TRANSPORTATION SYSTEM

A significant portion of the TPR II planning effort was focused on evaluating transportation facilities. Much of the discussion on community building in this report highlighted the need for transit-oriented development. However, while many activity centers would be located at rail transit stations, **the future transportation system must include roadways, bus service and pedestrian facilities so that the entire population is effectively served.**

New and improved roads are needed to address current deficiencies, as well as keep up with the growth expected over the next 50 years. New and improved transit service, including rail lines and bus routes, will provide residents with alternative modes for traveling. In addition, supportive policies developed by the Task Force's TDM and bus work groups are a critical part of the package of improvements. It is recognized that these must work in coordination with each other, and all be integrated fully into the land use patterns. All of the recommendations would be supportive of county land use plans as they are articulated in this report and the Montgomery County General Plan.

This chapter of the report includes four sections: the visions and principles that guided transportation planning decisions, the recommended transportation network, supportive transportation policies, and an evaluation of the recommended network.

Vision

The Montgomery County General Plan provides the goal that is the overall framework for the transportation system within the county. This is: Enhance mobility by providing a safe and efficient transportation system offering a wide range of alternatives that serve the environmental, economic, social, and land use needs of the county and provide a framework for development. Within this "vision", five goals consistent with those in this Report are being used to make decisions within the many options available for the transportation network. These goals concern: transportation, growth, environment, cost effectiveness, and safety.

Principles

The following general transportation-related principles were fundamental to the selection of transportation recommendations:

- Supporting existing communities and those locations where development has already been approved.
- Remove major intersection delay points by building interchanges.
- Build a larger transitway network: light rail, busways or HOV lanes.
- Expand the east-west transportation network.
- Provide policies that encourage non-auto use for travel, to reduce the demands on the roadway network and so minimize the need for additional facilities.

Recommended Transportation Network

The recommended network is composed primarily of facilities that are in master plans. Travel forecasts have confirmed that virtually all of the master-planned facilities are needed. However, the analysis also shows that some additional improvements are needed, including major transitways and an expansion of the High Occupancy Vehicle (HOV) lane network. HOV lanes accommodate both carpools and buses and can form part of a network that provides high quality bus service between key activity centers, in locations where light rail or Metrorail is not available or time efficient for the user.

This section presents the transit facilities and highway facilities contained in the recommended network as shown in Figure 2. The options for improved east-west connections in the Intercounty Connector (ICC) corridor have received special attention. There is also a discussion of some of the major facilities not included in the recommended network.

The need for improvement for east-west travel is critical. This Report recommends proceeding with a new roadway between approximately Shady Grove Road and Norbeck Road (MD 28), east of Georgia Avenue (MD 97) in the near term regardless of what is eventually decided about the ICC.

Transit Facilities

Montgomery County is served by an extensive and diverse transit system. The system includes major facilities and services such as the two legs of the Metrorail Red Line on the WMATA Metrorail system, MARC commuter rail, WMATA Metrobus service, Ride-On bus service operated by DPWT, HOV lanes on I-270, local shuttle services, and transportation management associations (TMAs). The diversity of this system allows for the consideration of a wide variety of future transit improvements.

One of the Board's underlying principles in developing the future transit network was to build on the successful Metrorail network. Each of the major transit initiatives proposed for construction would tie well to the Metrorail system, in effect increasing the reach of Metrorail service.

Under the adopted CLRP, transit ridership is anticipated to increase 50 percent between 1998 and 2025, by which time only the Georgetown Branch light rail transit (LRT) between Bethesda and Silver Spring would be added as a new facility. Even with this increase, the transit mode share would remain relatively constant, at around 17 percent of work trips. Today about one-half of Montgomery County Metrorail riders access the system by automobile. Future improvements are focused in areas where pedestrian access to transit can play a much larger role. An expanded transitway system can provide locations for denser, mixed-use development, expanding the capacity for residents to walk to transit and increasing jobs and household accessibility by transit.

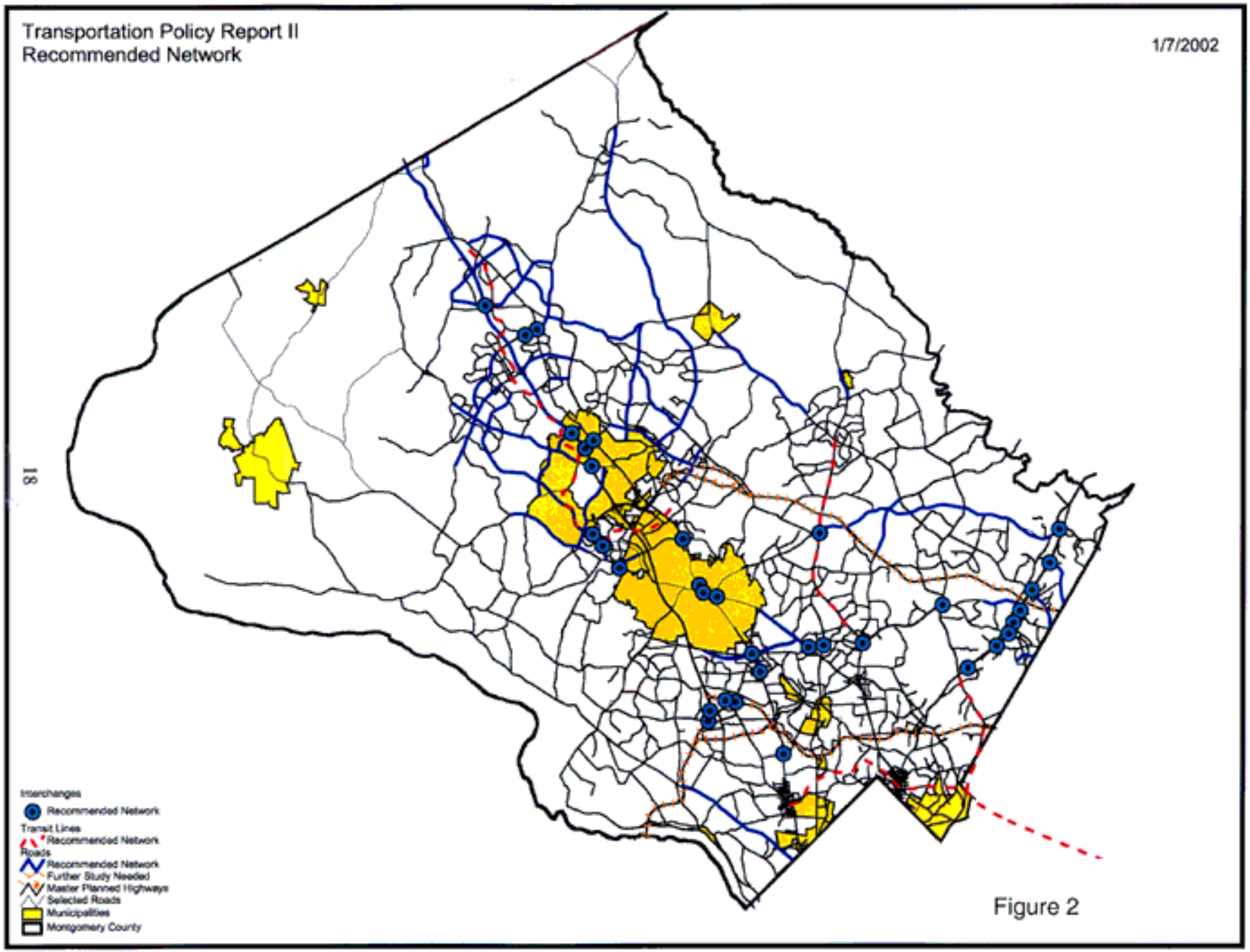
Transportation Policy Report II
Recommended Network
1/7/2002
Interchanges
Recommended Network
Transit Lines
Recommended Network
Roads
Recommended Network
Further Study Needed
Master Planned Highways
Selected Roads
Municipalities
Montgomery County

Figure 2

The Board recommends the following major transit improvements: the Inner Purple Line, including the Georgetown Branch, as light rail from Bethesda to New Carrollton, with an extension from the Inner Purple Line to the FDA site and White Oak; the Corridor Cities Transitway (CCT) as either a light rail or busway from the Shady Grove Metrorail Station to Clarksburg; additional rail cars to allow all trains to travel to the end-of-the-line Metrorail Stations in Montgomery County; the Georgia Avenue Busway; expansion of and enhancements to the county's bus system; and an expanded HOV lane network on I-270. Further study is needed for additional projects including the Capital Beltway (I-495) HOV lanes and widening the I-270 spurs to increase capacity and improve accessibility to the HOV lanes.[1] Details of the rationale for these projects follow.

- The **Inner Purple Line** from Bethesda to New Carrollton would expand upon the Georgetown Branch, extending it east from Silver Spring through Langley Park and College Park and terminating at New Carrollton. The TPR II analysis has found that the Georgetown Branch removes the need for circuitous trips on the Metrorail Red Line. A trip from Bethesda to Silver Spring that takes 35 minutes through downtown Washington today would take nine minutes on the Georgetown Branch.

  Projected ridership for the Georgetown Branch is about 7,000 to 10,000 peak period passengers (and approximately 25,000 daily riders) by 2025. The demand in the peak direction, if not accommodated by light rail transit, would require buses running on East-West Highway (MD 410) at less than two-minute headways to meet demand levels.

  For the entire Inner Purple Line, the segment between Bethesda and Silver Spring would have the highest passenger demand. However, the segment from Silver Spring to Langley Park also had strong demand, with volumes decreasing along the line east of College Park.

  This Report recommends accelerating transitways by extending the Georgetown Branch light rail to at least College Park, with the FDA/White Oak extension, by 2012. This would take advantage of the upcoming federal transportation legislation cycle.

  An extension of the Purple Line to Virginia, likely Tysons' Corner, has long-term merit from a transit network perspective. The most appropriate alignment has not been set, but this should be studied further for implementation after more pressing county needs have been met.

- The **FDA Light Rail Line** would serve as a spur connection to the Inner Purple Line. It would connect with the Inner Purple Line at Langley Park and travel north along New Hampshire Avenue (MD 650) to the FDA site and White Oak. The FDA LRT would significantly boost ridership on the Inner Purple Line and provide an option for travelers around the congested Colesville Road/Columbia Pike (US 29) corridor through Four Corners. New Hampshire Avenue (MD 650) has less severe right-of-

[1] Because HOV lanes constitute both a highway improvement and a transit improvement when used by buses, the HOV recommendations are discussed in both the transit and highway sections.

way limitations in this area than does US 29. It is recommended that this be included as an extension of the Inner Purple Line, in the Project Planning Study soon to be underway by MDOT.

- The **Corridor Cities Transitway** (CCT) is planned to serve the communities of Rockville (King Farm), Gaithersburg, the Life Sciences Center, Germantown and Clarksburg. A dedicated alignment, primarily at-grade, would begin at the Shady Grove Metrorail station and terminate at the Clarksburg Town Center. Various alternatives to extend the transitway to Frederick have been proposed, but Frederick County has not identified an alignment.

  Determining whether bus rapid transit (BRT) or light rail transit (LRT) is most appropriate for the CCT is beyond the scope of the TPR II. However, the adopted alignment can accommodate either mode. Roughly 80 percent of the alignment is secured in dedication or reservation. Modeling results assumed that the operating characteristics for either mode were roughly the same, resulting in similar ridership forecasts that show little difference between BRT and LRT.

  The CCT would help address the future heavy travel demand in the rapidly growing I-270 corridor and provide additional capacity through one the county's major traffic bottlenecks (the convergence of I-270, MD 355 and Clopper Road (MD 117) at Great Seneca Creek just north of Gaithersburg). In the TPR II analysis, about one-third of the CCT's ridership would occur between Shady Grove and the Life Sciences Center and about one-half would occur south of Metropolitan Grove.

  Extending the Red Line from Shady Grove to Metropolitan Grove was examined in comparison, but the CCT was found to provide the more cost-effective solution. The CCT alignment better serves the already approved as well as planned development in the area. The Metrorail extension would have high costs because it would be primarily underground, and have to go under the CSX railroad tracks. The extension also is not supported by the land use plans of the City of Gaithersburg, which has jurisdiction over the land that would be the primary station locations.

