Comments on the

Manassas National Battlefield Park Bypass Study Draft EIS

Prepared for:

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The Coalition for Smarter Growth
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SUMMARY

We have reviewed the Battlefield Bypass DEIS and have found a number of noteworthy deficiencies that significantly affect the conclusion that four lane bypasses are required to replace Routes 29 and 234 through the Manassas Battlefield National Park. These deficiencies include:

- **Proper Modeling Procedures Not Followed**. The proper modeling protocol was not carried through a sufficient number of iterations to give proper modeling results, so that the evaluation of alternatives in the DEIS is therefore based on inaccurate travel forecasts, which also fail to account for induced travel demand. The traffic forecasting results in the DEIS are invalid, rendering all conclusions in the DEIS that are based on those results of little or no use. Indeed, this significant flaw alone cripples the usefulness of the entire DEIS.
- **No-Action Alternative is Invalid and Leads to Invalid Alternatives Modeling.** The DEIS-No Action alternative includes numerous, redundant major highway projects, many of which may never be constructed. This further makes all traffic modeling forecasts unusable and unrealistic, as these new projects draw even more traffic to the area.
- **Flawed conclusion that four lane bypasses are needed** to accommodate the existing traffic volumes currently traversing the Park. Current road segment levels of service in the DEIS appear to be incorrect and undocumented. The existing congestion in the Park is due to the intersection of Routes 29 and 234, and not due to the fact that these roads have two-lane cross sections. Two-lane roads with appropriate intersection designs would supply the needed capacity to carry the traffic using Routes 29 and 234 through the park.
- **Flawed specification and subsequent rejection of the Transit alternative**. The "transit alternative" in the DEIS illogically attempted to replace the function of the Routes 29 and 234 with new local bus routes. A mass transit alternative must consider not only new transit service routes, but also the entire service network, and the need for supportive plans, pedestrian facilities, and land use policies that are needed to accompany a successful transit system. In particular, future land use projections must reflect transit supportive policies and practices in a mass transit alternative. Mass transit is not simply running bus routes. The mass transit alternative evaluated in the DEIS was designed to fail. No effort was made in the DEIS to develop a successful, feasible mass transit alternative.
- **Flawed rejection of the TSM alternative**. It appears that the TSM alternative only considered I-66 as an existing alternate route. This alternative was then rejected due to the concerns about merging on I-66, which were never described in detail nor analyzed in the DEIS. The TSM option could be vastly improved from what was evaluated in the DEIS by considering a broader range of improvements to existing routes, along with minor new linkages.
- **Flawed route chosen for Alternative G.** With some slight modifications to the proposed alignment, a two lane Alternative G bypass would have significantly less impacts on residences and the Park, while still serving the study's purpose of removing traffic from Routes 29 and 234. The traffic analysis presented in the DEIS for this alternative is also flawed.
- **Need for Evaluation of a New, Robust Multimodal Alternative**: In order to meet the goal of evaluating all prudent and feasible alternatives, the DEIS should evaluate a Smarter Growth

alternative which incorporates Land Conservation, Mass Transit and TSM, and strives to successfully integrate all these tools into a prudent, feasible, and effective alternative.

These deficiencies are discussed in more detail in the following sections.

Proper Modeling Procedures Not Followed

The traffic modeling performed in the preparation of the DEIS is invalid. The regional travel demand model used by the consultants is a four-iteration forecasting model, which improves accuracy of projections. However, for the DEIS effort, only the first iteration was ever undertaken, so that its projections have not been refined to a level of accuracy that is acceptable in the professional traffic modeling community.

The travel demand modeling process treats a set of simultaneous decisions like a set of sequential decisions. Instead of deciding where to go, how to get there, and what roads to take all in one step, the modeling process calculates this as 3 separate steps. This introduces error into the process because at the beginning of the modeling process, roads may appear uncongested and longer trips are encouraged. However, when these longer trips are then loaded onto the model network, the roads become congested, and travel times are longer than what was assumed. Under these more congested conditions, drivers would make different decisions about where to travel to or what routes to take. Additional calculations and iterations of the transportation model must be done to account for these changing conditions, and bring the modeled congestion into balance. Good modeling practice therefore feeds the congested travel times back into the earlier steps of the modeling chain, repeating the process through a number of iterations until an equilibrium condition is approximated.

The DEIS modeling was done using the Western Transportation Corridor (WTC) model which is based on the Metropolitan Washington Council of Governments (MWCOG) travel demand model.[1] Like the MWCOG model on which it was based when it was originally developed, the WTC model runs trip distribution and assignment through four "loops", or iterations:

1) PUMITR – "pump priming"
2) BASEITR - base iteration
3) FRSTITR – first iteration
4) SCNDITR – second iteration

Selecting the number of feedback loops to use involves balancing better model accuracy (more feedback iterations) against shorter computation time (fewer feedback iterations).[2] The traffic modeling performed for the DEIS stopped after the first loop and failed to conduct any feedback iterations. Models lacking feedback or with incomplete feedback overestimate travel on congested roadways, and therefore overestimate congestion and overstate the need for expanded roadway capacity. This failure to conduct feedback iterations renders its traffic modeling results incorporated into this DEIS invalid.

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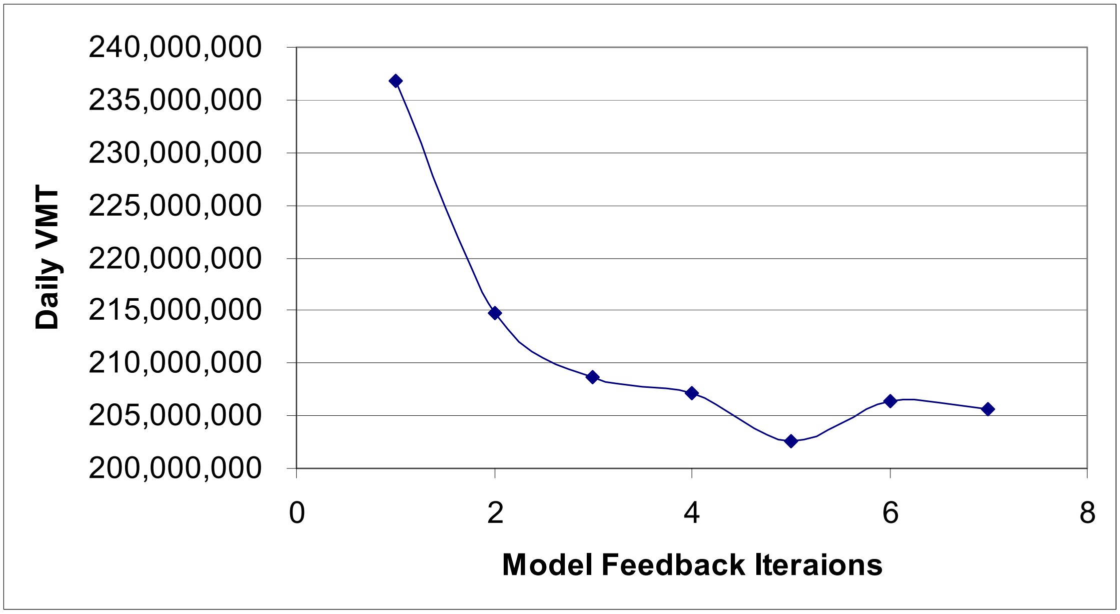
[1] Michael Baker Jr., Inc. "Existing Conditions and Transportation Modeling Methods: 1994 Validation, Western Transportation Corridor Study." Prepared for the Virginia Department of Transportation, January 2003.

[2] Indeed, MWCOG recently increased the number of feedback iterations in its model from 4 to 7 in order to improve model accuracy, following a 2003-2004 review of the MWCOG by a panel organized by the National Academy of Science Transportation Research Board.

The following graphic shows regional vehicle miles traveled (VMT) for the MWCOG Transportation Policy Board (TPB) Model Version 2.1D with 7 feedback iteration loops.

Version 2.1D Vehicle Miles of Travel (VMT) by Feedback Iteration



As shown above, the total regional daily VMT is over 10 percent higher at the first ("pump prime") iteration than it is at the end of the modeling process. The DEIS modeling included only this one model iteration, so its traffic assignments are unrealistically high. As further detailed below, the variation for individual corridors are more variable between iterations, which is one of the reasons why MWCOG has recently increased the number of feedback iterations included in that model from 4 to 7.

Notably, model feedback is also required by the Clean Air Act Amendments to assure that air pollution emissions are properly estimated. Model feedback has been required by Federal air quality modeling regulations for conformity determinations since 1993 and this provision was reaffirmed after public comment in 1997:

> *The final rule's fifth network modeling requirement is based on Sec. 51.452(b)(1)(iv)/Sec. 93.130(b)(1)(iv) of the November 1993 conformity rule, which requires feedback of travel times resulting from traffic assignment to travel times used in trip distribution. Although this requirement was not proposed as part of option 3, EPA received comments based on proposed option 2 that this requirement of the original rule should be retained. Commenters pointed out that this type of consistency in the evaluation of travel time is almost universally recognized to be scientifically valid. A commenter stated that not requiring feedback would allow analyses to be manipulated to produce desired results. Another commenter stated that most MPOs have already implemented full feedback, and it is easy to perform and more accurate than partial feedback. Commenters submitted technical reports and papers to the docket in order to document their claims that full feedback is recognized to be a necessary and sound modeling improvement.*
>
> *EPA agrees with commenters that there is clear theoretical justification for feedback between traffic assignment and trip distribution and that feedback may be essential to accurate forecasts when congestion exists. In addition, EPA agrees that full feedback is already widely available and used. As a result, EPA believes it is appropriate to retain the feedback requirement.*

(Federal Register: August 15, 1997, Volume 62, Number 158, Page 43779-43818, Transportation Conformity Rule Amendments: Flexibility and Streamlining)

Despite near consensus on this issue, it still comes up periodically on professional modeling internet discussion groups, and the answer always is that model feedback is necessary. Coincidentally, such a discussion is occurring now. On Monday, June 20, 2005, the following question was posted on the Travel Model Improvement Program (TMIP) listserv sponsored by the U.S. Department of Transportation and also on the TransCAD listserv.

> *Hello All,*
>
> *Is it necessary to run the Trip Distribution step for each model run when comparing a set of potential projects such as for an MPOs Long-range Transportation Plan?*
>
> *For example: Once you have run Trip Generation, Trip Distribution and Traffic Assignment (no mode split) one time all the way through, is it plausible to believe that you can then skip most all previous steps except Traffic Assignment when looking at alternatives? (Obviously when introducing a new set of links representing a planned facility you have to update your network travel times and skims.) The argument is that once the trip table is developed in the first run of trip distribution, new projects will not change the distribution patterns enough to warrant running it again for each subsequent model run. Can you just code in the new network links, recalculate link travel times and skims and then run Traffic Assignment again? Will the process of changing the network slightly for each planned facility not cause enough of a change in trip distribution patterns to warrant running this step?*
>
> *Another argument is that a fixed trip table makes it easier to compare one project's benefit versus another's. You are just comparing the traffic pattern changes, VMT and VHT given the new facility. Given this method of comparison I don't believe you are really comparing apples to apples.*
>
> *I would like to get your expert opinions on the need for running trip distribution when evaluating multiple planned projects for inclusion in an MPO Long-range Transportation Plan.*
>
> *Thanks in advance.*
>
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In the first 24 hours, several messages were posted that say that it is necessary to include model feedback in alternatives analyses. No one argued that feedback was unnecessary. Below is a response from a staff person at Caltrans (the California state transportation department).

> *With exactly the same input data (highway network, zonal data, transit data, etc.) it is possible to get a wide range of outputs depending on the way a model under highly congested conditions is run. Recently I have done a series of tests with a model in the SCAG region for the year 2030. The total average daily VMT varies from 472,000,000 to 500,000,000 depending on the number of iterations in the distribution step, the number of*

> *iterations in the assignments and the number of feedback loops. The variations at the corridor level are likely to be much greater. I agree with Juan, if you do not have proper convergence criteria for each of the submodels and also for the feedback loops it is hard to say what a model is actually telling you and even more so if you want to compare alternatives.*
>
> *Tony Van Haagen*
> *Caltrans District 7*
> *Los Angeles*
> *[posted on June 20, 2005]*

Mr. Van Haagen is arguing not only that feedback is essential but that it is also important that feedback be done correctly. He describes how different modeling procedures change regional vehicle miles traveled (VMT) dramatically. Furthermore, he states that the "variations at the corridor level are likely to be much greater." This point is particularly important to this DEIS, as the performance measures involve individual roadway links and intersections.

In the case of the DEIS, the model used was set up to include model feedback so that the DEIS modelers had no justification not to include feedback. The proper modeling protocol was not carried through a sufficient number of iterations to give proper modeling results, so that the evaluation of alternatives in the DEIS is therefore based on inaccurate travel forecasts. Moreover, by not including model feedback, the modeling in the DEIS has completely failed to account for induced travel demand.[3] This will inject further inaccuracies into the modeling results. Consequently, the traffic forecasting results in the DEIS are invalid, rendering all conclusions in the DEIS that are based on those results of little or no use. Indeed, this significant flaw alone cripples the usefulness of the entire DEIS.

No-Action Alternative is Invalid and Leads to Invalid Alternatives Modeling

A No-Action alternative is required for all Environmental Impact Statements. There always are some questions as to which roadway projects should be included in the future No-Action alternative. In this DEIS, the No-Action alternative includes an unreasonably high, and unrealistic number of major roadway projects in the study area. These roadway projects are included in every other alternative as well. This causes traffic redistribution and significantly increases modeled traffic volumes in the study area. It is impossible to know whether these modeling results are representative of the future traffic conditions in the far more likely case that not all of these roadways are constructed.

The major problem is that the DEIS assumes in the traffic analyses for the No-Action alternative and all other alternatives that two separate alignments of the proposed Tri-County Parkway will be constructed. The No-Action Alternative and all other alternatives include … "widening of I-66, construction of the Route 234 Bypass North Extension, and construction of the Tri-County Parkway. (DEIS, p. 2-8) For purposes of the traffic analysis, what is called in this DEIS the "Route 234 Bypass North Extension" was also modeled in the Tri-County Parkway DEIS as the "CBA West 2" Build Alternative. What is called the "Tri-County Parkway" was modeled in the Tri-County Parkway DEIS as the "CBA Comprehensive Plan" alternative. Therefore, the Battlefield Bypass DEIS assumes that two different alignments of the Tri-County Parkway will be constructed

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[3] Broadly understood, induced travel demand is defined as *any increase in travel resulting from improved travel conditions.* Travel conditions may be improved by reducing travel times, reducing travel cost, improving traveler safety, improving traveler comfort and so on. <u>See</u> Anthony Downs, *Stuck in Traffic: Coping with Peak-Hour Traffic Congestion* (Washington, D.D.: The Brookings Institute, 1992): 27-29.

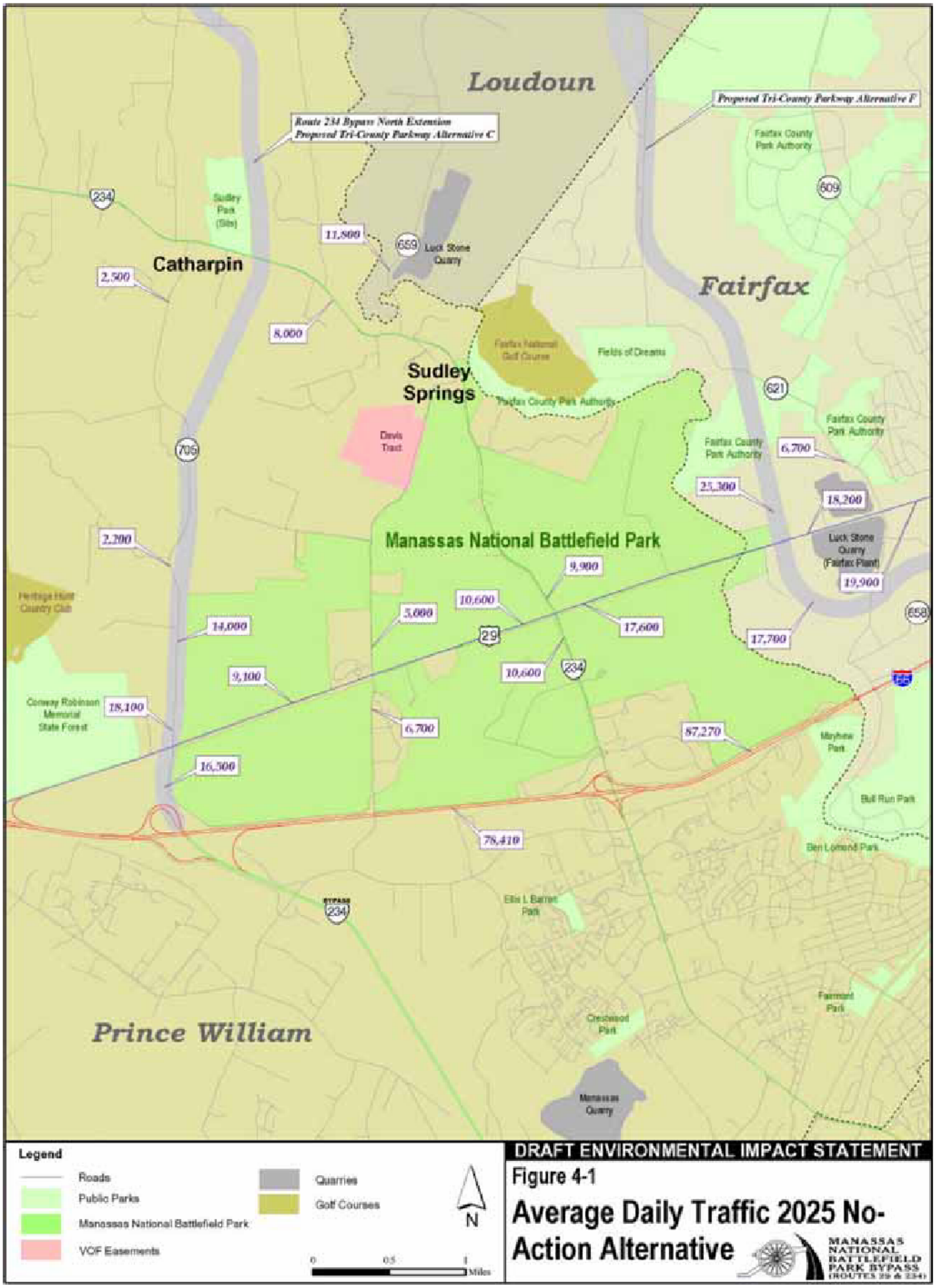
in the No Action alternative and all other alternatives. This is more new north-south roadway capacity in the study area than was included in the Tri-County Parkway DEIS in any Build alternative. Thus, these two studies, conducted at the same time and for the same study area, have contradictory assumptions about the future roadway network.

It is far from certain that either of the Tri-County Parkway alternatives will be constructed. It is extremely unlikely that both roadways will be constructed. Therefore, the traffic modeling and analyses overestimate traffic volumes in the study area for all alternatives, and all subsequent analyses based on this modeling are invalid. The DEIS should have modeled different scenarios including a true No Build alternative. This scenario would have no Tri-County Parkway. It also would be appropriate to model additional scenarios with <u>one</u> Tri-County Parkway, but it is inappropriate to model scenarios with <u>two</u> Tri-County Parkways.

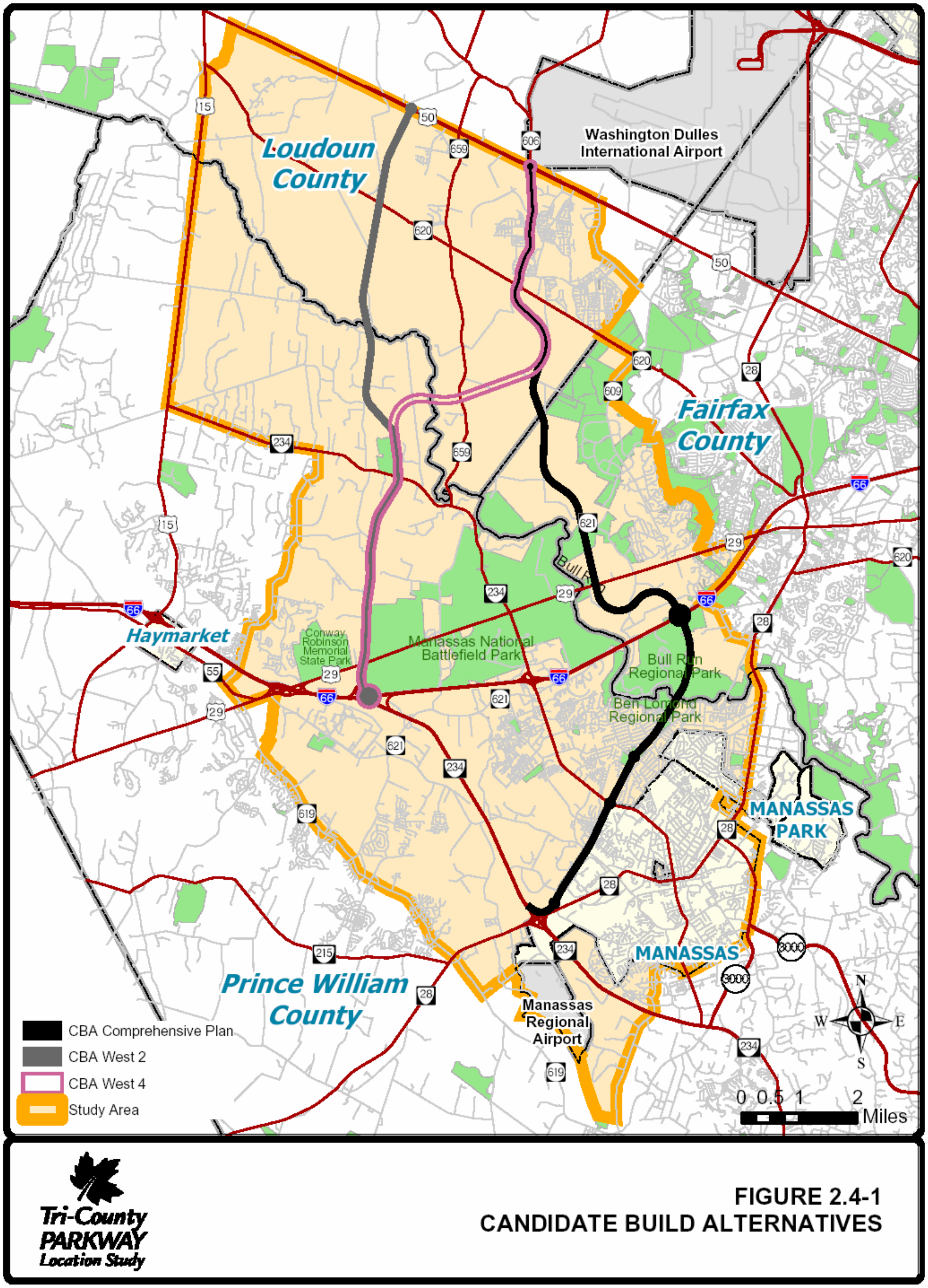
The inclusion of the two Tri-County Parkways in all scenarios makes some of the modeling comparisons completely meaningless. For example, the free flow (uncongested) travel times are identical from Catharpin to I-66 in 2025 across all alternatives (Table 4-2, p. 4-21). This is because the traffic analyses for all alternatives are based on the existence of the Tri County Parkway CBA West 2 Build alternative, a.k.a. the Route 234 Bypass North Extension, for handling this traffic. This is not a real set of alternatives: indeed, for north-south travel, the MBB DEIS's traffic analysis really only includes one north-south alternative – this CBA West 2 alternative of the Tri County Parkway.

