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

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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.

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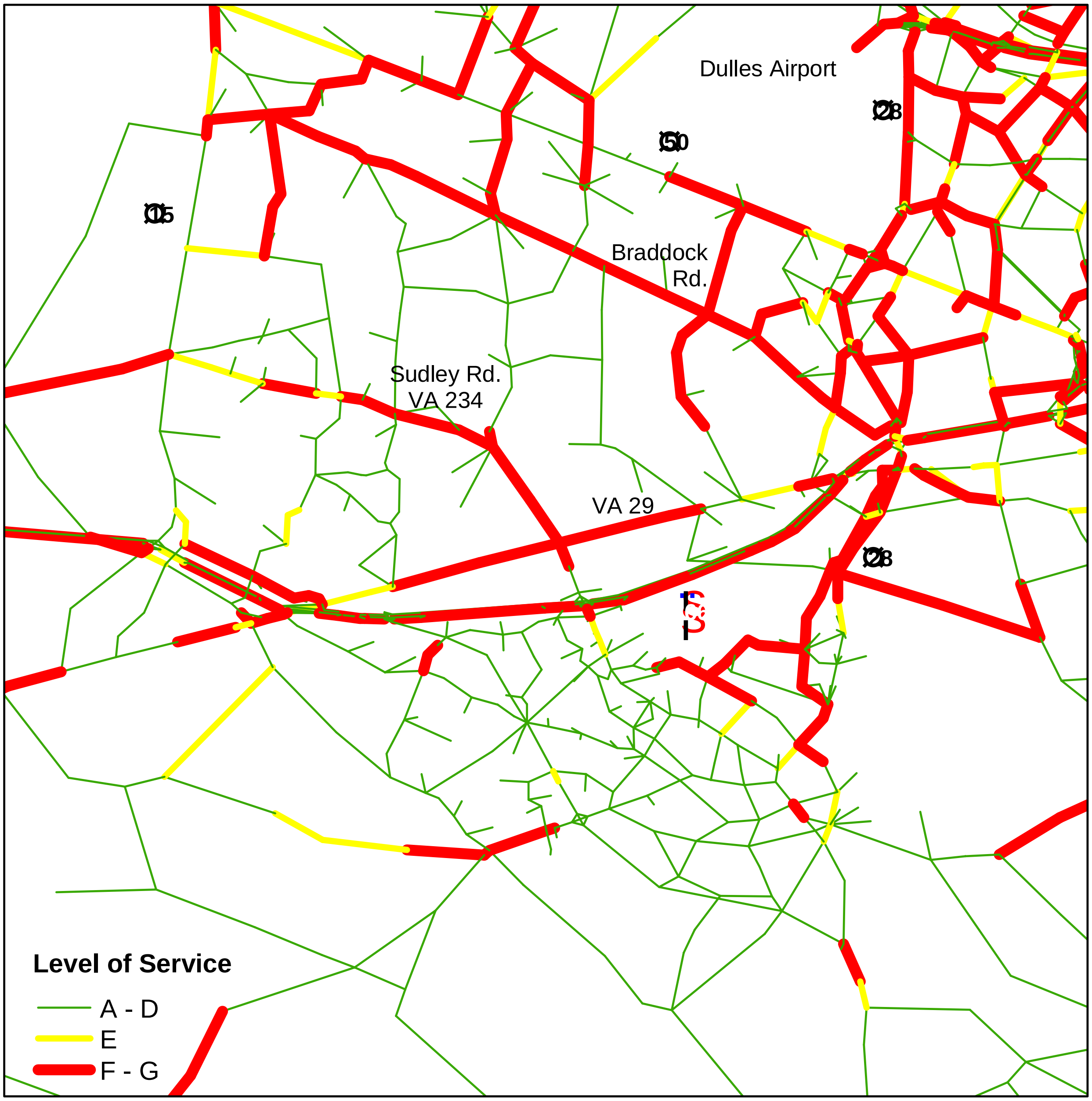
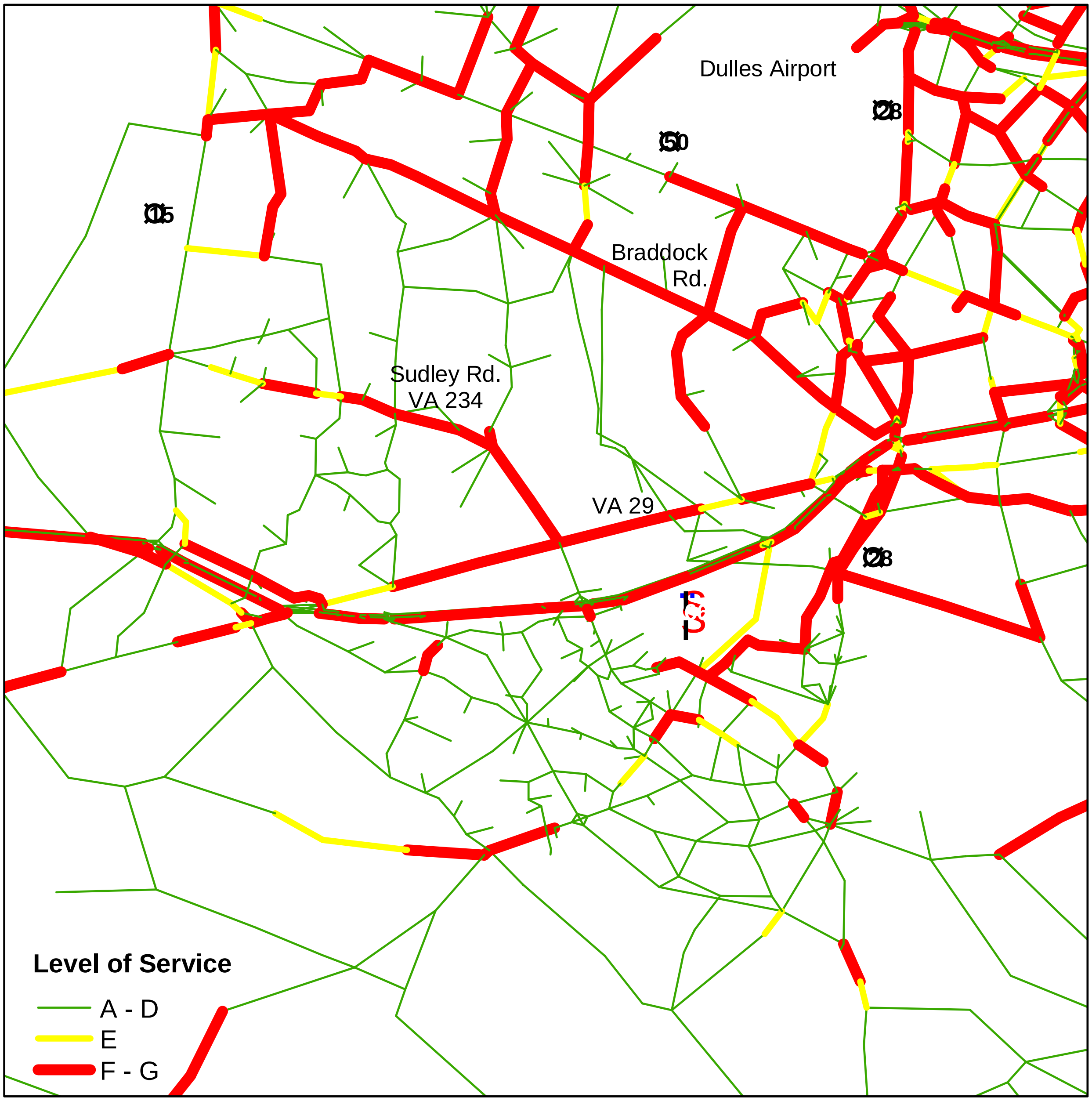
[1] Chicago Metropolis 2020: *The Metropolis Plan: Choices for the Chicago Region*, p. 10. Chicago, IL: 2003.