- The **Georgia Avenue Busway** would operate as a two-way, two lane facility in the median of Georgia Avenue (MD 97) from the Glenmont Metrorail station north to Olney. The analyses conducted during the previous feasibility study and TPR II show ridership estimates justifying the need for the facility. The facility would carry the equivalent of a travel lane of person movement during peak periods, and would capitalize on the investment in the Glenmont Metrorail station. Right-of-way impacts on the adjacent communities would be minimal.

- A **comprehensive HOV system with express bus operations** is recommended, including an extension of the existing lanes on I-270 to I-70 in Frederick County. Implementation of HOV lanes on the Capital Beltway warrants additional study but is not part of the Planning Board recommended network. Effective system connectivity between these major facilities would be essential to their successful operation. Developing efficient connections to Metrorail stations and high-density employment centers should be high priorities.

- The **expansion and enhancement of the county's bus system** should be pursued to improve service and increase ridership using cost-effective approaches. Roadway capacity enhancements (particularly at intersections), intelligent transportation systems (ITS) technologies, and rigorous route planning should be undertaken expeditiously to increase service and make the best use of transit resources.[2] More details on this recommendation are in a subsequent section of this report.

Highway Facilities

The recommended highway network addresses the county's most heavily traveled corridors, including I-270, I-495, and US 29. It also includes significant improvements to east-west travel and mobility throughout the county.

Although not detailed below, the recommended network includes roadways contained in the current Constrained Long Range Plan (CLRP). The CLRP is the 25-year, fiscally constrained long-range transportation plan for the region prepared by the Metropolitan Washington Council of Governments (MWCOG). The Montgomery County roads included in the CLRP are all in county Master Plans, and primarily include arterial extensions and widenings, and grade-separated interchanges. The CLRP also includes the Georgetown Branch Light Rail from Bethesda to Silver Spring, and the Montrose Parkway from I-270 to Veirs Mill Road (MD 586). The full list of projects is included in the attachment to this report.

These recommended improvements are necessary given the rapid growth of Gaithersburg, Germantown and Clarksburg; increasing regional travel generated outside the county; and the need to strengthen major activity centers at Metrorail stations and inside the Beltway. Some of the larger projects are described below.

- The recommended network contains **the extension of HOV lanes along I-270.** North of Montgomery Village Avenue (MD 124)/Quince Orchard Road (MD 124), I-270 would have three general-purpose lanes and one HOV lane in each direction (an alternative labeled in many reports as "6+2 HOV total") until Clarksburg Road (MD 121). North of MD 121, I-270 would have two general-purpose lanes and one HOV lane in each direction ("4+2 HOV total") until reaching I-70 in the City of Frederick. These lanes would expand the reach of the existing HOV network.

- **Two new interchanges along I-270** are added in the recommended network: one at Newcut Road Extended in Clarksburg and another at Watkins Mill Road Extended north of Gaithersburg. The Newcut Road interchange is identified as needed in the Clarksburg Vicinity Master Plan to serve the travel needs of this growing area, and the Watkins Mill Road Extended interchange has undergone a full Project Planning Study by SHA and been found to increase the accessibility to jobs and households in the important I-270 corridor.

[2] Roadway capacity enhancements and ITS technologies are considered transit improvements inasmuch as they improve bus operations.

- **The master-planned major highway and arterial network within the I-270** corridor would receive significant improvements in the recommended network. All of the changes are detailed in current master plans. These improved roads include Ridge Road (MD 27), Woodfield Road (MD 124), Brink Road, Wightman Road, Clopper Road (MD 117), Great Seneca Highway (MD 119), and Muddy Branch Road. These are needed to support planned jobs and household growth in this important corridor.

- **All eight master-planned interchanges on Columbia Pike** (**US 29)** are included in the long-term plans**, as is an interchange at US 29 and the Eastern Connector**. The initial five below are the first priority, and the remainder should be delayed in implementation to allow more high priority projects to proceed, and monitoring of the effects of the initial four interchanges as provided for in the Master Plans.

  Initial implementation:
  - Spencerville Road/Sandy Spring Road (MD 198) and Blackburn Road, including the realignment of US 29 between MD 198 and Dustin Road
  - Randolph Road
  - Briggs Chaney Road
  - Fairland Road
  - Eastern Connector

  Lower priority:
  - Greencastle Road
  - Musgrove Road
  - Tech Road and Industrial Parkway
  - Stewart Lane

These projects are included because US 29 is the major north-south facility in the eastern part of the county and carries substantial local and regional traffic. Both the congestion and speed of traffic on US 29 conspired to make it a barrier to the communities on both sides of the roadway. The master plans call for the construction of these interchanges to relieve congestion and provide for local east-west movement. Like all interchanges, appropriate integration with the surrounding community, and provision for cyclists and pedestrians are essential design criteria.

- The Eastern Connector between Columbia Pike (US 29) and US 1 in Prince George's County would be constructed along the ICC Master Plan Alignment (MPA) right-of-way near Briggs Chaney Road. The Eastern Connector would have two general-purpose lanes and one HOV lane in each direction ("4+2 HOV total"). The Eastern Connector provides a much-needed connection between the eastern part of the county and I-95.

- The recommended network includes the master-planned **Montrose Parkway** as a four-lane facility from Montrose Road to Veirs Mill Road (MD 586), with a grade-separated interchange at Rockville Pike (MD 355) and Montrose Road/Randolph Road. It is emphasized this should be a full-length facility, not ending at Parklawn Drive. In addition, **Veirs Mill Road (MD 586) would be widened** to six lanes between Twinbrook Parkway and Randolph Road to add capacity for traffic leaving the

Montrose Parkway at its eastern terminus. These projects provide congestion relief in North Bethesda, Twinbrook, and Aspen Hill and are required whether or not the master-planned ICC is eventually built.

- Concerning east-west travel, the recommended network would **widen Norbeck Road (MD 28)/Spencerville Road (MD 198) to four lanes between Georgia Avenue (MD 97) and US 29**. A discussion of higher capacity east-west connections, such as the ICC, follows in a separate section.

- Finally, the recommended network relieves many of the congestion "hot spots" throughout the county by **upgrading these intersections to grade-separated interchanges.** These interchanges within the non-freeway network are shown on page 18 and in the attachment to this Report.

It is recommended that studies be completed to determine the feasibility and desirability of several major potential projects. These include the HOV lanes on the Capital Beltway (I-495), with emphasis on the section from the Legion Bridge (with an appropriate terminus in Virginia) to I-95, and widening the I-270 spurs by one general purpose lane in each direction to provide better access and connection to and from the HOV lanes on the Beltway and I-270. These projects would support a potential future express bus network as well as encouraging carpool formation and use. However, the community effects of providing new HOV lanes by widening the Beltway are a major concern that would have to be balanced against the positive transportation benefits.

East-West Roadway Connections

The provision of east-west movement between I-95 and I-270 above the Capital Beltway is a trade-off between the auto mobility provided by new or widened roads, and the accompanying impacts on natural resources and existing communities that would fall in the path of roadway changes. How to provide for east-west highway movement has been the single most complex and controversial transportation issue of the past decade in Montgomery County.

The TPR II analysis highlighted the need for improvements to east-west travel within the county. Two of the most important findings were:

- The corridor between I-270 and Georgia Avenue (MD 97) crossing Rock Creek will have the greatest corridor capacity deficiency in the county. While the total volume of travel is greater in the I-270 corridor, the gap between the amount of roadway capacity provided and the traffic demand is greatest for east-west trips outside of the Beltway.

- The imbalance between jobs and households is most severe in this same corridor. The I-270 corridor has many more jobs than households. Georgia Avenue and eastern sections of the county have more households than jobs and are a significant source of affordable housing. This creates a situation in which workers living east of Rock Creek must travel to other parts of the county or region for work, or else they will be isolated from job opportunities. Even if proposed changes in land use are

made to improve the balance, the Georgia Avenue corridor will still have many more workers than jobs.

Several other studies have verified that the travel demands for east-west movement require significant improvements. An Intercounty Connector (Figure 3) was included as a freeway in each of the master plans in which it is located. The Intercounty Connector (ICC) Draft Environmental Impact statement (DEIS) showed significant travel demands in the corridor. The state of Maryland Transportation Solutions Group (TSG) concluded that a new roadway connection was needed, without recommending how it should be accomplished.

For these reasons, regardless of the ultimate decision on the full ICC, it is advisable in the short term to move ahead with completion of highway facilities that address some of the travel needs in this corridor.

While the ICC is clearly the biggest east-west highway improvement under consideration in TPR II, it faces significant environmental hurdles, including federal environmental regulations that may prevent or, at the very least, significantly delay construction of the project. Because of the uncertainties about whether these obstacles can be overcome, the ICC is not included in the recommended network. Instead, the network includes a set of projects, including some discussed above, that address travel needs in the corridor and can move forward in the relative short term. None of these projects would preclude the future construction of the full ICC on the master-planned alignment.

The ICC draft EIS found that the section between Georgia Avenue (MD 97) and US 29 had the most significant environmental impacts that could prohibit construction of the ICC. Two other sections have fewer obstacles: a western section from I-370 or Midcounty Highway Extended to Georgia Avenue (MD 97), and an eastern section from US 29 to US 1.

As noted in the previous section, irrespective of any ICC decisions, the **Eastern Connector** should be constructed in the ICC right-of-way from the master plan ICC interchange with US 29 to US 1. The SHA soon will begin detailed planning for the Eastern Connector to determine how intersections are to be handled and what the cross section should be.

The recommended network does include the widening of MD 28/MD 198 to 4 lanes and the completion of grade separated interchanges along Randolph Road. However, these improvements will not add capacity to the most significant bottleneck – the section of the corridor between I-270 and Georgia Avenue (MD 97).

Transportation Policy Report II
Intercounty Connector Along the Master Plan Alignment

1/7/2002

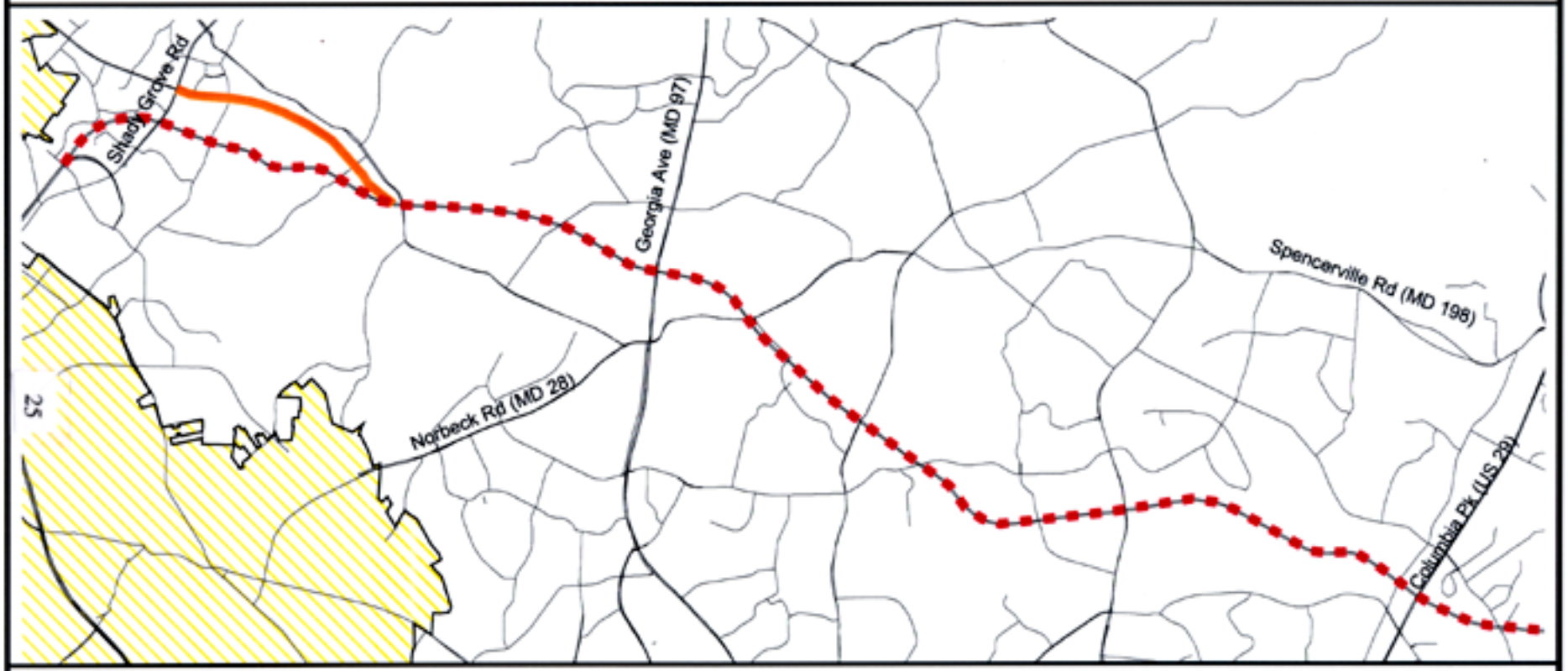

Figure 3

In this western section of the corridor, there are four options for new connections:

Option 1: (Figure 4) construct the Western Connector, a four-lane arterial between the I-370 and MD 28, along the ICC alignment, with at-grade intersections. This would provide the critical link between housing in the Georgia Avenue corridor and the jobs and other activities in the I-270 corridor. Four lanes are consistent with the number of lanes that will be on MD 28/MD-198 from MD 97 to US 29 and the at-grade intersections will create a link compatible with the character of MD 28/198 to the east.