The graphics on the following pages show first the traffic modeling routes for the No Action alternative in this DEIS, and then the separate Tri-County Parkway Build alignments in the Tri-County Parkway DEIS. The two graphics demonstrate that the traffic modeling for the MBB DEIS includes both a full eastern and western version of the Tri-County Parkway.

No-Action Scenario Includes Two Different Tri-County Parkways (p. 4-4)



Tri-County Parkway DEIS Showing Separate Build Alignments, p. 23.



Flawed Conclusion Regarding the Need for Four Lane Bypasses

Among the primary goals of this project is to provide new routes so that Routes 29 and 234 through the Manassas Battlefield Park can be closed. The following section from the Purpose and Need statement makes this clear.

- Accommodate Existing Traffic Volumes – the primary objective of this DEIS is to develop alternatives that can accommodate existing traffic volumes. Existing traffic congestion interferes with historic preservation and park interpretation. Impacts will be assessed in accordance with the National Environmental Policy Act (NEPA) and a future scenario, defined as the No-Action Alternative, has been developed to meet those requirements. However, this study acknowledges that the elements of need defined in the previous section are applicable to current conditions, and are not dependent on future growth (although future growth pressures are expected to worsen conditions). (page 1-16, DEIS)

Later in the DEIS, brief mention is made about the conclusion that existing traffic requires a four lane facility:

Development of Four-Lane Concepts
Route 29 and Route 234 are currently two-lane roadways within the Manassas National Battlefield Park. However, . . . traffic volumes on these routes already indicate demand for four-lane facilities. The travel demand modeling conducted for this DEIS also indicated that the construction of only two-lane facilities as part of the relocation proposals would result in failing levels of service and traffic congestion on the alternatives. A recommendation to study the effects of four-lane configurations was made and coordinated with the localities, State agencies, and the public. . . . . (page 2-17, DEIS)

The DEIS fails to provide technical information as to how the conclusion was drawn that four lanes are needed. The road corridor level of service results on page 3-9 and 3-10 do not include documentation of the input data, and this was not delivered to us as part of our request for modeling information, so we are unable to reproduce these analyses. Nonetheless, we believe that these level of service analyses are not accurate, based on the results of an analysis we conducted of the existing traffic conditions on these corridors using the *Highway Capacity Manual* Two Lane Highway Level of Service Analysis. This analysis indicates far different results than what the DEIS reports. (We have attached a printout of this HCS 2000 analysis with this report.) For the worst case segment, Route 29 east of Route 234 during the PM peak hour, the following input assumptions are used in our analysis:

PM Peak Hour Traffic	1,538 (Existing Condition Report Figure 2-3)
Peak Direction percentage	74% (Existing Condition Report Figure 2-3)
Peak Hour Factor	0.88 (default)
Percent heavy vehicles	10%
Percent Recreational Vehicles	1% (default)
Terrain	Rolling
Highway Type	Class 2*
Access points/mile	20
No Passing Zones	100%

* Class 2 is selected for this application, based on the following description from the Highway Capacity Manual: *Class II Highways—These are two-lane highways on which motorists do not necessarily expect to travel at high speeds. Two-lane highways that function as access routes to Class I facilities, serve as scenic or recreational routes that are not primary arterials, or*

pass through rugged terrain generally are assigned to Class II. Because this route is paralleled by an interstate highway that offers high speed travel, and traversed a scenic, historic landscape, Class 2 designation is appropriate.

These input assumptions -- which are reasonable and should reflect the same range of inputs that would go into any level of service analyses performed for this DEIS -- result in a level of service D for this worst case segment of road in the Park. However, the DEIS reports that this road segment received a level of service F for both AM and PM peak. A level of service F is always unacceptable, while a level of service D represents much more acceptable conditions. The Two Lane Highway level of service methodology bases the results on the "percent time following", which indicates the degree to which traffic might be hindered from driving at their desired speed due to following other vehicles. The following table from the Highway Capacity Manual shows how levels of service for two lane highways are defined by percent time following.

EXHIBIT 20-4. LOS CRITERIA FOR TWO-LANE HIGHWAYS IN CLASS II

LOS	Percent Time-Spent-Following
A	≤ 40
B	> 40–55
C	> 55–70
D	> 70–85
E	> 85

Note:
LOS F applies whenever the flow rate exceeds the segment capacity.

Because, as explained above, the DEIS does not provide definitions of their corridor level of service, nor details of the analysis it conducted for this road segment (or any other), it is unclear how it reached such a different conclusion on the existing level of service for this road segment. Nonetheless, the road segment functions much better than the DEIS sets forth. As a result, it appears that the decision to consider only four lane bypass concepts was based on faulty analyses, resulting in a deficient DEIS.

As opposed to an insufficient number of lanes, the traffic congestion along Route 29 through the Park is caused primarily by the intersection of Routes 29 and 234, which does not provide sufficient capacity for peak hour traffic. Two lanes of roadway supply the capacity needed to carry the traffic that currently uses Routes 29 and 234 through the Park. In fact, the *Highway Capacity Manual* states that for isolated signalized intersections on two lane highways, the intersections LOS will govern the road operation. The existing traffic volumes can be accommodated on two lane bypasses of the park, as long as the new intersections are designed to accommodate the peak hour traffic. Because of the serious flaws in the modeling noted earlier in this report, there are no reliable traffic forecasts for future traffic conditions. However, as the purpose of the project is to accommodate existing traffic, only two lane bypass routes are required.

Flawed Design of Alternative G

There are a number of flaws with the analysis of Alternative G, which resulted in erroneous conclusions that this is not a viable alternative. The following paragraphs describe our findings on these flaws.

Residential Impacts- Among the findings that weigh against Alternative G is the impact it would have on the cohesion of Bull Run Estates. The impacts from Alternative G as described in the DEIS are set forth below:

> **Alternative G**
> Alternative G would cut-through the Bull Run Estates neighborhood negatively impacting community cohesion, creating noise impacts to some residences, and displacing 3 residences within the community. Impacts to the Bull Run Estates neighborhood are illustrated in **Figure 4-21**. Alternative G would also displace 2 residences along Bull Run Post Office Road and 7 residences along Pageland Lane. Several residences along Pageland Lane would experience noise impacts. All of the residences located west of the alignment in the Pageland Lane area would continue to have direct access to Pageland Lane. Reconfigured access roads would be constructed at two locations, each of which would travel under the alternative at bridged
> locations, to maintain access to Pageland Lane. Alternative G would result in increased cut-through traffic on Pageland Lane. (page 4-37, DEIS)

However, these residential displacements could be easily avoided by a slight re-routing of the alignment of Alternative G to overlap with Route 621, and by reducing it to 2 lanes. This would also affect conclusions regarding cost of land acquisitions, on page 4-39, and would eliminate any impacts to the Cub Run Primitive Baptist Church. Furthermore, as shown on page 4-38, it is apparent that the existing cohesion of this subdivision neighborhood is quite severely impacted as it is bisected by I-66. These residences already experience high noise levels from I-66, so the impact of a bypass, especially a slower speed 2 lane bypass, is likely quite limited. An accurate impact assessment would require a more accurate description of the existing community cohesion and noise levels to these communities from a two lane bypass that overlaps with Route 621. Finally, any impacts to the Park would also be decreased by using a 2-lane rather than a 4-lane highway to the south of the Park.

Traffic Analysis-Table 4-3 (p. 4-23) gives signalized intersections levels of service for the morning and afternoon peak hours. In general, the results for Alternative G are better than the other alternatives. However, one problem is identified with Alternative G – the intersection of Battleview Parkway with Route 234 Business in the afternoon peak hour. The text identifies the problem as "demand for left turns at this location" (p. 4-24). It appears that this is referring to a high demand for left turns from development located on Battleview Parkway. However, it is inappropriate to assume that all of these left turns must take place at a single intersection. The DEIS states:

> *Because Alternative G would follow the existing alignments of Battleview Parkway and Bulloch Drive the impacts to the commercial sector would be low. Opportunities for aesthetic entrances to offices and commercial stores would exist along the alignment. (p. 4-78)*

This shows that more than one intersection is feasible and even probable. By splitting the traffic among multiple intersections, congestion can be alleviated.

Furthermore, the high conflicting traffic on Route 234 Business is a direct result of the Tri-County Parkway CBA Comprehensive Plan" alternative being included in all the traffic analyses as is demonstrated in the following excerpt from the DEIS.

> *Alternative G operates as more of a bypass for congested portions of I-66, particularly in the PM peak period. Thus, the volumes on the section of Alternative from Route 29 east of the Park to Business Route 234 are substantially higher than volumes (14,300 – 16,300) on Alternative G west of the Business Route*

> *234 (2,200). Most of the volume reduction is due to traffic diverting onto I-66 at the intersection with Business Route 234. (p. 4-10)*

Most of this traffic is from the Tri-County Parkway. If this Tri-County Parkway alternative were not constructed the traffic volumes would be substantially lower. This would improve performance of the Battleview Parkway intersections.

The DEIS also identifies the northbound left turn from Route 234 Business onto I-66 in the afternoon peak hour as a potential problem due to the increased through movements on Route 234 Business. Again, this is likely to be caused primarily by the inclusion of the Tri-County Parkway in the traffic modeling for this and all other alternatives.

Impacts on Pageland Road-Similarly, the residential impacts in the Pageland Road area can easily be avoided if Alternative G involved a two lane upgrade of the existing Pageland road rather than the new 4-lane highway envisioned for this CBA in the DEIS.

Flawed Rejection of I-66 Co-Location Alternatives

The following paragraphs from the DEIS state that any alternatives that involved co-location with I-66 were eliminated.

> **Elimination of I-66 Co-Location Alternatives**
> Due to concerns about an inconsistent cross-section on I-66 (number of lanes) that would be created by this relocation of Route 29 from Centreville to Gainesville and the resulting congestion projected to occur at the merge points, alternatives that involved co-location of Route 29 onto I-66 were eliminated. The Virginia Department of Transportation expressed concerns about alternatives that involved co-location of Route 29 onto I-66 as part of the alternatives development process. The traffic analysis indicated that at least one lane in each direction of I-66 would be needed to meet the travel demand created by shifting the traffic currently using Route 29 onto I-66. A revised southern alternative was developed as a compromise alternative that would not be located within the I-66 right-of-way. (page 2-17, DEIS)

It is not clear if any analysis was undertaken to document whether VDOT's concerns were valid. In any case, no alternatives should be rejected on speculation alone. A rigorous analysis of the weaving and merging conditions on I-66 should be undertaken to determine the feasibility of these options, without the additional traffic that would be generated by either of the two Tri County Parkways. Co-location alternatives should not be rejected unless these concerns are validated by analysis. Moreover, even if such concerns are documented, there should be efforts to address these problems through improvements to these segments of I-66.

Flawed Definition and Premature Rejection of Transit Alternative

The DEIS incorrectly assumes that a "mass transit alternative" should involve simply running some new bus lines in the vicinity of the closed routes. In fact, the study area is highly auto oriented, and it is simply impossible that adding these short bus routes could replace the functioning of the closed roads through the Park. The following paragraphs describe the transit alternative:

> To meet the Purpose and Need, the Transit concept would have to accommodate the demand of the existing north-south and east-west movements currently using Routes 29 and 234 through the Park, which would be closed in this concept. Figure 2-5 shows the proposed transit improvement routes that were tested as potential measures

> to accommodate that demand. North-south transit movements would be provided along bus routes using the Route 234 North Bypass Extension that is included in the No-Action Alternative. East-west service would be located on I-66. . . .
> Transportation Demand Management (TDM) measures were generally assessed as part of this system evaluation. However, detailed transit operating plans and detailed TDM measures were not developed since this concept did not pass the preliminary screening as discussed below in section 2.2. (page 2-9, DEIS)

The following sections describe the elimination of mass transit as a "stand alone" alternative:

> **Mass Transit**
> Although the Mass Transit Concept was eliminated as a stand-alone alternative during the screening of the preliminary concepts, elements of mass transit will be considered as part of the development of transportation corridors and the concept of additional transit on I-66 is encouraged. The Mass Transit Concept did not address several of the elements of need for this relocation study and was therefore eliminated. An investment in transit without any additional capacity or alternate locations for Route 29 and 234 would result in discontinuous routes, which is one of the primary elements of need. In addition, a "best case" estimate of transit ridership indicates that the transit concept would not provide adequate travel demand to replace the capacity lost by closure of both Routes 29 and 234. Finally, the transit concept was eliminated because it would not provide meaningful access to the quarries that generate much of the truck traffic on Routes 29 and 234 and would not provide relocated access to the private in-holdings within the Park.
>
> As part of the evaluation of the transit concept, a cursory analysis of the mode split effects of implementing transit was prepared. One of the primary goals is to provide for an alternative means of transportation for the 28,000 daily trips projected to use Routes 29 and 234 in the future design year of 2025. A mode split for transit of 10%, which is a very optimistic projection, would still leave over 25,000 trips that need to be accommodated in addition to the stand-alone transit alternative. Given the low density of land use in the vicinity of the Park and diversity of local trips shown as the primary origins and destinations of traffic traveling on these routes, even a 10% mode split would be difficult to achieve. (page 2-19, DEIS)

Of course, mass transit alone cannot possibly meet the purpose and need of providing alternate vehicular routes around the Manassas Battlefield Park, so it is a pointless exercise for the DEIS team to use this standard. Mass transit should be a component of a multimodal system, supported by a sound investment plan and transit oriented land use policies. Transit has the potential to gain a greater share in meeting the future transportation needs in the study area, rather than to entirely replace the need for new roads around the Park. It should be evaluated in the DEIS as part of a short-term strategy for removing traffic from the Park by combining transit enhancements in the study area with a smaller, two-lane bypass route, and as part of a long-term strategy to address traffic growth that includes an integrated land use/transportation/transit improvement plan for the region, as discussed below. The most likely corridors in the study area to support transit use are the east-west corridors of Route 29 and Route 50. Services could also feed existing or new commuter rail stations of the VRE system.

Flawed Definition and Premature Rejection of TSM Alternative

The following paragraph describes the TSM alternative in the DEIS:

> **Transportation Systems Management (TSM) Concept**
> The purpose of the TSM concept is to maximize the efficiency of the local transportation system, after Routes 29 and 234 through the Park have been closed, by including minor, low-cost spot improvements that allow the system to operate more efficiently without the construction of major new roadways segments. These spot improvements would include adding shoulders, removing sight-distance problems, adding or lengthening turn lanes, and improving signal timing. The TSM alternative for this DEIS includes the closure of Routes 29 and 234 within the Park. Because major improvements are not proposed, these routes would be co-located onto existing roads or onto those roads planned for construction prior to 2025 in the CLRP. As part of the TSM concept, Route 29 would be co-located onto an improved I-66 and Route 234 would be co-located onto the planned Route 234 Bypass North Extension that is included in the No-Action Alternative network. (page 2-9, DEIS)

This TSM alternative was subsequently rejected, apparently in large part because all alternatives that relocated Route 29 onto I-66 were rejected by VDOT. (See page2-21, DEIS). The DEIS states that this alternative "failed to provide a viable option for traffic now traveling through the park . . .", but there is no analysis supporting the rejection of this alternative, and the term "viable option" is never defined. Specifically, the DEIS fails to support its conclusion that co-location of Route 29 with I-66 is infeasible, as discussed earlier in this report, and it offers no basis for its conclusion that co-location of Route 234 onto the Route 234 Bypass North Extension is not viable. Moreover, the DEIS fails to explore other options for using existing routes to replace Route 29 and Route 234. Particularly since we have shown above that the new routes need only consist of two lanes of traffic, there are opportunities to utilize and link together existing road corridors to provide an alternate route which have not been explored in the DEIS. One such alternative is proposed for consideration later in this report.

Land Conservation and Smart Growth Strategies Not Considered

As part of a longer term strategy to address this region's transportation needs, an integrated transportation/ land use plan could offer the most cost effective, sustainable and equitable strategy to meet the region's future needs. A plan that adheres to the principles enunciated in the recent *Reality Check* process is a good first step. In that process, a consensus was reached by 300 stakeholders on the following principles for guiding growth:

- Preserve and protect natural areas and green space
- Create new development near transit
- Maintain a balance of jobs and housing; and
- Focus new development back into the urban core.

These principles should be considered as a cornerstone for planning the future transportation infrastructure. Investments that will support these goals should have priority for funding and implementation.

Integrated land use and transportation planning is also specifically encouraged in FHWA publication No: FHWA-RC-BAL-04-0015, *Land Use and Transportation Planning*:

> Land use decisions can provide a strategy to address congestion through land use development that generates fewer and/or shorter vehicle trips. Land use development patterns can also shape individual travel needs.

The primary purpose of the Battlefield Bypass is to establish an alternate facility for existing traffic. In order to accommodate traffic volumes farther into the future, land use strategies, as articulated above by the *Reality Check* process, will result in the types of benefits that FHWA describes in the same publication:

> **Benefits:**
> Improved transportation and land use decision-making processes affects the quality of life in communities. Improved coordination can reduce congestion, improve mobility, reduce air pollution and generally improve the quality of a community.

An alternative that relies on land use shifts that better represent local and regional planning goals can be a viable solution to the traffic growth in this area. There should be exploration of alternatives that consider alternative land use forecasts in a supplemental DEIS.

proposed smarter growth alternative

The DEIS fails to make a legitimate effort in developing an effective, feasible multimodal TSM alternative. The following section outlines a proposed multimodal strategy that should be evaluated, refined as needed based on accurate traffic forecasts, and improved upon in subsequent stages of the DEIS. It provides a prudent and feasible alternative that will have far less impact on this area's sensitive natural and historic resources.

This alternative has a number of components, as described below.

Alternate Two Lane Vehicular Route - A new 2 lane route, as outlined on the USGS base map attached to this report, could be developed primarily by upgrading existing routes. This proposed route is similar to Alternative G, but focuses on upgrading existing routes to a standard 2 lane road rather than building new roads, and thereby avoids many of the impacts described in the DEIS for Alternative G. The route should be planned and designed using the principles of context sensitive design. The design speed could be reduced in areas where a more meandering alignment could avoid impacts to sensitive natural, historic, or cultural resources. The road could be designed as a two lane parkway using National Park Service standards, with landscaped shoulders of stabilized soil/gravel mix. Paved shoulders sufficient to provide safe bicycle movement should be provided. Intersections should be designed to provide sufficient peak hour capacity for existing traffic volumes. Modern roundabouts could be used at the intersections, as they provide attractive, safe, and high capacity traffic control. One-lane roundabouts could be used at minor intersections, and flared entry two-lane roundabouts at major intersections. Roundabouts are supported by the Virginia legislature in *House Joint Resolution No. 594, Encouraging the Department of Transportation to construct more roundabouts instead of signalized intersections,* passed by the House of Delegates and Senate in February, 2003. (copy attached to this report) Access to existing land uses will be provided on the upgraded road, but there would be no new interchange with I-66. This new 2-lane route will provide adequate capacity to allow the closure of Routes 29 and 234 through Manassas Battlefield National Park.

Transit Oriented Development: Develop a coordinated, integrated land use/transportation/transit improvement plan for the area, based on the core principles of the *Reality Check* process, to address the areas' long term transportation needs. Focus new development at higher densities within ¼ mile of rail transit stops, and moderately high densities out to ½ mile. Feeder transit services can serve other higher density areas.

Land Conservation Strategies: Regionally coordinated land use and land conservation policies can be implemented to combine goals of preservation of the Rural Crescent area, Loudon's Transition Zone, and Western Fairfax with the establishment of higher density TOD areas. These strategies could include transfer of development rights, purchase of development rights and conservation easements.

Review of Tri-County Parkway DEIS

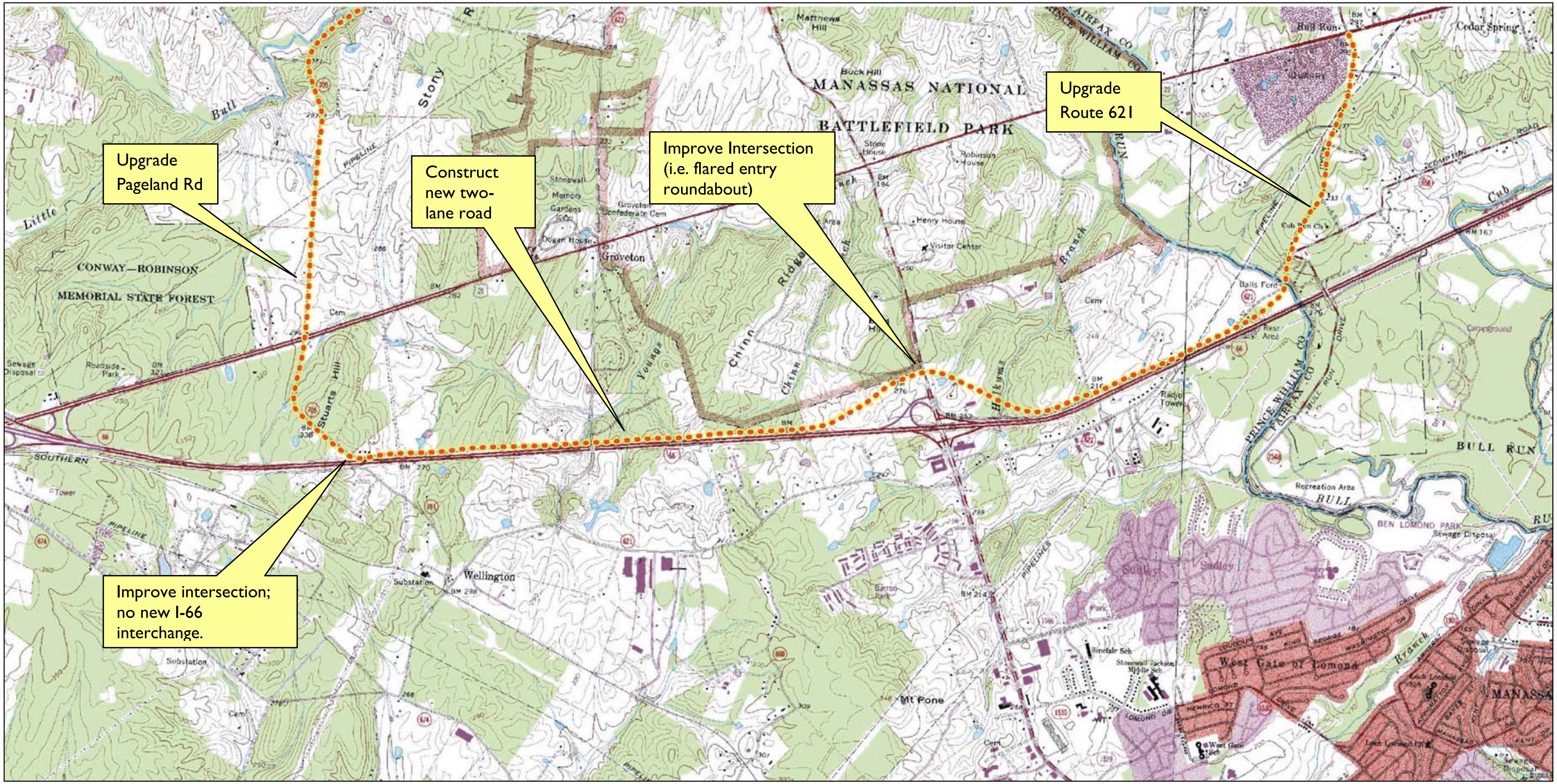
We have recently completed a review of the Tri-County Parkway DEIS and have found that the DEIS does not support construction of any of the proposed build alternatives. Furthermore, we have found that the document has a number of deficiencies. These conclusions also are relevant to this project. In particular, we found that there is less demand for north-south traffic than has been assumed when north-south roadway in the study area are assumed, and that the construction of major north-south roadways makes little difference to future congestion on existing roads. We include our summary here.