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



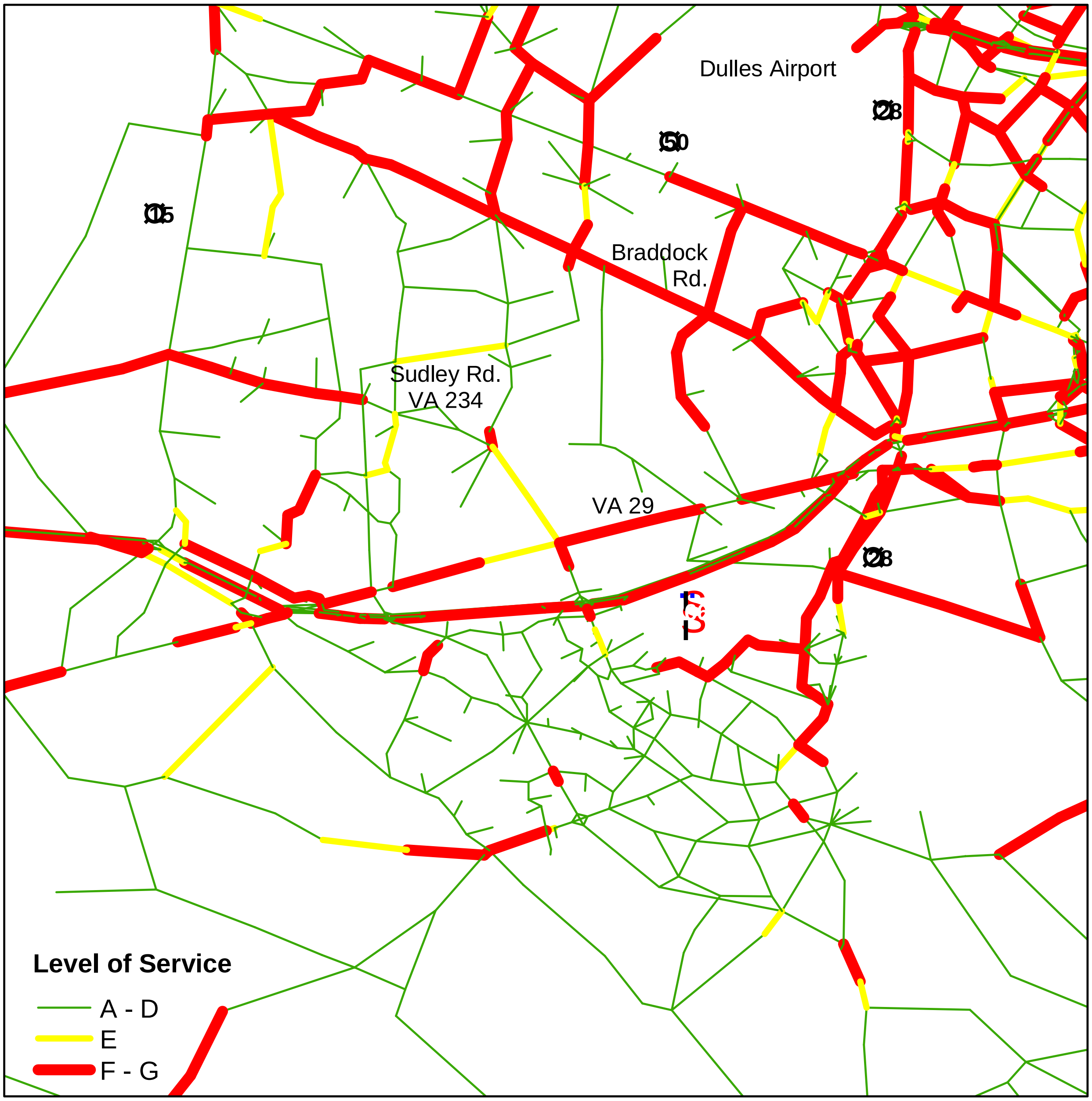
VA 28 is modeled as very congested in 2030, but otherwise there is much less congestion modeled on north-south roadways in the study area than the east-west roadways.

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



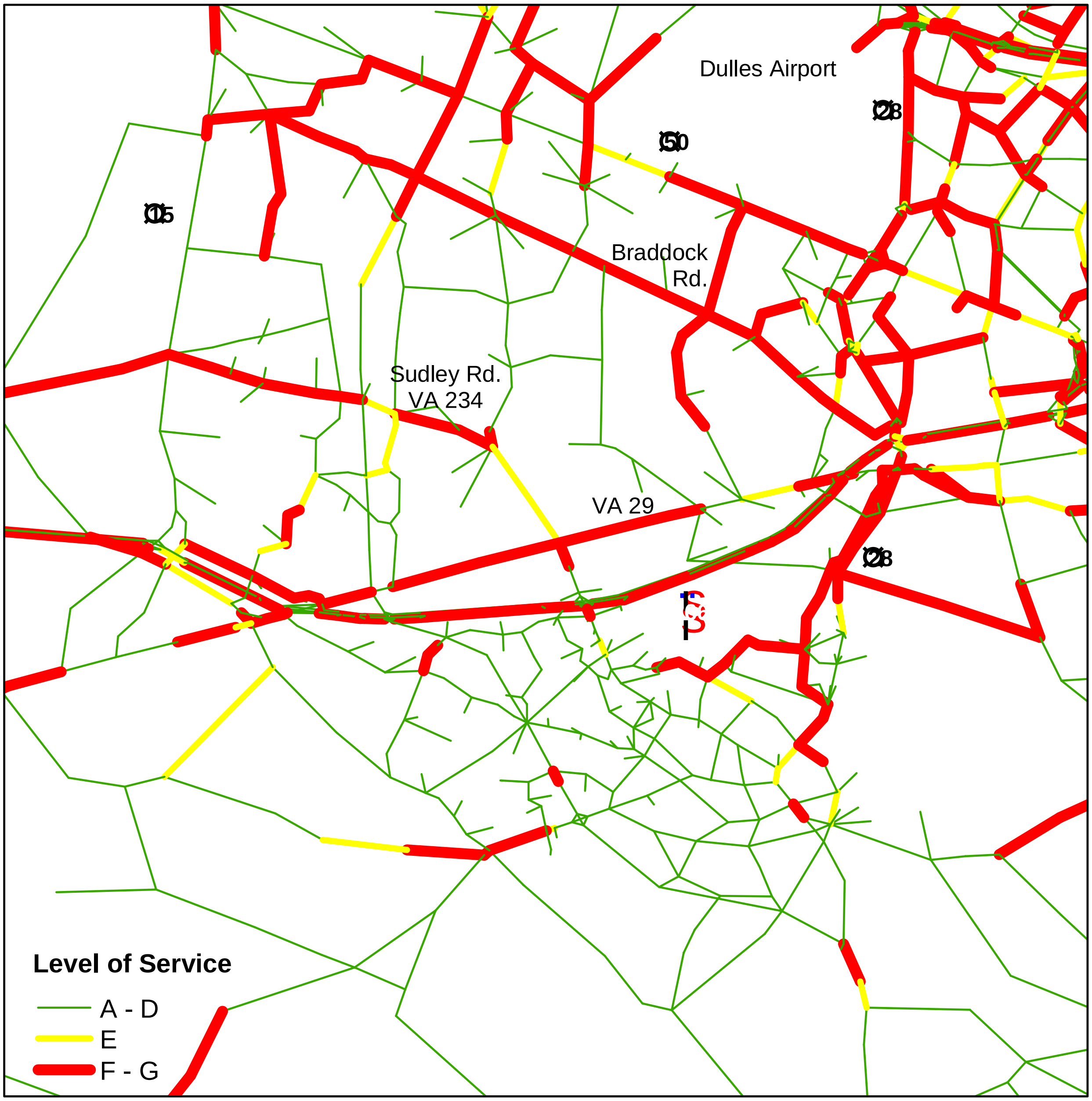
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

