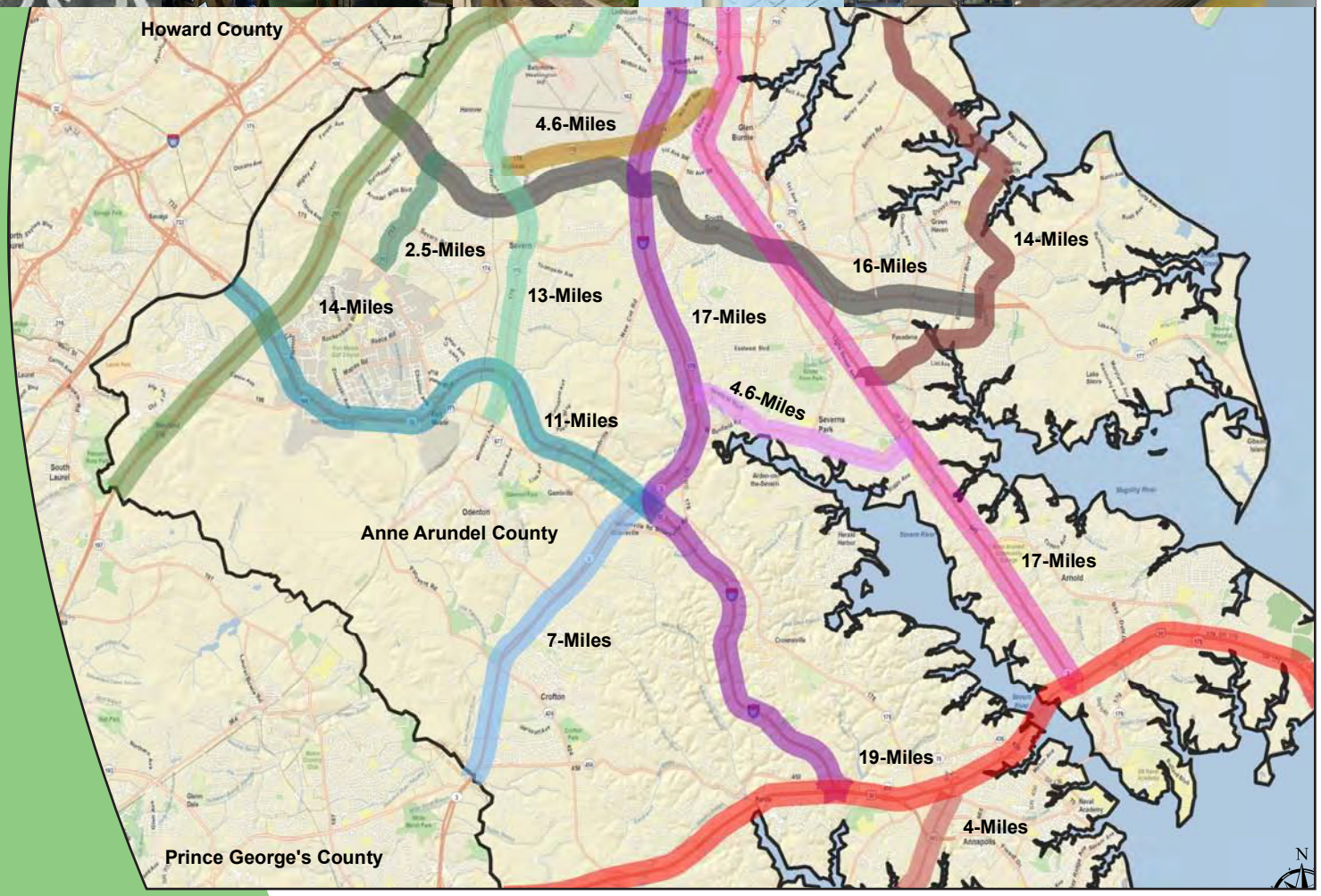
ANNE ARUNDEL COUNTY
MARYLAND

FINAL REPORT

Anne Arundel County
Corridor Growth Management Plan

July 20, 2012



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- Phil Bissett
- Maureen Carr
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George G. Cardwell, AICP, Planning Administrator
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PREFACE

The Corridor Growth Management Plan (CGMP) responds to the 2009 *General Development Plan* which observes that travel demand in Anne Arundel County continues to grow, but our ability to add road capacity is limited. The CGMP, therefore, evaluates on a Countywide basis, through the planning horizon year 2035, the feasibility of increasing use of alternative modes of travel (transit, managed travel lanes, bicycling and walking) in the County's nine most traveled regional highway corridors plus four important connector roads. These thirteen roadways currently accommodate over seventy percent of travel in the County.

A key finding of the CGMP is that the travel network improvements proposed in the Baltimore Region Constrained Long Range Plan (CLRP) are appropriate and necessary. However, they are insufficient to forestall traffic congestion in several segments of the thirteen corridors unless additional measures are implemented, particularly strategies which reduce the preponderance of single occupant automobile usage. The Study builds on the adopted CLRP network and indicates that the highest priority corridor for improvement is US 50 from the Prince George's County line to the Chesapeake Bay Bridge. In order to address recurring congestion, it is imperative that the crossing of the Severn River be widened as soon as possible to accommodate both the current and forecast travel demand in each direction. This project, listed in the CLRP, should be expedited. Further, the study also strongly urges that the State expedite the Federally mandated environmental and engineering studies necessary to identify a viable location for additional crossing capacity of the Chesapeake Bay.

Using the regional travel forecasting modeling process, the study evaluated a wide range of travel modes and transportation systems management (TSM) strategies. Although the study indicates that there is insufficient land use density to warrant additional passenger rail service, several study corridors can benefit from instituting premium bus service including US 50, I-97, MD 2, MD 100 and MD 3. If these services prove successful, it may be feasible that the premium services can be expanded to become bus rapid transit (BRT) operations, which provide high-speed transit vehicles on a separate right of way, offering high quality transit service at lower capital and operating expense. The US 50, MD 32 and MD 2 North corridors show particular promise for this type of transit improvement.

The CGMP is a component of a larger ongoing project to prepare the County's Transportation Functional Master Plan (TFMP) as recommended in the adopted *General Development Plan* (2009). As stated, the CGMP analyzes opportunities to improve travel in the County's major highway corridors. Other components will incorporate enhanced pedestrian and bicycle travel; identify potential regulatory changes that may facilitate efficient use of rights of way for all travel modes; evaluate engineering and operational strategies to relieve congestion at existing traffic bottlenecks; identify key relationships between land use patterns and transportation facilities; and recommend intergovernmental coordination strategies. All components comprising the TFMP are anticipated for completion by summer of 2014.

CHAPTER 1: EXECUTIVE SUMMARY

1.1 OVERVIEW

The Corridor Growth Management Plan is a response to the 2009 General Development Plan which observed that growth in employment and households is projected to continue over the next 20 years, which will create additional travel demand while the ability to add roadway capacity is limited. As the County continues to experience growth in population and employment, it faces both challenges to mobility and quality of life that are associated with that growth. The objective of this report is to develop transportation solutions for viable alternative modes of travel, with concept-level impacts and costs. The goal of these recommendations is to enhance mobility and accessibility for residents, commuters and businesses in order to preserve economic vitality and quality of life within the County. A map of these corridors is shown on the next page. A glossary of terms is provided in **Appendix U**.

This report presents specific recommendations, for mobility improvements based on changes in travel demand for the year 2035 forecasts, in nine key corridors throughout the County:

1. US 50: Prince George's County Line to the Chesapeake Bay Bridge – 19 miles
2. MD 2 North: US 50 to I-695 – 17 miles
3. MD 2 South: Central Avenue (MD 214) to West Street (MD 450) – 4 miles
4. I-97: US 50 to I-695 – 17 miles
5. MD 32: I-97 to the Howard County Line – 11 miles
6. MD 100: MD 648 to Howard County Line – 5 miles
7. Baltimore-Washington Parking/ MD 295: Prince George's County Line to I-695 – 14 miles
8. MD 3: Prince George's County Line to MD 32 – 7 miles
9. Magothy Bridge Road to Hog Neck Road (MD 607) to Ft. Smallwood Road (MD 173) to the Baltimore City Line – 14 miles

These nine corridors represent the busiest roadways in the County, carrying 70% of the total daily vehicle traffic volumes within the County, and also experience recurring rush hour congestion. Four secondary corridors were also studied to develop recommendations for toolbox strategies to provide enhanced management of day-to-day roadway/ traffic operations, as well as travel demand:

1. Benfield Blvd: I-97 to MD 2
2. MD 176 (Dorsey Rd) from MD 170 to MD 2
3. MD 170 (Aviation Blvd/Telegraph Rd) from MD 2 to MD 175,
4. MD 713/ Ridge Rd from MD 176 (Dorsey Rd) to MD 175

1.1.1 Purpose and Scope

This document and the proposed recommendations will assist County and State planners, land developers, and decision makers regarding future investments and priorities for improvements in highway, transit and non-motorized facilities. The recommendations have been carefully analyzed and vetted through the use of advanced travel forecasting software models, extensive coordination with local, state and regional transportation planners, as well as input from an 8-member appointed Citizen Advisory Committee. The recommendations focus on balancing the need for added roadway capacity with right-of-way and environmental constraints, and the need to provide for additional choices within each corridor other than travel by private automobile. As appropriate alternative modes of travel such as carpool, rail, bus, cycling and walking were identified in each corridor, the feasibility of each mode was tested. The selected recommendations represent “smart" transportation improvements that aim to:

- provide reliable travel times,
- decrease congestion along each corridor,
- enhance travel choices,
- improve safety for vehicles, bicyclists, and pedestrians, and
- support County land use plans while maintaining the character of the corridor.

For each corridor, the recommendations for roadway, transit, bicycle/ pedestrian facilities, and land use, along with toolbox strategies to provide enhanced management of day-to-day roadway/ traffic operations, as well as travel demand are presented in Figure 1-1. Capital and operating costs for all improvements are also presented.

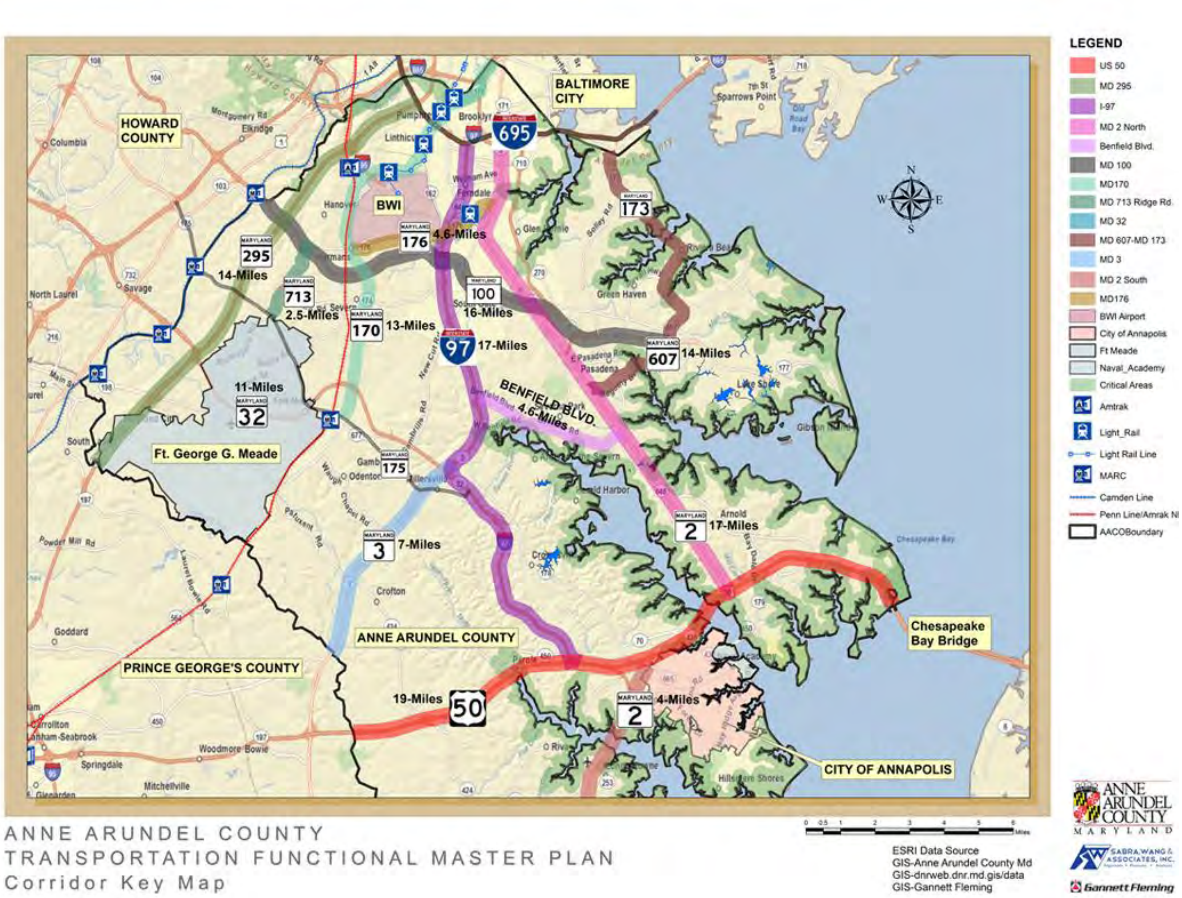
1.1.2 Project Costs

Planning level capital construction cost and operating cost estimates were developed for all roadway and transit improvements, based on costing guidance provided by the Maryland State Highway Administration and Maryland Transit Administration. The raw roadway costs include construction costs such as pavement widening, interchange upgrades, bridge structure upgrades, environmental mitigation, traffic control, as well as design fees but do not include the costs of purchases of lane for additional rights-of-way. The raw transit operating costs include the major components of fuel, labor and maintenance but do not include farebox recovery, park-and-ride lot construction/ expansion or maintenance garages. It is impractical at this time to estimate these later costs in the absence of a completed design. The total estimated cost to implement this plan on the nine primary corridors is **$3.6 billion**. See Table 1-1**.**

1.1.3 Alternatives Tested

Throughout the study, several alternatives were developed and tested for all corridors, including:

Figure 1-1: Corridor Key Map



ANNE ARUNDEL COUNTY
TRANSPORTATION FUNCTIONAL MASTER PLAN
Corridor Key Map

Table 1-1: Project Costs

Corridor	Roadway Cost	Transit Operating Costs (15-year service life)
US 50	$778,500,000	$189,887,000
MD 2 North	$100,800,000	$98,207,900
MD 2 South	$0	$0
I-97	$283,300,000	$51,916,200
MD 32	$665,150,000	$0
MD 100	$326,500,000	$28,002,600
BW Parkway/ MD 295	$48,000,000	$0
MD 3	$30,000,000	$37,433,700
Magothy Bridge/ Fort Smallwood	$0	$462,000
Transit Fleet Cost (Hybrid)		**$22,950**
GRAND TOTAL	**$3,180,700,000**	**$428,859,500**

1. A No Build Alternative. Only constructing roadways that are currently funded for construction, with no transit or carpool lane improvements.

2. A Roadway Widening Only Alternative. Only constructing roadways that are currently proposed to be widening in the Baltimore Region's Constrained Long Range Plan, with no transit or carpool lane improvements.

3. A Managed Lane Only Alternative. Only constructing new travel lanes on the existing corridors to provide priority carpool (High Occupancy Vehicle) and/ or general purpose traffic via tolled access (Express Toll/ High Occupancy Toll).

4. An Enhanced Transit Only Alternative. Providing new bus transit service in each corridor without necessarily providing new exclusive rights-of-way or priority treatments.

Based on the results of the alternatives analysis, the final and preferred alternative developed, tested, and recommended herein is a hybrid combination of the optimal roadway widening, managed lanes, and transit service with supporting select transit priority treatments and transit-oriented land use changes. Additional transit modes considered but not evaluated in detail are discussed in Chapter 5.

1.1.4 Priorities

Based on projected benefits, in travel time reliability, level of service, travel choices, and construction impact and feasibility it is recommended to construct US 50 and I-97 improvements initially, followed by a second tier priority of MD 295, MD 100 and M32, and lastly MD 3 and MD 2 North and South.

1.1.5 Next Steps

This document is a stand-alone report that is intended to justify advancing each of these corridors into detailed project planning and preliminary engineering, and identifying and securing funding commitments in partnership with appropriate State, Federal and private partners. This document builds on elements of the recently *adopted General Development Plan (2009) Chapters 7, 9, 11 and 12; GDP Background Report on Transportation, (2008) and the currently underway Anne Arundel County Pedestrian and Bicycle Master Plan, (2012)*. This report, along with future studies of additional secondary corridors, and new policy and design guidelines for developing Complete Streets that incorporate all modes of travel, will be integrated into a single Countywide Transportation Master Plan Document.

1.2 US 50

US 50 (John Hanson Highway) is a six to eight lane expressway that is projected to carry up to 200,000 vehicles per day by the year 2035, an increase of up to 40% over existing daily traffic

volumes. The corridor serves a diverse traffic mix including local traffic in the Annapolis area, long-distance commuter traffic destined for downtown Washington, D.C. and regional traffic destined to the Eastern Shore.

The recommendations for US 50 include roadway improvements, widening of the Severn River Bridge, new premium transit service and improved intermodal connections. See Table 1-2**.**

Table 1-2: Recommendations for US 50

Mode/ Strategy	Description
Roadway	• **Widen from 6 to 8 lanes between I-97 and the Chesapeake Bay Bridge including widening the Severn River Bridge** • Extend the existing carpool (HOV 2 or more persons) lanes from the Prince George's County Line to I-97
Transit	• Operation of all-day weekday high quality transit service (four routes) along this corridor with stops in Annapolis, Navy Stadium Park & Ride lot, Parole Town Center, Davidsonville, Bowie and continued service to key destinations in downtown Washington, D.C. The transit service would be permitted to run in the carpool lanes at all times. This service would be in addition to the existing MTA express bus services (922 and 950)
Bicycle and Pedestrian	• Bicycles and pedestrians will remain prohibited along US 50
Land Use	• Develop an intermodal hub in the Parole Town Center area, with direct access to/ from US 50 and expanded park and ride capacity
Toolbox Elements	• Configure separate express and local travel lanes between I-97 and MD 2 • Implement ramp metering between MD 665 and MD 2 • Enhance Active and Event Traffic Management through implementation of variable speed limits, dynamic lane marking, Variable Message Signs, and enhanced traveler information systems

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The provision of carpool lanes reduces daily general purpose traffic volumes by up to 10% in some segments in comparison to a roadway widening-only option, and the provision of premium bus service increases transit ridership in this corridor by up to 150% over existing conditions. Typical roadway cross-sections of this alternative are illustrated in Figure 1-2 along with a schematic route map of proposed location of transit nodes and intermodal connections in Figure 1-3.

The Maryland Transportation Authority, which owns and operates the Chesapeake Bay Bridge, has been a key technical partner in the development of improvements along US 50. While the Authority is undertaking short-term studies to consider enhanced bus service, variable toll pricing, and improved incident response services on the bridge, no formal initiation of the required federal environmental studies for an improved or additional Bay Crossing is currently

Figure 1-2: US 50 Proposed Roadway Cross-Sections

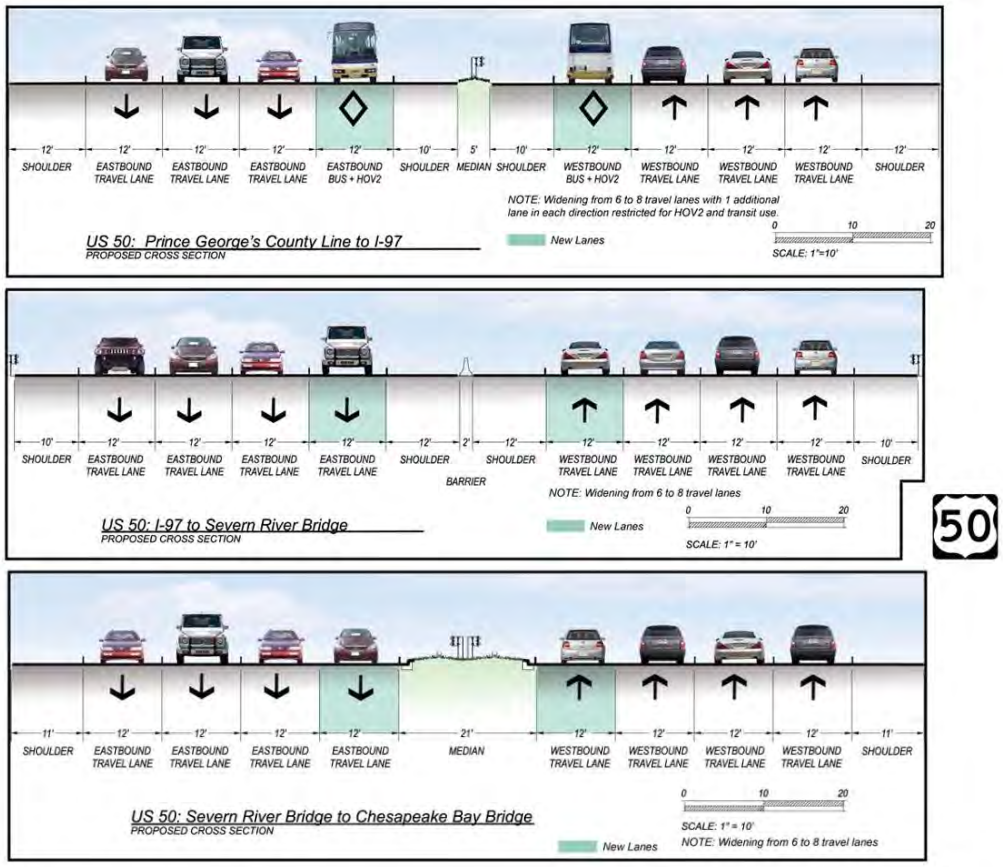


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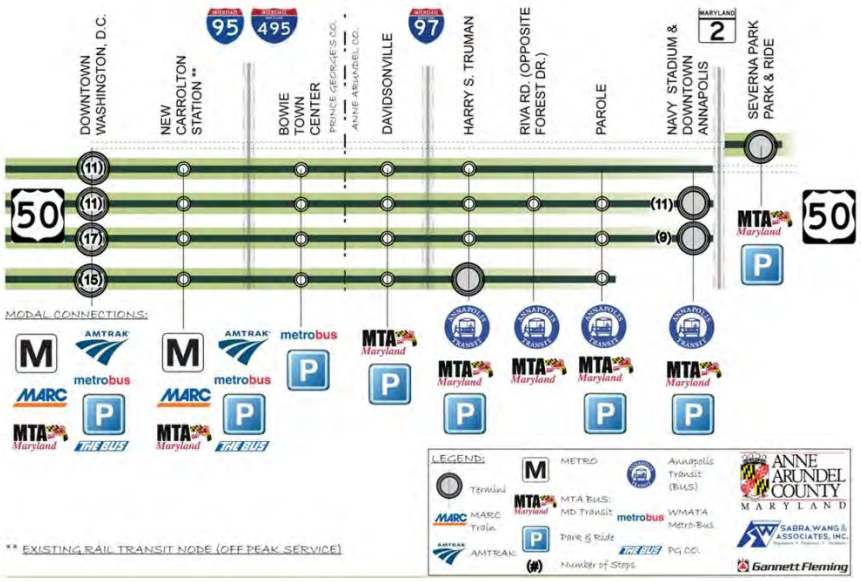
Figure 1-3: US 50 Proposed Transit Route Map, Nodes and Intermodal Connections



planned. The Authority has been fully engaged with the County in long-range land use and transportation planning and has pledged to carefully consider the recommendations developed for this study in developing their own improvements for additional roadway capacity across the Chesapeake Bay. It is recommended that the Authority initiate necessary environmental and engineering studies to determine location and design feasibility of an additional Bay crossing

1.3 MD 2 - NORTH

Maryland Route 2 (Governor Ritchie Highway) is a four to six-lane arterial roadway that is projected to carry up to 76,000 vehicles per day by the year 2035, an increase of up to 26% over existing daily traffic volumes. The corridor serves both local traffic in the Annapolis, Severna Park, Pasadena and Glen Burnie areas, as well as long-distance commuter traffic destined for downtown Baltimore.

The recommendations for MD 2 include roadway improvements, new premium transit service, new sidewalks, and permitting land use densities that support transit in select locations where redevelopment might occur. See Table 1-3.

Table 1-3: Recommendations for MD 2 North

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between US 50 and MD 10**
Transit	• Operation of all-day weekday high quality limited stop transit service along this corridor with stops at the Navy Stadium Park and Ride lot, Anne Arundel Community College, Jones Station Park and Ride, Severna Park Plaza, Marley Station, Glen Burnie Town Center and key destinations in downtown Baltimore. This service would not replace the existing MTA local bus route #14
Bicycle and Pedestrian	• New sidewalk on both sides of MD 2
Land Use	• Allow for transit-oriented development in Severna Park Marketplace, Harundale Plaza, Marley Station Mall and Glen Burnie Town Center
Toolbox Elements	• Implement bus priority treatments such as queue jumps, signal priority and enhanced signal coordination • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The additional land use density increased projected daily traffic volumes by 10% in one segment, but resulted in overall only one additional failing segment than a roadway-only widening option. However, the plan recommendation for this corridor significantly increased walking and biking trips, and increased transit ridership by up to 125% over existing levels.

Typical roadway cross-sections of this alternative are illustrated in Figure 1-4, along with a schematic route map of proposed location of transit nodes and intermodal connections (Figure 1-5).

Figure 1-4: MD 2 Proposed Roadway Cross Sections

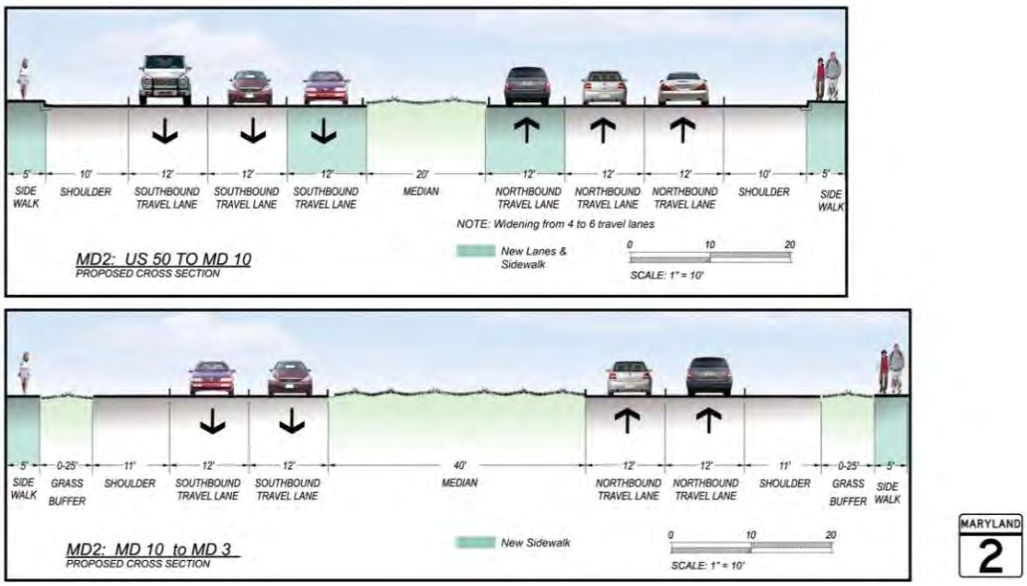
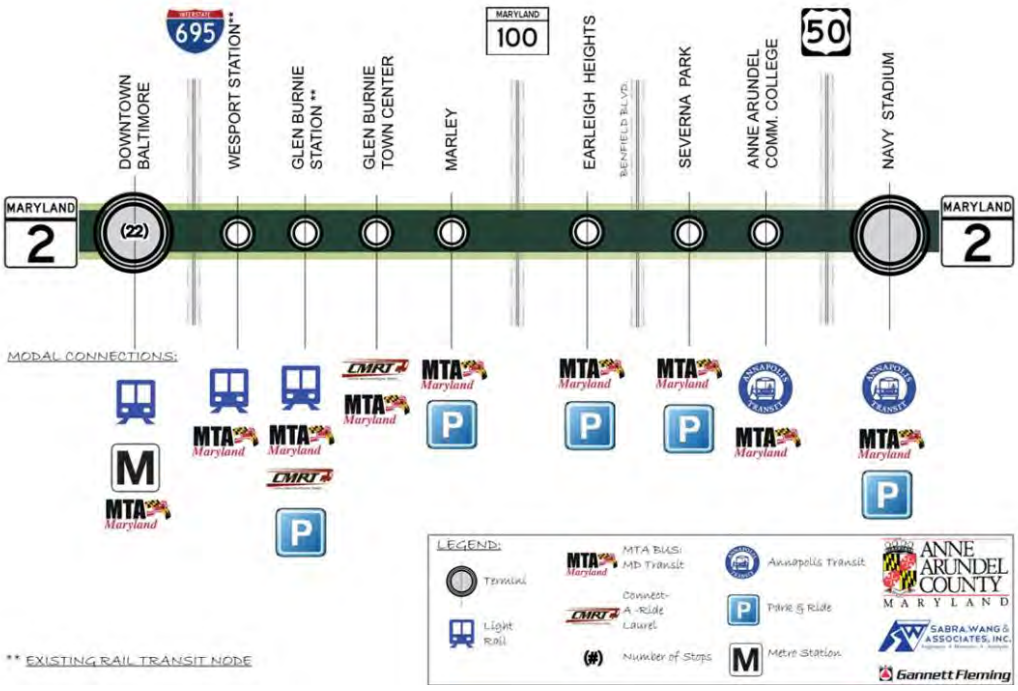


Figure 1-5: MD 2 Proposed Transit Route Map, Nodes and Intermodal Connections



1.4 MD 2 - SOUTH

Maryland Route 2 (Solomon's Island Road) is a four to six-lane arterial roadway that is projected to carry up to 63,000 vehicles per day by the year 2035, an increase of up to 46% over existing daily traffic volumes. The corridor serves both local traffic in the Annapolis area, as well as long-distance commuter traffic from South County.

The recommendations for MD 2 include primarily pedestrian and bicycle improvements and toolbox strategies to better manage congestion. See Table 1-4.

Table 1-4: Recommendations for MD 2 South

Mode/ Strategy	Description
Roadway	• none
Transit	• no new service but improve existing service frequency, span, and upgrade bus stops with real-time transit information, shelters, lighting and benches
Bicycle and Pedestrian	• construct missing sidewalks, evaluate feasibility to add bike lanes and/ or signed routes along side streets, parallel routes or MD 2
Land Use	• incorporate improved site design to orient new buildings to the street and encourage more walkable frontage
Toolbox Elements	• Implement bus priority treatments such as queue jumps, signal priority and enhanced signal coordination • Develop improved access controls such as frontage road creation and streetscape treatments as redevelopment occurs to create a boulevard style cross-section • Evaluate the need for improvements to connecting roadways such as MD 214 to improve intersection level of service • Evaluate MD 2 South from Aris T. Allen Blvd to and including the South River Bridge

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The proposed roadway cross-sections and transit routing remains unchanged from existing conditions.

1.5 I-97

I-97 is a four to six lane expressway that is projected to carry up to 150,000 vehicles per day by the year 2035, an increase of up to 30% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Millersville, Severna Park and Glen Burnie area, and commuter traffic destined for downtown Baltimore and Annapolis.

The recommendations for I-97 include roadway improvements, and new premium transit service. See Table 1-5.

Table 1-5: Recommendations for I-97

Mode/ Strategy	Description
Roadway	• Widen from 4 to 6 lanes between US 50 and MD 32
Transit	• Operation of all-day weekday high quality transit service along this corridor with stops in Parole Town Center, Benfield Blvd, Glen Burnie Town Center, Glen Burnie Light Rail Station, BWI Airport and Arundel Mills Mall
Bicycle and Pedestrian	• **Bicycles and pedestrians will remain prohibited along I-97**
Land Use	• No land use changes are proposed
Toolbox Elements	• Enhance Active and Event Traffic Management through implementation of variable speed limits, dynamic lane marking, Variable Message Signs, and enhanced traveler information systems • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The roadway widening proved to provide adequate levels of service in all but one segment near the MD 3 Business interchange, and the provision of high quality bus service reduced daily traffic volumes by 1% in some segments.

Typical roadway cross-sections of this alternative are illustrated in **Error! Reference source not found.**, along with a schematic route map of proposed location of transit nodes and intermodal connections (Figure 1-7).

1.6 MD 32

MD 32 is a four to six lane expressway that is projected to carry up to 93,000 vehicles per day by the year 2035, an increase of up to 55% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Savage, Odenton and Millersville areas, and commuter traffic destined for Ft. Meade, NSA job centers as well as Annapolis.

The recommendations for MD 32 include roadway improvements. The carpool lanes reduce daily traffic volumes from a roadway-widening only option by up to 12% in some segments. Volumes on the carpool lanes are projected to reach up to 19,000 vehicles per day. See Table 1-6.

Typical roadway cross-sections of this alternative are illustrated in Figure 1-8.

Figure 1-6: I-97 Proposed Roadway Cross Sections

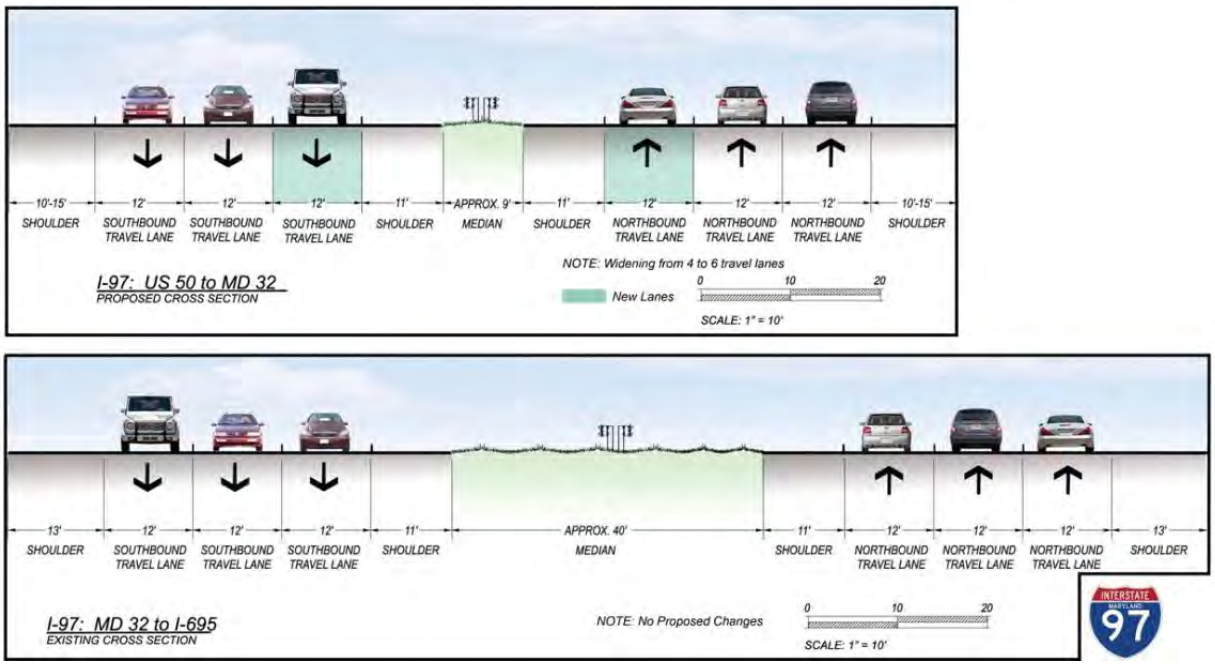


Figure 1-7: I-97 Proposed Transit Route Map, Nodes and Intermodal Connections

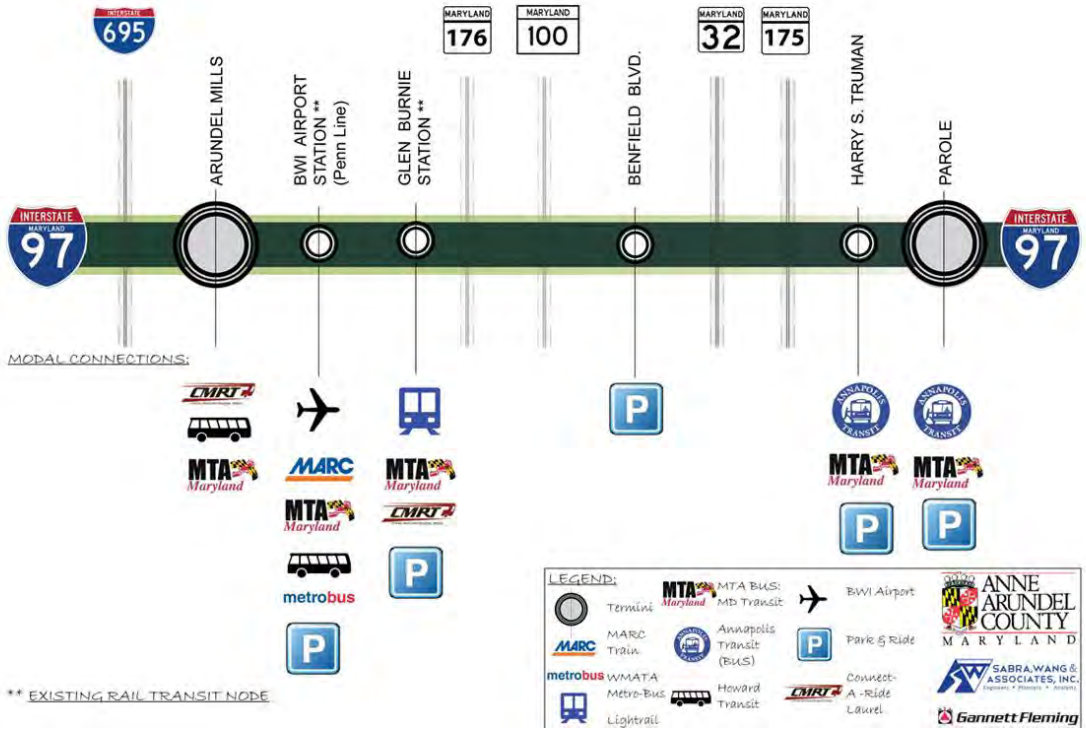
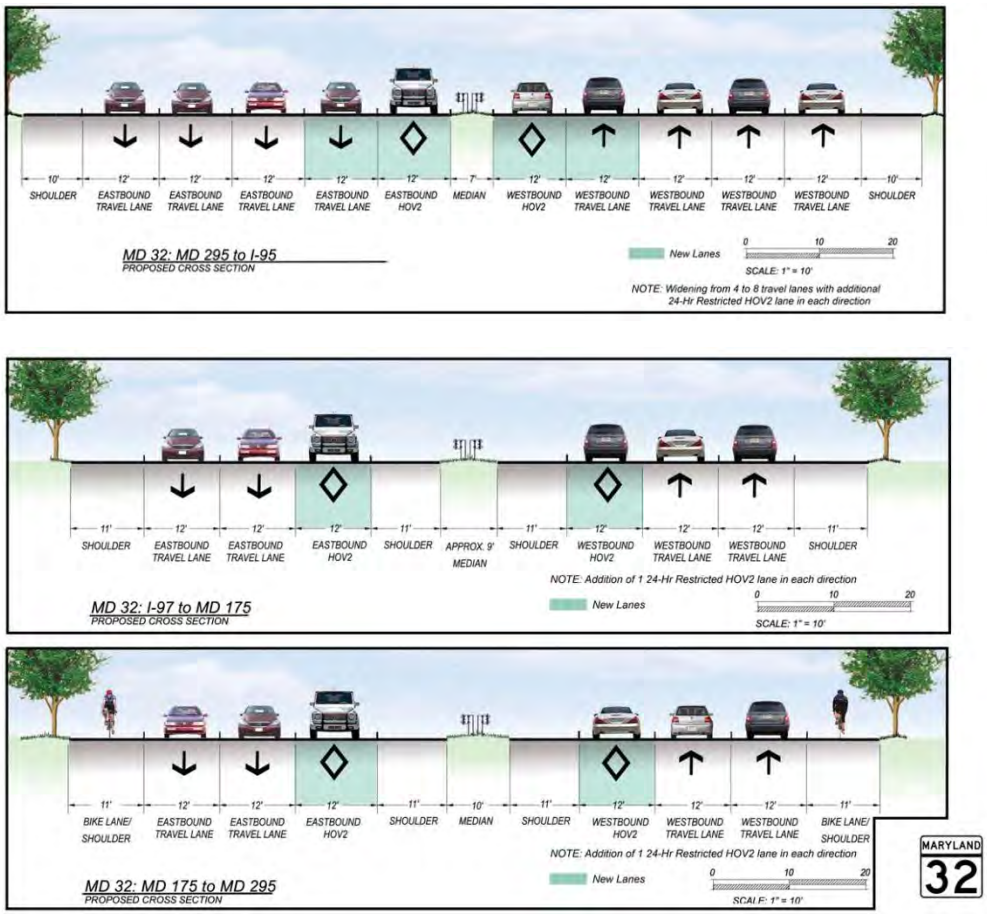


Table 1-6: Recommendations for MD 32

Mode/ Strategy	Description
Roadway	• **Widen to 8 lanes (between I-95 and MD 295)** • Construct new carpool (HOV 2 or more persons) lanes from I-95 to I-97
Transit	• Provide subscription transit services and eventually express bus service
Bicycle and Pedestrian	• None other than where located today
Land Use	• No land use changes are proposed due to federal ownership of land on both sides of the roadway
Toolbox Elements	• Evaluate operation of subscription (van pool) and local bus service, and having those vehicles use the HOV lanes

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

Figure 1-8: MD 32 Proposed Roadway Cross Sections



1.7 MD 100

MD 100 is a four to six lane expressway that is projected to carry up to 112,000 vehicles per day by the year 2035, an increase of up to 37% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Dorsey, Glen Burnie and Lake Shore, and traffic destined for major activity centers such as BWI Airport, Arundel Mills Mall, and the Maryland Live casino.

