



More Sprawl, More Traffic, No Relief: An Analysis of Proposed Potomac River Crossings

Executive Summary of research completed by:

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for

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Chesapeake Bay Foundation

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Solutions Not Sprawl

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Summary of Study

This study evaluates the effects of building a proposed new Potomac River crossing and expressway connecting northern Virginia with Montgomery or Frederick County, Maryland, considering two possible alignments. Utilizing detailed real estate market data and a refined version of the latest Council of Governments regional traffic model, the study estimates the land use and transportation effects of two proposed crossings, which are components of long-discussed proposed outer beltways around metropolitan Washington, DC.

The study concludes that either of these alignments – the Techway or the Western Transportation Corridor - would spur sprawl, traffic, and pollution growth, especially in the western portion of the region, while failing to relieve traffic problems on many existing roads. Construction of the proposed Techway, for example, would cause the average traffic congestion to rise by 10 percent in Montgomery County, 6 percent in Loudoun, 4 percent in Prince William, and 2 percent in Fairfax and Frederick counties, compared to the No Build scenario. The Western Transportation Corridor would have similar, but more modest growth shift and traffic impacts because the full build out of that corridor would occur later than for the Techway corridor. Thus, average county level traffic congestion would increase by 5 percent in Prince William, 4 percent in Montgomery, 3 percent in Frederick, and 1 percent in Fairfax, compare to the No Build scenario. Loudon County's comprehensive plan helps limit sprawl effects of the WTC, producing a 4 percent drop in Loudoun County, compared to the No Build scenario. Under either alignment, inner suburban and urban jurisdictions would experience some reduction in traffic due to declining economic and travel activity caused by loss of job and housing growth.

Development of a new Techway Potomac River Bridge would reduce traffic on the Capital Beltway American Legion Bridge by less than 2 percent. A new Western Transportation Corridor Bridge would reduce American Legion Bridge traffic by less than 1 percent. Traffic on roads near the new bridges would be significantly higher than it would be without the bridges. With the Techway, for example, traffic on Route 7 in Virginia adjacent to a new interchange would almost double compared to the No Build scenario. Traffic on Maryland Route 28 would nearly triple compared to the No Build scenario.

Significant shifts in land use and traffic sparked by the new bridges account for the increased traffic and congestion. An analysis of demographic changes finds that all bridge alternatives will result in significant increases in development by 2025 over the current regional forecasts for Loudoun, Fairfax, Prince William, and Fauquier Counties in Virginia and Montgomery and Frederick Counties in Maryland. Construction of these roads would also likely shift population and employment from core areas of DC, Alexandria, Arlington and Prince George's County, reducing their tax base. This creates a number of transportation problems as vehicle trips increase, trip lengths increase because of more scattered development, and transit trips decline.

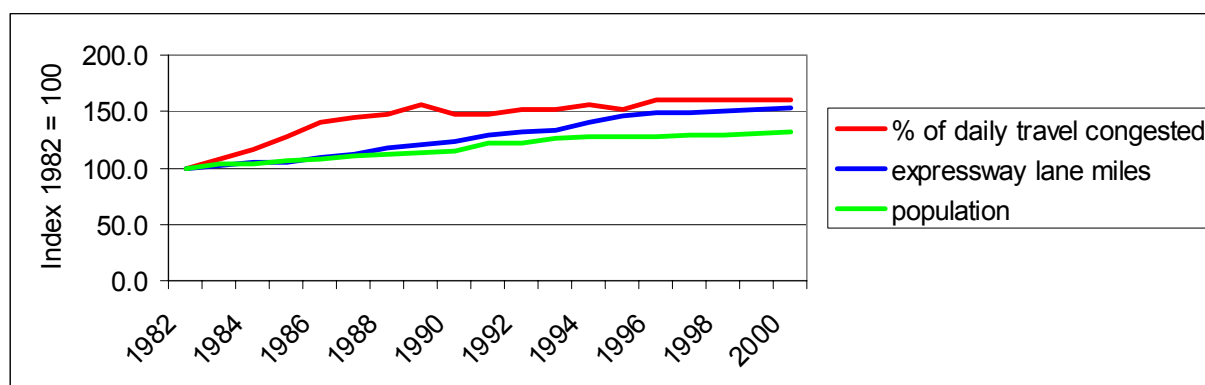
Attempts to Build Our Way Out of Congestion Have Failed

Those who do not learn from history are doomed to repeat it. – George Santayana

The Washington region is considering new expressway Potomac River crossings west of the beltway. Before investing in any of these projects, it is critical that citizens understand what has happened in the past, and what will likely happen in the future. This report documents land use changes and traffic impacts that would result from different possible new Potomac River crossings west of the beltway. In each case, the new roadways will bring additional development, and additional traffic. Any benefits will be small, and outweighed by the costs.

Despite billions of dollars of investments in suburban expressways, congestion has gotten worse in every major metropolitan area in the U.S. over the past twenty years. In the Washington D.C. region, expressway capacity has increased much faster than population growth. Congestion has gotten worse.

Expressway Investments Have Failed to Reduce Congestion in the Region



Texas Transportation Institute *Urban Mobility Study* data for the Washington D.C. region

New and widened suburban expressways have failed to live up to their promise. Sprawling development has followed the expressway projects. Expressways have filled with traffic much faster than planners assumed. Travel begins at homes and businesses. No trip begins or ends on an expressway, and the increased expressway traffic has spilled over onto intersecting roadways, creating many new bottlenecks. Expected traffic decreases on other roadways often have failed to occur at all.