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



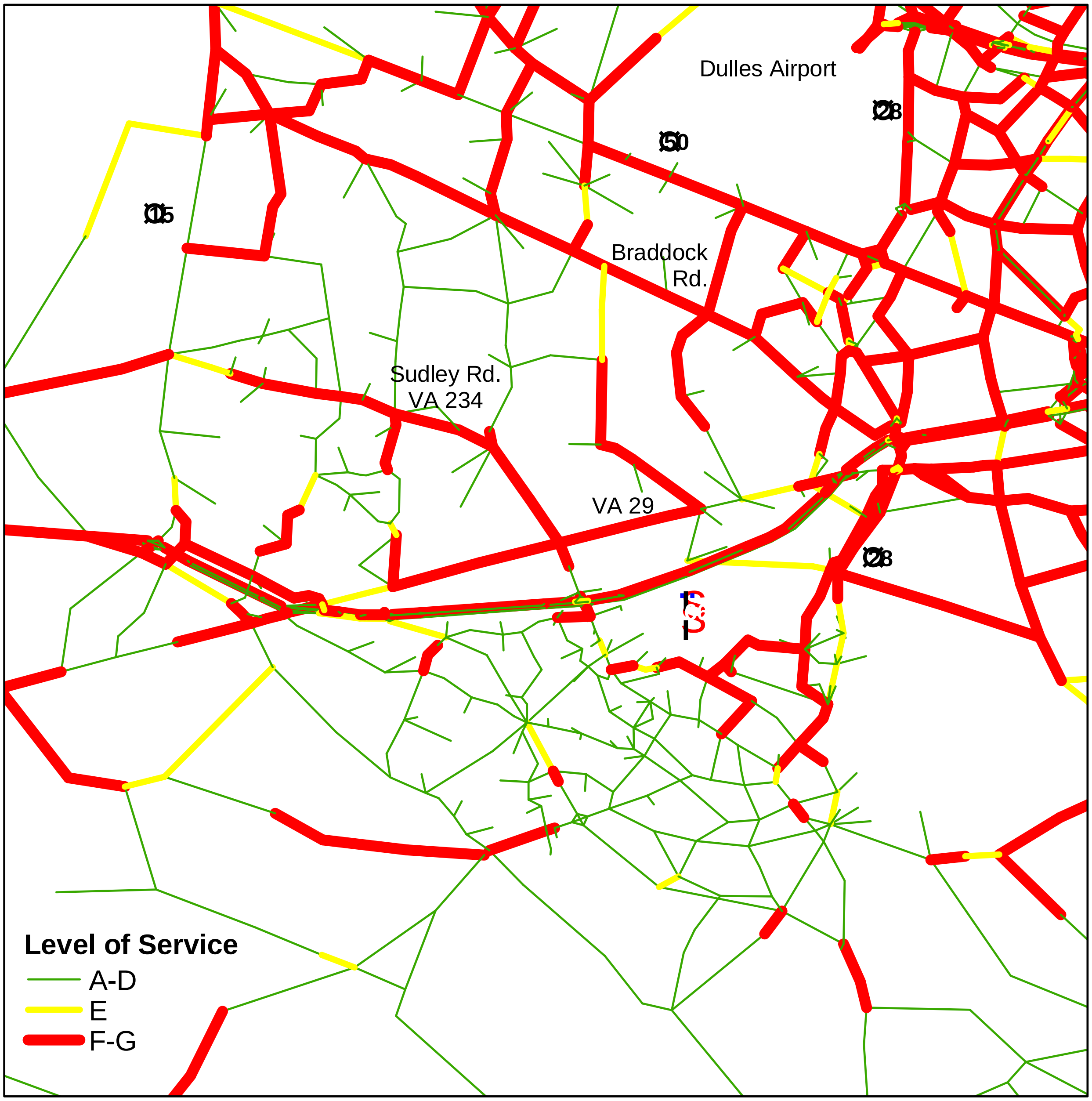
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

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



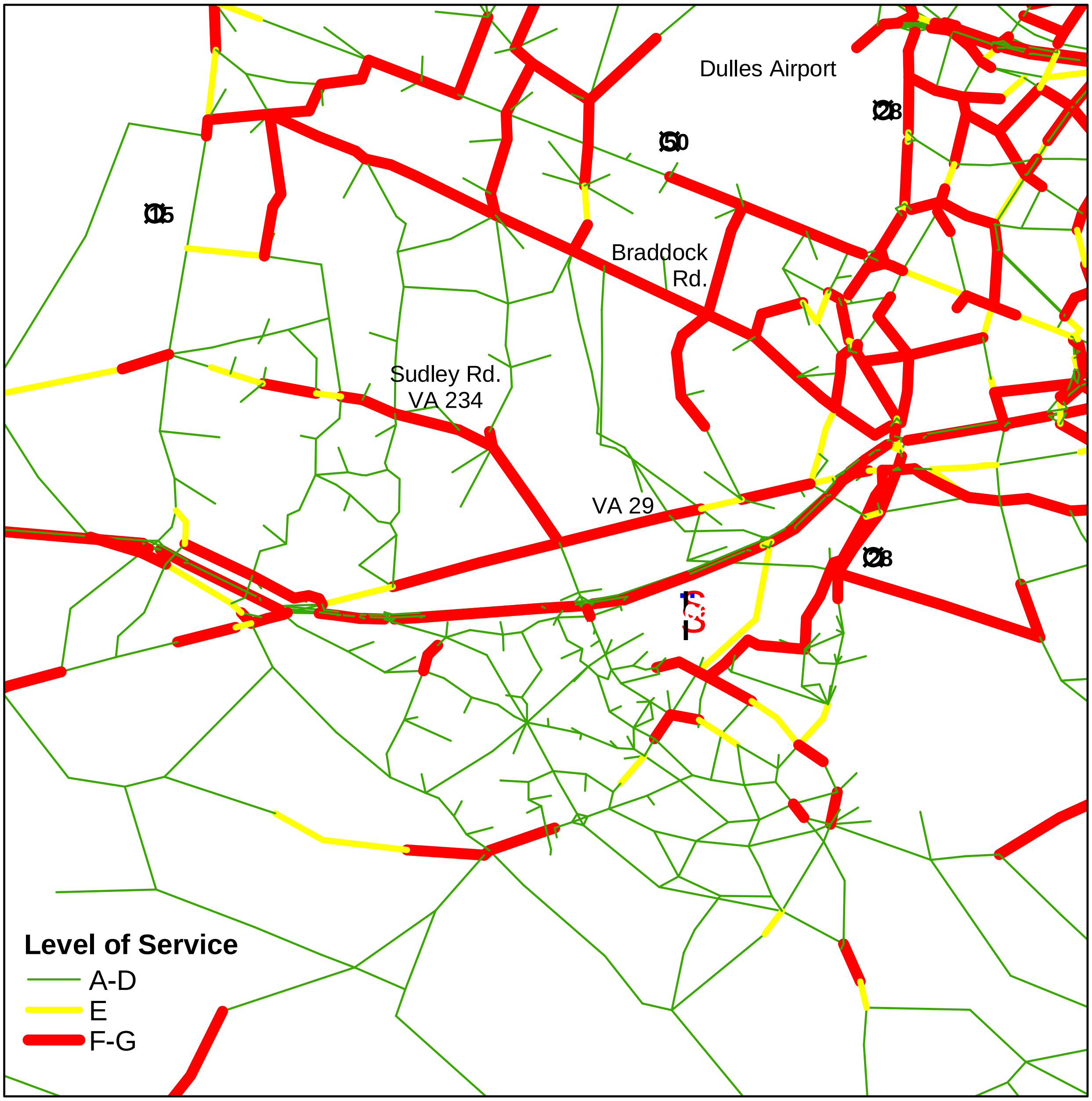
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

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



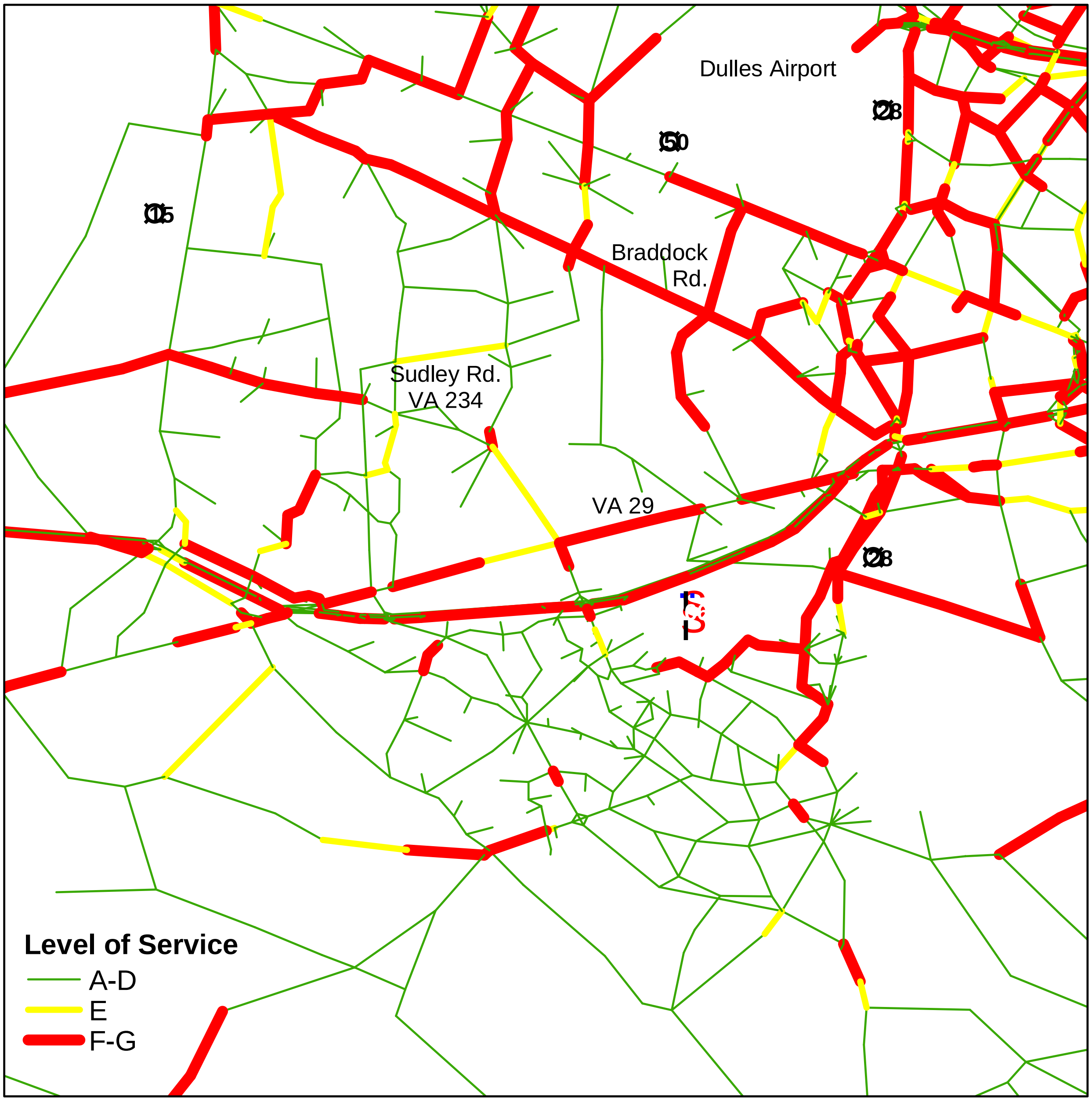
The most congested roadways as modeled in the afternoon peak period are the same roadways that are most congested in the morning peak period.