Our conclusions are:

1) None of the build alternatives reduce vehicle hours of travel, and therefore they would not meaningfully reduce congestion. As the DEIS states: "VHT will increase approximately 68 percent from 2005 to 2030 regardless of the alternative selected." The build alternatives thus fail to meet the first element of the Project Purpose and Need, which is to reduce congestion..
2) The DEIS demonstrates that future congestion on east-west roadways in the study area will be much worse than congestion on north-south roads, and that none of the build alternatives would significantly reduce this congestion.
3) The Tri-County Parkway alternatives also are ineffective in reducing traffic congestion on VA 28. Instead, they primarily would carry new, induced traffic and shift traffic from uncongested local roads.
4) Two other elements of Project Purpose and Need, "community linkage" and "social demands and economic development needs," ultimately come back to congestion as a way to measure success. The build alternatives do not reduce congestion, so they also do not meaningfully achieve benefits in these other areas.
5) The final Project Purpose and Need element is safety. The average accident rates in the study area are slightly higher than statewide averages, but it should be expected that average rates in urban areas will exceed statewide averages made up of both urban and rural areas.
6) Of the proposed build alternatives, only the Comprehensive Plan has a significant effect on reducing traffic on the high-accident roadway segments highlighted in the DEIS.
7) It is likely that targeted safety and access management improvements could significantly reduce accidents in the high accident sections very cost effectively.
8) These safety and access management improvements could be considered as part of a Transportation Systems Management alternative; instead the DEIS prematurely rejects consideration of a TSM alternative.
9) The DEIS also prematurely rejects consideration of a transit alternative by too narrowly focusing on travel movements in the proposed Tri-County Parkway alignments, rather than on where larger groups of people in the study area are traveling.

The full text of our comments is attached and hereby incorporated into this report.

Smarter Growth Alternative Vehicular Route for Routes 29 and 234



HCS2000: Two-Lane Highways Release 4.1b

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Two-Way Two-Lane Highway Segment Analysis

Analyst	LG
Agency/Co.	SMI
Date Performed	6/22/2005
Analysis Time Period	PM Peak
Highway	Route 29
From/To	234 to 621
Jurisdiction	
Analysis Year	2004
Description	

Input Data

Highway class Class 2

Shoulder width	2.0	ft	Peak-hour factor, PHF	0.88	
Lane width	11.0	ft	% Trucks and buses	10	%
Segment length	2.0	mi	% Recreational vehicles	1	%
Terrain type	Rolling		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	20	/mi
Up/down		%			

Two-way hourly volume, V 1538 veh/h
Directional split 74 / 26 %

Average Travel Speed

Grade adjustment factor, fG	0.99	
PCE for trucks, ET	1.5	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.951	
Two-way flow rate,(note-1) vp	1855	pc/h
Highest directional split proportion (note-2)	1373	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed, BFFS	50.0	mi/h
Adj. for lane and shoulder width, fLS	3.0	mi/h
Adj. for access points, fA	5.0	mi/h
Free-flow speed, FFS	42.0	mi/h
Adjustment for no-passing zones, fnp	1.2	mi/h
Average travel speed, ATS	26.4	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1748	pc/h
Highest directional split proportion (note-2)	1294	
Base percent time-spent-following, BPTSF	78.5	%
Adj.for directional distribution and no-passing zones, fd/np	6.3	
Percent time-spent-following, PTSF	84.8	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.58	
Peak 15-min vehicle-miles of travel, VMT15	874	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3076	veh-mi
Peak 15-min total travel time, TT15	33.2	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HOUSE JOINT RESOLUTION NO. 594

Encouraging the Department of Transportation to construct more roundabouts instead of signalized intersections.

Agreed to by the House of Delegates, February 1, 2003
Agreed to by the Senate, February 13, 2003

WHEREAS, modern roundabouts are designed to control traffic flow at intersections without the use of stop signs or traffic signals; and

WHEREAS, in recent years, there has been growing interest in their potential benefits and an increase in roundabout construction; and

WHEREAS, studies have shown that construction of modern roundabouts instead of signalized intersections result in much needed improvements in motorists' safety and reductions in motor vehicle crashes and injuries; and

WHEREAS, though relatively uncommon in Virginia, modern roundabouts have been and are used extensively and successfully in other states and in foreign countries; and

WHEREAS, California, Colorado, Florida, Maine, Maryland, Michigan, Nevada, South Carolina, Vermont, and Washington are among the states where modern roundabouts are being used; and

WHEREAS, an eight-state study of 24 intersections changed from stop signs and traffic signals to modern roundabouts between 1992 and 1997 revealed a 39 percent reduction in crashes for the converted intersections; and

WHEREAS, widespread construction of roundabouts can produce substantial reductions in crash losses associated with motor vehicles on roads; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Department of Transportation be encouraged to construct more roundabouts instead of signalized intersections; and, be it

RESOLVED FURTHER, That the Clerk of the House of Delegates transmit a copy of this resolution to the Commonwealth Transportation Commissioner, requesting that the Commissioner further disseminate copies of this resolution to his constituents so that they may be apprised of the sense of the General Assembly of Virginia in this matter.

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Review of Tri-County Parkway Location Study Draft Environmental Impact Statement and Draft Section 4(F) Evaluation

Norman L. Marshall

Brian R. Grady

Prepared for Southern Environmental Law Center

June, 2005

Summary

We have reviewed the Draft Environmental Impact Statement and Draft Section 4(F) Evaluation for the Tri-County Parkway Location Study. This review has included the DEIS, a set of Technical Reports supporting the DEIS, and travel demand modeling files developed and used in preparing the DEIS. This review includes numerous tables and graphics made directly from data in the DEIS travel demand modeling files.

We have found that the DEIS does not support construction of any of the proposed build alternatives. Furthermore, we have found that the document has a number of deficiencies.

Our conclusions are:

1) None of the build alternatives reduce vehicle hours of travel, and therefore they would not meaningfully reduce congestion. As the DEIS states: "VHT will increase approximately 68 percent from 2005 to 2030 regardless of the alternative selected." The build alternatives thus fail to meet the first element of the Project Purpose and Need, which is to reduce congestion..
2) The DEIS demonstrates that future congestion on east-west roadways in the study area will be much worse than congestion on north-south roads, and that none of the build alternatives would significantly reduce this congestion.
3) The Tri-County Parkway alternatives also are ineffective in reducing traffic congestion on VA 28. Instead, they primarily would carry new, induced traffic and shift traffic from uncongested local roads.
4) Two other elements of Project Purpose and Need, "community linkage" and "social demands and economic development needs," ultimately come back to congestion as a way to measure success. The build alternatives do not reduce congestion, so they also do not meaningfully achieve benefits in these other areas.
5) The final Project Purpose and Need element is safety. The average accident rates in the study area are slightly higher than statewide averages, but it should be expected that average rates in urban areas will exceed statewide averages made up of both urban and rural areas.
6) Of the proposed build alternatives, only the Comprehensive Plan has a significant effect on reducing traffic on the high-accident roadway segments highlighted in the DEIS.
7) It is likely that targeted safety and access management improvements could significantly reduce accidents in the high accident sections very cost effectively.
8) These safety and access management improvements could be considered as part of a Transportation Systems Management alternative; instead the DEIS prematurely rejects consideration of a TSM alternative.
9) The DEIS also prematurely rejects consideration of a transit alternative by too narrowly focusing on travel movements in the proposed Tri-County Parkway alignments, rather than on where larger groups of people in the study area are traveling.

10) The DEIS fails to adequately consider the effects of induced travel demand. In particular, it fails to account for the land use shifts that follow construction of new roadways.

11) The same 2030 land use inputs are used in modeling all four scenarios, and these inputs assume that there will be an unrealistic excess of jobs in the Dulles/Sterling/Ashburn area. This is more consistent with the build alternative than for the No Build alternative. Thus, any benefits of the proposed roadways over the No Build alternative are overstated.

12) True solutions to future congestion in Northern Virginia will require integrating land use and transportation planning. The recent Reality Check process is a good first step. A consensus was reached by 300 stakeholders on the following principles for guiding growth:

    - Preserve and protect natural areas and green space
    - Create new development near transit
    - Maintain a balance of jobs and housing; and
    - Focus new development back into the urban core.

    The proposed Tri-County Parkway runs directly counter to these principles, and is a remnant of the failed policies of the past.

I. Purpose and Need/Alternatives Analysis

A. Purpose and Need

The Project Purpose and Need is a critical foundation of any Environmental Impact Statement as it identifies the objectives by which the project's success can be measured. The Tri-County Parkway Draft Environmental Impact Statement summarizes the Project Purpose and Need as follows:

> *The purpose of the project involves the following four key elements.*
>
> 1. *Improve transportation mobility and capacity and, by doing so, improve access and reduce congestion.*
> 2. *Enhance the linkage of communities and the transportation system that serves those communities.*
> 3. *Accommodate social demands and economic development needs.*
> 4. *Improve safety and, by doing so, reduce the average crash, injury, and accident rates on the roadway network. (DEIS, p. 10)*

We will follow this general outline in the first part of our review of the DEIS

B. Traffic

The traffic component of Project Purpose and Need is written: "Improve transportation mobility and capacity and, by doing so, improve access and reduce congestion." There are four key words included in this statement: mobility, capacity, access and congestion. While these terms are all related, it is important to recognize that the relationships among them are not simple and direct.

Roadway capacity is not desirable in itself. In fact, building additional roadway capacity obviously is costly and environmentally damaging. While the proposed project certainly would increase roadway capacity, this capacity would be valuable only to the extent that it addresses the other key words.

Congestion is the issue that is most exactly defined and that is most subject to quantitative analysis. It is often surprising to laypeople that the addition of large amounts of roadway capacity can have little effect on congestion. This is, in fact, the case with the Tri-County Parkway. Buried in the middle of the DEIS is this important conclusion.

> **As the entire study area in 2030 is highly congested, no single option will change the total number of hours drivers are expected to travel in 2030. VHT will increase approximately 68 percent from 2005 to 2030 regardless of the alternative selected.** (DEIS, p. 93)

It is important to emphasize that "regardless of alternative" includes the No Build alternative. Compared to the No Build alternative, two of the build alternatives have calculated total travel time that is slightly more than for the No Build alternative, and the other build alternative has a slightly lower travel time. The range of the times varies less than 1 percent, so they are all essentially equal. None of the proposed alignments reduce future travel time.

In the next paragraph, the DEIS refers to these results as "inconclusive." This is completely wrong; the results are **conclusive**. They demonstrate that the project fails to meaningfully reduce congestion. The DEIS then goes on to "spin" the data with more obscure measures that attempt to demonstrate minor benefits. We will address these at the end of this section after first presenting the DEIS modeling results in a more straightforward way than they are presented in the DEIS.

There are still two key words to address. There are many critics of the importance mobility has received in planning processes. Mobility can end up simply meaning traveling further and faster without saving time or achieving any other social benefit. In fact, this is the case with the Tri-County Parkway. Travel distance as measured by vehicle miles traveled (VMT) is projected to increase over the No Build case if this highway is built (DEIS, Table 4.1-8, p. 92). There also is a small increase in average speed, so that the total travel time is the same.

The final keyword, access, is discussed little in the DEIS. Unlike a transit project, the proposed project would provide no new travel options to anyone – only a possibility of time savings for certain auto trips. It doesn't even clearly serve major activity centers. Access is mostly discussed in relation to Purpose and Need #3: "Accommodate social demands and economic development needs." We will similarly address access in that context in a later section of this review.

Roadway Levels of Service

The DEIS uses the standard *Level of Service* (LOS) categories defined in the *Highway Capacity Manual* (DEIS, p. 6, Tables 1.3-3 and 1.3-4). The levels of service range from best, "A", to worst, "F." The DEIS also uses LOS "G" to define conditions that are even worse than "F." Both levels "F" and "G" represent conditions where traffic demand exceeds capacity. In a congested region like northern Virginia, this means that queues will build up during peak periods, and that the queues clear slowly. LOS "E" is also labeled as "severe" congestion as it is characterized by "unstable flow" that can deteriorate rapidly to LOS "F". Levels "C" and "D" are "moderate" congestion levels and generally are the best conditions that can be realistically used as goals for peak period conditions in urbanized areas.

The DEIS computes 2030 No Build levels of service for Interstate and U.S. Routes in the study area and tabulates them in Table 1.3-5 (p. 7) which is reproduced below.

TABLE 1.3-5
FUTURE ADT AND LOS (INTERSTATE AND U.S. ROUTES)

Route and Location	ADT	AM LOS[5]	PM LOS[5]
I-66 from Fauquier/Prince William county line to US 15[2]	82,900	G	G
I-66 from US 15 to US 29 (Gainesville)[2]	131,000	G	G
I-66 from US 29 (Gainesville) to VA 234 Bypass[2]	202,100	G	G
I-66 from VA 234 Bypass to VA 234[2]	177,500	F	G
I-66 from VA 234 to US 29 (Centreville)[2]	193,300	G	G
I-66 from US 29 to VA 28[2]	187,600	G	G
US 15 from US 29 to I-66[2]	34,700	B	C
US 15 from I-66 to VA 234[2]	41,900	C	E
US 15 from 234 to VA 701[2]	33,500	D	D
US 15 from VA 701 to US 50[3]	22,400	G	G
US 29 from US 15 to VA 55[2]	67,000	G	G
US 29 from VA 55 to I-66 (Gainesville)[2]	83,100	G	G
US 29 from I-66 (Gainesville) to Prince William/Fairfax county line[4]	20,700	G	G
US 29 from Prince William/Fairfax county line to I-66 (Centreville)[4]	36,500	E	E
US 29 from I-66 (Centreville) to VA 28[4]	50,400	F	E
US 50 from US 15 to VA 606[3]	42,700	G	G
US 50 from VA 606 to Loudoun/Fairfax county line[3]	44,500	F	G
US 50 from Loudoun/Fairfax county line to VA 28[4]	72,700	F	G

Sources: [1] Tri-County Parkway Traffic Count Program (City of Manassas), 2002;
[2] Interstate 66 Traffic Count Program, 2000 and 2001;
[3] Other VDOT study area traffic counts, 1999;
[4] Commonwealth of Virginia Department of Transportation Average Daily Traffic Volumes on Interstate, Arterial and Primary Routes, 2000;
[5] Metropolitan Washington Council of Governments Conformity Model Outputs, 2000.

The table shows much worse congestion for east-west travel than for north-south travel. As shown, most sections of the three east-west roadways listed (I-66, US 29 and US 50) are forecast to operate at LOS “F” or worse during both the morning and afternoon peak periods in 2030, except for US 29 east of the Prince William/Fairfax County line, where the forecast is LOS “E” and “F”.

Results for only one north-south route are given, for US 15. For this roadway only one segment is shown as over capacity, the segment from “VA 701 to US 50.” Even this overstates the modeling results. In the morning peak period, less than half of this segment is shown as over capacity – the northern part north of VA 600. The model shows a lot of traffic traveling to and from the north on US 15 traveling also on VA 600. In the model, there are no other north-south roads in this area west of US 15. In fact, there are local roads that would carry some of this traffic. In the afternoon peak period, only a 0.32 mile segment is shown as over capacity in the 2030 No Build scenario. If this area were thought a problem, the first step would be to add all roads in the model, and then consider local improvements including intersection improvements and improved connectivity.

The DEIS puts a different spin on this table. It says: “Table 1.3.5 shows the greatest delays continue to exist between the City of Manassas Park and the Loudoun/Fairfax county line near Dulles Airport.” (DEIS, p. 6) This is a baffling statement. The road linking the City of Manassas

Park and Dulles Airport is VA 28, which isn't in Table 1.3.5. If VA 28 were included in the table, delays could not be worse than those shown for the east-west roadways I-66, Route 29, and Route 50 as these are shown at LOS "G" which is the worst category. The conclusion stated in the DEIS is unsupported.

Placing this table in the Purpose and Need section implies that the proposed project will be measured by how well it addresses the future congestion described. The DEIS does not provide this information, but we have provided it in the tables below (which we had to extract from the model files).

Modeled 2030 LOS for Interstate and U.S. Routes – Morning Peak Period

Route and Location	No Build	Comp. Plan	West 2	West 4
I-66 from Fauquier/Prince William county line to US 15	G	G	G	G
I-66 from US 15 to US 29 (Gainesville)	G	G	G	G
I-66 from US 29 (Gainesville) to VA 234 Bypass	G	G	G	G
I-66 from VA 234 Bypass to VA 234	F	F	F	F
I-66 from VA 234 to US 29 (Centreville)	G	F	G	G
I-66 from US 29 to VA 28	G	G	G	G
US 15 from US 29 to I-66	B	C	C	C
US 15 from I-66 to VA 234	D	C	C	C
US 15 from 234 to VA 701	D	C	C	C
US 15 from VA 701 to US 50	G	G	G	G
US 29 from US 15 to VA 55	E	E	E	E
US 29 from VA 55 to I-66 (Gainesville)	G	G	G	G
US 29 from I-66 (Gainesville) to Prince William/Fairfax county line	G	F	G	G
US 29 from Prince William/Fairfax county line to I-66 (Centreville)	E	F	F	E
US 29 from I-66 (Centreville) to VA 28	F	G	F	G
US 50 from US 15 to VA 606	G	G	G	G
US 50 from VA 606 to Loudoun/Fairfax county line	F	F	F	F
US 50 from Loudoun/Fairfax county line to VA 28	F	F	G	F

Notes: Green shows improvement; orange shows deterioration as compared to the No Build case. Some base values are slightly different from DEIS Table 1.3-5, probably because description covers more than 1 modeled link.

As shown above, the Tri-County Parkway improvements are modeled as making some segments of US 15 less congested in the morning peak period and others more congested. However, all of the changes are within the range of LOS B-D, which are defined in the DEIS as "low" to "moderate" levels of congestion (Table 1.3-3, p. 6).. There also are some changes from LOS "G" to "F" or from "F" to "G". These probably are not very important because both "F" and "G" are unacceptable. Finally, there is a change shown from LOS "E" to "F" for one segment on US 29 that may be somewhat more significant. The primary conclusion from the table is that none of the alternatives address the future congestion problems raised in the DEIS.

Modeled 2030 LOS for Interstate and U.S. Routes – Afternoon Peak Period

Route and Location	No Build	Comp. Plan	West 2	West 4
I-66 from Fauquier/Prince William county line to US 15	G	G	G	G
I-66 from US 15 to US 29 (Gainesville)	G	G	G	G
I-66 from US 29 (Gainesville) to VA 234 Bypass	G	G	G	G
I-66 from VA 234 Bypass to VA 234	G	F	F	G
I-66 from VA 234 to US 29 (Centreville)	G	F	G	G
I-66 from US 29 to VA 28	G	G	G	G
US 15 from US 29 to I-66	C	C	C	C
US 15 from I-66 to VA 234	E	D	D	D
US 15 from 234 to VA 701	D	D	C	C
US 15 from VA 701 to US 50	G	G	G	G
US 29 from US 15 to VA 55	F	F	F	F
US 29 from VA 55 to I-66 (Gainesville)	G	G	G	G
US 29 from I-66 (Gainesville) to Prince William/Fairfax county line	G	E	G	G
US 29 from Prince William/Fairfax county line to I-66 (Centreville)	E	E	F	E
US 29 from I-66 (Centreville) to VA 28	G	G	G	G
US 50 from US 15 to VA 606	G	G	G	G
US 50 from VA 606 to Loudoun/Fairfax county line	G	G	G	G
US 50 from Loudoun/Fairfax county line to VA 28	G	G	G	G

Notes: Green shows improvement; orange shows deterioration. Some base values are slightly different from DEIS Table 1.3-5, probably because description covers more than 1 modeled link.

The afternoon peak period case shows more "green" and less "orange." However, a close look reveals that most of the changes are from LOS "G" to "F" (still unacceptable) or within one acceptable category to another. None of the proposed alternatives significantly addresses the congestion problems shown.

The tables may actually overstate the benefits of the proposed alternatives because the roadway segments are treated as independent. In reality, the delay along major roadways is largely a function of the delays at bottleneck locations. Capacity expansions away from the bottlenecks may have little impact on travel time. Even improvements focused on bottlenecks can have disappointing results as is illustrated in the following example from the Chicago region.

> *The Hillside Strangler: $140 Million To What End?*
>
> *The "Hillside Strangler"—the point at which the East-West Tollway and the Tri-State Tollway converge with the Eisenhower Expressway—was long a notorious traffic bottleneck. After a $140 million construction project to "fix" the problem, the Daily Herald posed this question: "Many millions have been spent to change that evil Hillside Strangler. So, has it been rehabilitated?" This was the answer:*
>
> 1. *Getting through the Strangler is now about 15 minutes faster.*

2. *But the bottleneck has merely been pushed further up the road to a point where the Eisenhower funnels into three lanes.*
3. *And more motorists are now using the expressway since the Strangler work was completed.*

The net effect? The Daily Herald concluded: "Overall, then, the commute time from the suburbs to the Loop, via the Eisenhower and its extension, is one hour—exactly what it was before the Hillside Strangler was repaired."