The history of widening I-270 in Montgomery County, Maryland in the late 1980's demonstrates all these failings. Traffic conditions improved briefly. Then land development boomed in the corridor. With approval of funds for the I-270 widening, under Montgomery County's growth management law, planners were forced to immediately relax the corridor's subdivision growth limits to allow up to 12,000 added homes and 13,000 added jobs¹ In the five years before construction began, officials had approved permits for 1,745 new homes in the area stretching from Rockville to Clarksburg. During the next five years, 13,642 won approval and moved to construction. (Washington Post, January 4, 1999) By 1997, I-270 was routinely overrunning its

¹ Maryland-National Capital Parks and Planning Commission, Montgomery County 1985 Comprehensive Planning Policies Report, May 1986, Silver Spring, Maryland.

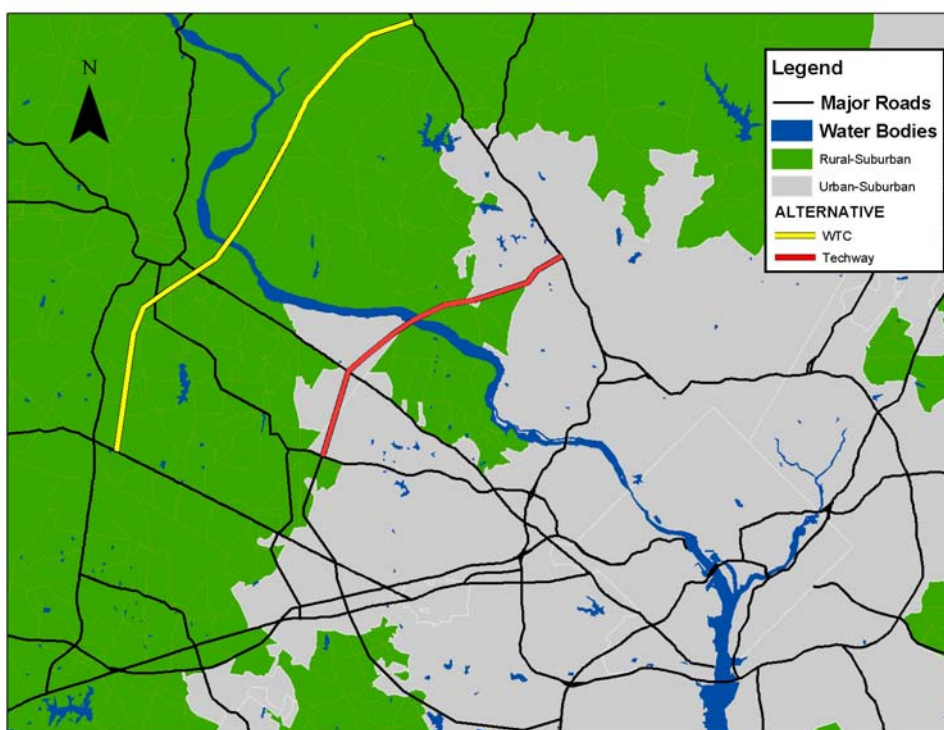
designed capacity, and peak-hour traffic volumes on some segments had surpassed levels forecasted for 2010.

I-270 Traffic – Montgomery County, Maryland



This report analyzes shifts in households, employment, and traffic that would result from proposed expressway projects shown in the figure below.

Proposed New Expressway/Potomac River Crossings



Different alignments have been proposed for the roadways. The WTC as modeled would cross the Potomac east of Leesburg. The Techway as modeled would cross the river near the Fairfax/Loudoun County line.

Build It and They Will Shift

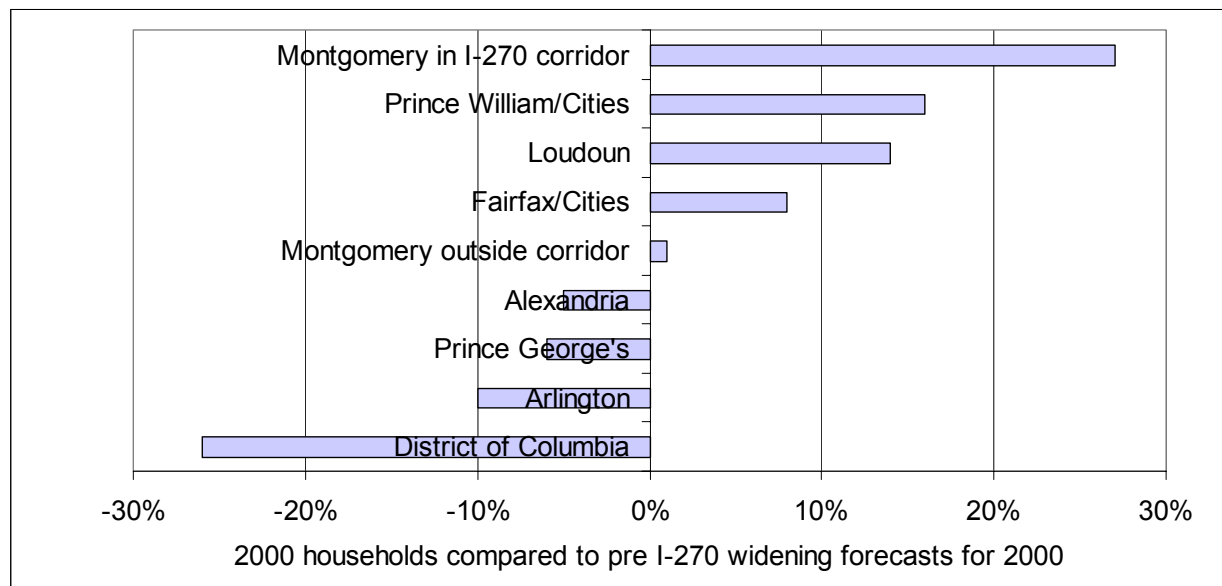
The famous line “Build it and they will come” from *Field of Dreams* has often been used to describe increased development and traffic following construction of suburban roadways. Looking at the local area only, it is true – build it and they will come. New housing and commercial development follows the roadways, and traffic increases.