Option 2: (Figure 5) extend Midcounty Highway from Shady Grove Road to the point where the Master Plan alignment for Midcounty Highway intersects the ICC MPA right-of-way, then continue along the ICC MPA to reach MD 28.

Option 3: (Figure 6) widen Muncaster Mill Road (MD 115) to 4 lanes along the full length from Shady Grove Road to Norbeck Road. This would add two lanes to the existing Muncaster Mill Road, with provision for auxiliary lanes (acceleration/ deceleration areas) and left-hand turn bays.

Option 4 (Figure 7): extend Midcounty Highway from Shady Grove Road to the point where the Master Plan alignment for Midcounty Highway intersects Muncaster Mill Road, then widen Muncaster Mill Road (MD 115) to 4 lanes along the southern section to Norbeck Road.

The Board recommends that either Option 1 or Option 2 be implemented to address the current and near-term capacity constraints for east-west travel. The Maryland Department of Transportation should be requested to begin their proposed project planning analysis to determine the costs and benefits of these options to lead toward a decision and implementation.

Option 1 has a transportation advantage over Option 2 because it provides a better connection to the I-270 corridor, especially to jobs located west of I-270 in the Life Sciences Center. Analysis of the extension of Midcounty Highway (Option 2) showed that the volumes at the intersection of Midcounty Highway and Shady Grove Road and the section of Shady Grove Road between this intersection and I-370, would be well over capacity. Option 2 has an environmental advantage over Option 1, as it would avoid natural resources and park land.

Transportation Policy Report II
East-West Connections Options 1 and 2

Option 1 -- Western Connector (I-370 to MD 28): 4 lane arterial with at-grade intersections

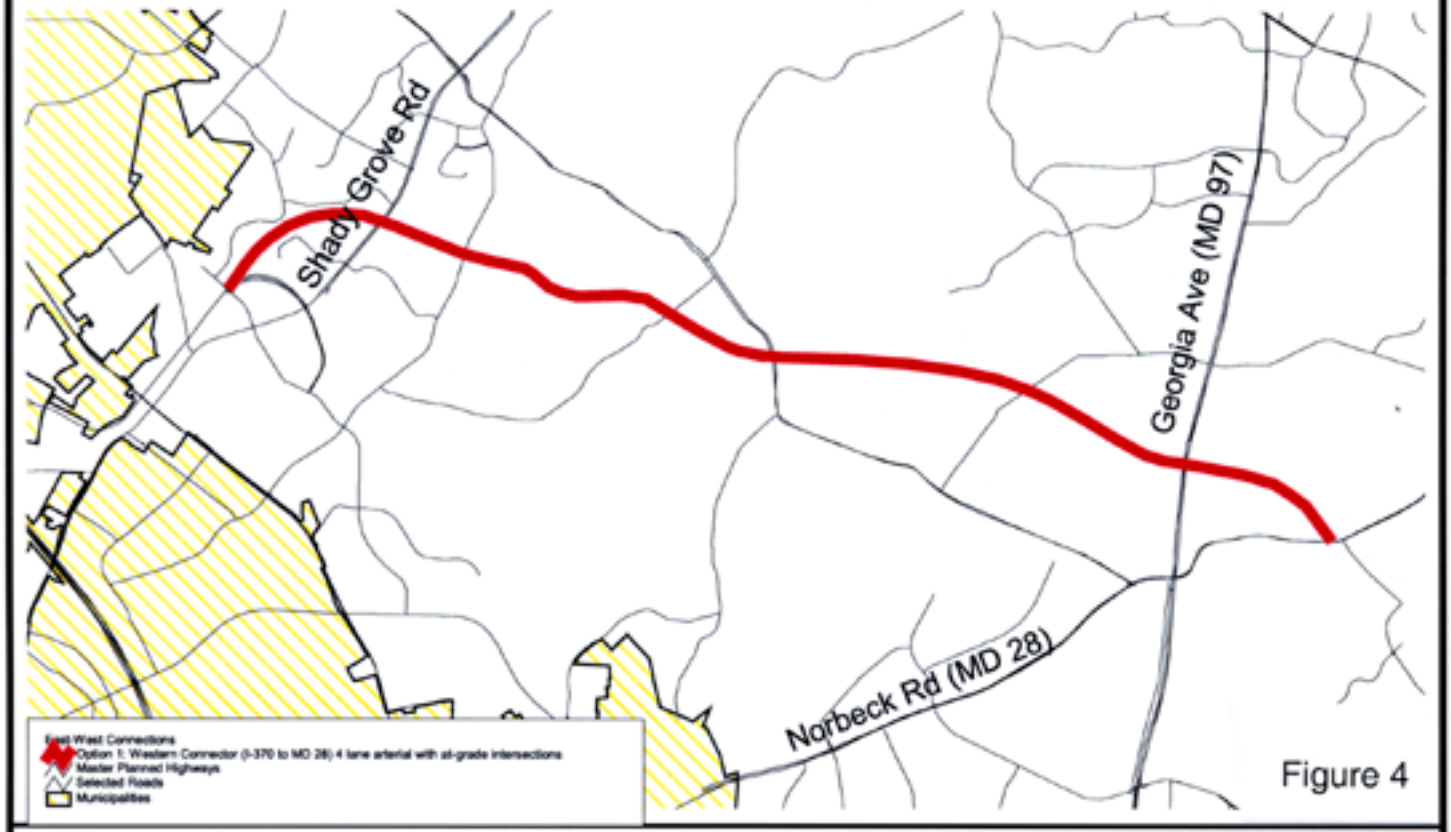

Figure 4

Option 2 -- Midcounty Highway (Shady Grove to ICC ROW) then ICC ROW to MD 28

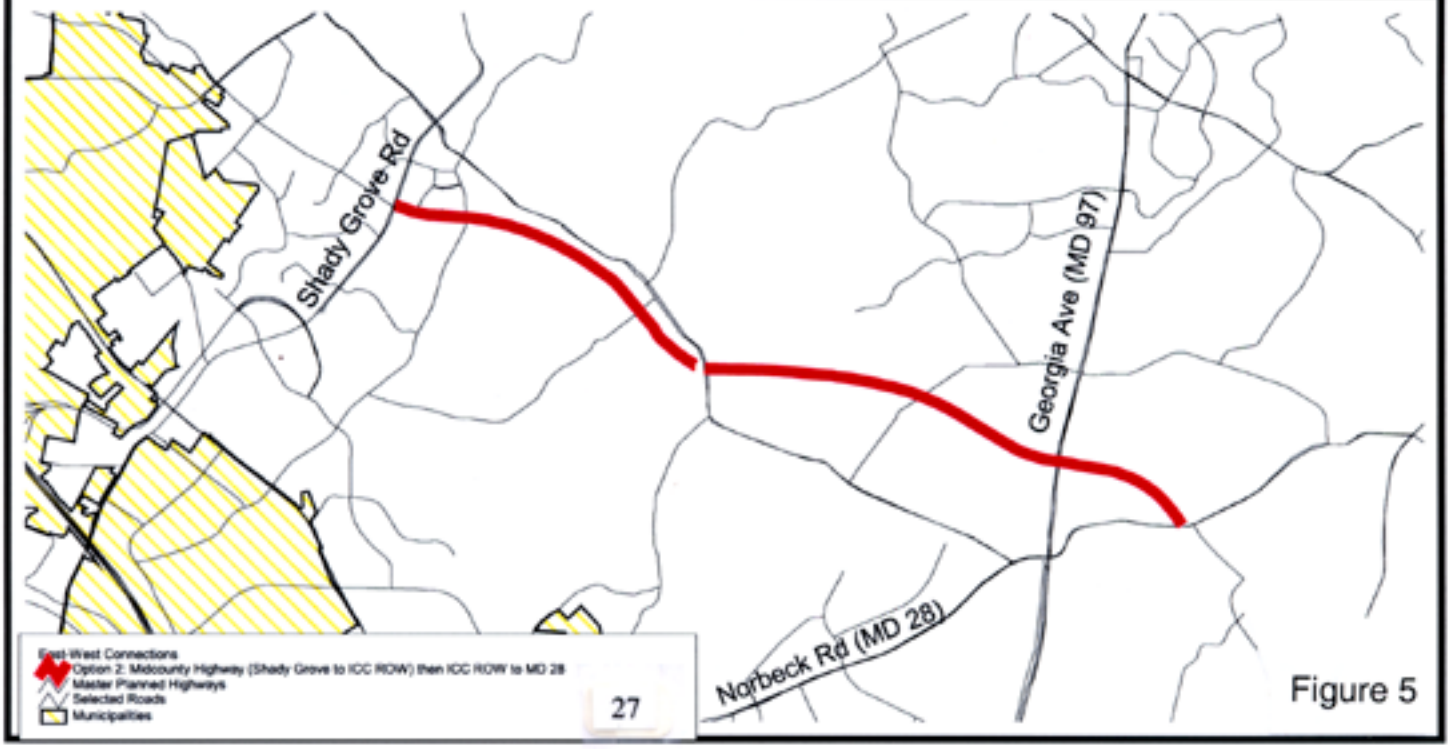

Figure 5

Transportation Policy Report II
East-West Connections Options 3 and 4

Option 3 - Widen Muncaster Mill Rd (MD 115) from Shady Grove Rd to MD 28 to 4 lanes