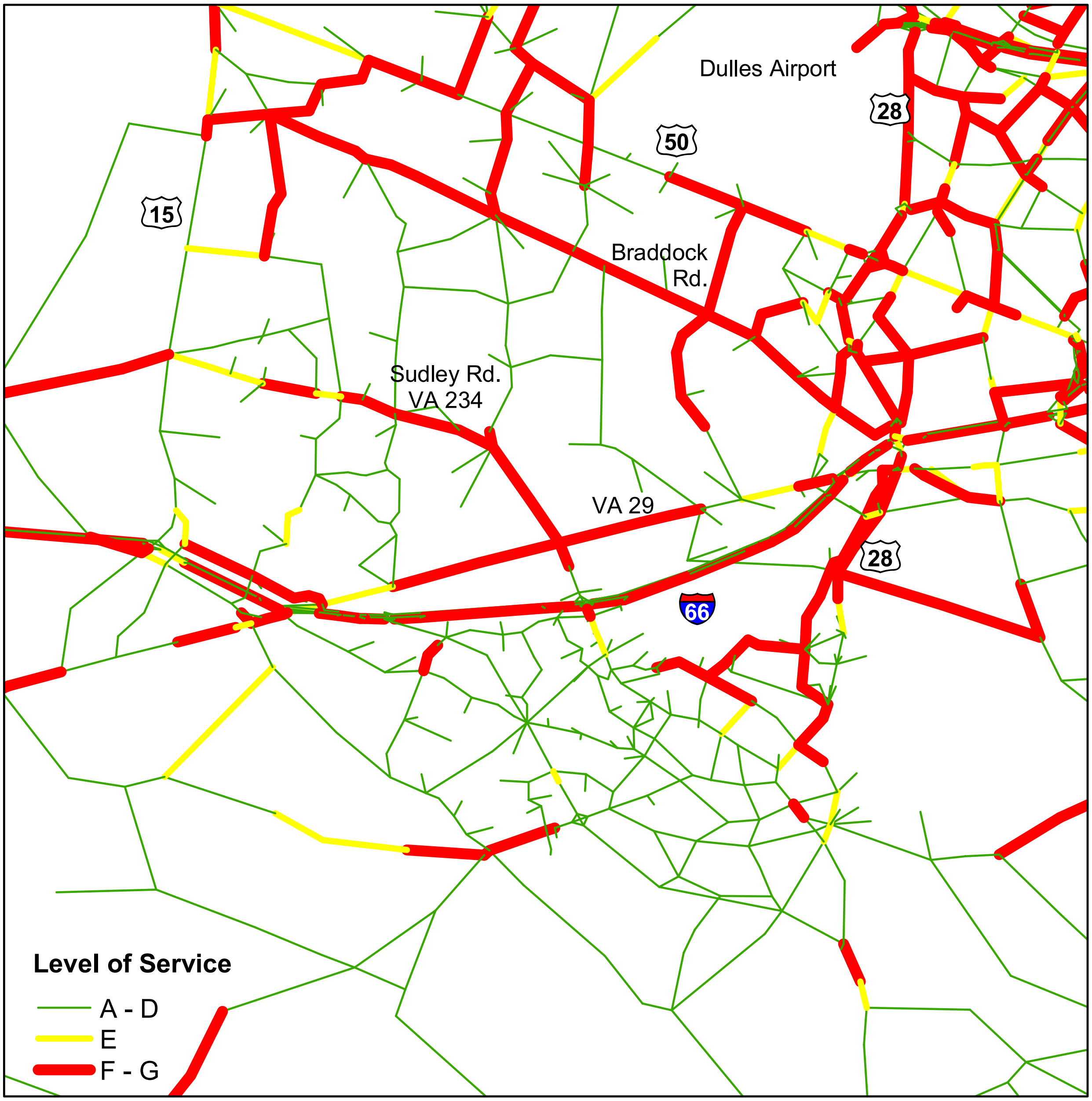
"More Costly Roadwork, and Travel Still Tough," Daily Herald, October 3, 2002.[1]

The following graphics show modeled 2030 levels of service for the study area for the morning and afternoon peak periods. In order to simplify the graphics only three groupings are shown: LOS F-G (over capacity), LOS E (approaching capacity), and LOS A-D (low to moderate congestion.)

Any roadway that is shown to include LOS F-G sections (in red) can be expected to have bottleneck sections that will control capacity and delay along longer sections of the roadway.

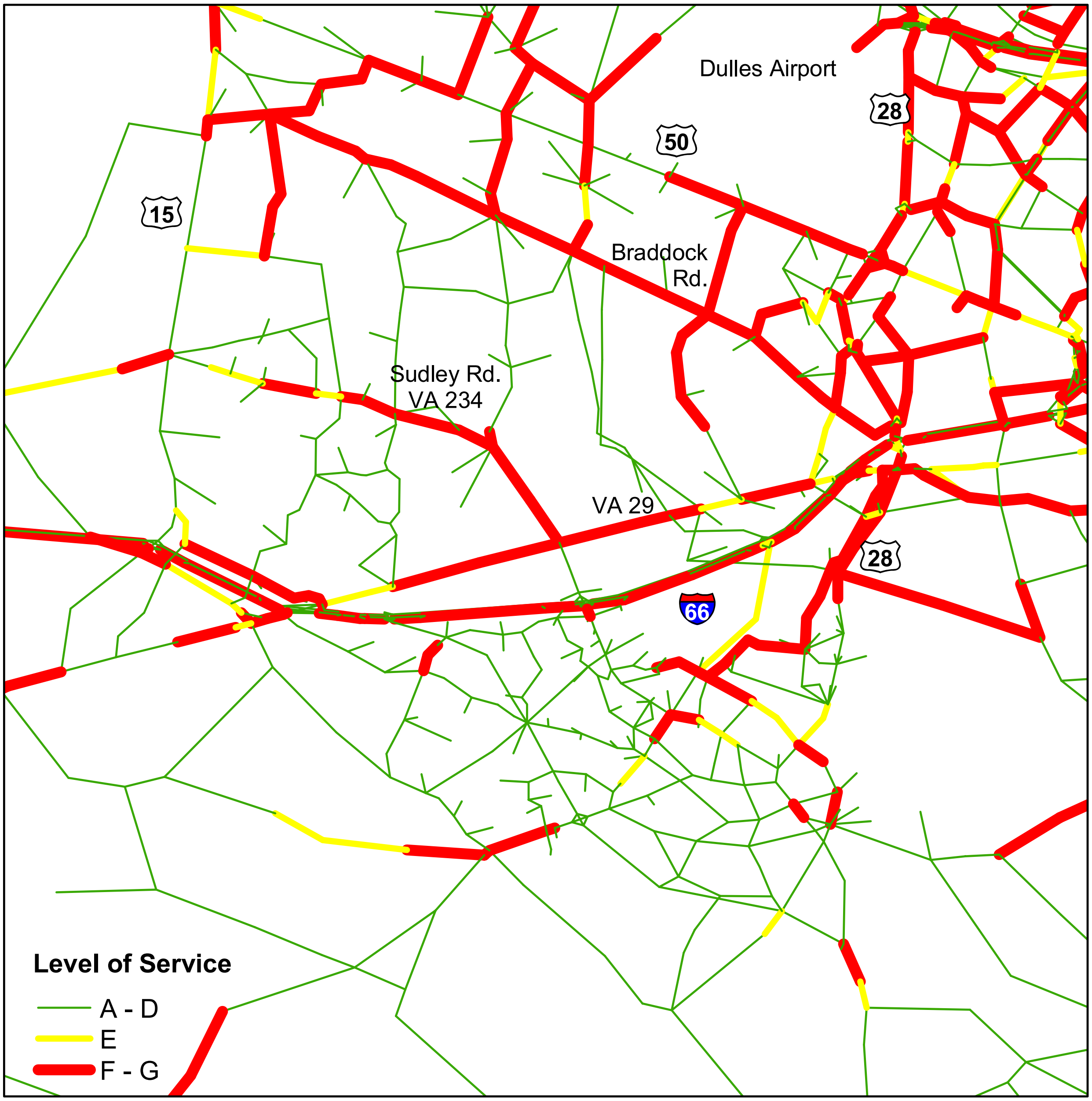
[1] Chicago Metropolis 2020: *The Metropolis Plan: Choices for the Chicago Region*, p. 10. Chicago, IL: 2003.

Levels of Service: 2030 No Build A.M. Peak Period (DEIS Modeling)



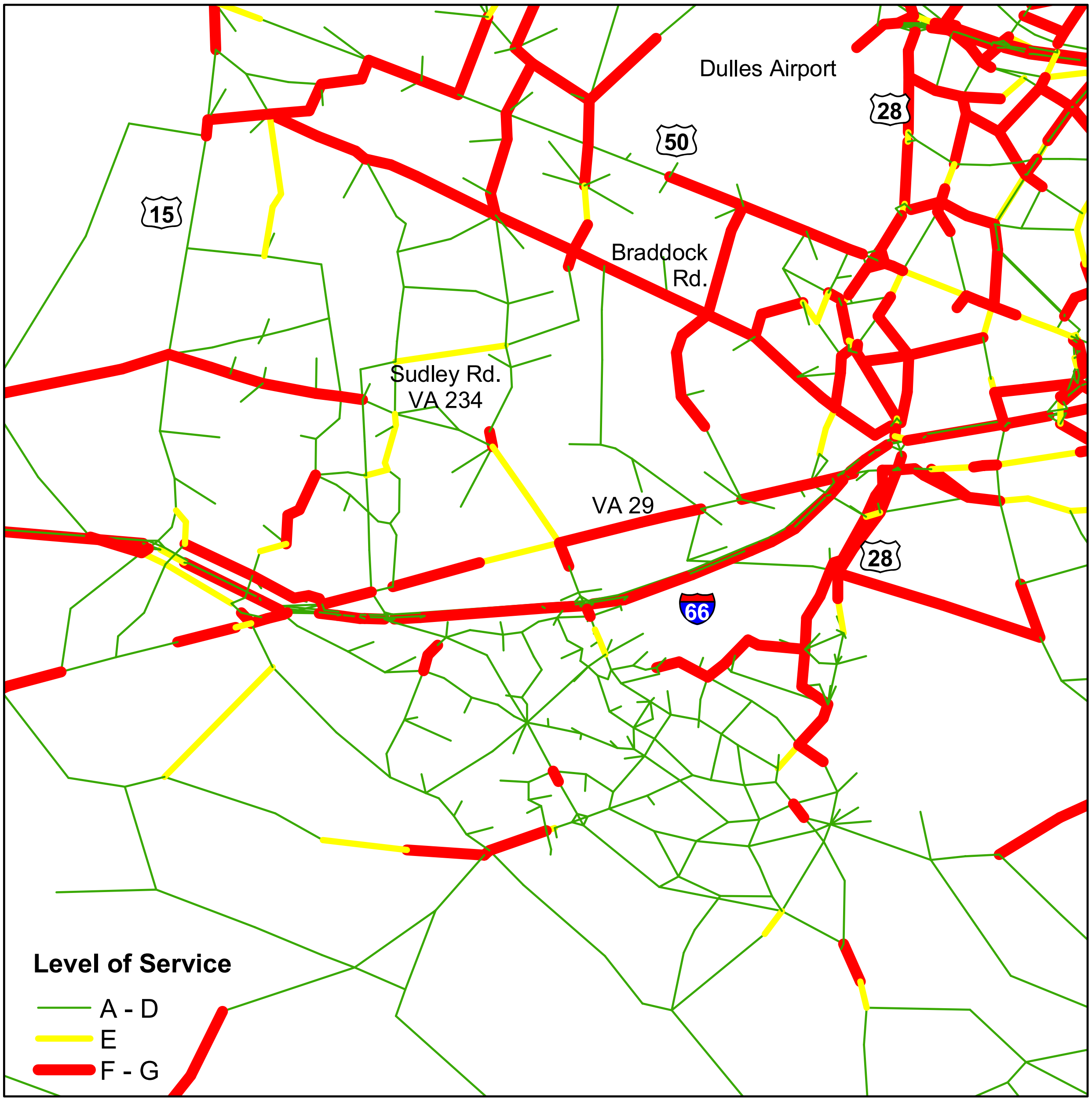
VA 28 is modeled as very congested in 2030, but otherwise there is much less congestion modeled on north-south roadways in the study area than the east-west roadways.

Levels of Service: 2030 Comprehensive Plan A.M. Peak Period (DEIS Modeling)



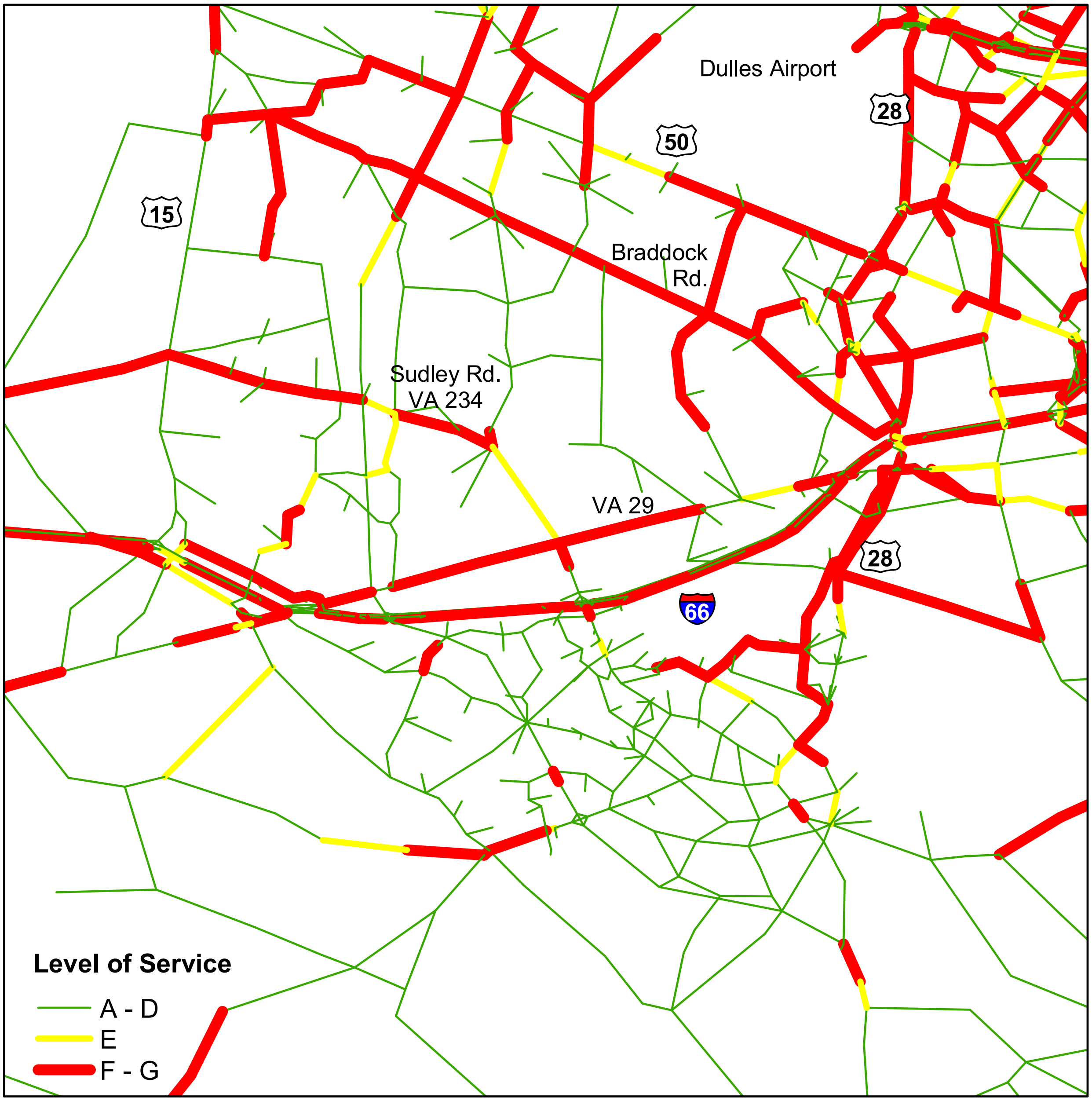
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

Levels of Service: 2030 West 2 A.M. Peak Period (DEIS Modeling)



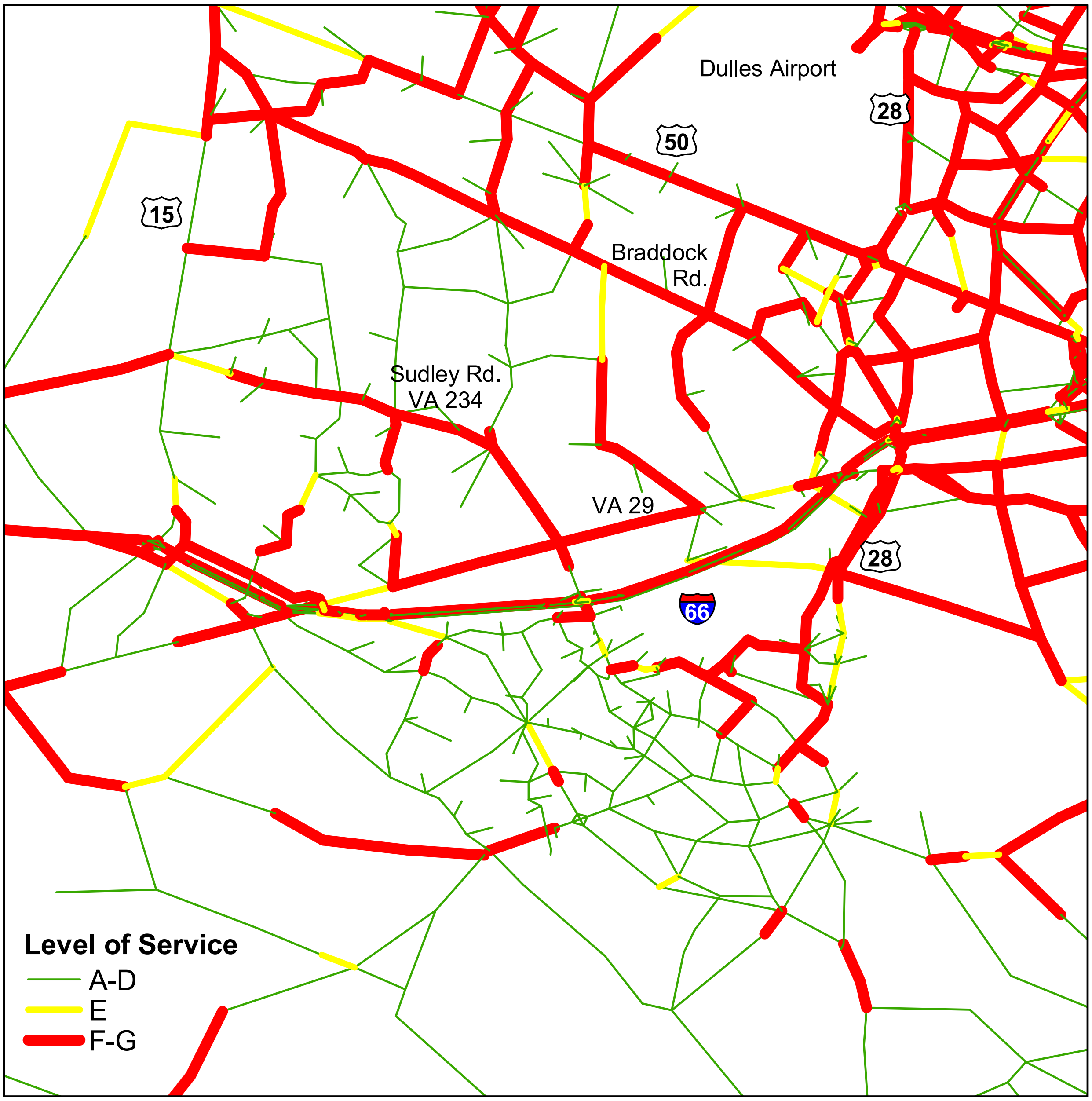
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

Levels of Service: 2030 West 4 A.M. Peak Period (DEIS Modeling)



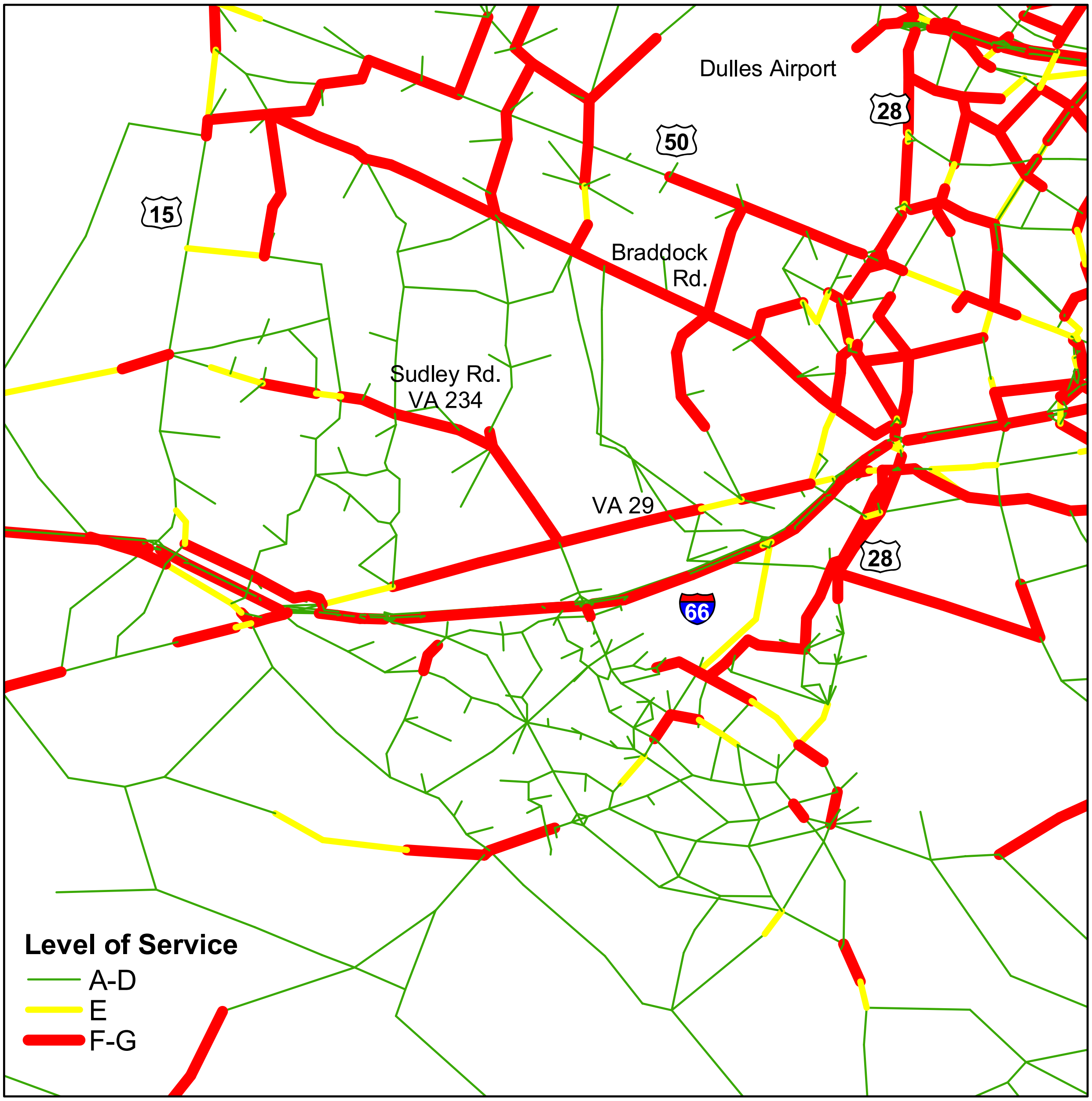
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