The story is more complex at the regional level. Researchers have found that constructing suburban roadways does not increase regional population and employment. Instead it shifts them from some areas to other areas. Economists Marlon G. Boarnet of University of California at Irvine and Andrew F. Haughwout of the Federal Reserve Bank of New York reviewed research in a paper published by the Brookings Institution. They conclude: “*In sum, the evidence suggests that highways influence land prices, population, and employment changes near the project, and that the land use effects are likely at the expense of losses elsewhere.*”²

The history of the I-270 widening project clearly demonstrates this shift to the suburbs. When the project was planned, forecast housing and employment growth in the corridor was moderate, and growth in the region’s core was expected to be much stronger.³ The forecast for total 2000 households for the entire region was accurate, only 2 percent higher than the actual number. The forecasts were completely wrong about the distribution of the households.

As shown below, the largest error was for Montgomery County in the I-270 corridor, where the actual number of households in 2000 exceeded the forecast by 27 percent. This was caused by the I-270 widening.

Past Suburban Expressway Projects Shifted Households to Suburbs from Core



² Boarnet, Marlon G. and Andrew F. Haughwout. “Do Highways Matter? Evidence and Policy Implications of Highways’ Influence on Metropolitan Development.” The Brookings Institution Center on Urban and Metropolitan Policy, August 2000 (<http://www.brookings.edu/dybdocroot/urban/boarnetexsum.htm>).

³ Data from National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, “Comparison of 1984 Study Forecasts with Most Recent Data: I-270 Corridor, June 18, 2001.

The other areas where growth was underestimated are suburban Virginia areas where expressway capacity has also been greatly expanded. Recent projects in these areas include construction of the Dulles Greenway and the Route 234 Bypass and widening I-66.

The suburban increases were balanced by declines and slower growth in the core of the region, including D.C., Arlington, Prince George’s County, and Alexandria.

Underestimation of employment growth in the I-270 corridor was even more significant. Actual employment in the corridor in 2000 was 45 percent greater than the forecast.

Anita Kramer & Associates have modeled the demographic effects in 2025 that would result from a new Potomac River Bridge.⁴ They find that all bridge alternatives will result in increases to growth in households and employment over the base COG 6.2 forecasts in Loudoun, Fairfax, Prince William, and Fauquier counties in Virginia, and in Montgomery and Frederick counties in Maryland.⁵

The first step in the modeling process was calculating the effects of each bridge scenario on inter-county travel distances. Then, county-to-county commuting patterns in Census data were analyzed. Next, each county was divided into several subareas. Development potential estimates were made for each subarea, based on local planning and zoning regulations and current development densities. Combining the travel distance information, commuting pattern data, and the development potential data, the model estimates increases for households and employment by subarea.

The following tables, reproduced from the Kramer report, summarize the projected demographic changes to the study area counties resulting from the Potomac River Bridge alternatives.

Increase in Households Due to Proposed North Potomac River Crossings

	Techway	Techway	WTC	WTC
County	New HH	% New HH	New HH	% New HH
Loudoun	14494	10%	6868	5%
Fairfax	18491	4%	6660	1%
Fauquier	2300	6%	1792	5%
Prince William	10067	6%	6032	4%
Montgomery	31222	8%	11238	3%
Frederick	8866	8%	9526	8%
Total	85441		42116	

⁴ Anita Kramer & Associates - Economic and Financial Consultants, Washington D.C. “Analysis: Impact on Land Use of a North Potomac River Crossing”, 2002.

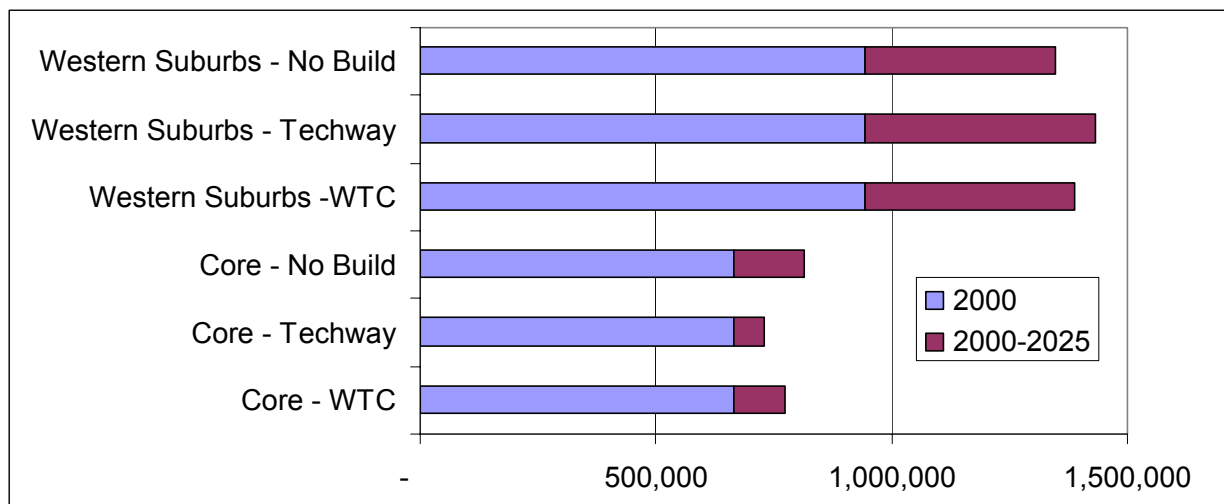
⁵ Anita Kramer & Associates modeled three alternatives. The Techway alternative described in this report is labeled “High Techway” in the Kramer report. The “Low Techway” considered in the Kramer report includes the same alignment as the “High Techway” in Virginia but follows a different route in Maryland. Modeled household and employment shifts are lower than the High Techway scenario but higher than the WTC scenario.