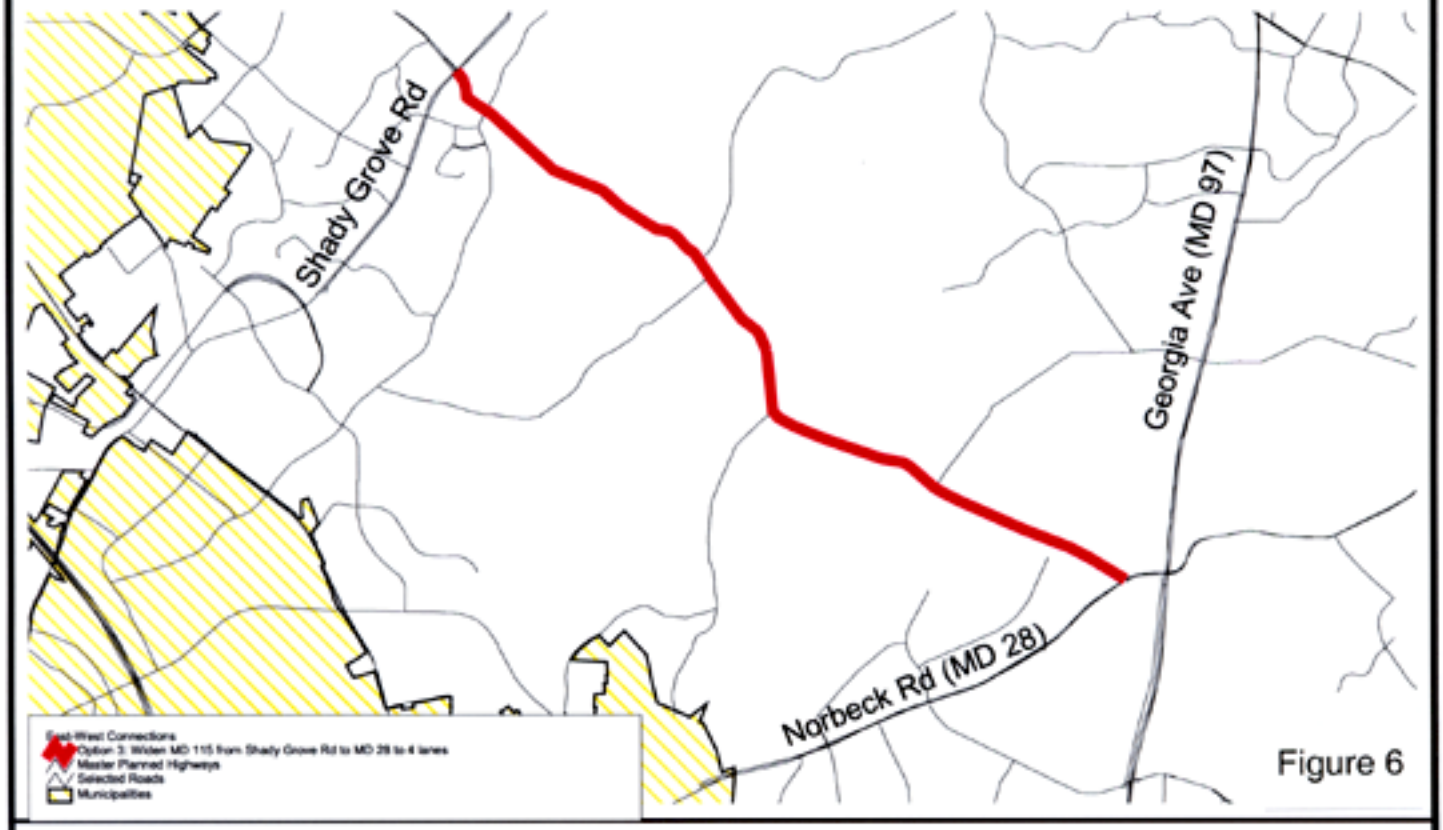

Figure 6

Option 4 - Midcounty Highway from Shady Grove Rd to MD 115
plus widening MD 115 from Midcounty Highway to MD 28

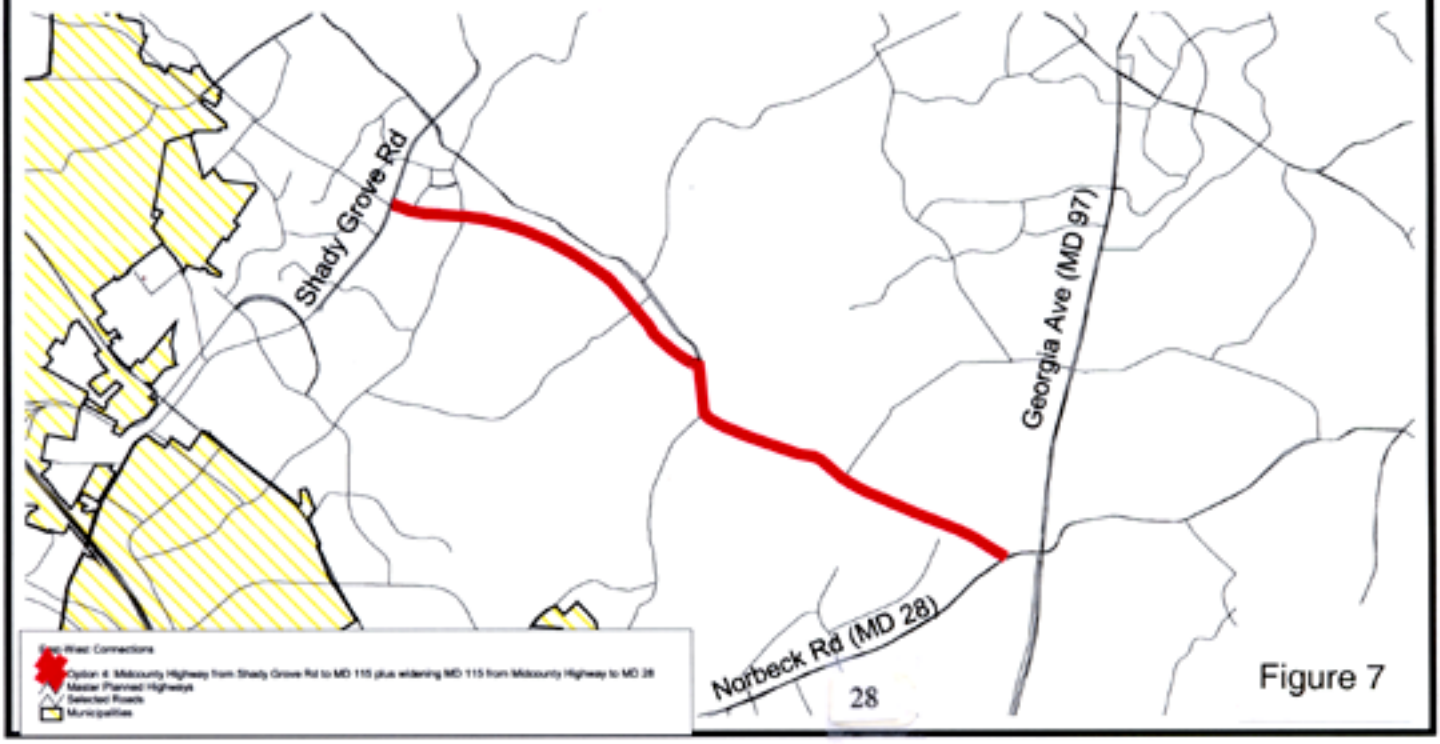

Figure 7

Analysis has shown that widening MD 115 (Option 3) did little to increase capacity between Shady Grove Road and MD 28. It would result in severe backups at intersections of Muncaster Mill Road with Shady Grove Road and with Norbeck Road. In tests conducted for the Upper Rock Creek Master Plan, it was found that, even if Muncaster Mill Road were widened to four lanes, traffic would seek other routes because of the circuitous nature of this road in relation to the jobs and housing that it connects to in the Georgia Avenue (MD 97) and I-270 area. This widening also would be very disruptive in terms of impacts on communities along this road, particularly at the end points of Shady Grove Road and Norbeck Road. The additional traffic west of Georgia Avenue (MD 97) will be a choke point, as southbound MD 115 traffic must turn left to reach Georgia Avenue (MD 97). Option 3 would, however, disturb natural resources the least and would avoid the most park land of any options considered.

However, to have the same capacity as options 1 and 2, Option 3 would require widening Muncaster Mill Road to six lanes along its length This would further congest the intersections at either end and increase the impacts to the adjacent communities. Even then, the high “friction” from driveways and adjacent uses would restrict the per-lane capacity.

Option 4 would provide a direct connection to Midcounty Highway to the north, but with the same intersection problems as Option 2 at Shady Grove Road. The alternative tested for TPR II assumed that the lower section of Muncaster Mill would be widened to four lanes. As a result, six lanes of traffic from Midcounty Highway (four lanes) and Muncaster Mill Road (two lanes) would merge into four lanes along the widened section of Muncaster Mill Road, effectively restricting movement to four lanes total. These vehicles would also have to travel through the capacity bottleneck at the intersection with Norbeck Road. This intersection has adjacent development, is nearby to the planned interchange at Norbeck Road and Georgia Avenue (MD 97), and would be very difficult to improve so that it would accommodate the future volumes without severe congestion and significant impacts on the adjacent community. Option 4 would have more environmental impacts than Option 3 but significantly fewer impacts than Options 1 and 2.

Using GIS technology sketch-level analysis of environmental impacts of the options has been made. These are shown on Table 1.

Table 2 presents travel forecast data for the western section of the ICC corridor, specifically those roadways crossing Rock Creek, including Norbeck Road (MD 28), Muncaster Mill Road (MD 115), and the ICC alternatives. The first three scenarios all have the existing number of lanes on Muncaster Mill Road crossing the screenline: 1998, 2025 with CLRP and 2050 No build (Master Plan with no projects in this corridor). These scenarios show what would happen if no improvements are made in the corridor. Next, the four options for improving the network between Shady Grove Road and Georgia Avenue (MD 97) are listed for the year 2050. Finally, data is presented for the recommended network if the full six-lane ICC (with HOV lanes) were constructed.

The capacities of the roadways crossing the screenline are presented along with the forecasted peak-hour traffic volumes in both directions. The average volume-to-capacity (V/C) ratio gives an indication of the amount of capacity that would be used and the

congestion levels that would result. Anything above 0.8 V/C ratio can be considered congested. Average speed is a clear indicator of the performance of the roadways crossing the screenline.

Table 1. Environmental Impacts of East-West Options

Environmental Feature (acres rounded to nearest whole number)	Option 1 ICC ROW I-370 to MD 28	Option 2 M-83/ICC	Option 3 M-83/ Muncaster Mill Road Widening	Option 4 M-83 to MD 115
Wetlands	8	1	0	0
Floodplain	12	3	1	1
Stream Buffers	51	24	4	5
Combined Riparian Areas	55	25	5	5
Parkland	48	15	4	4
Biodiversity Areas	42	11	2	4
Top Ten Natural Areas	15	15	0	0
Combined Park Features	48	15	4	4
Forest	153	43	7	1
Significant Forest (100 acres)	173	64	13	7
Interior Forest	98	41	0	2
Number of Buildings[3]	7	4	1	2
Estimated Capital Cost[4]	$98 million	$86 million	$82 million	$77 million

Table 2. Rock Creek (at North Branch) Screenline

Scenario	Number of Lanes	Capacity (veh/hr)	Pk Hour Volume	Avg Vol/Cap	Avg Speed
1998 Base, Existing Network	6	7,980	6,465	0.81	15.8
2025 CLRP, Existing Network	6	7,980	7,375	0.92	10.8
2050 No-Build, Existing Network	6	7,980	7,665	0.96	8.4
2050 Option 1, Western Connector (as 4-lane at-grade)	10	13,300	11,230	0.84	15.8
2050 Option 2, Extension of M-83*	10	13,300	11,430	0.86	15.1
2050 Option 3, Widen MD 115*	8	10,640	9,735	0.91	11.2
2050 Option 4, M-83 Ext to MD115	8	10,640	9,400	0.88	12.5
2050 with Full MP ICC	12	21,180	17,175	0.81	24.7

* Note: M-83 is Midcounty Highway Extended; MD 115 is Muncaster Mill Road.

[3] Buildings are counted only if the master-planned right-of-way falls across a structure. More than the master-planned right-of-way may be required on Muncaster Mill Road due to topography and scope requirements. This additional right-of-way will directly affect more houses than indicated but the precise number can only be determined by additional engineering.

[4] Costs do not include bridges and environmental mitigation. The costs for Option 3 and Option 4 are higher than those reported by the TPR Task Force due to the inclusion of costs expected for auxiliary and turn lanes.

The data show the following:

- Without any roadway improvements to the screenline, congestion levels would increase and the average speed would continue to drop from roughly 16 miles per hour in 1998 to 11 mph in 2025. If no improvements were made by 2050, the average speed would approach 8 mph. This would result in long delays and lost accessibility to jobs and households for central areas of the county. Some additional capacity is essential.

- The Intercounty Connector as a freeway would provide significantly more capacity at much higher speeds than any of the alternatives. The peak hour capacity with the ICC is roughly double the screenline capacity if only Muncaster Mill Road is widened. The screenline speed for the 2050 recommended network with the ICC is about 25 miles per hour, significantly higher than any other alternative and an improvement over existing conditions.