Levels of Service: 2030 No Build P.M. Peak Period (DEIS Modeling)



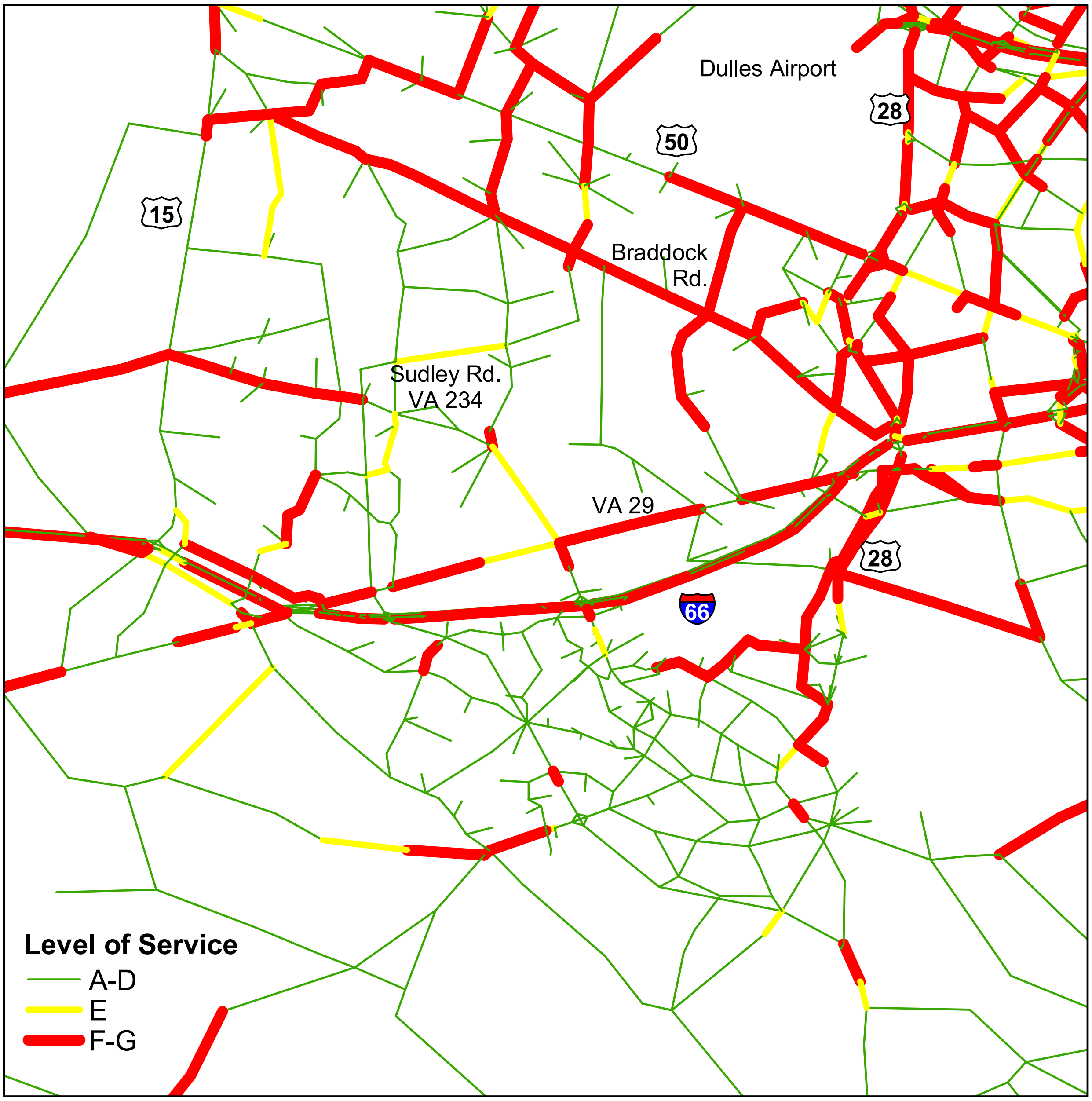
The most congested roadways as modeled in the afternoon peak period are the same roadways that are most congested in the morning peak period.

Levels of Service: 2030 Comprehensive Plan P.M. Peak Period (DEIS Modeling)



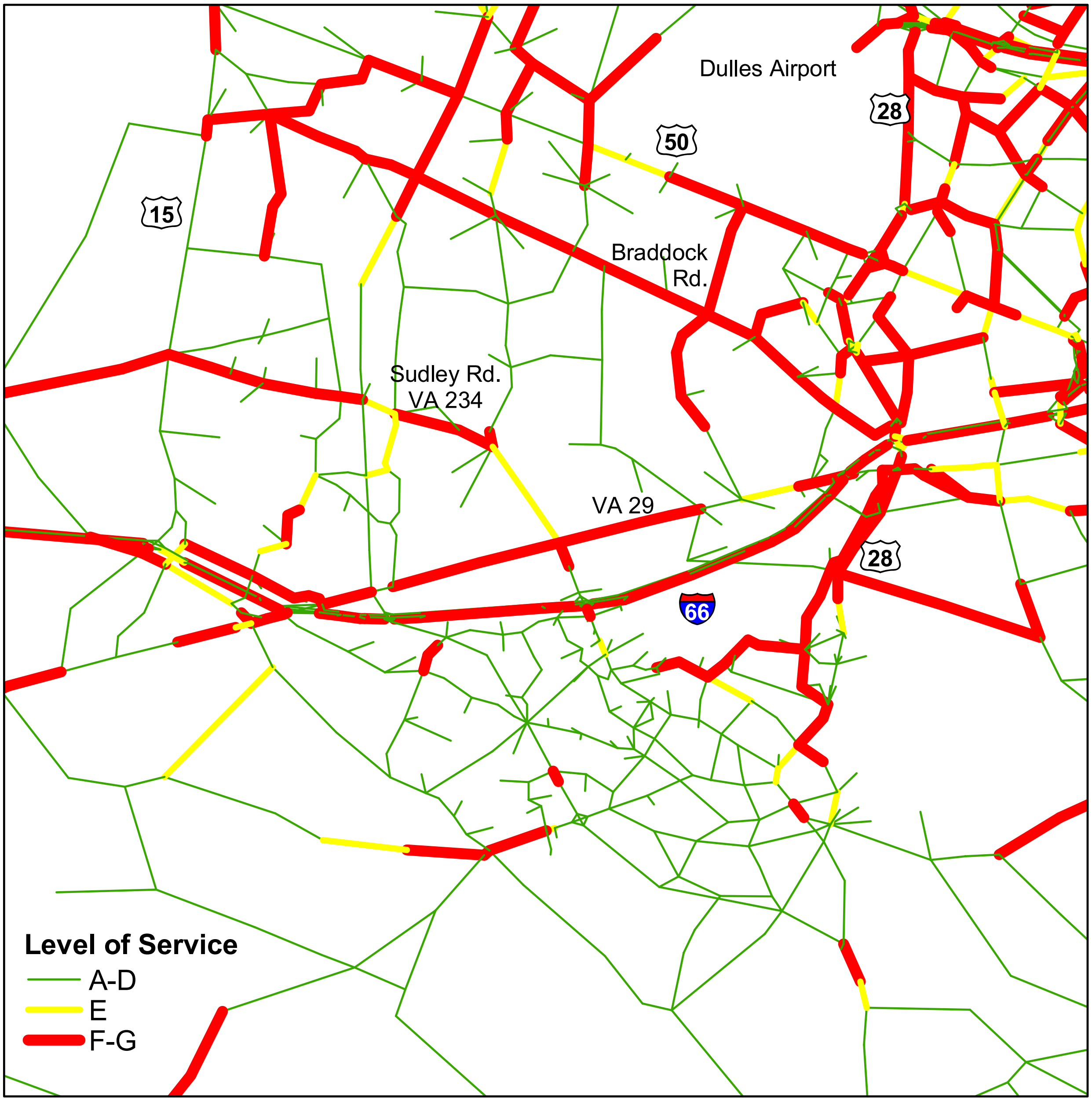
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

Levels of Service: 2030 West 2 P.M. Peak Period (DEIS Modeling)



Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

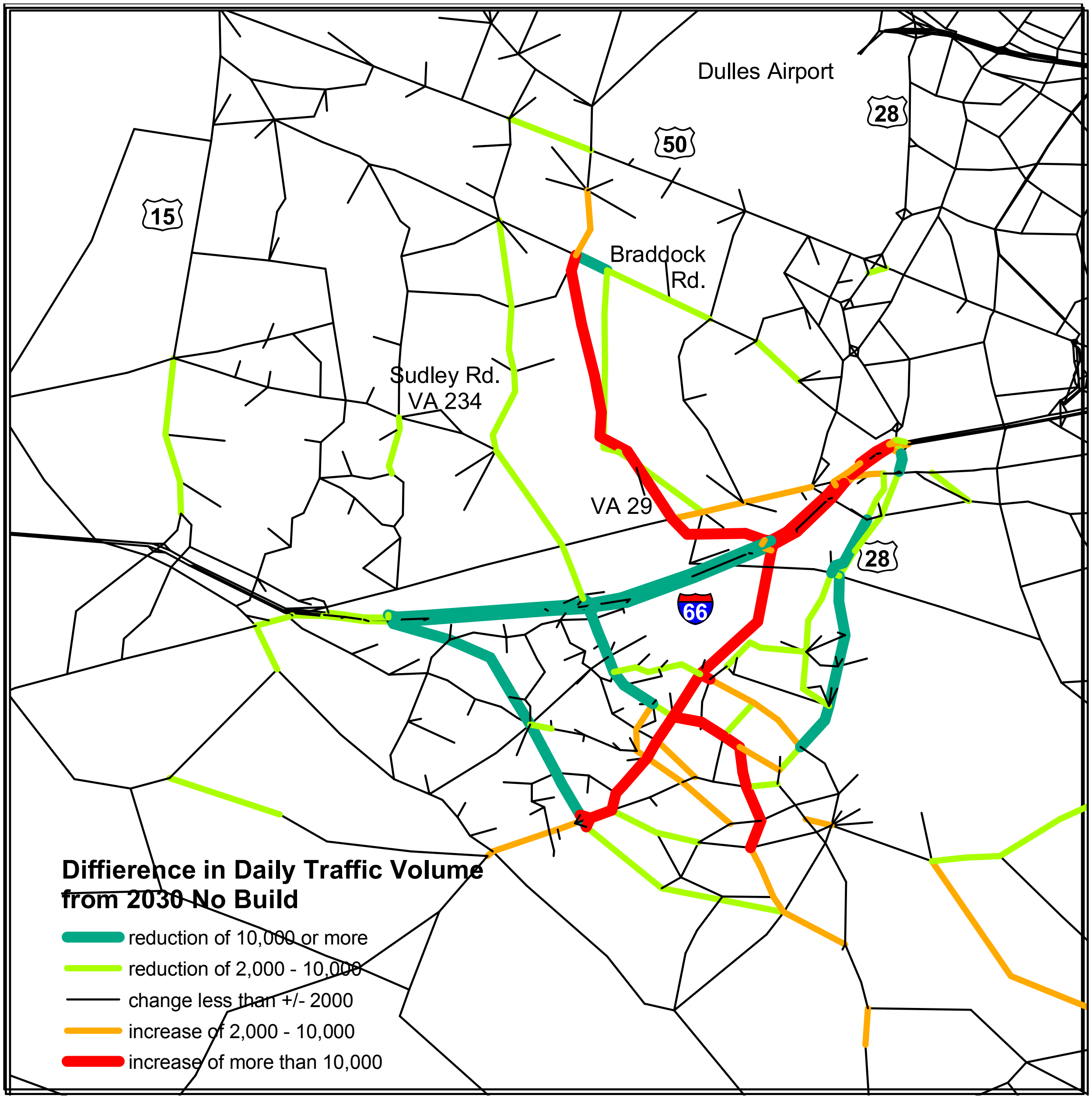
Levels of Service: 2030 West 4 P.M. Peak Period (DEIS Modeling)



Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

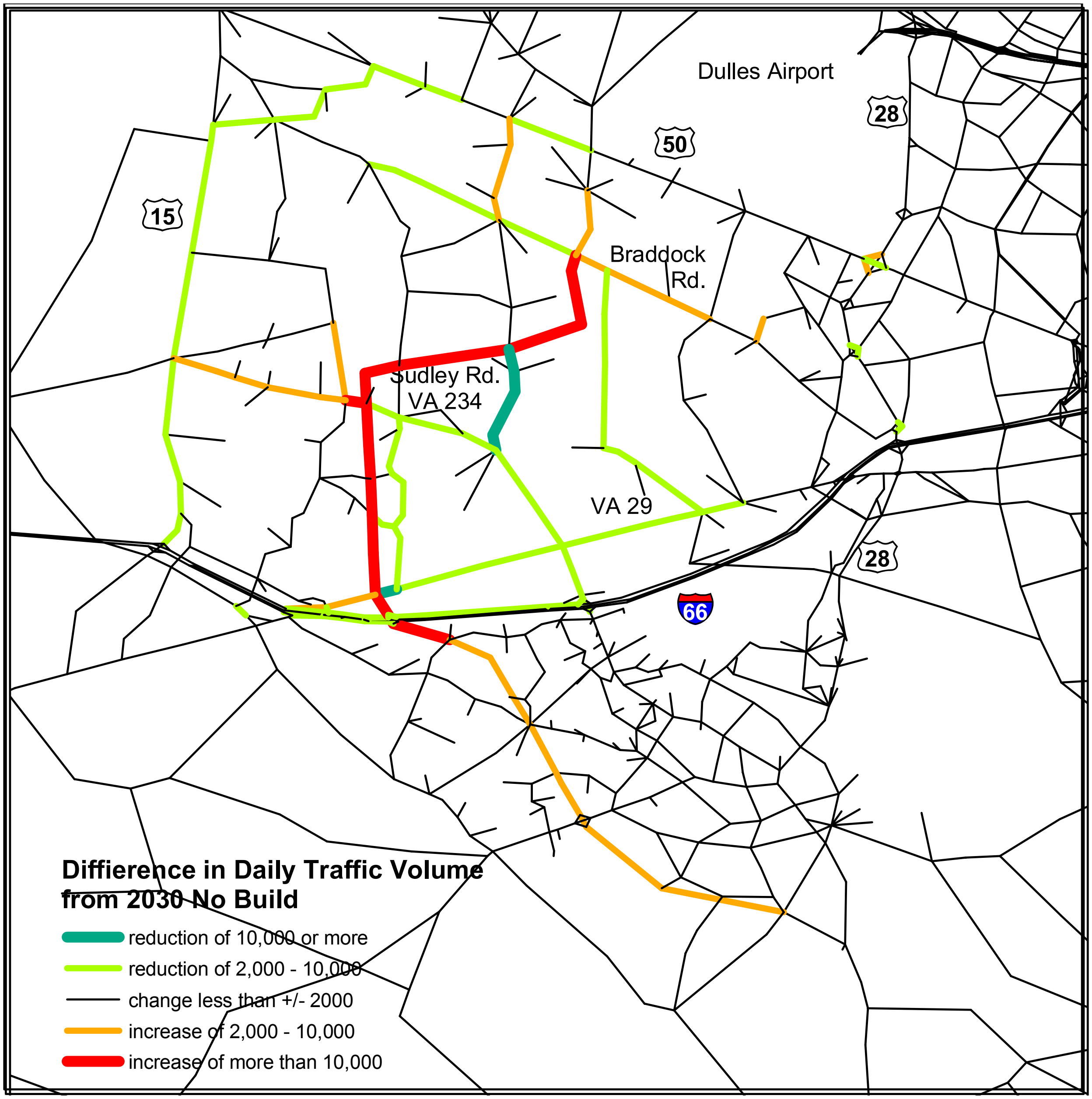
How can a project that costs hundreds of millions of dollars have such a minor effect on traffic congestion? The following graphics illustrate the changes in daily traffic volume modeled, as compared to the No Build scenario, for each of the proposed alternatives. These help explain why the proposed roadways are ineffective.

2030 Traffic – Comprehensive Plan Compared to No Build (DEIS Modeling)



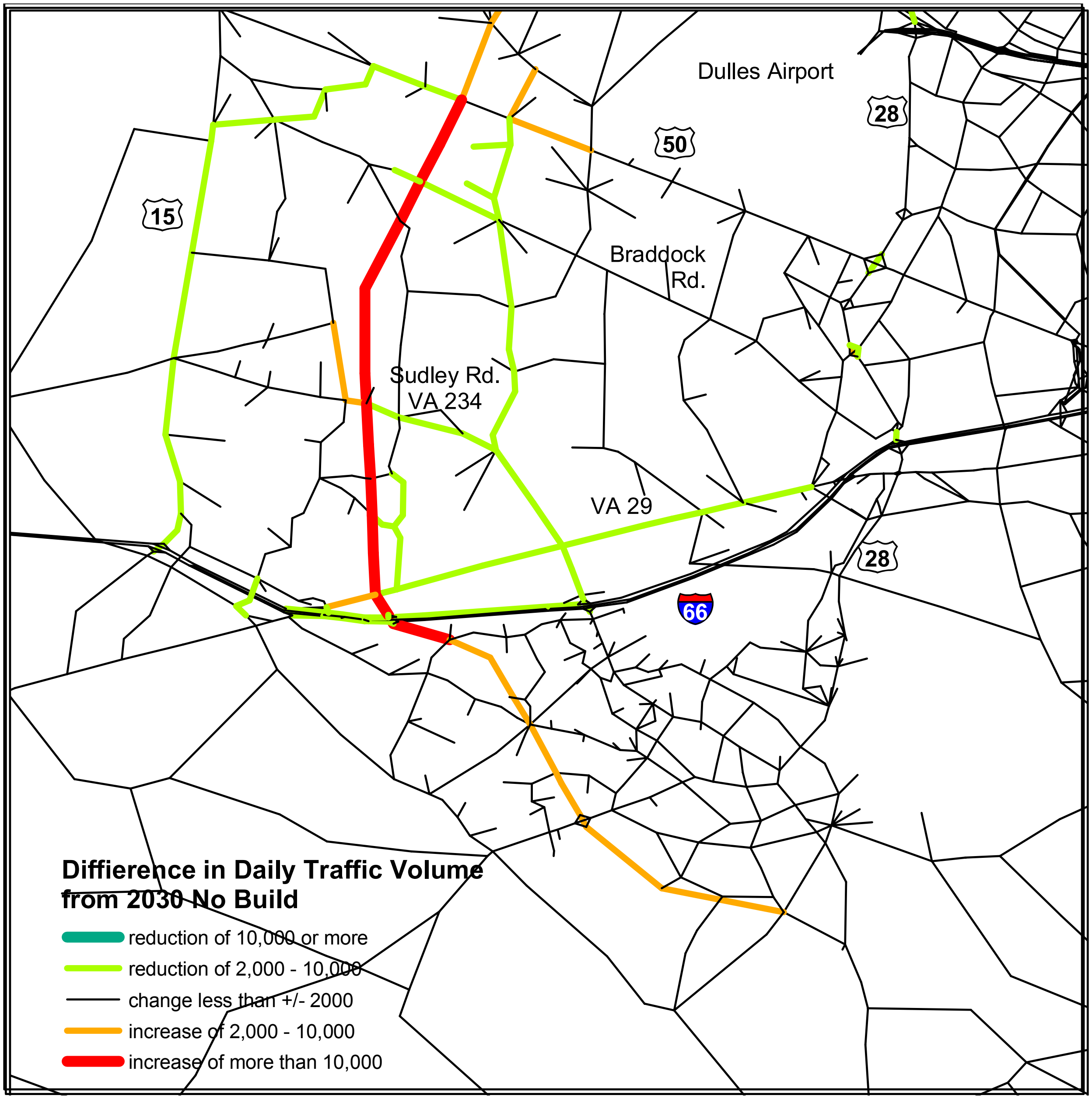
The Comprehensive Plan alternative has the greatest effect on traffic on existing roads. There is a significant traffic decrease modeled for VA 28, but only to the south of I-66. There are moderate decreases in traffic on north-south roads south of Braddock Rd., but these roadways are not expected to be congested anyway. There are also significant traffic increases modeled on I-66 east of the proposed new road and on a number of roadways in the City of Manassas and surrounding areas.

2030 Traffic – West 2 Compared to No Build (DEIS Modeling)



The West 2 alternative reduces traffic considerably on a short section of Gum Spring Rd. (which is not expected to be congested). There are moderate traffic reductions on US 15, but not the section south of US 50, which is modeled as the extremely congested section. The West 2 alternative draws some traffic from the US 29/VA 234 intersection, but as noted above, not enough to significantly improve the levels of service there. There also are moderate traffic increases on VA 234 Bypass, Sudley Rd., Braddock Rd., and some local roads.