The recommendations for MD 100 include roadway improvements, and new premium transit service. See Table 1-7.

Table 1-7: Recommendations for MD 100

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between I-95 and I-97**
Transit	• Operation of all-day weekday high quality transit service along this corridor with stops in Marley Station, BW Medical Center, MD 170 (potential future MARC Station), Arundel Mills, Dorsey MARC Station, Snowden River Park & Ride, and Long Gate Park & Ride/ Ellicott City
Bicycle and Pedestrian	• Bicycles and pedestrians will remain prohibited along MD 100
Land Use	• Allow for transit-oriented development around the MD 170 interchange to support a future infill commuter rail station
Toolbox Elements	• Configure separate express and local lanes between I-97 and MD 2 • Implement ramp metering between MD 295 and MD 2 • Enhance Active and Event Traffic Management through implementation of variable speed limits, dynamic lane marking, Variable Message Signs, and enhanced traveler information systems • Evaluate interchange improvements such as extended acceleration/ deceleration lanes to enhance merging and weaving between I-97 and Catherine Ave • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The roadway widening proved to provide adequate levels of service in all segments west of I-97, and the transit-oriented development along with the high quality transit service also projected over 2,300 transit trips per day.

Typical roadway cross-sections of this alternative are illustrated in Figure 1-9, along with a schematic route map of proposed location of transit nodes and intermodal connections (Figure 1-10).

Figure 1-9: MD 100 Proposed Roadway Cross Sections

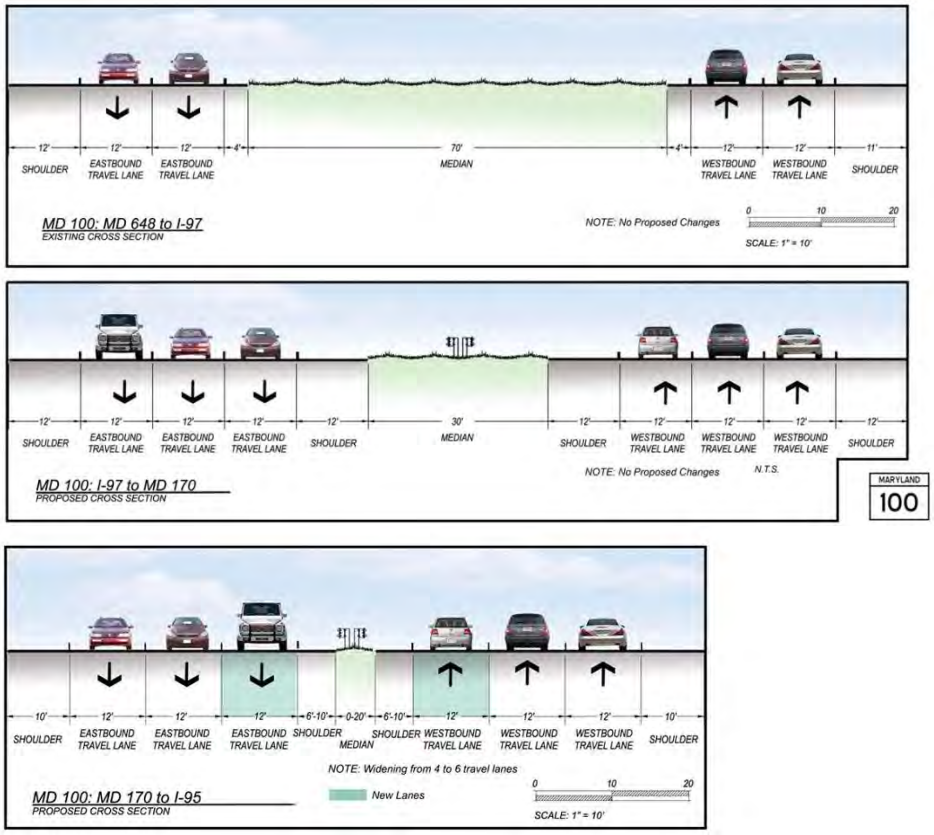
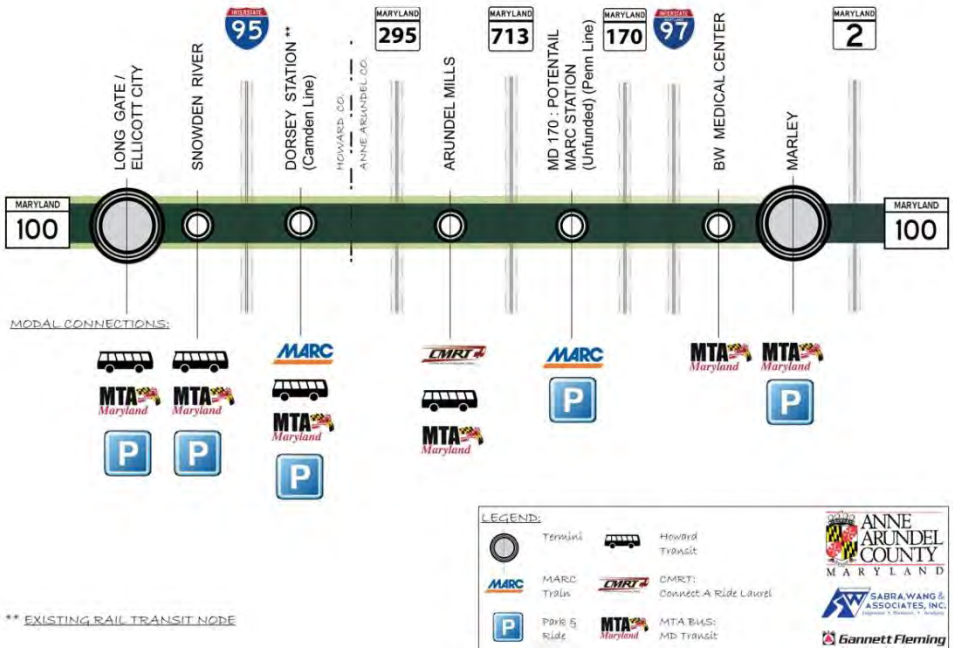


Figure 1-10: MD 100 Proposed Transit Route Map, Nodes and Intermodal Connections



1.8 BALTIMORE-WASHINGTON PARKWAY/ MD 295

The Baltimore-Washington Parkway (MD 295 north of MD 175) is a four to six-lane expressway that is projected to carry up to 130,000 vehicles per day by the year 2035, an increase of up to 44% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Savage, Jessup, and Linthicum areas, long-distance commuter traffic destined for downtown Washington, D.C., Baltimore and regional traffic destined to major activity centers such as Fort Meade/ NSA, Arundel Mills, the Maryland Live casino and BWI Airport.

The recommendations for US 50 include roadway improvements, and new local transit service. See Table 1-8.

Table 1-8: Recommendations for MD 295

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between MD 100 and I-195**
Transit	• Operation of new local transit service in parallel corridors such as MD 176 and MD 713
Bicycle and Pedestrian	• Bicycles and pedestrians will remain prohibited along MD 295
Land Use	• none
Toolbox Elements	• enhance signal coordination on parallel corridors such as MD 713, MD 170 • Evaluate improved local road connectivity west of MD 295 • Improvements to Race Road, Brock Bridge, Ridge Road and US 1 to carry additional local traffic

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The Baltimore-Washington Parkway/ MD 295 corridor is owned and maintained by the National Park Service (NPS) south of MD 175. A recent NPS planning study recommended no widening, carpool lanes or new transit service south of MD 175.

Typical roadway cross-sections of this alternative are illustrated in Figure 1-11.

1.8.1 MD 3

MD 3 is a four to six lane expressway that is projected to carry up to 109,000 vehicles per day by the year 2035, an increase of up to 38% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Millersville and Crofton areas, regional traffic destined for Bowie and points south in southern Maryland, and long-distance traffic destined to other states.

The recommendations for MD 3 include roadway improvements, and new premium transit service. See Table 1-9.

Figure 1-11: BW Parkway/ MD 295 Proposed Roadway Cross Section

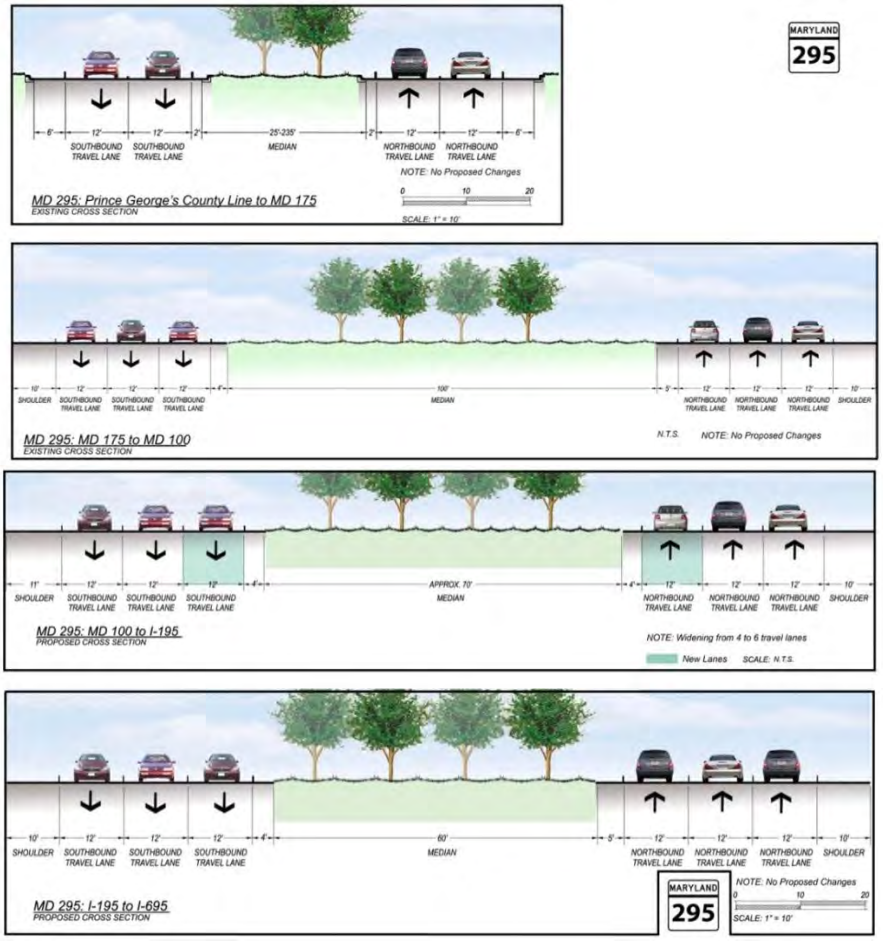


Table 1-9: Recommendations for MD 3

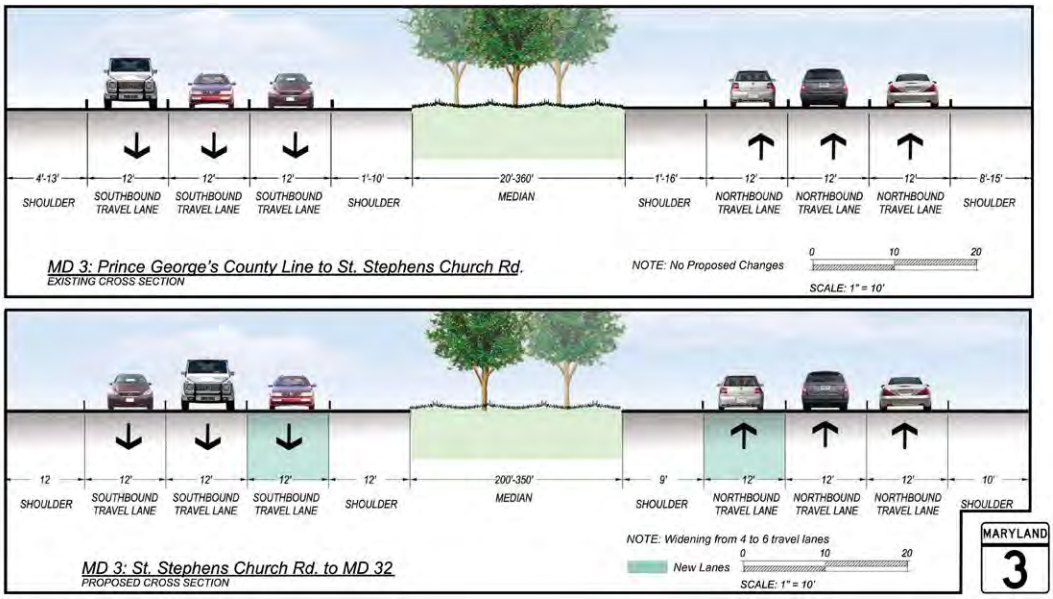
Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between the Prince George's County line and MD 32**
Transit	• Operation of all-day weekday high quality transit service along this corridor with stops in Bowie MARC, Bowie Town Center, Crofton, Waugh Chapel, Odenton, Benfield Blvd, Glen Burnie Light Rail, BWI Airport and Arundel Mills
Bicycle and Pedestrian	• Construct a new sidewalk and trail between MD 450 and MD 32 (per NEPA documentation)
Land Use	• none
Toolbox Elements	• upgrade all signalized intersections to interchanges • Priority bus treatments such as queue jumps, signal priority as enhanced/upgraded transit services are provided. • Access management/ driveway consolidation and frontage road creation for bicycle and pedestrian access as redevelopment occurs • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The roadway widening will still result in some rush hour congestion in the peak direction; however, the provision of premium bus service in this corridor reduces daily traffic volumes by 1%.

Typical roadway cross-sections of this alternative are illustrated in Figure 1-12 along with a schematic route map of proposed location of transit nodes and intermodal connections (Figure 1-13).

Figure 1-12: MD 3 Proposed Roadway Cross Sections



1.9 MAGOTHY BRIDGE ROAD/ HOG NECK ROAD/ FORT SMALLWOOD ROAD

Magothy Bridge Road/ Hog Neck Road (MD 607) and Fort Smallwood Road (MD 173) are two to four lane arterials that are projected to carry up to 27,000 vehicles per day by the year 2035, an increase of up to 14% over existing daily traffic volumes. The corridor serves local traffic in the Pasadena, Lake Shore and Riviera Beach areas.

The recommendations for MD 3 include extended local transit service and improved access for pedestrians, bicycles, and transit users. See Table 1-10.

The roadway cross-section remains unchanged from existing conditions.

1.10 SECONDARY CORRIDORS

Four secondary corridors were also studied to develop recommendations for toolbox strategies to provide enhanced management of day-to-day roadway/ traffic operations, as well as travel demand.

Figure 1-13: MD 3 Proposed Transit Route Map, Nodes and Intermodal Connections

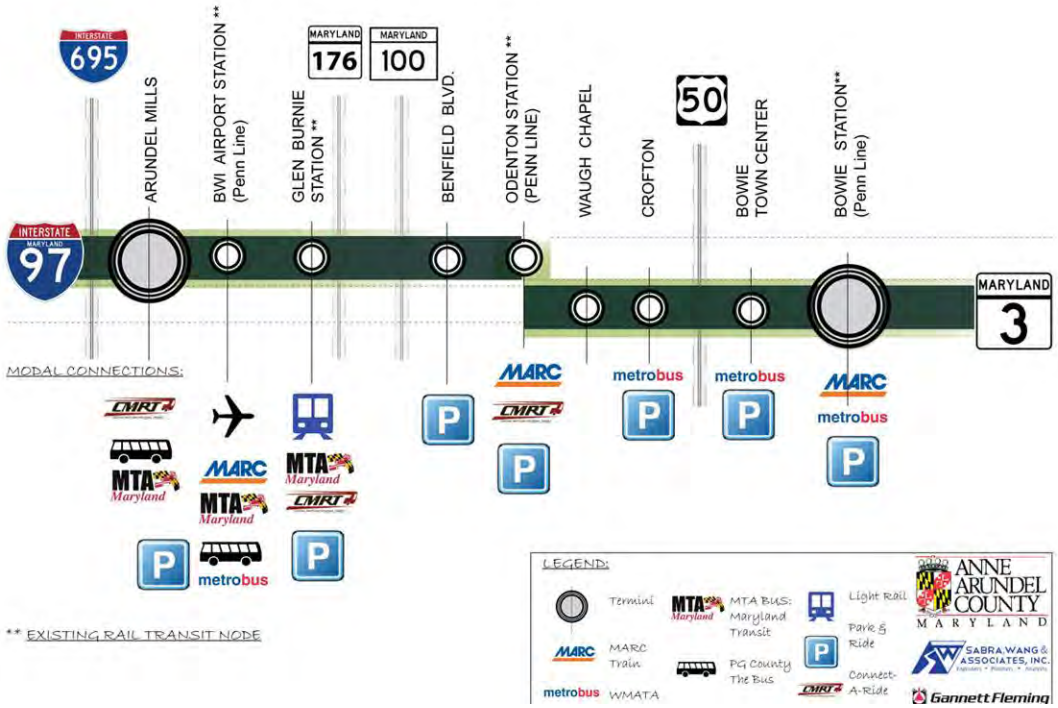


Table 1-10: Recommendations for Magothy Bridge, Hog Neck, & Ft Smallwood Roads

Mode/ Strategy	Description
Roadway	• none
Transit	• Extend the existing MTA bus route #64 to Chesterfield Plaza and increase peak hour headways
Bicycle and Pedestrian	• Construct new sidewalks and evaluate feasibility for bicycle lanes or signed routes along the corridor
Land Use	• None
Toolbox Elements	• Improve amenities for transit users including shelters, benches, lighting and provision of real-time transit information • Evaluate developer-funded intersection improvements along Magothy Bridge Road

1. Benfield Blvd: I-97 to MD 2
2. MD 176 (Dorsey Rd) from MD 170 to MD 2

3. MD 170 (Aviation Blvd/Telegraph Rd) from MD 2 to MD 175,
4. MD 713/ Ridge Rd from MD 176 (Dorsey Rd) to MD 175

No detailed technical analysis of traffic forecasts were performed for these corridors, but a summary of improvements is presented in Table 1-11.

Table 1-11: Secondary Corridor improvements

Benfield Blvd
• Improve the cross-section to accommodate bicycles and pedestrians, including designated bike lanes/ route signing • Implement access management/ driveway consolidation in the more commercial area • Implement a demand-responsive shuttle service between the Benfield Park & Ride and the Jones Station Park & Ride to connect with proposed high quality transit along MD 2 and I-97 • Implement bike shares and car shares at the Benfield Park &Ride and the Jones Station Road Park & Ride
MD 176
• Improve bicycle and pedestrian facilities such as sidewalks and bicycle lanes/ signed routes • Implement access management • Implement new site design guidelines/ overlay district to provide a more walkable streetscape/ building frontage • Implement shared parking requirements
MD 170
• **Widen from 2 lanes to 4 lanes from MD 175 to MD 100** • Implement subscription bus service and install amenities for transit users such as shelters, benches, lighting and real-time transit information
MD 713/ Ridge Road
• **Widen from 2 lanes to 4 lanes from MD 175 to Arundel Mills Blvd to relieve MD 295 traffic** • **Widen from 4 lanes to 6 lanes from Arundel Mills Blvd to MD 176 to relieve MD 295 traffic** • Provide more frequent local transit service and install transit amenities for transit users such as shelters, benches, lighting and real-time transit information, • Improve bicycle and pedestrian facilities such as bicycle lanes/ signed routes • Implement new site design guidelines/ overlay district to provide a more walkable streetscape/ building frontage

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

CHAPTER 2: INTRODUCTION

2.1 INTRODUCTION

The Corridor Growth Management Plan is a response to the 2009 General Development Plan which observed that growth in employment and households is projected to continue over the next 20 years, which will create additional travel demand while the ability to add roadway capacity is limited. This report presents the analysis, forecasting, alternatives development, testing, and recommended improvements to nine primary corridors within the County's transportation network. As the County continues to experience growth in population and employment, it faces both challenges to mobility and quality of life that are associated with that growth. The County's somewhat unique location adjacent to two metropolitan areas and the Chesapeake Bay, and the cluster of major State and Federal facilities, are contributing factors to this demand. The objective of this report is to present concept-level transportation solutions with impacts and costs for nine specific corridors that carry the highest volume of traffic within the County. The goal of these recommendations is to enhance mobility and accessibility for residents, commuters and businesses. These corridors include:

- US 50: Prince George's County Line to WP Lane Memorial (Chesapeake Bay) Bridge – 19 miles
- MD 2: Central Avenue (MD 214) to West Street (MD 450) – 4 miles
- MD 2: US 50 to I-695 – 17 miles
- I-97: US 50 to I-695 – 17 miles
- MD 32: I-97 to Howard County – 11 miles
- MD 100: MD 648 to Howard County – 5 miles
- MD 295: Prince George's County to I-695 – 14 miles
- MD 3: Prince George's County to MD 32 – 7 miles
- Magothy Bridge Road to Hog Neck Road (MD 607) to Ft. Smallwood Road (MD 173) to the Baltimore City Line – 14 miles

The nine corridors represent the busiest roadways in the County as identified in the General Development Plan, experience recurrent congestion, and also may be ones in which high quality transit could be a viable means of moving people. Four secondary corridors were also studied to develop recommendations for 'toolbox strategies' to provide enhanced management of day-to-day roadway/ traffic operations, as well as travel demand:

1. Benfield Blvd: I-97 to MD 2
2. MD 176 (Dorsey Rd) from MD 170 to MD 2
3. MD 170 (Aviation Blvd/Telegraph Rd) from MD 2 to MD 175,
4. MD 713/ Ridge Rd from MD 176 (Dorsey Rd) to MD 175

This report identifies constraints and opportunities for each corridor and recommends improvements for highway, transit and non-motorized facilities. This project builds on elements of the recently adopted *General Development Plan (2009) Chapters 7, 9, 11 and 12; GDP Background Report on Transportation, (2008) and the currently underway Anne Arundel County Pedestrian and Bicycle Master*

Plan, (2012). This report, along with future studies of additional secondary corridors, and new policy and design guidelines for developing Complete Streets that incorporate all modes of travel, will be integrated into a single Countywide Transportation Master Plan Document.

The approach in this effort was to address forecasted future recurring congestion through evaluation of the major transportation corridors of the County as a network, evaluating alternatives using the adopted land use plan and cooperative demographic forecasts to determine what mixture of recommendations, at a network level, will serve to best reduce future travel congestion, at the lowest capital and operating costs while limiting the impact to the adjacent natural and built environment. It should be noted that this effort was a Countywide approach and that this approach was built upon the currently adopted Baltimore Metropolitan Council Transportation Improvement Plan and Constrained Long Range Plan which are the current policies of the County for future improvements to the transportation network.

The study focused on identifying, analyzing, and understanding the relationship between land use patterns and the mobility and accessibility constraints and opportunities within each corridor and their interaction within the region. This document and the proposed recommendations will assist County planners, land developers, decision makers, and budgets regarding future investments and improvements for highway, transit and non-motorized facilities.

The effort also included a review and revision to the Countywide travel forecasting and travel demand models, compilation of traffic data, roadway level of service/ capacity analyses, modeling of future roadway networks, development of high quality transit routing, operating characteristics and intermodal connections, identification of system and demand management strategies, conceptual footprint assessment including cross-section elements and preliminary costs, and stakeholder and public outreach.

2.2 PURPOSE AND NEED

The purpose of this report is to identify and develop transportation solutions for viable alternative modes of travel, with concept-level impacts and costs. The purpose of these recommendations is to enhance mobility and accessibility for residents, commuters and businesses in order to preserve economic vitality and quality of life within the County. Anne Arundel County's transportation planning process is a comprehensive, coordinated and continuous process that follow's current federal regulations and is active at the local, State and Regional level. The emphasis of the study is to explore the feasibility of improving alternative travel options such as carpool, rail, bus, cycling and walking. The goal of these recommendations is to identify "smart" transportation improvements that decrease congestion along each corridor, enhance travel choices, and improve safety for vehicles, bicyclists, and pedestrians while not substantially changing the character of the corridors. This report is a critical component to the County's overall Transportation Master Plan. It will serve several needs including:

- Developing a vision to guide investment in the County's primary transportation corridors over the next 25 years

- Assessing, within each corridor, enhanced travel choices, optimal new modes of travel, intermodal connections and tools for better managing congestion
- Assisting the County in having a greater leadership role in the pursuit of regional transportation funding, planning and improvement strategies through better analysis and advocacy
- Supporting existing and future land uses including transit-oriented development
- Developing concept level design elements and preliminary construction costs for each corridor
- Developing a 'toolbox' of practical day-to-day strategies to better management roadway/ traffic operations as well as travel demand for each corridor
- Identify longer term right-of-way needs and make informed recommendations about land requirements for future transportation facilities.

2.3 TRANSIT NODE IDENTIFICATION AND MODE INVESTIGATION

Primary modes assessed in this study included highway, managed lanes (carpool and tolled lanes), and transit. In order to begin identifying appropriate modes of transit, a comprehensive regional assessment of transit routing including nodes, termini, connections to existing transit services, and land use compatibility was considered. A node, for the purposes of this report, is defined as an location where two modes of travel intersect. A maximum conceptual transit network of 30 new nodes and 10 existing nodes was developed for testing. Varying levels and technologies of transit considered included heavy rail, light rail, streetcar, commuter bus, premium bus, local bus, and bus rapid transit. The regional travel modeling tool was used to identify the following key issues regarding alternative modes of travel:

- If approved land use patterns and future travel demand support high-quality new transit service
- If additional land use density, or increased service frequency and/ or speed (through priority treatments) would make transit, carpooling or tolled lanes a viable travel choice
- Would provision of alternative modes of travel result in any measurable reduction in projected daily vehicle traffic and/ or levels of congestion
- What supporting packages (park and ride facilities, priority treatments, rights-of-way) would be needed to implement a seamless network

2.4 ALTERNATIVE SCREENING/ MEASURES OF EFFECTIVENESS/ PRIORITIZATION

Balancing the need for added roadway footprint with limited right of way, environmental constraints, and the need to provide for more travel choices has been carefully considered on a corridor-by-corridor and segment-by-segment basis to identify which roadway and transit capacity improvements will be most operationally beneficial and justified. The following factors will be considered in both screening

alternatives to identify preferred concepts as well as among the final set of recommendations for ranking corridor implementation priorities for advancement into detailed project planning, preliminary and final engineering design, acquisition, and construction:

1. Travel Time Reliability. The ability of travel options in each corridor to provide consistent future peak hour travel times either based on the lack of peak hour vehicle congestion or the provision of alternative modes of travel with priority treatments and exclusive right-of-way to ensure faster travel times,

2. Average Daily Traffic. The total daily number of vehicles traversing a particularly point along a roadway over a 24-hour period,

3. Level of Service. A qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed, travel time, freedom to maneuver, traffic interruption, comfort and convenience. For example, LOS A represents free flow, almost complete freedom to maneuver within the traffic stream. LOS F represents forced flow, more vehicles are attempting to use the freeway than can be served resulting in stop and go traffic,

4. Transit Ridership. The number of passengers using a public transportation system such as a bus

5. Travel Choices .The number of future available options to travel from one point in a corridor to another, in comparison to existing conditions,

6. Cost. The total dollar value, in current year dollars, to design and construct a proposed improvement,

7. Feasibility (environmental, right-of-way impact).The amount of impact from construction of proposed improvements due to sensitive environmental features such as streams, wetlands or personal property such as homes and business, and

8. Land Use Compatibility. The consistency of recommendations with currently zoned land use regulations and small area plans.

2.5 STAKEHOLDER AND PUBLIC OUTREACH

The Corridor Growth Management Plan process facilitated extensive stakeholder and public outreach along several facets throughout the 18-month timeline:

- A Project Management Team met quarterly throughout the 18-month study and provided technical guidance and feedback. Represented agencies included:
    - The Maryland State Highway Administration (Regional Intermodal Planning Division, Travel Forecasting and Analysis Division, District 5)
    - Anne Arundel County Department of Public Works

- Maryland Transit Administration
- Central Maryland Regional Transit
- Maryland Transportation Authority
- Howard County
- Prince George's County
- BWI Partnership
- Annapolis Regional Transportation Management Association
- Maryland Department of Planning
- City of Annapolis
- Maryland Department of Transportation
- Baltimore Metropolitan Council
- Washington Metropolitan Transit Authority

- An 8-member specially appointed Citizen Advisory Committee representing various communities throughout the County
  - Katherine Falk, Chair
  - William Nevel, Vice Chair
  - Phil Bissett
  - Maureen Carr
  - David Cosner
  - Michael Gellner
  - Benjamin Hilliard
  - Lenora McMillian

- A series of public meetings and open houses were held throughout the project. Listening sessions at three locations around the County were held at the project initiation stage, a presentation of preliminary findings open house was held in February of 2012 and presentation of the final recommendations open house was held in June of 2012

A comprehensive website and repository for all technical documents including reports, meeting minutes, graphics, and schedules: http://www.aacounty.org/PlanZone/TransPlan/index.cfm. See **Appendix V** for meeting minutes from the PMT and CAC Meetings and public comments.

2.6 REPORT ORGANIZATION

The report is organized in several chapters as follows:

1. Chapter 1. Executive Summary
2. Chapter 2. Introduction
3. Chapter 3. Existing Conditions Documentation
4. Chapter 4. Travel Forecasting
5. Chapter 5. The Plan Recommended Network
6. Chapter 6. Corridor Toolbox Strategies
7. Chapter 7. Corridor Footprint Assessment
8. Chapter 8. Cost Assessment
9. Chapter 9. Summary and Recommendations

CHAPTER 3: EXISTING CONDITIONS DOCUMENTATION

3.1 INTRODUCTION

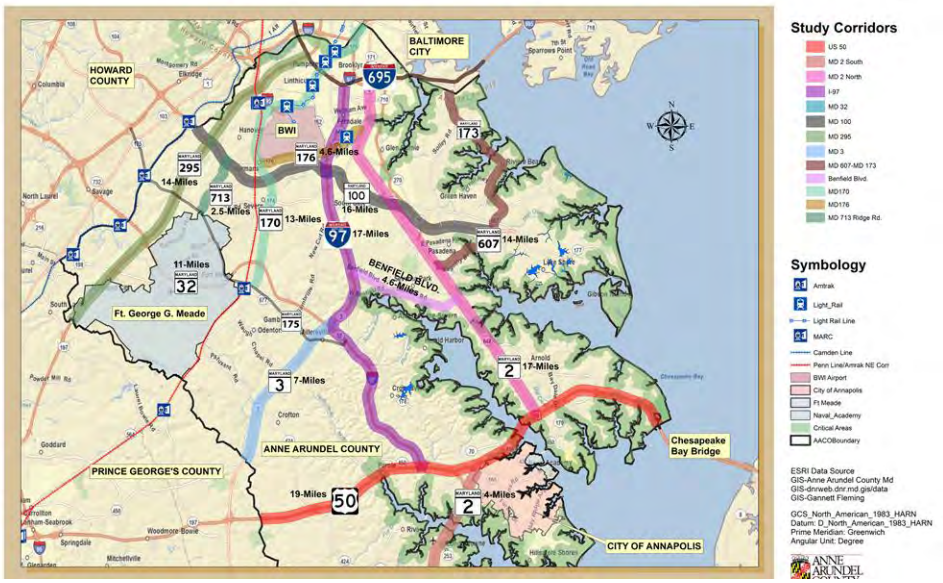
The purpose of this Chapter is to document the existing conditions of transportation-related elements in each of the identified corridors, including existing traffic volumes, existing level of service and existing transportation network characteristics. Existing conditions data was collected through a series of field inventories and windshield surveys including number of lanes, cross-sectional elements (median, shoulder, drainage), bicycle routes and access, sidewalks, bus stop type and location, park-and-ride lots and utilization, and transit ridership. In addition, the key elements of completed transportation studies and land-use plans were reviewed to ascertain currently planned future transportation and land use conditions affecting these corridors.

Detailed traffic count data is included in **Appendix A**. Detailed level of service calculations are included in **Appendix B**. Detailed inventory summaries are included in **Appendix C**. Detailed corridor base mapping is included in **Appendix D**. Existing transit service mapping is illustrated in **Appendix E**. Detailed summaries of previous transportation and land use plan recommendations affecting each corridor is including in **Appendix F**.

3.2 EXISTING TRAFFIC VOLUMES

Existing and historical traffic counts were compiled to determine the daily travel demand for each corridor and to obtain the traffic data necessary for roadway capacity analyses and travel demand model validation (e.g. average annual daily traffic (AADT), commuter peak hour traffic volumes). An illustration of the 13 corridors is shown in Figure 3-1.

Figure 3-1: Corridor Key Map



3.2.1 US 50

US 50 (John Hanson Highway) is a six to eight lane expressway that carries up to 161,000 vehicles per day, with the highest volumes between I-97 and the lowest volumes (63,000) near Bay Dale Drive. The corridor serves a diverse traffic mix including local traffic in the Annapolis area, long-distance commuter traffic destined for downtown Washington, D.C. and regional traffic destined to the Eastern Shore.

3.2.2 MD 2 South

MD 2 South (Solomon's Island Road) is a four to six-lane arterial roadway that currently carries up to 54,000 vehicles per day, with the highest volumes near MD 665 and the lowest volumes (29,000) north of MD 450 (West Street). The corridor serves both local traffic in the Annapolis area, as well as long-distance commuter traffic from South County.

3.2.3 MD 2 North

MD 2 North (Governor Ritchie Highway) is a four to six-lane arterial roadway that currently carries up to 62,000 vehicles per day, with the highest volumes near College Parkway and the lowest volumes (29,000) near 5th Avenue. The corridor serves both local traffic in the Annapolis, Severna Park, Pasadena and Glen Burnie areas, as well as long-distance commuter traffic destined for downtown Baltimore.

3.2.4 I-97

I-97 is a four to six lane expressway that currently carries up to 133,000 vehicles per day, with the highest volumes near MD 100, and the lowest volumes (92,000) near MD 178. The corridor serves a diverse traffic mix including local traffic in the Millersville, Severna Park and Glen Burnie area, and commuter traffic destined for downtown Baltimore and Annapolis.

3.2.5 MD 32

MD 32 is a four to six lane expressway that currently carries up to 60,000 vehicles per day, with the highest volumes near MD 295 and the lowest volumes (37,000) near MD 170. The corridor serves a diverse traffic mix including local traffic in the Savage, Odenton and Millersville areas, and commuter traffic destined for Ft. Meade, NSA job centers as well as Annapolis.

3.2.6 MD 100

MD 100 is a four to six lane expressway that currently carries up to 91,500 vehicles per with the highest volumes near MD 295 and the lowest volumes (27,000) near Magothy Bridge Road. The corridor serves a diverse traffic mix including local traffic in the Dorsey, Glen Burnie and Lake Shore, and traffic destined for major activity centers such as BWI Airport and Arundel Mills Mall.

