

Rethinking the Bi-County Parkway

Making Sound Transportation Investments in Prince
William County and Loudoun County While
Preserving Manassas National Battlefield Park

Southern Environmental Law Center
Coalition for Smarter Growth
Piedmont Environmental Council
National Trust for Historic Preservation
National Parks Conservation Association

Incorporating the Traffic Modeling Analysis of Smart Mobility, Inc.

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Cover Image: Manassas National Battlefield Park, showing a portion of the Second Manassas Battlefield. The adjacent historic district, eligible for inclusion in the Manassas National Battlefield Park, and landscape of the Second Battle are now threatened by the proposed Bi-County Parkway.

Victory at Second Manassas in August 1862 emboldened Confederate General Robert E. Lee to cross the Potomac River into Maryland, leading to the Battle of Antietam in September 1862. Lee’s retreat from Antietam provided sufficient momentum for the Union for President Abraham Lincoln to issue the Preliminary Emancipation Proclamation on September 22, 1862.

Executive Summary

The Virginia Department of Transportation's ("VDOT") own traffic modeling data reveal that the proposed Bi-County Parkway ("BCP") would worsen, not relieve, traffic congestion. The same model shows that the comprehensive alternative offered by our coalition (termed the "Substitute Vision" by VDOT) will better address congestion in the study area, and better serve the dominant need for east-west traffic capacity—now and in the future.

By contrast, the BCP would generate more traffic and more congestion in southern Loudoun County and the areas of Prince William County around Manassas National Battlefield Park ("Park"). The Substitute Vision, a package of common-sense solutions, would generate lower traffic volumes, would better serve local trips, and would move traffic around the Park with significantly fewer impacts both to this irreplaceable historic resource and to surrounding communities.

In its analysis of the Substitute Vision, VDOT has effectively disclosed that it has not included many of the most sensible and critically necessary projects in the current Six-Year Improvement Program or worked to make sure they are included in the regional priorities plan (the Constrained Long Range Plan). The neglected projects would ease east-west commutes, help travelers on Route 28 between Manassas and Route 7, and improve local traffic in areas with planned development in southern Loudoun and western Prince William counties. Important examples of VDOT's failure to provide for needed projects are the lack of full funding for the I-66/Route 28 interchange, the absence of any funding for the Route 28/Braddock Road interchange, and the lack of funding for key primary roads in southern Loudoun and western Prince William counties.

VDOT's priority focus on the BCP is perplexing given its findings that the Bi-County Parkway's effects on I-66 would be "limited," and that the BCP would result in minimal reductions in traffic volumes on Route 28.

For nearly a decade, our coalition of historic preservation, conservation and smart growth groups has recommended comprehensive alternatives for handling traffic in the Bi-County Parkway study area, and lower-impact alternatives for moving traffic around the Park in lieu of building the proposed Bi-County Parkway. Early this year, VDOT agreed to study our comprehensive alternative using the regional traffic model, and in May, VDOT issued its findings. We hired a nationally-recognized traffic modeling expert to analyze VDOT's report and the underlying data generated by VDOT's updated traffic modeling.

Our main findings, based on VDOT's modeling results, and described in more detail in our report, are as follows:

The Ineffectiveness of the Bi-County Parkway

- 1) Building the BCP would make overall traffic conditions worse than they would be if the project is not built, and would generate significantly higher traffic volumes within and in close proximity to the Manassas National Battlefield Park, undermining the goals of improving traffic conditions and preserving the Battlefield.

2) As commuters and residents in this area already know, the great majority of travel in the study area is east-west, and yet the BCP is intended to facilitate north-south travel. Worse, building the BCP would actually increase both the amount of overall congestion and north-south congestion in the study area.

a) Specific areas where the BCP would increase north-south congestion include:

- The portion of Prince William Parkway (234 Bypass) south of I-66;
- The portion of Cartharpin Road at VA 234; and
- Sudley Road (Business VA 234) south of I-66

b) The BCP also would increase congestion on a number of east-west roadways, including:

- Braddock Road on both sides of the BCP; and
- Sudley Road (VA 234) between Route 15 and the BCP.

c) The BCP would have very little positive effect on two of the most seriously congested highways within the study area: Interstate 66 and Route 28.

- With regard to I-66, VDOT's Traffic Technical Memorandum for the BCP acknowledges on page 24 that "the effects of the proposed [Bi]-County Parkway on operations on east-west I-66 are limited because the proposed roadway is expected to affect east-west travel only to a limited degree."
- On Route 28, which the 2005 Draft Environmental Impact Statement for the Tri-County Parkway recognized as containing "[t]he most severe congestion experienced within the study area," (p. 6 of DEIS), the BCP reduces traffic volumes only by one to two percent.

3) Building the BCP would dramatically increase the amount of traffic within and adjacent to the Park, resulting in close to 30,000 more vehicles on roads directly impacting the Park than would be the case if the BCP were not built. And although the draft Programmatic Agreement (required under Section 106 of the National Historic Preservation Act) includes a commitment by VDOT that the southern portion of the BCP along the western border of the Park will not exceed four lanes, the heavy congestion along that stretch, and proposed 6-lane construction of connecting highway segments to the north and south of the BCP, would likely generate tremendous pressure to widen it.

The Substitute Vision—A Common-Sense, Comprehensive Alternative

1) In contrast to building the BCP, the Substitute Vision reduces both overall congested vehicle miles traveled (VMT) and east-west congested VMT in the study area, while not increasing north-south congested VMT. The Substitute Vision provides a measurable benefit to east-west travel by reducing traffic volumes on US 50 and VA 620 (Braddock Road) and provides extensive transit alternatives for the I-66 corridor, including extension of VRE, addition of express bus service, and a future Metrorail extension to Centreville.

2) The Substitute Vision includes numerous projects that the residents who live and commute in the study area will recognize as critical to addressing their east-west transportation needs, improving other major commuter routes like Route 28, and enhancing local connectivity within Loudoun County and western Prince William County. Grouping the projects in the Substitute Vision by the corridors and the areas they serve reveals that the Substitute Vision improvements include the projects that are needed to address traffic challenges *today*. The BCP and associated North-South “Corridor of Statewide Significance” projects would divert roughly \$1.5 billion from these needs.

3) The Substitute Vision would result in 13,000 trips per day in 2040 moving north-south on Pageland Lane, not much more than the 11,000 to 12,000 trips per day being carried now on Sudley Road (Route 234) through the Park. Meanwhile, building the BCP would bring 60,000 vehicles to the Park’s western border, and with congestion projected along much of its ten-mile route, it would have much more harmful traffic, noise and visual impacts on the historic Park and surrounding rural areas.

4) The Manassas National Battlefield Park Amendments of 1988 do not require the construction of the Bi-County Parkway nor the proposed Battlefield Bypass as replacement routes for closing Routes 234 and 29 through the Park.

- The legislation requires that the Secretary of the Interior, in consultation with the Federal Highway Administration, the Commonwealth of Virginia, and Prince William County, “shall specifically consider and develop plans for the closing of those public highways (known as routes 29 and 234) that transect the park and shall include analysis of the timing and method of such closures and of means to provide alternative routes for traffic now transecting the park.”
- In accord with the Congressional directive, the Substitute Vision provides alternative routes for traffic now transecting the park, and it does so more effectively, and less expensively, than constructing two new highways that would result in the Park being surrounded on all sides by major roads.

VDOT's traffic analysis of the Substitute Vision, along with the additional analysis the Coalition groups have provided in this report, confirms that the Substitute Vision provides an appropriate alternative to the Bi-County Parkway and the Manassas Battlefield Bypass, better addressing the key transportation needs in the study area while avoiding and minimizing harm to the irreplaceable historic resources that are the Manassas National Battlefield Park and Historic District. Further, the Substitute Vision would also reinforce the rural land preservation policies of Prince William and Loudoun Counties and represent a far more sensible investment of tax dollars. Rather than invest further time and effort into a damaging and ineffective proposal, the public would be much better served by pursuing our recommended approach.

Section I

The Bi-County Parkway Would Worsen Traffic Conditions in the Study Area and Bring Far More Traffic to Manassas National Battlefield Park than It Would Remove

We appreciate the Virginia Department of Transportation’s (“VDOT”) agreement to analyze our recommended approach for addressing the transportation needs in the Bi-County Parkway (BCP)¹ study area and closing Routes 234 and 29 through the Manassas National Battlefield Park (“Park”) to commuter traffic. With the assistance of a traffic modeling expert, Norm Marshall of Smart Mobility, Inc., we have thoroughly analyzed VDOT’s May 8, 2013 memorandum entitled *Analysis of the Substitute Vision Provided by SELC et al. as an Alternative to the Tri-County Parkway* (“VDOT SV Memo”), as well as the traffic modeling files VDOT used to develop the memo. VDOT’s traffic analysis of the Substitute Vision² (“SV”), along with the additional analysis we have provided in this report, confirms that the Substitute Vision provides an appropriate alternative to both the proposed Bi-County Parkway and the proposed Manassas Battlefield Bypass, while best avoiding and minimizing harm to the Park.

According to VDOT, the “most notable conclusion” it draws from comparing forecasts for the various scenarios it modeled—including a scenario that incorporates both the BCP *and* the Substitute Vision—is that the volume of traffic forecast to use the BCP does not change significantly regardless of whether the components of the Substitute Vision are implemented.³ VDOT’s SV Memo also emphasizes future traffic volumes forecast for other roadways in the study area and assesses how those volumes vary depending on whether the BCP is built, the Substitute Vision is implemented, or both.

However, those forecasts alone offer little value in assessing how well different alternatives would meet core components of VDOT’s expressed “purpose and need” for the BCP, including reducing congestion in the study area and improving access to key destinations in the corridor; nor are they particularly helpful in evaluating the extent to which alternatives would address other needs that have been recognized as priorities throughout the planning processes for the BCP and Battlefield Bypass. Although the BCP is forecast to carry a significant volume of traffic if it is built, that fact does not necessarily translate to reducing congestion or improving access. Nor has VDOT presented the forecasts in a manner that allows for evaluating the extent to which different scenarios would impact the Manassas National Battlefield Park.