2030 Traffic – West 4 Compared to No Build (DEIS Modeling)



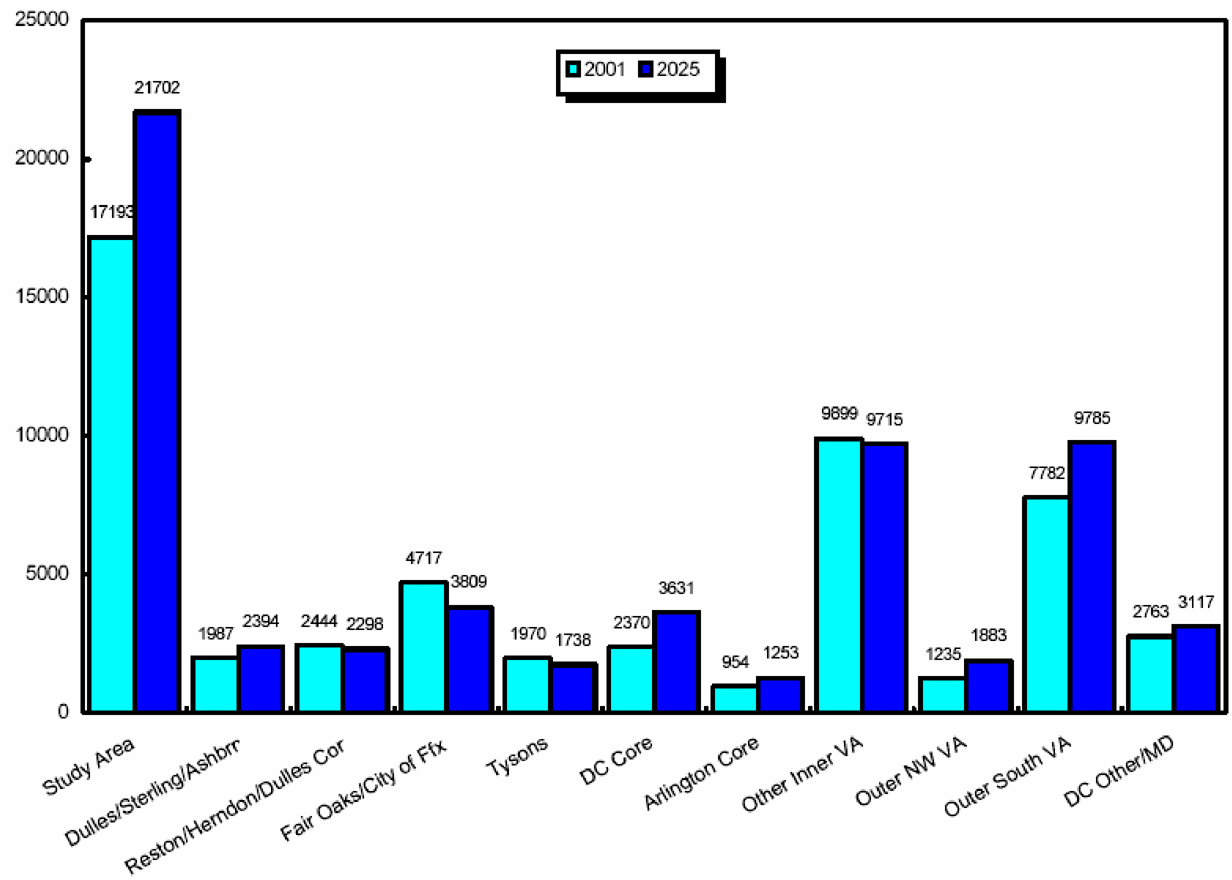
The traffic shifts for West 4 are similar to those for West 2. As West 4 is a somewhat more direct route to the north, it has somewhat greater effect on north-south travel. There is no significant impact on VA 28 traffic or congestion.

While each alternative redistributes traffic within the study area, in general these diversions are from other relatively uncongested roadways onto the new roadways. There is not significant impact on the congested roadways.

Given that none of the proposed roadways reduces travel time or significantly reduces congestion, the DEIS resorts to more obscure measures to attempt to show transportation benefits for the proposed project.

One of the measures is travel time for selected origin-destination interchanges. The selected interchanges have been chosen, not because of their importance in regional travel, but because they conveniently represent travel from one end of the proposed corridor to the other end – from the Manassas area to the Dulles/Sterling/Ashburn area. As shown in the figure below from a DEIS technical report, these interchanges represent only 3.73% of the work trips from the Manassas area in 2001 and only 3.90% in 2025.

FIGURE 1.3-2
WORK TRIPS FROM MANASSAS AREA

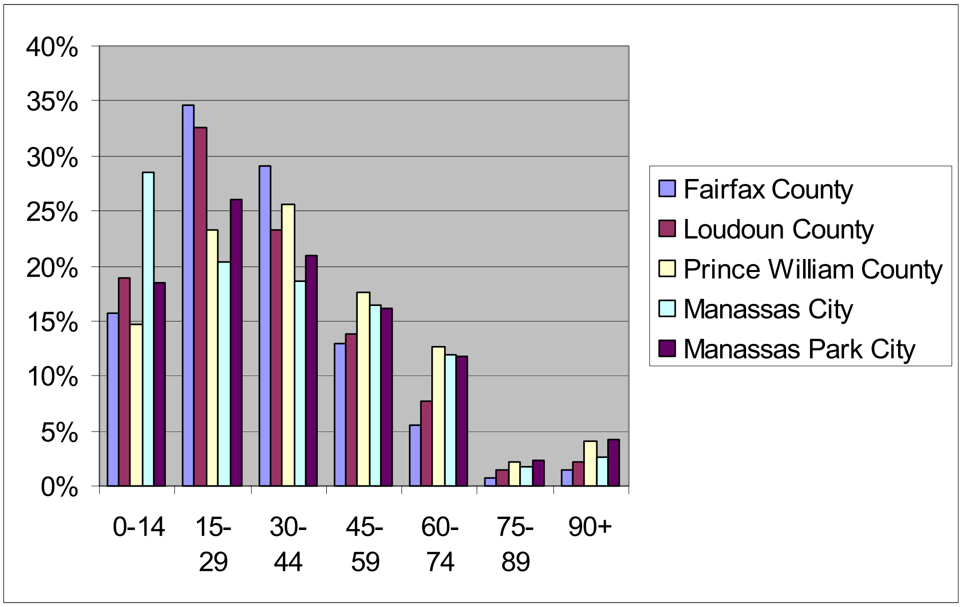


Source: DEIS *Purpose and Need Technical Report*, p. 1-8

In addition to being unpopular commute trips, they are very long commute trips, with 2030 travel times estimated to range from 62-77 minutes in the No Build alternative, reduced to 61 to 74 minutes in the three build alternatives.

The median auto commute length in Northern Virginia is about 30 minutes. Auto commutes of 60 minutes of longer represented less than one fifth of all commutes in 2000.

__Auto Commute Time (Minutes) by Place of Residence (2000 Census)__



Any commute trip over one hour one way by auto is undesirable. Saving a few minutes on such a long commute by a small number of people is not very significant. Furthermore, it is important to remember that there are no travel time savings for the population as a whole; any savings by individuals is balanced by additional time for other travelers.

The final two transportation measures in the DEIS stress mobility, and are tailored towards showing benefits of new roadways. The first measure is “Forecast Peak Deficient VMT.” The idea is that driving at LOS “D” or worse is undesirable. If traffic is shifted off congested roads onto the new road and the new road operates at LOS “C” or better, this measure will show a benefit. It stresses mobility, because a benefit will be shown even if the new route is longer and offers no travel time savings. It assumes that driving at LOS “C” is better than driving at LOS “D”, regardless of whether time is saved or not.

Given that the measure is designed to show benefits for new roadways, it is surprising that a benefit has been found for only one of the three alternatives. The Comprehensive Plan alternative shows an improvement of 4 percent. The result for the West Two alternative is unchanged from the No Build alternative. The West Four alternative result is actually 1 percent worse than the No Build case. (DEIS, Table 4.1-10, p. 93)

The other measure is “Peak Vehicle Hours of Delay.” This again stresses mobility because it splits travel time into two components – 1) free-flow travel time and 2) delay. If one travels 1 mile on a congested road, averaging 30 m.p.h., the travel time might be:

1 minute free-flow time + 1 minute delay time = 2 minutes

If there were an alternative 2-mile uncongested route, averaging 60 m.p.h., the travel time might be:

2 minutes free-flow time + 0 minutes delay time = 2 minutes

The Delay measure thus favors the longer and faster route, even though the travel time is exactly the same.

This time, all three alternatives show some benefit – 2 percent for the Comprehensive Plan and West Four alternatives, and 4 percent for the West Two alternative. . (DEIS, Table 4.1-11, p. 93)

Although these two measures were developed to show the project in the best possible light, the DEIS is forced to conclude: "… the Comprehensive Plan CBA is the only alternative which is an improvement over the No-Build Alternative in both peak deficient VMT and hours of peak delay." (DEIS, p. 93)

C. Community Linkage

The second key element in the Project Purpose and Need is:

> *Enhance the linkage of communities and the transportation system that serves those communities*.

Inadequate street connectivity is a critical transportation problem, especially within communities. A major cause of congestion on principal roadways like VA 28 is a lack of parallel local streets. This forces local traffic onto VA 28, even for short distance trips. Turning vehicles reduce available capacity more than through movements, so the effect of these short trips on congestion is enormous. When considering widening such roadways, it is important to consider whether improving access and capacity on parallel routes could achieve equal levels of service at lower cost. Harrison Rue of the Charlottesville MPO has called for flexible Federal funding for such roadways, calling them "primary relievers."

The DEIS uses the term somewhat differently, translating "connecting communities" into connecting Manassas, Dulles Airport and several roadways.

> *Existing north-south transportation linkages connecting Manassas, I-66, Washington Dulles International Airport and the Washington Dulles Access and Toll Road, and Dulles Greenway are limited. (DEIS, p. 5)*

Manassas is the only "community" on the list." To state the obvious, a road is not a community. The proposed project has more to do with expanding the number of roads in the area than it does with community needs.

In trying to explain why more asphalt is needed, the DEIS goes back to congestion.

> *By 2030, the lack of adequate north-sound transportation links within the study area will continue to result in significant traffic congestion a.m. and p.m. travel times. (DEIS, p. 6)*

As discussed extensively above, the DEIS modeling demonstrates that the proposed Tri-County Parkway does not address the future congestion problems.

D. Social Demands and Economic Development Needs

The third key element in the Project Purpose and Need is:

> *Accommodate social demands and economic development needs*.

However, there is virtually no evidence offered that these needs exist or that the proposed highway could satisfy these needs. This element is given little space in the DEIS – about half a page (DEIS, p. 7-8). The major theme in this brief section is that the area is growing and will experience increased traffic. The resulting problem is again congestion which has already been addressed thoroughly in this review.

There also is a short paragraph which discusses how the Tri-County Parkway is listed in county plans for aiding in economic development in existing corridors. Mere listing in a county plan does not establish the purpose and need for a highway. Moreover, as will be discussed below in a section on Induced Travel Demand, the suggestion that the project would aid development is in conflict with DEIS statements that the construction of the Tri-County Parkway will not cause changes in future land use.

E. Safety

The fourth key element in the Project Purpose and Need is:

> *Improve safety and, by doing so, reduce the average crash, injury, and accident rates on the roadway network.*

The DEIS states:

> *Average crash and injury rates in the study area exceed statewide average rates on primary roads, secondary roads, and interstate facilities.*

More information is given in the following tables from the DEIS *Transportation and Traffic Technical Report*.

TABLE 5.3-1
STATEWIDE AVERAGE INCIDENCE RATES
(per 100 million VMT, 1998-2000)

Incident	Primary	Secondary	Interstate[1]
Crash	157.0	250.0	72.0
Injury	100.0	142.0	38.0
Death	1.7	1.9	0.6

Source: VDOT Statewide Crash Statistics, 1998, 1999, and 2000.

TABLE 5.3-2
TRI-COUNTY REGION AVERAGE INCIDENCE RATES
(per 100 million VMT, 1997-2000)

Incident	Primary	Secondary	Interstate[1]
Crash	195.04	266.74	82.00
Injury	114.11	143.83	45.00
Death	0.83	1.10	0.27

Source: VDOT Statewide Crash Statistics, Fairfax, Prince William and Loudon counties; 1997 1998,1999, and 2000
[1] Interstate rates from 1996 only.

This 50,000-foot view shows that the crash and injury rates are consistently higher in the study area than in the state as a whole but that the death rates appear to be lower. Accident rates are calculated on a basis of accidents per million vehicle miles traveled (VMT) and generally are higher in urban areas than rural areas. Therefore, it is not surprising that the study area rates are higher than statewide averages. The percentage differences are 24 percent, 7 percent, and 14 percent for crash rate on primary, secondary, and Interstate roadways, respectively. The corresponding differences in injury rates are 14 percent, 1 percent and 18 percent. These types of differences are to be expected. In contrast, the death rate in the study area appears to be only about half the statewide rate. This may reflect lower average operating speeds, or may be a statistical fluke due to the relatively low number of fatalities.

The DEIS notes further that certain segments have accident rates that are significantly higher than average. The worst case is VA 234 Business (Sudley Road) from the northern boundary of Manassas and Prince William County to just before the I-66 interchange. This is a modern roadway but has a large amount of turning traffic at commercial driveways. It is likely that targeted safety improvements and access management strategies could reduce accidents on this roadway segment. Nationwide, it has been estimated that:

> For each dollar invested in safety infrastructure improvements, \$2.80 in benefits are returned in terms of lives saved and injuries prevented.[2]

Yet the DEIS fails to meaningfully consider these types of safety and access management improvements.

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[2] Statement of Frederick G. Wright, Jr., Executive Director Federal Highway Administration and Dennis C. Judycki, Director Research, Development, and Technology Service Business Unit Federal Highway Administration U.S. Department of Transportation On Reauthorization of the Federal Surface Transportation Research Program Before the Committee on Environment and Public Works United States Senate March 15, 2002

In contrast to targeted improvements, the construction of a new parallel roadway is an ineffective safety strategy. As shown in the figures cited earlier in this review document, only the Comprehensive Plan alternative results in significantly lower traffic volumes on this roadway. In contrast, the West Two and West Four alternatives reduce traffic volume on this segment by about 1 percent.

The DEIS summarizes the proposed Tri-County Parkway's safety benefits in the following tables.

TABLE 4.1-12
PROJECTED ACCIDENT, INJURY, AND FATALITY COMPARISON ON EXISTING VA 234 BUSINESS

VA 234 Business from Godwin Drive to I-66	1997-2000	2030[1]			
	Average Existing	No-Build	Comprehensive Plan CBA	West Four CBA	West Two CBA
Accidents	218	366	234 (-132)	363 (-3)	360 (-6)
Injuries	96	161	103 (-58)	159 (-2)	158 (-3)
Fatalities	1	1	1 (0)	1 (0)	1 (0)

Notes: [1] 234 (-132) = forecast # accidents, injuries, and fatalities (amount less than No-Build Alternative)

TABLE 4.1-13
PROJECTED ACCIDENT, INJURY, AND FATALITY COMPARISON ON EXISTING VA 28

VA 28 from VA 234 Bypass to Old Centreville Rd	1997-2000	2030[1]			
	Average Existing	No-Build	Comprehensive Plan CBA	West Four CBA	West Two CBA
Accidents	134	183	173 (-10)	182 (-1)	184 (+1)
Injuries	49	67	63 (-4)	67 (0)	67 (0)
Fatalities	0	0	0 (0)	0 (0)	0 (0)

Notes: [1] 173 (-10) = forecast # accidents, injuries, and fatalities (amount less than No-Build Alternative)

Source, DEIS, p. 94.

Consistent with the traffic volumes modeled, the West Four and West Two alternatives are expected to reduce accidents on the VA 234 Business section by only 1-2 percent. The effects of these two alternatives on VA 28 accidents is negligible, with West Four showing a reduction of 1 accident per year and West Two showing an increase of one per year. It is probable that a single intersection improvement on VA 234 Business could have a greater safety benefit on these two roadways than the construction of the Tri-County Parkway.

The Comprehensive Plan alternative shows a greater benefit because it does divert traffic from VA 234 Business and the southern portion of VA 28. However, this presentation of the data overstates the benefits. Although the new road would be expected to have lower accident rates, there would be accidents, and these accidents would offset some of the benefits shown.

Another factor is that accident rates per million vehicle miles have been dropping gradually in the U.S. – particularly for fatality and injury accidents. Cars have become safer and more reliable, and modern emergency medicine also is saving lives. By 2030, accident rates should be considerably lower than historical rates.

Finally, total vehicle miles traveled (VMT) is higher in all alternatives. Growth in VMT can offset benefits from lower accident rates. This is especially true when induced travel is considered.

Induced Travel Demand

Despite billions of dollars of investments in suburban freeways, congestion has increased in every major metropolitan area in the U.S. over the past twenty years. New and widened suburban freeways have failed to live up to their promise. Sprawling development has followed the freeway projects, and freeways have filled with traffic much faster than planners assumed. Travel begins at homes and businesses. No trip begins or ends on a freeway, and the increased freeway traffic has spilled over onto intersecting roadways, creating many new bottlenecks. Expected traffic decreases on other roadways often have failed to occur at all.

Broadly understood, induced travel demand is defined as *any increase in travel resulting from improved travel conditions.*[3] Travel conditions may be improved by reducing travel times, reducing travel cost, improving traveler safety, improving traveler comfort and so on. Changes in transportation capacity can elicit three possible changes in travel behavior almost instantaneously after they occur. These changes constitute "triple convergence" as characterized by Downs in his seminal book *Stuck in Traffic*, published in 1992.[4]

1) *Temporal convergence:* people might change their departure time, for example by shifting their departure times to the peak hour when they previously might have traveled off-peak to avoid congestion;
2) *Spatial convergence:* people might change their route to take advantage of added capacity on a particular facility or service;
3) *Modal convergence:* people might change how they choose to travel by, for example, foregoing carpooling or transit use to drive alone following a highway improvement.

The reality of triple convergence is that efforts to reduce peak congestion through roadway expansion tend to be ineffective. Downs has recently completed an updated version of *Stuck in Traffic*. In a companion piece published by the Brookings Institution, he writes:

> **Greatly expanding road capacity.** The second approach would be to build enough road capacity to handle all drivers who want to travel in peak hours at the same time without delays. But this “cure” is totally impractical and prohibitively expensive. Governments would have to widen all major commuting roads by demolishing millions of buildings, cutting down trees, and turning most of every metropolitan region into a giant concrete slab. Those roads would then be grossly underutilized during non-peak hours. There are many occasions when adding

[3] J.D. Hunt, “Induced Demand in Transportation Demand Models” in *Working Together to Address Induced Demand.* Washington: ENO Transportation Foundation, 2002.
[4] Anthony Downs, *Stuck in Traffic: Coping with Peak-Hour Traffic Congestion* (Washington D.C.: The Brookings Institute, 1992): 27-29.

> more road capacity is a good idea, but no large region can afford to build enough to completely eliminate peak-hour congestion.[5]

In 2003, the Utah Department of Transportation commissioned a study that summarized research on induced travel from new highways. The following discussion is based on the Utah study.

Induced travel results have typically been summarized in terms of "elasticity."

> **Elasticity –** The percent change in a variable resulting from a percent change in another variable. For VMT with respect to lane-miles, it is defined as the percent change in total VMT resulting from a percent change in lane-miles. A typical measure of lane-miles is number of lanes added times centerline miles of the improved or new road. Elasticities have been correlated with expansion of highway capacity, price of gasoline, economy of an area, distance from roadways, cost of transit and other variables.[6]

The research results for elasticity of induced travel in terms of vehicle miles of travel (VMT) as a function of lane miles is shown below.

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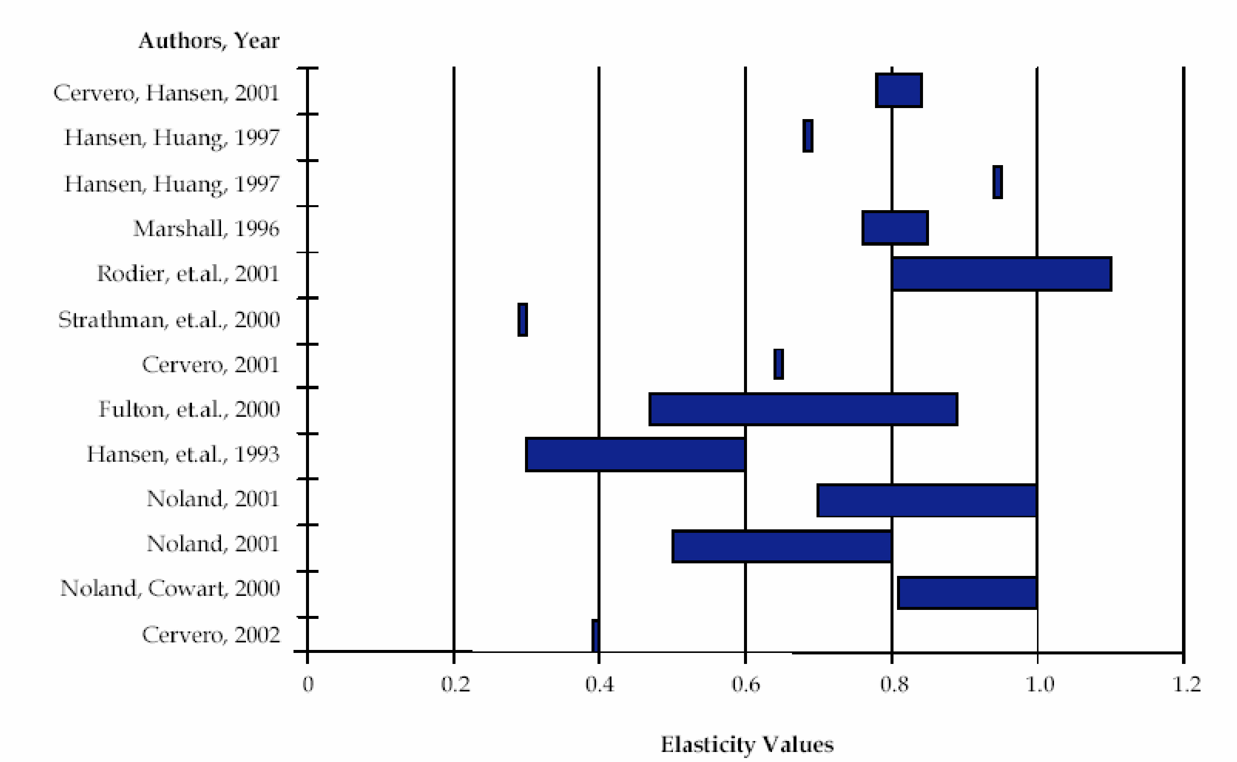
[5] Downs, Anthony. "Traffic: Why It's Getting Worse, What Government Can Do", Brookings Institution *Policy Brief* 128, January 2004.

[6] Cambridge Systematics, Inc. with Fehr & Peers Associates, Inc. Wasatch Front Regional Council (WFRC) *Model Sensitivity Testing and Training Study: Final Report*, Figure 2.5. Prepared for the Utah Department of Transportation, November 2003.

Long-Term Elasticity for All Project Types



Reproduced from Cambridge Systematics, Inc. with Fehr & Peers Associates, Inc. Wasatch Front Regional Council (WFRC) *Model Sensitivity Testing and Training Study: Final Report*, Figure 2.2 p. 2-8. Prepared for the Utah Department of Transportation, November 2003.

In a congested region like northern Virginia, the typical value from the figure above of 0.8 means that the equivalent of 80 percent of new roadway capacity will be filled by induced traffic. Not all of this traffic will be on the new roadway; some of it will further clog other roadways.

Incredibly, the DEIS is silent on induced travel demand. As a result, not only do the Tri-County Parkway alternatives not offer any meaningful congestion relief, but the analysis of these alternatives is likely to overstate the limited relief they might offer.

II. Indirect and Cumulative Impacts

The analysis of the indirect and cumulative impacts of the alternatives for constructing the Tri-County Parkway is wholly inadequate. The analysis of the potential sprawl-inducing impacts of the project, for example, utterly fails to assess the likely impacts a new highway would have.

A. Restricted Area of Land Use Impacts Considered

For one thing, the DEIS arbitrarily and unnecessarily restricts the portions of the study area in which it considers the land use impacts of the various build alternatives. The DEIS assumes that land use impacts of the Tri-County Parkway will be limited to a distance of one-half mile from new interchanges and intersections.