3.2.7 MD 295

MD 295 The Baltimore-Washington Parkway (MD 295 north of MD 175) is a four to six-lane expressway that currently carries up to 104,000 vehicles per day, with the highest volumes near MD 100 and the lowest volume (82,000) near MD 32. The corridor serves a diverse traffic mix including local traffic in the Savage, Jessup, and Linthicum areas, long-distance commuter traffic destined for downtown Washington, D.C. and Baltimore, and regional traffic destined to major activity centers such as Fort Meade/ NSA, Arundel Mills and BWI Airport.

3.2.8 MD 3

MD 3 is a four to six lane expressway that currently carries up to 76,000 vehicles per day, with the highest volumes near MD 450, and the lowest volumes (59,000) near Waugh Chapel Road. The corridor serves a diverse traffic mix including local traffic in the Millersville and Crofton areas, and regional traffic destined for Bowie and points south in southern Maryland.

3.2.9 MD 173/ MD 607

MD 173/ MD 607 Magothy Bridge Road/ Hog Neck Road and Fort Smallwood Road are arterial roadways that currently carry up to 24,000 vehicles per day, with the highest traffic volumes near Marley Neck Blvd and the lowest volumes (9,000) near MD 2. The corridor serves local traffic in the Pasadena, Lake Shore and Riviera Beach areas.

3.2.10 Benfield Blvd

Benfield Blvd is a two-lane arterial roadway that currently carries up to 25,000 vehicles per day serving local traffic in the Severna Park area between MD 2 and I-97.

3.2.11 MD 176

MD 176 is a two to four lane arterial roadway the currently carries up to 25,000 vehicles per day serving local traffic between MD 2 and MD 170 including BWI Airport and Arundel Mills Mall.

3.2.12 MD 170

MD 170 (primary arterial) – This corridor is a two to four lane arterial roadway the currently carries up to 30,000 vehicles per day and serves local traffic between Odenton and Linthicum Heights including BWI Airport.

3.2.13 MD 713/ Ridge Road

MD 713/ Ridge Road is a two to six-lane arterial roadway currently carrying up to 35,000 vehicles per day, and serves local traffic between Ft. Meade and Arundel Mills.

3.3 EXISTING LEVEL OF SERVICE

Existing levels of service for each corridor were calculated. Level of service (LOS) is a grading system for transportation components (intersections, freeways, ramps, etc.) and a qualitative measure describing operational conditions within a traffic stream, based on such factors as speeds, travel time, freedom to maneuver, and stops. For example, LOS A represents free flow, almost complete freedom to maneuver within the traffic stream. LOS F represents congested flow; more vehicles are attempting to use the roadway than can be served resulting in stop-and-go traffic. While the letter grades correlate to classroom grades, the acceptable level of service grade for most jurisdictions is the letter D, which indicates an efficient use of roadway space but not oversaturated flow. It should be noted that this analysis is a macroscopic analysis based on roadway geometric characteristics and vehicle traffic composition, and may not always reflect friction caused by weaving, acceleration and deceleration along freeways through interchanges, or along arterials due to variable signal timing patterns.

Congested and failing commuter rush hour conditions were primarily noted in the following locations:

- along US 50 near MD 70
- along MD 2 South near MD 214 and MD 665
- along MD 2 South near the South River Bridge
- along MD 2 North near MD 710 and MD 10
- along I-97 near US 50
- along MD 32 near MD 295
- along MD 100 near MD 295, MD 713, I-97 and MD 2
- along MD 195 near I-695, near MD 175 and MD 32
- along MD 3 near MD 450, MD 424, Waugh Chapel Road and MD 175
- along Magothy Bridge Road near MD 100, and Fort Smallwood Road near Duvall Highway
- along Benfield Blvd near MD 2 and I-97
- along MD 176 near MD 648
- along MD 170 near MD 176
- along MD 713 near MD 175 and near Arundel Mills Blvd

In each of the corridors the known operational constraints that cause some of the current congestion will be further addressed in during more detailed project planning studies of the individual corridor.

3.4 PREVIOUS STUDIES

Prior to developing any future recommendation, a thorough review of previous transportation and land use studies was performed. These studies are indexed in Table 3-1.

Table 3-1: Master List of Transportation and Land Use Reports Reviewed

Title	Date Published	Publishing Agency
Annapolis Comprehensive Plan	August 2007	City of Annapolis
Annapolis Neck Small Area Plan	March 2003	AA Co
Anne Arundel County GDP Background Report - Land Use	June 2008	AA Co
Anne Arundel County GDP Background Report - Transportation	May 2008	AA Co
Anne Arundel County General Development Plan	April 2009	AA Co
Anne Arundel County Greenways Master Plan	October 2002	AA Co
Anne Arundel County Pedestrian & Bicycle Master Plan	March 2003	AA Co
Anne Arundel County Priority Letter	May 2010	MDOT
Anne Arundel County Transit Development Plan	January 2010	AA Co
Arundel Mills Video Lottery Terminal Facility Traffic Impact Study	November 2010	AA Co
Baltimore-Washington Investment Corridor Studies	April 2008	MDOT
Bay Crossing Study	September 2007	MdTA
BMC Transportation Outlook 2035	November 2007	BMC
BRAC Action Plan Report	N/A	MDOT
Broadneck Small Area Plan	December 2001	AA Co
Brooklyn Park Small Area Plan	September 2004	AA Co
BWI/Linthicum Small Area Plan	November 2003	AA Co
Crofton Small Area Plan	January 2001	AA Co
Crownsville Small Area Plan	May 2000	AA Co
Deale/Shady Side Small Area Plan	June 2001	AA Co
Edgewater/Mayo Small Area Plan	February 2002	AA Co
Fort Meade BRAC Near Term Highway Corridor Studies	January 2009	AA Co
Fort Meade BRAC Transit & Ridesharing Planning Study	November 2009	AA Co
Fort Meade Final EIS	September 2010	AA Co
Glen Burnie Small Area Plan	September 2004	AA Co
Jessup/Maryland City Small Area Plan	February 2004	AA Co
Lake Shore Small Area Plan	May 2004	AA Co
Magothy Bridge Road Future Traffic Corridor Analysis	September 2008	AA Co
Maryland Transportation Plan	January 2009	MDOT
MD 175 Phase II Feasibility Study	January 2010	AA Co
MD 607: MD 173 to Woods Road Feasibility Study	November 2006	AA Co
MDOT Consolidated Transportation Program (CTP) 2010-2015	2010	MDOT
Odenton Small Area Plan	September 2003	AA Co
Odenton Town Center Master Plan Transportation Study	June 2010	AA Co
Parole Town Center Plan	1994	AA Co
Pasadena/Marley Neck Small Area Plan	August 2004	AA Co
Prince Georges County Master Plan of Transportation	October 2008	MNCPPC
Severn Small Area Plan	July 2002	AA Co
Severna Park Small Area Plan	March 2002	AA Co
SHA Consolidated Transportation Program (CTP) 2010-2015	2010	SHA
SHA Highway Needs Inventory - Anne Arundel County	2010	SHA
SHA MD 175 Environmental Assessment	Ongoing	SHA
SHA MD 198 Environmental Assessment	Ongoing	SHA
SHA MD 295 - MD 100 to I-95 Environmental Assessment	Ongoing	SHA
SHA MD 3 Environmental Impact Statement	Ongoing	SHA
South County Small Area Plan	December 2001	AA Co
US 50 over Severn River Bridge Feasibility Study	October 2010	SHA
Villages of Waugh Chapel South Traffic Impact Study (Revised)	December 2009	AA Co

Illustrations of existing corridor cross-sections and level of service are shown in Figures 3-2 through 3-14.

Figure 3-2: MD 50 Existing LOS

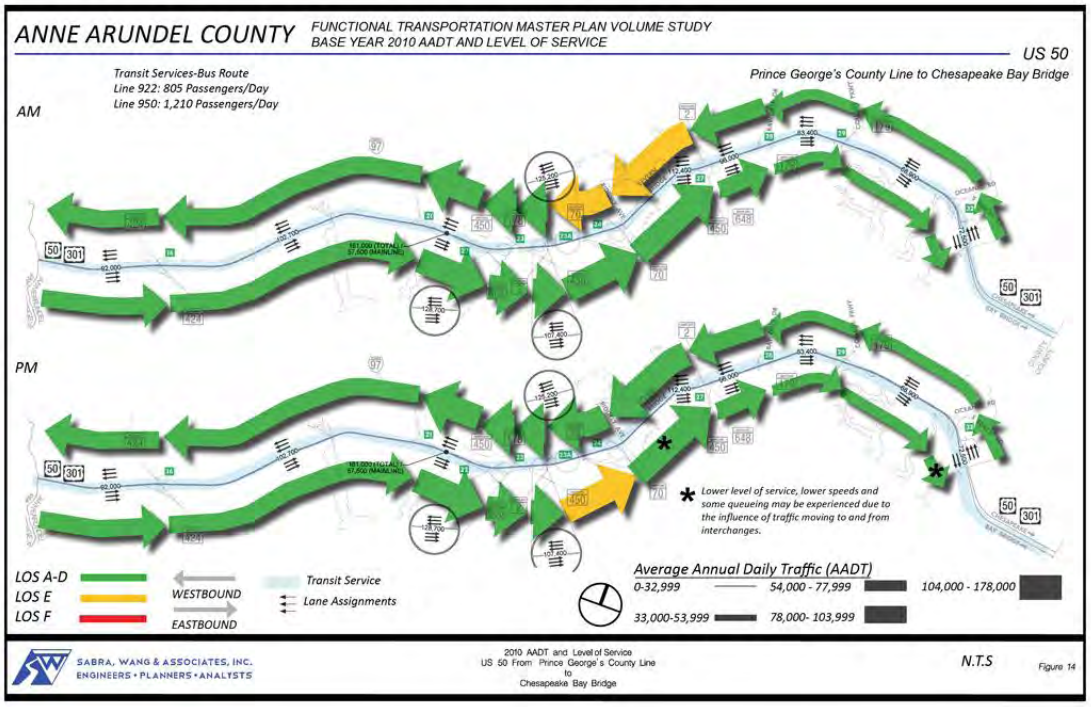


Figure 3-3: MD Existing 2 LOS

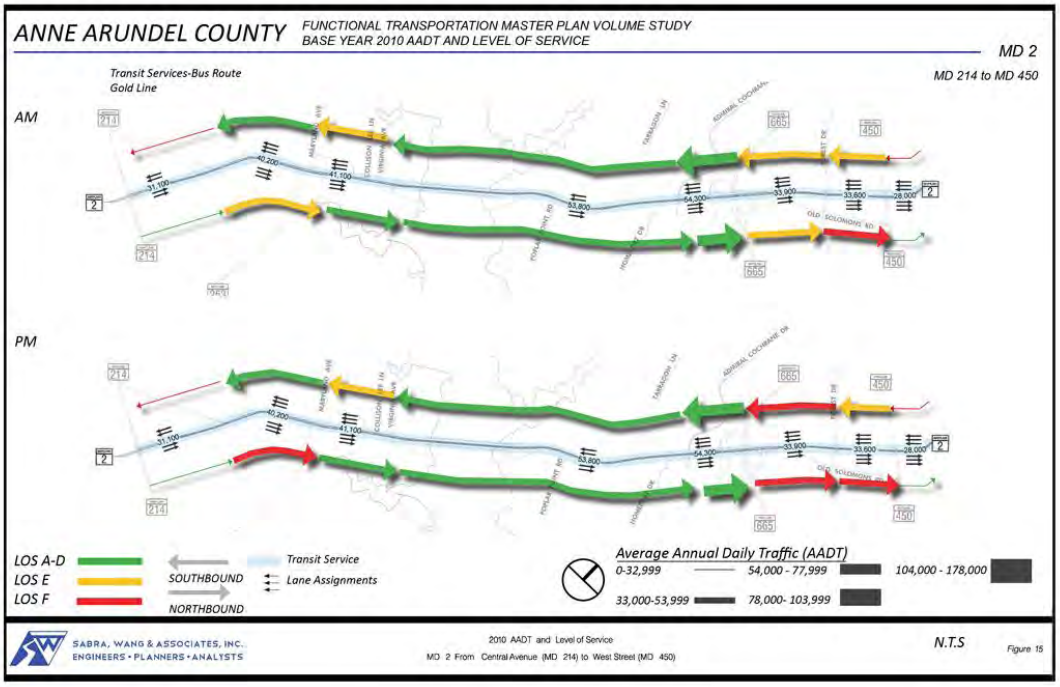


Figure 3-4: MD 2 Existing LOS

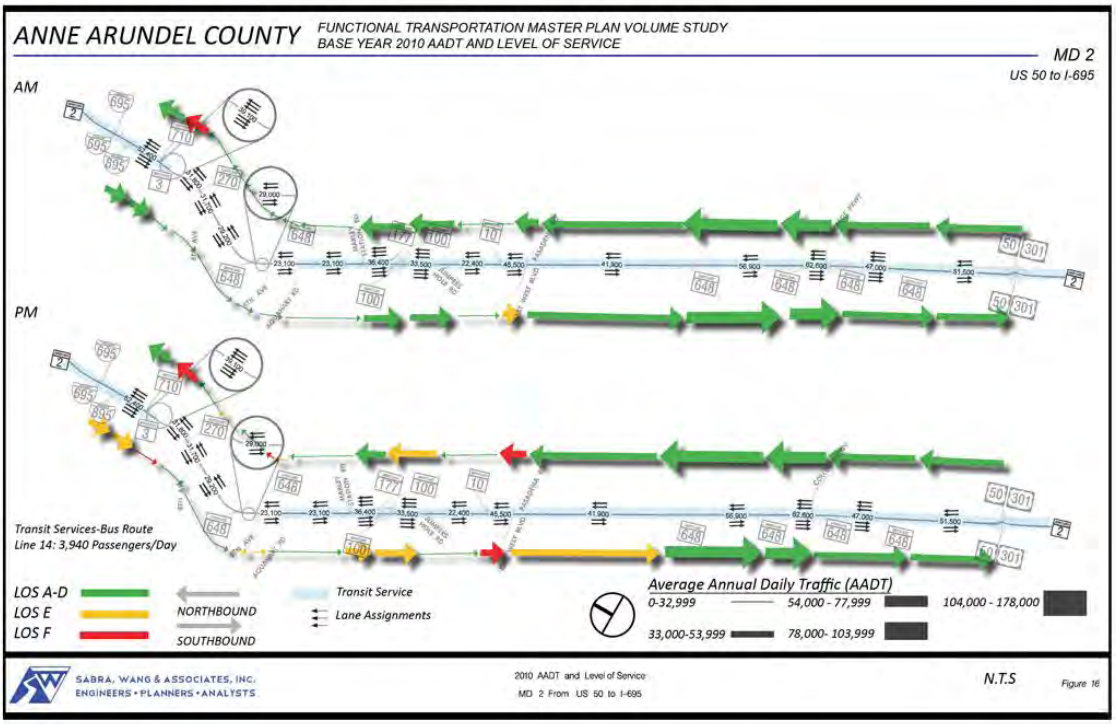


Figure 3-5: I-97 Existing LOS

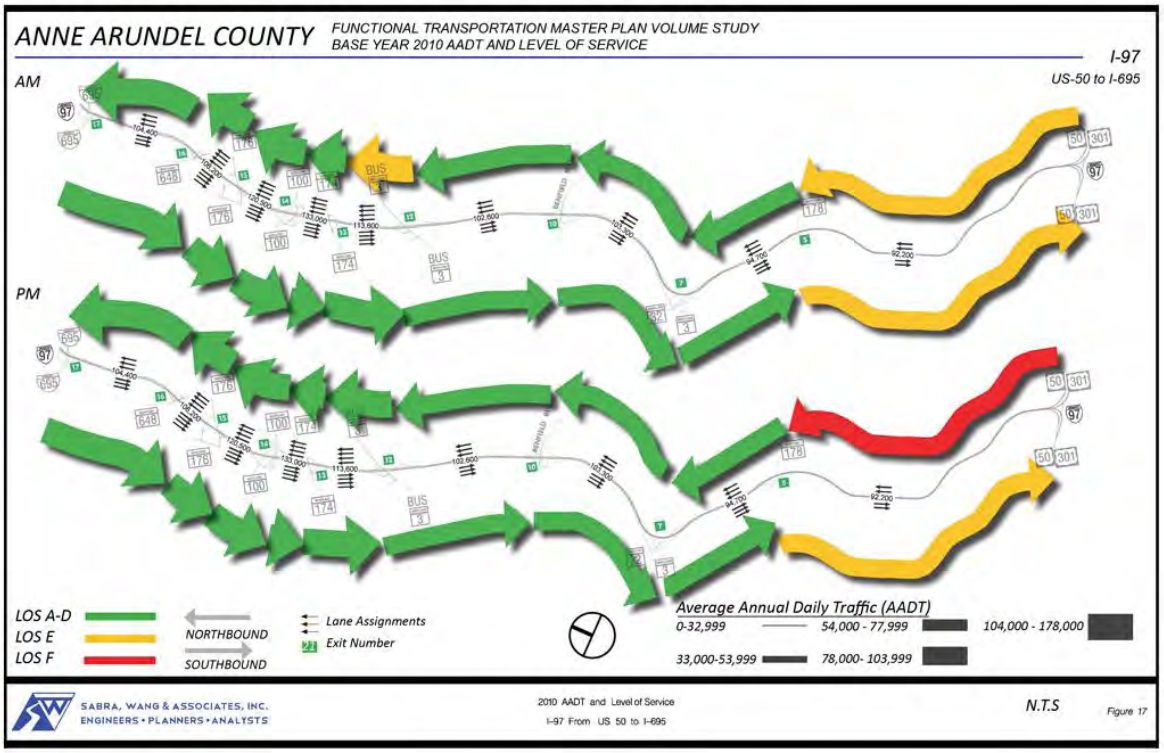


Figure 3-6: MD 32 Existing LOS

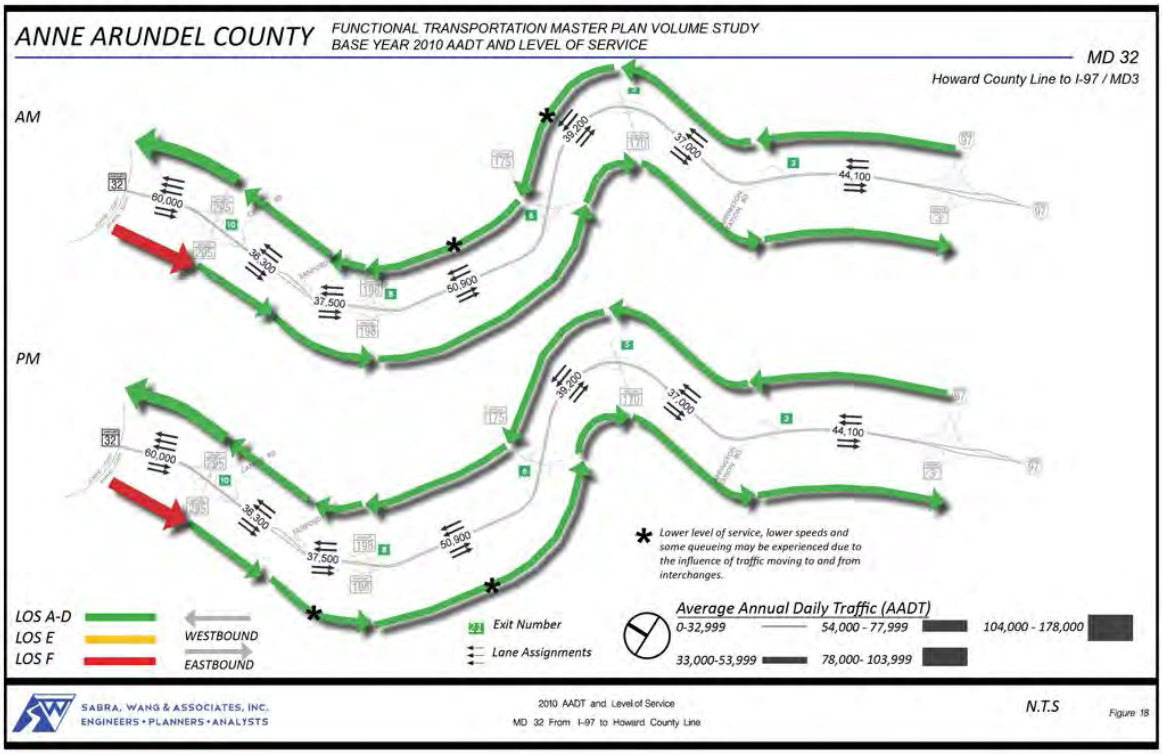


Figure 3-7: MD 100 Existing LOS

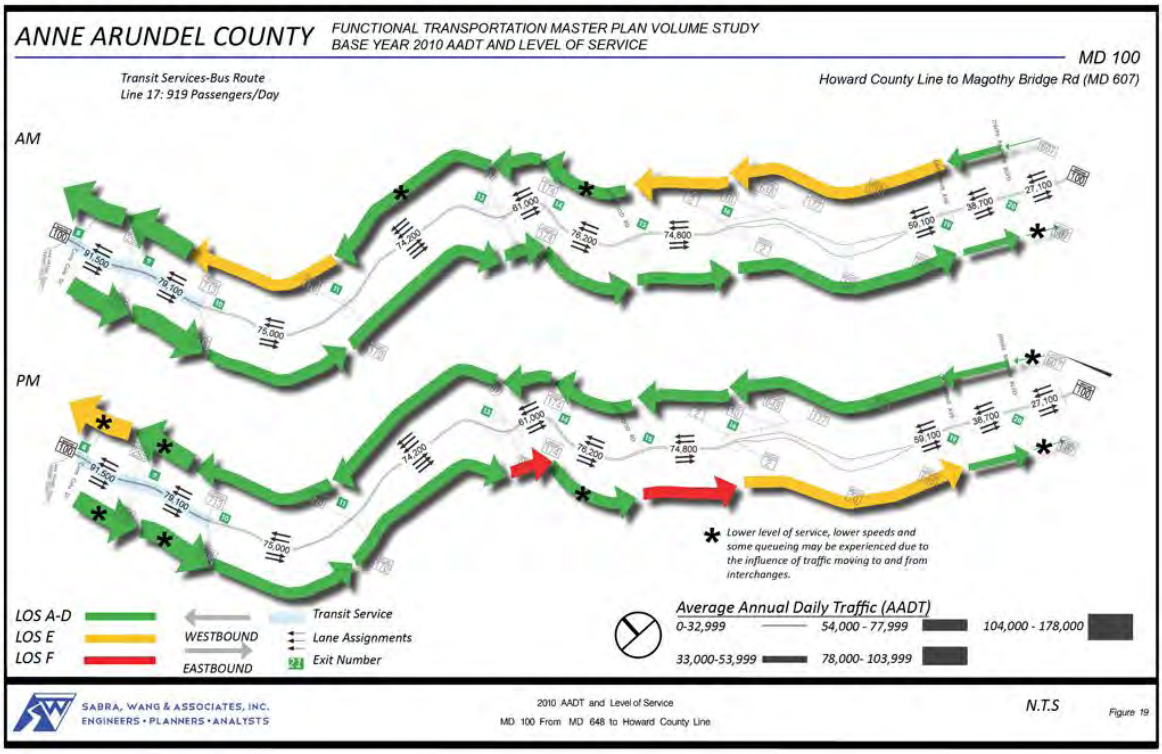


Figure 3-8: MD 295 Existing LOS

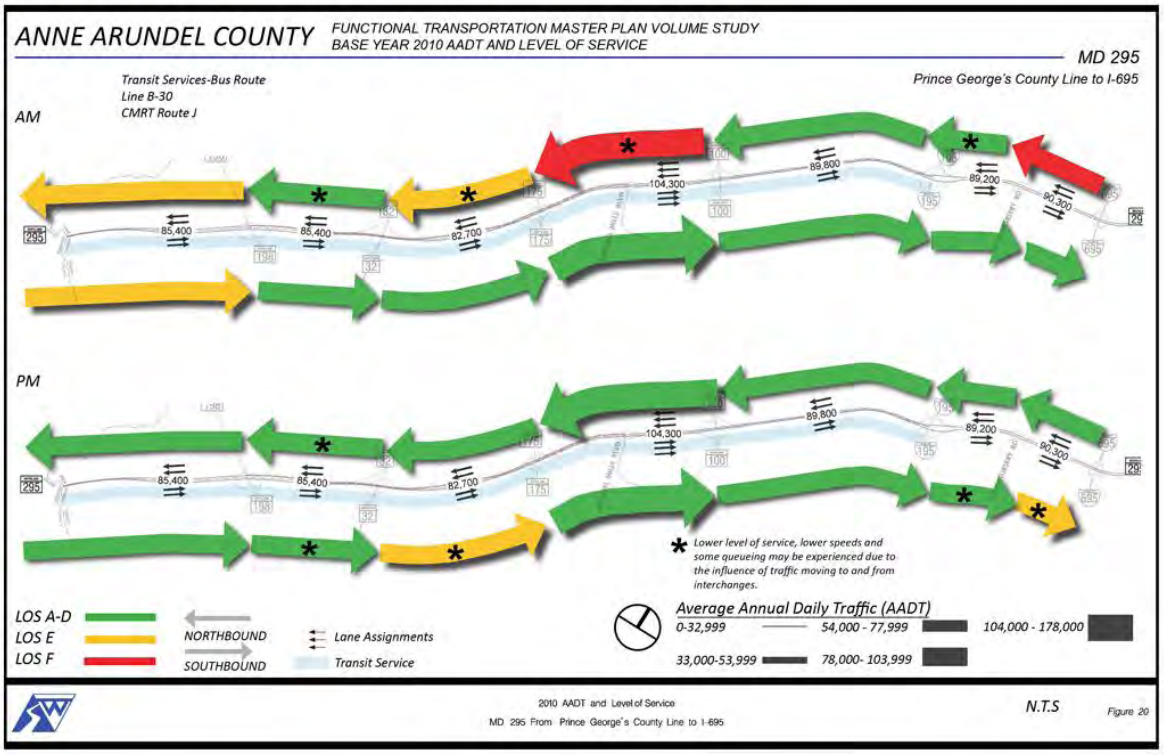


Figure 3-9: MD 3 Existing LOS

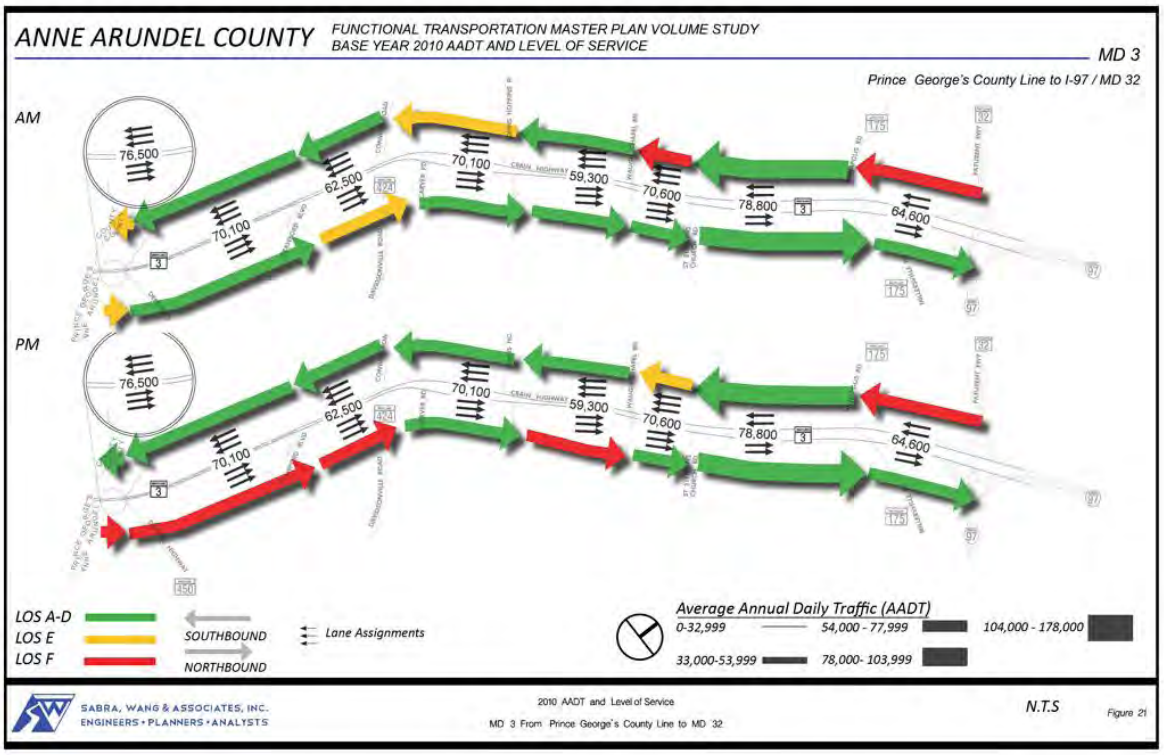


Figure 3-10: MD 607 / MD 173 Existing LOS

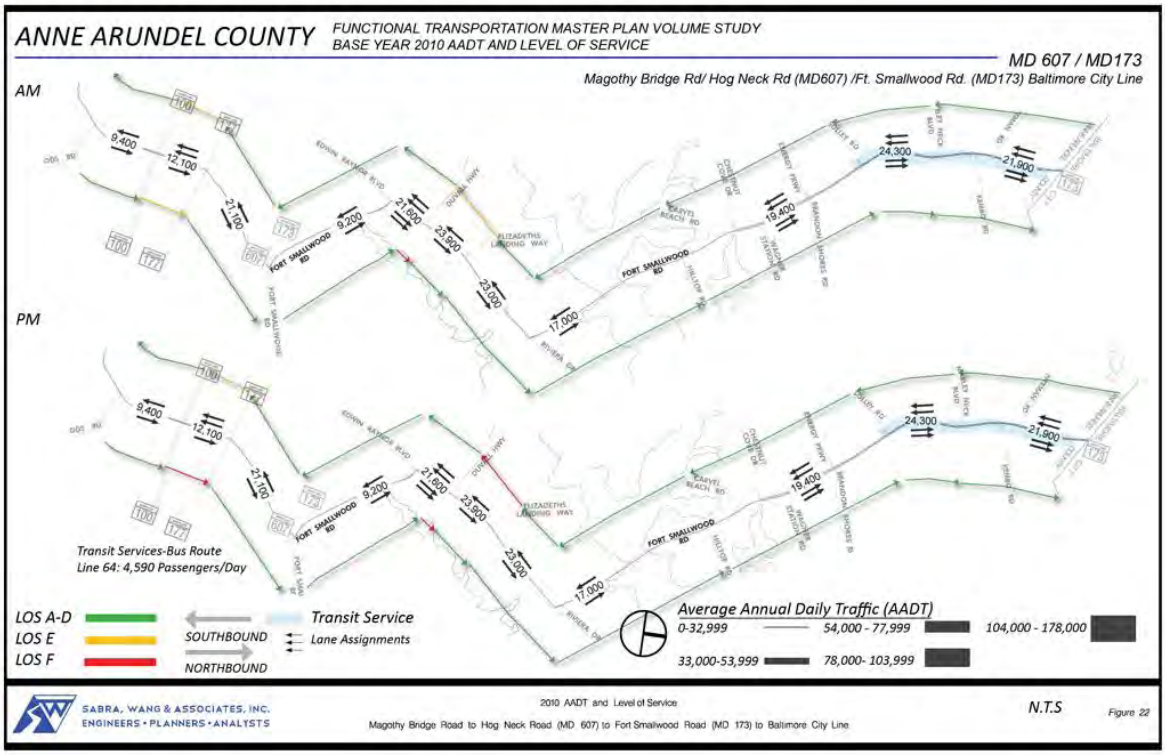


Figure 3-11: Benfield Blvd Existing LOS

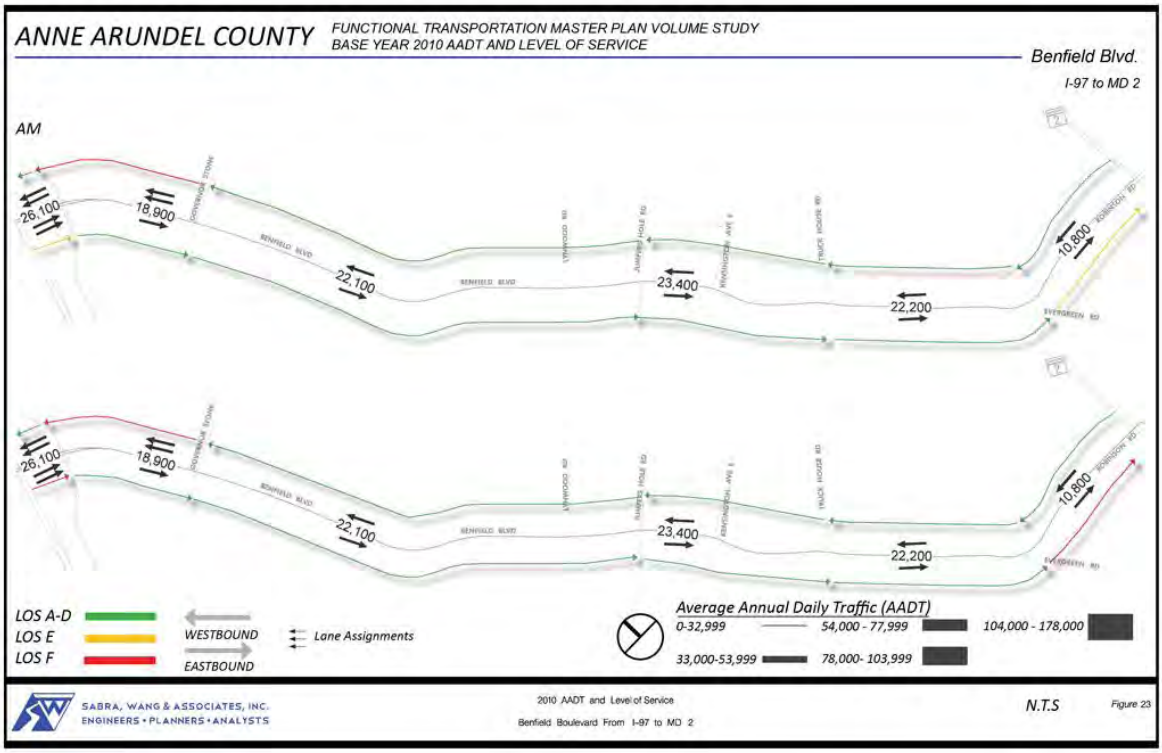


Figure 3-12: MD 176 (Dorsey Rd) Existing LOS

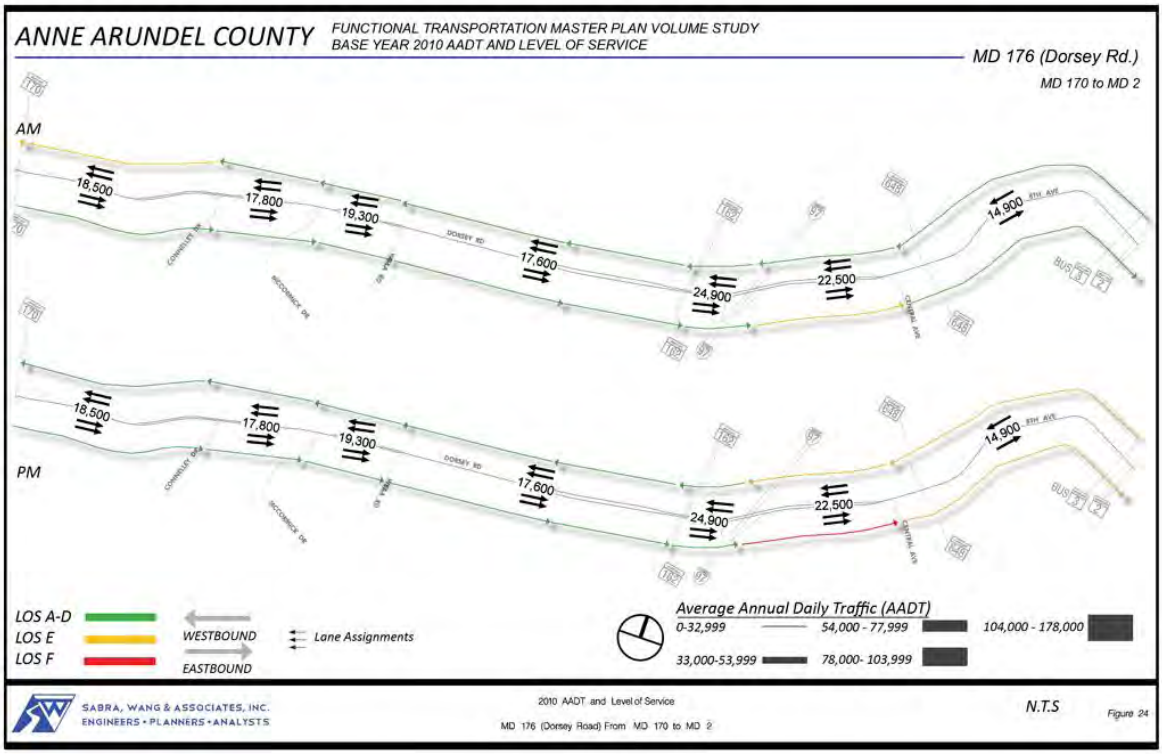


Figure 3-13: MD 170 Existing LOS

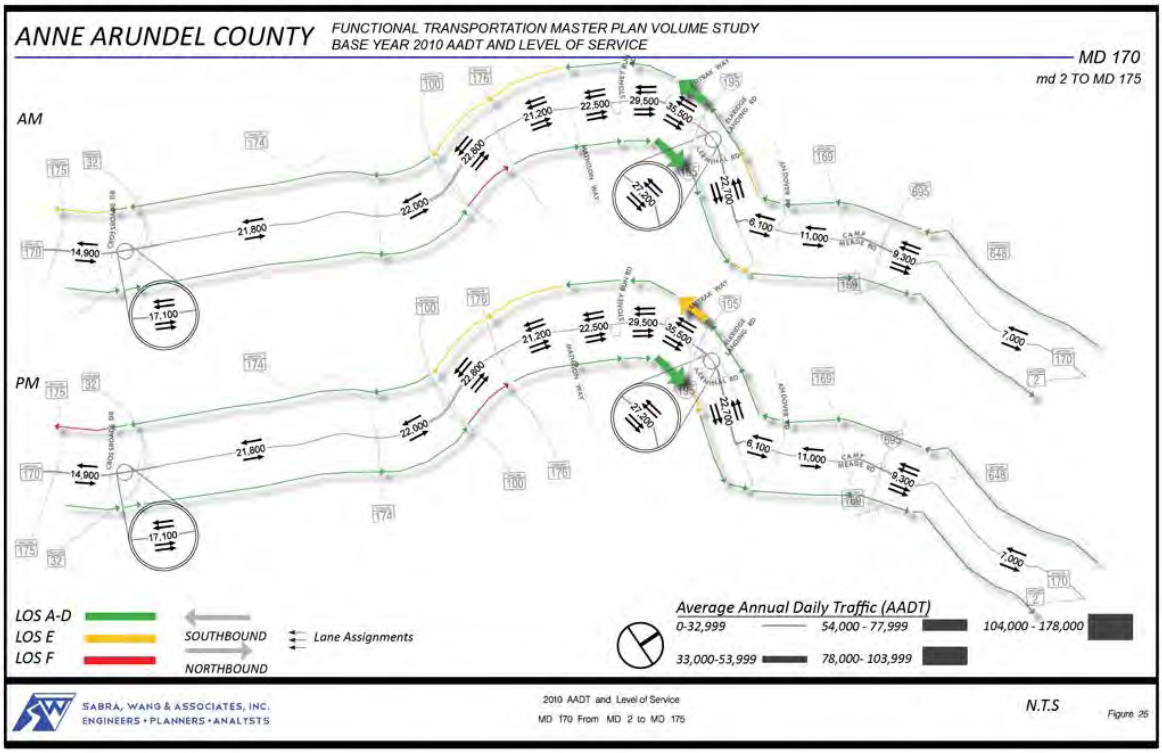
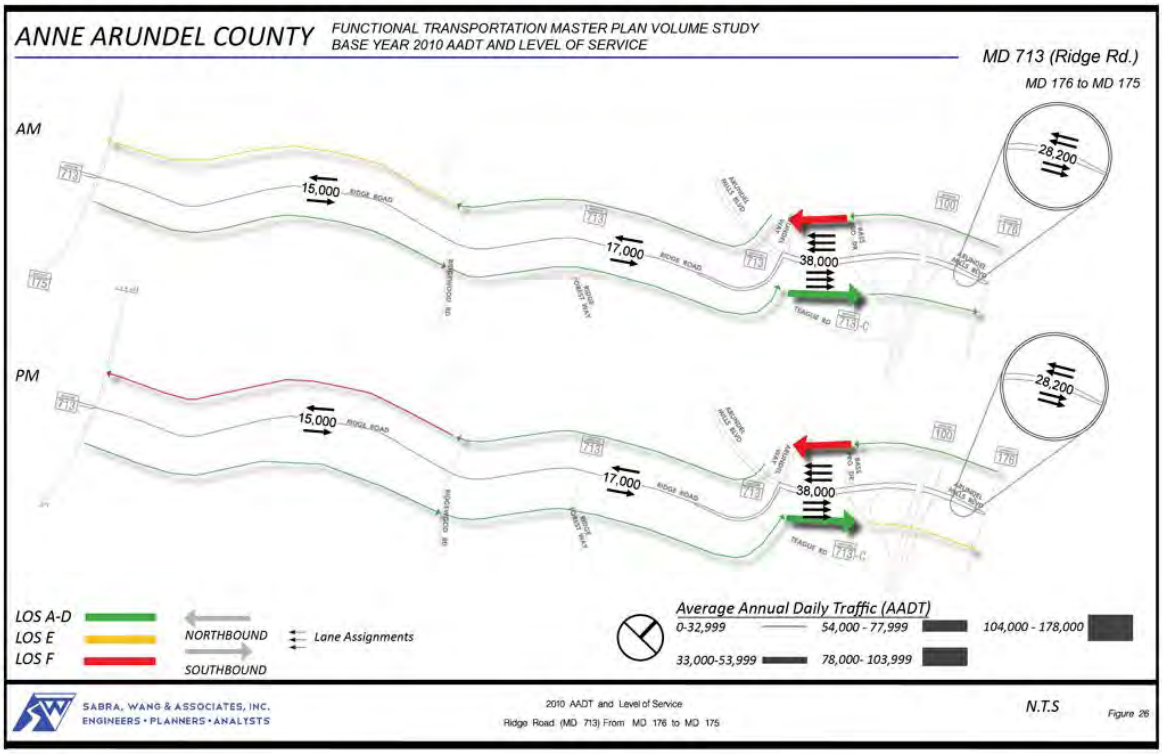


Figure 3-14: MD 713 Ridge Rd Existing LOS



CHAPTER 4: TRAVEL FORECASTING

4.1 INTRODUCTION

This chapter summarizes the travel demand model validation (see **Appendix Y** and **Appendix Z**), the development of an initial set of alternatives, and the development of travel demand forecasts for the initial set of alternatives.