¹ As noted in a July 2, 2013 email from Mary Ellen Hodges at VDOT to the Section 106 consulting parties for the Tri-County Parkway, VDOT has recently begun calling the project the Bi-County Parkway or BCP. In this report, we generally will use that name for the proposal, although we will continue to use “Tri-County Parkway” or TCP when referring to document titles or citing quotations that use the former name.

² We have referred to our comprehensive alternative approach in various ways during the Section 106 process. VDOT elected to label in the “Substitute Vision” in the memorandum summarizing their analysis, and to avoid confusion, we will use that label in this report.

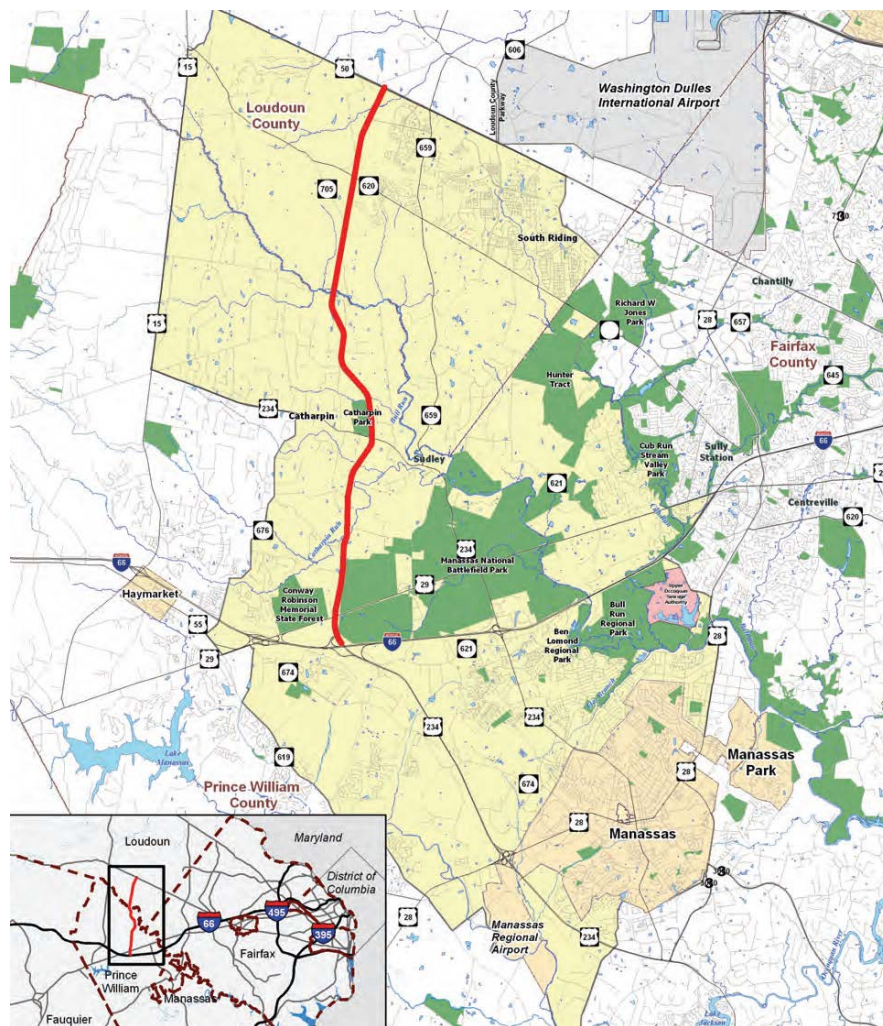
³ See, e.g., VDOT SV Memo at page 27: “From the forecast volumes in Table 5, the most notable conclusion is that, even with the changes assumed for the Substitute Vision, travel demand on the Tri-County Parkway remains relatively unchanged.”

As set forth below, a deeper look into the modeling results shows that **building the BCP would make overall traffic conditions in the project study area worse than they would be if the project is not built, would create or exacerbate as many local traffic problems as it would improve, and would generate significantly higher traffic volumes within and in close proximity to the Manassas National Battlefield Park. In short, the BCP would do far more to undermine the goals of improving traffic conditions and preserving the Park than it would to advance them.**

Explanation of Analysis

For the purposes of this memo, the BCP “study area” is the same study area used in the March 2005 Draft Environmental Impact Statement for the TCP/BCP and illustrated below in Figure 1 (taken from VDOT’s May 8, 2013 *Traffic Modeling and Analysis Technical Memorandum for Tri-County Parkway Location Study Reevaluation and Final Environmental Impact Statement*).

Figure 1: BCP Study Area⁴



⁴ Traffic Modeling and Analysis Technical Memorandum for Tri-County Parkway Location Study Reevaluation and Final Environmental Impact Statement, VDOT, p. 2 (May 8, 2013).

In order to evaluate the effectiveness of the proposed BCP relative to the 2040 “No Build” scenario, Smart Mobility took the transportation model outputs supplied to us by VDOT and calculated two key metrics for all roadways located within the study area (including roadways that form parts of the study area boundaries, such as Route 28). The two metrics Smart Mobility used are:

- Vehicle miles of travel (VMT) per day,⁵
- Congested VMT per day.

Smart Mobility calculated the metrics separately for “north-south” traffic and “east-west” traffic so that we could analyze the relative benefits of the BCP to both traffic movements.

Building the BCP Would Increase Vehicle Miles Traveled in the Study Area

Figure 2 below shows the total daily VMT within the study area for: (1) the 2010 base model year; (2) the 2040 model forecast for the No-Build scenario (which does not include the Bi-County Parkway but does assume construction of the Manassas Battlefield Bypass, including the north-south segment that is proposed to be co-located with the BCP); and (3) the 2040 model forecast for the BCP “Build” scenario, which also assumes construction of the Battlefield Bypass.⁶

Figure 2: Most Daily VMT in the Study Area is East-West, and the BCP Would Increase North-South VMT

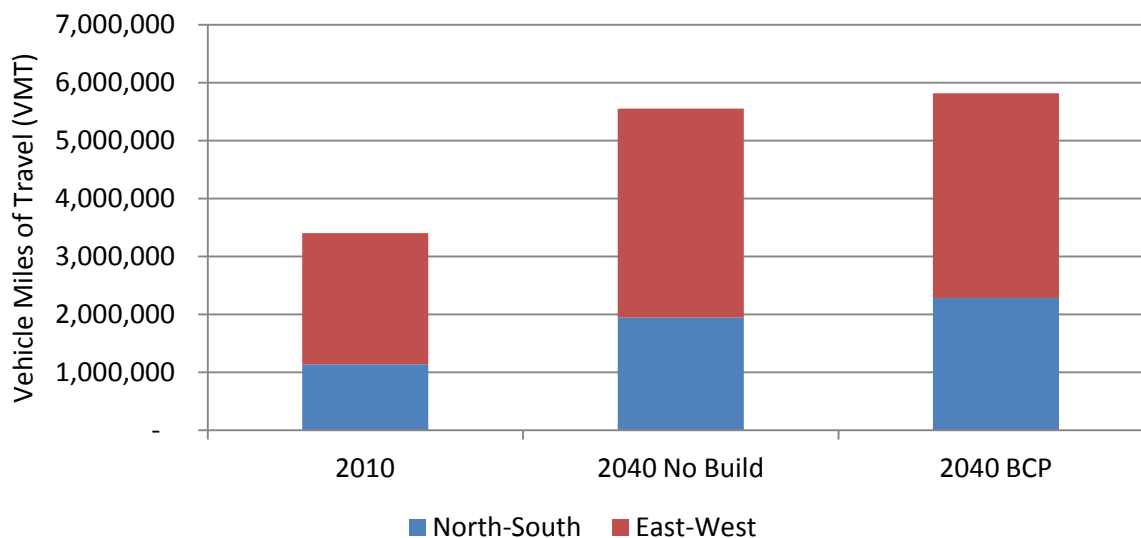


Figure 2 demonstrates that the great majority of travel in the study area—both currently and in 2040—is east-west traffic. It further shows that constructing the BCP would increase the amount of north-south travel in the study area but would make little difference in addressing east-west travel. As a result, total

⁵ The number of vehicle miles of travel (VMT) is an indicator of the travel levels on the roadway system. VMT is estimated for a given time period, and VMT estimates are based upon traffic volume counts and roadway length. One vehicle mile of travel equals one vehicle traveling one mile.

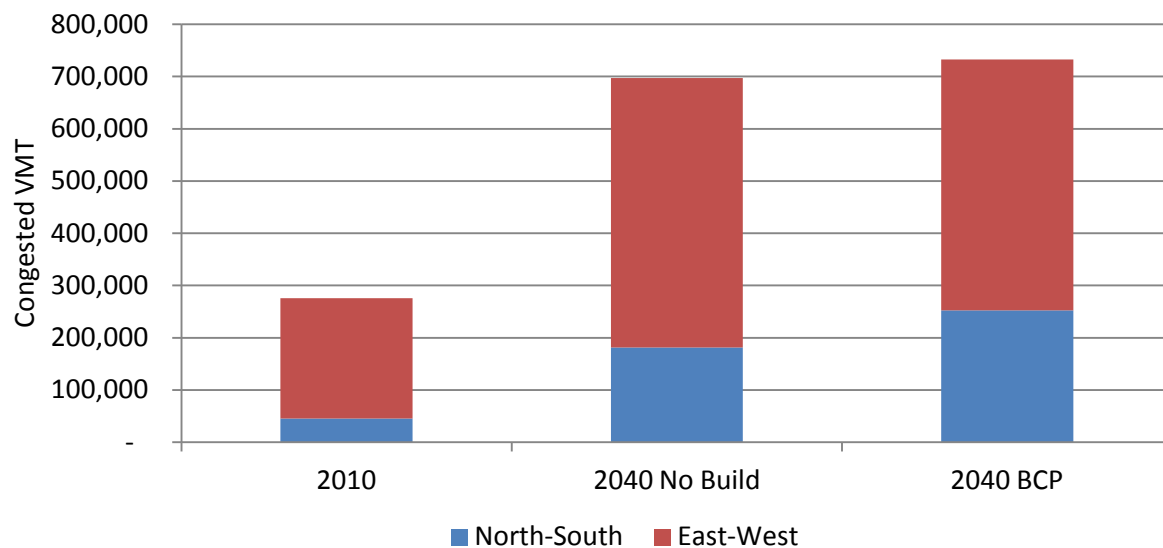
⁶ The descriptions of each of VDOT’s modeled transportation scenarios are included on page 26 in VDOT’s Substitute Vision memo.

travel in the study area would increase. **In other words, building the BCP would generate more overall travel—and more north-south travel—in the study area than would be the case if the BCP is not built.** Comparing the 2040 BCP Build scenario to the No Build scenario, constructing the BCP would exacerbate the negative community and environmental impacts that result when more cars are on the road and are traveling longer distances.