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



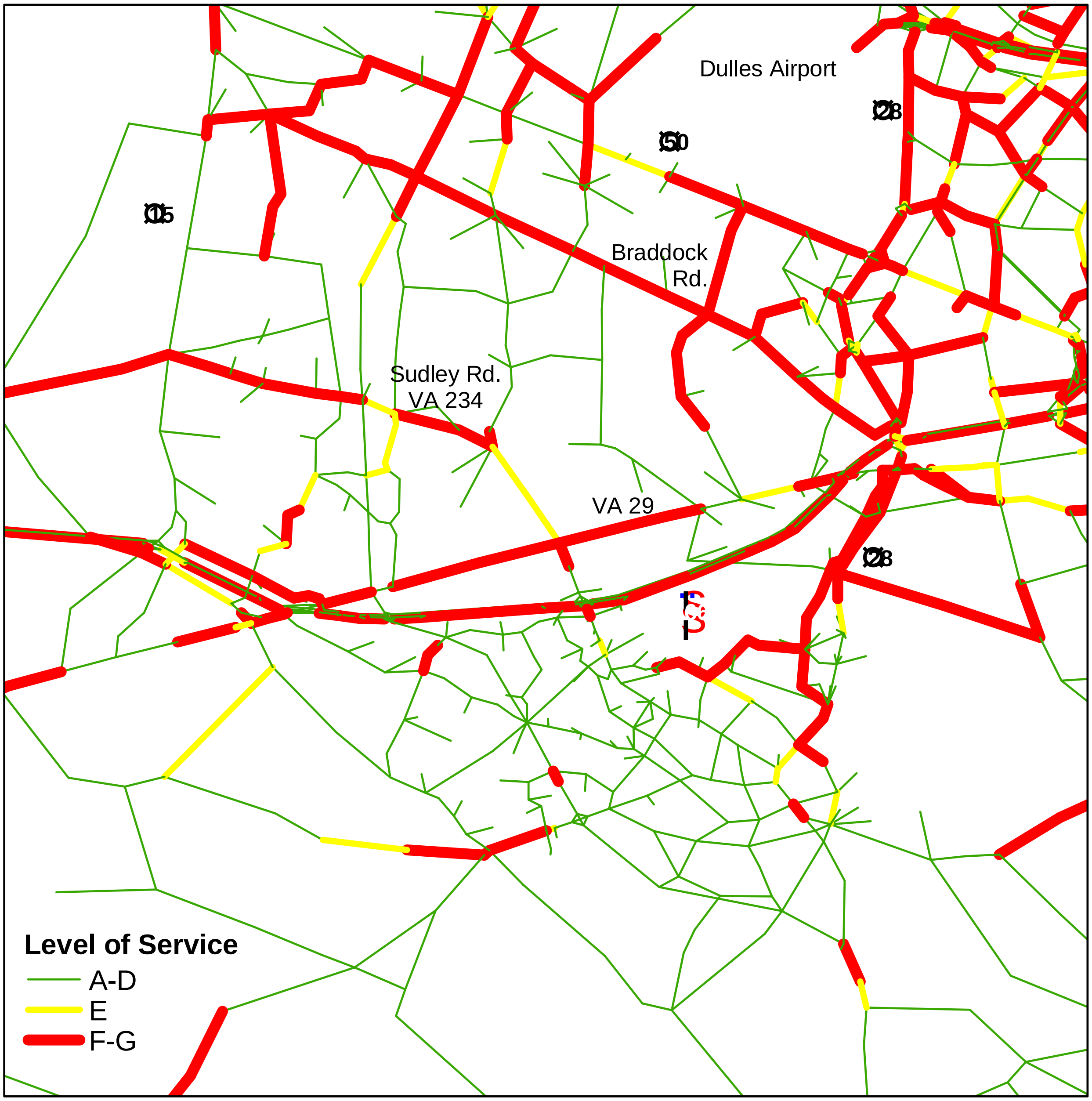
Note that the performance is practically identical to the No Build graphic, including similar congestion levels on both VA 28 and US 15.

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.

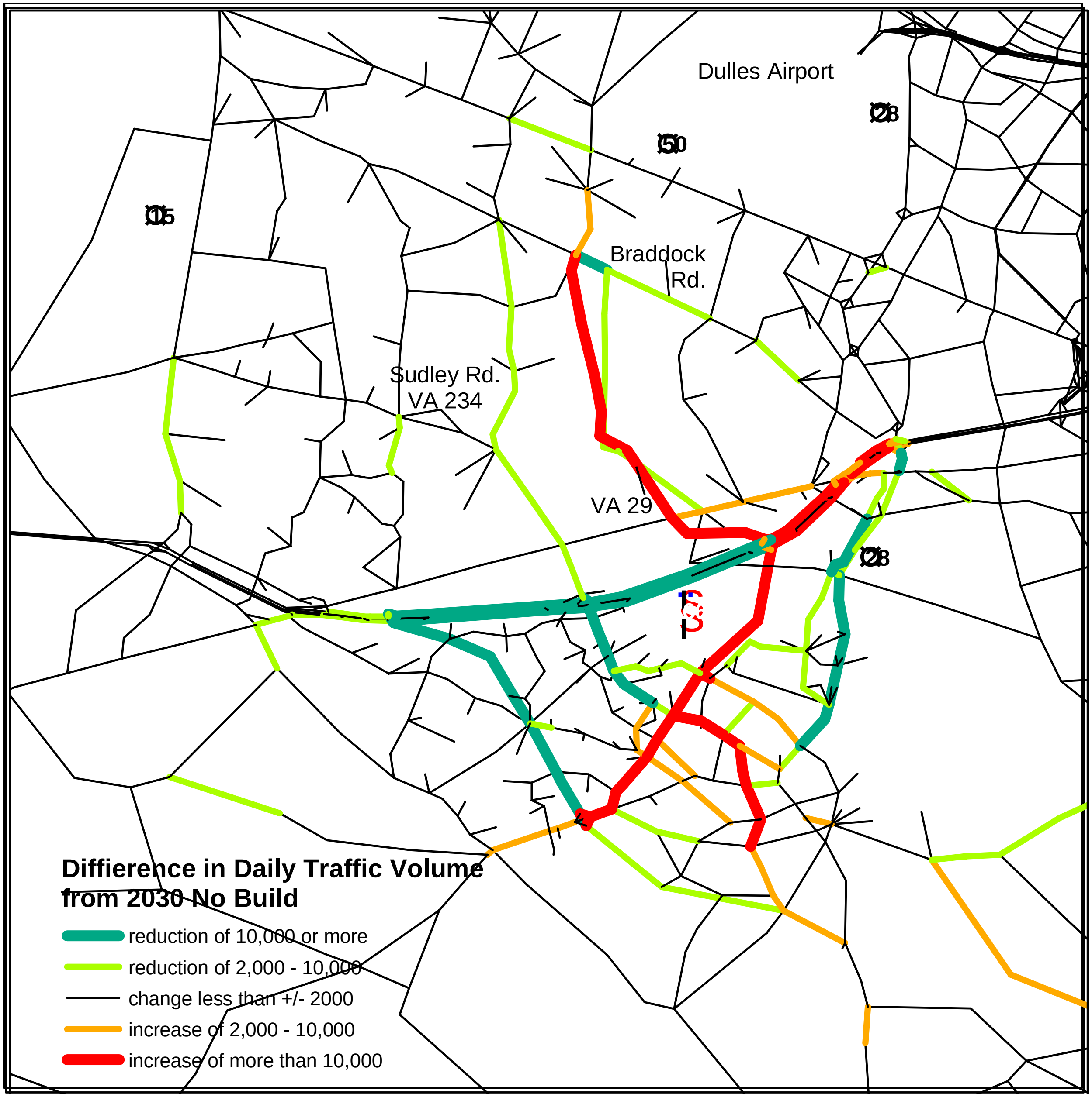
Levels of Service: 2030 West 4 P.M. Peak Period (DEIS Modeling)