4.2 MODEL VALIDATION

The travel demand model which was used for this effort was developed from the Baltimore Metropolitan Council's regional travel demand model (version 3.3e), which includes cooperative forecasts of demographic data such as households and jobs for all local jurisdictions in the metropolitan area. The model was further modified for the County's analysis of BRAC (Base Realignment and Closure) related impacts. These modifications included a more refined zone structure and additional details were added to the roadway network. These refinements to the model (referred to as the SAM2 model) were used to develop 2015 forecasts and were developed under Round 7a land use assumptions.

As part of the Corridor Growth Management Plan, it was assumed that the model structure would be sufficient, but updates to the land use would be necessary, as would a re-validation. During the validation process, it was confirmed that a restructuring of the model was not necessary, and the SAM2 model's zone structure remained intact. See **Appendix H**. Validation of the model consisted of minor refinements/corrections to the roadway network, and the land-use was updated to represent Round 7c. See **Appendix I**. In addition, a 2035 forecast was performed, as opposed to the 2015 forecasts that were done previously. Refined corridor level forecasts were developed using standard National Cooperative Highway Research Project processes.

The overall goal of the model validation effort is to improve the model's predictive capabilities and ability to provide reasonable forecasts. This is done by developing a base year model and evaluating how well the model is able to replicate the existing conditions. For this effort, the base year was 2005. Existing traffic data was compiled that represents year 2005 conditions. The model was then input with 2005 roadway characteristics (number of lanes, access controls, capacity, etc.) and 2005 socioeconomic data (households, employment, etc.) and the model was refined and adjusted to best replicate these existing conditions. See **Appendix G**.

The Federal Highway Administration (FHWA) has published targets for model validation, and these targets provided the guidelines for this effort. The validation statistics that were used include volume-to-count ratio, root mean squared error, and Percent Deviation. Emphasis has been placed on the facilities responsible for accommodating higher volumes of traffic (e.g. I-97, MD 32, etc.) where the target is to simulate within 7% of the observed count volumes. Other facilities that are typically have signalized controls and direct access and carry less traffic (e.g., Magothy Bridge Road) would have a higher tolerance during validation; where simulating within ±15 percent of the observed traffic volumes would be considered acceptable. The FHWA targets for volume-to-count ratios are as follows:

- Freeways/Expressways ±7%
- Principal Arterials ±10%
- Minor Arterials ±15%
- Collector Roadways ±25%

Based on the above, US 50, I-97, MD 32 and MD 100 were validated with targets of ±7% of the count volume. MD 2, MD 295, MD 3, MD 170, MD 176 and Benfield Boulevard were validated with target goals of ±10% of the count volume. MD 173 and MD 713 were validated using targets of ±15% of the count volume. With the base year mode replicating observed counts within these targets the future year model should provide reasonable forecasts for the future year being evaluated.

The core of the validation effort included evaluating each corridor individually in order to verify critical link attributes for accuracy. These attributes included number of lanes, facility type, roadway type, etc., in addition to other more qualitative features such as roadway geometry. Addition of collector roadways, repositioning of centroids, and adding centroid connectors were additional techniques used in validation. Also, certain original roadway links were eliminated from the analysis if they were considered redundant for the effort. These techniques have improved vehicular loadings such that the simulated volumes become a better match with the existing counts.

4.2.1 US 50 (freeway)

Upon initial investigation, the US 50 corridor (between the Prince George's County line and the Bay Bridge) was already validating reasonably well. In fact all but one segment was within a few percentage points of the FHWA guidelines of ±7% (The segment between Bay Dale Drive and College Parkway). A minor adjustment was made to better reflecting the local roadway network in the Cape St. Claire area by adjusting the locations and loading points for centroid connectors. Once more travel choices were available in this area, College Parkway became a more competitive route and trips then shifted to this facility and off of US 50.

4.2.2 MD 2 South (primary arterial)

Initial validation showed this corridor to be validating fairly well, with the biggest concern south of Forest Drive, where that particular link was under-simulating 2005 counted volumes by over 30%. Minor adjustments such as movement of centroid connectors, the inclusion of additional access points onto MD 2 that were not originally in the model, and changes to the coding of the US 50/MD 2 interchange.

4.2.3 MD 2 North (primary arterial)

Validation of this corridor needed to account for both the length of the corridor and large number of access points. The current zone structure along the corridor proved to be adequate (no zone splitting needed), however the addition of centroid connectors and increased feeder routes allowed for more balanced loadings of traffic volumes.

4.2.4 I-97 (freeway)

The initial evaluation of this corridor proved that the model was validating with nearly an acceptable level of accuracy. Screenline techniques were used to remedy the remaining inaccuracies for the model in this corridor.

4.2.5 MD 32 (freeway)

The initial assessment of this corridor revealed the entire corridor was under performing, with nearly every segment under-simulating. The western limit of the corridor was under-simulating by over 15,000 ADT and the worst performing segment by percentage was under-simulating by 27%. After reviewing zone structure, centroids, loading points and local roadway networks, it was determined that coding the entire MD 32 corridor as an interstate was the most beneficial adjustment to achieve volume to count ratios within ±7%.

4.2.6 MD 100 (freeway)

This corridor was one of the most problematic of any to achieve validation. The initial evaluation showed one segments of the corridor under-simulating by over 30,000 ADT. Similar to MD 32, this corridor functions very much like an interstate facility given the design, speeds, and limited access. Therefore, the entire corridor was recoded as such. Within the vicinity of the MD 100 corridor, two major activity centers stand out: BWI Airport and Arundel Mills Shopping Center. In addition to screenline level post-processing to adjust for the undersimulation, the results of origin-destination surveys for the two activity centers were used to refine the zone assignment within the model to achieve acceptable simulation.

4.2.7 MD 295 (special freeway)

The validation target of this corridor was ±10% mostly due to the fact that the corridor does not function as a high-speed interstate. It is an older facility with lower design speeds and a posted speed of 55 mph. In addition, the corridor handles predominantly commuter traffic and less of the typical interstate through traffic. Minor adjustments to interchange ramp geometry and roadway centerlines were sufficient in improving simulation results.

4.2.8 MD 3 (primary arterial)

Initial evaluations showed this corridor to be under-simulating along the entire corridor by up to approximately 14,000 ADT. This corridor reacted very well to minor adjustments such as movement of centroid connectors, the inclusion of additional access points onto MD 3 that were not originally in the model in the Crofton vicinity, and the addition of lanes that were missing on several links.

4.2.9 MD 173/ MD 607 (minor/ primary arterial)

Acceptable validation of this corridor was achieved through improving connectivity and network loading, coding of lanes, and relocating centroids and adding additional centroid connectors.

4.2.10 Benfield Blvd (primary arterial)

Acceptable validations of this corridor was achieved through making minor adjustments such as movement of centroid connectors and the inclusion of additional access points onto Benfield Boulevard that were not originally in the model

4.2.11 MD 176 (minor arterial)

This corridor was not able to successfully be validated, due under simulation of the presence of the two activity centers – BWI Airport and Arundel Mills Mall. Further study of this corridor is necessary before developing any future year traffic forecasts.

4.2.12 MD 170 (primary arterial)

This corridor runs north-south from MD 2 to MD 175 along the western portion of the County. The initial assessment of this corridor showed inconsistent and imbalanced loading throughout. The corridor includes many residences and businesses with direct access, signalized and unsignalized intersections, and interchanges at I-695, I-195, MD 100, and MD 32. As was similar with many of the other arterial corridors, this corridor reacted very well to minor adjustments such as the movement of centroid connectors and the inclusion of additional access points onto the corridor that were not originally in the model.

4.2.13 MD 713/ Ridge Road (minor arterial)

The initial assessment of the corridor showed that it was under-simulating throughout much of the corridor (by as much as 14,000 ADT). As was similar with many of the other arterial corridors, this corridor reacted very well to minor adjustments such as the movement of centroid connectors and the inclusion of additional access points onto the corridor that were not originally in the mode

4.3 MODE INVESTIGATION, LAND USE, AND TRANSIT NODE IDENTIFICATION

An initial screening effort aimed to identify the most viable modes of travel in each corridor. Primary modes assessed in this study included highway (vehicle), managed lanes (carpool and tolled lanes), and transit (bus and rail).

In order to better understand how land use can support transit, some guidance is presented from the Institute of Transportation Engineers in the graphic below regarding what levels of residential and non-

residential density support various modes of transit. Local bus service is recommended only above a density of 4 dwelling units per acre, light rail service is recommended only above a density of 9 dwelling units per acre and premium bus is recommended only above a density of 15 units per acre. Providing transit to areas with employment densities of 14 jobs per acre is recognized as a minimum threshold to begin to reduce auto mode share, while greater than 20 jobs per acre can have moderate shifts away from auto mode share. See Table 4-1.

Table 4-1: Thresholds of Service Types

Type of Service	Minimum Housing Density Dwelling Units per Acre (DUA)	Minimum Population Density/ Min. Non-Residential Floorspace
Local Bus (1 hour service)	4 -5	3,000 - 4,000 people per square mile. 5 - 8 million square feet concentration of non-residential floorspace.
Intermediate Bus (1 bus every half hour)	6 - 7	5,000 - 6,000 people per square mile. 8 - 20 million square feet concentration of non-residential floorspace.
Frequent Level Bus (A bus every 10 minutes)	15	10,000 people per square mile. 15 - 20 million square feet of non-residential floorspace.
Light Rail	9 (between ¼ and ½ mile of route)	35 - 50 million square feet of non-residential floorspace.
Commuter Rail	1 - 2	100 million square feet or more of non-residential floorspace.

Source: ITE "A Toolbox for Alleviating Traffic Congestion."

A land use analysis was performed using the County's existing Traffic Analysis Zone structure. The analysis included only those zones within ½ mile of any of the 13 study corridors, resulting in inclusion of 79% of all zones. Density within each zone was calculated for households (# households/ acre), and employment (# jobs/ acre). Density was calculated for both the model base year (2005) and the model horizon year (2035). The calculations were based on the currently approved General Development Plan zoning. Detailed mapping can be found in **Appendix P**. The analysis revealed several findings:

- The results indicated that relatively few zones in the County support such density.
- In 2035, residential zones with transit-supporting density are located in Maryland City, Parole, Marley Station, Annapolis, Odenton, Arundel Mills, Riviera Beach, Lake Shore, and Linthicum Heights.
- In 2035, employment zones with transit-supporting density are located in Arundel Mills, BWI, Annapolis, and at the BW Medical Center
- One limitation of this analysis includes not aggregating large employment generators such as Ft. Meade as a single entity. However, even if the Ft. Meade/ NSA acreage were considered a single zone, due to the size and security requirements it presents additional challenges in providing transit access.

- Another limitation of this analysis is that it does not include projects currently undergoing rezoning, or any other area plans where increased density is recommended

The analysis further indicates that even by the year 2035, there will be a very limited and geographically disperse zone structure of transit-supporting land uses – only four zones meeting minimum transit-supporting employment density in the entire County. The fact that there are few zones with both employment and residential density to support transit means that without alternative modes of travel, increased density in other locations, or expansion of the roadway network, many residents will be forced to commute by car to work, on congested roadways for longer distances to locations both within the County and outside of the County to earn a wage. As the network scenarios are more clearly defined later in this report, an exploration of 'fringe' zones currently near transit where density may be close to the noted thresholds suggested several locations along MD 2, and one location along MD 100

In order to begin identifying appropriate modes of transit within each corridor, varying levels and technologies of transit were considered including heavy rail, light rail, streetcar, commuter bus, premium bus, local bus, and bus rapid transit. More detailed information on transit can be found in **Appendices N, Appendix O, Appendix Q** and **Appendix R**. The regional travel modeling tool was used to identify the following key issues regarding alternative modes of travel:

- If currently approved land use patterns and future travel demand support new transit service,
- If additional land use density, or increased service frequency and/ or speed (through priority treatments) would make transit, carpooling or tolled lanes a viable travel choice
- If provision of alternative modes of travel would result in any measurable reduction in projected daily vehicle traffic and/ or levels of congestion
- If any supporting facilities/ infrastructure (park and ride facilities, priority treatments, rights-of-way) would be needed to implement a seamless network

A brief discussion for each corridor is presented below.

4.3.1 US 50

This corridor is currently served by existing commuter bus service, and has existing carpool lanes to the west in Prince George's County. Between I-495 in Prince George's County and MD 8 in Kent County, there are numerous connections to transit providers including local bus, intercity bus, heavy and commuter rail, and park-and-ride lots. Extensions of existing rail service from New Carrollton (Metrorail Orange Line) and/ or Largo (Metrorail Blue Line) to Annapolis have previously been studied and were found not to be feasible from a cost, environmental or ridership perspective. As no substantial change in rail costs, environmental features along the corridor or significant increases in density, rail transit options were not retained for further study. Light rail service would be too slow and could not compete with existing express commuter bus service, and additionally would have similar cost and environmental impacts, as well as challenges for pedestrian and bicycle access. As a result, it was recommended to

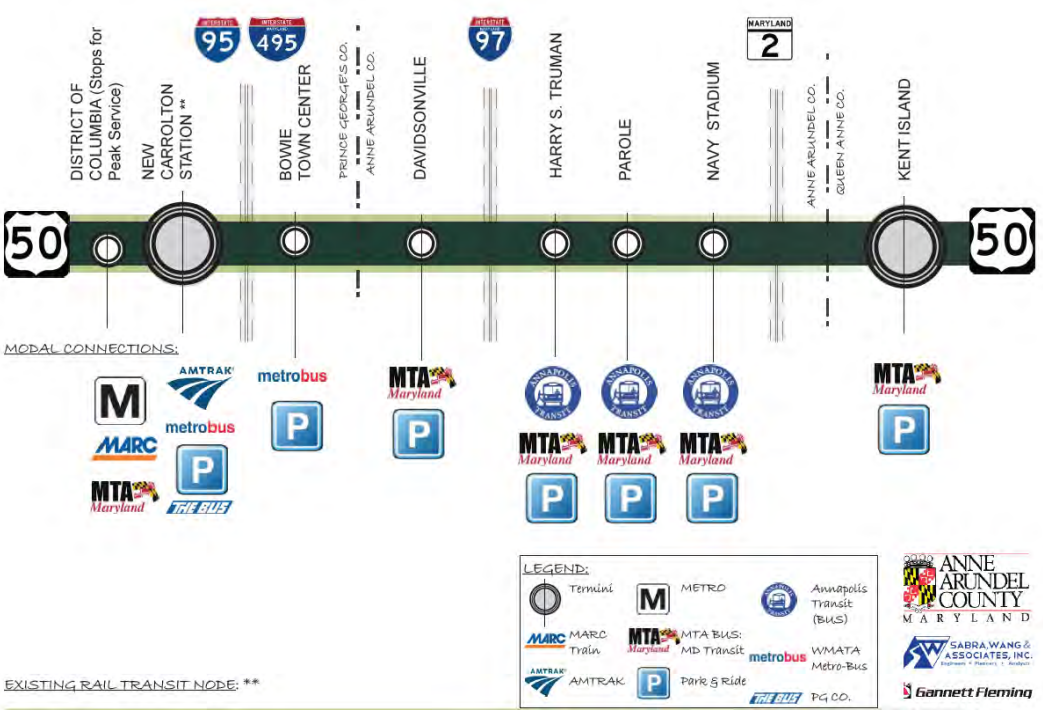
consider general purpose roadway widening, managed lanes (carpool and tolled), and premium bus transit. A transit alternative could extend beyond the County lines from the Eastern Shore to downtown Washington, D.C. See Table 4-2.

Table 4-2: US 50 Mode Investigation

US 50 Mode Investigation	
Existing Transit	• MTA Commuter Bus
Potential Improvements/ Modes	• Premium Bus Transit • High Occupancy Vehicle/ High Occupancy Toll • General Purpose Widening.
Potential Stations	• Kent Island Park and Ride • Navy Stadium Park and Ride • Parole Town Center • MD 665 (Harry S Truman Park and Ride) • MD 424- Davidsonville Park and Ride • Bowie Town Center • New Carrollton Metro Station • Downtown Washington, D.C.
Potential Termini	• Stevensville • New Carrollton
Modal Connections	• Annapolis Transit • Washington Metropolitan Area Transit Authority (WMTA) Metrorail • WMATA Metro Bus • PG The Bus • Intercity Bus • Amtrak • MARC • MTA Bus • Park and Ride • Future Purple Line
Priority Treatments	• Exclusive lanes for premium bus transit • Express vs. local configuration • Ramp metering

A schematic route map of the location of potential transit nodes and intermodal connections is shown in Figure 4-1.

Figure 4-1: US 50 Schematic Route Map



4.3.2 I-97

This corridor is not currently served by any transit service, and has no connections to existing carpool or toll lanes. There are some potential connections to existing transit nodes/ providers, and major activity centers such as BWI Airport and Parole Town Center. Due to the proximity of the corridor to existing commuter rail services, rail was not considered for this corridor. As a result, it was recommended to consider general purpose roadway widening, managed lanes (carpool and tolled), and premium bus transit. See Table 4-3. A schematic route map of the location of potential transit nodes and intermodal connections is shown in Figure 4-3.

4.3.3 MD 2 (North)

This corridor is currently served by existing local transit, but previously was served by regional transit. Extensions of existing light rail service from Glen Burnie to Annapolis have previously been studied and were found not to be feasible from a cost, environmental or ridership perspective. However, due to similar operating characteristics as premium bus service, it will be carried forward and tested again. As a result, it was recommended to consider general purpose roadway widening, light rail transit and premium bus transit. A transit alternative would extend beyond the County lines to downtown Baltimore City. See Table 4-4. A schematic route map of the location of potential transit nodes and intermodal connections is shown in Figure 4-3.

Table 4-3: I-97 Mode Investigation

I-97 Mode Investigation	
Existing Transit	• None
Potential Improvements/ Modes	• Premium Bus Transit • High Occupancy Vehicle/ High Occupancy Toll • General Purpose Widening
Potential Stations	• Arundel Mills • Glen Burnie Light Rail • BWI Airport • Benfield Blvd Park and Ride • MD 665 (Harry S Truman Park and Ride) • Parole Town Center
Potential Termini	• Arundel Mills • Parole Town Center
Modal Connections	• BWI Airport • Annapolis Transit • Central Light Rail • MTA Bus • WMATA Metrobus • Park and Ride • Central Maryland Regional Transit • Howard Transit
Priority Treatments	• None

Figure 4-2: I97 Schematic Route Map

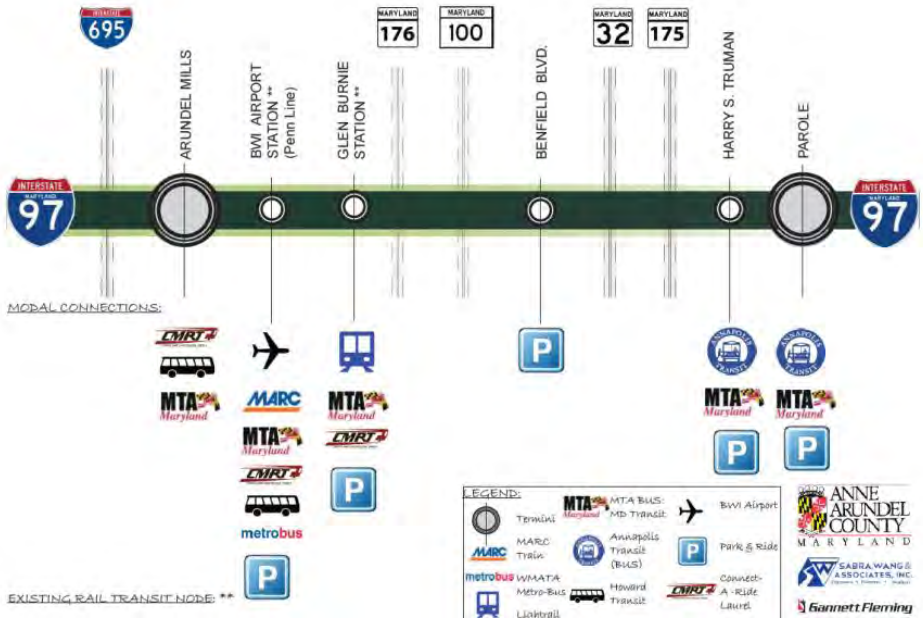
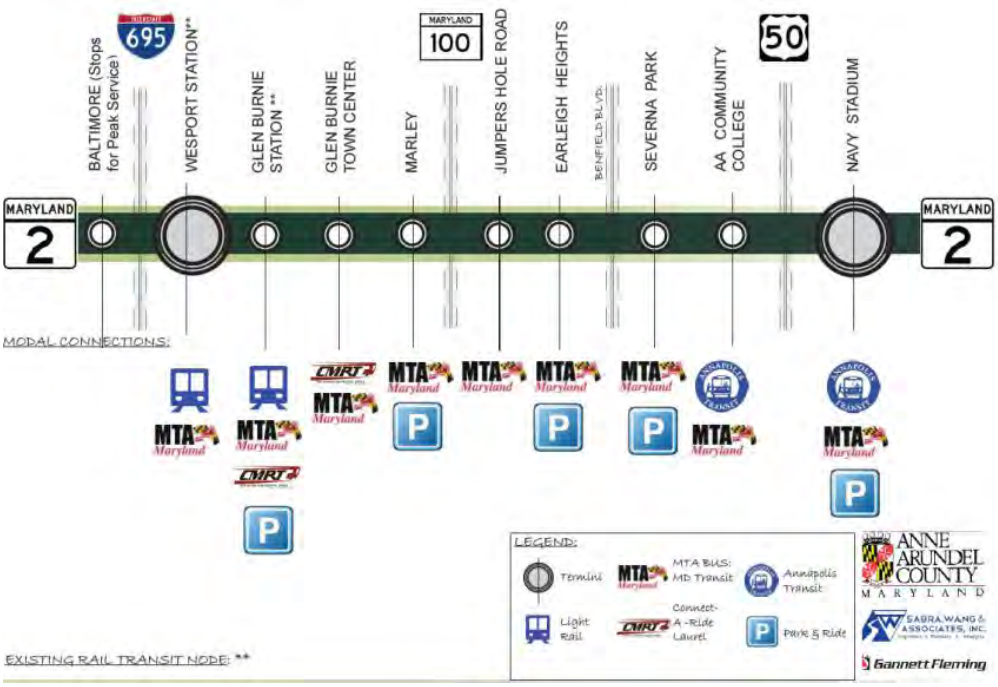


Table 4-4: MD 2 North Mode Investigation

MD 2 North Mode Investigation	
Existing Transit	• Annapolis Transit MTA
Potential Improvements/ Modes	• Premium Bus Transit • Light Rail Transit • General Purpose Widening.
Potential Stations	• Navy Stadium • AA Community College • Severna Park (Jones Station) Park and Ride • Severna Park Plaza • Pasedena (Earlieigh Heights Park and Ride) • Marley Station • Glen Burnie Town Center • Glen Burnie LRT
Potential Termini	• Annapolis • Baltimore City
Modal Connections	• Annapolis Transit • MTA Central Light Rail • MTA Bus
Priority Treatments	• Queue Jumps • Exclusive Bus Lanes • Transit Signal Priority

Figure 4-3: MD 2 North Schematic Route Map



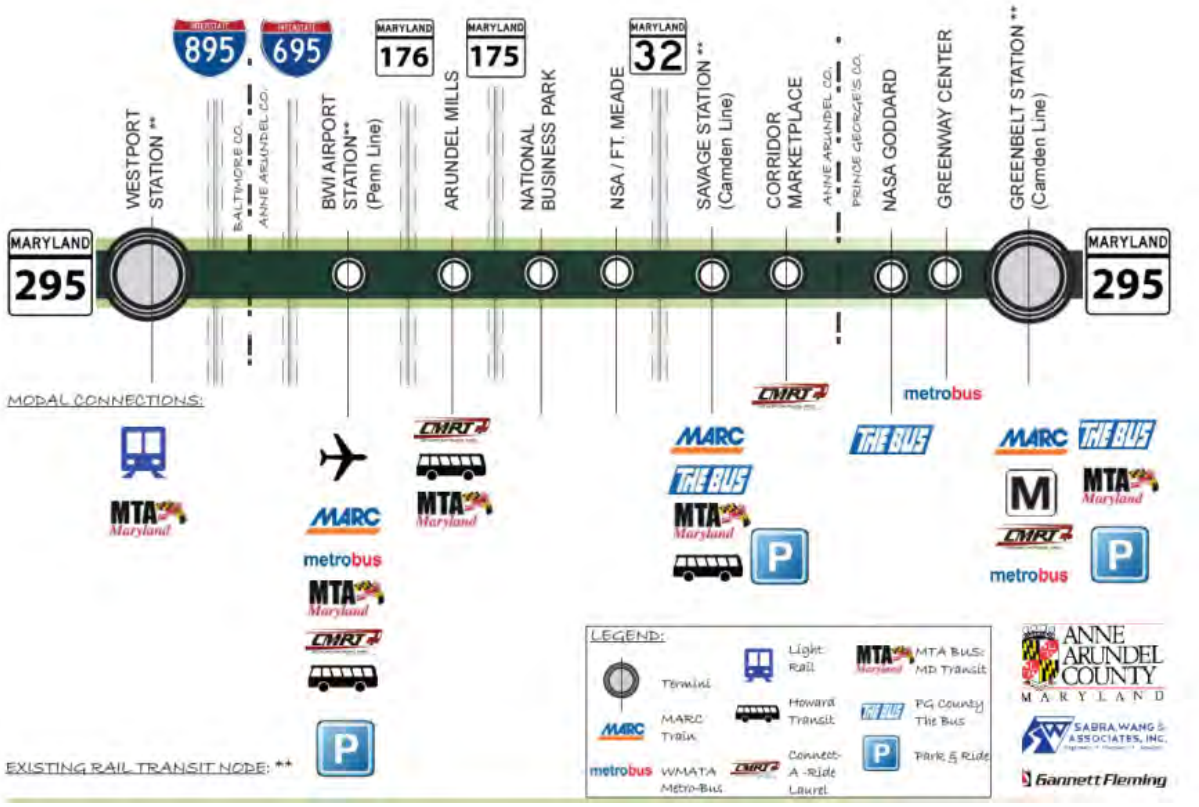
4.3.4 MD 295

This corridor is currently served by local and regional transit service with connections to BWI airport and the Washington Metrorail Green Line. Due to the proximity of the corridor to existing commuter rail services, rail was not considered for this corridor, although an extension of the Metrorail Green Line from Greenbelt to Ft. Meade may be studied by WMATA, as may Magnetic Levitation trains by Maryland DOT. As the roadway south of MD 175 is owned and maintained by the National Park service, options for consideration were limited to north of MD 175 and include general purpose roadway widening, managed lanes (carpool and tolled), and premium bus transit. A transit alternative would extend beyond the County lines from Greenbelt to Baltimore City. See Table 4-5. A schematic route map of the location of potential transit nodes and intermodal connections is shown in Figure 4-4.

Table 4-5: MD 295 Mode Investigation

MD 295 Mode Investigation	
Existing Transit	• WMATA • MTA • Howard Transit • CMRT
Potential Improvements/ Modes	• High Occupancy Vehicle/ High Occupancy Toll (north of MD 175 only) • Premium Bus Transit • General Purpose Widening.
Potential Stations	• Westport Light Rail • BWI • Arundel Mills Park and Ride • National Business Park • Savage MARC • NSA • MD198 Corridor Marketplace • NASA • MD 193/ Greenway Center • Greenbelt Metro
Potential Termini	• Westport • Greenbelt
Modal Connections	• CMRT • BWI Airport • Amtrak • Howard Transit • MTA Bus • PG The Bus • Central Light Rail Line • MARC • WMATA Metro • WMATA Metro Bus • NSA Shuttle
Priority Treatments	• Bus use of shoulder

Figure 4-4: MD 295 Schematic Route Map



4.3.5 MD 100

This corridor is currently served by local transit service with connections to one existing and one potential commuter rail station, several park and ride lots, and a major activity center at Arundel Mills. A heavy or light rail option, previously identified as the Yellow Line potential proposed expansion of the Baltimore Regional Rail System, will be included in the next Constrained Long Range Plan and is planned to be studied by others (MTA) and is therefore not considered as part of this project scope. As a result, it was recommended to consider general purpose roadway widening, managed lanes (carpool and tolled), and premium bus transit. A transit alternative would extend west of the County lines to Ellicott City. See Table 4-6. A schematic route map of the location of potential transit nodes and intermodal connections is shown in Figure 4-5.

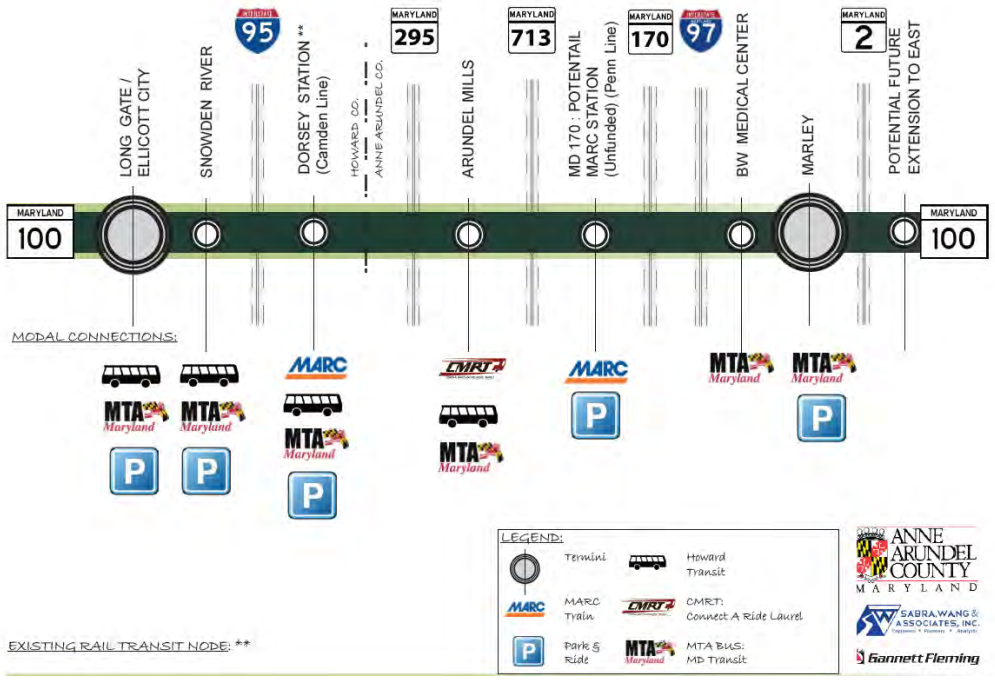
4.3.6 MD 32

This corridor is currently served by local and regional transit service with connections to two commuter rail lines, several park and ride lots, and a major employment center at Ft. Meade/ NSA. Alternatives evaluated included general purpose roadway widening, managed lanes (carpool and tolled), and premium bus transit. A transit alternative would extend west of the County lines to Clarksville.

Table 4-6: MD 100 Mode Investigations

MD 100 Mode Investigation	
Existing Transit	• Howard Transit • CMRT
Potential Improvements/ Modes	• High Occupancy Vehicle/ High Occupancy Toll • Premium Bus Transit • General Purpose Widening
Potential Stations	• Marley Station • BWI Medical Center • MD 170 (Future MARC Station) • Arundel Mills P/R • Dorsey MARC • Snowden River • Long Gate/ Ellicott City
Potential Termini	• Marley Station • Long Gate/Ellicott City
Modal Connections	• MTA Bus • MARC • Howard Transit • CMRT • Park and Ride
Priority Treatments	• Exclusive Lanes/ Shoulder Use for Premium Transit • Local Vs. Express Lane Configuration • Ramp Metering

Figure 4-5: MD 100 Schematic Route Map

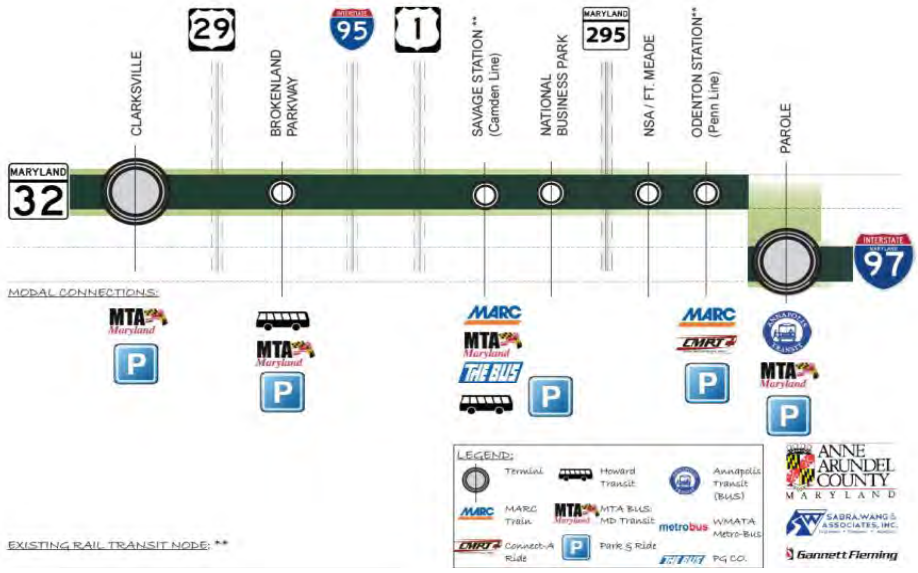


See Table 4-7**.** A schematic route map of the location of potential transit nodes and intermodal connections is shown in Figure 4-6.