Building the BCP Would Increase Congested VMT in the Study Area

To get a clearer picture of the effect that building the BCP would have on *congestion* in the study area, Smart Mobility analyzed the total *Congested VMT* in the same three scenarios discussed above: (1) the 2010 base model year; (2) the 2040 model forecast for the No-Build scenario; and (3) the 2040 model forecast for the BCP “Build” scenario.⁷ The results are presented in Figure 3 below.

Figure 3: The BCP Would Increase North-South and Overall Congested VMT in the Study Area



The first column in Figure 3 will be of no surprise to anyone who lives in the study area or routinely travels through it; the model clearly indicates that there is much more congestion on east-west roadways than on north-south roads. While the share of north-south Congested VMT is forecast to increase by 2040, it still represents only about 25% of the total Congested VMT in the study area in 2040 (in the No Build scenario); the vast majority of the Congested VMT (75%) will remain on east-west roads.

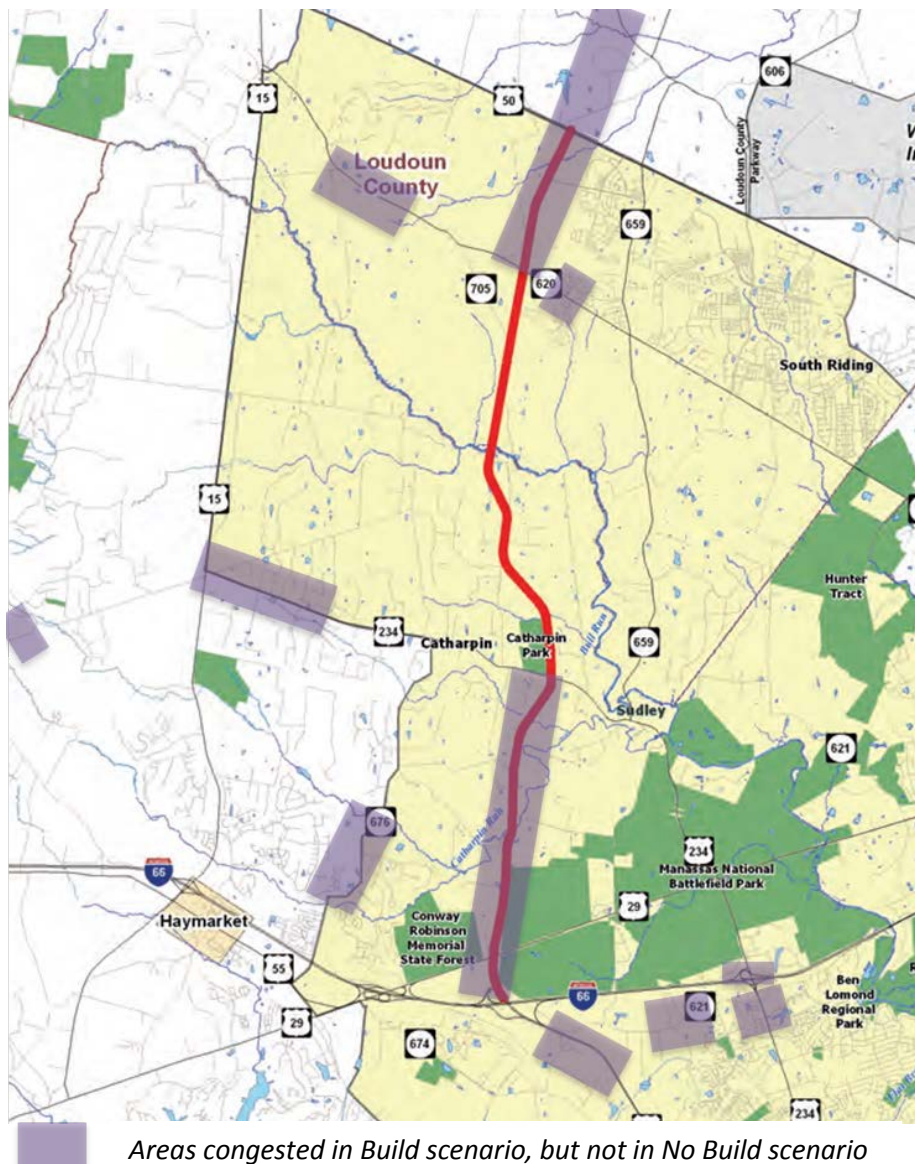
The third column in Figure 3 is likely more surprising than the first two. **VDOT’s own modeling shows that constructing the BCP would *increase* Congested VMT in the study area beyond what it would**

⁷ The transportation model VDOT is using to analyze the BCP and the Substitute Vision divides an average weekday into four time periods. Smart Mobility categorized VMT for a roadway “link” (or segment) as “congested” in our metric if the model volume on that link for a particular time period exceeds the estimated capacity for that link for the same time period.

be if the BCP is not built (represented by the 2040 No Build scenario). Further, it would result in a sizable increase in the amount of Congested VMT on north-south roadways.

These results may seem counterintuitive. People tend to think that moving one car to a new roadway will remove one car from a parallel roadway, and that there will be no other effects on the traffic network. However, decades of experience and analysis have proven this assumption to be incorrect, and the regional travel demand model reflects the far more complex dynamics and relationships that occur on a transportation network. It is important to keep in mind that the proposed BCP would only be accessed at a few points. With the model showing that the BCP would carry a large volume of traffic, there would have to be large increases in traffic on other roadways that would be used to access the BCP. This is evident in the congested road segments approaching the northern and southern termini and intermediate interchanges of the BCP shown in Figure 4 (below). These roads and road segments are not forecast to become congested until the BCP is added to the model in the 2040 Build scenario.

Figure 4: BCP Would Increase Peak Period Congestion Relative to 2040 No Build



As shown in Figure 4, specific areas where the BCP increases north-south congestion over the No Build scenario include:

- The portion of Prince William Parkway south of I-66 used to access the southern terminus of the BCP;
- The portion of Cartharpin Road used to access the BCP at VA 234; and
- Sudley Road (VA 234) south of I-66.

The BCP also would increase congestion on east-west roadways, including:

- Braddock Road on both sides of the BCP; and
- Sudley Road (VA 234) between Route 15 and the BCP.

Further, Figure 4 shows that a large amount of new Congested VMT would be on the BCP itself. In the No Build alternative, the southern section of the BCP is the north-south segment of the proposed Manassas Battlefield Bypass and is predicted to have adequate capacity. However, in the Build alternative in which the full BCP is added to the north-south segment of the Battlefield Bypass, the resulting traffic volume is significantly higher and exceeds capacity in the peak period in the peak travel direction. This will create congested traffic conditions with high volumes of traffic along the Park's western border that would not exist there but for the construction of the BCP.

As an important side note, **although the draft Section 106 Programmatic Agreement includes a commitment that the co-located portion of the BCP and Manassas Battlefield Bypass along the western border of the Park will not exceed four lanes, the heavy congestion along that stretch, combined with the fact that the segments of the corridor to the north and south of the BCP are envisioned as six-lane facilities, will generate tremendous pressure to widen it.**

The northern section of the BCP similarly is forecast to have traffic volumes exceeding its capacity. Further, this congestion would spill northward outside the study area onto the Northstar Boulevard Extension, a project that is included in the No Build scenario and is expected to have adequate capacity in that scenario, but would exceed capacity if the BCP is built.

Thus, when we take account of the total amount of new Congested VMT generated on the roads used to access the BCP, and the BCP itself, there is more Congested VMT in the study area in the 2040 Build scenario than in the 2040 No Build scenario. In other words, **building the BCP would increase congestion in the study area by generating more congestion than it relieves.**

Figure 4 and the Congested VMT modeling results provide an excellent illustration of why attempting to build new roads to address congestion is a failed approach. Constructing the BCP would simply create the "need" to widen the BCP, and to build extensions to the north and south of the BCP to address the congestion it would generate at both ends. Building the BCP would also create the "need" to widen the east-west roadways that provide access to it. Building and widening these roads in an attempt to resolve those new areas of congestion would itself create "needs" for additional roadways, trapping taxpayers in an endless cycle that is unsustainable from an economic and an environmental standpoint. Thus, the increased VMT that would result in the study area from building the TCP would not correspond to a decrease in *Congested* VMT. To the contrary, building the TCP would make congestion worse.

Analysis of Specific Roads and Intersections Shows that the BCP's Benefits Would Be Outweighed by the Traffic Problems it Would Create or Exacerbate

VDOT has included a more thorough analysis of the 2040 Build scenario in the May 8, 2013 Traffic Modeling and Analysis Technical Memorandum for Tri-County Parkway Location Study Reevaluation and Final Environmental Impact Statement ("Reevaluation Traffic Memo") that it provided to consulting parties at the same time it provided the VDOT SV Memo. In addition to including forecast traffic volumes on various road segments (as were included in the VDOT SV Memo), the Reevaluation Traffic Memo also included a traffic operations analysis for freeway segments and intersections. The traffic operations analysis reveals much the same story about the BCP's effect on congestion as the findings presented above.

Tables 9 and 10 on page 25 of the Reevaluation Traffic Memo show traffic operations at twelve different intersections under the 2040 No Build and the 2040 Build scenarios. Table 9 shows that during the AM peak hours, five of the twelve analyzed intersections are projected to operate at an "F" level of service in the 2040 No Build scenario. In the 2040 Build scenario, which adds the BCP, two of those five intersections would be improved so that they are no longer at "F" levels of service (Braddock Rd/Gum Spring Rd; and Braddock Rd/Loudoun County Pkwy); the other three of the five intersections rated "F" in the No Build would remain at "F" in the Build scenario. Further, building the BCP pushes two other intersections to "F" levels of service: Heathcote Blvd at US 29/WB I-66 exit; and US 234 (Sudley Rd)/Balls Ford Rd. Therefore, a total of five of the twelve analyzed intersections will operate at "F" levels of service regardless of whether the BCP is built or not.