- Option 1, construction of a four-lane arterial connecting to I-370, would increase the screenline capacity by 66 percent and result in an average screenline speed of more than 15 mph, which is close to the existing speed.

- Option 2, an extension of the Midcounty Highway as a four-lane major highway, would have about the same capacity assumptions and resulting speeds as Option 1.

- Option 3, widening Muncaster Mill Road (MD 115), does not add sufficient capacity to the existing network. Average speed for the Rock Creek screenline would be about 11 mph in 2050 with the widening.

- With Option 4, extension of Midcounty Highway to a widened lower section of MD 115, capacity at the screenline is the same as Option 3. Speed is slightly higher than Option 3, due to a lower projected traffic volume.

One of the major concerns about the construction of a western connector between the I-270 Corridor and Georgia Avenue (MD 97) is that traffic might increase on MD 198 through communities between Georgia Avenue (MD 97) and I-95. The analysis showed that the completion of a new four-lane major highway connecting MD 28/MD 198 to points west would not significantly increase traffic more than the widening of Muncaster Mill Road.

Figure 8 compares the forecasted 2050 traffic volumes for three alternatives: widening Muncaster Mill Road, extending Midcounty Highway (M-83) to MD 28 east of Georgia Avenue (MD 97), and completing the full ICC. The ICC would cause the lowest traffic volumes on MD 198 because it provides an alternative route east of Georgia Avenue (MD 97). The M-83 extension would cause traffic volumes to increase by 225 vehicles in the peak hour in both directions, about 2200 cars daily. This would be about 6% greater than if Muncaster Mill Road were widened between Shady Grove Road and MD 28. An alternative that connects the M-83 extension to a widened Muncaster Mill Road south of their intersection would have virtually the same traffic effects on MD 198 as widening the entire length of Muncaster Mill Road.

Thus, the traffic impact on MD 28/MD 198 would not vary much between a new arterial roadway identified as the Western Connector, M-83 extension, or widening Muncaster Mill Road. The major impact on MD 28/MD 198 would be a result of a decision not to construct the ICC on the Master Plan alignment. If the Master Plan ICC is not built, there will be impacts on communities along the alternative routes that were not contemplated by these respective Master Plans. Therefore, regardless of which option is chosen, steps must be taken to preserve as many of the communities' expectations as possible, and to provide traffic mitigation since this report has not included the Master Plan ICC in its network.

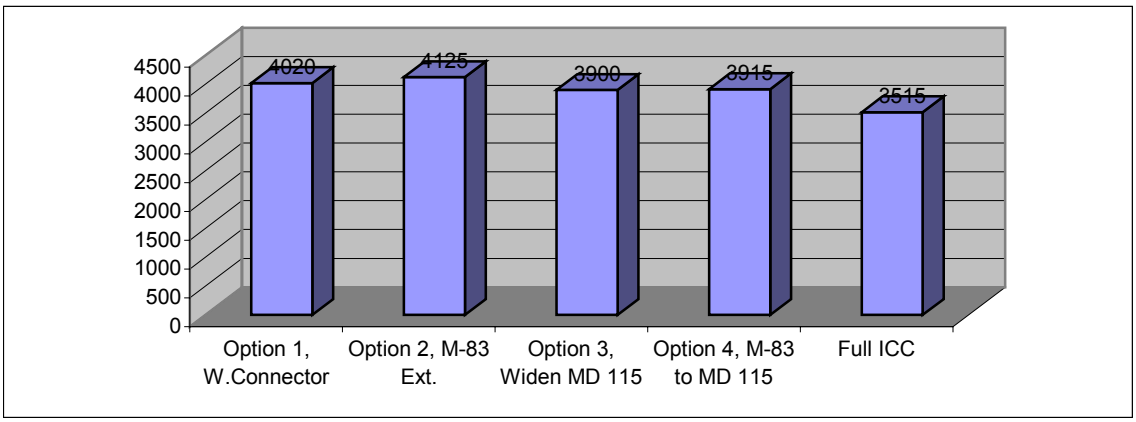

Figure 8. 2050 Peak Hour Traffic on MD 28/198 w. of N. Hampshire Ave

Although the recommended network does not include the ICC, the analysis suggests that if built, the ICC could produce improvements in east-west mobility. As noted earlier, the ICC faces significant environmental issues. These issues were identified in the draft EIS, but the draft did not explore all options for minimizing or mitigating these impacts that would be addressed in a final EIS. Therefore, ***the Board recommends completing an EIS for the Master Plan alignment of the ICC,*** to determine if a roadway configuration and environmental mitigation that will allow for a four-lane freeway with two additional bus/HOV (six lanes total) lanes can be constructed between I-370 and US 29.

ICC Master Plan Advantages

TPR analysis shows that the ICC is the most significant project in the proposed network in terms of increasing average speeds in the county, a key measure of system performance. The ICC would increase the average speed of all county travel by seven percent, even with increased VMT overall.

Many significant transportation benefits would be found at the District level,[5] especially in the eastern county and Georgia Avenue (MD 97). In particular, improvements would include 19-percent increases in district-level average speed, reductions in the percent of congested lane miles and increased accessibility to jobs and households by auto and

[5] For TPR II analysis below the countywide level, the county is divided into smaller areas called Districts. There are five (5) Districts: I-270 Corridor, Georgia Avenue, Eastern county, Inside the Beltway, & Rural.

transit (due to bus services on the ICC HOV lanes). Access to jobs from homes in the Georgia Avenue district increased ten percent, indicating how this area is becoming cut off from adjacent areas in the absence of roadway improvements.

The ICC was included in the transportation network when all the current county Master Plans were adopted. Removing any major portion of the master-planned ICC, or all of it, would require a re-examination of zoning and development patterns and the transportation network throughout much of the county and particularly the middle and eastern portions. The effects on the Shady Grove area would be to cut it off from many county households. This report recommends retaining the ICC master–planned right-of-way until the EIS is completed and a final decision is resolved. If the ICC were ultimately found to be acceptable, this Report would further recommend the construction of a four-lane M-83 between Shady Grove Road and the ICC.

To summarize, the ICC would:

- Increase average speed and accessibility countywide and in particularly within the Georgia Avenue (MD 97) and Eastern areas of the county
- Reduce congestion and increase speeds across the Rock Creek screenline
- Relieve or reduce congestion at many intersections and on some local roads
- Increase network reliability by adding redundancy to the county freeway system, providing an alternative to the Beltway
- Connect the I-270 corridor to BWI airport
- Enhance the county's attractiveness to business
- Support existing land use and travel behavior
- Connect the housing resource area east of Rock Creek to the jobs west of Rock Creek
- Add HOV lanes to the network for cross-county bus operations.

ICC Master Plan Disadvantages

The TPR II analysis, as well as other previous studies, has shown that the ICC has the largest acreage impacts on wetlands, floodplains, stream buffers, parkland and forest of any single facility examined in the TPR II process. It crosses the Paint Branch watershed through Upper Paint Branch Stream Valley Park, which is the only stream in the County with reproducing trout. The disruption to the stream valley and increased roadway storm water runoff will make retaining the present water quality a significant challenge at best. The right-of-way crosses North Branch Stream Valley Park, which is presently one of the top ten natural habitat areas of the county's park system. Needwood Lake Regional Park and Rock Creek Park, which are also traversed by the ICC, are recreational resources that would be impacted by highway noise with the ICC.

As the ICC would use federal funding, it must undergo a full evaluation under the National Environmental Policy Act of 1969 (NEPA), which includes the Environmental Impact Statement procedure. Federal regulators have already signaled their displeasure at the Master Plan alignment, particularly for its parkland impacts. It could prove difficult or perhaps even impossible to obtain Federal agency approval and environmental permits for the Master Plan alignment as currently configured.

The ICC increases total countywide vehicle miles traveled (VMT). That is another way of saying that it creates an incentive for people to use cars and drive further distances than if it were not built. People could live further away from their jobs with the ICC than without it. Although a very expensive project, it will not eliminate congestion in its' corridor. As a matter of public policy, some would argue that the county should invest in expanding transit options that get people out of cars and into transit.

To summarize disadvantages, the ICC would:

- Increase vehicle miles traveled (VMT) countywide and increase average trip distance
- Increase total congested VMT countywide
- Negatively affect the environment in a number of irreparable ways by splitting interior forests, impinging on wetlands in a high quality watershed, reducing parkland, and potentially decreasing air quality (see increased VMT)
- Absorb fiscal resources that might otherwise be spent on transit
- Adversely affect local neighborhoods.
- The full Master Plan alignment is problematic under current environmental regulations
- Many intersections would still be over desirable congestion levels.
- The ICC may have a sprawl-inducing impact on land use.

Network Costs

Table 3 summarizes the estimated capital costs for the Master Plan and recommended network in two ways. One shows the costs by transit and roadways, the other the costs by section of the county. The costs for projects that travel through the rural district are included in the other areas.

Major Transportation Facilities Not in Recommended Network

Although TPR II examined many road and transit projects, much of the Task Force's attention was focused on a few major facilities, the Intercounty Connector being one. Some of the other high-profile facilities not recommended include the Midcounty Highway crossing Great Seneca Creek, a new Potomac River crossing, and the Outer Purple Line. **In addition to these major projects, master-planned roads not recommended include the widening of Norwood Road, portions of MD 108, the Fairland Road widening east of US 29, Clopper Road limited to four lanes through Seneca Park, and the widening of Georgia Avenue (MD 97) north of Olney.**

Midcounty Highway North of Montgomery Village Avenue (MD 124)

The comments at the public forums and review of the environmental and community constraints on extending Midcounty Highway from its current terminus at Montgomery Village Avenue (MD 124) to MD 27 have convinced the Board that this section is not feasible to construct. It is *reluctantly* recommended that this be deleted from the Master

Plans.[6] However, this action must be accompanied by an update to the land use sections of the Clarksburg and Germantown Master Plans by reducing the total development levels to be commensurate with what the reduced roadway network would support.

This section of Midcounty Highway was intended to connect this part of the county with activity areas to the east, and little additional capacity on other roads is available. There is no good travel option from Montgomery Village Avenue (MD 124) to the north except Frederick Road (MD 355), and that road, as well as the remaining area network, is already slated for widening to the master plan maximum. Removing this roadway makes sense from an environmental and community disruption perspective but would create transportation capacity deficiencies that must be rebalanced.

Table 3 – Transportation Network Cost Comparison

Transit and Road Project Countywide Cost Comparison		
Type of Project	**Base Master Plan (excludes ICC)**	**Recommended Network (excludes projects requiring further study)**
Transit		
Cost (millions)	$1,196	$2,363
Percent of Total Cost	20%	34%
Road		
Cost (millions)	$4,834	$4,579
Percent of Total Cost	80%	66%
Total Cost (rounded)	$6,031	$6,942
	100%	100%
Cost Comparisons by TPR II District		
TPR II District	**Base Master Plan (excludes ICC)**	**Recommended Network (excludes projects requiring further study)**
Georgia Avenue & Eastern County	$1,168	$1,447
Percent of Total Cost	19%	21%
I-270 Corridor	$4,515	$4,114
Percent of Total Cost	75%	59%
Inside the Beltway	$347	$1,382
Percent of Total Cost	6%	20%
Total Cost	$6,031	$6,942

[6] The CLRP contains Midcounty Highway from MD 27 to Middlebrook Road; this section would have to be removed from the CLRP concurrent with its deletion from the Master Plan.

Outer Purple Line

The Board has not included the Outer Purple Line in our recommendations. The Maryland Department of Transportation (MDOT) Capital Beltway Corridor Study provided information that augmented the TPR II forecasting work on the Outer Purple Line. The findings of the MDOT study, supported by recent actions by the Planning Board and the Montgomery County Council, are that the Inner Purple Line is more desirable as a way to connect communities and serve potential high transit use areas. It is also more feasible from a cost perspective. The Inner Purple Line would have a greater percentage of trips where pedestrians walked to the stations, while the Outer Purple Line would rely heavily on automobile access.