Table 4-7: MD 32 Mode Investigation

MD 32 Mode Investigation	
Existing Transit	• Howard Transit • MTA Commuter • CMRT
Potential Improvements/ Modes	• High Occupancy Vehicle/ High Occupancy Toll • Premium Bus Transit • General Purpose Widening
Potential Stations	• Clarksville Park and Ride • Broken Land Park and Ride • Savage MARC • National Business Park • NSA/ Fort Meade • Odenton Town Center/ MARC • Parole Town Center
Potential Termini	• Clarksville • Parole Town Center
Modal Connections	• MARC • CMRT • NSA Shuttle • Annapolis Transit • Park and Ride
Priority Treatments	• Exclusive Lanes/ Shoulder Use for Premium Transit • Local Vs. Express Lane Configuration • Ramp Metering • Subscription Bus Service (from Sykesville to NSA)

Figure 4-6: MD 32 Schematic Route Map



4.3.7 MD 3

This corridor is currently served by local and regional transit service with connections to one commuter rail line. Alternatives evaluated included general purpose roadway widening, and premium bus transit. A transit alternative would be most efficient in combination with the potential transit routing along I-97 north of MD 32. See Table 4-8. A schematic route map of the location of potential transit nodes and intermodal connections is shown in Figure 4-7.

Table 4-8: MD 3 Mode Investigation

MD 3 Mode Investigation	
Existing Transit	• WMATA
Potential Improvements/ Modes	• Premium Bus Transit • General Purpose Widening
Potential Stations	• Glen Burnie LRT • Waugh Chapel • Crofton • Bowie Town Center • Bowie MARC
Potential Termini	• Glen Burnie • Bowie
Modal Connections	• MTA • CMRT • WMATA MetroBus • Central Light Rail • MARC
Priority Treatments	• Queue Jumps • Exclusive Lanes • Transit Signal Priority

4.3.8 MD 2 South

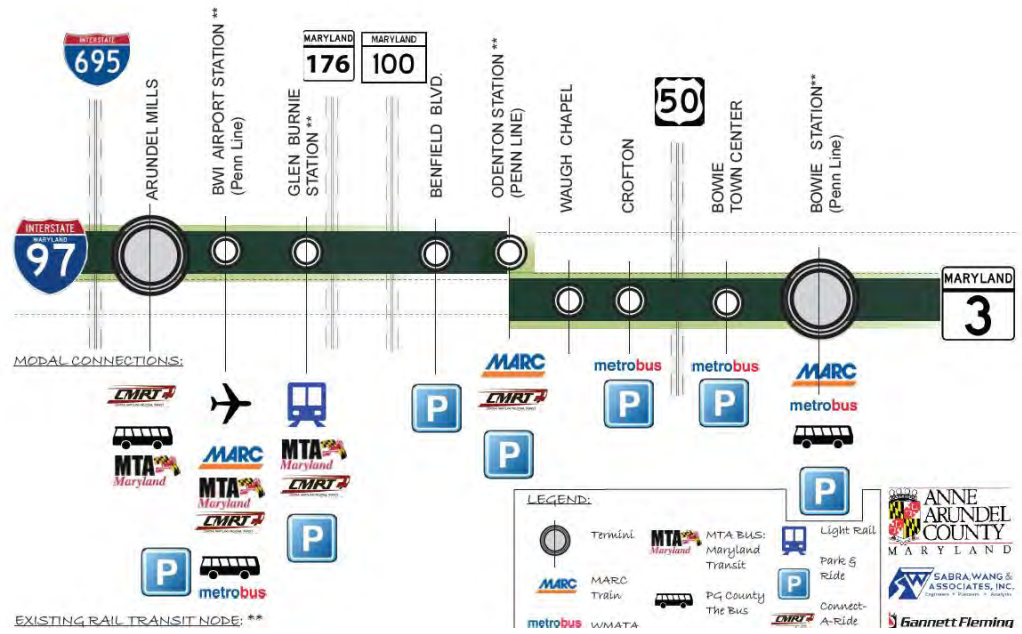
Due to constrained growth in South County, no major transit alternatives, managed lanes or major roadway widening was identified for this corridor. However, enhancements of existing local transit service will be tested.

4.3.9 Fort Smallwood Road/ Magothy Bridge Road/ Hog Neck Road

Due to constrained growth in South County, no major transit alternatives, managed lanes or major roadway widening was identified for this corridor. However, enhancements/ extensions of existing local transit service will be tested.

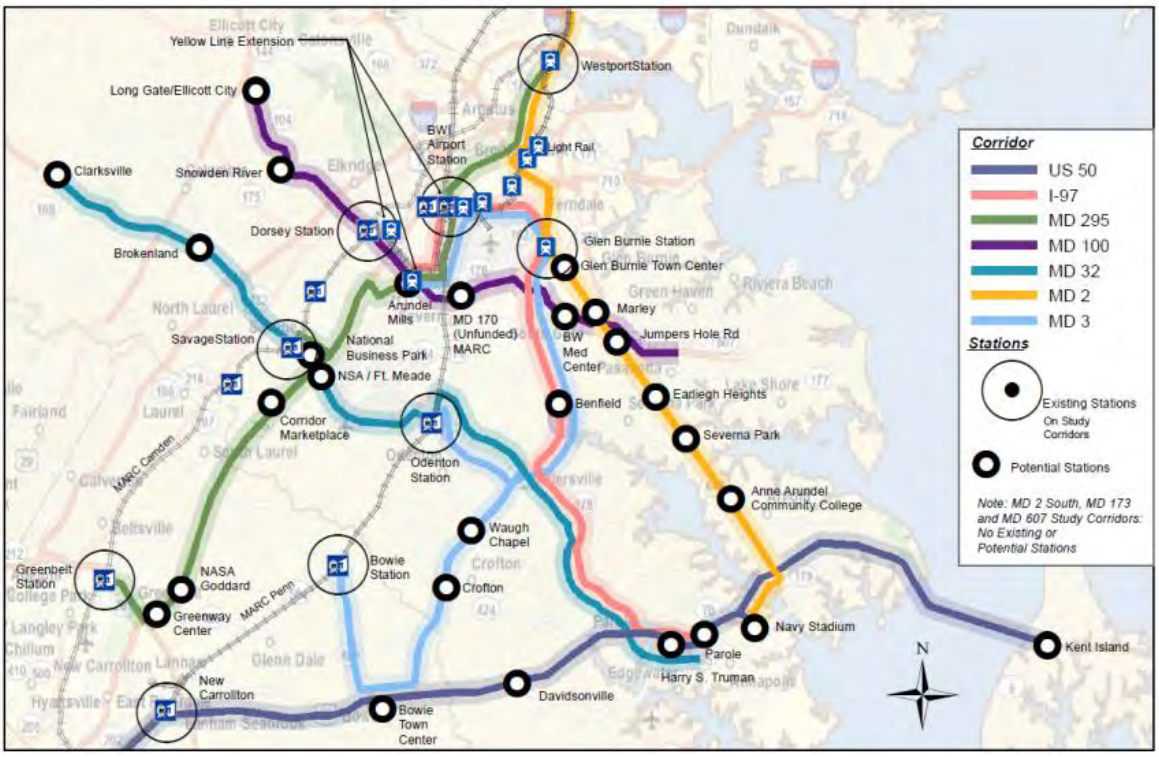
Based on the mode investigation for each corridor, a comprehensive regional transit network including nodes, termini, connections to existing transit services, and land use compatibility was developed for

Figure 4-7: MD 3 Schematic Route Map



the Transit Only alternative. This maximum conceptual transit network of 30 new nodes and 10 existing nodes is shown in Figure 4-8.

Figure 4-8: Conceptual Transit Network



4.4 RELATIONSHIP TO LAND USE

The County's land use patterns represent a suburban jurisdiction located between the two major urban centers of Washington, D.C. and Baltimore, with identified town centers (e.g. Glen Burnie, Odenton, Parole), activity centers (e.g. Arundel Mills, BWI airport), job centers (e.g. Ft. Meade/ NSA), government centers (Annapolis), institutions, extended commercial districts along its major arterial highways, and low density residential uses in other areas. Previous transportation investments in both roadway and bus and rail transit have been made to support travel between those urban job centers and between major town, activity and employment centers through the county. This study reflects both current and future travel demand through, into, within and out of the county, as well as the impact of roadway widening and introduction of other modes of travel in each of these corridors.

The impact of proposed roadway and/ or transit improvements on adjacent land uses in terms of density and activities, right-of-way availability, connectivity to existing transit/ bicycle and pedestrian facilities, supporting infrastructure (park & ride lots, transit stations) is considered and evaluated at a county and regional context.

4.5 TRAVEL FORECASTS AND LEVEL OF SERVICE

4.5.1 No Build - Existing + Committed (E+C) Scenario

The 2035 E+C network served as the future "no-build" condition for this analysis; and represents:

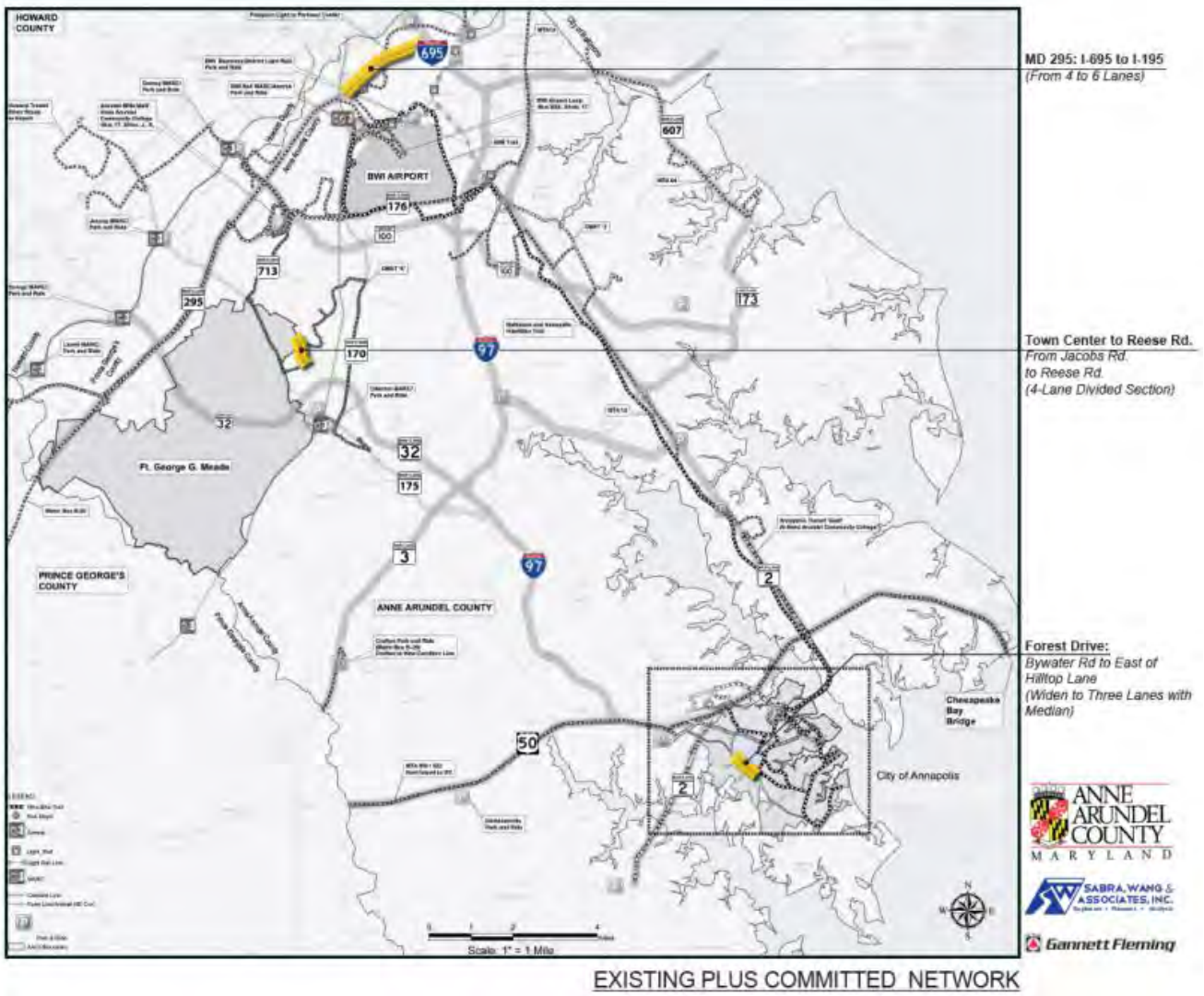
- Existing highway and transit networks
- Highway and transit projects currently under construction
- Planned highway and transit projects with secured construction funding

This information was developed by reviewing transportation project information in the regional transportation plans developed by the Metropolitan Washington Council of Governments (MWCOG), and BMC, the State's Consolidated Scenario Transportation Plan and recent budget documentation. This scenario was the pivot-point in which other forecasts were compared. An illustration of the E+C network is shown in Figure 4-9, specific projects assumed in this scenario are identified in **Appendices J** and **Appendix K.**

4.5.2 Roadway Widening Only – CLRP Plan Scenario

The current Constrained Long-Range Plan (CLRP) scenario represents the current roadway-only transportation plan. This scenario includes all CLRP projects within Anne Arundel County, and major CLRP projects in neighboring jurisdictions. The following summarizes those projects in the CLRP that are assumed for each of the 9 study corridors.

Figure 4-9: E+C Network



4.6 CORRIDOR CLRP IMPROVEMENT

- **US 50 –** Widen from 6 lanes to 8 lanes (between I-97 to the Chesapeake Bay Bridge).
- **MD 2 (north) –** Widen from 4 lanes to 6 lanes (between US 50 and MD 10).
- **MD 2 (south) –**No projects currently identified in the CLRP.
- **I-97 –** Widen from 4 lanes to 6 lanes (between MD 32 and US 50).
- **MD 100 –** Widen from 4 lanes to 6 lanes (between I-95 in Howard County to I-97).
- **MD 295 –**Widen from 4 lanes to 6 lanes (between I-695 and MD 100).

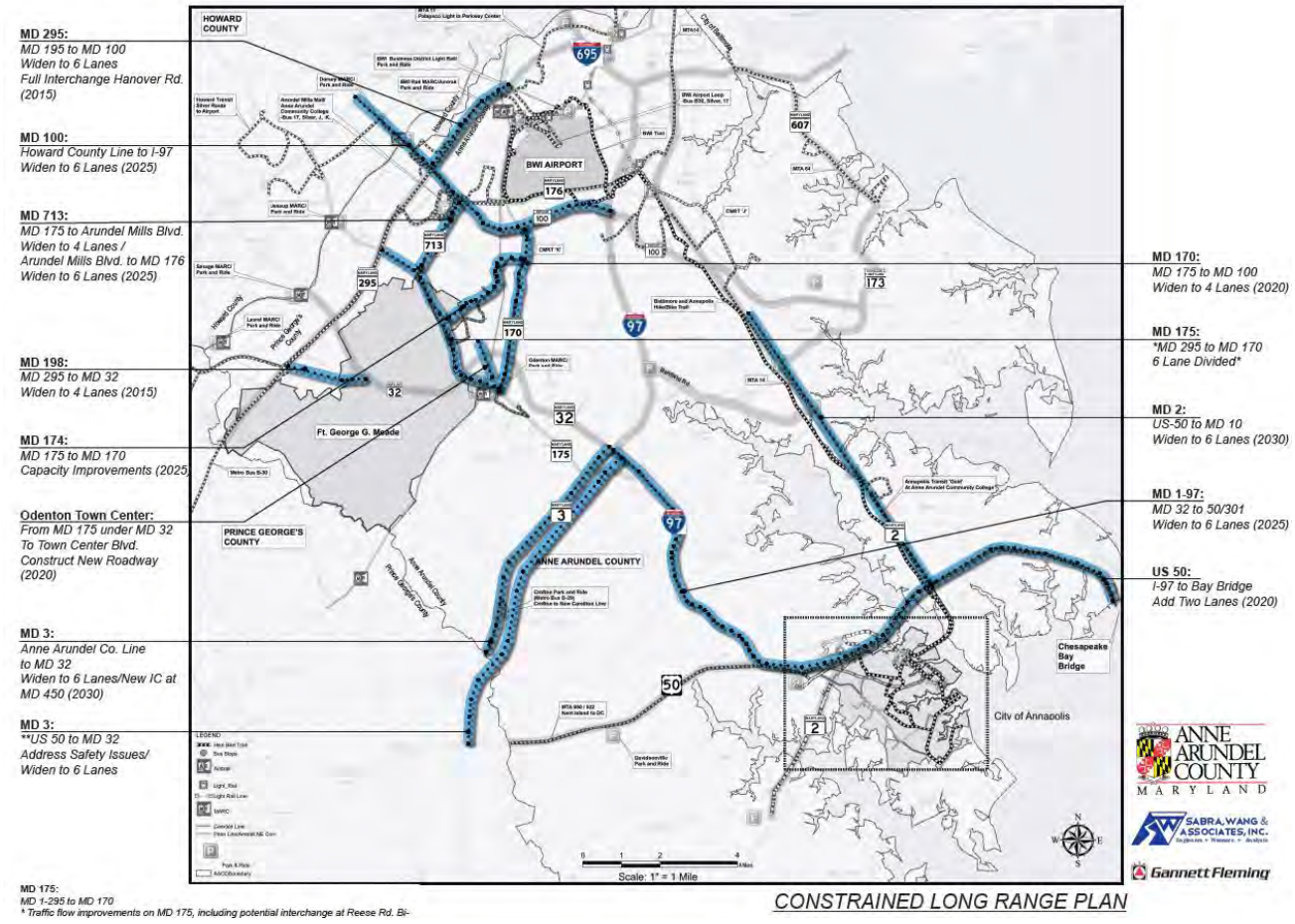
- **MD 3 –**Widen and upgrade MD 3 to six lanes with interchanges at key junctions between the Prince George's County line and MD 32.

- **MD 32 –** Widen to 8 lanes (between I-95 and MD 295).

- **Fort Smallwood/ Magothy Bridge Road –** No projects currently identified in the CLRP.

An illustration of the E+C network is shown in Figure 4-10; specific projects assumed in this scenario are identified in **Appendices J** and **Appendix K.**

Figure 4-10: CLRP Network



4.7 MANAGED LANE AND ENHANCED TRANSIT SCENARIO

Several assumptions were utilized in developing the managed lane and transit-only networks (see **Appendices L** and **Appendix M**):

- HOV is defined as HOV-2 and operates as a 24-hour diamond lane. This is consistent with US 50 in Prince George's County and is intended to provide travel time advantages for persons in 2+ carpool vehicles.

- Proposed HOV and Toll lanes were in addition to existing lanes and included
    - Extension of existing HOV diamond lanes on US 50 from the Prince George's County line to Rowe Blvd, providing access to the Navy Stadium P&R lot.
    - New HOV diamond lane along the entire length of I-97, from I-695 to US 50
    - New HOV diamond lane along MD 32, from I-95 to I-97
    - New HOV diamond lane along MD 100, from I-95 to I-97
    - New HOV diamond lane along MD 295, from I-695 to MD 175
- Toll lane analysis assumed a 15¢/mile peak period toll and a 5¢/mile off-peak toll. This is consistent with the current tolling assumptions in the regional model being used to analyze other existing and proposed toll facilities in the Baltimore area. However it should be noted that actual implementation of toll lanes would require State legislative approval.
- All bus service tested was in addition to any existing services provided.
- Premium bus service in the transit only alternative was coded to operate in general use traffic lanes, but with limited stops.
- Bus Rapid Transit/ Light Rail Transit were assumed to operate either on exclusive right-of-way or receive priority treatment. Peak headways are 10 minutes and station dwell times are 1 minute at each stop.

4.8 SUMMARY OF FORECASTS

- During the analysis of the results of the No Build (E+C), Roadway (CLRP), and Managed Lane and Transit-Only sensitivity runs, the following findings were derived:
- Implementing new transit service but in a non-priority manner was not initially successful in producing strong ridership or diverting trips from the highway network. Two factors may be:
    - Transit service that was tested provides connectivity to existing Park and Ride lots and rail stations. Much of the travel time savings is most-likely lost during transfers, reducing the overall competitiveness of the service.
    - Improvements to the highway system (reduced volumes) on most corridors that resulted from shifts to transit were largely negated from vehicles diverting from adjacent facilities to the major corridor. This results in many corridors showing very little traffic volume relief from the transit service that was tested along that corridor.

- A market-based approach to identifying transit supportive markets may yield increases in ridership. Markets will be identified in the development of the final alternative through a select-link analysis along selected corridors to better understand travel markets, including the influence of parking costs on mode choice. Person-trips as well as total vehicle trips will also be examined.

- Overall several facilities (US 50, I-97, MD 32, MD 100, MD 295, and MD 3) showed potential reductions in daily traffic volumes under a managed lane (primarily HOV) scenario. The toll scenarios showed similar patterns in volume changes to the HOV scenarios, but to a lesser magnitude.

4.8.1 US 50

Along US 50, additional regional and statewide travel demand models (the Council of Governments and the Maryland State Highway Administrations) were used to converge on updated travel demand forecasts for the Bay Bridge of 100,000 vehicles per day. Without any additional improvements in the corridor (E+C Scenario), growth in daily traffic volumes along this corridor ranges from 11% (vicinity of MD 178 & MD 70) to 38% (prior to Bay Bridge). Overall, the average total growth along the corridor segments is 20.6% from 2005 to 2035, or 0.7% annually. With the capacity improvements that are assumed in the CLRP scenario, the link segments towards the middle of the corridor experience the most growth as a result of the capacity identified in the CLRP. This growth is an additional 6% beyond what is estimated to occur under the no-build conditions (E+C). The Managed Lane and Transit-Only scenarios showed minor reductions in ADT within the western portion of the corridor. This is consistent with the HOV scenario, where the newly constructed HOV diamond lanes diverge into the general purpose lanes just prior to the Severn River Bridge. The HOV scenario provided volume reductions along mainline US 50 of up to 12% from the E+C Scenario, while transit reductions were less than 1%. The BRT service terminated at the New Carrollton Metro station, allowing riders to transfer onto the Red Line or MARC for continued service to Washington, DC. This service would most likely have a greater impact if the service continued directly into DC. This would reduce transfer times and most likely result in increased ridership.

4.8.2 MD 2 North

Without any additional improvements in the corridor (E+C Scenario) growth in daily traffic volumes along this corridor ranges from 3% (south of I-695) to 16% (Jumpers Hole Road). Overall, the average growth along the corridor segments is 9.9%, or 0.3% annually. When capacity improvement projects are considered as identified in the CLRP, growth along the corridor increases at the southern end by 26% as the corridor approaches US 50. The corridor did not show any sensitivity to enhanced rail or premium bus transit service, either due to low densities or shifting vehicle traffic from other parallel facilities when vehicle trips along MD 2 shifted to transit. And although HOV lanes were not tested on this facility, reductions of up to 7% were realized along MD 2 when HOV lanes were implemented along I-97.

4.8.3 MD 2 South

Without any additional improvements within the corridor (E+C Scenario); ADT growth along this corridor ranges from 12% (vicinity of MD 253) to 46% (approaching West Street). Overall, the average growth along the corridor segments is 19.3%, or 0.6% annually. Since there are no major capacity improvement projects along this corridor identified in the CLRP; the forecast volumes between the E+C scenario and the CLRP scenario remain unchanged.

4.8.4 I-97

Without any additional improvements in the corridor (E+C Scenario), growth in daily traffic volumes along this corridor ranges from 10% (south of I-695) to 27% (at Benfield Boulevard). Overall, the average growth along the corridor segments is 18.3%, or 0.6% annually. With the capacity improvements that are assumed in the CLRP scenario, volumes on the link segments on the northern end of the corridor drop slightly, while the volumes along the southern portion increase slightly as a result of the capacity improvements identified in the CLRP. Overall the average volumes along the corridor segments are reduced by 3% in the CLRP scenario when compared to the E+C scenario. The transit only test scenarios showed minimal decreases in ADT from the E+C Scenario along the corridor, with reductions ranging from -0.3% to -0.5% in the premium bus transit scenario The HOV scenario resulted in reductions in ADTs in the general purpose lanes ranging from -6.5% at MD 100 to -15.1% at the northern end.

4.8.5 MD 32

Without any additional improvements in the corridor (E+C Scenario), growth in daily traffic volumes along this corridor ranges from 45% (at I-97) to 55% (at MD 295). Overall, the average growth along the corridor segments is 51.1%, or 1.7% annually. With the capacity improvements that are assumed in the CLRP scenario, volumes on the link segments on the western end of the corridor drop slightly, while the volumes along the eastern portion increase slightly (4,000 ADT). Overall the average volumes along the corridor segments are increased by 0.4% in the CLRP scenario when compared to the E+C scenario. The transit only scenario showed negligible reductions in ADT compared to any highway scenario (note that the model does not have the full Odenton Town Center densities included). However, the HOV scenario resulted in reductions in ADTs on the general purpose lanes ranging from -1.0% at MD 295 to -7.0% at eastern end of the corridor at I-97.

4.8.6 MD 100

Without any additional improvements in the corridor (E+C Scenario), growth in daily traffic along this corridor ranges from 8% (MD 2) to 29% (MD 170). Overall, the average growth along the corridor segments is 20.5%, or 0.7% annually. When capacity improvement projects are considered as identified in the CLRP, growth along the corridor increases at the western end where it increases to 37% as the corridor approaches MD 295. The transit only scenario showed negligible change in ADT. The HOV scenario resulted in reductions in ADTs on the general purpose lane of up to 8% through the I-97

interchange, however it resulted in increases of up to 5% in general purpose ADT east of I-97 where no CLRP widening is proposed.

4.8.7 MD 295

With the additional improvements in the corridor (E+C Scenario), growth along this corridor ranges from 17% at the Prince George's County Line to 38% at the Baltimore Beltway (I-695). Overall, the average growth along the corridor segments is 23.6%, or 0.8% annually. When region-wide capacity improvement projects are considered as identified in the CLRP; growth along the corridor increases at the northern section (up 6 points to 44%) and decreases slightly at the southern section (down 2 points to 15%). The transit only scenario did not yield any measurable changes to ADT, however, the HOV scenario predicted reductions in ADT along the corridor from 2% to 9% in the general purpose lanes.

4.8.8 MD 3

Without any additional improvements in the corridor (E+C Scenario), ADT growth along this corridor ranges from 20% at the MD 450 to 59% at Waugh Chapel Road. Overall, the average growth along the corridor segments is 32.9%, or 1.1% annually. When region-wide capacity improvement projects are considered as identified in the CLRP, growth along the corridor increases in the vicinity of Waugh Chapel (up 5 points to 64%) and decreases slightly at the southern section (down 5 points to 15%). The transit only scenario did not yield any measurable changes in ADT, but HOV lanes tested along other facilities did reduce general purpose ADT volumes along MD 3.

4.8.9 Magothy Bridge/ Hog Neck Road/ Ft. Smallwood Road

Without any additional improvements in the corridor (E+C Scenario), growth in daily traffic volumes along this corridor ranges from 8% at the Solley Road to 41% at Edwin Raynor Boulevard. Overall, the average growth along the corridor segments is 15.9% or 0.5%, annually. Since there are no major capacity improvement projects along this corridor identified in the CLRP, the forecast volumes between the E+C scenario and the CLRP scenario remain unchanged. The corridor showed no sensitivity to a transit-only scenario, and a managed lane scenario was not tested.

Detailed corridor-by-corridor forecasts for the four initial alternatives are summarized in the Tables 4-9 through 4-17 and Figures 4-11 through 4-28.

4.9 SUMMARY OF NO BUILD AND CLRP LEVEL OF SERVICE

Generally, where CLRP projects were planned (MD 2, MD 3, MD 295, US 50, MD 100), the portions of those roadways widened showed improved level of service in relation to the No-Build future condition, but not always improved to existing level of service. Testing of level of service for the corridors with proposed transit and/ or managed lanes will be discussed in more detail in Chapter 5.

Table 4-8: US 50 2035 AADT

2035 AADT
US 50: Prince George's County Line to Chesapeake Bay Bridge

Segment	2005 AADT	Highway Options		Transit Options				HOV/Toll Options			
		E+C	CLRP	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
Prince George's County Line to MD 424	92,000	117,000	117,000	116,800	-0.2%	116,800	-0.1%	111,700	-4.5%	112,300	-4.0%
MD 424 to I-97	102,700	123,000	125,000	122,600	-0.3%	122,800	-0.1%	121,100	-1.6%	118,500	-3.6%
I-97 to MD 665	57,500	67,800	68,900	67,500	-0.4%	67,700	-0.2%	68,600	1.1%	65,800	-3.0%
MD 665 to MD 178 / MD 450	128,700	148,000	156,000	147,300	-0.5%	147,700	-0.2%	149,800	1.2%	145,000	-2.0%
MD 178 to MD	107,400	120,000	127,000	119,700	-0.2%	119,800	-0.2%	112,600	-6.1%	118,200	-1.5%
MD 2 to MD 70	125,200	139,000	146,000	138,800	-0.1%	138,800	-0.1%	122,700	-11.7%	139,700	0.5%
MD 70 to MD 2	112,400	130,000	137,000	129,900	-0.1%	129,900	-0.1%	130,700	0.5%	130,500	0.4%
MD 2 to Bay Dale Dr	96,000	114,000	120,000	114,000	0.0%	114,000	0.0%	114,500	0.4%	114,300	0.3%
Bay Dale Dr to MD 179	63,400	86,000	88,000	86,000	0.0%	86,000	0.0%	86,000	0.0%	86,000	0.0%
MD 179 to Oceanic Dr	68,900	91,000	91,000	91,000	0.0%	91,000	0.0%	91,000	0.0%	91,000	0.0%
Oceanic Dr to Chesapeake Bay Bridge	72,500	100,000	100,000	100,000	0.0%	100,000	0.0%	100,000	0.0%	100,000	0.0%

Table 4-9: MD 2 South 2035 AADT

2035 AADT
MD 2: Central Avenue (MD 214) to West Street (MD 450)

Segment	2005 AADT	Highway Options		Transit Options				HOV/Toll Options			
		E+C	CLRP	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
Central Ave (MD 214) to Pike Ridge Rd	31,100	35,000	35,000	35,000	0.0%	35,000	0%	35,500	1.5%	35,200	0.5%
Pike Ridge Rd to MD 253	40,200	45,000	45,000	45,000	0.0%	45,000	0%	45,700	1.5%	45,200	0.5%
MD 253 to Virginia Ave	41,100	47,000	47,000	47,000	0.0%	47,000	0%	47,700	1.5%	47,200	0.5%
Virginia Ave to Admiral Cochrane Dr	53,800	60,000	60,000	60,000	0.0%	60,000	0%	60,800	1.4%	60,300	0.5%
Admiral Cochrane Dr to MD 665	54,300	63,000	63,000	63,000	0.0%	63,000	0%	63,800	1.2%	63,100	0.2%
MD 665 to Forest Dr	33,900	42,000	42,000	42,000	0.0%	42,000	0%	41,800	-0.5%	42,000	0.0%
Forest Dr to MD 450	33,600	44,000	44,000	44,000	0.0%	44,000	0%	43,800	-0.4%	44,000	0.0%
West Street (MD 450) to End	28,000	41,000	41,000	41,000	0.0%	41,000	0%	40,900	-0.3%	41,000	0.0%

Table 4-10: MD 2 North 2035 AADT

2035 AADT
MD 2: US 50 to I-695

Segment	2005 AADT	Highway Option		Transit Option				HOV/Toll Options			
		2035 E+C AADT	2035 CLRP AADT	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
Ramp to US 50 to MD 648	51,500	57,000	65,000	57,000	0.0%	57,000	0.0%	55,700	-2.3%	56,400	-1.0%
MD 648D to College Pkwy	47,000	53,000	59,000	53,000	0.0%	53,000	0.0%	52,100	-1.7%	52,600	-0.8%
College Pkwy to Robinson Rd	62,600	67,000	75,000	67,000	0.0%	67,000	0.0%	65,700	-2.0%	66,300	-1.0%
Robinson Rd to MD 648	56,900	63,000	67,000	63,000	0.0%	63,000	0.0%	61,000	-3.2%	62,000	-1.5%
MD 648H to East West Blvd	41,900	47,000	51,000	47,000	0.0%	47,000	0.0%	46,100	-2.0%	46,500	-1.0%
East West Blvd to MD 10	45,500	52,000	54,000	52,000	0.0%	52,000	0.0%	52,000	0.0%	52,300	0.5%
MD 10 to Jumpers Hole Rd	22,400	26,000	27,000	26,000	0.0%	26,000	0.0%	26,500	1.8%	26,300	1.0%
Jumpers Hole Rd to MD 100	33,500	37,000	37,000	37,000	0.0%	37,000	0.0%	38,900	5.0%	38,500	4.0%
MD 100 to Marley Station Rd	36,400	39,000	39,000	39,000	0.0%	39,000	0.0%	42,000	7.6%	41,700	7.0%
Marley Station Rd to Aquahart Rd	23,100	26,000	26,000	26,000	0.0%	26,000	0.0%	26,500	2.0%	26,800	3.0%
Aquahart Rd to 5th Ave	23,100	26,000	26,000	26,000	0.0%	26,000	0.0%	25,200	-3.0%	25,700	-1.0%
5th Ave to MD 648	29,000	33,000	33,000	33,000	0.0%	33,000	0.0%	31,700	-4.0%	32,600	-1.1%
MD 648 to 8th Ave	29,200	33,000	33,000	33,000	0.0%	33,000	0.0%	31,400	-5.0%	32,300	-2.0%
8th Ave to MD 270	31,700	34,000	34,000	34,000	0.0%	34,000	0.0%	32,000	-6.0%	33,000	-3.0%
MD 270 to MD 3	31,800	34,000	34,000	34,000	0.0%	34,000	0.0%	31,600	-7.0%	32,600	-4.0%
MD 3 to MD 710	39,100	41,000	41,000	41,000	0.0%	41,000	0.0%	38,000	-7.4%	39,000	-5.0%
MD 710 to I-695	52,400	54,000	54,000	54,000	0.0%	54,000	0.0%	49,800	-7.8%	49,900	-7.5%

Table 4-11: I-97 2035 AADT

2035 AADT
I-97: US 50 to I-695

Segment	2005 AADT	Highway Option		Transit Option				HOV/Toll Options			
		2035 E+C AADT	2035 CLRP AADT	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
US 50 to MD 178	92,200	115,000	121,000	114,500	-0.4%	115,000	0.0%	102,400	-10.9%	112,500	-2.2%
MD 178 to MD 3	94,700	118,000	124,000	117,400	-0.5%	118,000	0.0%	106,300	-9.9%	115,400	-2.2%
MD 3 to Benfield Blvd	103,300	130,000	127,000	129,400	-0.5%	130,000	0.0%	117,600	-9.6%	127,600	-1.8%
Benfield Blvd to MD 3 Bus	102,600	125,000	123,000	124,600	-0.3%	125,000	0.0%	114,400	-8.5%	121,600	-2.7%
MD 3 Bus. to MD 174	113,600	132,000	130,000	131,600	-0.3%	132,000	0.0%	120,900	-8.4%	126,900	-3.9%
MD 174 to MD 100	133,000	155,000	151,000	154,600	-0.3%	155,000	0.0%	145,000	-6.5%	153,100	-1.2%
MD 100 to MD 176	120,500	140,000	138,000	139,400	-0.4%	140,000	0.0%	125,500	-10.4%	137,300	-1.9%
MD 176 to MD 648	106,200	118,000	117,000	117,600	-0.3%	118,000	0.0%	101,000	-14.4%	114,800	-2.7%
MD 648 to I-695	104,400	115,000	114,000	114,700	-0.2%	115,000	0.0%	97,600	-15.1%	111,900	-2.7%

Table 4-12: MD 32 2035 AADT

2035 AADT
MD 32: Howard County Line to I-97/MD 3

Segment	2005 AADT	Highway Option		Transit Option				HOV/Toll Options			
		2035 E+C AADT	2035 CLRP AADT	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
Howard County Line to MD 295	60,000	93,000	93,000	93,000	0.0%	93,000	0.0%	92,100	-1.0%	93,000	0.0%
MD 295 to Sanford Rd	36,300	57,000	54,000	57,000	0.0%	57,000	0.0%	53,900	-5.4%	56,800	-0.4%
Sanford Rd to MD 198	37,500	57,000	56,000	57,000	0.0%	57,000	0.0%	53,800	-5.6%	56,700	-0.5%
MD 198 to MD 175	50,900	74,000	73,000	74,000	0.0%	74,000	0.0%	69,700	-5.8%	73,500	-0.7%
MD 175 to MD 170	39,200	62,000	62,000	62,000	0.0%	62,000	0.0%	58,000	-6.5%	60,500	-2.5%
MD 170 to Sappington Station Road	37,000	54,000	56,000	54,000	0.0%	54,000	0.0%	50,300	-6.9%	52,700	-2.5%
Sappington Station Road to I-97/MD 3	44,100	64,000	68,000	64,000	0.0%	64,000	0.0%	59,500	-7.1%	62,400	-2.5%

Table 4-13: MD 100 2035 AADT

2035 AADT
MD 100: Howard County Line to Magothy Bridge Rd (MD 607)

Segment	2005 AADT	Highway Option		Transit Option				HOV/Toll Options			
		2035 E+C AADT	2035 CLRP AADT	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
Howard County Line to MD 295	91,500	105,000	112,000	105,000	0.0%	105,000	0.0%	98,400	-6.3%	104,300	-0.7%
MD 295 to MD 713	79,100	101,000	108,000	101,000	0.0%	101,000	0.0%	96,000	-5.0%	100,400	-0.6%
MD 713 to MD 170	75,000	97,000	103,000	97,000	0.0%	97,000	0.0%	92,200	-5.0%	96,600	-0.5%
MD 170 to I - 97	74,200	95,000	97,000	95,000	0.0%	95,000	0.0%	91,000	-4.2%	94,600	-0.4%
I - 97 to MD 174	61,000	75,000	77,000	75,000	0.0%	75,000	0.0%	68,500	-8.7%	71,300	-5.0%
MD 174 to Oakwood Rd	76,200	92,000	92,000	92,000	0.0%	92,000	0.0%	96,700	5.1%	92,900	1.0%
Oakwood Rd to MD 2	74,800	87,000	87,000	87,000	0.0%	87,000	0.0%	91,400	5.1%	87,900	1.0%
MD 2 to Catherine Ave	59,100	64,000	64,000	64,000	0.0%	64,000	0.0%	67,300	5.1%	64,600	1.0%
Catherine Ave to Edwin Raynor Blvd	38,700	44,000	44,000	44,000	0.0%	44,000	0.0%	46,300	5.2%	44,400	1.0%
Edwin Raynor Blvd to Magothy Br Rd(MD 607)	27,100	31,000	31,000	31,000	0.0%	31,000	0.0%	32,600	5.1%	31,300	1.0%