Increase in Employment Due to Proposed North Potomac River Crossings

County	Techway	Techway	WTC	WTC
	New Emp	% New Emp	New Emp	% New Emp
Loudoun	33224	14%	19957	9%
Fairfax	64186	8%	28279	4%
Fauquier	1856	6%	1559	5%
Prince William	14234	8%	9560	5%
Montgomery	121591	18%	46866	7%
Frederick	17137	11%	18569	11%
Total	252228		124789	

Based on the Boarnet and Haughwout research cited above and the experience of the region in the past two decades, these increases will be balanced by slower growth in other parts of the region. Total regional population and employment will be about the same for any of the scenarios, and is assumed to be exactly the same. It also is assumed that the core areas that lost share in the I-270 case will similarly lose share here – D.C., Arlington, Prince George’s County, and Alexandria. As shown in the figure below, these areas grow in both scenarios, but they will grow less than if none of the new expressways were constructed.⁶

Any of the Expressways Will Shift Household Growth from the Core to the Suburbs

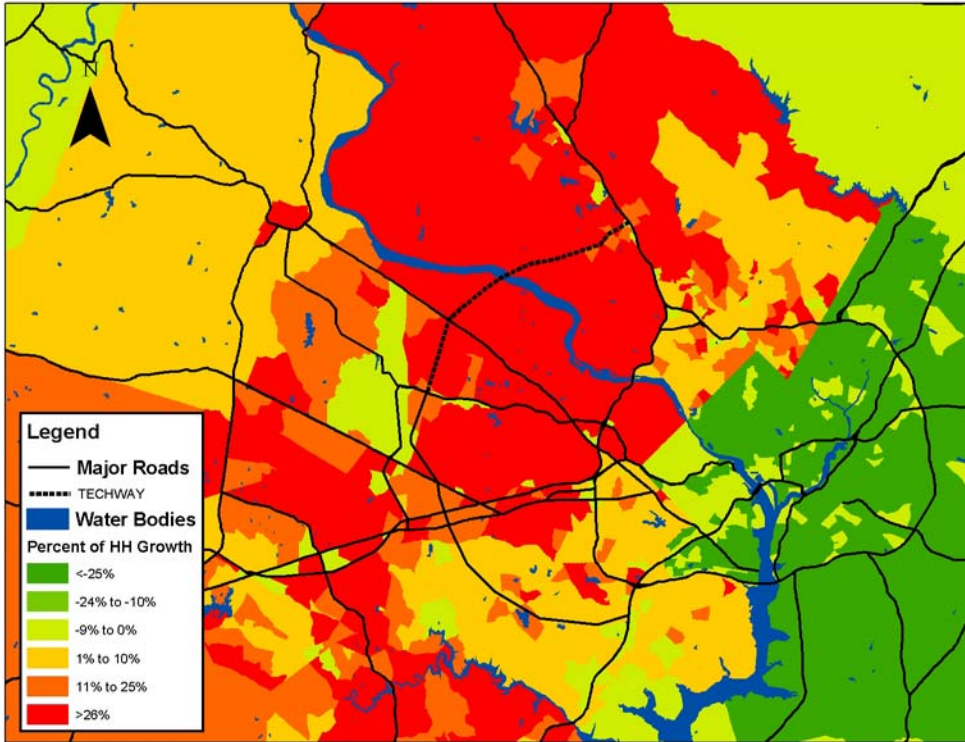


Similar shifts in employment were made from the core areas to balance the increases in the suburbs.

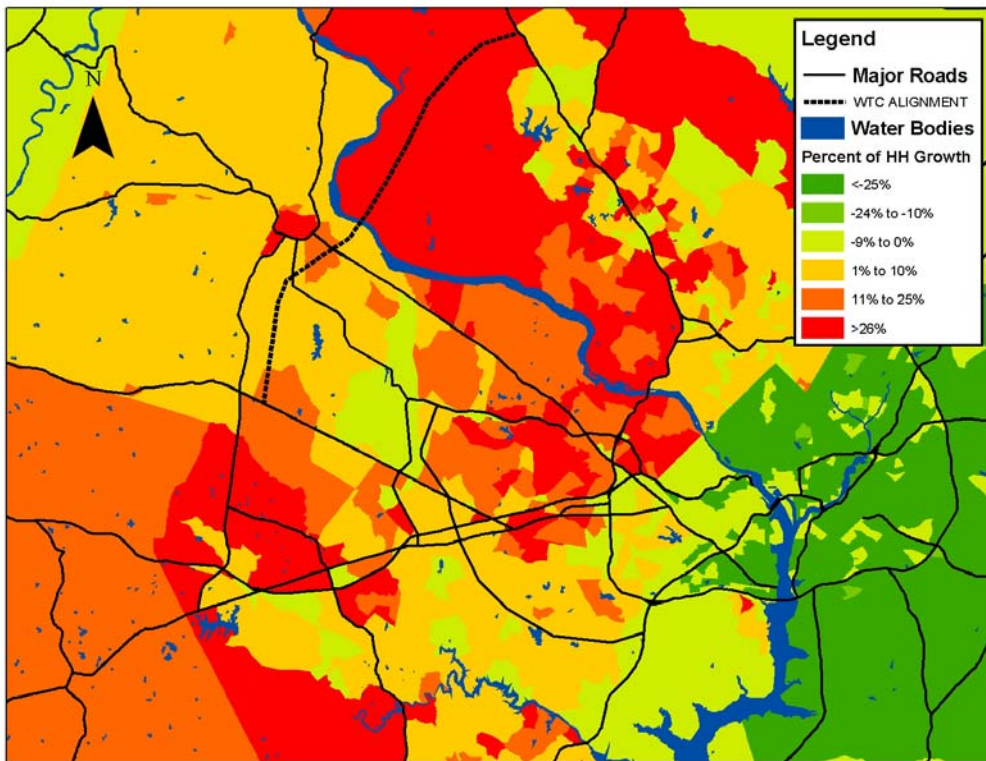
In order to model the transportation impacts of the scenarios, the socioeconomic forecasts must be refined to the Transportation Analysis Zone (TAZ) level. The household changes for the Techway and WTC scenarios are shown on the next page.