Ridership forecasts showed that the Inner Purple Line would carry roughly 25 to 30 percent more riders per mile than the Outer Purple Line. This finding is significant because the TPR forecasts assumed the same speed and operating characteristics for both the Inner and Outer lines, while the MDOT study assumed significantly higher speeds for the Outer line. If it assumed that the Georgetown Branch segment will be operational when the Outer Purple Line is built, ridership per mile would be even lower on the Outer Purple Line.

Potomac River Crossings: The "Techway"

The Techway received a good deal of study during the TPR II process. Alignments studied included the 1) "High Techway" as a six-lane limited access road and bridge from I-270 into Virginia, and 2) "Low Techway" as a four-lane arterial bridge and associated widenings and extensions of the current arterial network.

Travel forecasts showed that significant demand would exist for both alternatives. The High Techway would carry about 10,000 vehicles and the Low Techway would carry about 5,900 vehicles in both directions in the peak hour (the existing Legion Bridge carries about 16,000 vehicles in the peak hour). The demand is approaching the assumed capacity for either bridge. The tested alternative network, including the master-planned ICC, and the High Techway would have a much bigger impact on countywide traffic, increasing countywide VMT by 18% and average speed by 8%.

Without the full ICC connection, the Techway speeds benefit would be much lower, perhaps only one-third as large. The freeway nature of the high Techway, with no connection in the county before I-270, created a link that did not relieve congestion on non-freeway roads. The American Legion Bridge volumes were down about 6% with the full Techway. The Low Techway would increase countywide VMT by 4% and average speed by 3%. Forecasts also show that many of the trips using the bridge would travel between the Dulles Corridor and I-270 corridor, but most trips would not extend further east over to Georgia Avenue (MD 97) or beyond.

The VMT increases from the High Techway cause both the percent of the lanes at congested levels and the percent of VMT at congested levels to increase. (4% increase in congested VMT and 2% increase in congested lane miles.)

Although there are certainly some transportation technical benefits for the Techway, the environmental and community impacts outweigh the benefits. The road would cross the C&O Canal (National Park Service Property) and county parkland as well. The High Techway alternative impacts the environment at the bridge and also along the eight-mile alignment of the connecting freeway. Although a particular route was tested, any alignment would negatively impact existing communities. The areas impacted include: 86 acres of Combined Wetlands/Floodplain/Stream/Lake, 25 acres of Parkland/ Biodiversity, and 42 acres of significant forest. The High Techway would impact about 183 buildings. Tunneling, as some have suggested, would dramatically increase cost. The High Techway changes the focus of the region. The center of gravity of Montgomery County's accessibility to and from suburban employment centers would be moved further from the Core.

The Low Techway bridge's direct environmental impacts are less, but still significant. The areas impacted include: 14 acres of Combined Wetlands/Floodplain/Stream/Lake, three acres of Parkland/Biodiversity, and four acres of significant forest. The Low Techway would impact about two buildings directly in the potential right-of-way.

The connection from the bridge to the existing roadway system at any point is problematic. The Low Techway would be connected to MD 118, MD 28, and River Road (MD 190). The extended MD 118 would negatively impact an existing community in ways completely unanticipated by the existing and proposed Potomac Master Plan. Traffic on the three connecting roads would roughly double with the new bridge. As a result, speeds would decrease by ten miles per hour on MD 118.

The accessibility gains are precisely where they are least desired. There is little benefit to the county in making Darnestown more accessible to the Dulles Corridor. This is a low-density wedge area of the county where the General Plan would affirm that land use. As a matter of political will, the zoning could be maintained but the Techway would create market pressures to increase zoning density where it is not planned to do so.

Recommended Transportation Policies

Bus System Recommendations

In order to improve the quality of bus transit services, the Board makes the following recommendations toward the goal of attracting additional riders and providing bus service as an alternative to auto use:

1. Initiate a study to evaluate a bus routing system that better interconnects activity centers and has more frequent service, greater penetration into residential and employment areas, and extended hours. The goal should be one, integrated transportation system, including improved Ride-On Service around Metrorail stations. Provide many safe and convenient transfer nodes, preferably at retail and other activity centers.

2. Put in final form, approve, and implement DPWT's guidelines for bus stops.

3. Encourage WMATA to purchase buses that are more comfortable and user-friendly, generate real-time bus information for customers, and are similar in quality, but not necessarily the same size, as the ones that are being purchased by the county for Ride-On. The buses purchased should easily accommodate bus use by the disabled and elderly.

4. Expand the county's marketing and promotional efforts to better inform potential bus users about the service features of the region's bus system in order to overcome socioeconomic stereotypes of buses, and improve customer service.

5. Construct bus priority lanes on existing and proposed roads. Also pursue opportunities to construct queue jumpers and to allow real time adjustments to traffic signals in order to provide buses a time advantage over general-purpose traffic.

Discussion

The intent of the bus recommendations is to make bus service more appealing and more responsive to the needs of potential riders. The cost of enhancing bus service consistent with the above recommendations, however, would be substantial, but less than major roadway projects. Therefore, there will need to be a solid county as well as regional commitment to proceed in the recommended directions.

Recommendation #1, which would significantly alter and enhance the existing bus routing and transfer system, would require the greatest policy and funding commitment. **One possible concept, shown in Figure 9, was prepared as part of the Transportation Policy Report Task Force.**

Recommendations #2 and 3 would provide physical amenities at bus shelters and in buses that would make using bus service a more appealing option for more people. Recommendation #4 places emphasis on producing new informational materials that can help overcome stereotypes relating to bus usage and on improving customer service.

Recommendation #5 indicates that queue jumpers and real time adjustments to traffic signals are two good ways to give buses a time advantage, however greater benefits can be achieved by creating exclusive lanes for buses. As general purpose lanes get more and more congested, buses will get stuck in clogged traffic long before they reach the traffic signals and their schedules will be severely disrupted unless they have their own dedicated lanes. A bus priority lane can be provided by either adding a lane to an existing road or by converting an existing general purpose lane for bus use. Either option can be difficult to implement, but if governmental policy is to make transit a priority in the travel stream, such bus lanes will become more and more necessary.

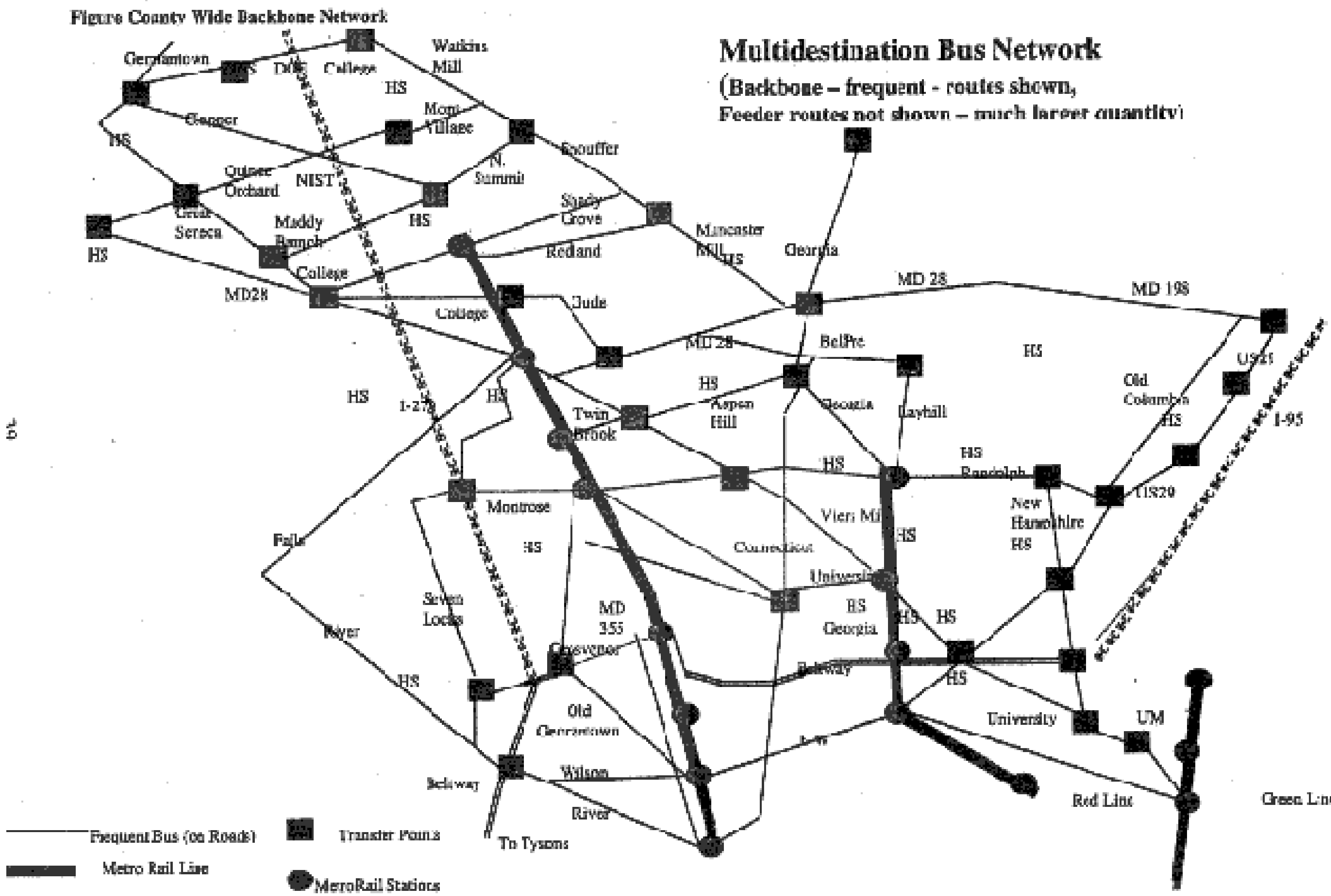
Figure County Wide Backbone Network
Multidestination Bus Network
(Backbone – frequent - routes shown,
Watkins Mill
College
HS
Mont Village
Shady Grove
Redland
N. Summit
Quince Orchard
NIST
Great Seneca
Muddy Branch
College
MD28
Germantown
Gunners
HS
Georgia
MD 28
MD 198
BelPre
Aspen Hill
Layhill
Old Columbia
I-95
Twin Brook
Montrose
Randolph
US29
New Hampshire
Connecticut
Falls
Seven Locks
River
MD 355
Grosvenor
Georgia
Beltway
University
Old Georgetown
Wilson
River
To Tysons
Red Line
Green Line
UM
Frequent Bus (on Roads)
Metro Rail Line
Transfer Points
MetroRail Stations

Figure 9

Transportation Demand Management (TDM) and Bus Policy Recommendations

The following TDM actions have considerable merit and are recommended for near-term funding and implementation. The ten recommendations include actions that the county can take to help achieve more efficient use of the capacity in the transportation infrastructure that already exists. They are relatively low cost items that deserve prompt consideration for funding. As a general principle, TDM measures should be applicable to existing development as well as new approvals.

1. Intensify the county's efforts to encourage more employers to offer employees a transit fare benefit (up to $100/month, tax-free to the employee, starting in 2002). Prepare a stronger marketing and advertising campaign focused on employers as well as employees. Also, make more employers aware of the Maryland tax credit, which saves employers up to half of the cost of providing the benefit.

    - Expand the county's outreach efforts to all employment areas of the county.

    - Consider establishing a new county ordinance that would require employers to provide the transit pass benefit in certain activity centers that are well served by public transit.

    - Increase the county's budget for the Fare Share and Super Fare Share Programs, which provide a county government match to employers that offer the transit subsidy. To reach more employers, at least double the amount currently budgeted to improve marketing, increase the number of outreach personnel, and enhance the dollar amount available for the match.

2. Initiate county efforts to encourage employers to provide cash to employees who elect to forego drive-alone parking privileges (parking cash-out).

    - Employees who walk, cycle, or carpool to and from work would receive cash, which is taxable, equivalent to the fair market value of the parking subsidy.

    - Employees who use transit would receive transit passes, which are non-taxable (up to $100/month, starting in 2002), equivalent to the fair market value of the parking subsidy.

3. Set an example by offering stronger traffic mitigation programs to county government employees.

    - Increase the transit pass benefit to the federal tax-free level of $100/month by 2003.