Table 4-14: MD 295 2035 AADT

2035 AADT
MD 295: Prince George's County Line to I-695

Segment	2005 AADT	*Highway Option*		*Transit Option*				*HOV/HOT Option*			
		2035 E+C AADT	2035 CLRP AADT	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
Prince George's County Line to MD 198	85,400	100,000	98,000	99,800	-0.2%	100,000	0%	95,000	-5%	95,000	-5.0%
MD 198 to MD 32	85,400	102,000	99,000	101,800	-0.2%	102,100	0%	96,400	-6%	95,900	-6.0%
MD 32 to MD 175	82,700	98,000	96,000	97,700	-0.3%	98,000	0%	95,700	-2%	93,100	-5.0%
MD 175 to MD 100	104,300	127,000	125,000	126,700	-0.3%	127,000	0%	123,000	-3%	120,200	-5.3%
MD 100 to I - 195	89,800	110,000	119,000	109,600	-0.4%	110,000	0%	103,500	-6%	105,600	-4.0%
I - 195 to West Nursery Rd	89,200	113,000	123,000	112,500	-0.4%	113,100	0%	103,200	-9%	109,600	-3.0%
West Nursery Rd to I-695	90,300	125,000	130,000	124,500	-0.4%	125,000	0%	113,800	-9%	122,500	-2.0%

Table 4-15 MD 3 2035 AADT

2035 AADT
MD 3: Prince George's County Line to I-97/MD 32

Segment	2005 AADT	*Highway Option*		*Transit Option*				*HOV/HOT Option*			
		2035 E+C AADT	2035 CLRP AADT	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
Prince George's Co Line to MD 450 (Defense Hwy)	76,500	92,000	88,000	91,800	-0.2%	91,600	-0.4%	82,300	-10.5%	85,500	-7.1%
MD 450 to Crawford Blvd	70,100	87,000	87,000	86,800	-0.2%	86,700	-0.4%	77,900	-10.5%	80,800	-7.1%
Crawford Blvd to Davidsonville Rd	62,500	80,000	80,000	79,800	-0.2%	79,700	-0.4%	74,400	-7.0%	75,600	-5.5%
Davidsonville Rd to Johns Hopkins Rd	70,100	97,000	97,000	96,800	-0.2%	96,600	-0.4%	92,900	-4.3%	90,300	-7.0%
Johns Hopkins Rd to Waugh Chapel Rd	59,300	94,000	97,000	93,800	-0.2%	93,600	-0.4%	91,200	-3.0%	88,400	-6.0%
Waugh Chapel Rd to St Stephens Church Rd	70,600	96,000	101,000	95,800	-0.2%	95,600	-0.4%	94,100	-2.0%	91,200	-5.0%
St Stephens Church Rd to MD 175	78,800	102,000	109,000	101,800	-0.2%	101,600	-0.4%	101,100	-0.9%	97,900	-4.0%
MD 175 to I-97/MD 32	64,600	86,000	90,000	85,800	-0.2%	85,700	-0.4%	86,000	0.0%	83,400	-3.1%

Table 4-16: MD 607 / MD 173 2035 AADT

2035 AADT
Magothy Bridge Rd/ Hog Neck Rd (MD 607)/ Ft. Smallwood Rd (MD 173): MD 2 to Baltimore City Line

Segment	2005 AADT	*Highway Option*		*Transit Option*				*HOV/Toll Options*			
		2035 E+C AADT	2035 CLRP AADT	BRT Scenario	% Change From E+C	Local/Exp Bus Scenario	% Change From E+C	HOV Scenario	% Change From E+C	Toll Scenario	% Change From E+C
MD 2 to MD 100	9,400	10,400	10,400	10,400	0%	10,400	0%	10,600	2.0%	10,400	0.0%
MD 100 to MD 177	12,100	14,000	14,000	14,000	0%	14,000	0%	14,300	2.0%	14,000	0.0%
MD 177 to Fort Smallwood Road	21,100	24,000	24,000	24,000	0%	24,000	0%	24,400	1.8%	24,000	0.0%
Fort Smallwood Rd to Edwin Raynor Blvd	9,200	13,000	13,000	13,000	0%	13,000	0%	13,200	1.5%	13,000	0.0%
Edwin Raynor Blvd to Duvall Hwy	21,600	26,000	26,000	26,000	0%	26,000	0%	26,300	1.0%	26,000	0.0%
Duvall Hwy to Elizabeth's Landing Way	23,900	27,000	27,000	27,000	0%	27,000	0%	27,300	1.0%	27,000	0.0%
Elizabeth's Landing Way to Rivera Dr	23,000	26,000	26,000	26,000	0%	26,000	0%	26,000	0.0%	26,000	0.0%
Rivera Dr to Hilltop Rd	17,000	19,000	19,000	19,000	0%	19,000	0%	19,000	0.0%	19,000	0.0%
Hilltop Rd to Solley Rd	19,400	21,000	21,000	21,000	0%	21,000	0%	21,000	0.0%	21,000	0.0%
Solley Rd to Marley Neck Blvd	24,300	27,000	27,000	27,000	0%	27,000	0%	27,000	0.0%	27,000	0.0%
Marley Neck Blvd to Baltimore City Line	21,900	25,000	25,000	25,000	0%	25,000	0%	25,000	0.0%	25,000	0.0%