Table 10 shows the same twelve intersections for the PM Peak Hour. In the afternoon, eight of the twelve intersections are shown at "F" levels of service in the 2040 No Build. Building the BCP would reduce the number of "F" intersections by only one. Further, delay at two of the "F" intersections gets considerably worse in the 2040 Build scenario (Braddock Rd/Gum Spring Rd; and 234 Bypass/Balls Ford Rd).

Thus, when we narrow our focus from the BCP's effects on VMT and Congested VMT to its impact on failing traffic operations near the proposed highway, the benefits it offers are largely outweighed by the other congestion problems it either exacerbates or creates. Moreover, the traffic analysis area VDOT used for the VDOT SV Memo and the Reevaluation Traffic Memo does not account for the increased congestion that the BCP would cause to the north of its northern terminus at Route 50 on roadways such as the Northstar Boulevard Extension, resulting in an incomplete picture.

Building the BCP Would Do Little To Improve the Most Serious Congestion Problems In the Study Area

It must be noted that the BCP would have little positive effect on the most serious traffic problems within and immediately adjacent to the study area. With regard to I-66, the Reevaluation Traffic Memo acknowledges on page 24 that "the effects of the proposed [Bi]-County Parkway on operations on east-west I-66 are limited because the proposed roadway is expected to affect east-west travel only to a limited degree." Route 28 is another critical piece of the network, as it provides the most direct access from the

City of Manassas and central Prince William County to Dulles Airport and nearby job centers. The 2005 Draft Environmental Impact Statement (“DEIS”) for the Tri-County Parkway recognized Route 28 as containing “[t]he most severe congestion experienced within the study area.”⁸ Yet the BCP would only reduce traffic volumes on Route 28 by 1-2%.⁹

If we analyze other roads that the model is showing as the most congested in the 2040 No-Build, we again see that the BCP offers little improvement. We used a threshold of a 160% volume-to-capacity ratio to highlight the road segments within the study area that the model shows as the most congested in 2040. The following roadways include some sections on which the volume-to-capacity ratios exceed 160% in both the 2040 No Build and the 2040 Build scenarios, indicating that the BCP would make little to no difference:

- VA 28 between I-66 and Manassas City Line
- US 29 between Battlefield Bypass and I-66
- Sudley Road (VA 234) south of I-66
- Braddock Road east of Pleasant Valley Parkway
- Sudley Road west of the BCP
- Braddock Road west of Route 28
- Route 28 at Westfields Boulevard

The only roadway sections with 160% or greater volume-to-capacity ratio that the model shows the BCP would bring under that threshold are: the 0.3-mile section of Gum Spring Road in Prince William County, which is modeled with two lanes in 2040 (whereas the much longer portion of Gum Spring Road located in Loudoun County and connecting to this segment is modeled with four lanes), and a short section of Route 15 through the I-66 interchange. In short, the BCP would do little to address the most congested roadways in the study area, while consuming funding that could be much better used to improve the worst trouble-spots directly.

The BCP Would Significantly Increase Traffic Volumes Within and in Close Proximity to the Manassas National Battlefield Park

Another important lens for evaluating the impacts of the BCP is the amount of traffic that would use roads within and in close proximity to the Manassas National Battlefield Park if the BCP is built. Commuter traffic in the Park already undermines its natural and historic value. Further, it also jeopardizes the 650,000 annual visitors to the Park and threatens the economic benefits park visitors generate in the surrounding communities. Any proposed solution that closes Routes 234 and 29 through the Park to commuter traffic but brings significantly higher volumes of traffic to other areas of the Park and Historic District is not a viable solution.

We analyzed the average weekday volumes that would use four such roads or road segments under four different scenarios: the 2010 base model year; the 2040 No Build scenario; the 2040 “Interim Build” scenario (which includes the BCP but not the Battlefield Bypass, and assumes both Route 234 and Route

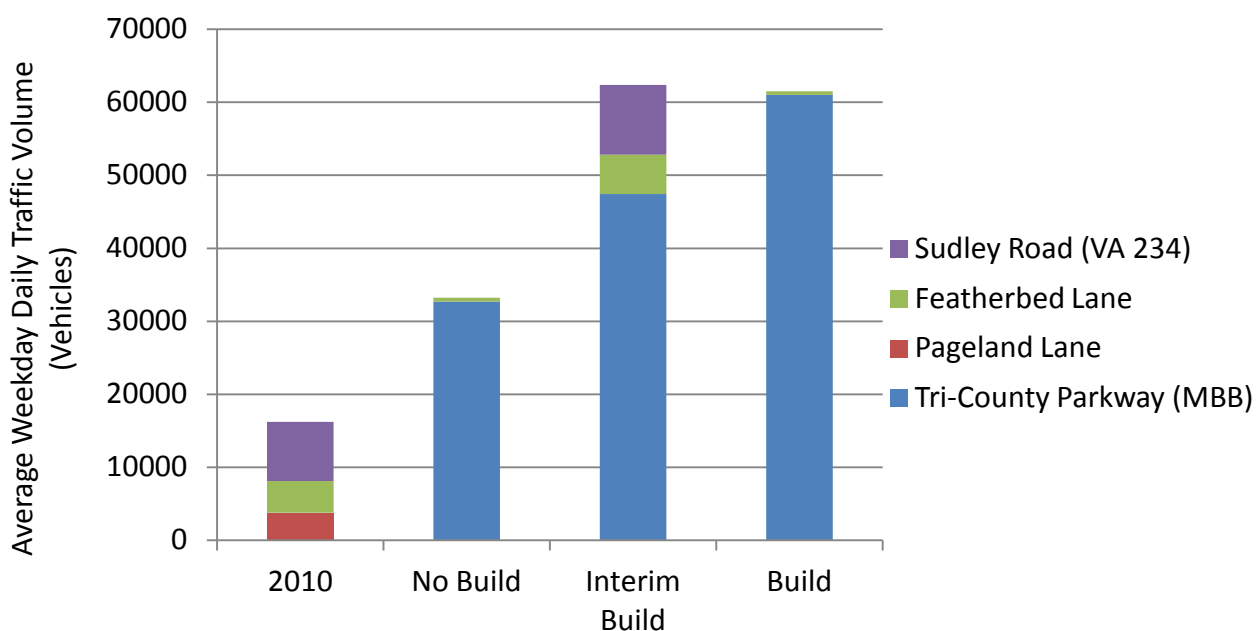
⁸ Tri-County Parkway DEIS at p. 6.

⁹ See Reevaluation Traffic Memo, Table 6, p. 15.

29 through the Park remain open); and the 2040 BCP Build scenario. Those four roads and road segments are: (1) Sudley Road (Route 234) through the Park and north of Route 29; (2) Featherbed Lane through the Park between Sudley Road (Route 234) and Route 29; (3) Pageland Lane through the Park (and north of Route 29); and (4) the BCP and/or the Battlefield Bypass north-south segment north of Route 29 (depending on which was included in the respective scenarios).

As shown in Figure 5 below, building the Bi-County Parkway would result in nearly double the volume of north-south traffic within or in close vicinity to the Park relative to the No Build scenario. It is also worth noting that, under the BCP Interim Build scenario (in which the BCP is built but the Battlefield Bypass is not, and Route 234 and Route 29 both remain open through the Park), the amount of traffic on Route 234 and on Featherbed Lane through the Park would be greater than the volumes using those roads through the Park today, while the amount of traffic on the western border of the Park would jump from the current level of roughly 4,000 vehicles per day to close to 50,000 vehicles per day. It is clear that building the BCP would dramatically increase the amount of traffic that would directly impact the Park.

Figure 5: BCP Would Increase Daily North-South Traffic Through and Adjacent to the Park



Note on Figure 5: VDOT's No Build and Build scenarios assume that Route 234 is closed through the Park, and that the 0.8 miles of Pageland Lane north of Route 29 is closed in the No Build, Build, and Interim Build scenarios.

Thus, based on VDOT's own modeling results and operations analyses, building the BCP would make overall traffic conditions worse than they would be if the project is not built, would create or exacerbate as many local traffic problems as it would improve, and would generate significantly higher traffic volumes within and in close proximity to the Manassas National Battlefield Park. Building the BCP is not a reasonable approach for either improving traffic conditions in the study area or for preserving the Park.

Section II

The “Substitute Vision” Is the Superior Approach for Addressing Current and Future Transportation Needs—Both in the Vicinity of the Battlefield and in the Larger Study Area

Having offered our analysis and interpretation of the results of VDOT’s modeling as they relate to the BCP, we now turn to evaluating VDOT’s comparison of the BCP to our package of alternative transportation improvements, which VDOT has labeled the “Substitute Vision” (or “SV”)—a label we also will use throughout this report in order to reduce confusion.

As an initial matter, VDOT’s SV Memo repeatedly asserts that the Substitute Vision consists of a “wide-ranging” and “disparate” set of transportation improvements rather than a “single proposed action,” as VDOT describes the BCP, and that the Substitute Vision is therefore “largely impractical” to assess as an alternative to the BCP.

We readily acknowledge that the package of improvements VDOT modeled in the VDOT SV Memo does indeed represent a “substitute vision” for addressing the highest priority transportation needs in the study area, particularly when compared to the approach VDOT is pursuing. Throughout the Section 106 and NEPA processes for both the BCP and for the Manassas Battlefield Bypass, we have made clear that a “comprehensive approach” would likely better address congestion in the study area and would address the most critical regional transportation priorities more effectively than the proposed BCP and the proposed Battlefield Bypass, while better preserving the Manassas National Battlefield Park, the Historic District, and the adjacent rural areas. As recently as our January 7, 2013 memo to VDOT entitled “Updated Composite Alternative,” we noted that “[o]ur alternative is designed to address the much greater need for east-west commuter movement and to provide for dispersed, local north-south movement for current and future traffic,” and would “benefit[] more travelers and trip types than would the single large north-south highway proposal.”