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

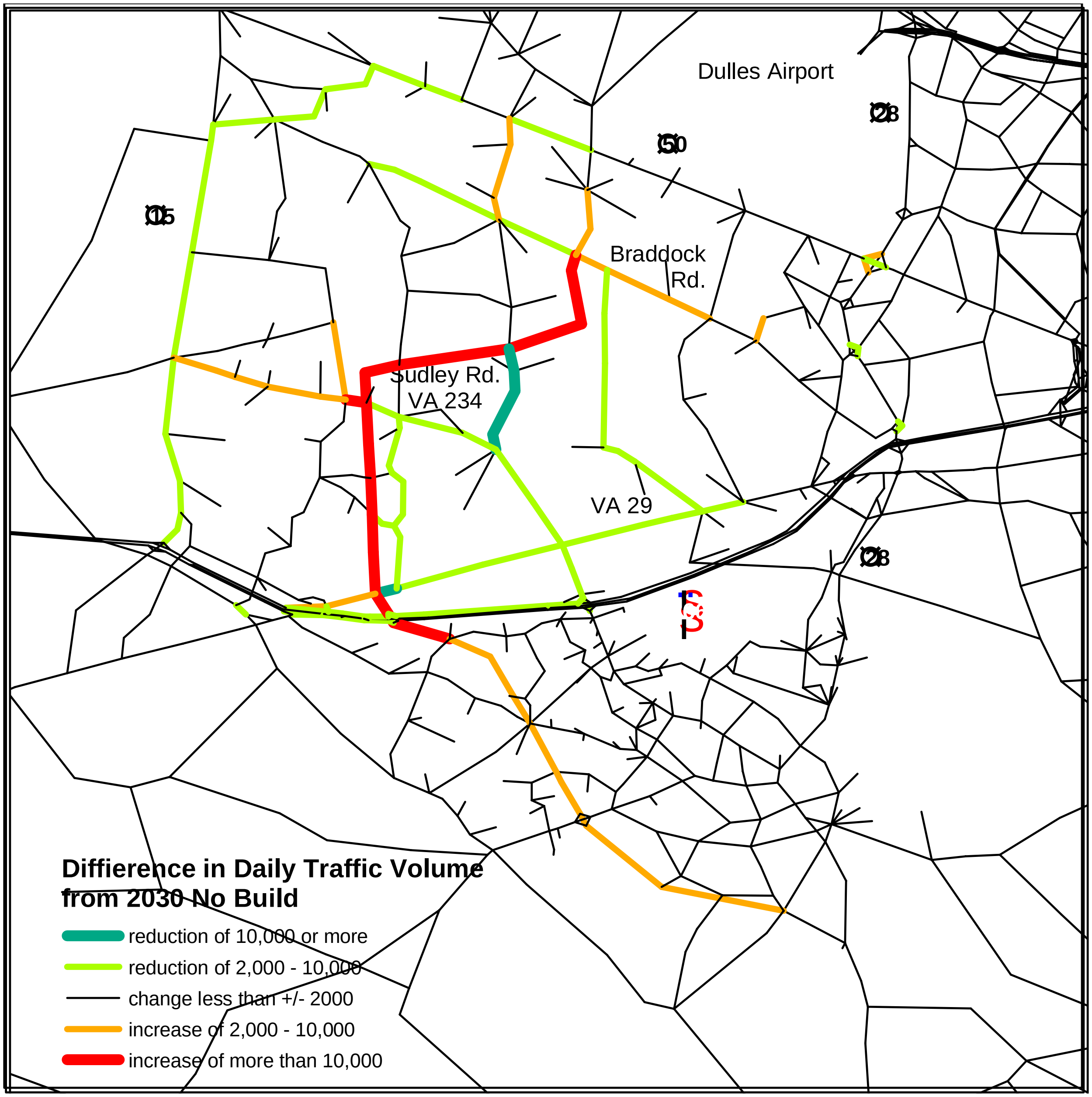
How can a project that costs hundreds of millions of dollars have such a minor effect on traffic congestion? The following graphics illustrate the changes in daily traffic volume modeled, as compared to the No Build scenario, for each of the proposed alternatives. These help explain why the proposed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

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



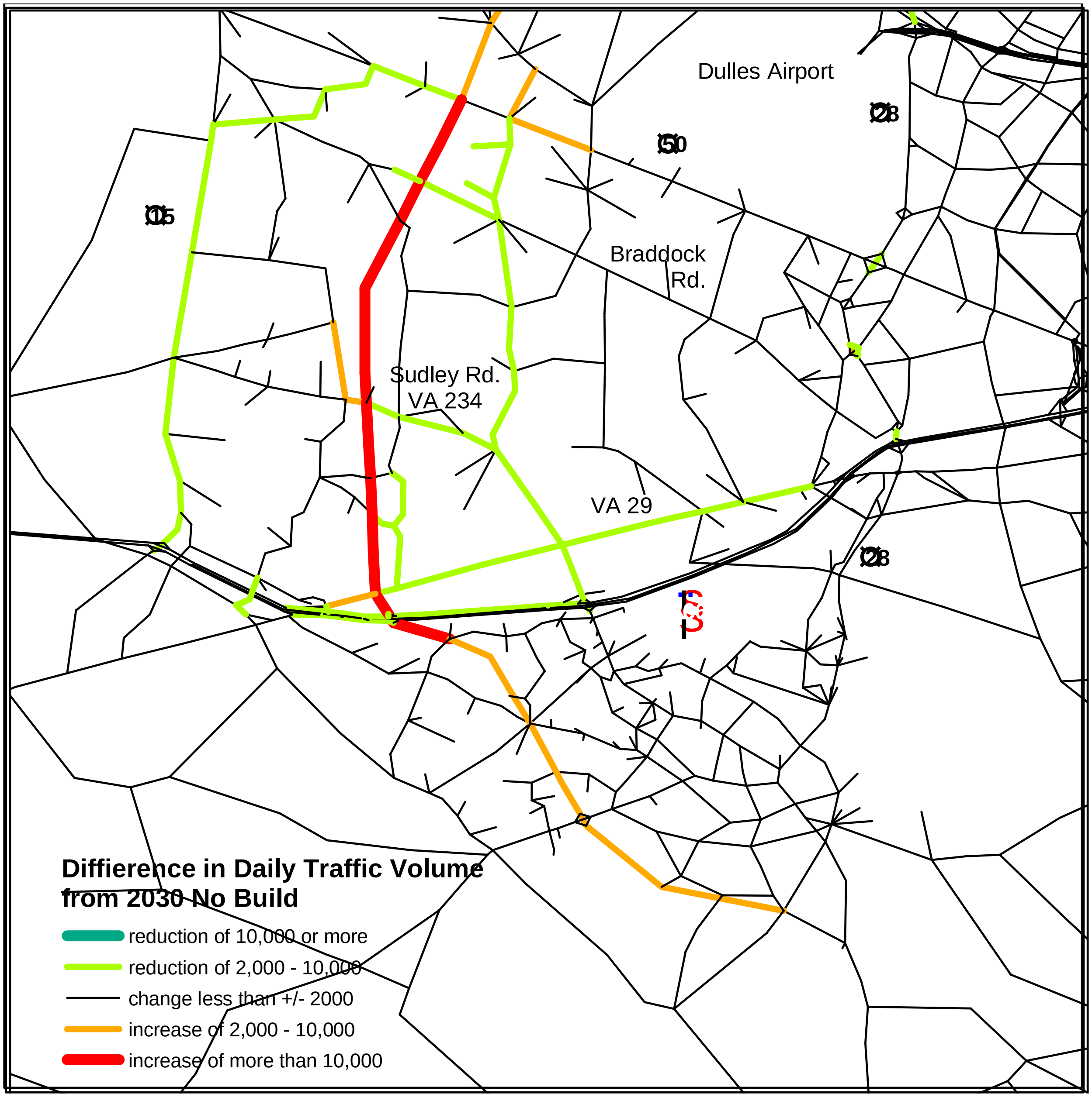
The Comprehensive Plan alternative has the greatest effect on traffic on existing roads. There is a significant traffic decrease modeled for VA 28, but only to the south of I-66. There are moderate decreases in traffic on north-south roads south of Braddock Rd., but these roadways are not expected to 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)