⁶ Smart Mobility, Inc. calculated the offsetting reductions in the core area. Assuming exactly the same number of households and employment in all scenarios makes comparisons of the impacts straightforward. If contrary to the research cited, constructing a new roadway were to increase regional population and employment, the traffic impacts of a new roadway would be more severe than those described in this report.

Household Shift: Techway from No Build



Household Shift: WTC from No Build



Land Use Shifts Cause Travel Shifts

Smart Mobility, Inc. modeled the transportation impacts of the different land use scenarios. This work was done with an enhanced version of the region's travel demand model, which better represents Potomac River crossing data than the standard version.⁷

The model is of the standard “four step” type used throughout the U.S. for transportation planning and air quality analysis. The four steps are:

- 1) Trip Generation – how many trips of each type (work, shopping, etc.) from each land use
- 2) Trip Distribution – matching the origins and destinations to form complete trips
- 3) Mode Choice – dividing the trips into auto and transit trips
- 4) Assignment – putting the auto trips on the roadway network

The result of all these steps is a complex shift in traffic between the new bridge scenarios and the baseline scenario. With the forecasted shift in land use to the suburbs from the core areas, there also is a shift in trip making to the suburbs. There are more suburb-to-suburb trips, and the average trip length increases because land uses are more dispersed in the suburbs. There is less opportunity for transit use and the transit trips decline. Traffic on some roadways declines; while traffic on other roadways increases.

The model shows that the new roadways would carry a lot of traffic. Depending on how many lanes were built, sections of the new expressways could be congested in 2025. It would be easy to conclude that traffic congestion would have been even worse without the new roadway, but in fact the opposite is true. Traffic is worse with a new expressway. When the land use shifts and travel shifts are considered, congestion is worse with the new roadway than without.

The study concludes that either of these alignments – the Techway or the Western Transportation Corridor - would spur sprawl, traffic, and pollution growth, especially in the western portion of the region, while failing to relieve traffic problems on many existing roads. Construction of the proposed Techway, for example, would cause the average traffic congestion⁸ to rise by 10 percent in Montgomery County, 6 percent in Loudoun, 4 percent in Prince William, and 2 percent in Fairfax and Frederick counties, compared to the No Build scenario. The Western Transportation Corridor would have similar, but more modest growth shift and traffic impacts because the full build out of that corridor would occur later than for the Techway corridor. Thus, average county level traffic congestion would increase by 5 percent in Prince William, 4 percent in Montgomery, 3 percent in Frederick, and 1 percent in Fairfax, compare to the No Build scenario. Loudon County's comprehensive plan helps limit sprawl effects of the WTC, producing a 4 percent drop in Loudoun County, compared to the No Build scenario. Under either alignment, inner suburban and urban jurisdictions would experience some reduction in traffic due to declining economic and travel activity caused by loss of job and housing growth.

⁷Smart Mobility, Inc. Traffic and Land Impacts of North Potomac River Crossings, October 2002.

⁸The changes in congestion reported here are calculated as the change in the average daily volume to capacity ratio.