Although our various communications have primarily highlighted specific components of the comprehensive approach that would address the purpose and need elements of the BCP or the Battlefield Bypass individually, we have also indicated that, “in light of the interconnected nature of the BCP and the Battlefield Bypass ..., it may be prudent to evaluate instead a broader ‘low build’ alternative that could satisfy the purposes of both projects,” combining recommended improvements for the two projects into a broader, more systematic alternative to both the BCP and the Battlefield Bypass.¹⁰ Because VDOT has analyzed a full package of Substitute Vision improvements intended to accomplish a broader set of goals than either the BCP or the Battlefield Bypass individually, it should come as no surprise that its elements are “wide-ranging” and perhaps difficult to analyze as an alternative solely to one project or the other. This does not, however, make the alternative any less of a “prudent and feasible” alternative to the BCP and the Battlefield Bypass that avoids and minimizes harm to the Park while more effectively meeting current and future transportation needs.

¹⁰ See Coalition’s August 24, 2012 letter to VDOT.

VDOT's Cost Comparison is Misleading and Obscures the Most Critical Needs in the Study Area

Before we begin evaluating the traffic modeling comparisons, we would first like to respond to what likely strikes most readers of the VDOT SV memo as the most compelling difference between the Substitute Vision and the BCP: cost. VDOT's estimated total cost of the Substitute Vision package of improvements is \$6.4 billion, compared to the \$440 million estimate VDOT has offered for the BCP. These figures must be put in their proper context.

First of all, it should be expected that a package of improvements designed to accomplish a much broader set of goals and priorities than the BCP would cost more than the BCP. Directly comparing the cost of one to the other risks misleading the public into thinking that the two accomplish the same results, so it is worth emphasizing that they do not. As will be explained below, the Substitute Vision more effectively addresses the most pressing transportation needs and reduces congestion in the area, while best preserving the Manassas National Battlefield Park and reinforcing the rural land preservation policies of Prince William County and Loudoun County.

Second, most (if not all) of the transportation components of the Substitute Vision represent projects included in the Northern Virginia Transportation Authority's TransAction 2040 plan, Prince William County's Transportation Plan, Loudoun County's Transportation Plan, or otherwise under consideration by VDOT and local officials. Thus, these projects have been recognized as transportation needs regardless of whether the BCP is built. Including the costs for all of these project in the Substitute Vision column and not in the BCP column creates the erroneous impression that building the BCP would preclude the need for the Substitute Vision projects that are not already included in the Metropolitan Washington Council of Governments' Constrained Long Range Transportation Plan ("CLRP"), when clearly it would not.

Moreover, the Substitute Vision includes numerous projects that the people who live and commute in the study area will recognize as essential for addressing their east-west transportation challenges, improving other major routes like Route 28, and enhancing local connectivity within Loudoun County and western Prince William County. Yet the state has failed to prioritize most (if not all) of these projects in its Six-Year Improvement Program or to urge the Metropolitan Washington Council of Governments to prioritize them in its Constrained Long Range Plan. Instead, VDOT is aggressively pursuing the BCP despite the project's inability to address effectively the area's congestion problems or priority east-west travel needs.

Common-sense projects in the Substitute Vision include roundabouts¹¹ (which have proven extremely effective at Route 50 and Route 15), as well as improving the I-66/Route 28 interchange and the Route

¹¹ On page 5 of the VDOT SV Memo, VDOT notes that "regional travel demand models are typically not sensitive to differences in intersection control types," such as the conversion of a signalized intersection to a roundabout, as part of explaining why VDOT labeled our proposed roundabouts as "Operations/Safety" improvements rather than as "Capacity" improvements. However, the model's failure to capture the benefits of converting intersections to roundabouts—both from a capacity and an operational standpoint—highlights a shortcoming of the regional travel demand models, rather than indicating that roundabouts would not be effective at reducing congestion, smoothing traffic flow, improving safety and enhancing network linkages. Indeed, VDOT itself has noted that roundabouts "reduce crashes, traffic delays, fuel consumption, air pollution and construction as well as maintenance costs, while

28/Braddock Road interchange, VRE extension and other transit for the I-66 corridor, and interchanges on the existing Route 234 Bypass south of I-66. The interchanges and roundabouts included in the Substitute Vision improvements would directly address some of the worst localized congestion spots in the study area, and they are therefore the transportation projects that would do the most to improve the lives and the commutes of residents of this area. Yet because *regional* travel demand models like the one VDOT used for its analysis of the Substitute Vision typically cannot reflect the *localized* benefits of interchange improvements and roundabouts (as VDOT indicates on page 5 of the VDOT SV Memo), the benefits of those improvements are not captured by VDOT's analysis. Including the cost of those projects within the total cost shown for the Substitute Vision when their benefits are not captured in the accompanying traffic modeling undermines the value of the cost comparison even further.

A fair view of project costs also requires a more accurate estimate of the true cost of the BCP, including consideration of the costs of the suite of additional planned projects that are centered on the assumption that the BCP will be built. For example, completing the east-west portion of the Manassas Battlefield Bypass would likely cost somewhere around \$200 million. The Dulles Cargo and Metro Passenger Access Highway that would link the BCP to Dulles Airport would cost hundreds of millions of dollars more,¹² and the rest of the projects included in the North-South Corridor of Statewide Significance master plan, which includes the BCP but at a lower cost (~\$250 million), is estimated at close to \$1 billion dollars. All told, advancing all of these combined and interrelated projects—which is VDOT's clear intent—could total \$1.5 billion or more. In addition, as discussed above in Section I, the congestion the BCP would create would generate demand for additional road improvements, further increasing the true cost of this proposal, and leaving many critical needs unfunded and unmet.

Breaking the Substitute Vision projects and costs out into groups helps to demonstrate why a simplistic emphasis on the \$6.4 billion total for the Substitute Vision can be misleading, and why taxpayers cannot afford the diversion of \$1.5 billion to the BCP and related projects given the many more critical needs in and around the study area. Grouping the Substitute Vision projects also helps to illustrate the important roles these projects play in addressing traffic in particular subareas and corridors shown below and in the spreadsheet included as Appendix A to this report.

quite often moving more traffic.” See <http://www.virginiadot.org/info/resources/Roundabouts.pdf>. VDOT fact sheets on roundabouts note that they can provide a 30-50% increase in traffic capacity, and a 20-30% increase in capacity during peak hours in many instances. See http://www.virginiadot.org/info/resources/Roundabout_Facts_-_Week_1.pdf and http://www.virginiadot.org/info/resources/Roundabout_Facts_-_Week_2.pdf

The VDOT SV Memo also suggests that roundabouts “are typically best utilized at locations where the intersecting roadways carry similar volumes of traffic,” and that “the Substitute Vision locations [for roundabouts] do not necessarily meet this condition or other VDOT roundabout guidance.” Yet numerous examples exist of roundabouts functioning well at intersections of roadways with disparate volumes. One of the closest and best examples is the intersection of Route 15 and Route 464 in Frederick County, Maryland. Route 15 carries almost six times the volume of Route 464 in this location (18,140 vs. 3,050 annual average daily traffic). See http://roads.maryland.gov/Traffic_Volume_Maps/frederick.pdf.

¹² The Reevaluation Traffic Memo notes on page 5 that estimates submitted to the Metropolitan Washington Council of Governments assess the alternatives for a new Dulles connector road as ranging between \$153 million and \$813 million in cost.

- **I-66 Corridor and Route 50:** As discussed above in Section I, VDOT's traffic data show that the dominant demand now and in 2040 is east-west.¹³ As a result, the Substitute Vision projects show a particular emphasis on I-66 and the transit projects cited by regional officials as essential to the long-term movement of people along the I-66 corridor. Improving I-66 in this area begins with improving the I-66/Route 28 interchange. It must also include investment in extending the Virginia Railway Express (VRE) to Gainesville and Haymarket, and express bus service on HOV/Bus lanes on Route 50 in southern Loudoun County and on I-66 between Fauquier County and Arlington County, eventually followed by extending Metrorail to Centreville. Since the 1999 Major Investment Study for I-66, transit has been the top priority of regional officials for this corridor. The total price tag for this package of improvements to what is arguably one of the three most important radial corridors in Northern Virginia is **\$2.5 billion**.
- **Route 28 Corridor:** Six road projects are included in the Substitute Vision for the Route 28 Corridor from Manassas to Route 7 and total **\$308 million**.¹⁴ We also proposed a dedicated-lane transit project for the Route 28 corridor, with Bus Rapid Transit likely being the most appropriate and affordable way to provide this. In the VDOT SV Memo, VDOT estimated a cost for Light Rail Transit—a more expensive option—at **\$1.44 billion**. The Route 28 corridor is one of the region's top priorities, and the Northern Virginia Transportation Authority has included a number of Route 28 projects in its 2014 and Six-Year Plan lists. Travel demand from the southern and eastern sides of Manassas to I-66, Dulles Airport, and the Dulles technology corridor is significant and will require both road and transit investment. Route 28 investments will serve the most people in connecting the north-south travel movement to the Dulles Airport passenger entrance on the east side of the airport, and to nearby jobs in the Dulles Corridor.
- **Southern and Central Loudoun:** Nine projects in the Substitute Vision are also found in the Loudoun County Transportation Plan and total **\$865 million**. These projects include the expansion of Route 659 and Route 606 between Route 50 and Route 7, and a series of projects between Braddock Road and Route 50 necessitated by the development that has already been approved in that area. Loudoun residents consider many of these investments to be more effective at providing the local connectivity they need, and higher priorities for their communities than the BCP and related North-South Corridor of Statewide Significance projects.
- **Western Prince William south of I-66:** Six projects in the Substitute Vision are in western Prince William County just south of I-66 in an area of growing traffic and development impacting Wellington Road and Balls Ford Road. These projects total **\$685 million**. Improving these travel routes would also offer traffic relief to I-66 for trips between Gainesville and Manassas, and would also serve trips from the vicinity of the Park north of I-66 to Manassas.
- **Godwin Drive Corridor:** Three projects in the Substitute Vision are part of the Godwin Drive corridor and total **\$474.5 million**. It is important to note that Prince William County and VDOT

¹³ This analytical conclusion was certainly corroborated in the response to VDOT's recent public meetings on the BCP and related projects, where the overwhelming public sentiment was clearly in support of east-west rather than north-south transportation improvements.