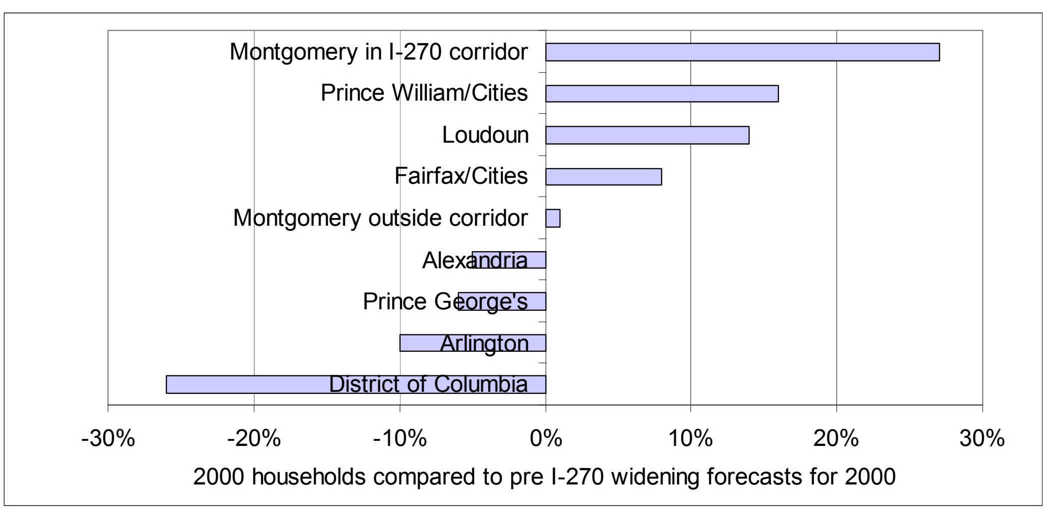
> *It is reasonable to assume that a certain degree of development will ultimately occur in the vicinity of those interchanges/intersections proposed within the study area. A zone of potential influence having a one-half-mile radius around each proposed interchange/intersection was used to estimate the amount of undeveloped land that could be developed for non-highway use that is not accounted for in the various county comprehensive plans.(DEIS, p. 194)*

This arbitrary limitation greatly understates the true impacts of a new roadway on land use.

The history of widening I-270 in Montgomery County, Maryland in the late 1980's offers an excellent case study of the land use impacts of new and expanded highways. Traffic conditions improved briefly following construction. Then land development boomed in the corridor. "In the five years before construction began, officials endorsed 1,745 new homes in the area stretching from Rockville to Clarksburg. During the next five years, 13,642 won approval." (*Washington Post*, January 4, 1999) By 1997, I-270 was routinely overrunning its designed capacity, and peak-hour traffic volumes on some segments had surpassed levels forecasted for 2010. A primary cause of the inaccurate traffic forecasts was inaccurate land use forecasts which were assumed to be the same for both no build and build analyses.

The figure below compares the 2000 forecast made before the I-270 widening with actual 2000 numbers. The largest forecasting error was for Montgomery County in the I-270 corridor, where the actual number of households in 2000 exceeded the forecast by 27 percent. Widening I-270 was a primary cause.

Washington DC Region: Suburban Freeway Projects Shifted Households to Suburbs from Core



The total number of regional households in 2000 was 2 percent less than forecast prior to the I-270 widening project. When the I-270 widening 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. The forecasts were completely wrong about the distribution of the households. Growth was much lower in the region's core than forecast, and much higher in western suburban areas, especially in the I-270 corridor.

The other areas where growth exceeded the forecast are suburban Virginia areas where freeway capacity also was expanded. Projects in these areas include construction of the Dulles Greenway, the Route 234 Beltway 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.

Suburban road building has fostered an endless cycle of sprawl and congestion, followed by more road building, more sprawl and more congestion.

The DEIS, however, largely ignores these impacts.

B. Land Use Assumed in Forecast

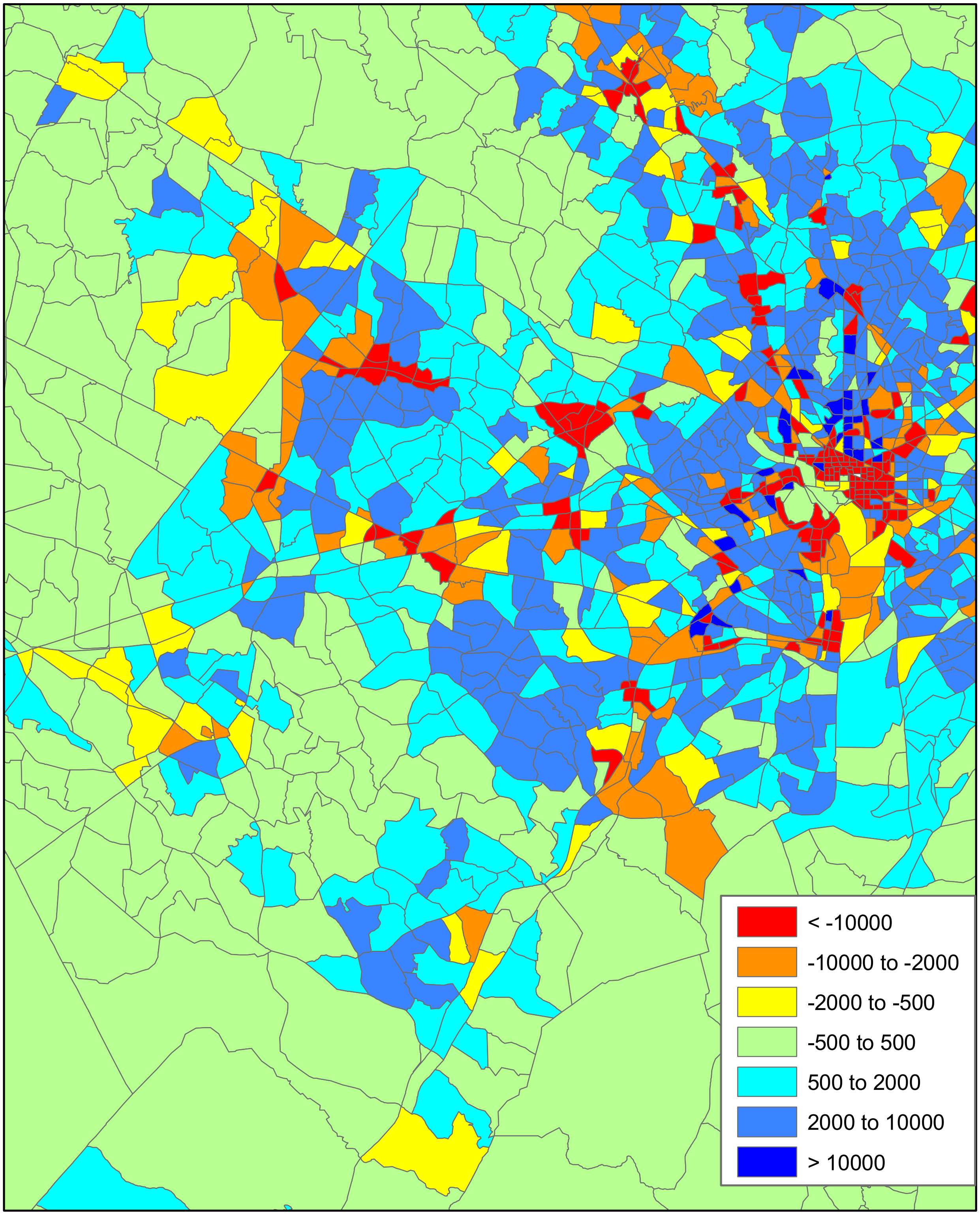
The single land use scenario used for 2030 assumes that northeast Loudoun County will achieve a jobs excess that is unprecedented in the region. The figures below illustrate the worker/job imbalances for 2000 and as modeled for 2030.[7]

Some areas have more commuters living in them than there jobs. Other areas have more jobs than commuters. When there is a large surplus of jobs only a larger area, there will be heavy, directional commuter traffic into the area in the morning and out of it in the afternoon. As shown, the Dulles/Sterling/Ashburn area has a significant number of surplus jobs now but is modeled as becoming the largest geographic area of excess jobs in the region

The worker/job imbalances are directly related to commuting which still creates a large percentage of vehicle miles traveled during the weekday morning and afternoon peak traffic periods. Less obviously, the worker/job imbalances influence many non-work trips including shopping and service trips.

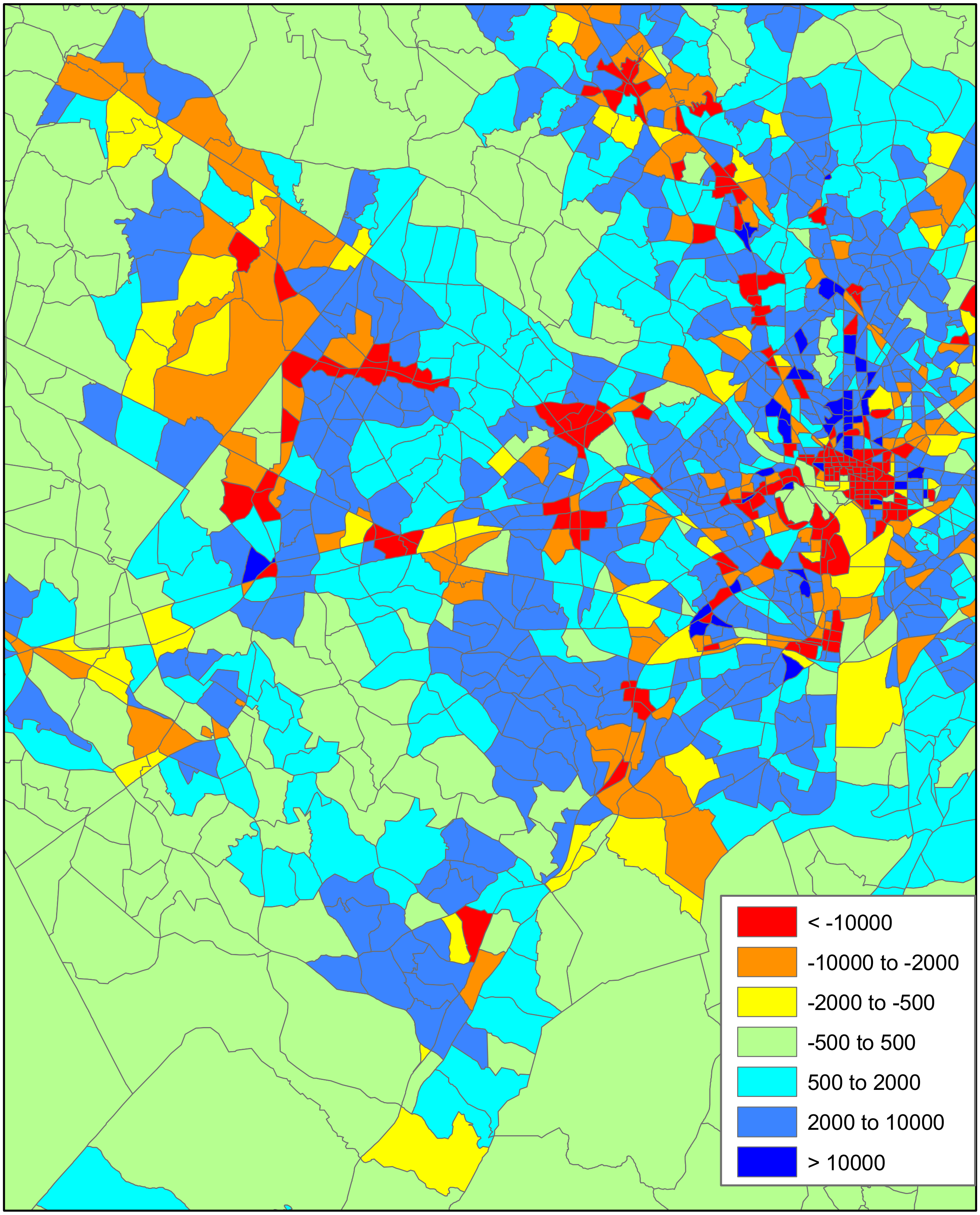
[7] The imbalances are calculated by subtracting home-based-work trip "attractions" from "productions" in the model files. Each production or attraction represents one end of a one way trip, so a single worker often represents two productions and two attractions. However, not every worker works every day, and not every worker travels directly from home to work and back. Therefore, there are approximately 1.7 productions and 1.7 attractions per job in the region.

2000 Worker-Job Imbalance (per square mile)



Note: Red = more jobs than workers; Blue = more workers than jobs

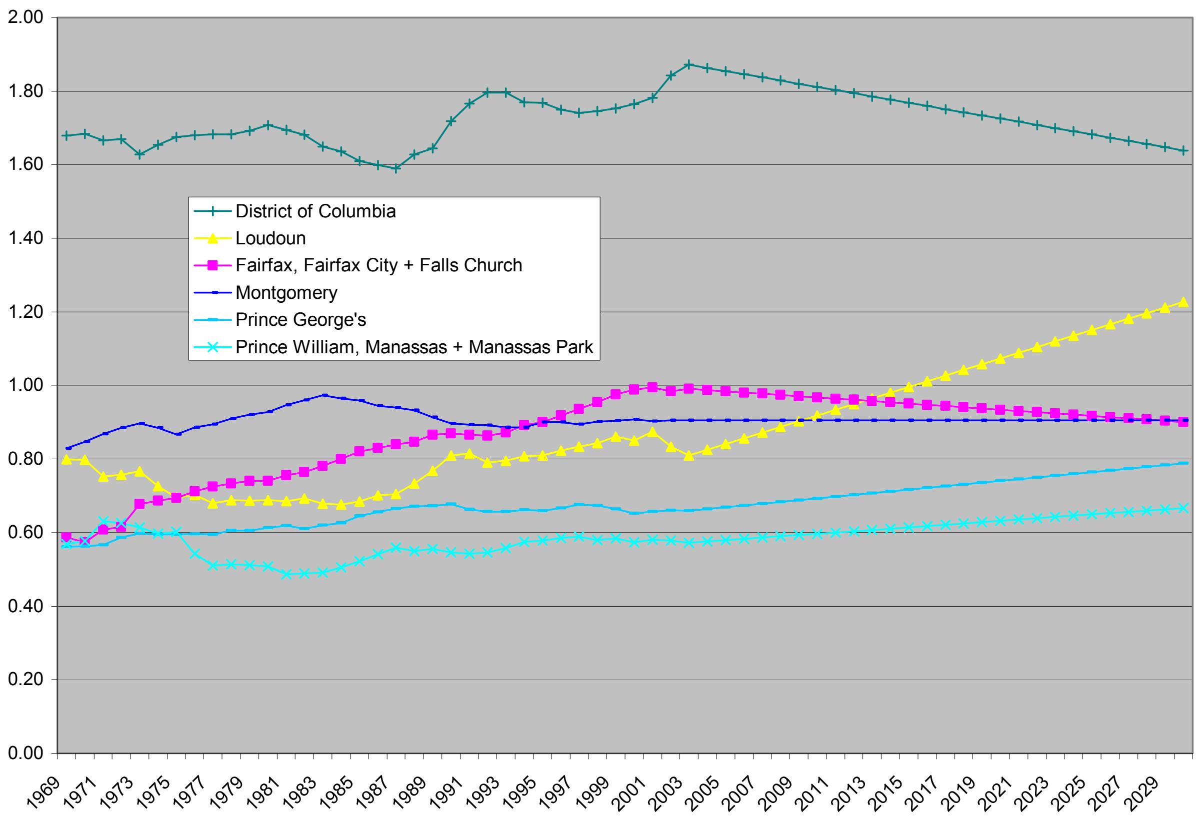
2030 Worker-Job Imbalance (per square mile)



Note: Red = more jobs than workers; Blue = more workers than jobs

The job growth shown in northeastern Loudoun County is so great that it disturbs long-standing regional patterns. The graphic below shows jobs/person from 1969 on, indexed so that 1.0 represents the regional average for each year. As shown only the District of Columbia has historically been a net importer of commuters.

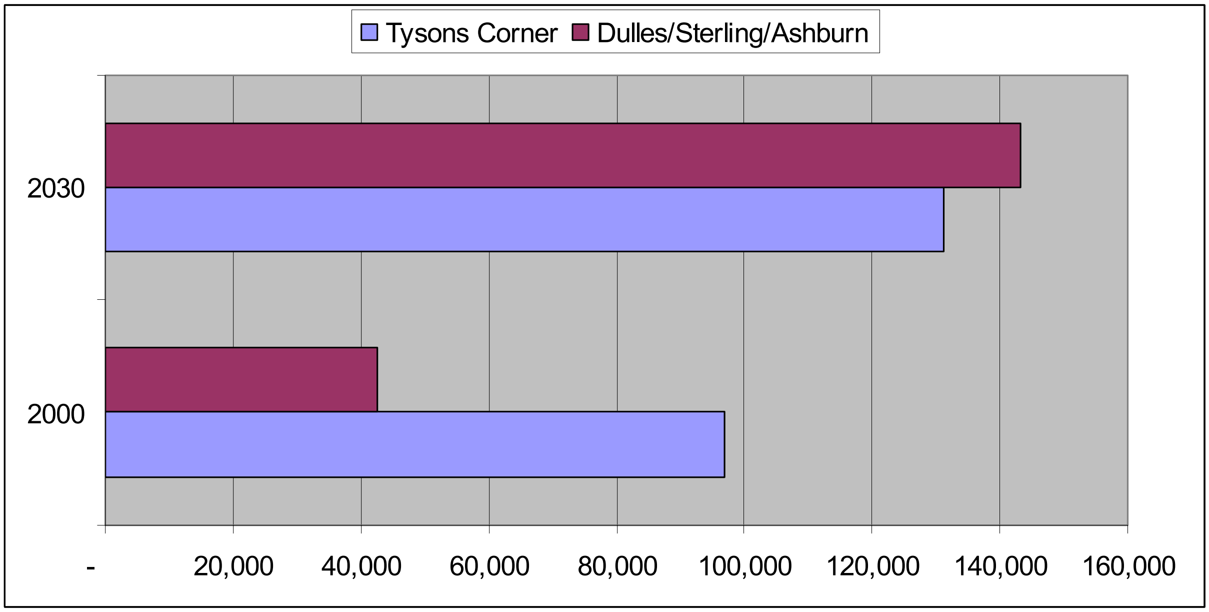
2000 Job-Population Ratio (Indexed 1.0 = Regional Average for Each Year)



Sources: U.S. Bureau of Economic Analysis through 2003; then straight line until 2030 model inputs

A comparison with the Tysons Corner area is constructive. In 2000, the excess jobs in the Tysons Corner area were over twice that of the Dulles/Sterling/Ashburn area. Between 2000 and 2030, the Tysons Corner excess is modeled as increasing by 35 percent. The Dulles/Sterling/Ashburn increase is modeled as 237 percent! The increase alone is greater than the entire Tysons Corner imbalance in 2000.

Tysons Corner vs. Dulles/Sterling/Ashburn – Excess Daily Work Trip Ends



Note: "Tysons Corner" is defined as the contiguous red Transportation Analysis Zones (TAZs) shown in the graphics above and "Dulles/Sterling/Ashburn is the yellow/orange/red areas between US 50 and VA 7, including some blue TAZs internal to this area.

Whether Tysons Corner can achieve such a great job imbalance without unreasonable gridlock is unclear but it is much more likely to do so than the Dulles/Sterling/Ashburn area. It is near the center of the expanded Washington D.C. metropolitan area. It is served by a set of major roadways including the Capital Beltway. Metro rail transit is planned for the area. Its higher density will support internal shared parking and non-auto trips. It is surrounded by housing rich areas so that commuters arrive from all directions.

The realization of the Dulles/Sterling/Ashburn job imbalance is unthinkable without much more residential growth to the west than is modeled, and much more roadway capacity leading to that area than is modeled. In the context of the I-270 discussion above, the land use scenario best represents a Build condition. It is unlikely in any case, but unthinkable without a significant investment in new highways leading to this area. Each roadway like the Tri-County Parkway that is constructed will help to encourage a greater imbalance. It will encourage a larger jobs/housing imbalance, more sprawl and longer commutes.

The single land use scenario modeled is more consistent with the build alternatives than for the No Build alternative. Thus, any benefits of the proposed roadways over the No Build alternative are overstated.

The DEIS continually suggests that land use inputs are a local concern only. Although this is the state of the planning practice in the region, it is foolish. Local planners cannot produce tens of thousands of jobs independent of a local workforce and local infrastructure. Economic forces will not allow this to happen.

III. Meeting the Project Purpose and Need

A. A Plan for Failure

As demonstrated in Part I, none of the Tri-County Parkway alternatives reduce congestion. Yet congestion reduction is the goal of three of the four elements of Project Purpose and Need since both "community linkages" and "social demands and economic development" also come down to congestion in terms of objective measures. Moreover, there is no attempt in the DEIS to look seriously at more promising alternatives to relieve congestion, including upgrading existing roadways and expanding transit. Only the Comprehensive Plan alternative, with its high cost and impacts, offers any hope of reducing accidents significantly and thus meeting the final Project Purpose and Need – to improve safety. There has been no attempt in the DEIS to examine how targeted safety and access management improvements along high-accident corridors could provide similar or greater accident reductions at lower cost.

Given the dismal performance of the alternatives, why is the Tri-County Parkway being seriously considered? We think it is parallel to this wise and funny story of Nasrudin.

There is More Light Here

> Someone saw Nasrudin searching for something on the ground.
>
> "What have you lost, Mulla?" he asked. :"My key," said the Mulla. So they both went down on their knees and looked for it.
>
> After a time the other man asked: "Where exactly did you drop it?"
>
> "In my own house."
>
> "Then why are you looking here?"
>
> "There is more light here than inside my own house."

With the Tri-County Parkway, there is an attempt to find the "key" to solving congestion. It is assumed that this key must be a new road. As it is infeasible to build a new road in any of the highly congested corridors discussed in the DEIS, it is proposed to build a roadway somewhere else.

That the failure of this strategy is not immediately obvious to all concerned simply highlights the importance of the "Don't just stand there; do something" mentality in our society, combined with a too-limited toolbox. When all we have is a hammer, we treat everything as a nail. When all we have in our toolbox are roads, we treat every place as future pavement. As the discussion of induced demand demonstrated, this failed planning approach is not harmless, but is in fact an important cause of the very problem that it is supposed to be addressing.

B. Planning for Success

None of the Tri-County Parkway alternatives will meet the Project Purpose and Need. In order to reduce congestion and improve safety, a combination of alternatives the DEIS does not consider adequately should be analyzed further and adopted.

The DEIS prematurely rejects detailed consideration of either a Transportation System Management (TSM) Alternative or a Mass Transit Alternative (p. S-1 – S-2).