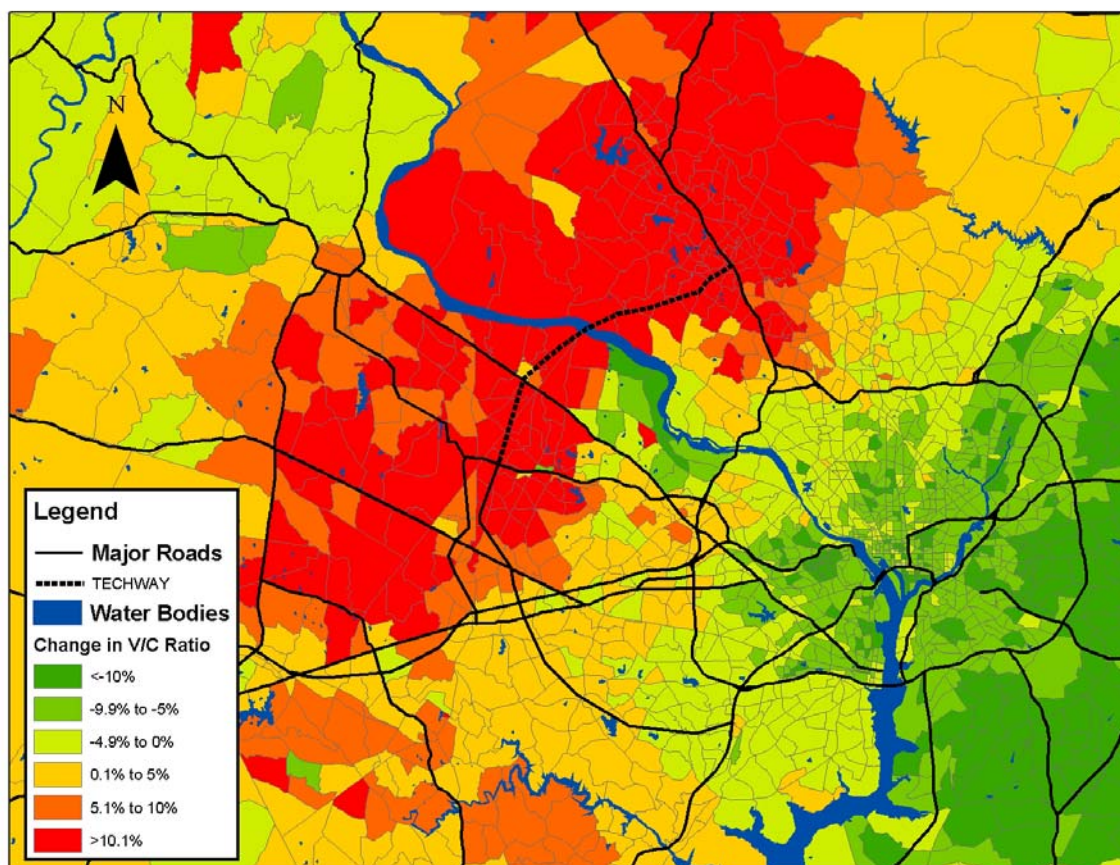
No Trip Begins or Ends on an Expressway

No trip begins or ends on an expressway. With increases in households and employees that a new expressway will bring, almost all local roadways will also have traffic increases. Traffic growth will be greatest around new and existing interchanges. For example, in the Techway scenario traffic on Virginia Route 7 adjacent to a new interchange is 89 percent higher than in the No Build scenario. In the WTC scenario, traffic on Maryland Route 28 is 195 percent higher than the No Build scenario.

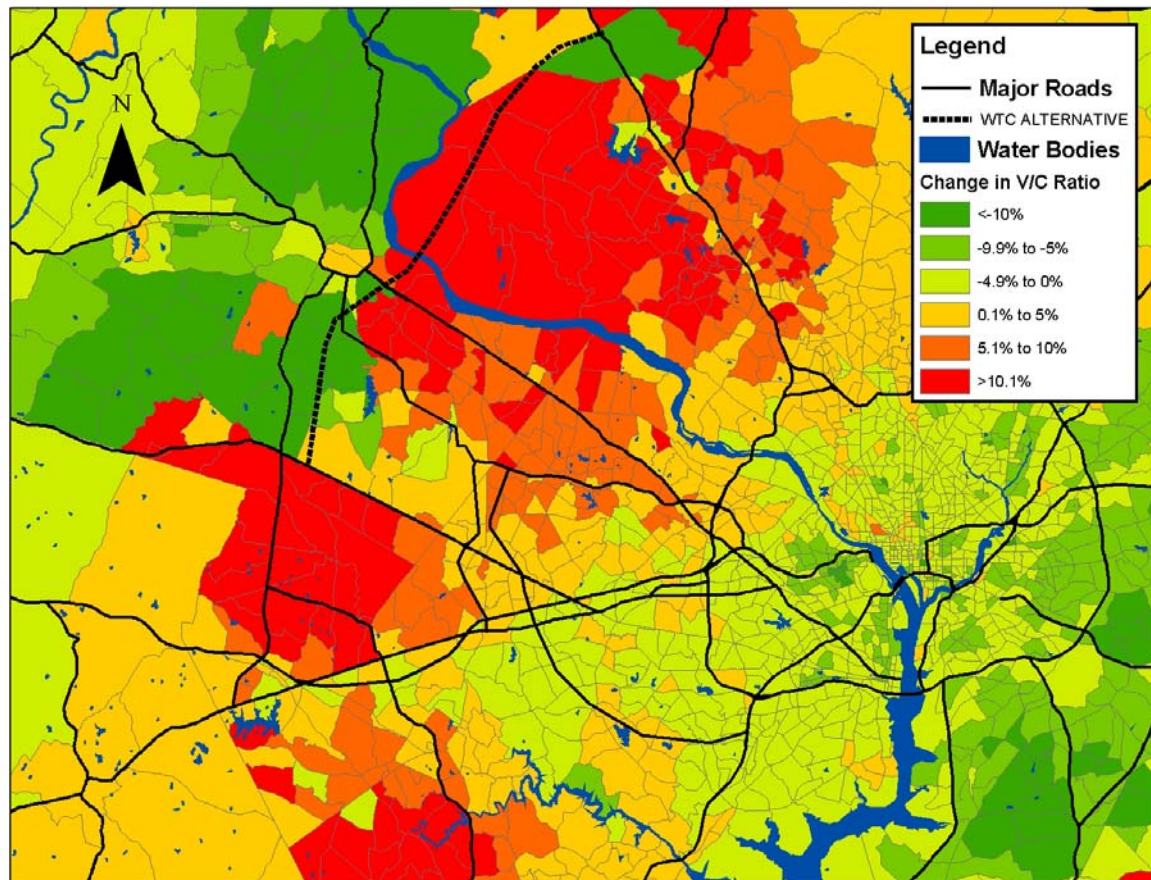
The maps on the following page show the difference in traffic congestion by transportation analysis zone. Congestion is represented as the ratio between volume and capacity, where the capacity is higher with any of the proposed expressway scenarios.

The congestion maps tell the same story as the land use maps. Areas near the new expressways will see more development and more traffic. Any increase in capacity from the new expressways is more than offset by increased traffic. Congestion in the corridor is greater with the new expressways than without.