¹⁴ It does not appear that VDOT included the cost of widening Route 28 between Manassas and Route 7 in the VDOT SV Memo.

recently submitted the Godwin Drive corridor for inclusion in the regional Constrained Long Range Plan (CLRP).

- **Manassas National Battlefield Park Area:** Eleven projects in the Substitute Vision are in the vicinity of the Park and total **\$140.6 million:** \$23.5 million for enhancing two miles of Pageland Lane; \$82 million for improving Bull Run Post Office Road; \$34.5 million for eight roundabout projects; and \$528,000 for upgrading Cedar Ridge Boulevard. VDOT has estimated in the VDOT SV Memo that five of the roundabouts would cost \$5.3 million each, which may be higher than required. However, even accepting VDOT's estimate, the total cost for the local improvements in the vicinity of the Park that are called for in the Substitute Vision is significantly less than the combined cost of the BCP and Battlefield Bypass (likely to be as much as \$660 million to \$700 million), and could adequately serve key purposes of both projects.

Over the past few months, the public's insistence on focusing transportation dollars on priority needs, and particularly east-west commuting corridors, has turned into an outcry. Given limited resources, the most effective investments would include: combining the Substitute Vision components within the vicinity of the Battlefield to address local traffic moving both north-south and around the Battlefield; improving I-66 by fixing the Route 28/I-66 interchange and funding VRE expansion and express bus service along that corridor; and targeted improvements to the Route 28 corridor.

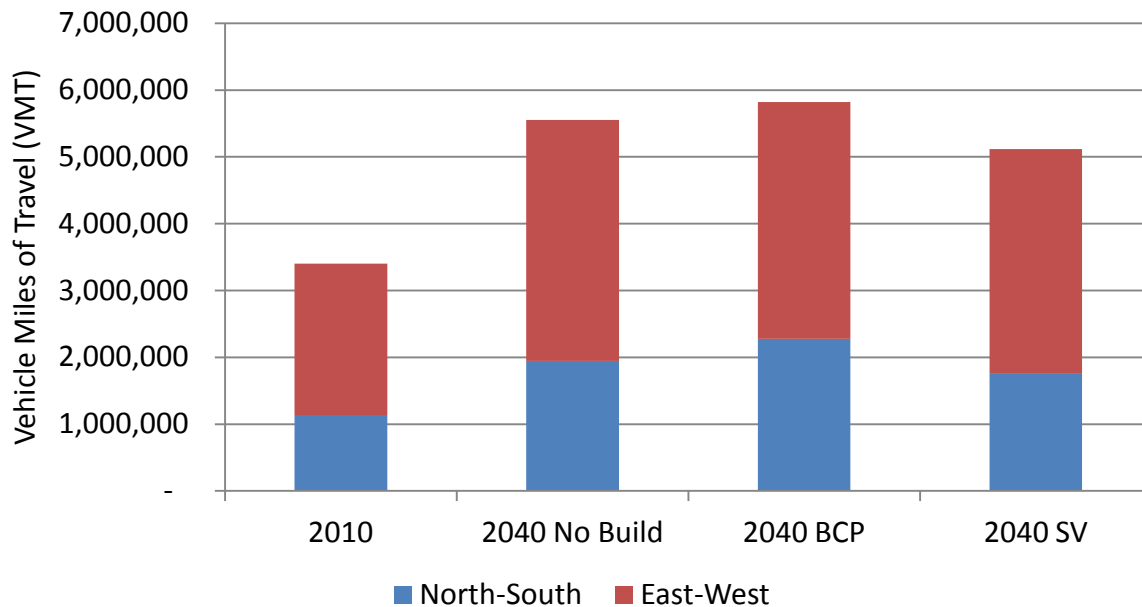
Yet VDOT has not ensured that these key projects, enumerated in the Substitute Vision, are included in the Metropolitan Washington Council of Governments' Constrained Long Range Plan or VDOT's Six Year Improvement Program. In contrast, VDOT is placing its full force behind funding and completing the BCP as soon as possible. **Construction of the BCP and related projects would divert tax dollars away from, and therefore delay, the most pressing transportation needs in the area.**

The Substitute Vision Provides Greater Transportation and Land Use Benefits Than Would the BCP

Unlike the BCP, the Substitute Vision Would Reduce VMT and Congested VMT in the Study Area

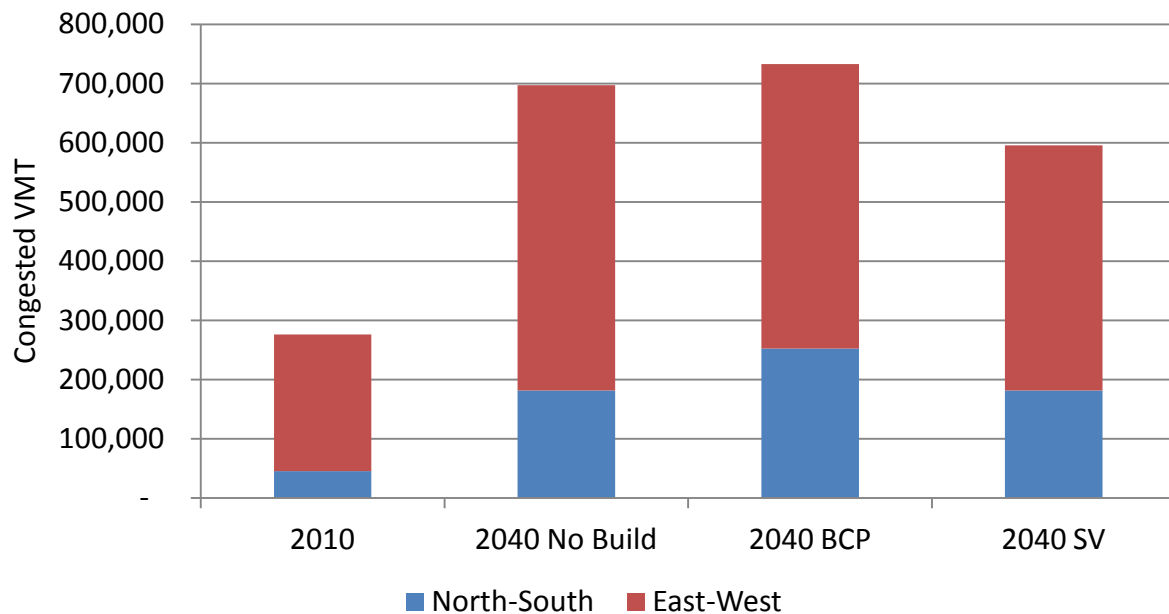
When the modeling results of the 2040 BCP Build scenario are compared to the results for the Substitute Vision scenario, the benefits of the Substitute Vision stand in contrast to the negative performance of the BCP. In Section I, we explained that the BCP would result in a larger number of vehicle miles traveled (VMT) within the study area relative to the No Build scenario. As shown in Figure 6 (next page), the Substitute Vision, on the other hand, would lower VMT in the study area.

Figure 6: The Substitute Vision Would Reduce Daily VMT in the Study Area



Similarly, while the BCP would increase Congested VMT within the study area relative to the No Build scenario (despite the added roadway capacity provided by the BCP), the Substitute Vision would significantly reduce it, as shown in Figure 7 below.

Figure 7: The Substitute Vision Would Reduce Daily Congested VMT in the Study Area



VDOT acknowledges on page 27 of the VDOT SV Memo that the Substitute Vision provides a measurable benefit to east-west travel by reducing traffic volumes on US 50 and VA 620 (Braddock

Road). As discussed in the first section of this report, the east-west movement is where the most significant traffic and congestion problems exist in the study area, so this is a critically important benefit that the Substitute Vision provides to a much greater extent than the BCP.

Thus, when taking a closer look at the traffic forecasts, it becomes apparent that where the BCP would reduce Congested VMT, those reductions would be more than offset by the increases in Congested VMT it would generate elsewhere in the study area. In contrast, overall Congested VMT and east-west Congested VMT is reduced in the study area with the Substitute Vision scenario, and unlike the BCP, the Substitute Vision does not increase north-south Congested VMT.

The Substitute Vision Reduces Travel Times to Dulles and Tysons Corner for a Greater Portion of the Study Area than the BCP

While the Substitute Vision clearly reduces traffic congestion in the study area, the benefits of the Substitute Vision extend far beyond those boundaries. As shown in Figures 8 through 11 (next pages), the Substitute Vision would do a better job than would the BCP in reducing peak period travel times to two important destinations in the study area: Dulles Airport and Tysons Corner. These four figures indicate in green the areas that would experience a five-minute or more reduction in their travel time to Dulles Airport (in the first two graphics) and to Tysons Corner (in the second two graphics).

The first graphic in both series shows the areas experiencing a five-minute or more reduction when the BCP Build is compared to the No Build scenario, and the second graphic in each series shows the areas experiencing a five-minute or more reduction when the Substitute Vision is compared to the No Build scenario. It is worth noting that in both cases, the number of residents living in areas that would see time savings in the BCP Build scenario is likely to be far fewer (Rural Crescent and Loudoun County rural areas) than those who would benefit from the time savings provided by the Substitute Vision (Manassas, southern Loudoun County growth areas, and more of central eastern Loudoun County).