Figure 4-11: US 50 2035 CLRP LOS

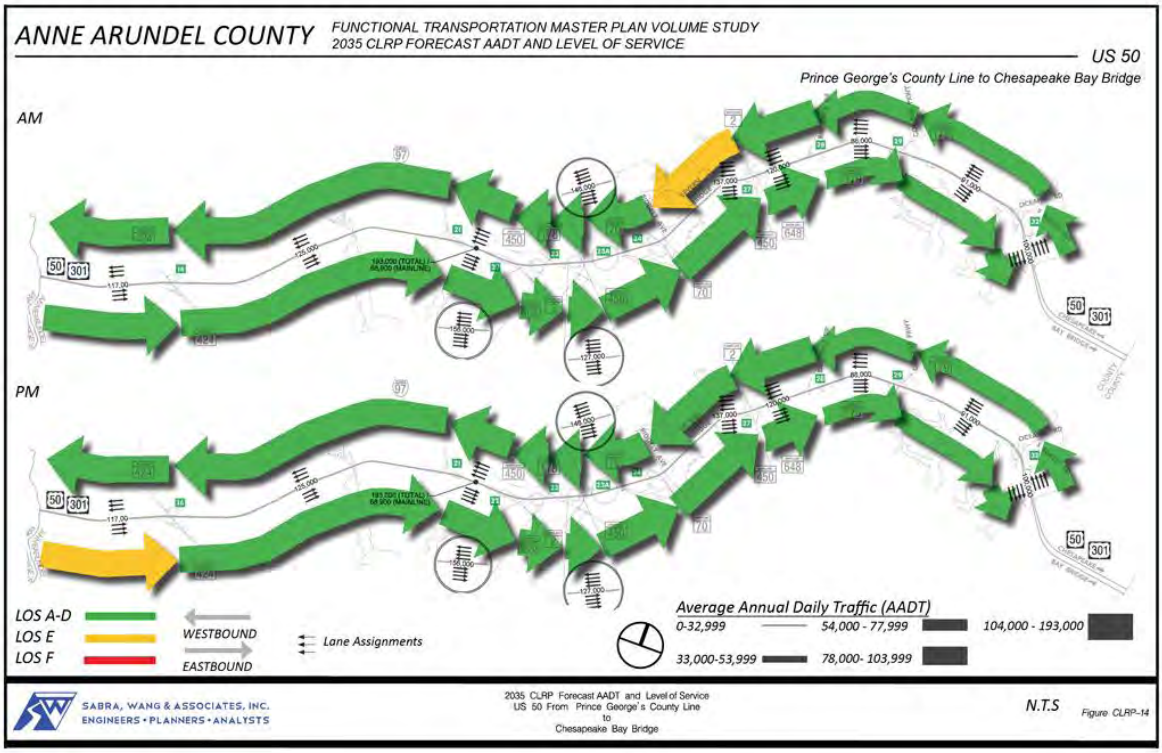


Figure 4-12: MD 2 (North) 2035 CLRP LOS

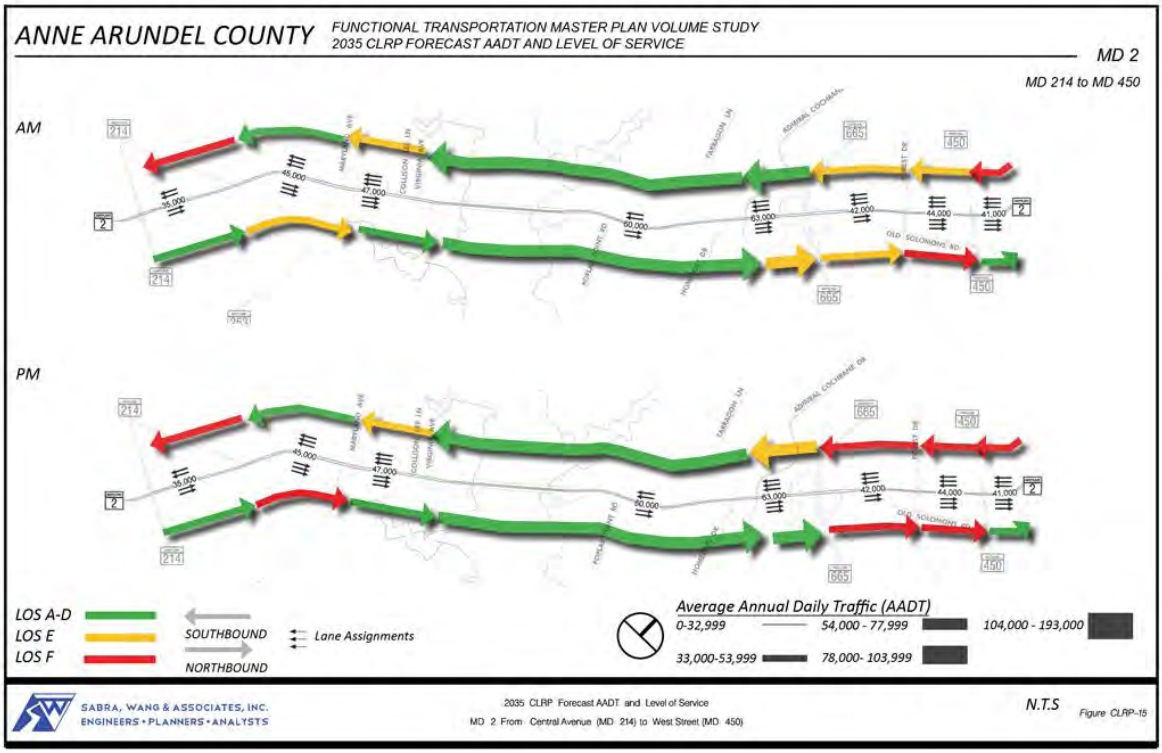


Figure 4-13: MD 2 (South) 2035 CLRP LOS

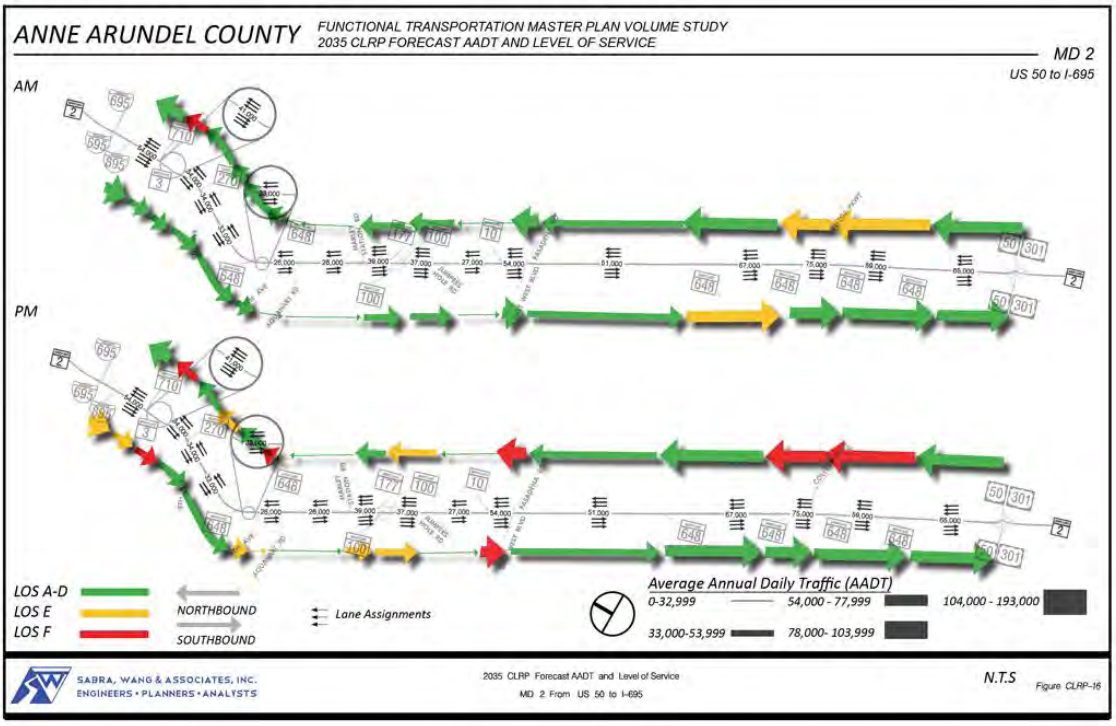


Figure 4-14: I-97 2035 CLRP LOS

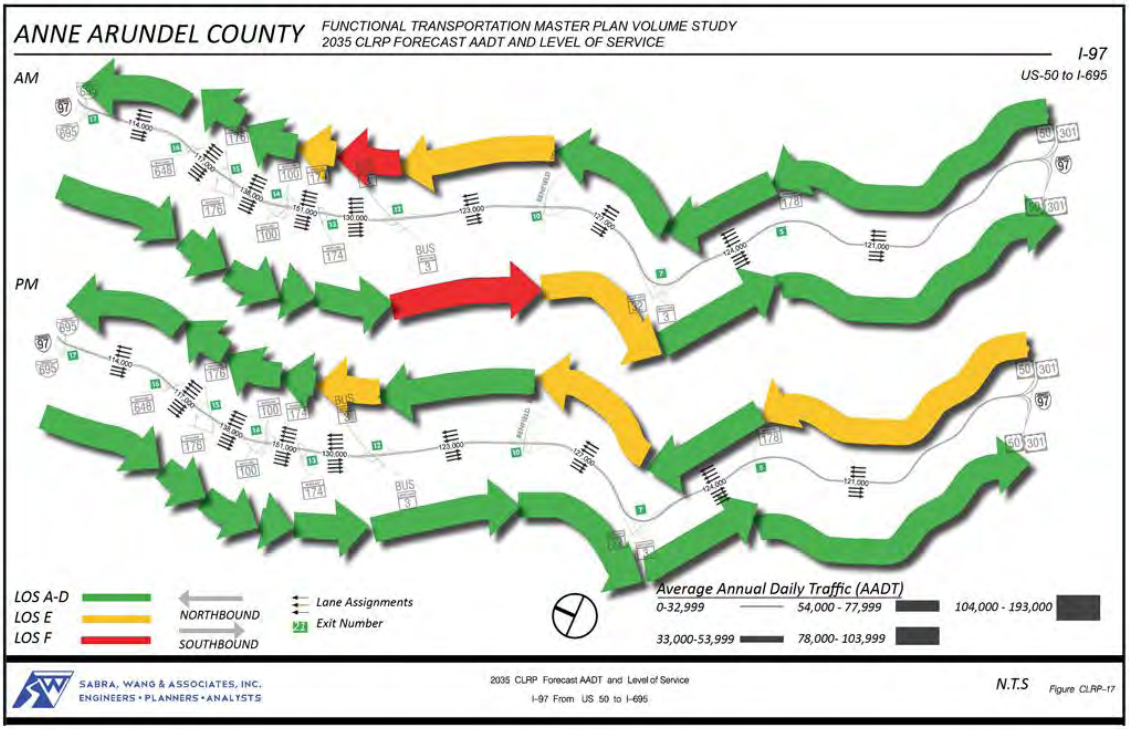


Figure 4-15: MD 32 2035 CLRP LOS

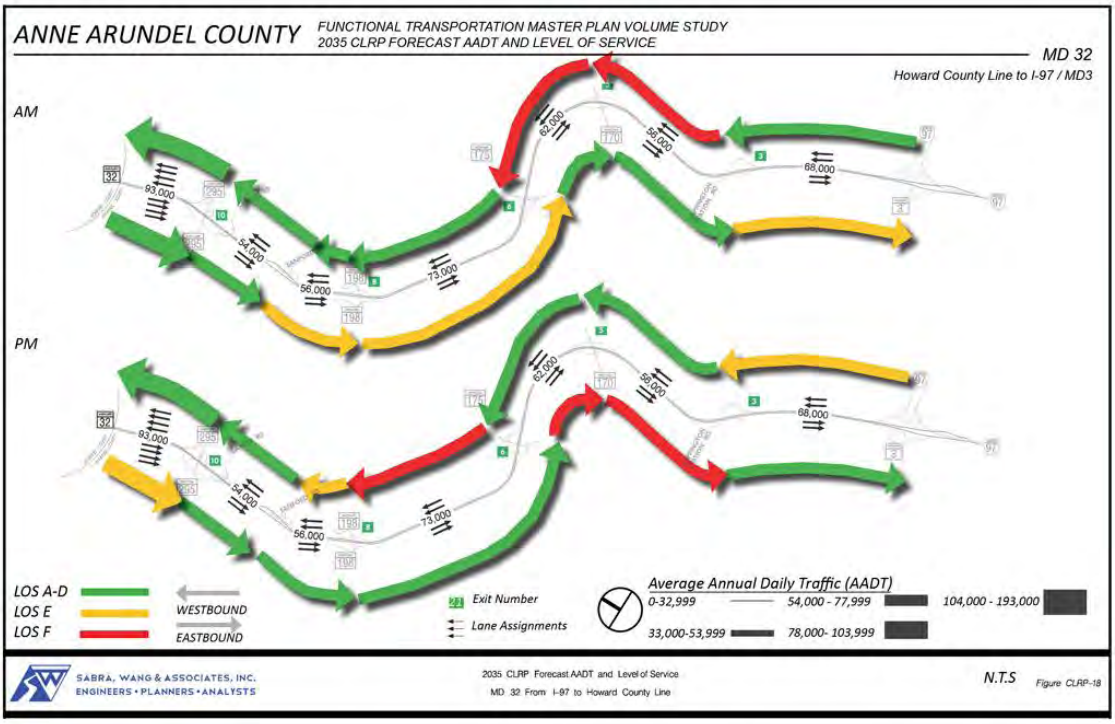


Figure 4-16: MD 100 2035 CLRP LOS

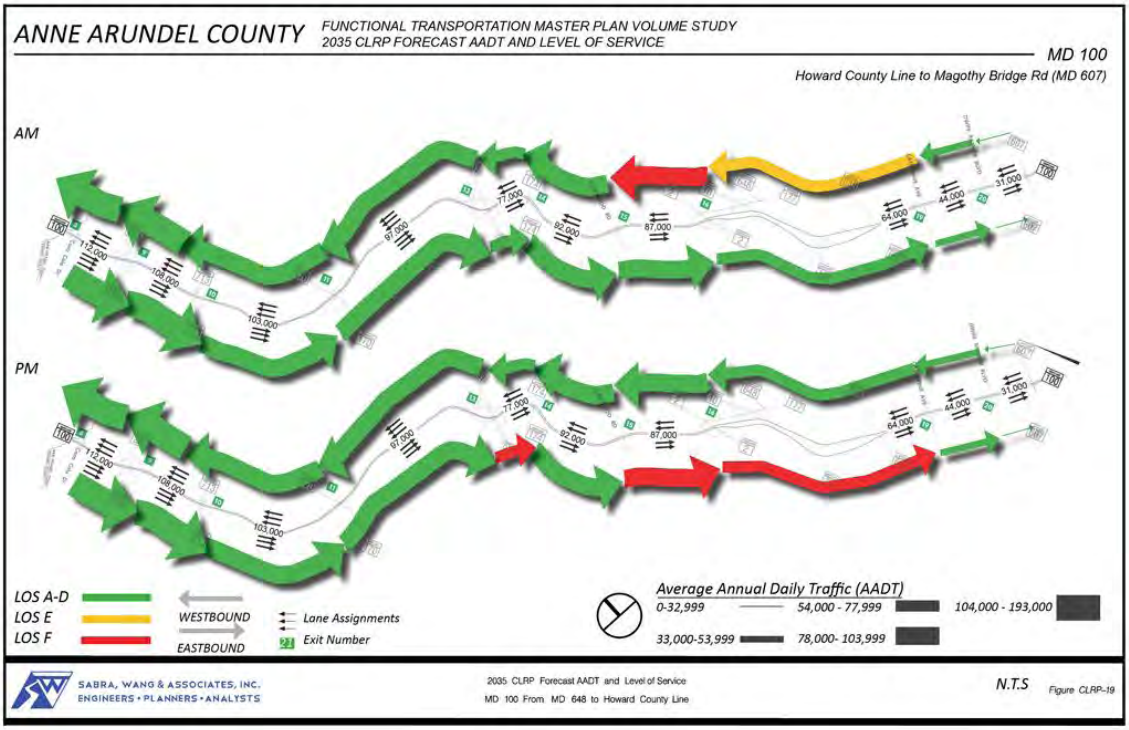


Figure 4-17: MD 295 2035 CLRP LOS

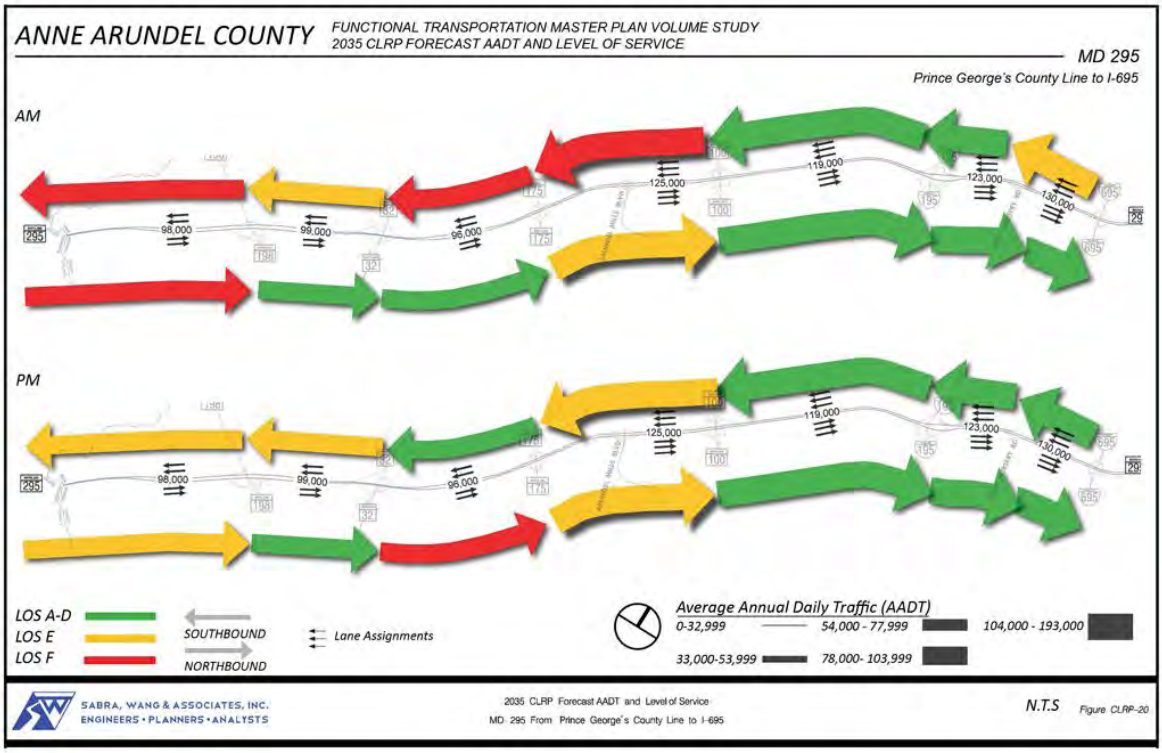


Figure 4-18: MD 3 2035 CLRP LOS

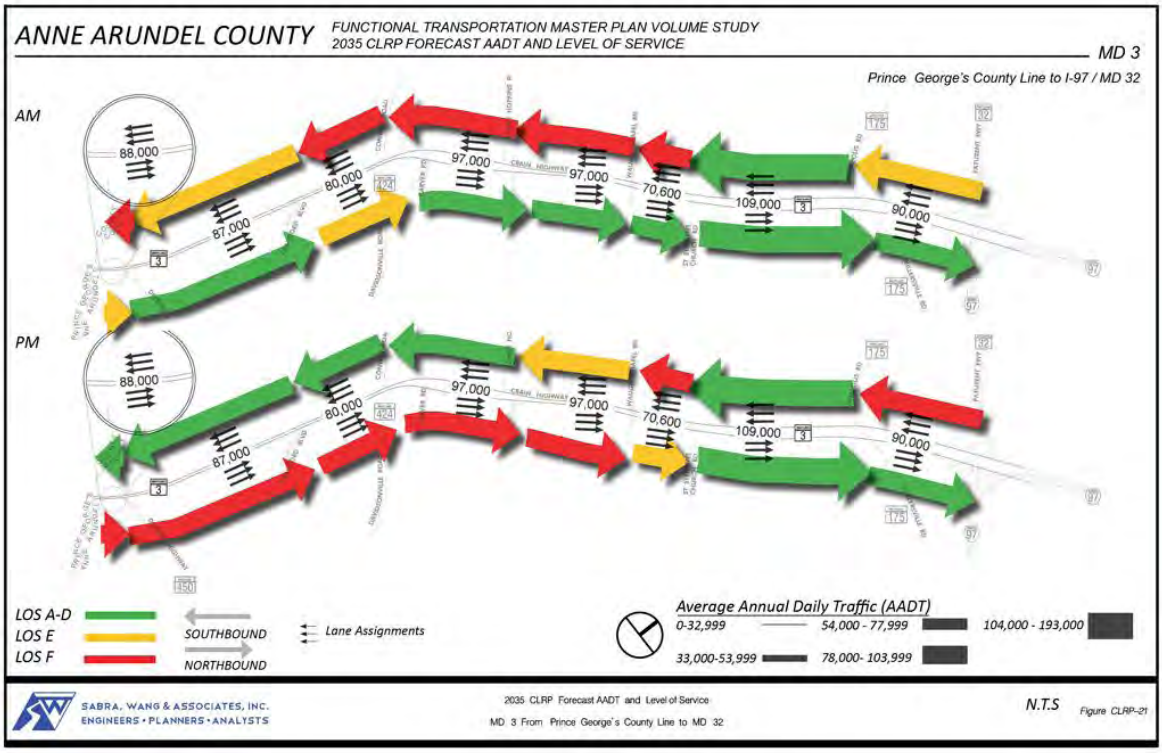


Figure 4-19: MD 607 / MD 173 2035 CLRP LOS

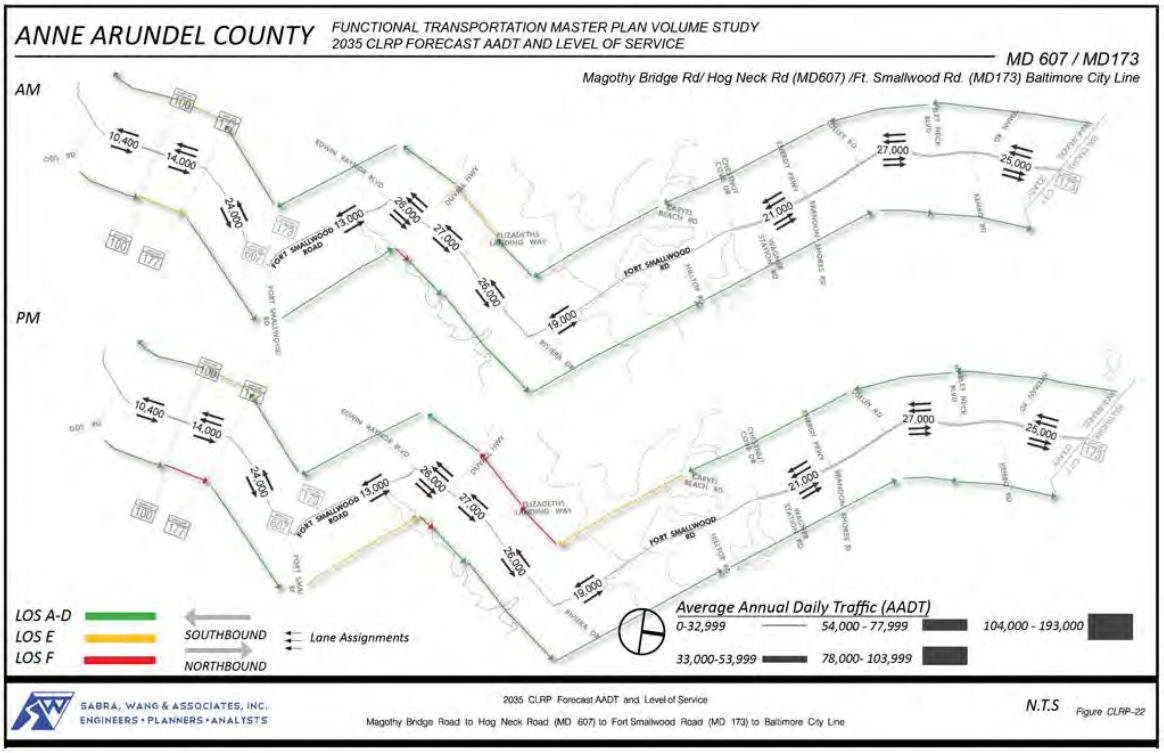


Figure 4-20: US 50 2035 E+C LOS

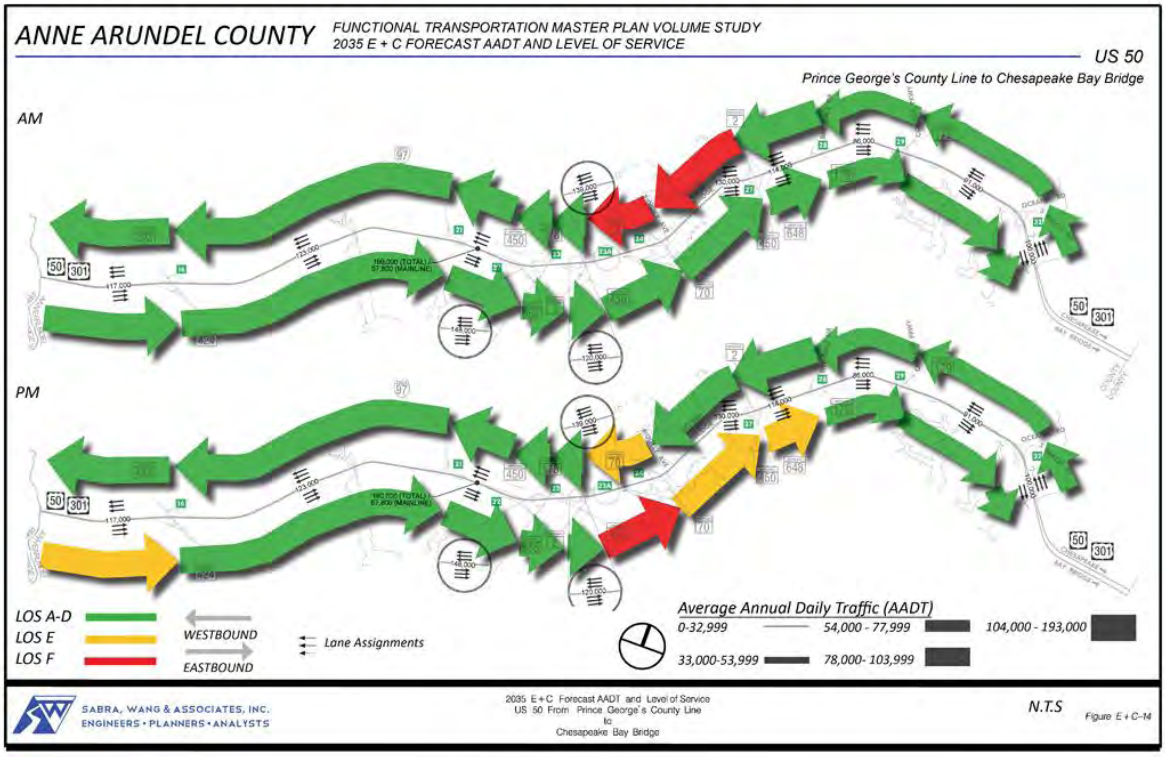


Figure 4-21: MD 2 (North) 2035 E+C LOS

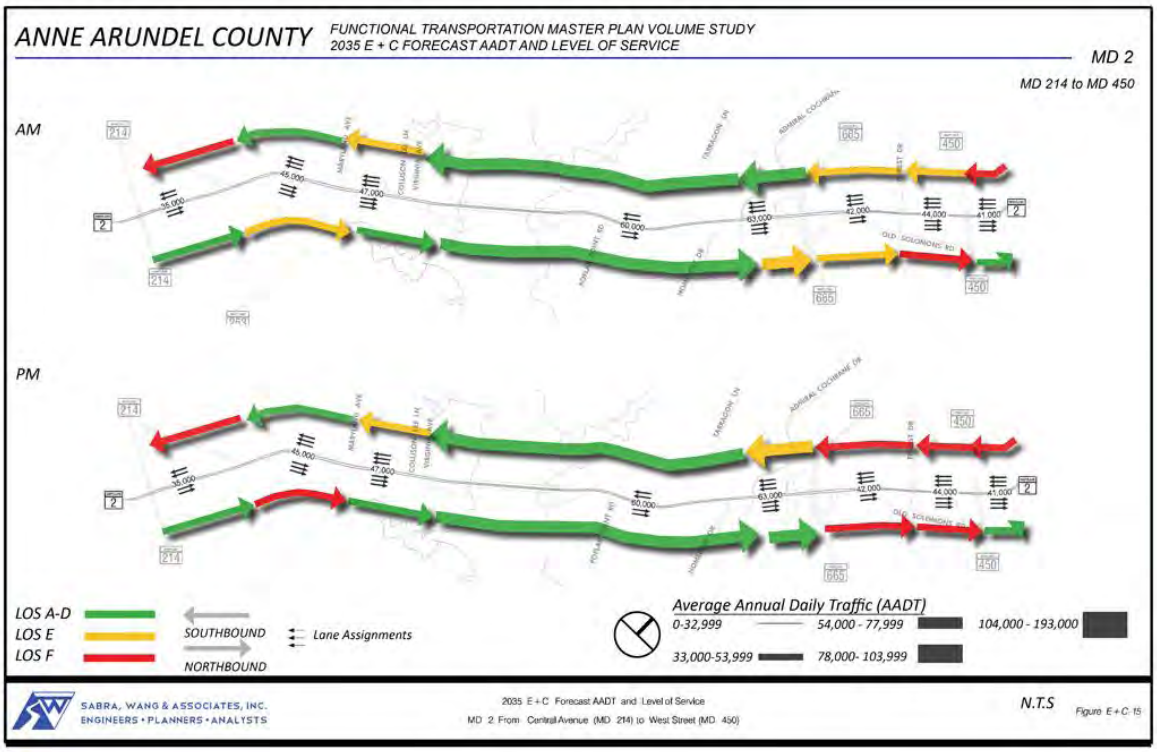


Figure 4-22: MD 2 (South) 2035 E+C LOS

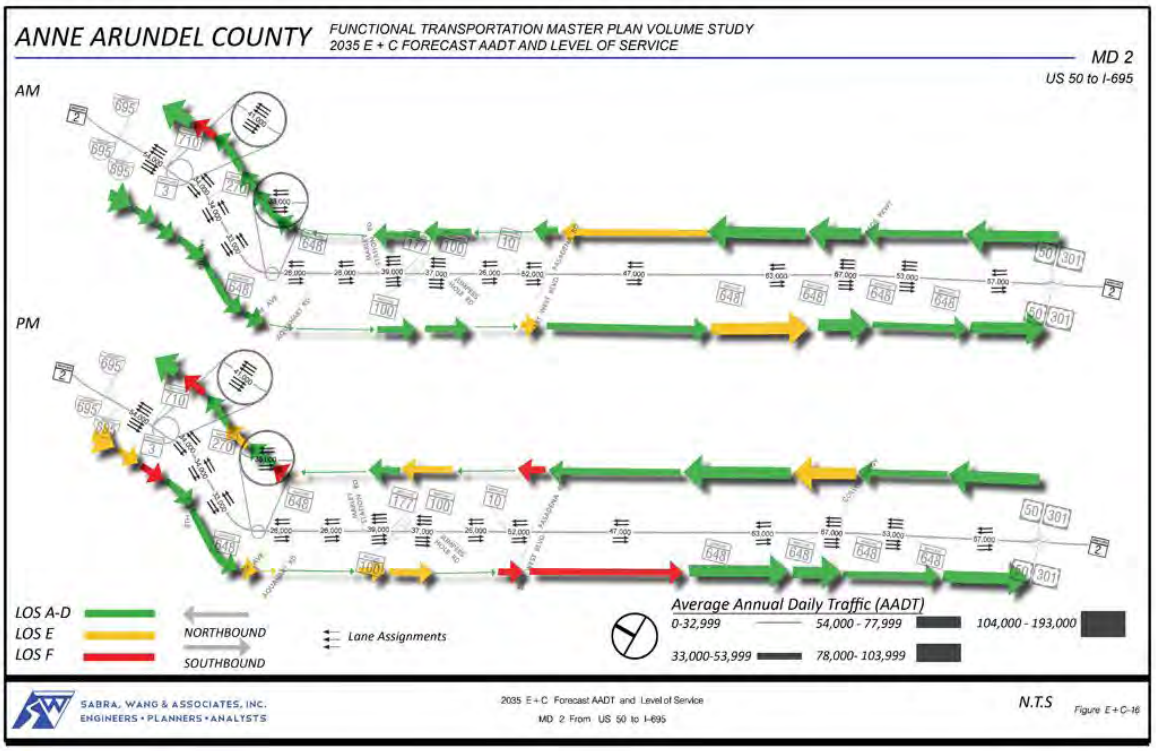


Figure 4-23: I-97 2035 E+C LOS

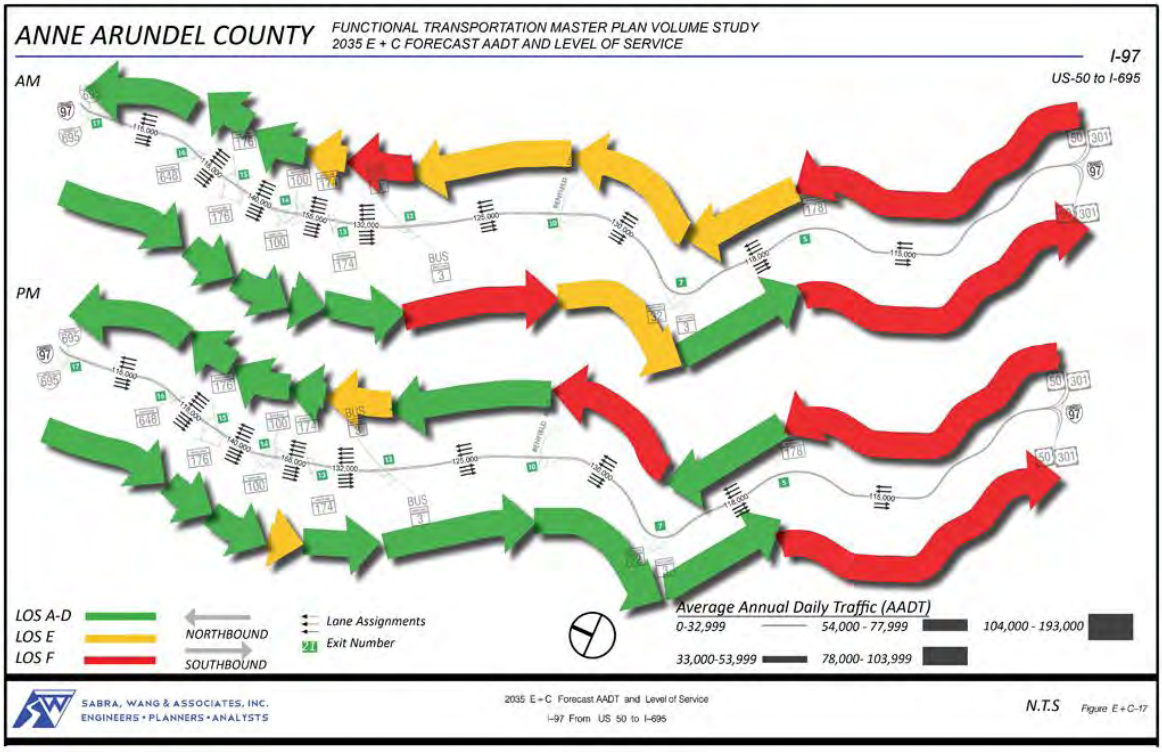


Figure 4-24: MD 32 2035 E+C LOS

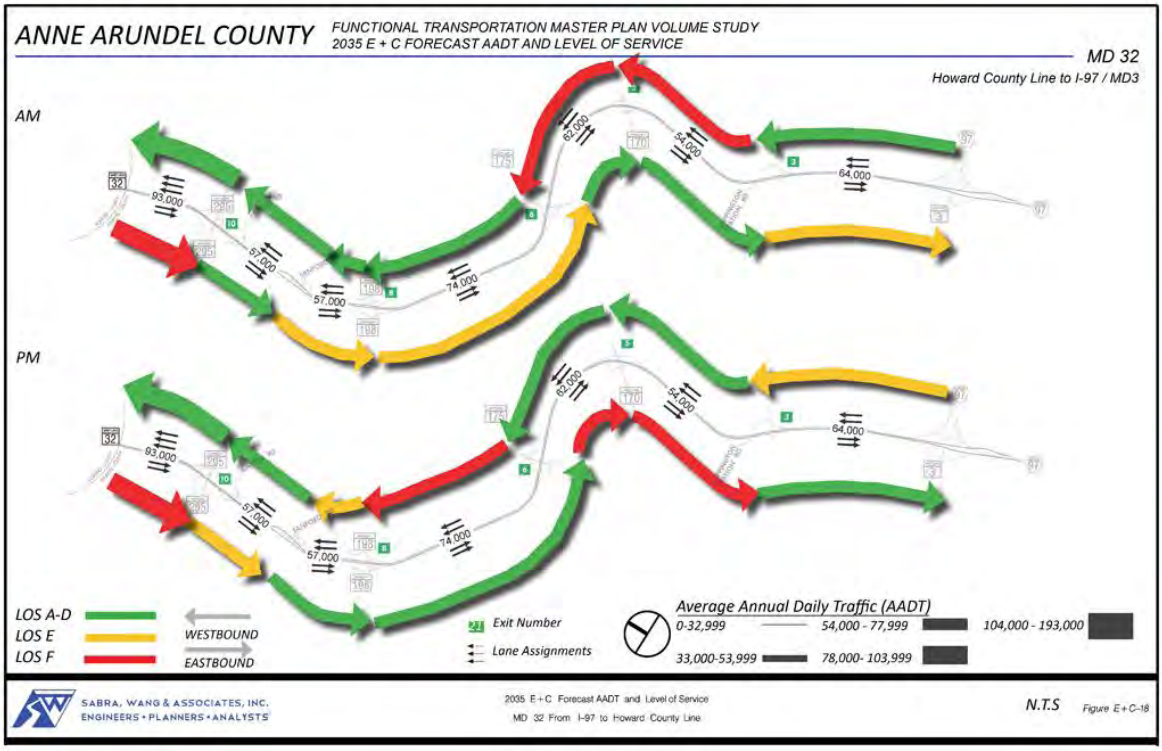


Figure 4-25: MD 100

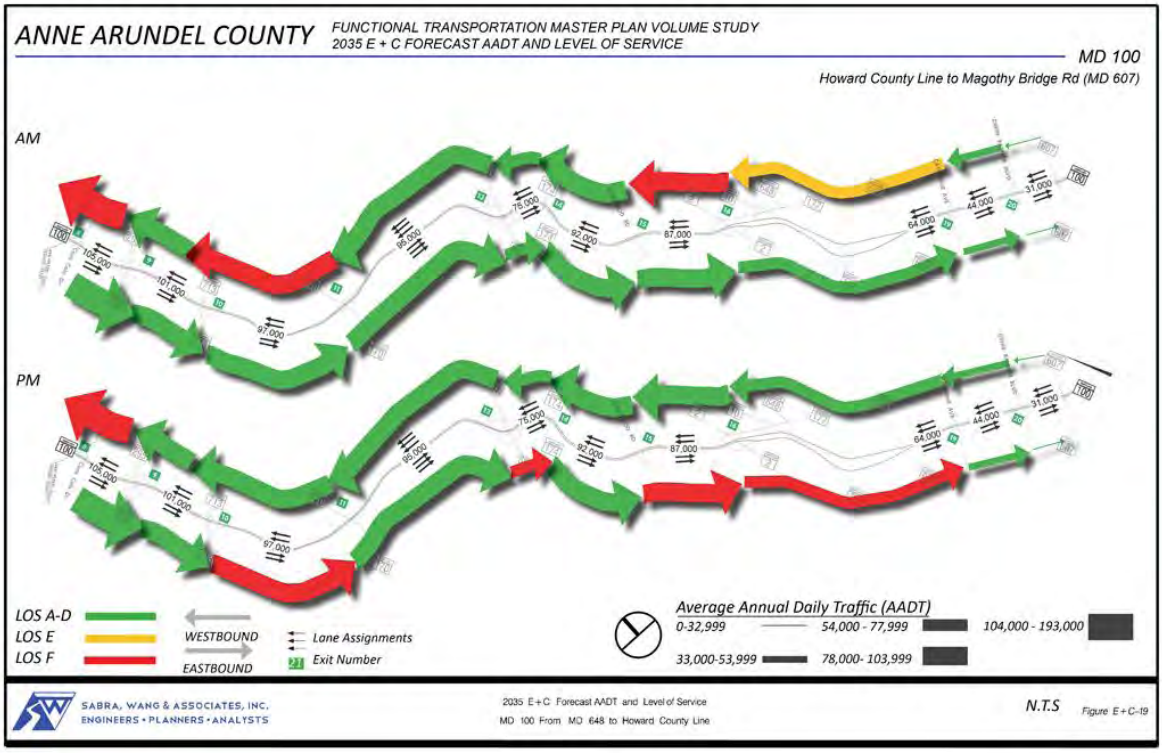


Figure 4-26: MD 295

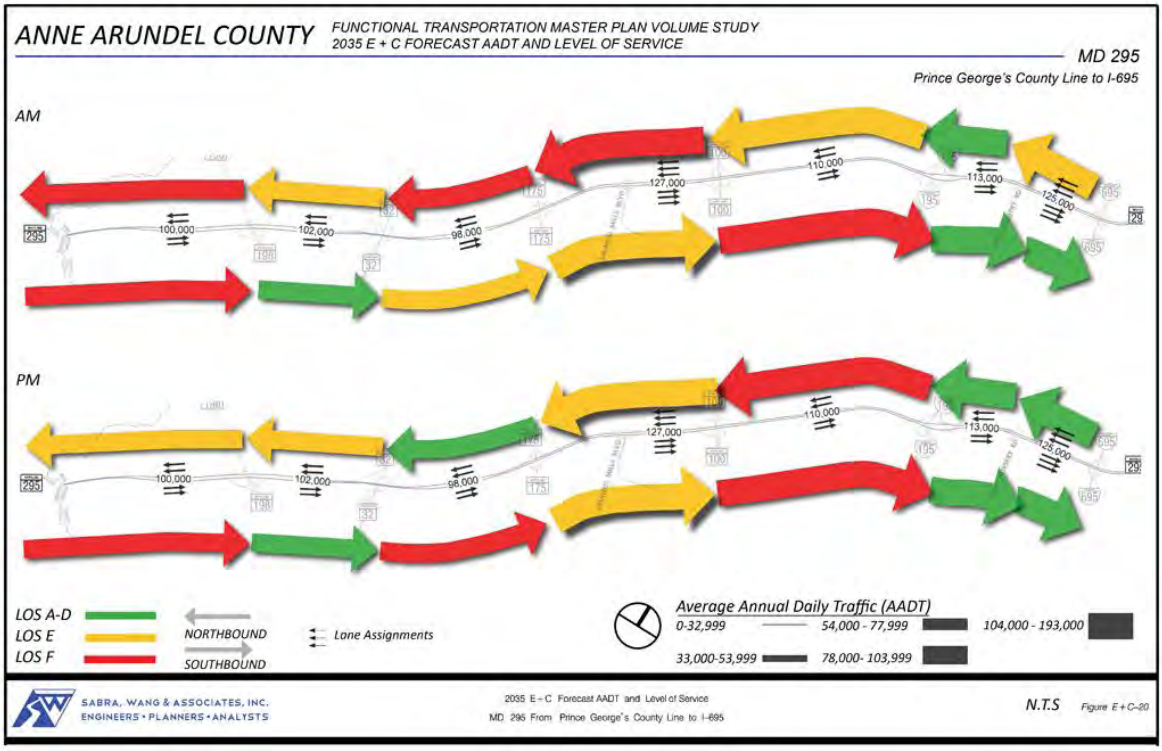


Figure 4-27: MD 3 2035 E+C LOS

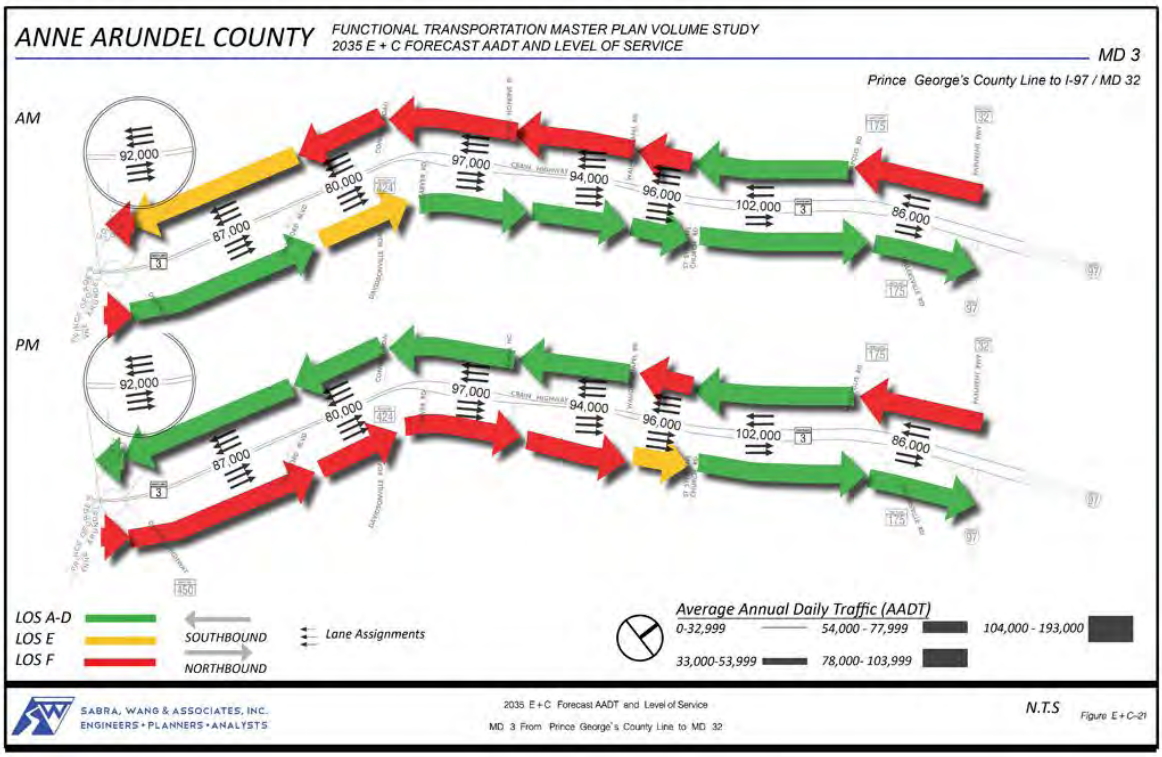
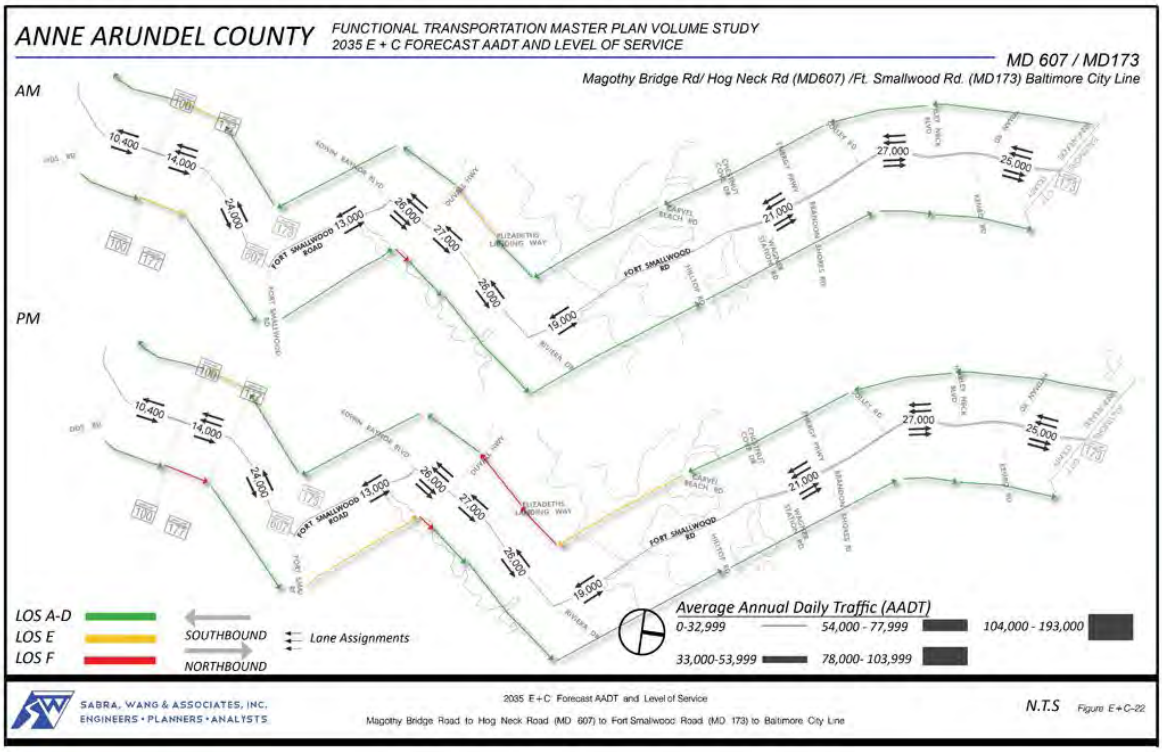


Figure 4-28: MD 607/MD 173 2035 E+C LOS



CHAPTER 5: THE PLAN RECOMMENDED NETWORK

5.1 FINAL ALTERNATIVE DEVELOPMENT

Based on the results of the previous alternatives analysis, the final alternative developed, and tested in this chapter is a Hyrbrid (Preferred) alternative, which combines the optimal roadway widening, new and/ or extensions of existing managed lanes, and transit service with supporting select transit priority treatments and transit-oriented land use changes in each corridor. **It should be noted that the land use changes tested in this report are not consistent with the currently approved General Development Plan and would require a full public process to allow rezoning and seek Council approval.**

A brief overview of key findings from the previous alternatives, and sensitivity testing is summarized below:

- Current conditions show the MD 2 (north) and MD 100 travel sheds have the highest number of transit riders (6.6% and 5.4% respectively). See **Appendix S** and **Appendix T** for travel shed information.

- Under 2035 No Build assumptions, transit trips throughout the County remain relatively flat, showing only marginal growth.

- When testing premium transit along all study corridors, MD2 (north) and US 50 experience the most growth in transit riders (11.2% and 15.5%) respective growth when comparing these corridors against the 2035 No Build.

- The MD 2 (north), US 50, and MD 100 corridors appear to respond favorably to a premium transit service. These routes may accommodate both the east-west and north-south markets within and through the County.

- The MD 2 (south) and Magothy Bridge Road corridors are expected to experience high proportional growth in transit ridership over the next 25 years. Smaller-scale transit improvements along these corridors may prove beneficial, such as improving peak hour headways.

- The results of the managed-lane sensitivity analysis show the following:

    - The US 50, I-97, MD 100 and MD 32 corridors demonstrated the most benefit in increasing HOV trips.

    - Parallel corridors such as MD 2 experienced reductions potentially as a result of longer commute trips migrating to the HOV facilities.

- A network of HOV facilities, complimented by premium transit along the US 50 and MD 100 corridors may prove most beneficial along these corridors. Premium transit along MD 2 with direct service to major downtown Baltimore destinations could be the most effective means of addressing the transportation needs along that corridor.

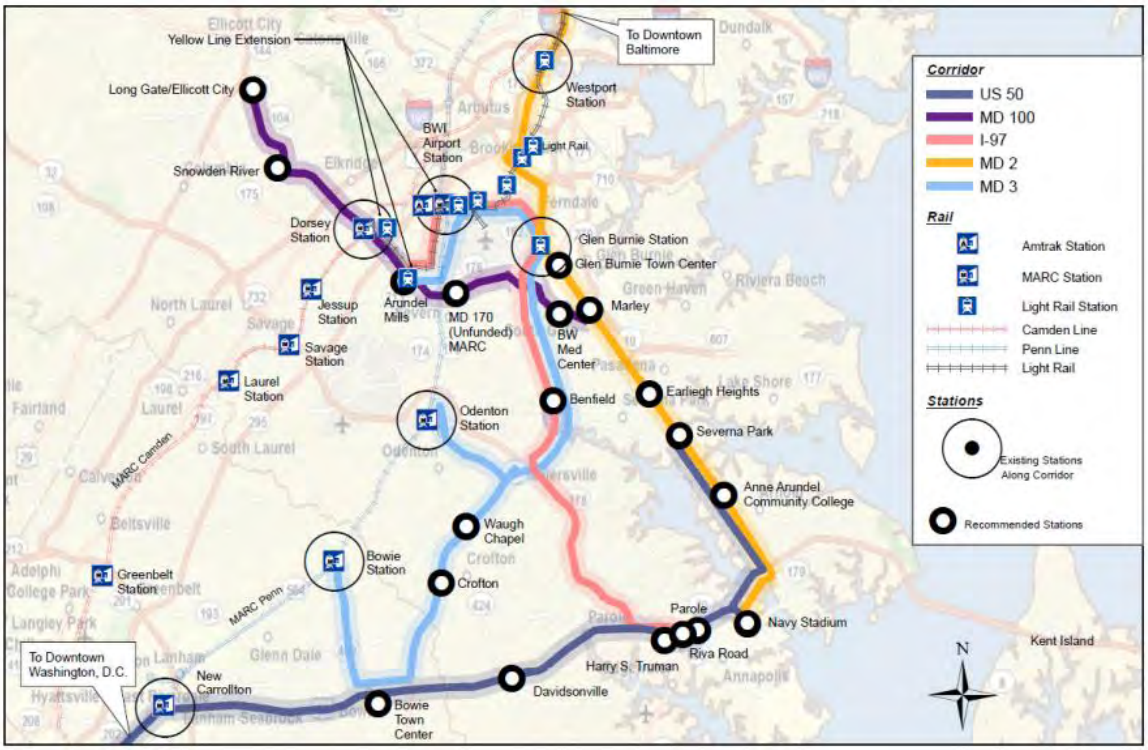
A summary of the final Hybrid Alternative is presented below in Table 5-1. .

Table 5-1: Summary of Preferred Hybrid Alternative

Corridor	Improvement			
	Roadway	Managed Lane	Transit	Land Use
US 50	Widen from 6 lanes to 8 lanes between I-97 to the Chesapeake Bay Bridge	HOV lanes from Prince George's County line to I-97	Premium bus transit from Annapolis to Downtown D.C.	none
I-97	Widen from 4 lanes to 6 lanes between MD 32 and US 50	none	Premium bus transit from Parole Town Center to BWI and Arundel Mills	none
MD 2 North	Widen from 4 lanes to 6 lanes between US 50 and MD 10	None	Premium bus transit from Annapolis to Downtown Baltimore	Transit-supporting densities at Severna Park Marketplace, Harundale Mall and Marley Station
MD 2 South	None	None		
MD 100	Widen from 4 lanes to 6 lanes between I-95 in Howard County to I-97	None	Premium bus transit from Marley Station to Ellicott City	Transit supporting densities at MD 170 interchange
MD 32	Widen to 8 lanes (between I-95 and MD 295)	HOV lanes from I-95 to I-97	None	None
MD 3	Widen and upgrade MD 3 to six lanes with interchanges at key junctions between the Prince George's County line and MD 32	None	Premium bus transit from BWI to Bowie	None
Ft. Smallwood/ Magothy Bridge	none	none	Extension of local bus service to Chesterfield Plaza	none

The preferred transit network is illustrated in Figure 5-1 and the proposed land use changes are illustrated in Figure 5-2.

Figure 5-1: Preferred Transit Network



5.2 NOTEWORTHY CHARACTERISTICS OF THE FINAL ALTERNATIVE

Highlights of the preferred hybrid alternative analysis are summarized below; detailed travel demand forecasts for each corridor and illustrations for level of service follow; detailed modeling summaries can be found in **Appendix Z**.

5.2.1 US 50

Existing express commuter buses, and proposed premium transit buses will operate on the HOV lanes. Premium bus transit service will operate on 10 min peak hour headways and 20 minute off-peak headway. The provision of carpool lanes reduces daily general purpose traffic volumes by up to 10% in some segments in comparison to a roadway widening-only option, and the provision of premium bus service increases transit ridership in this corridor by up to 150% over existing conditions.

Figure 5-2: Proposed Land Use Changes – This Figure Needs to be updated

The following table details the revised household and employment data for the 3 zones where future transit-oriented developments will be planned.

	CLRP		TFMP	
TAZ	Households	Employment	Households	Employment
241	988	1,140	1,279	2,300
250	475	3,120	693	3,990
251	456	1,524	504	1,715

5.2.2 MD 2 (North)

Premium transit service will operate on a 10-minute peak and 20- minute off-peak headway. The transit route will be extended to downtown Baltimore via I-695/ MD 295 with no stops north of the Glen Burnie Light Rail Station during peak service. The additional land use density increased projected daily traffic volumes by 10% in one segment, but resulted in overall only one additional failing segment than a roadway-only widening option. However, the plan recommendation for this corridor significantly increased walking and biking trips, and increased transit ridership by up to 125% over existing levels. The land use changes also support more walking and bicycle trips in commercial areas.

5.3 MD 2 (SOUTH)

No roadway, transit service improvements or land use changes are proposed in the preferred hybrid alterantive.

5.3.1 I-97

The roadway widening proved to provide adequate levels of service in all but one segment near the MD 3 Business interchange, and the provision of high quality bus service reduced daily traffic volumes by 1% in some segments. Premium transit service will operate on a 30-minute peak and 60-minute off-peak headway.

5.3.2 MD 32

The carpool lanes reduce daily traffic volumes from a roadway-widening only option by up to 12% in some segments. Volumes on the carpool lanes are projected to reach up to 19,000 vehicles per day.

5.3.3 MD 100

The roadway widening proved to provide adequate levels of service in all segments west of I-97, and the transit-oriented development along with the high quality transit service also projected over 2,300 transit trips per day. Premium transit service will operate on a 30-minute peak and 60-minute off-peak headway.

5.3.4 MD 295

No roadway, transit service improvements or land use changes are proposed in the preferred hybrid alterantive.

5.3.5 MD 3

The roadway widening will still not alleviate some rush hour congestion in the peak direction; however, the provision of premium bus service in this corridor reduces daily traffic volumes by 1%. Premium transit service will operate on a 30-minute peak and 60-minute off-peak headway.

5.3.6 Fort Smallwood/ Magothy Bridge Road

No roadway, new transit service or land use changes are proposed in the preferred hybrid alterantive.

Table 5-2: US 50 2035 AADT

2035 AADT US 50: Prince George's County Line to Chesapeake Bay Bridge					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
Prince George's County Line to MD 424	92,000	117,000	117,000	106,500	-9%
MD 424 to I-97	102,700	123,000	125,000	122,500	-2%
I-97 to MD 665	161,000	190,000	193,000	191,100	-1%
MD 665 to MD 178 / MD 450	128,700	148,000	156,000	154,400	-1%
MD 178 to MD 2	107,400	120,000	127,000	128,300	1%
MD 2 to MD 70	125,200	139,000	146,000	147,500	1%
MD 70 to MD 2	112,400	130,000	137,000	138,400	1%
MD 2 to Bay Dale Dr	96,000	114,000	120,000	120,000	0%
Bay Dale Dr to MD 179	63,400	86,000	88,000	88,000	0%
MD 179 to Oceanic Dr	68,900	91,000	91,000	91,000	0%
Oceanic Dr to Chesapeake Bay Bridge	72,500	100,000	100,000	100,000	0%

NOTE: Volume improvements may appear misleading, as segments experiencing reductions are the longest segments within the corridor. Volumes on the HOV lanes from Anne Arundel County entering Prince George's County were 8,600.

For the links with HOV lanes (west of MD 178), the above represents volumes in the SOV lanes only.

The addition of BRT service along this corridor increased overall transit ridership by 150%.

Table 5-3: MD 2 (South) 2035 AADT

2035 AADT MD 2: Central Avenue (MD 214) to West Street (MD 450)					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
Central Ave (MD 214) to Pike Ridge Rd	31,100	35,000	35,000	35,000	0%
Pike Ridge Rd to MD 253	40,200	45,000	45,000	45,000	0%
MD 253 to Virginia Ave	41,100	47,000	47,000	47,000	0%
Virginia Ave to Admiral Cochrane Dr	53,800	60,000	60,000	60,000	0%
Admiral Cochrane Dr to MD 665	54,300	63,000	63,000	63,000	0%
MD 665 to Forest Dr	33,900	42,000	42,000	42,000	0%
Forest Dr to MD 450	33,600	44,000	44,000	44,000	0%
West Street (MD 450) to End	28,000	41,000	41,000	41,000	0%

NOTE: No improvements assummed for this corridor, and subsequently there were no changes to the traffic volumes

Table 5-4: MD 2 (North) 2035 AADT

2035 AADT MD 2: US 50 to I-695					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
Ramp to US 50 to MD 648D	51,500	57,000	65,000	63,100	-3%
MD 648D to College Pkwy	47,000	53,000	59,000	57,800	-2%
College Pkwy to Robinson Rd	62,600	67,000	75,000	76,500	2%
Robinson Rd to MD 648H	56,900	63,000	67,000	68,300	2%
MD 648H to East West Blvd	41,900	47,000	51,000	51,500	1%
East West Blvd to MD 10	45,500	52,000	54,000	54,000	0%
MD 10 to Jumpers Hole Rd	22,400	26,000	27,000	27,000	0%
Jumpers Hole Rd to MD 100	33,500	37,000	37,000	37,400	1%
MD 100 to Marley Station Rd	36,400	39,000	39,000	42,500	9%
Marley Station Rd to Aquahart Rd	23,100	26,000	26,000	28,600	10%
Aquahart Rd to 5th Ave	23,100	26,000	26,000	26,500	2%
5th Ave to MD 648	29,000	33,000	33,000	34,000	3%
MD 648 to 8th Ave	29,200	33,000	33,000	35,000	6%
8th Ave to MD 270	31,700	34,000	34,000	36,000	6%
MD 270 to MD 3	31,800	34,000	34,000	35,000	3%
MD 3 to MD 710	39,100	41,000	41,000	42,200	3%
MD 710 to I-695	52,400	54,000	54,000	55,600	3%

NOTE: Although the added BRT service increased total transit ridership by 125%; these improvements were offset from the increased landuse at Severna Park and Marley Station

Table 5-5: I-97 2035 AADT

2035 AADT I-97: US 50 to I-695					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
US 50 to MD 178	92,200	115,000	121,000	123,400	2%
MD 178 to MD 3	94,700	118,000	124,000	126,500	2%
MD 3 to Benfield Blvd	103,300	130,000	127,000	125,700	-1%
Benfield Blvd to MD 3 Bus.	102,600	125,000	123,000	121,800	-1%
MD 3 Bus. to MD 174	113,600	132,000	130,000	128,700	-1%
MD 174 to MD 100	133,000	155,000	151,000	149,500	-1%
MD 100 to MD 176	120,500	140,000	138,000	136,600	-1%
MD 176 to MD 648	106,200	118,000	117,000	117,000	0%
MD 648 to I-695	104,400	115,000	114,000	114,000	0%

NOTE: Additional capacity along MD 32 (HOV lanes) seems to attract more vehicles in the southern end of I-97. Express bus service, however, resulted in modest volume reductions in the central part of the corridor of 1%.

Preliminary raw model outputs estimate the transit ridership to be approximately 1,800.

Table 5-6: MD 32 2035 AADT

2035 AADT MD 32: Howard County Line to I-97/MD 3					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
Howard County Line to MD 295	60,000	93,000	93,000	81,800	-12%
MD 295 to Sanford Rd	36,300	57,000	54,000	50,200	-7%
Sanford Rd to MD 198	37,500	57,000	56,000	52,100	-7%
MD 198 to MD 175	50,900	74,000	73,000	66,400	-9%
MD 175 to MD 170	39,200	62,000	62,000	56,400	-9%
MD 170 to Sappington Station Road	37,000	54,000	56,000	51,000	-9%
Sappington Station Road to I-97/MD 3	44,100	64,000	68,000	60,500	-11%

NOTE: Volumes on the general purpose lanes were reduced by 7% to 12%. The AADT shown above represents volumes in the SOV lanes only. Volumes on HOV links ranged from 12,500 - 19,000.

Table 5-7: MD 100 2035 AADT

2035 AADT MD 100: Howard County Line to Magothy Bridge Rd (MD 607)					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
Howard County Line to MD 295	91,500	105,000	112,000	112,000	0%
MD 295 to MD 713	79,100	101,000	108,000	109,100	1%
MD 713 to MD 170	75,000	97,000	103,000	105,100	2%
MD 170 to I - 97	74,200	95,000	97,000	99,900	3%
I - 97 to MD 174	61,000	75,000	77,000	79,300	3%
MD 174 to Oakwood Rd	76,200	92,000	92,000	94,800	3%
Oakwood Rd to MD 2	74,800	87,000	87,000	88,700	2%
MD 2 to Catherine Ave	59,100	64,000	64,000	64,000	0%
Catherine Ave to Edwin Raynor Blvd	38,700	44,000	44,000	44,000	0%
Edwin Raynor Blvd to Magothy Br Rd (MD 607)	27,100	31,000	31,000	31,000	0%

NOTE: Volumes along this corridor remain unchanged except in the central portion of the corridor where changes in land use (NW quad of MD 100 & MD 170) resulted in slight increases in ADT.

Express bused service was also assumed along the corridor, and preliminary raw model outputs estimate the ridership to be approximately 2,300.

Table 5-8: MD 295 2035 AADT

2035 AADT MD 295: Prince George's County Line to I-695					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
Prince George's County Line to MD 198	85,400	100,000	98,000	97,000	-1%
MD 198 to MD 32	85,400	102,000	99,000	98,000	-1%
MD 32 to MD 175	82,700	98,000	96,000	95,000	-1%
MD 175 to MD 100	104,300	127,000	125,000	123,800	-1%
MD 100 to I - 195	89,800	110,000	119,000	117,800	-1%
I - 195 to West Nursery Rd	89,200	113,000	123,000	123,000	0%
West Nursery Rd to I-695	90,300	125,000	130,000	130,000	0%

NOTE: Although no improvements (beyond the CLRP) were assumed on this corridor, minor secondary benefits shown may be a result of other improvements within the County.

Table 5-9: MD 3 2035 AADT

2035 AADT MD 3: Prince George's County Line to I-97/MD 32					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
Prince George's Co Line to MD 450 (Defense Hwy	76,500	92,000	88,000	87,100	-1%
MD 450 to Crawford Blvd	70,100	87,000	87,000	86,100	-1%
Crawford Blvd to Davidsonville Rd	62,500	80,000	80,000	79,200	-1%
Davidsonville Rd to Johns Hopkins Rd	70,100	97,000	97,000	96,000	-1%
Johns Hopkins Rd to Waugh Chapel Rd	59,300	94,000	97,000	96,000	-1%
Waugh Chapel Rd to St Stephens Church Rd	70,600	96,000	101,000	100,000	-1%
St Stephens Church Rd to MD 175	78,800	102,000	109,000	109,000	0%
MD 175 to I-97/MD 32	64,600	86,000	90,000	90,900	1%

NOTE: The added capacity on MD 32 had minor effects on this corridor, increasing volumes on the northern portion by 1%. The express bus service that was assumed resulted in postive effects to the remaining corridor with modest reductions of 1%.

Preliminary raw model outputs estimate the transit ridership for the entire route to be approximately 1,800.

Table 5-10: MD 607 / MD 173

2035 AADT Magothy Bridge Rd/ Hog Neck Rd (MD 607)/ Ft. Smallwood Rd (MD 173): MD 2 to Baltimore City Line					
Segment	**2005 AADT**	**2035 E+C AADT**	**2035 CLRP AADT**	**2035 TFMP AADT**	**% Change From CLRP**
MD 2 to MD 100	9,400	10,400	10,400	10,400	0%
MD 100 to MD 177	12,100	14,000	14,000	14,000	0%
MD 177 to Fort Smallwood Road	21,100	24,000	24,000	24,000	0%
Fort Smallwood Rd to Edwin Raynor Blvd	9,200	13,000	13,000	13,000	0%
Edwin Raynor Blvd to Duvall Hwy	21,600	26,000	26,000	26,000	0%
Duvall Hwy to Elizabeth's Landing Way	23,900	27,000	27,000	27,000	0%
Elizabeth's Landing Way to Rivera Dr	23,000	26,000	26,000	25,700	-1%
Rivera Dr to Hilltop Rd	17,000	19,000	19,000	18,800	-1%
Hilltop Rd to Solley Rd	19,400	21,000	21,000	20,800	-1%
Solley Rd to Marley Neck Blvd	24,300	27,000	27,000	26,700	-1%
Marley Neck Blvd to Baltimore City Line	21,900	25,000	25,000	24,800	-1%

NOTE: Extension of the MTA 64 bus service proved to have marginal benefits to the northern portion of the corridor, resulting in reductions in AADT of 1%.