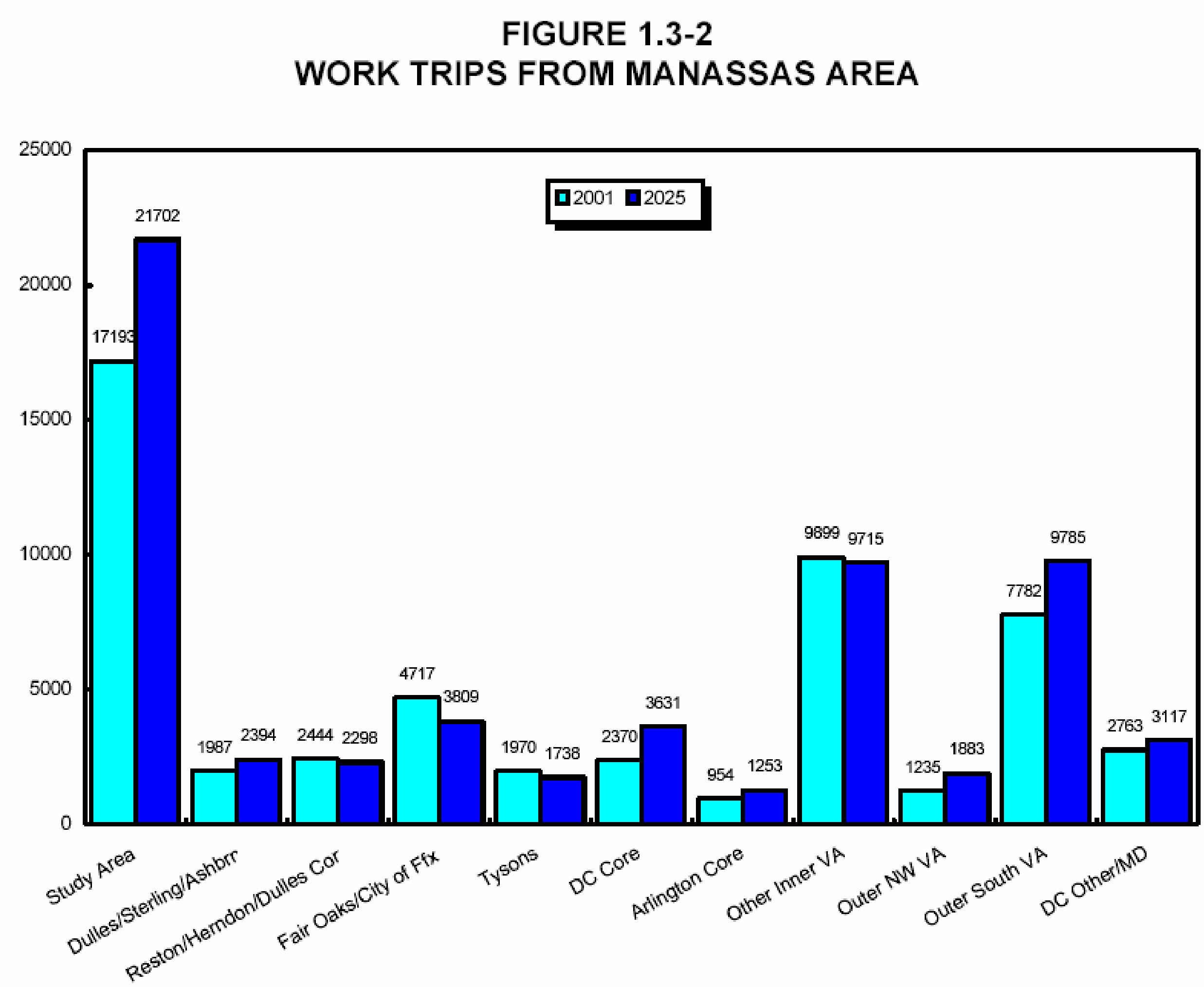


The traffic shifts for West 4 are similar to those for West 2. As West 4 is a somewhat more direct route to the north, it has somewhat greater effect on north-south travel. There is no significant impact on VA 28 traffic or congestion.

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.

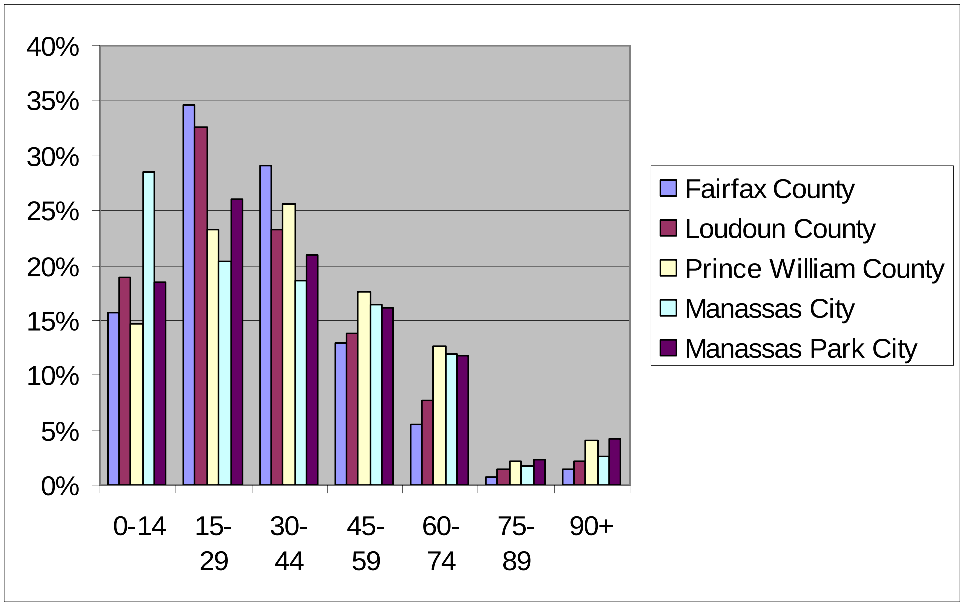


Source: DEIS *Purpose and Need Technical Report*, p. 1-8

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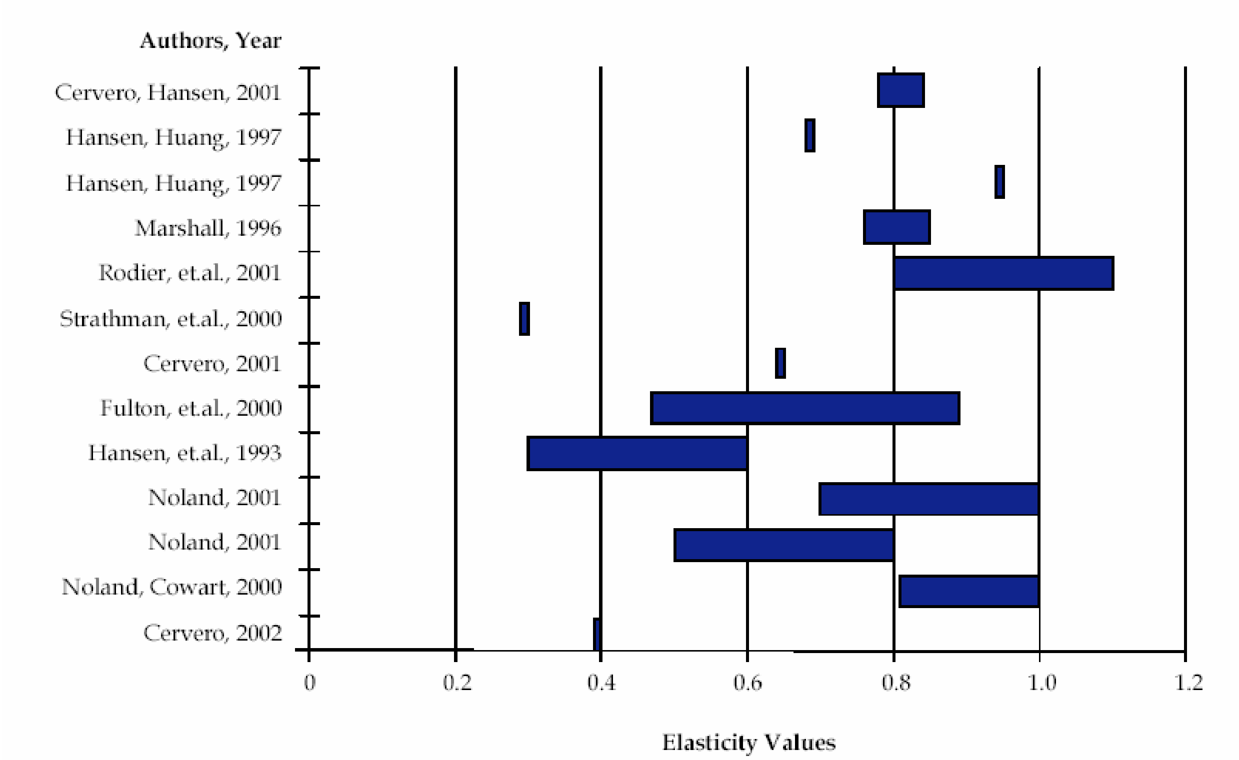
[5] Downs, Anthony. "Traffic: Why It's Getting Worse, What Government Can Do", Brookings Institution *Policy Brief* 128, January 2004.