Figure 8: Bi-County Parkway – AM Peak Period Time Savings of 5 Minutes or More to Dulles Airport Relative to No Build

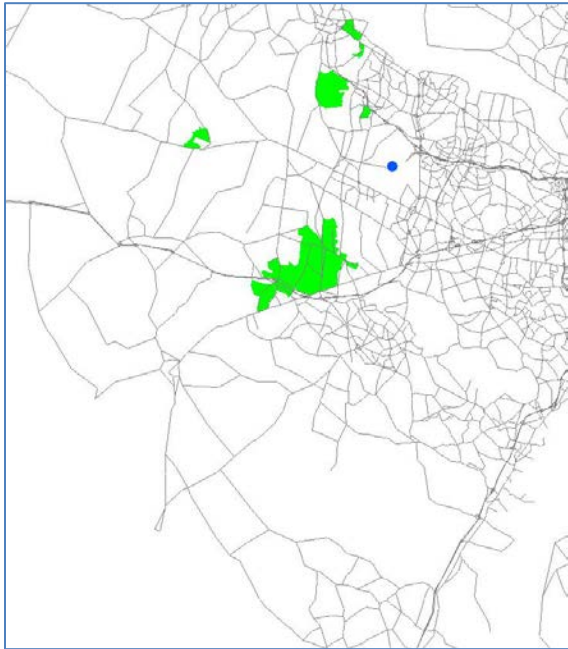


Figure 9: Substitute Vision – AM Peak Period Time Savings of 5 Minutes or More to Dulles Airport Relative to No Build

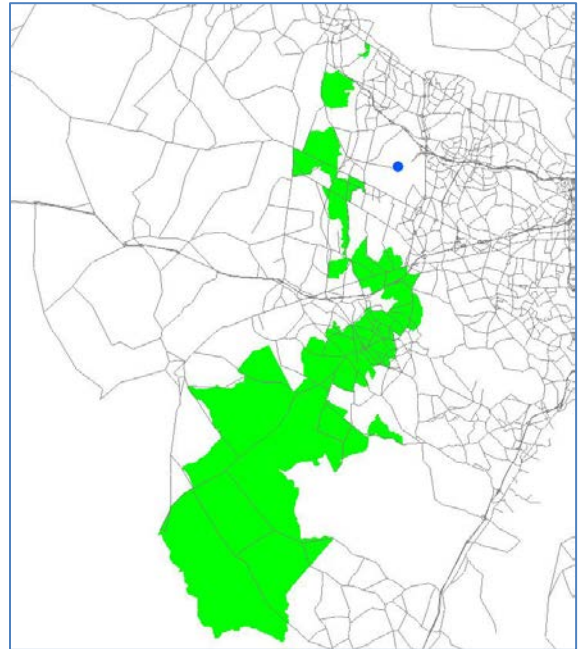


Figure 10: Bi-County Parkway – AM Peak Period Time Savings of 5 Minutes or More to Tysons Corner Relative to No Build

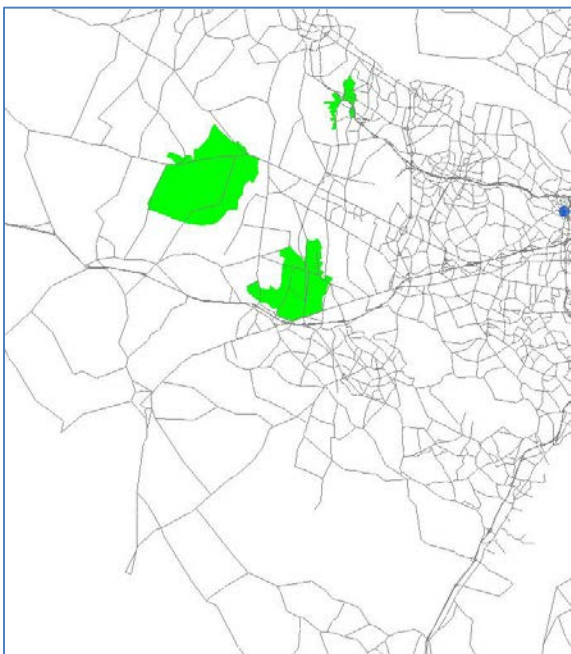
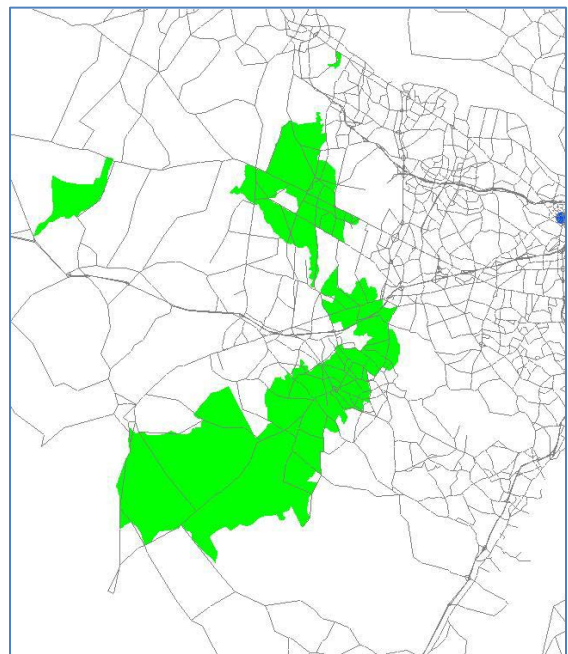


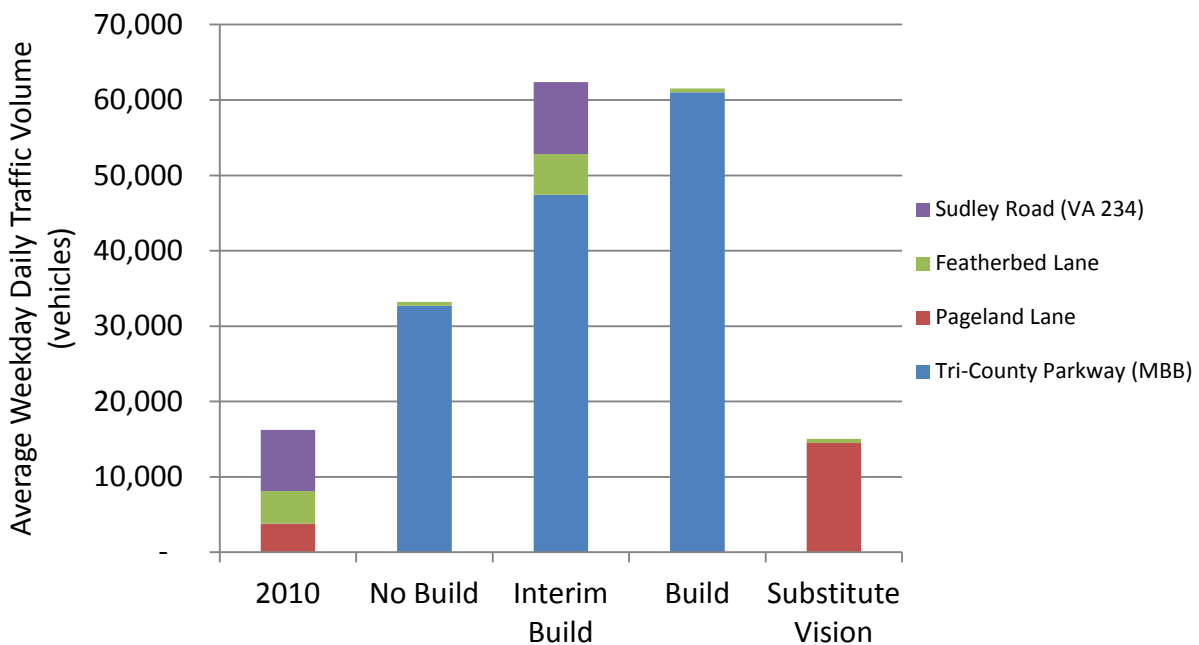
Figure 11: Substitute Vision – AM Peak Period Time Savings of 5 Minutes or More to Tysons Corner Relative to No Build



The Substitute Vision Addresses 1988 Congressional Legislation and Would Generate Less Traffic Affecting Manassas National Battlefield Park

If we focus on the traffic volumes on the roadways that are within or in close proximity to the Park, it is clear that the Substitute Vision would be far better for the long-term preservation of the Park and its resources than would the BCP. In Figure 12 (next page), we have added the Substitute Vision to the comparative analysis included above in the portion of Section I discussing Figure 5. As the graph demonstrates, the total traffic volume on the four north-south roadways with the most direct impact to the Park would be roughly the same in 2040 under the Substitute Vision as current (2010 model year) volumes. Yet under the two BCP Build scenarios, the volumes would be roughly *four times higher*. While traffic volumes on Pageland Lane would be higher in the Substitute Vision than current volumes on that road, the volume on Pageland Lane would still be only a fraction—roughly one-quarter—of the volume on the BCP in the BCP Build scenario.

Figure 12: The Substitute Vision Significantly Reduces Traffic Volumes Within and Near the Park



Note: The No Build and Build scenarios assume that Route 234 is closed through the Park, and the 0.8 miles of Pageland north of Route 29 is closed in the No Build, Build, and Interim Build scenarios. Even though VDOT recently stated at a public meeting that Pageland Lane will remain open to through traffic north of Route 29, VDOT has not used this assumption in its traffic modeling, and has not explained how it would feasibly accomplish this goal.

Finally, VDOT asserts on page 34 of the VDOT SV Memo that an approach which “assum[es] that neither the Tri-County Parkway nor the Manassas National Battlefield Park Bypass would be built (i.e., no replacement routes would be provided to absorb the traffic displaced by the road closures)” would go against the direction of Congress as set forth in the Manassas National Battlefield Park Amendments of 1988. However, the Manassas National Battlefield Park Amendments of 1988 do not require the

construction of the Bi-County Parkway nor the Battlefield Bypass as replacement routes. Rather, the legislation requires that the Secretary of the Interior, in consultation with the Federal Highway Administration and Prince William County, “shall specifically consider and develop plans for the closing of those public highways (known as routes 29 and 234) that transect the park and shall include analysis of the timing and method of such closures and of means to **provide alternative routes for traffic now transecting the park.**”¹⁵ Our alternative provides alternative routes for traffic now transecting the Park in accordance with the Congressional directive, without requiring the construction of two new highways that would result in the Park being surrounded on all sides by major roads.

¹⁵ Act Nov. 10, 1988, P.L. 100-647, Title X, § 10004, 102 Stat. 3811 (amending 16 U.S.C. § 429b) (emphasis added).

