2	2	4
Transit Oriented Land Use And Investment	2.3	3	2	3	1	1	2	2	1	3	5
Add Toll Lane-Express Bus	3.3	4	3	4	3	3	3	3	3	4	3
Convert HOT Lane-Express Bus	3.6	2	4	1	6	6	4	4	6	1	2
No Build	4.6	5	5	5	5	5	5	5	5	5	1
ICC Build	5.4	6	6	6	4	4	6	6	4	6	6

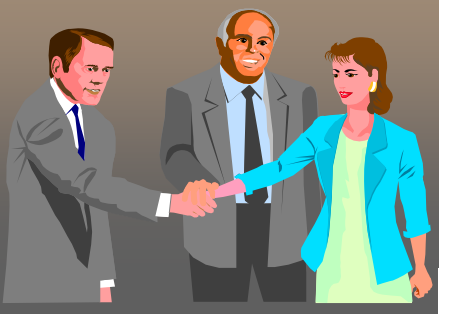
Toll Managed Lane Systems Can Be Designed To:

- Maximize road system expansion and traffic throughput
- Limit use of toll revenues to road system investment alone
- Such systems are likely to spur sprawl, traffic growth, increased pollution and greenhouse gas emissions, worse inequality of access to jobs and opportunities
- This may spur opposition, project delays, and backlash against toll projects and public-private partnerships





Or Toll Managed Lane Systems Can Be Designed To:



- Mitigate adverse impacts from expanded mobility
- Reduce and manage traffic growth and congestion
- Promote more efficient public transportation
- Expand transportation choices and value for all user groups
- Boost equitable access to jobs and public facilities
- Support compact, mixed use development, community reinvestment
- Incorporate these in community benefit agreements for public-private partnerships to cut opposition to projects

Good stewardship demands open consideration of alternatives with public involvement and sound analysis