[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.

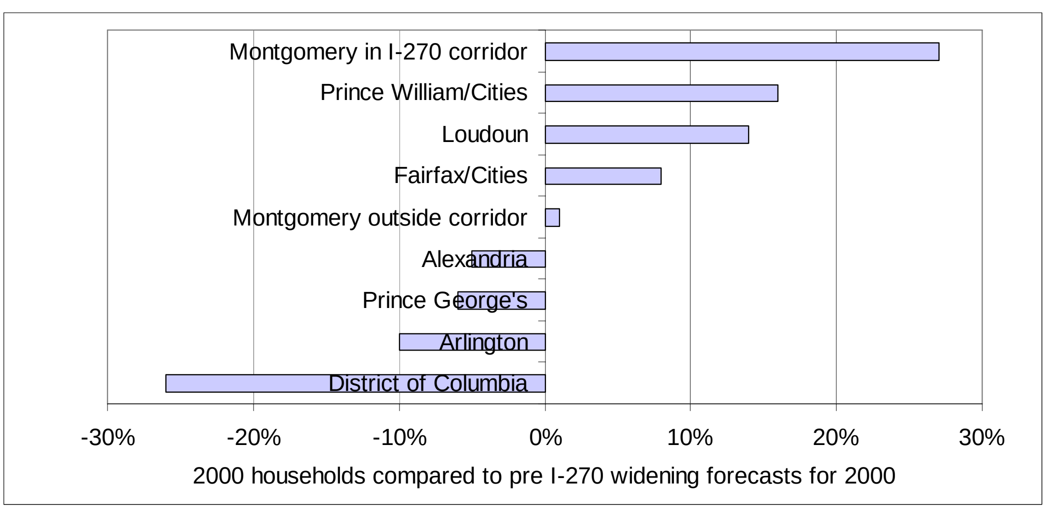
> *It is reasonable to assume that a certain degree of development will ultimately occur in the vicinity of those interchanges/intersections proposed within the study area. A zone of potential influence having a one-half-mile radius around each proposed interchange/intersection was used to estimate the 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 DEIS uses a single forecast of the locations of jobs and population. As is demonstrated below, this forecast includes an unrealistic excess in jobs in Loudoun County. This single forecast is not based on rigorous analysis. Rather, it is just a pooling of assumptions and wishes of local officials. The high suburban job growth numbers are now being challenged within the Metropolitan Policy Committee of the Metropolitan Washington Council of Governments (MWCOG).

The unrealistic job forecast is driving transportation planning as roads like the Tri-County Parkway are proposed to address an implausible future "need." If a more realistic land use forecast was used instead, there would be less north-south travel modeled in the study area and more east-west travel. Even with the land use forecast "stacked" to show a benefit for the project, as demonstrated above there is no transportation benefit.

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 are jobs. Other areas have more jobs than commuters. When there is a large surplus of jobs over a larger area, there will be heavy, directional commuter traffic into the area in the morning and out of it in the afternoon. As

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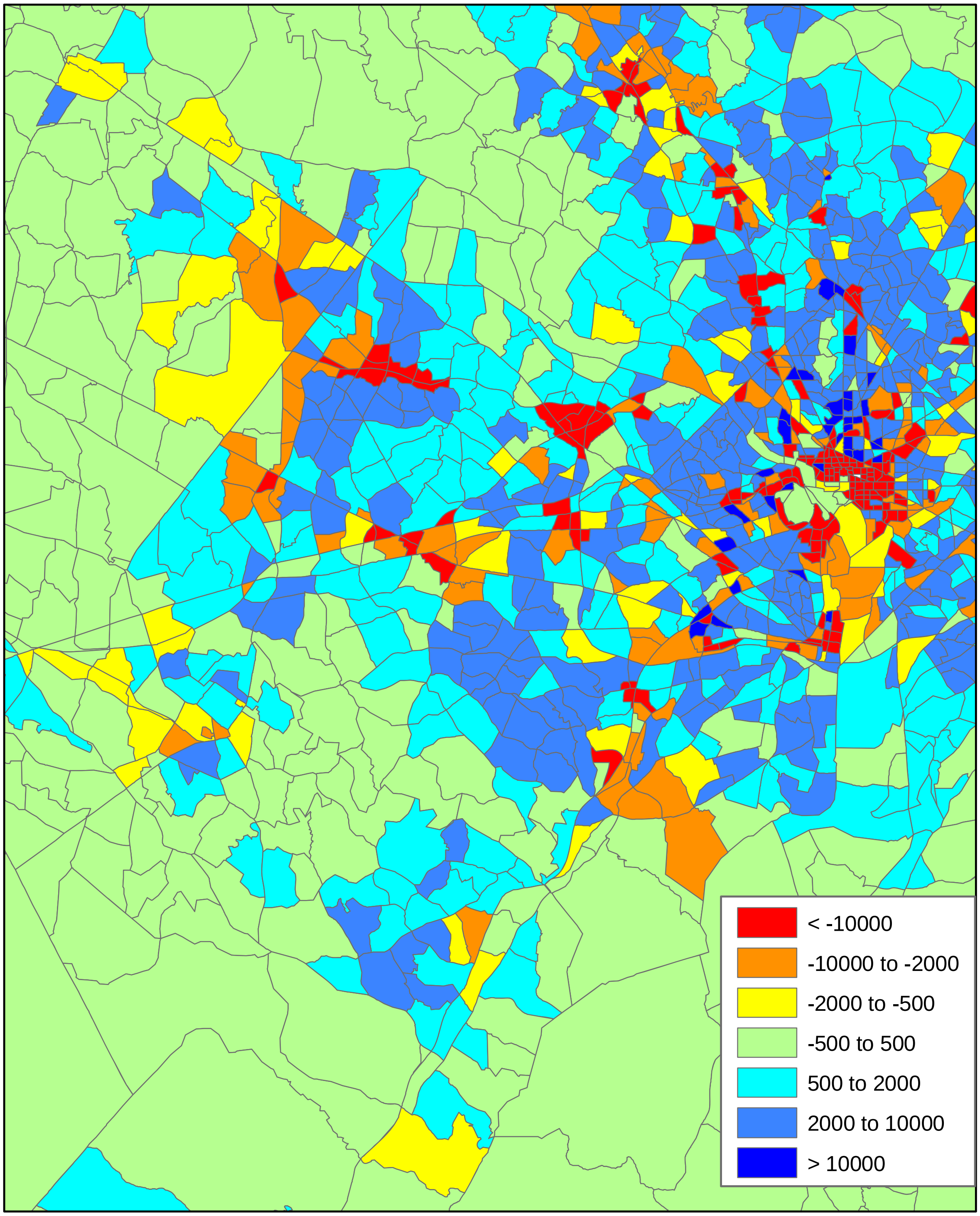
[7] The imbalances are calculated by subtracting home-based-work trip "attractions" from "productions" in the model files. Each production or attraction represents one end of a one way trip, so a single worker often represents two productions and two attractions. However, not every worker works every 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.