Conclusion

We have brought to the planning process for the Bi-County Parkway and the Manassas Battlefield Bypass a comprehensive alternative designed to address the most pressing transportation needs and congestion problems in the study area while allowing for the closure of Routes 234 and 29 through the Park to commuter traffic. In so doing, our goal has been to find the least damaging and most effective way accomplish VDOT's expressed purpose and need for the Bi-County Parkway and the goals of the 1988 legislation for the Battlefield Bypass. We appreciate VDOT's agreement to analyze the traffic efficacy of our comprehensive approach for addressing these needs.

VDOT's analysis of the Substitute Vision, along with the additional analysis we have provided in this report, confirms that the Substitute Vision provides an appropriate alternative for the Bi-County Parkway and the Manassas Battlefield Bypass, better addressing the key transportation needs in the study area while avoiding and minimizing harm to the irreplaceable historic resources that are the Manassas National Battlefield Park and Historic District. Further, the Substitute Vision would also reinforce the rural land preservation policies of Prince William and Loudoun Counties and represent a far more sensible investment of tax dollars. Rather than invest further time and effort into a damaging and proposal, the public would be much better served by pursuing our recommended approach.

Appendix A

Spreadsheet of VDOT Cost Estimates for Substitute Vision Projects

Download this appendix as an Excel spreadsheet ([click here](#)).

VDOT Selected Projects for Substitute Vision			Projects Grouped by Type of Service and Roles They Play				Notes
Project #	Project Name	VDOT Est Cost	Investment Packages	Project #	Project Name	VDOT Est Cost	
1	66 Signage	\$250,000	I-66 Corridor + Route 50	2	VRE	\$265,518,000	A high priority for PW/VRE VDOT includes ops/maint with all transit but not the roads
2	VRE	\$265,518,000		3	Metrorail	\$2,087,860,000	
3	Metrorail	\$2,087,860,000		4	I-66 HOV Signage	\$200,000	
4	I-66 HOV Signage	\$200,000		5	I-66 Each Express Bus	\$1,158,000	
5	I-66 Each Express Bus	\$1,158,000		9	US 50 Bus Lanes	\$123,110,000	
6	Gainesville Interchange	\$0				\$2,477,846,000	
7	Pageland Lane	\$23,460,000					
8a	Tall Cedars Parkway	\$23,460,000					
8b	Tall Cedars Parkway	\$140,632,500					
8c	Glascocock Blvd	\$23,460,000	SV Battlefield Area	7	Pageland Lane	\$23,460,000	
8d	Glascocock Blvd	\$70,074,000		11	Cedar Ridge Blvd	\$528,000	
8e	Quarry Road	\$54,111,000		12	Bull Run Post Office Road	\$82,110,000	
9	US 50 Bus Lanes	\$123,110,000		17	15/234 Roundabout	\$5,304,000	
10	US 50 Signage for Trucks	\$250,000		18	659/234 Roundabout	\$5,304,000	
11	Cedar Ridge Blvd	\$528,000		19	234/Pageland Roundabout	\$2,652,000	
				20	Pageland/29 Roundabout	\$5,304,000	
				21	Catharpin/234 Roundabout	\$5,304,000	
					Bull Run Post Office Rd/29 Roundabout	\$5,304,000	
12	Bull Run Post Office Road	\$82,110,000	Route 28 Corridor	22	Bull Run Post Office Rd/620 Roundabout	\$2,652,000	
13	28/66 Interchange	\$85,855,000		23	Pleasant Valley Rd/620 Roundabout	\$2,652,000	
14	28/Walney Interchange	\$114,455,000		24		\$140,574,000	
15	28 Widening from 66 to 7	\$0		13	28/66 Interchange	\$85,855,000	High priority for region
16	28 LRT	\$1,440,360,000		14	28/Walney Interchange	\$114,455,000	High priority if 28 to be completed
17	15/234 Roundabout	\$5,304,000		15	28 Widening from 66 to 7	\$0	In NVTa regional priority for funding
18	659/234 Roundabout	\$5,304,000		38	28 widening from MCL to 66	\$0	
19	234/Pageland Roundabout	\$2,652,000		39	28 HOV Signage	\$1,552,000	
20	Pageland/29 Roundabout	\$5,304,000					
21	Catharpin/234 Roundabout	\$5,304,000	Loudoun County Transportation Plan	40	28/New Braddock Rd Interchange	\$106,131,000	
22	Bull Run Post Office Rd/29 Roundabout	\$5,304,000		16	28 LRT	\$1,440,360,000	BRT is cheaper and more appropriate
23	Bull Run Post Office Rd/620 Roundabout	\$2,652,000				\$1,748,353,000	
24	Pleasant Valley Rd/620 Roundabout	\$2,652,000		8a	Tall Cedars Parkway	\$23,460,000	All are on Loudoun CTP and necessitated by development already approved by Loudoun County
25	Loudoun Cty Pkway - 620 to 50	\$75,570,000		8b	Tall Cedars Parkway	\$140,632,500	
26	Lenah Loop - Tall Cedars to 50	\$13,527,750		8c	Glascocock Blvd	\$23,460,000	
27	659 from 50 to 7	\$210,948,750		8d	Glascocock Blvd	\$70,074,000	
28	606 from 50 to 7	\$253,138,500		8e	Quarry Road	\$54,111,000	
29	Wellington Road	\$188,925,000					
30	Wellington Road	\$60,665,000		25	Loudoun Cty Pkway - 620 to 50	\$75,570,000	
31	Wellington Road - Bridge/interchange	\$214,637,500		26	Lenah Loop - Tall Cedars to 50	\$13,527,750	
32	Balls Ford Rd	\$92,335,500	PW W. of Manassas	27	659 from 50 to 7	\$210,948,750	659 and 606 serve as independent connecting roads within Loudoun
33	Balls Ford Rd	\$14,063,250		28	606 from 50 to 7	\$253,138,500	
34	Balls Ford Rd Interchange	\$114,455,000				\$864,922,500	
35	Godwin Drive	\$96,525,034		29	Wellington Road	\$188,925,000	
36	Godwin Drive Bridge	\$179,010,000		30	Wellington Road	\$60,665,000	
					Wellington Road - Bridge/interchange	\$214,637,500	
37	Godwin Drive/66 Interchange	\$199,027,500		31	Balls Ford Rd	\$92,335,500	
38	28 widening from MCL to 66	\$0		32	Balls Ford Rd	\$14,063,250	
				33	Balls Ford Rd Interchange	\$114,455,000	
39	28 HOV Signage	\$1,552,000	Godwin Drive	34		\$685,081,250	
40	28/New Braddock Rd Interchange	\$106,131,000		35	Godwin Drive	\$96,525,034	This project was recently added to CLRP for study by PW and VDOT
				36	Godwin Drive Bridge	\$179,010,000	
				37	Godwin Drive/66 Interchange	\$199,027,500	
						\$474,562,534	
			Miscellaneous	1	66 Signage	\$250,000	
				6	Gainesville Interchange	\$0	
				10	US 50 Signage for Trucks	\$250,000	
						\$500,000	
			Crosscheck Total:			\$6,391,839,284	

Appendix B: Resume

NORMAN L. MARSHALL, PRINCIPAL

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982

Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Regional Land Use/Transportation Scenario Planning

California Air Resources Board – Leading team including the University of California that is reviewing the ability of the new generation of regional activity-based models and land use models to accurately account for greenhouse gas emissions from alternative scenarios including more compact walkable land use and roadway pricing.

Climate Plan (California statewide) – Assisted large coalition of groups in reviewing and participating in the target setting process required by Senate Bill 375 and administered by the California Air Resources Board to reduce future greenhouse gas emissions through land use measures and other regional initiatives.

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Envision Central Texas Vision (5-county region)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for “choice” riders). Analyzed set land use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)—developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Baltimore Vision 2030—working with the Baltimore Metropolitan Council and the Baltimore Regional Partnership, increased regional travel demand model’s sensitivity to land use and transportation infrastructure. Enhanced model was used to test alternative land use and transportation scenarios including different levels of public transit.

Chittenden County (2060 Land use and Transportation Vision Burlington Vermont region) – leading extensive public visioning project as part of MPO’s long-range transportation plan update.



Municipal Planning

City of Grand Rapids – Michigan Street Corridor – developed peak period subarea model including non-motorized trips based on urban form. Model is being used to develop traffic volumes for several alternatives that are being additionally analyzed using the City's Synchro model

City of Omaha - Modified regional travel demand model to properly account for non-motorized trips, transit trips and shorter auto trips that would result from more compact mixed-use development. Scenarios with different roadway, transit, and land use alternatives were modeled.

City of Dublin (Columbus region) – Modified regional travel demand model to properly account for non-motorized trips and shorter auto trips that would result from more compact mixed-use development. The model was applied in analyses for a new downtown to be constructed in the Bridge Street corridor on both sides of an historic village center.

City of Burlington (Vermont) Transportation Plan – Led team that developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Roadway Corridor Planning

Managed Toll Lanes in the Chicago region (Reason Foundation) – Developed advanced model of the Chicago area that calculates variable tolls by link for seven weekday time periods. The model was used to analyze a comprehensive set of new toll roads and managed toll lanes added to existing freeways.

Hudson River Crossing Study (Capital District Transportation Committee and NYSDOT) – Analyzing long term capacity needs for Hudson River bridges which a special focus on the I-90 Patroon Island Bridge where a microsimulation VISSIM model was developed and applied.

State Routes 5 & 92 Scoping Phase (NYSDOT) —evaluated TSM, TDM, transit and highway widening alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea CORSIM model.

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnston Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions and making recommendations for future practice.

PUBLICATIONS AND PRESENTATIONS (partial list)

Understanding the Transportation Models and Asking the Right Questions. Lead presenter on national Webinar put on by the Surface Policy Planning Partnership (STTP) and the Center for Neighborhood Technologies (CNT) with partial funding by the Federal Transit Administration, 2007.

Sketch Transit Modeling Based on 2000 Census Data with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record*, No. 1986, “Transit Management, Maintenance, Technology and Planning”, p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record*, No. 1921, “Travel Demand 2005”, p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board’s Conference on Planning Applications, Baton Rouge LA, April 2003.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Institute of Transportation Engineers Technical Conference on Transportation’s Role in Successful Communities, Fort Lauderdale FL, March 2003.

Evidence of Induced Travel with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute’s Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers

Member, American Planning Association

Member, Congress for the New Urbanism