Volume-to-Capacity Ratio (Congestion) Shift: Techway from No Build

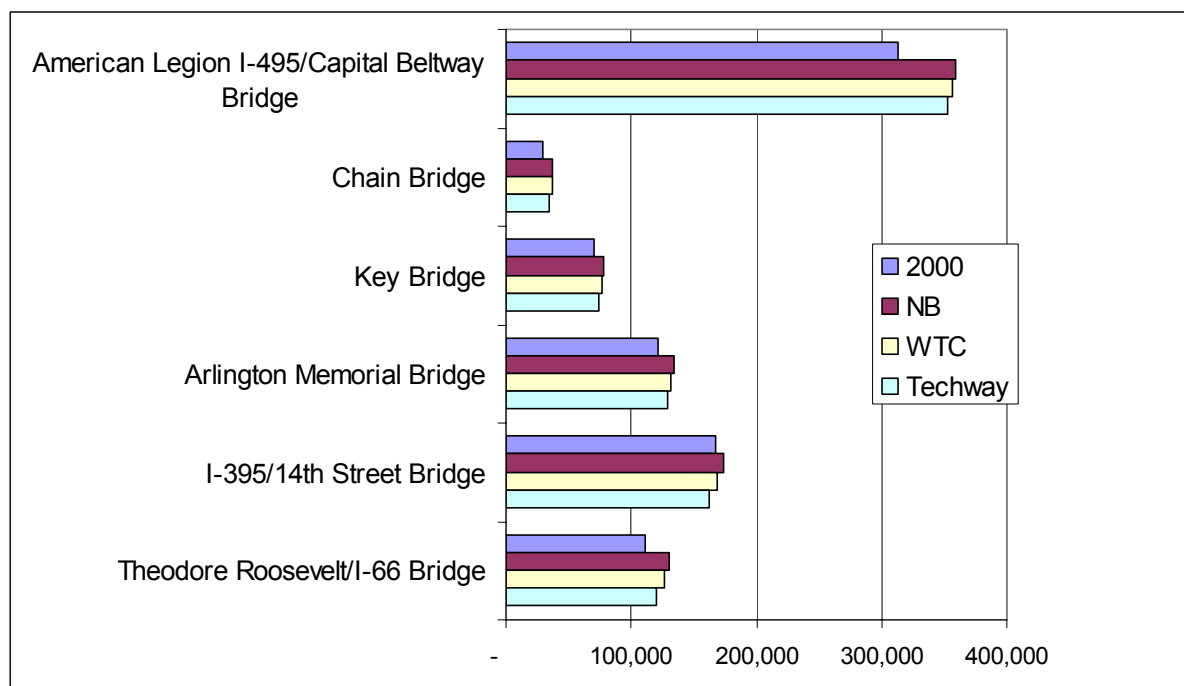


Volume-to-Capacity Ratio (Congestion) Shift: WTC from No Build



In general, traffic congestion will be greater in the vicinity of the new expressways. Exceptions generally are along parallel roads, including existing bridges, where traffic is diverted onto the new expressway. The Woodrow Wilson Bridge is scheduled for a major capacity expansion and large traffic increases are forecast. The figure below shows the forecast 2025 daily traffic volume on the other bridges compared to 2000.

New Expressway across the Potomac Will Have Little Effect on Traffic on Other Bridges



The percent traffic reductions on existing bridges compared to the No Build scenario is shown below:

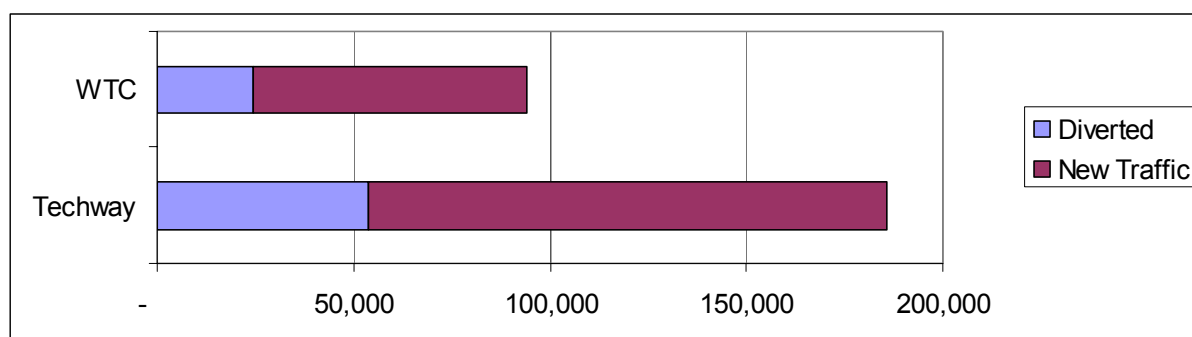
Even with New Expressway Bridge, Reductions from No Build Scenario Are Small

	WTC	Techway
American Legion I-495/Capital Beltway Bridge	-0.8%	-1.9%
Chain Bridge	-0.1%	-5.1%
Key Bridge	-1.2%	-5.4%
Arlington Memorial Bridge	-1.9%	-4.0%
I-395/14th Street Bridge	-2.8%	-6.6%
Theodore Roosevelt/I-66 Bridge	-2.7%	-7.6%

Thus, the Techway would reduce traffic on the American Legion Capital Beltway Bridge by less than 2 percent, providing no noticeable traffic relief to motorists who are now stuck in traffic. Reductions in traffic on other bridges would come about mostly due to reduced economic and travel activity in the core of the metropolitan region compared to the Techway no-build scenario."