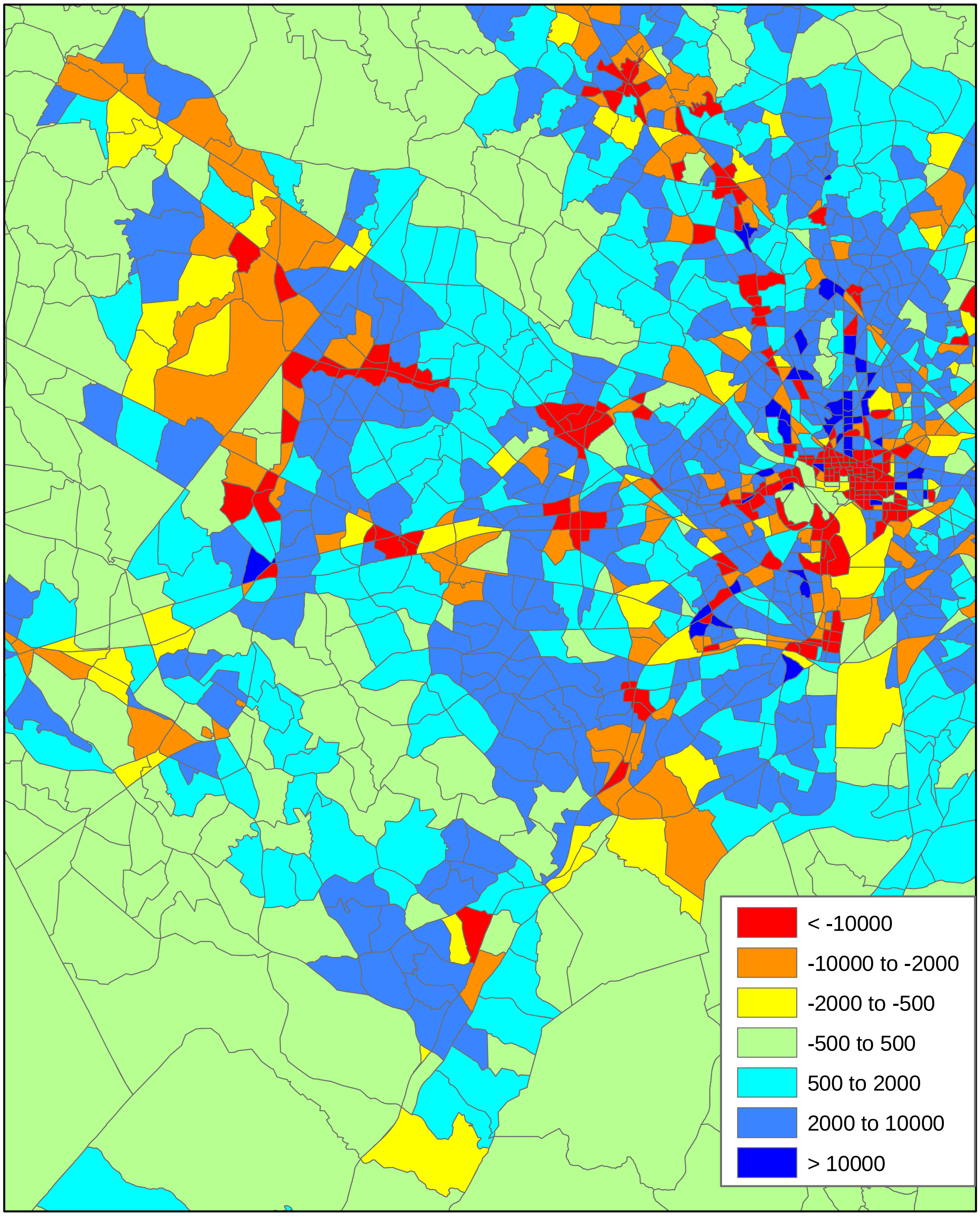
shown, the Dulles/Sterling/Ashburn area has a significant number of surplus jobs now but is modeled as becoming the largest geographic area of excess jobs in the region

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)

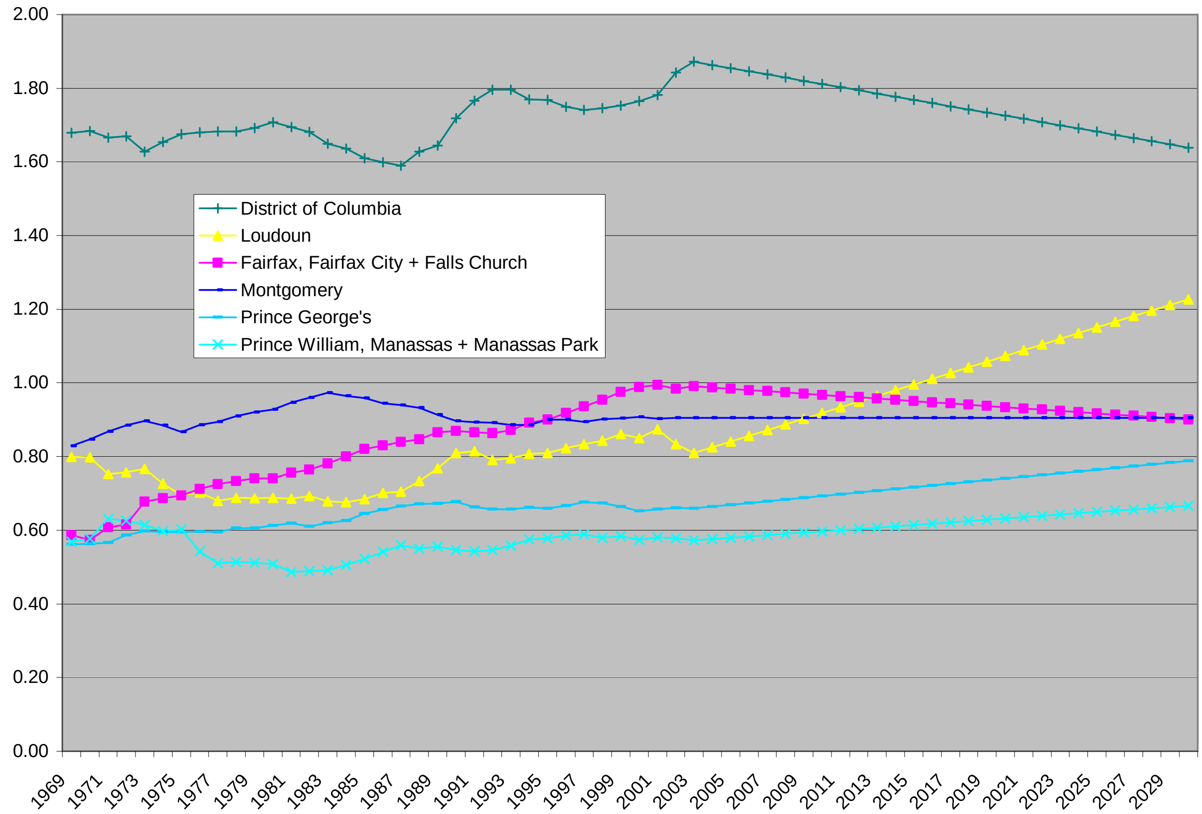


Note: Red = more jobs than workers; Blue = more workers than jobs

The 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.

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. The forecast shows Loudoun County, at the edge of the region, shooting past Loudoun County to become the major net commuting destination in the region. This makes no sense.

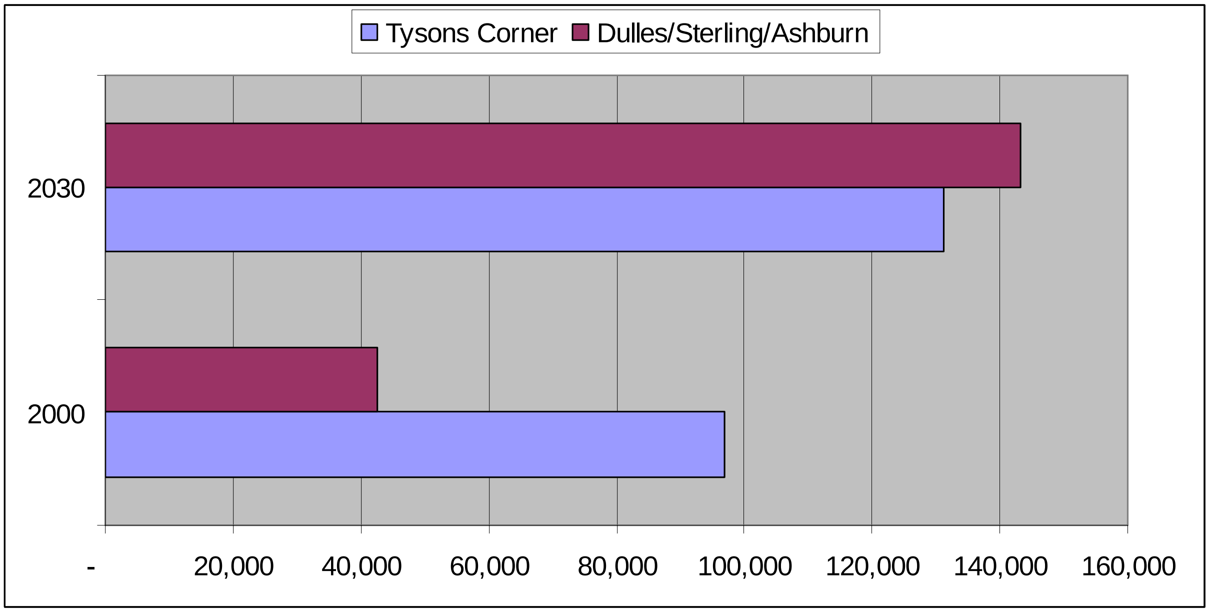
2000 Job-Population Ratio (Indexed 1.0 = Regional Average for Each Year)



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. Tysons Corner 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 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 is a set of safety and access management measures that would reduce accidents in the identified high accident roadway segments. Second, there 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.

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.