    - Offer parking cash-out

4. Make real-time bus information available at major bus stops and also to bus customers through the Internet to computers, pagers, and cell phones.

   - To take the uncertainty out of waiting for buses, use current technology to allow bus customers to obtain the instantaneous location and estimated arrival time of buses.

   - Install equipment on buses and prepare computer software that makes use of the Global Positioning System (GPS) technology to keep track of buses.

   - Make the information accessible to bus customers through portable and non-portable devices.

5. Open more Commuter Stores.

   - Use the Silver Spring Commuter Store as a model for establishing storefront units in other employment centers in the county (e.g., Bethesda, Friendship Heights, Rockville, Gaithersburg, Shady Grove, Wheaton, White Oak, and North Bethesda).

   - Initiate a mobile Commuter Store, using a large van, to reach smaller and more dispersed employment areas.

6. Put greater emphasis on installing protected bus shelters with adequate space for lighting, wheelchairs and, wherever possible, accessible by sidewalks.

7. Accelerate the schedule for improving walking and bicycle access to transit stops and other destinations.

8. Put greater emphasis in outreach efforts on encouraging employers to establish telecommuting programs as an alternative to travel.

9. Create an updated information booklet showing all TDM opportunities and incentives available to people and businesses in Montgomery County.

10. Initiate a study to determine the feasibility of establishing parking impact taxes in the county. Study, at a minimum, the following two options:

    a. Establish an annual parking impact tax at all existing and new office and industrial properties.

       – Base the tax on the total number of parking spaces on the property.

       – Apply the tax to the owners of the properties, but exempt them from the tax if they offer parking cash-out and the full transit benefit to employees on the site.

- Exempt from the tax the land uses that provide parking primarily for non-commuters, such as retail, service, etc.

b. Establish a one-time parking impact tax on new office and industrial properties.

   - Base the tax only on the number of excess spaces provided, beyond the amount required by the zoning ordinance.

   - Apply the tax to the owners of the properties.

   - Exempt from the tax the land uses that provide parking primarily for non-commuters, such as retail, service, etc.

Discussion

The TDM recommendations would entail some important new initiatives. Recommendations #1 and 2 will require additional resources to allow a significant expansion of the employer outreach efforts of DPWT's Commuter Services Section. Most of recommendation #3 will require implementation of new or enhanced transit-friendly policies at county Government and M-NCPPC. Recommendation #4 calls for Ride-On, and especially WMATA and MTA, to catch up with recent technological advances and make a commitment to implement real-time bus information, which is already being provided or planned by some other transit providers in the Baltimore-Washington region and around the nation. Recommendation #5 will require a county commitment to replicate and expand on the successful experience of the Silver Spring storefront operation. Recommendation #6 puts a new emphasis on making bus shelters more pedestrian-friendly.

Recommendation #7 calls for accelerating the county's efforts to improve access to transit. Recommendation #8 calls for a greater emphasis on telecommuting through the county's employer outreach initiatives. Recommendation #9 calls for informational material that is already available to people and businesses in various formats, but needs to be updated.

Recommendation #10 is a new concept that deserves some additional explanation. In principle, a parking impact tax would follow the precedent of the traffic impact taxes that the county currently levies. While the proceeds from traffic impact fees are primarily allocated to road projects, the proceeds from parking impact fees could be allocated to TDM projects and programs.

A primary purpose of the tax is to ensure a stable source of revenue for TDM activities in the county. A side-benefit could occur if the property owners decide to pass all or part of the tax to the parkers by way of a parking fee, thus tending to cause a reduction in vehicle trips. Another side-benefit could occur if the property owners decide to have fewer excess parking spaces in order to reduce their overall tax. However, those side-benefits would only occur if property owners voluntarily choose to take those actions.

Business community members are concerned that parking impact taxes may put our county in a competitive disadvantage with other jurisdictions in the region and hurt economic growth. A related issue deals wit the financial impact of parking impact fees on existing businesses that have long-term leases and a significant number of parking spaces. A parking tax could be in the hundreds of thousands of dollars annually on individual properties, and some owners may have limited ability to pass the tax onto parking users. There also are many places where parking fees are already imposed. Should these areas increase the fees as much as those where parking is now free? These questions do not have good answers at this time.

Proponents of parking impact taxes feel that they may have a positive rather than a negative effect on economic competitiveness. They note that developers would still have the option of building as many spaces as they want, but would simply make a payment that would be used to fund alternatives to driving alone in the area. The resulting TDM projects would provide commuters more choices and actually make the area a more appealing place for locating a business.

Over the years, Montgomery County has introduced a number of tools for managing growth that were meant to preserve the county's quality of life. Those tools were adopted even though most other jurisdictions, particularly those in neighboring states, did not have them. The adequate public facilities ordinance, growth policy, and traffic impact taxes are three prominent examples. Similar concerns were raised before those tools were adopted, but the county's economic health has not been harmed. Given the need to raise revenues to improve the quality of TDM in the county, but recognizing that many issues must be resolved before such topics are ready for implementation, a feasibility study of parking impact taxes would first be needed.

Evaluation of the Recommended Transportation Network

General Findings from Travel Forecasts

The forecasting and evaluation tasks of TPR II were conducted in three rounds of scenario testing. These tests were used to narrow the list of projects under consideration and to describe future conditions of the county's transportation network. The following discussion is grouped into three categories: projected changes to travel patterns, future mobility and congestion levels and accessibility to jobs and households.
Travel

Existing trends point to a future where growth will make today's traffic congestion problems worse. Changes in development patterns will affect travel patterns in a number of ways:

- As the county matures, changing travel patterns are placing greater burdens on the transportation system. More people live and work in the suburbs than in the District of Columbia. This trend will become more dominant in the future. Circumferential (suburb-to-suburb) travel is increasing at a much more accelerated rate than the traditional radially-oriented travel to D.C.

- The total number of north-south work trips will continue to be greater than east-west work trips, although there will be more growth in east-west travel. For example, today, trips between jobs inside the Beltway and homes in the I-270 corridor are roughly double the number of trips between jobs in the I-270 corridor and Montgomery County homes east of Rock Creek. However, the roadway and transit network available to serve the growing number of east-west trips is much more constrained than that available and planned for north-south travel.

- As congestion continues to increase, trip lengths are expected to get shorter as people try to reduce their time spent commuting. As a result, the percentage of residents staying within the county to work is expected to increase slightly, from 58 percent in 1997 to 65 percent in 2025. Scenarios that included adding highway capacity across the Potomac River forecast the percent of people working in the county at 61 percent.

- Travel within corridors will increase dramatically. For example, work trips that begin and end within the I-270 corridor are projected to grow 70 percent between 2000 and 2025.

- Countywide transit mode shares are expected to remain relatively constant in the future, accounting for 17 to 20 percent of trips, even when significant transit improvements are made. Suburban-to-suburban trips, which represent the most rapidly growing segment of travel, are very difficult to serve with fixed-route transit such as light or heavy rail. This is true even when land use changes are made to bring some jobs and households closer to existing and proposed rail stations.

Mobility

Most of the transportation facilities considered in TPR II were proposed to improve mobility; i.e., to improve the performance of the transportation system in the movement of people and goods. Some of the changes in mobility include the following:

- The percentage of travel occurring in congested conditions will increase if new capacity is not added beyond current plans. The 1998 base scenario showed 19 percent of VMT occurring on congested road segments. By 2025, under the Constrained Long Range Plan CLRP),[7] the percent of congested VMT would climb to 30 percent, and by 2050, under current master plans, this percentage would reach 32 percent.

- None of the transportation scenarios tested was found to have congestion levels better than today's system. Only when significant highway improvements, equivalent to all of the master-planned facilities, were made by the year 2025 did average speed and congestion approach current conditions.

[7] The CLRP is the 25-year fiscally constrained transportation plan for the Washington Region. County facilities are submitted by Maryland and Montgomery County officials and adopted by the Metropolitan Washington Council of Governments (MWCOG).

- The most significant bottlenecks in the county occur at stream valley crossings because of the limited number of alternate routes. In particular, movement on roads crossing Great Seneca Creek and Rock Creek showed the greatest capacity deficiencies in the county.

- Although congestion cannot be eliminated, improvements to the most severely congested links and intersections will result in significant timesaving when totaled over all travelers.

Accessibility

Transportation planners long have recognized that travel is a derived demand, meaning that people travel to participate in activities and fulfill other basic needs. No one drives at the peak hour of traffic to enjoy the experience. Accessibility is an important goal for the transportation system. Accessibility means being able to reach activities such as work and shopping within a reasonable travel time (in TPR II, peak hour trip times less than 45 minutes were considered reasonable). This concept highlights the link between transportation and land use. As congestion increases on roadways, or as the network stays static while development moves outward, accessibility decreases in the absence of land use changes. A few key points to consider:

- Accessibility can be improved by expanding highways, but transit networks provide accessibility gains that are not subject to congestion delays.

- Compact, transit-oriented land use can provide large increases in accessibility, even as mobility is declining, by clustering important activities closer together and close to the high-capacity transportation networks such as rail or busways.

- Although none of the future scenarios were forecasted to reduce congestion, all of the future scenarios showed improvements in accessibility simply because of the projected growth in jobs and households during the next 50 years.

Comparison of the Recommended Network with Master Plan Network

The recommended network differs from the master plan network in the following ways:

- The ICC Corridor options, as noted in the East-West Connections section of this Report

- Midcounty Highway between Montgomery Village Avenue (MD 124) and Ridge Road (MD 27) is in current master plans but is *not* included in the recommended network, as noted above.

- Capital Beltway (I-495) HOV lanes are *not* in current master plans, but are recommended for further study by SHA.

- The master-planned widenings of Georgia Avenue (MD 97) between Olney and the Montgomery County/Howard County line, as well as Olney-Laytonsville

Road/Damascus Road (MD 108) widening between Damascus and the Town of Laytonsville are absent. These facilities were not justified in terms of travel demand and do not support smart growth principles.

- The master-planned North Bethesda Transitway is not included in the recommended network because of its high cost, relatively low ridership, and the ability to serve the travel demands with buses.

- Clopper Road (MD 117) is reduced from the master-planned six lanes to four lanes though Seneca Creek State Park to reduce the environmental impacts on the park. Six lanes are retained on other sections and the transition will be made where the lanes can be terminated at cross streets.

- An additional lane was added to each of the I-270 spurs in each direction to reduce future congestion levels. This was introduced in the Task Force testing, and the Board found it beneficial enough to warrant further study. Issues of right-of-way and engineering feasibility have not been explored, but it is *not consistent* with current master plans.

- The interchanges on Randolph Road and Rockville Pike are not all in current master plans, nor is the one at Georgia Avenue (MD 97) and Norbeck Road (MD 28).

Comparison of Measures of Effectiveness (MOEs)

Tables 4 and 5 compare the transportation and environmental MOEs for the recommended network with the Master Plan No-Build network. The Master Plan network in the table *does not include the ICC or any road improvements in the ICC corridor between I-370 and Georgia Avenue*. This scenario is labeled as "No-Build" and allows for comparisons with scenarios that include any of the options in the ICC corridor.

Two versions of the Recommended Network are shown: 1) the recommended network with the full ICC on the Master Plan alignment and 2) the recommended network with the Option 2 extension of M-83 between Shady Grove Road and Norbeck Road (MD 28). At the county level, Options 1 and 2 perform virtually the same. All of the 2050 scenarios use the adopted Master Plan land use, not the alternative land use that the TPR II Task Force developed. Both versions include HOV lanes on I-495 even though this project is only recommended for study.

Another major difference between the recommended network and the Master Plan network is that the Master Plan No-Build does contain the completion of Midcounty Highway (M-83) between its current terminus at Montgomery Village Avenue (MD 124) and Ridge Road (MD 27). This section of Midcounty Highway is not included in the Recommended Network.