A new bridge would carry almost four times as much traffic as the total reduction in traffic on the other bridges. These increases result from the land use shifts and traffic shifts. Adding bridge capacity is inefficient because most of the capacity serves new traffic rather than reducing congestion.

Most New Bridge Traffic Will Be New Traffic



With any of the new expressways, there will be more regional traffic as measured in vehicle miles of travel (VMT), and more air pollution than in the No Build scenario.

A recent analysis by the Metropolitan Washington Transportation Planning Board⁹ showed that by deferring 100 lane miles of highway expansion projects in 2002 - a 0.5% reduction in lane-miles of road capacity - Virginia saves \$800 million in capital costs while cutting NOx emissions by more than 1%, or nearly 2 tons per day, and reducing vehicle miles of traffic by 0.6%. This illustrates how the very expensive expansion of new highways typically produces a growth in air pollution emissions by spurring more traffic, rather than a reduction in emissions as often claimed by the road lobby. It illustrates how reducing expenditures on new roads is often the most cost-effective emission reduction strategy, because it avoids generating both costs and air pollution.

Total regional vehicle miles of travel (VMT) increases in all of the scenarios. The largest increase is for the Techway scenario (1.6 percent), with an increase of 1.3 percent in the WTC scenario. Total vehicle hours of travel (VHT) also increases for all the scenarios. Again, the largest increase is for the Techway scenario (1.3 percent), with an increase of 0.8 percent in the WTC scenario.

A Lose-Lose Result

Often regional issues are described in “win-lose” terms; for example, the suburbs gain at the expense of the urban core. With outer beltways like the WTC or Techway, it is a “lose-lose” situation. The inner core loses population, jobs, and tax base. The suburbs lose open space and gain traffic congestion. Suburban dwellers drive much more than urban dwellers because destinations are farther away and they have fewer travel choices. Urban dwellers without cars face decreased access to employment opportunities, which shift to areas unserved by transit. With the shift in population and jobs to the suburbs, regional travel, regional congestion, regional air pollution and greenhouse gas emissions, and inequity of access to jobs and public facilities all increase.

⁹ Kirby, Ronald F., Director of Transportation Planning, Transportation Planning Board. “Emissions Estimates Associated with the 2002 CLRP and FY2003-08 TIP, and Potential Transportation Emissions Reductions Measures (TERMs). Memorandum to Transportation Planning Board, June 28, 2002.

Real and Permanent Solutions

Instead of continuing to pour good money after bad into a failed policy, the region needs to refocus its energies towards implementing real and permanent solutions. Some elements of such a policy could include:

Automated Time-of-Day Tolls on Bridges – Highway capacity on bridges is very costly to provide, both in dollars and in its effects on the environment. Therefore, bridge capacity will always tend to be a scarce good, compared with more conventional roadway capacity. Our region could better manage this scarce bridge capacity with far less congestion delay by making some or all of the lanes on these bridges toll facilities. Fully automated electronic toll collection, with off-peak discounts, and dedication of toll revenues to improved transit and incident management would improve both efficiency and equity of transportation in the region. The NY-NJ Hudson River bridges and tunnels offer automated time-of-day toll discounts that help finance transit and cut traffic congestion. Our region can do so too.

Locating Jobs and Housing Near the Existing Transit System – There is much discussion in the region concerning transit extensions in the suburbs. While some of these extensions may be worthwhile, often it is impossible to serve dispersed suburban land uses efficiently with transit. The Washington region already has many opportunities for development close to existing Metro rail stations. It will be much more effective concentrate housing and jobs near the stations than to expand the system. New initiatives are needed to promote creation of "invisible affordable housing" in the form of accessory units in existing neighborhoods close to jobs and transit.

Local Roadway Improvements in the Suburbs – Suburban areas suffer from traffic congestion primarily because of poorly planned, disconnected street systems. There are too few through streets for the level of development, and traffic is all forced to travel through the resulting bottlenecks. Adding lanes to those bottlenecks does not add a proportional increase in intersection capacity and is inefficient. Indeed, engineering research shows that highly interconnected slow traffic street grids can provide up to double the traffic capacity of sparse street grids that force traffic onto major arterials and freeways. Requiring more through streets in developing areas can make a huge difference in traffic flow, and also improves opportunities for walking and bicycling. Traffic calming and bicycle/pedestrian safety improvements need to be an integral part of such initiatives to protect and enhance neighborhood quality. Intersection improvements on existing roadways, including intelligent signal systems and modern roundabouts, can also help.¹⁰

Commuter Choice – Commuters are often subsidized with free parking. If they were offered a choice between the parking or its cash value or a transit pass, many would choose alternative modes. The Commuter Choice Maryland supports employers in eliminating these incentives to drive through tax credits and other assistance. This type of program should be extended to the rest of the region. It should be complemented with impact fees on employer-provided free parking that would be waived if employers offer paid transit benefits or cash-in-lieu-of-parking commuter assistance programs. If widely adopted, these initiatives could significantly reduce traffic during the morning and afternoon peak periods.

¹⁰ Kulash, Walter. 1990. Traditional Neighborhood Development: Will the Traffic Work? Orlando: Glattig Lopez Kercher Anglin., see also: <http://sustainable.state.fl.us/fdi/fssc/news/world/tnd.htm>.

Smart Growth— The ideas described above are consistent with Maryland’s Smart Growth initiatives. Maryland’s policies include: investing in existing communities, providing alternatives to driving, improving traffic flow without adding lanes, improving pedestrian and bicycle options, and providing incentives for development around existing transit stations. Adoption of these concepts throughout the region would result in major progress towards reducing suburban congestion.