To justify rejecting the TSM alternative, the DEIS states:

> *There are no practicable TSM measures beyond those already proposed in the CLRP and VDOT Six Year Plan which could reasonably be implemented to sufficiently satisfy the purpose and need for the Tri-County Parkway. (DEIS, p. S-1)*

The DEIS fails to support the contention that there are no other TSM measures available in the study area that might help to achieve the Project Purpose and Need. As demonstrated above, none of the build alternatives satisfy the Project Purpose and Need to a significant extent, so it is hard to believe that there is not a set of available TSM measures that would do as well. Two elements of a possible TSM package have been discussed above. First, there likely are a set of safety and access management measures that would reduce accidents in the identified high accident roadway segments. Second, they are likely connectivity and access management improvements in the VA 28 corridor that could reduce local traffic on VA 28.

The rejection of a transit alternative appears to result from a fixation on building a new roadway.

> *The nature of the study area makes the identification of a mass transit alternative that can adequately address the corridor's purpose and need problematic. (DEIS p. 35)*

The word "corridor" is inappropriate here. The Project Purpose and Need identifies a study area and traffic problems, but there is no north-south "corridor" except perhaps the VA 28 corridor. By limiting consideration of transit to the "corridor", the DEIS misses the point as to how transit could benefit the study area.

The DEIS states:

> *Finally, the development patterns and traffic patterns and volumes within the study corridor do not favor north-south through movement along the corridor. The majority of trips and greatest volumes are to points outside the study area or along only a portion of the corridor (i.e., from the Manassas and Centerville areas to I-66 and points east, from the South Riding area to the Dulles corridor). The through volumes are by far the weakest in the study area and would not attract sufficient transit riders to make such service viable; therefore, the Mass Transit Alternative has been eliminated from further consideration. (DEIS, p. 20)*

This paragraph helps to describe why the proposed roadway alternatives cannot solve the congestion problems. Yes, transit will not be effective in the Tri-County corridor, but could be effective on existing highly congested roadways. In particular, Bus Rapid Transit (BRT) could be a flexible system where buses could do local collection and then run express to major activity centers, using managed lanes on freeways where available, and having signal priority and queue jump lanes on major arterials.

The DEIS argues that transit service cannot be studied because it is not in the Constrained Long-Range Plan (CLRP), and that it is not clear what agency might operate transit. These are not insurmountable obstacles. If a transit alternative best meets Project Purpose and Need, the alternative can be added to the CLRP as projects are added and modified frequently. If the transit project makes sense, an administrative structure to operate it will be found.

A combination of TSM and transit is likely to offer more benefits than either strategy together. In addition, many regions in the U.S. are concluding that integrating transportation and land use planning is essential if any real progress is to be made in addressing congestion. The recent *Reality Check* exercise in the Washington region is an initial effort locally in this direction.

> **WASHINGTON, D.C.** (February 4, 2005) - Using maps and colored Legos® representing jobs and housing, 300 decision-makers from 21 jurisdictions in the Washington, D.C. region recently played 'Reality Check,' a one-day exercise sponsored by the ULI Washington, the Washington area district council of the Urban Land Institute. The unique program, first offered by ULI Los Angeles, is designed to foster collective visioning about community growth.
>
> The Washington event brought together a diverse group of stakeholders, including politicians, developers, environmentalists, and business and civic leaders, all of whom worked together to create scenarios to accommodate the 2 million additional residents and 1.6 million new jobs anticipated for the region by 2025…
>
> Gerrit Knaap, executive director of the National Center for Smart Growth at the University of Maryland, said the morning session reached a consensus on four principles for guiding growth:
>
> - Preserve and protect natural areas and green space
> - Create new development near transit
> - Maintain a balance of jobs and housing; and
> - Focus new development back into the urban core. [8]

Building a roadway like the Tri-County Parkway would be a step in the wrong, failed direction.

[8] http://www.realitycheckwashington.org/dcgetsarealitycheck.php.

Attachment 1: Resumes

NORMAN L. MARSHALL, PRESIDENT
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:

Mr. Marshall helped found Smart Mobility, Inc. in 2001 and is its President. Prior to this, he was employed for 14 years at Resource Systems Group, Inc. where he developed a national practice in travel demand modeling and related transportation planning work. His work focuses on analyzing the relationships between the build environment and travel behavior.

Developing Regional Transportation Models

Chicago Metropolis 2020—made further enhancements to the model developed for the Route 53 and I-355 Alternatives Studies (described below). These enhancements included porting to TransCAD, implementation of a non-motorized trip mode based on urban form variables, and a truck freight model with multi-class assignment (truck restrictions, and truck-only routes). Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004, based in part on this work.

Envision Central Texas—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).

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 is being used to test alternative land use and transportation scenarios.

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

Route 53 and I-355 Alternatives Studies—with assistance from University of Illinois at Chicago staff, developed advanced transportation modeling capability of the Chicago. The model includes simultaneous selection of destination, mode, route, and time of day, and is being used to test alternative highway, transit, land use, and TDM scenarios.

Georgia Intercity Rail Plan—developed statewide travel demand model for the Georgia Department of Transportation including auto, air, bus and rail modes. Work included estimating travel demand and mode split models, and building the Departments ARC/INFO database for a model running with a GIS user interface.

Trip Generation Characteristics of Multi-Use Developments—estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

Pease Area Transportation and Air Quality Planning—developed an integrated land use allocation, transportation, and air quality model for a three-county New Hampshire and Maine seacoast region that covers two New Hampshire MPOs, the Seacoast MPO and the Salem-Plaistow MPO.

Syracuse Intermodal Model—developed custom trip generation, trip distribution, and mode split models for the Syracuse Metropolitan Transportation Council. All of the new models were developed on a person-trip basis, with the trip distribution model and mode split models based on one estimated logit model formulation.

Portland Area Comprehensive Travel Study—Travel Demand Model Upgrade—enhanced the Portland Maine regional model (TRIPS software). Estimated person-based trip generation and distribution, and a mode split model including drive alone, shared ride, bus, and walk/bike modes.

Chittenden County ISTEA Planning—developed a land use allocation model and a set of performance measures for Chittenden County (Burlington) Vermont for use in transportation planning studies required by the Intermodal Surface Transportation Efficiency Act (ISTEA).

Bangor Area Comprehensive Travel Study—developed transportation system planning model for Bangor (Maine) metropolitan area including auto, carpool, bus, and walk/bike travel modes.

Nashua Regional Planning Commission—completed regional travel demand model update for Nashua, New Hampshire MPO.

Improved Transportation Models for the Future—assisted Sandia National Laboratories in developing a prototype model of the future linking ARC/INFO to the EMME/2 Albuquerque model and adding a land use allocation model and auto ownership model including alternative vehicle types.

Applying Regional Transportation Models

Mr. Marshall has applied regional transportation models developed by his own team and by others in highway and transit planning projects at the project, corridor, and regional levels. Projects include:

Essex (VT) Commuter Rail Environmental Assessment—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

State Routes 5 & 92 Scoping Phase—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.

Conformity Analyses – Applied models for three New Hampshire MPOs in calculating air emissions in the conformity process.

Twin Cities Area and Corridor Studies—improved regional demand model to better match observed traffic volumes, particularly in suburban growth areas. Applied enhanced model in a series of subarea and corridor studies.

Ohio 3-C Corridor Rail Estimation—re-calibrated a previously-developed demand model and produced ridership and revenue estimates for a proposed Cleveland-Columbus-Cincinnati high-speed rail service.

Reviewing Regional Transportation Models

Mr. Marshall draws on his experience in developing and applying regional transportation models to review the work of others. Projects include:

Stillwater Bridge – Participated in 4-person expert panel assembled by Minnesota DOT to review modeling of proposed replacement bridge in Stillwater, with special attention to land use, induced travel, pricing, and transit use.

Ohio River Bridges Projects– Reviewed Environmental Impact Statement for proposed new freeway bridge east of Louisville Kentucky for River Fields, a local land trust and historic preservation not-for-profit organization.

Indiana I-69 – Reviewed model analyses from Indiana statewide travel demand model of proposed new Interstate highway for coalition, including the Environmental Law and Policy Center of the Midwest.

Washington, DC region – Reviewed modeling of Potomac River bridge crossings.

Phoenix, Arizona – Reviewed conformity analyses and long-term transportation plan under contract to Tempe, a municipality in the Phoenix region.

Atlanta, Georgia – Critiqued conformity analyses and long-term transportation plan for an environmental coalition.

Daniel Island (Charleston, South Carolina) – Reviewed Draft Environmental Impact Statement for large proposed Port expansion (the "Global Gateway") for an environmental coalition.

Houston, Texas– Analyzed conformity analyses and long-term transportation plan for an environmental coalition.

MEMBERSHIPS/AFFILIATIONS

Associate Member, Institute of Transportation Engineers
Individual Affiliate, Transportation Research Board
Member, American Planning Association
Member, Congress for New Urbanism
Technical Advisory Committee Member and past Board Member, Vital Communities (VT/NH)

PUBLICATIONS AND PRESENTATIONS

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 accepted for upcoming publication in the *Transportation Research Record*.

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.

Subarea Modeling with a Regional Model and CORSIM" with K. Kaliski, presented at *Seventh National Transportation Research Board Conference on the Application of Transportation Planning Methods, Boston MA, May 1999.*

New Distribution and Mode Choice Models for Chicago with K. Ballard, *Transportation Research Board Annual Meeting*, Washington DC: January 1998.

"Land Use Allocation Modeling in Uni-Centric and Multi-Centric Regions" with S. Lawe, *Transportation Research Board Annual Meeting,* Washington DC: January 1996.

Multimodal Statewide Travel Demand Modeling Within a GIS with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Linking a GIS and a Statewide Transportation Planning Model, with L. Barbour and Judith LaFavor, Urban and Regional Information Systems Association (URISA) Annual Conference, San Antonio, TX, July 1995.

Land Use, Transportation, and Air Quality Models Linked With ARC/INFO. with C. Hanley, C. Blewitt, and M. Lewis, Urban and Regional Information Systems Association (URISA) Annual Conference,: San Antonio, TX, July 1995.

Forecasting Land Use Changes for Transportation Alternative with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods, Seattle WA, April 1995.

Forecasting Land Use Changes for Transportation Alternatives, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board),: Seattle WA, April 1995.

Integrated Transportation, Land Use, and Air Quality Modeling Environment with C. Hanley and M. Lewis Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Seattle WA, April 1995.

Land Use Allocation Models for Multi-County Urban and Suburban Areas, with S. Lawe, Fourth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Daytona Beach, FL, May 1993.

Land Use Allocation Models for Regional Planning with S. Lawe, 1993 International System Dynamics Conference, Cancun, Mexico, July 1993.

Estimating Network Model Parameters from Mail Survey Data, with K. Kaliski, L. Rimmer, and S. Lawe, American Society of Civil Engineers 4th International Conference on Microcomputers in Transportation, Baltimore MD, July 1992.

BRIAN R. GRADY, ENGINEER
bgrady@smartmobility.com

EDUCATION:

Bachelor of Science in Engineering Sciences, Bates College 1998
Bachelor of Engineering, Dartmouth College 1999

SELECTED PROFESSIONAL EXPERIENCE:

Mr. Grady works on projects in transportation planning and traffic impact analysis requiring the application and development of regional travel demand models. Mr. Grady has been actively involved in the review and critique of network models, particularly as they relate to the National Environmental Policy Act, Environmental Impact Statement, and air quality conformity determination processes. Mr. Grady also has special expertise in the field of mobile source emissions modeling using the MOBILE pollutant emission factor models developed by the Environmental Protection Agency.

Developing Regional Transportation Models

Envision Central Texas—implemented many enhancements in MPO TransCAD 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).

Chicago Metropolis 2020—Developed TransCAD based regional travel demand model for the Chicago six-county region which was used to evaluate various land use and transportation system strategies. Performed highway and transit network coding within TransCAD to include a system of parkways, boulevards and Bus Rapid Transit service which complemented the smart growth land use scenarios.

Baltimore Vision 2030— Enhanced the Baltimore Metropolitan Council’s TP+ regional travel demand model to be more responsive to land use development and public investment strategies. The model was run for four different scenarios, and indicators such as land consumption, fuel consumption, accessibility to transit, and mode shares were prepared for each.

Applying Regional Transportation Models

Mr. Grady has applied regional transportation models developed by Smart Mobility, Inc. and by other MPOs and/or consultants in highway and transit planning projects at the project, corridor, and regional levels.

Essex, Vermont Commuter Rail Environmental Assessment—estimated transit ridership for light rail and enhanced bus scenarios, as well as traffic volumes along a major transportation corridor in the Burlington, Vermont designed to serve commuters working at one of the region's major employers, IBM.
Highway Investments and Induced Demand Travel—under contract with the Environmental Protection Agency, determined the extent to which the overall transportation planning and 4-step modeling processes account for induced demand, and the extent to which the individual components of different transportation planning and modeling methodologies account for induced demand.

Inter-County Connector Impacts and Alternatives Study—evaluated the impact of a proposed 18-mile limited access highway in Montgomery County, Maryland and modeled a number alternatives including a transit oriented development strategy as well as the implementation of an express toll lane network consisting of I-270, the Capital Beltway, and I-95 in the Washington, D.C. metro area.

North Potomac River Crossings Impacts Study—evaluated the impact of three different proposed Potomac River crossings: Western Transportation Corridor, High Techway, and Low Techway, northwest of the Capital Beltway in the Washington D.C. region. The TPB-MWCOG travel model was used to quantify the regional transportation impacts of the proposed bridges.

Seacoast Air Quality Conformity Analysis—updated the Seacoast Megamodel developed for three New Hampshire MPOs. The model was applied to calculate vehicle-miles traveled and the resulting air emissions for the conformity determination process.

Nashua Regional Planning Commission Conformity Analysis—updated and improved the RPC travel demand used by planners in the Nashua, New Hampshire region. The model was applied by staff with our support and technical guidance to calculate vehicle-miles traveled and the resulting air emissions for the conformity determination process.

Burlington One-Way Circulation Study—used the Chittenden County travel demand model to identify one-way street pairs for potential two-way conversion. A level of service analysis for fifteen major intersections in the downtown area was conducted for the Department of Public Works.

Reviewing Regional Transportation Models and Studies Based on Them

Mr. Grady has also participated in the review of travel demand models and their use in the air quality conformity process.

Ohio River Bridges Projects– Reviewed Environmental Impact Statement for proposed new freeway bridge east of Louisville, Kentucky for River Fields, a local land trust and historic preservation not-for-profit organization.

Indiana I-69 – Reviewed model analyses from Indiana statewide travel demand model of proposed new Interstate highway for coalition, including the Environmental Law and Policy Center of the Midwest.

Legacy Highway Draft Supplemental Environmental Impact Statement – Reviewed model alternative analyses from Salt Lake City travel demand model of proposed new highway for Utahns for Better Transportation and FRIENDS of Great Salt Lake. We also modeled a locally-preferred alternative to the new highway.

Reviewing Regional Conformity Findings— Mr. Grady reviews conformity determination analyses, and corresponding transportation improvement plans and long range transportation plans. Recent project work includes: Tempe, Arizona; Atlanta, Georgia; Houston, Texas; Las Vegas, Nevada; and Salt Lake City, Utah.

RECENT PUBLICATIONS AND PRESENTATIONS

Travel Demand Modeling for Regional Visioning and Scenario Analysis with Norm Marshall. Recommended for presentation at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005.

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

LUCINDA GIBSON, PE
lgibson@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1988
Bachelor of Science in Civil Engineering, University of Vermont, Burlington, VT, 1983

PROFESSIONAL EXPERIENCE:

SMART MOBILITY, INC, Norwich, VT
VICE PRESIDENT
November 1, 2001 – Present

Manages and contributes to a variety of projects involving conceptual traffic engineering design, multimodal transportation planning, and applying principles of smart growth and new urbanism. Project focus areas include conceptual design of sustainable transportation solutions, regional transportation infrastructure planning and analysis, review of projects in the NEPA process and development of alternative plans for municipalities or concerned citizen groups. Project work includes developing alternative conceptual designs for future land use/transportation scenarios at a local or regional scale; transportation improvement cost analysis; conceptual design and analysis of transportation and transit facilities, and impact assessment for transportation projects. Current clients include non-profit organizations, planning agencies and municipalities. Specific projects include:

- Two Lane Plan for PA Route 41—Prepared conceptual plan alternative to a Four lane limited access widening proposed by Pennsylvania DOT for PA Route 41 through Chester County, PA. Used RODEL for roundabout analysis and design, and VISSIM for developing corridor-wide measures and informational display. Sub-contracted with Barry Crown of Rodel Software, and Faber Maunsell, UK Distributors of VISSIM. Plan is currently under review by PennDOT for consideration as an alternative.
- Alternative Plan for US 202 Section 700—Prepared alternative plan of traffic operational improvements and connector streets as an alternative to a proposed 10 mile expressway along US 202 through Bucks County, Pennsylvania, due to concerns about the expressway's primary and secondary impacts.
- Transportation Plan for Montpelier, Vermont—Comprehensive, multimodal transportation plan for the City of Montpelier, Vermont to be integrated into their updated municipal plan. Planning process included public visioning workshop, a review of all modes of transportation, travel demand management and parking options, and options to increase street connectivity. In collaboration with ORW, Landscape Architects.
- Chicago Metropolis 2020 Plan for Growth and Transportation-Contributed to this APA Burnham Award-winning project to explore alternative scenarios for growth and transportation investment and management for the Chicago Region. Developed alternative transportation investment strategies and budgets, and prepared modeling input files to analyze these scenarios with an advanced regional TransCAD model.
- Prairie Crossing Boulevard Plan, Grayslake, Illinois-Developed context sensitive integrated transportation and land use alternative plan for an abandoned Tollway right-of-way through a new urbanist development in Grayslake, Illinois. Integrated traffic and transportation design into community street network and land use patterns. Plan features landscaped boulevards, roundabouts, and improved street connectivity in the area.
- Monadnock Traffic Calming Foundation—Developed conceptual traffic calming plan and design criteria for a NHDOT traffic calming project on Route 101through the center of Dublin, New Hampshire.
- Dresden School Transportation Committee—Conducted study on the Feasibility of Queue Jump Lane for the Ledyard Bridge Approach in Norwich, Vermont. Reviewed options and obstacles for establishing a bus-only during morning peak hours for buses, with the goal of reducing bus travel time and encouraging school bus and public transit use between Norwich, Vermont and Hanover, New Hampshire.
- Barnard Villages Traffic and Growth Management Plan—Developed a plan for Barnard, Vermont's two village areas, including intersection safety, pedestrian circulation, traffic calming, establishing village identity, re-designing lakefront parking on Silver Lake, and exploring opportunities for infill development.
- NEPA Document Reviews-Reviewed and prepared comments on several EIS and EA documents for community groups and other stakeholders for a variety of projects, including the I-93 Salem to Manchester, NH Widening; the Ohio River Bridges in Louisville, Kentucky; US 202 Section 100 in Chester County, PA.

TWO RIVERS-OTTAUQUECHEE REGIONAL COMMISSION, Woodstock, VT– *www.trorc.org*
SENIOR TRANSPORTATION PLANNER
October 1994 – October 2001

Managed regional transportation planning program for a rural 27-town region in central Vermont. Prepared the Regional Transportation Plan, and prepared a regional Transportation Improvement Program for incorporation into the Vermont Statewide Transportation Improvement program. Implemented extensive public involvement program for transportation planning and project development; assisted communities in planning, conceptual design, and cost analysis of transportation improvements; conducted Scenic Byway and Bicycle/pedestrian planning and design studies; assisted municipalities in addressing traffic circulation, pedestrian transportation and parking issues in their downtown area plans. Specific projects include:

- <u>Middlebury Gap Scenic Byway Corridor Management Plan</u>—Managed consultant team, conducted portions of traffic inventory, and coordinated public involvement for the completion of Vermont's first corridor management plan for the Middlebury Gap Scenic Byway, traversing the Green Mountains National Forest, and connecting historic villages, ski areas and a scenic gorge.
- <u>US 4 Task Force</u>- Convened and staffed a citizen's advisory group to provide thoughtful input on the purpose, need and priorities for improvements to the NHS Route US 4 through the sensitive scenic and historic communities of Woodstock and Bridgewater, Vermont. Prepared report summarized current conditions, local concerns, and specific project priorities that was adopted and endorsed by this group.
- <u>Vermont Design Standards Committee</u>-Provided staff assistance and analysis for the development of Vermont's highway design standards, the first state in the country to adopt flexible design standards, enabled by ISTEA legislation in 1991. Specific tasks included conducting literature research and analysis on Vermont's state highways to develop appropriate standards for shoulder widths on various classes of roads and conditions.

RESOURCE SYSTEMS GROUP, White River Junction VT
ENGINEER/ANALYST
November 1988 - October 1994

Conducted and prepared numerous local and regional transportation planning, traffic impact assessment and feasibility studies at a transportation consulting firm. Duties included analyzing traffic data, preparing regional transportation plans, conducting transportation improvement feasibility studies, and traffic impact evaluations.

JASON M. CORTELL AND ASSOCIATES, Waltham, MA
ENVIRONMENTAL ENGINEER
September 1984 to August 1986

Worked on a variety of environmental studies including NEPA documents, impact analysis for developments, hazardous material site assessments, water quality impact assessments and other tasks at a full service environmental consulting firm.

PROFESSIONAL CERTIFICATIONS AND MEMBERSHIPS

Professional Engineer – P.E., Vermont Board of Professional Engineering, License #6133
Member, Institute of Transportation Engineers (ITE)
Member, Congress for the New Urbanism, Transportation Planning Committee
Member, Board of Directors, CNU New England Chapter of CNU
Member, ITE/CNU Design Standards Task Force

PUBLICATIONS

Context Sensitive Design Approach for the Route 41 Corridor, Gibson, Lucinda E., and Dee Durham. Presented the Historic Roads National Conference in Portland, OR. Described multi-faceted approach including research, public involvement and education, used to develop a context sensitive plan for improvements to PA Route 41, an NHS route through scenic rural landscapes and Amish farms. April, 2004.

Chicago Metropolis 2020: The Business Community Develops an Integrated Land Use/Transportation Plan, Gibson, Lucinda E., Frank Beal, John Fregonese, Norman Marshall. Presented at the ITE 2003 Technical Conference, *Transportation's Role in Successful Communities* Presented in Fort Lauderdale, FL, 2003.

Functional Classification for Multimodal Planning, Strate, Harry E., Elizabeth Humstone, Susan McMahon, Lucy Gibson and Bruce D. Bender, Transportation Research Record #1606, Transportation Planning, Programming, and Land Use, National Academy Press, Washington DC, 1997.

SPEAKING ENGAGEMENTS (Partial List)

Emerging Transportation Planning Techniques for Smart Growth Planning. Presented at the Smart Growth Network annual conference in Burlington, VT, September, 2003.

Success Stories and How-To's, Vermont Bicycle and Pedestrian Coalition Annual Meeting, Randolph, VT, April, 2002.

Transportation Concepts for Smart Growth Planning, Chicago Metropolis 2020 Steering Committee, Chicago, IL, January 2002.

How Engineers Think, Vermont Historic Preservation Annual Conference, Manchester, VT, June, 1999.

Traffic and Transportation Trends and Considerations, US Route 4 Forum, Woodstock, VT, April 1998.