Table 4: Comparison of 2050 Recommended Network with Master Plan Scenario

TRANSPORTATION MOE's *COUNTY LEVEL SUMMARY*	1998 Base	2050 Master Plan No-Build	2050 Rec. Net w/ ICC		2050 Rec. Net w/ Option 2	
			Total	Pct Change w/ 2050MP	Total	Pct Change w/ 2050MP
Trip Totals & Avg Trip Time						
Auto Person, P.M. Peak Period (3-hour)						
Total Trips	521,899	758,309	758,461	0.0%	756,566	-0.2%
Avg Trip Time	17.59	18.91	19.24	1.7%	19.12	1.1%
Tot Person Trav Time (Hours)	153,016	239,011	243,189		241,132	
Average Distance (Miles)	7.6	7.3	7.7		7.4	
Transit Person, P.M. Peak Period (3-hour)						
Total Trips	44,707	79,127	80,429	1.7%	81,419	2.9%
Avg Trip Time	46.98	41.73	41.28	-1.1%	40.93	-1.9%
Tot Person Trav Time (Hours)	35,007	55,030	55,333	0.6%	55,541	0.9%
Average Distance (Miles)	9.6	9.1	9.2	0.9%	9.1	0.1%
Highway System						
Countywide, P.M. Peak Hour (VMT, and VHT in Thousands)						
Total Vehicle Trips (SOV, HOV, & Truck)	162,610	237,180	237,223	0.0%	236,495	-0.3%
Lane Miles	2,474	3,081	3157	2.4%	3093	0.4%
VMT	1,458.37	2,144.00	2,341.50	9.2%	2,243.20	4.6%
VHT	52.059	104.3	104.4	0.1%	103.5	-0.8%
Avg V/C Ratio	0.60	0.68	0.68	0.0%	0.68	0.0%
Avg Speed (mph)	28.0	20.5	22.4	9.3%	21.7	5.9%
% Congested VMT (V/C >= 0.80)	19.11%	31.93%	32.70%	2.4%	34.24%	7.2%
Total Congested VMT	1,458	684.5	765.8	11.9%	768.1	12.2%
% Congested Lane Miles	7.10%	15.48%	15.93%	2.9%	16.79%	8.5%
Accessibility						
Countywide (in thousands) :						
Avg. Number of Jobs Accessible in 45 min (Auto)	1355.2	1,611.50	1,702.30	5.6%	1,654.70	2.7%
Avg. Number of Hholds Accessible in 45 min (Auto)	772.1	750.3	805.4	7.3%	777.7	3.7%
Avg. Number of Jobs Accessible in 45 min (Transit)	171.1	373.2	416.8	11.7%	414.1	11.0%
Avg. Number of Hholds Accessible in 45 min (Transit)	99.0	203.1	233.7	15.1%	232.3	14.4%
Work Transit Mode Share	16.84%	17.21%	17.30%	0.5%	17.61%	2.3%

Table 5: Comparison of 2050 Recommended Network with Master Plan – Environmental MOEs

Figures rounded to nearest whole number Environmental Factors:	*2050 MP*	*2050 Rec.Network with ICC and I-495 HOV*	*Pct Change w/ 2050MP*	*2050 Rec. Network with Option 1 and I-495 HOV*	*Pct Change w/ 2050MP*
Wetlands (acres)	16	64	305%	39	149%
Floodplain (acres)	144	270	88%	228	59%
Stream/Lake (acres)	394	704	78%	644	63%
Wet/Flood/Stream Total	444	824	86%	744	68%
Parkland (acres)	111	298	169%	271	144%
Bioacres (acres)	26	136	433%	60	136%
Topten (acres)	15	91	506%	31	103%
Park/Bioacres/Topten	116	379	228%	272	135%
Interior (acres)	5	56	972%	55	947%
Significant (acres)	74	191	158%	169	127%
Direct Forest (acres)	80	248	211%	223	181%
Interior Forest (acres)	17	118	580%	115	563%
# of play. fields	15	28	87%	27	80%
Well Service area (acres)	402	236	-41%	236	-41%
# of buildings	161	330	105%	320	99%

With countywide MOEs, comparing the Master Plan No-Build and recommended networks shows more travel occurring at higher speeds with the ICC. On the accessibility and transit measures, the recommended network is superior because it builds on the Master Plan network, with a greatly expanded transitway and HOV system.

The network with the ICC has 2.5% more lane miles and 9% more vehicle miles traveled than the Master Plan as modeled. This is due primarily to the inclusion of the ICC and the Beltway HOV lanes in the network with the ICC. Average countywide speed is projected to be about 9% greater with the network, again due in large part to the ICC. The percentage of the county lane miles that are congested stays about the same in both networks, although the total congested VMT is greater in the network with the ICC.

Option 2 at the county level performs as expected in between the Master Plan No-Build and a full ICC. Average speed is 6% higher than the Master Plan No-Build network, but there is a greater percentage of congested lane miles. The effects of this option are more apparent at the district level discussed briefly in the next section.

The transportation MOEs also show that the expanded transitway network would increase transit accessibility to jobs and housing. Transit improvements include not only the Inner Purple Line and FDA connector, but also some express bus service to take advantage of the I-270 and Beltway HOV lanes. Jobs accessible within 45 minutes by transit went up by 11 percent, and households from jobs by 15 percent.

District Level Findings

Evaluating transportation changes at the county level is problematic because of the large base of travel that these changes must be compared against and also because increases and decreases can cancel each other out countywide. At the district level, changes are more apparent (see Tables 6 through 8 for the district level MOEs). The recommended network results are shown for both the full ICC and with the Option 2 connector and the following discussion compares them against the Master Plan No-Build network. **All of the MOE results reflect the full recommended network and not the ICC option only.**

The **Eastern county district** showed significant improvements with the recommended network, particularly with the addition of the light rail extension to White Oak:

- Lane miles increased by 9.9 percent and VMT increased by 28 percent with the ICC network. Lane miles decreased by 2.4 percent and VMT increased by 3.7 percent with Option 2 network.

- Average speed increased by 15.5 percent with the ICC network and 2.6% with Option 2 network.

- Percent congested lane miles dropped from 16.1 percent to 10.2 percent with the ICC network, but increased with Option 2 network.

- Auto accessibility to jobs increased by 6.5 percent and to households by 6.6 percent with the ICC network. Auto accessibility to jobs increased by 5.1 percent and to households by 2.3 percent with the Option 2 network.

- Transit accessibility to jobs and households would more than double with either network.

The **Georgia Avenue Corridor district** also showed large improvements with the recommended network:

- Lane miles increased by 7 percent and VMT increased by 13 percent with the ICC network. Lane miles increased by only 1 percent with Option 2 network and there was a negligible change in VMT.

- Average speed increased by 20 percent with the ICC network and by 8 percent with Option 2 network.

- Percent congested lane miles dropped from 13.2 percent to 9.4 percent with the ICC network, and to 12.8 percent with Option 2 network.

- Auto accessibility to jobs increased by 11 percent and to households by 1.3 percent with the ICC network. Auto accessibility to jobs increased by 4.7 percent with Option 2 network and there was a negligible change in accessibility to households. The fact that accessibility to jobs went up so significantly while households did not underscores the importance of connecting the jobs in the I-270 corridor with the households in the Georgia Avenue corridor.

- Transit accessibility to jobs increased by 19 percent and to households by 15 percent.

The **I-270 corridor district** shows less of an improvement in many transportation MOEs because of the removal of Midcounty Highway from the recommended network:

- While lane miles are less than one percent lower in the recommended network, VMT would be five percent higher. VMT can increase when cars are forced to take a more circuitous route to get around a gap in the roadway network.

- Average speed stays about the same with the recommended network.

- Percent congested lane miles increases from 5 percent to 6 percent.

- Auto accessibility to jobs increased by 7.6 percent and to households by 11.2 percent with the ICC network. Auto accessibility to jobs increased by 2.4 percent and to households by 5.4 percent with Option 2 network.

- Transit accessibility to jobs increased by 9.4 percent and to households by 12 percent.

Table 6 – District Level Summary of 2050 Master Plan No-Build Scenario

TRANSPORTATION MOE's *SUB-REGION / CORRIDOR LEVEL SUMMARY*	**Eastern County**	**Georgia Ave. Corridor**	**I-270 Corridor**	**Inside Beltway**	**Rural**
Highway System					
Note: Lane Miles, VMT, and VHT in Thousands					
P.M. Peak Hour:					
Lane Miles	253	310	1,306	483	729
VMT	201.1	212.1	900.8	443.7	386.2
VHT	8.6	11.4	39.3	23.6	21.5
Avg V/C Ratio	0.68	0.66	0.65	0.77	0.65
Avg Speed	23.3	18.6	22.9	18.8	18
% Congested VMT (V/C >= 0.80)	22.72%	24.33%	26.75%	52.36%	29.49%
Total Congested VMT	45.7	51.6	241	232.3	113.9
% Congested Lane Miles	16.08%	13.23%	4.97%	7.15%	12.53%
Accessibility					
(in thousands) :					
Avg. Number of Jobs Accessible in 45 min (Auto)	1,697.40	1,629.00	1,147.70	3,034.70	864.50
Avg. Number of Hholds Accessible in 45 min (Auto)	927.8	982.70	639.6	930.8	703.9
Avg. Number of Jobs Accessible in 45 min (Transit)	58.7	310.4	351.3	855.7	19.2
Avg. Number of Hholds Accessible in 45 min (Transit)	41.1	236.1	134.9	435.6	22.8

Table 7 – District Level Summary of 2050 Recommended Network (with ICC and I-495 HOV)

TRANSPORTATION MOE's *SUB-REGION / CORRIDOR LEVEL SUMMARY*	**Eastern County**	**Georgia Ave. Corridor**	**I-270 Corridor**	**Inside Beltway**	**Rural**
Highway System					
Note: Lane Miles, VMT, and VHT in Thousands					
P.M. Peak Hour:					
Lane Miles	278	331	1,301	521	727
VMT	257.1	239.5	948.2	490.8	405.8
VHT	9.6	10.7	41.5	23.7	18.9
Avg V/C Ratio	0.68	0.64	0.66	0.75	0.65
Avg Speed	26.9	22.3	22.8	20.7	21.5
% Congested VMT (V/C >= 0.80)	24.36%	16.97%	29.39%	55.41%	27.57%
Total Congested VMT	62.6	40.6	278.7	272	111.9
% Congested Lane Miles	10.19%	9.44%	5.87%	6.21%	9.75%
Accessibility					
(in thousands) :					
Avg. Number of Jobs Accessible in 45 min (Auto)	1,808.00	1,803.40	1,235.10	3,094.00	914.30
Avg. Number of Hholds Accessible in 45 min (Auto)	989.2	995.70	711.1	954.9	748.5
Avg. Number of Jobs Accessible in 45 min (Transit)	145.4	368.8	384.4	915.6	25.7
Avg. Number of Hholds Accessible in 45 min (Transit)	98.9	272.1	151.8	495.4	29.1

Table 8 – District Level Summary of 2050 Recommended Network (with Option 2 and I-495 HOV)

TRANSPORTATION MOE's *SUB-REGION / CORRIDOR LEVEL SUMMARY*	**Eastern County**	**Georgia Ave. Corridor**	**I-270 Corridor**	**Inside Beltway**	**Rural**
Highway System					
Note: Lane Miles, VMT, and VHT in Thousands					
P.M. Peak Hour:					
Lane Miles	247	313	1,291	521	721
VMT	208.6	211.5	936.4	494.2	392.5
VHT	8.7	10.5	41.2	24.1	19
Avg V/C Ratio	0.66	0.64	0.66	0.76	0.65
Avg Speed	23.9	20.1	22.8	20.5	20.7
% Congested VMT (V/C >= 0.80)	25.22%	21.00%	30.18%	56.62%	27.68%
Total Congested VMT	52.6	44.4	282.6	279.8	108.7
% Congested Lane Miles	17.74%	12.78%	6.16%	6.48%	11.04%
Accessibility					
(in thousands) :					
Avg. Number of Jobs Accessible in 45 min (Auto)	1,784.60	1,705.80	1,175.40	3,083.40	881.80
Avg. Number of Hholds Accessible in 45 min (Auto)	949	981.80	674	948.3	733.7
Avg. Number of Jobs Accessible in 45 min (Transit)	137.1	354.5	384.3	916.1	25.2
Avg. Number of Hholds Accessible in 45 min (Transit)	91.5	270.2	150.6	494.8	28.4