Figure 5-3: US 50 Plan Recommended Alternative LOS

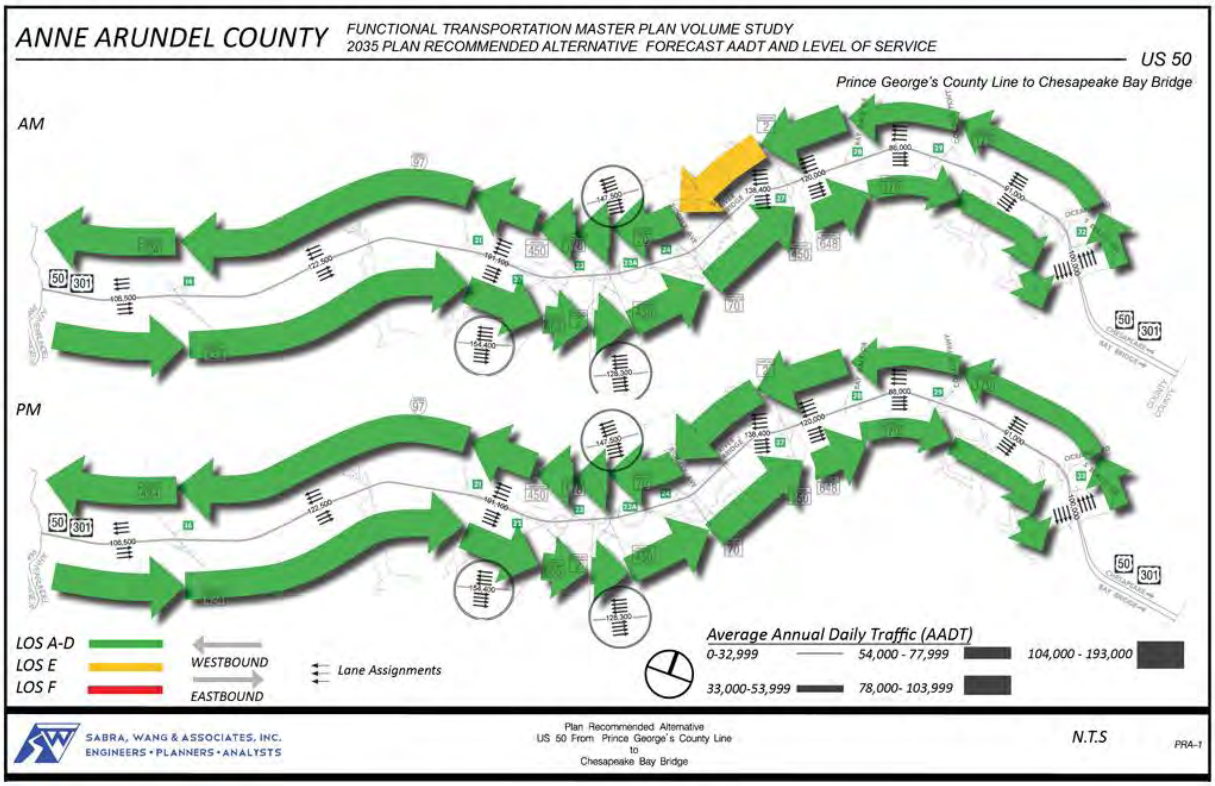


Figure 5-4: MD 2 (North) Plan Recommended Alternative LOS

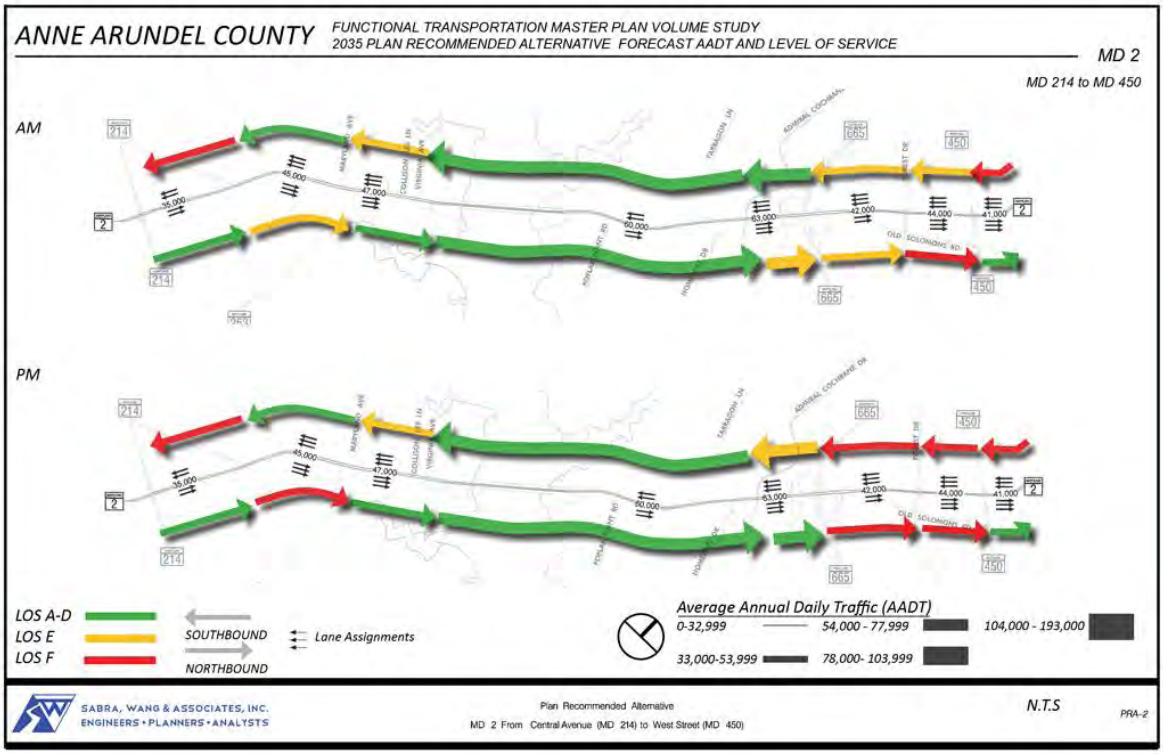


Figure 5-5: MD 2 (South) Plan Recommended Alternative LOS

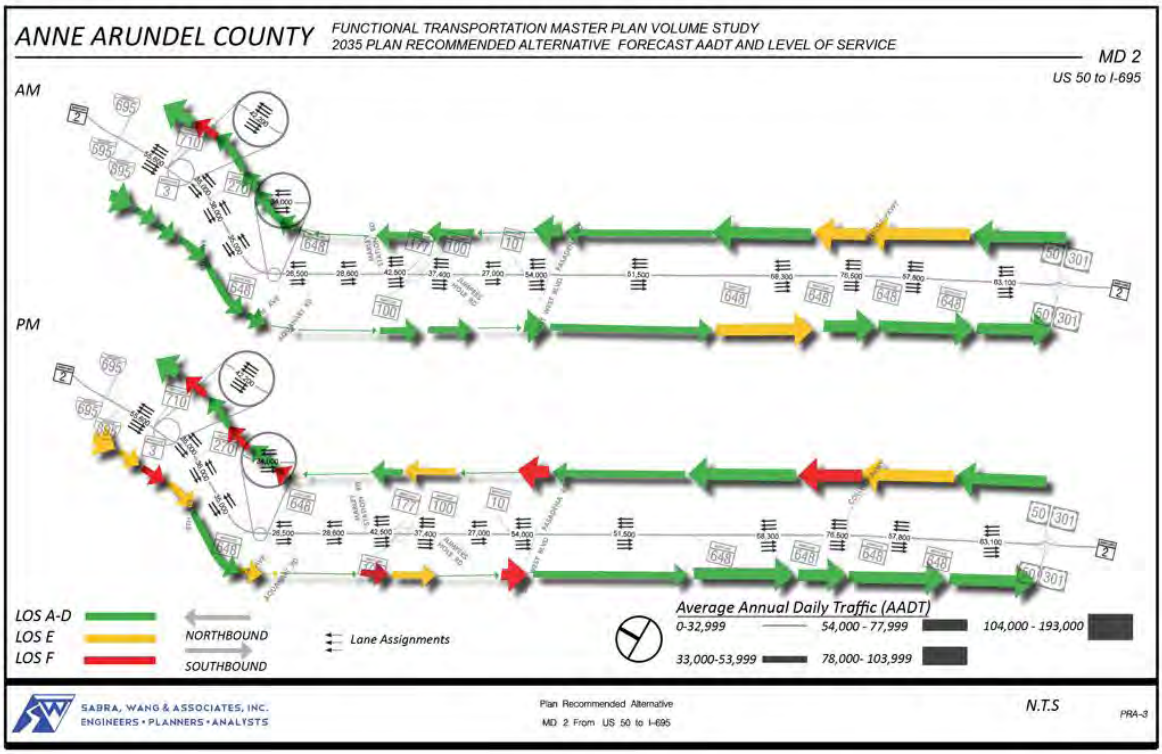


Figure 5-6: I-97 Plan Recommended Alternative LOS

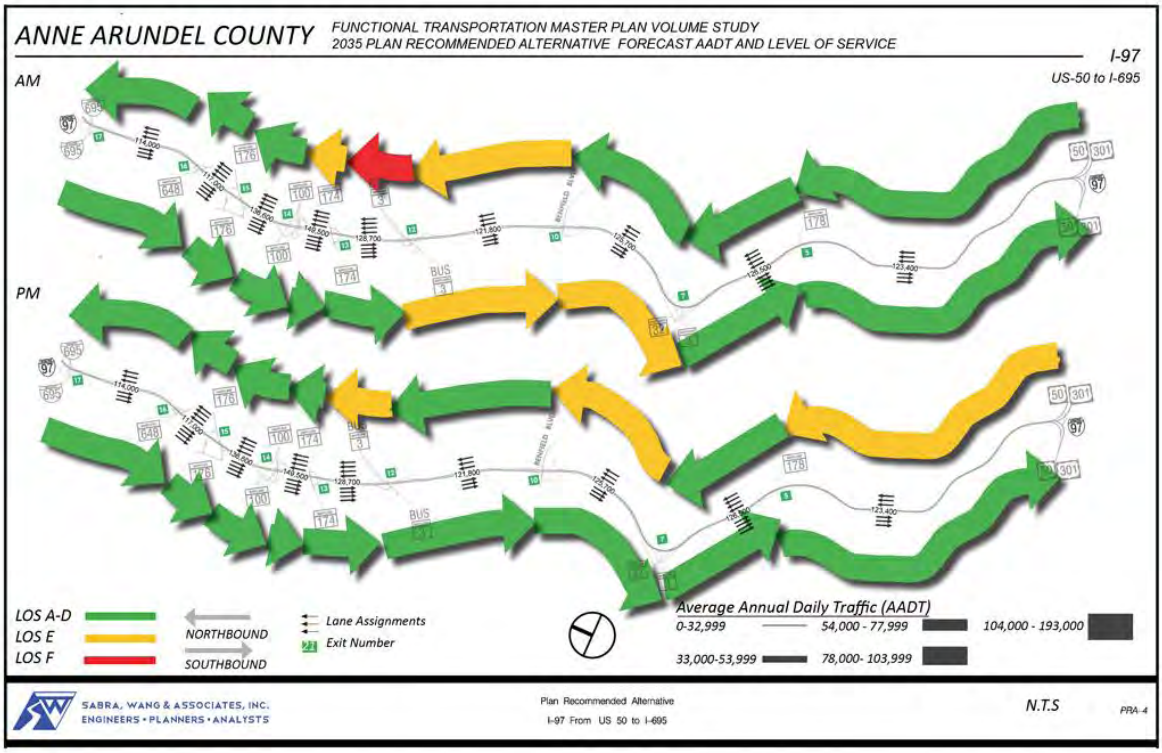


Figure 5-7: MD 32 Plan Recommended Alternative LOS

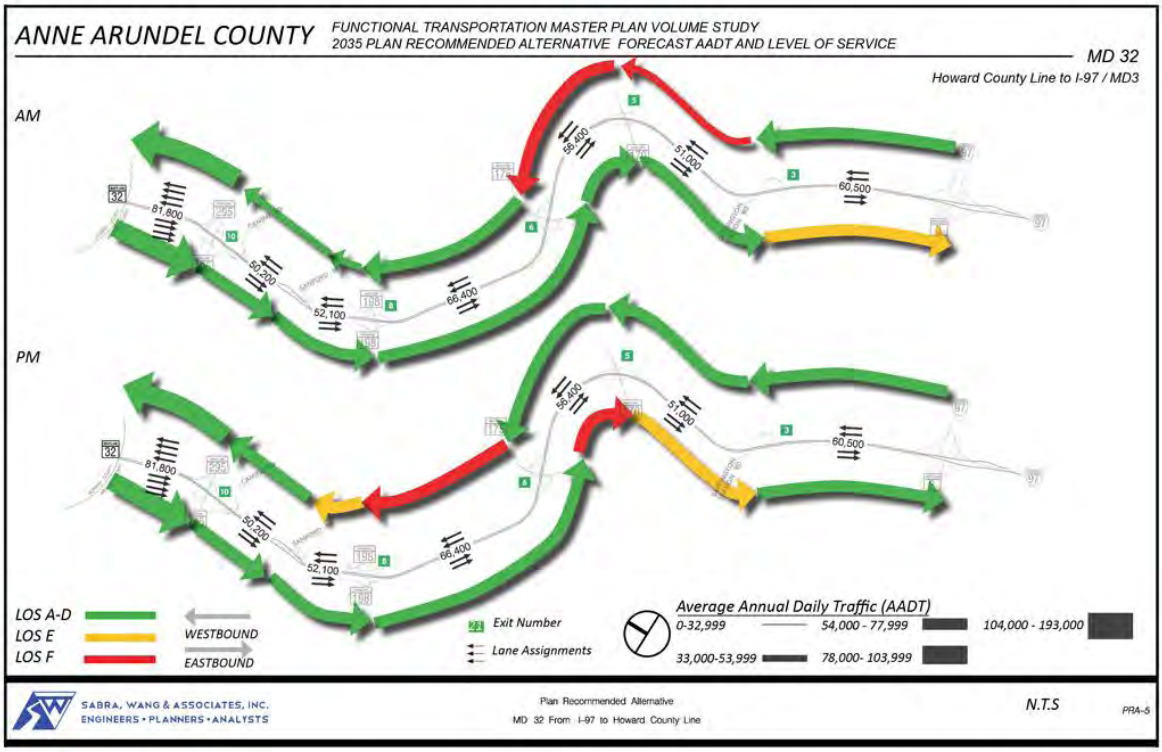


Figure 5-8: MD 100 Plan Recommended Alternative LOS

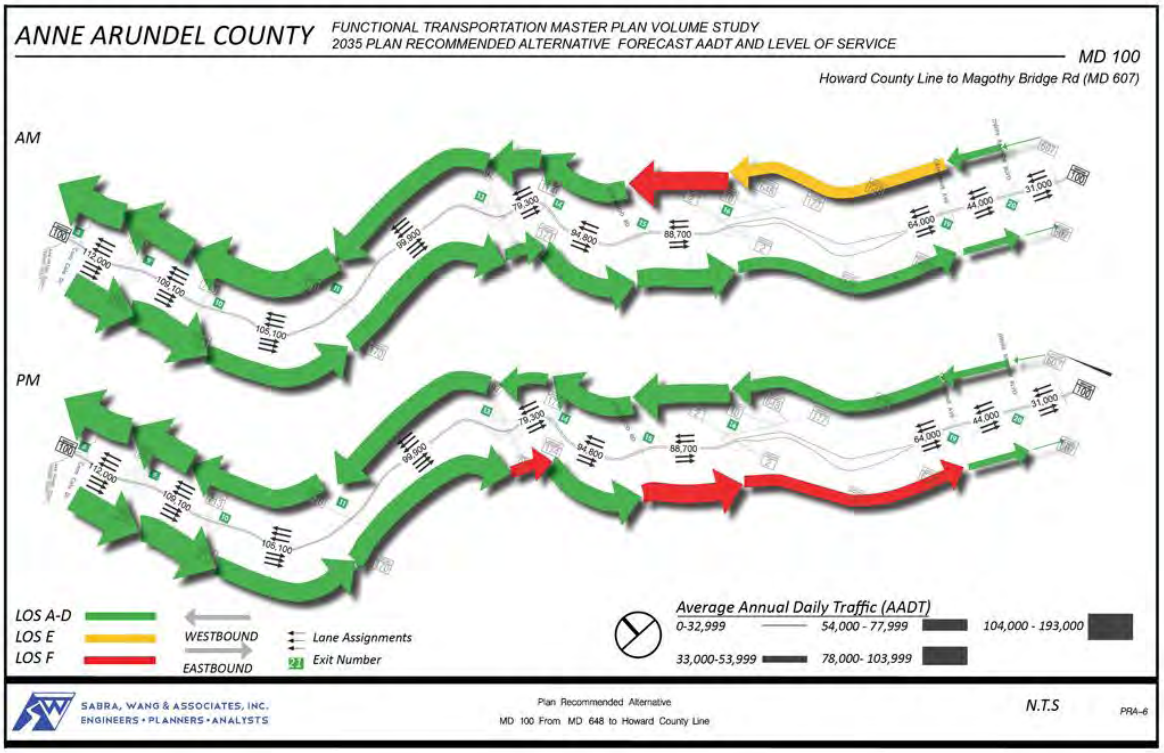


Figure 5-9: MD 295 Plan Recommended Alternative LOS

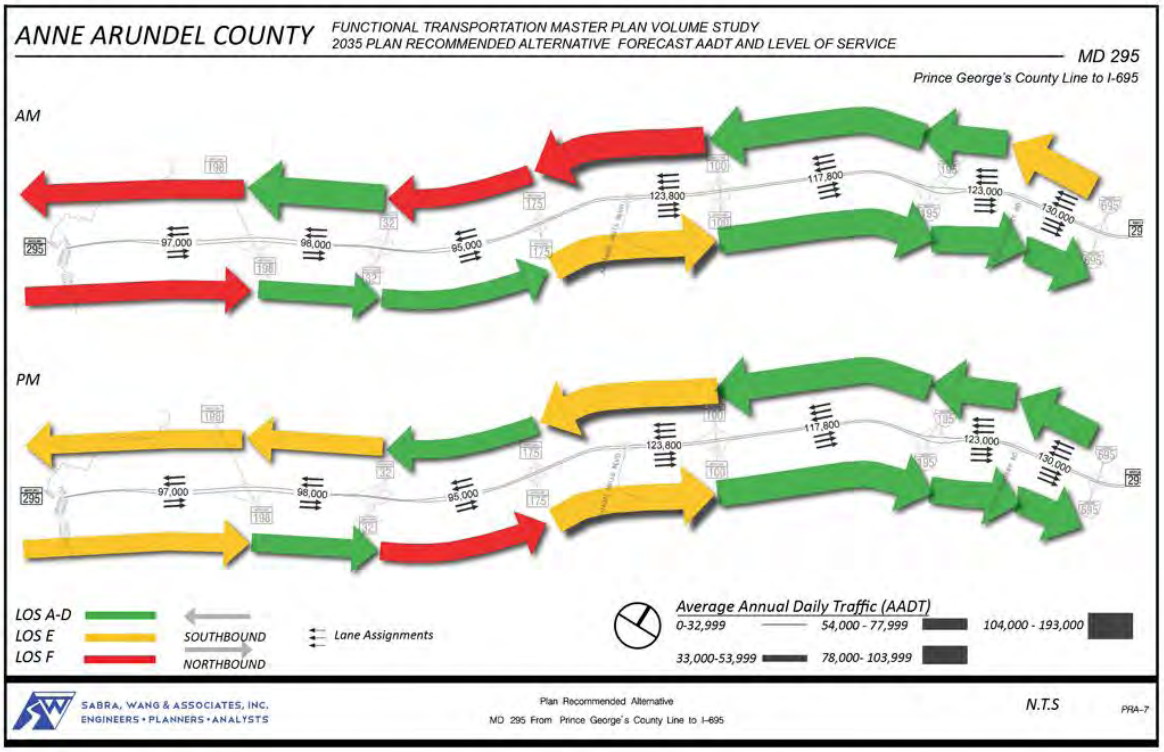


Figure 5-10: MD 3 Plan Recommended Alternative LOS

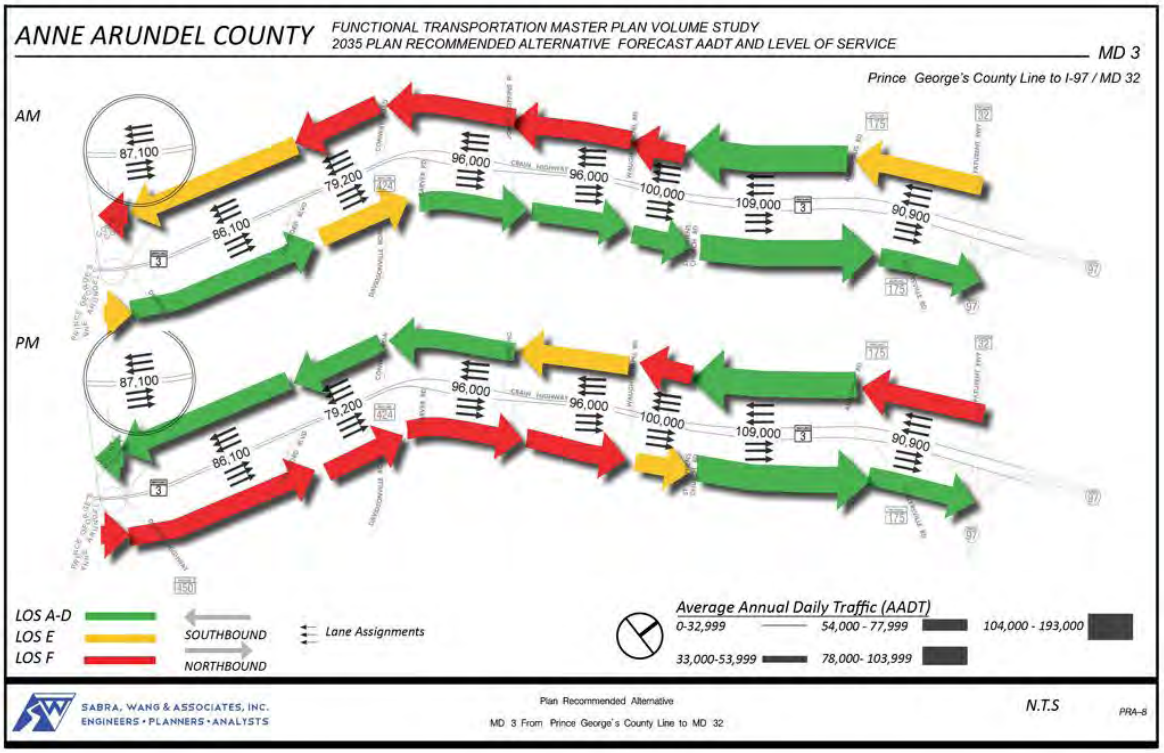
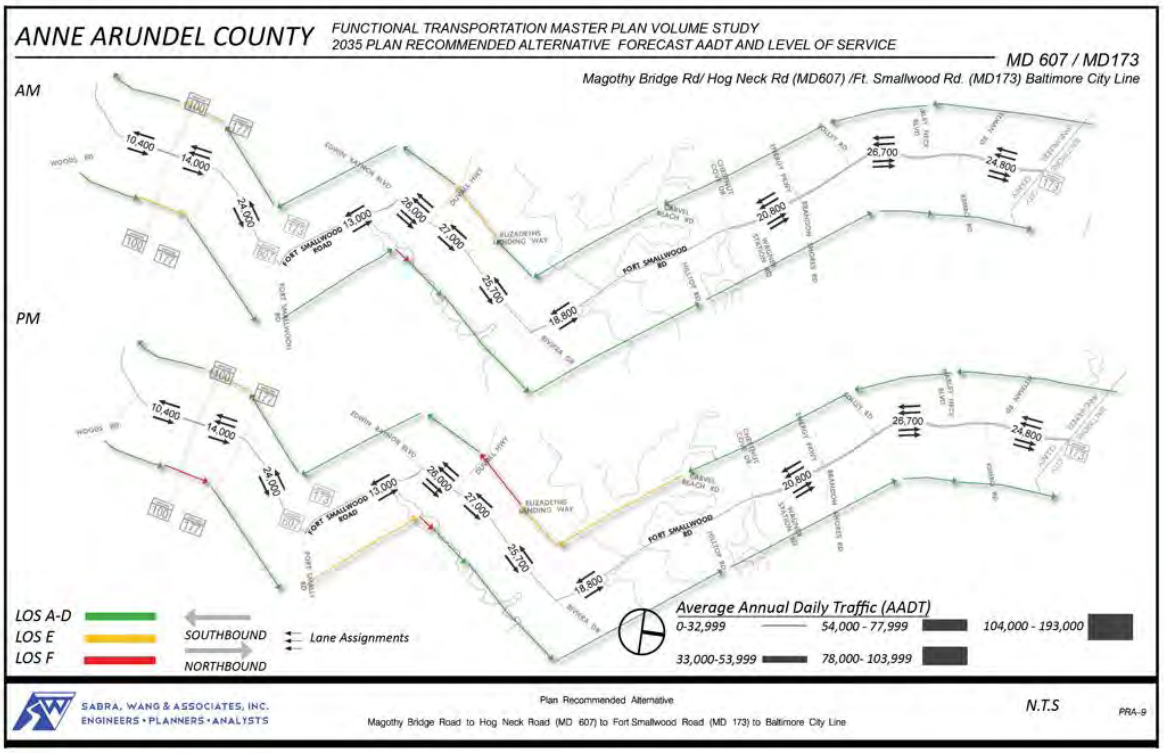


Figure 5-11: MD 607 / MD 173 Plan Recommended Alternative LOS



CHAPTER 6: CORRIDOR TOOLBOX STRATEGIES

6.1 TOOLBOX STRATEGIES

The discussion of toolbox strategies focuses on short-term day-to-day strategies to enhance roadway/ traffic operations as well as better manage the demand for travel on the roadway network. The two types of toolbox strategies include Transportation System Management and Transportation Demand Management. Descriptions of a range of measures are presented for each category, followed by specific applications for each study corridor.

6.1.1 System Management Strategies

Transportation system management (TSM) strategies are improvements that enhance operations of the existing transportation network without directly providing increased roadway capacity through traditional strategies such as roadway widening. Through better management of the transportation network and traffic control systems, traffic can flow more efficiently without the provision of any additional roadway capacity.

6.1.1.1 Signal System Operations

Traffic signal coordination can improve traffic flow through a corridor by reducing delay and unnecessary stops at traffic signals. It allows traffic to flow more efficiently through a group of intersections and can also result in benefits to air quality due to decreased idling of vehicles.

Traffic responsive signal control that adjusts signal timing parameters such as cycle lengths, in real-time has the ability to improve traffic operations when compared to traditional fixed-time control systems. These systems use vehicle detection to manage signal coordination designed to optimize flow throughout the roadway network. Different measures of effectiveness such as optimal travel time on the mainline or reduced overall delay can be targeted depending on the priorities of the area or corridor. The County currently has adaptive control on several corridors, such as Riva Road Jennifer Road and Forest Drive, and the State is considering several more.

6.1.1.2 Traveler Information and Intelligent Transportation Systems

Traveler information can be disseminated through a variety of media including variable message boards, radio, internet, telephone, and in-vehicle or handheld navigation systems. Travelers who are informed about weather and driving conditions, delays and detours, parking and other situations that may affect their travel can use the information to make decisions and increase the mobility, safety, and satisfaction of their trip.

Detection of traffic conditions and communication throughout the transportation system is the principle behind intelligent transportation systems. It allows real-time response in the form of active traffic management and can be used to measure the results of implemented strategies.

6.1.1.3 Event Traffic Management

Event and incident management is a specific type of traveler information that guides travelers through hazardous or atypical situations. These could include crashes, police activity, disabled vehicles, inclement weather, construction, or special events. There are a number of regional monitoring systems such as SHA's CHART currently operating in the region that collaborate to monitor, respond, and share information across jurisdictions. The use of devices such as Closed Circuit Television Cameras, Variable Message Signing, Highway Advisory Radio, Roadway Weather Information Systems, and Automated Traffic Recorders are a few devices that allow for improved monitoring and response during emergency situations, and is useful in presenting real-time travel information such as travel times to the general public. It should also be noted that other toolbox strategies, such as the provision of subscription bus service for special events, could also be applied to ease congestion for major events.

6.1.1.4 Active Traffic Management

An active traffic management system takes advantage of technology to adapt traffic controls to changing traffic conditions throughout the day and over time. These strategies allow traffic to use the existing infrastructure in the most efficient way possible and help smooth out the flow of traffic. Based

on the traffic conditions at the time, drivers can be directed through the roadway network at varying speeds, lane configurations, or priorities in order to optimize system performance. In addition to responding to daily congestion, these techniques can be employed to minimize risky behavior in construction zones or inclement weather conditions.

Examples of active traffic management include variable speed limits, dynamic lane markings, and ramp meters. Variable speed limits can help keep flow smooth along or between lanes, reducing friction between vehicles across lanes and preventing sudden changes in flow speeds. Dynamic lane markings allow underused lanes or even shoulders to be reassigned in order to maximize the efficiency of the roadway. Ramp metering ensures that vehicles entering a freeway do so in a regular fashion so that traffic flow along the mainline is not overly interrupted.

6.1.1.5 Express Lanes

Physically separating through traffic from local traffic – with barriers or passive measures such as signing – can improve traffic flow through a corridor. Making a distinction between express lanes and local lanes reduces the amount of merging and weaving that occurs along a freeway.

6.1.2 Demand Management Strategies

Transportation demand management (TDM) strategies are techniques that focus on influencing driver behavior and demand. Transportation demand derives from individual decisions based on numerous factors such as trip purpose, available modes, distance, and costs. By shifting these factors to favor non-auto travel for some travelers, programmatic TDM strategies have the potential to have a large positive impact. Managing trips may include:

- trips shifted to another mode,
- trips shifted to another time (outside of peak hour),
- trips shifted to another route, and
- trips not made.

By making other options more appealing, TDM aims to sway drivers away from choosing to drive alone during peak rush hours.

6.1.3 Promote Transit Use

Transit has to be comfortable and convenient in order for users to perceive it as a viable mode of transportation. Faster travel times, more frequent service, and enhanced traveler information can encourage commuters to ride transit. Bus speeds can be improved by implementing bus priority treatments that help buses maneuver through traffic. Queue jumps allow a bus to bypass traffic through an intersection by accessing a restricted or underused lane. Signals can be programmed to detect approaching buses and give them an early or extended green indication to minimize the amount of time they spend behind traffic.

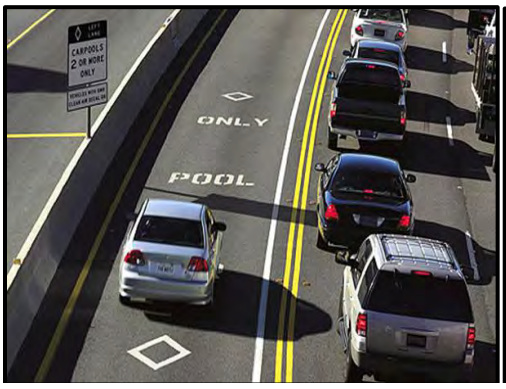
Apart from improved service, adequate amenities for riders to improve passenger comfort both on and off transit vehicles can also promote the use of transit. Shelters, benches, lighting and adequate sidewalk access at transit stops can make riding transit a more pleasant experience. Wayfinding signs in areas served by transit, route maps at transit stops, and real-time vehicle location information (e.g. NextBus) can make taking transit much easier for those unfamiliar with the service.

6.1.4 Land Use Management and Urban Design

Land use, zoning, and urban design can help decrease demand on the roadway network by encouraging the development of communities that are not dependent on the automobile. Orientation of development towards a transit station can improve the movement into and out of the community without the use of a private vehicle. Mixed-use zoning, a connected street network, and building orientation to the sidewalk can help make neighborhoods easier to navigate on foot or bicycle – reducing the need to drive for routine errands or other local trips.

6.1.5 Promote Carpooling

By having more people using one vehicle, carpooling reduces each person's travel costs and results in less demand for roadway space. Carpooling can be promoted through a variety of ways including tolling on select travel lanes, designated high occupancy vehicle lanes, parking priority, or direct financial incentives that can be applied at many levels. Car sharing, such as Zip Car, also falls under this category. It should be noted that the County currently promotes rideshare programs through two separate Transportation Management Associations (TMA): the BWI business Partnership and the Annapolis Regional Transportation Management Association, who are affiliated with the business communities of West County and the Annapolis area. The expansion of these TMA's and creation of new TMA's are encouraged.



6.1.6 Congestion Pricing

With congestion pricing, tolls vary throughout the day in response to user demand – prices rise at peak periods to discourage discretionary travel during that time and maintain high travel speeds in the tolled facility. Tolls can be implemented on an exclusive express toll lane, entire roadway, or various roadways in an area. Congestion pricing works by shifting a portion of rush hour traffic to other transportation modes or to off-peak periods.

Available technologies allow tolls to be collected at highway speeds through transponders read by overhead antennas. This method allows for great flexibility in the placement of toll collection sites – such as over a single travel lane or on an access ramp. GPS technology is not as widely used yet, but is being tested to collect tolls based on a vehicle's location and distance traveled. This technology, although more expensive, allows tolls to be assigned on a per mile basis and, since it is not tied to roadside equipment, allows for greater flexibility on what facilities to charge.

6.1.7 Employer-Based Incentives

Employers can offer a number of incentives to help reduce driver demands on roadways and parking. They can organize carpools, vanpools, and shuttles to increase commute options or provide a transit connection. These services could also be encouraged by implementing preferred parking. They can provide financial incentives like free transit passes or parking cash out for those that do not make use of parking facilities. Also, alternative work arrangements could be established and encouraged to allow employees greater flexibility.

6.1.8 Alternative Work Schedule Arrangements

Employees that have the flexibility to work from home or work outside of the normal office hours can opt out of driving at times of peak congestion. Many offices now employ flexible work hours that help space out demand more evenly through a longer period of time. Some workers can compress a 40-hour workweek into 4 days, thereby eliminating their need to commute one day in the week. Advances in telecommunications have made working from home a viable option for many employees whether full time or on occasion. The collective effect of these individual choices across a region can be significant. In addition, the implementation of these strategies by major employers can have an even greater effect on reducing travel demand.

6.1.9 Pedestrian and Bicycle Enhancements

Creating a bicycle network and roadways with bicycle compatibility can be accomplished in several measures:

- Bicycle Routes. Installing signs and pavement markings that designate bike routes on the street in a shared lane arrangement with vehicles
- Bicycle Lanes. Creating exclusive right-of-way through the use of pavement markings along a roadway. These lanes can be adjacent to a vehicle lane or can be separated by a physical barrier for enhanced safety and comfort.
- Bicycle Trails. Can include shared use paths along a roadway or an off-street path or trails.

Each is appropriate in different circumstances but have similar goals of promoting the use of public roadway space for modes other than vehicles, and guiding cyclists through convenient routes and making them feel safe and comfortable while riding.

Pedestrian enhancements can include new or widened sidewalks, improving ADA compliance, implementing audible and accessible pedestrian indication signals, implementing countdown timers for pedestrians, and providing well-maintained and well lit sidewalks make a pedestrian facility more accessible and attractive.

Both pedestrian and bicycle enhancements should aim to improve connections to other modes of transportation – especially so that transit riders can complete their trips safely and conveniently. Additionally, adequate design of bicycle and pedestrian facilities will encourage more people to take advantage of them.

A component of the Transportation Functional Master Plan currently underway is an update of the 2003 *Anne Arundel County Pedestrian and Bicycle Master Plan.* This effort will identify missing links which can improve the overall network, thus providing opportunities to promote walking and biking for shorter trip lengths in the more developed areas of the County.

6.1.10 Traffic Calming

Traffic calming consists of using physical, regulatory or enforcement measures to either control speed or manage traffic volume on a particular street. Typical devices may include chokers, chicanes, speed humps, or roundabouts. Additionally, access restrictions to particular streets at certain points and times of day can be implemented to discourage through trips and reduce traffic volumes where appropriate.

6.2 CORRIDOR APPLICATIONS

6.2.1 US 50

US 50 is projected to carry up to 200,000 vehicles per day in the year 2035. It is one of the principal east-west corridors in the region and provides connections to other major corridors, including I-95, I-97, MD 3, and MD 2. As it provides a key connection between Washington, DC and the Chesapeake Bay crossing, it serves a diverse mix of traffic ranging from long distance commuters to local traffic in Annapolis. The roadway currently experiences some congestion between MD 2 and MD 70, but operates at acceptable LOS through the rest of the study area.

The toolbox elements recommended for this corridor are:

1. Local and express lane separation. Separation of traffic into local and express lanes between I-97 and MD 2 could address the different trip types in this corridor and improve the flow through this highly traveled segment.

2. Active traffic management. Using dynamic measures to manage traffic flow would increase the ability of the freeway to adapt to different conditions – whether regularly occurring or for special events. Ramp metering is recommended between MD 665 and MD 2; variable speed limits, and dynamic lane markings are recommended for the entire corridor.

3. Advanced traveler information. Advanced traveler information systems such as additional variable message signs, closed-circuit television cameras, automated traffic recorders, expanded transportation management centers, real-time parking, integration with local and regional transit systems for real-time transit information, freight carriers, and enhanced special event planning will help drivers navigate through the corridor by making advanced and informed decisions about travel.

6.2.2 MD 2 – North

MD 2 (north of US 50) is projected to carry up to 76,000 vehicles per day in 2035. It provides an important north-south connection along Eastern Anne Arundel County that serves a number of communities between Annapolis and Baltimore. Traffic patterns along this corridor include local traffic within Annapolis, Severna Park, Pasadena, and Glen Burnie as well as commuter traffic destined for downtown Baltimore. This roadway experiences heavy congestion throughout its entire length, especially in the afternoon peak period.

The toolbox elements for this corridor include:

1. Priority treatments for bus transit. Queue jumps, signal priority for transit vehicles, and improved signal coordination to increase bus speeds and improve transit service along the corridor.

2. Access to transit. Improving sidewalks, bus stops, shelters, lighting and providing real-time transit information

3. Pedestrian and bicycle enhancements. In the town center areas such as Glen Burnie, Pasadena, Severna Park, and Arnold construct missing sidewalk links and develop bicycle facilities including signed and marked routes along connecting and parallel streets and shared paths along segments of MD 2

6.2.3 MD 2 – South

MD 2 (south of US 50) is projected to carry up to 63,000 vehicles per day by 2035. It serves both local Annapolis traffic as well as long distance trips to/from points south. The corridor currently has segments of high congestion throughout its entire length during both the morning and afternoon peak periods. This congestion is expected to worsen as traffic volumes increase up to 46% over the next 20 years.

The toolbox strategies recommended for this corridor are:

1. Priority treatments for bus transit. Such as queue jumps, signal priority for transit vehicles, and improved signal coordination to increase bus speeds and improve transit service along the corridor.

2. Access to transit. Improving sidewalks, bus stops, shelters, lighting and providing real-time transit information

3. Intersection improvements to connecting roadways. Additional turn and through lanes at MD 214 are essential to improve level of service.

4. Access controls and urban design and streetscape standards. As redevelopment occurs, develop an access management plan to consolidate driveways and access points, while also implementing urban design controls to bring buildings closer to the roadway, create frontage roads, and construct streetscape treatments that could change the character of the roadway over time to better accommodate a more walkable network.

6.2.4 I-97

I-97 is projected to carry up to 150,000 vehicles per day by 2035. It connects MD 50 near Annapolis to the Baltimore Beltway. The corridor serves local traffic in Millersville, Severna Park, and Glen Burnie as well as long distance commuters traveling to Baltimore and Annapolis. The roadway currently experiences congestion between MD 32 and US 50.

The recommended toolbox strategies for this corridor are:

1. Advanced traveler information systems. Such as additional variable message signs, closed-circuit television cameras, automated traffic recorders, expanded transportation management centers,

real-time parking, integration with local and regional transit systems for real-time transit information, freight carriers, and enhanced special event planning will help drivers navigate through the corridor by making advanced and informed decisions about travel.

6.2.5 MD 32

MD 32 is projected to carry up to 93,000 vehicles per day by 2035. It provides an essential link to major roadways across the region including I-97, I-95, and MD 295. It serves local traffic in Savage, Odenton, and Millersville as well as commuters going to job centers in Fort Meade, the NSA, and Annapolis. The corridor currently experiences congestion between I-95 and MD 198.

The toolbox strategies recommended for this corridor are:

1. Enhanced transit services and employer based initiative. Encouraging use of the HOV lanes restricted to carpools of 2 or more people through incentive based programs such as subscription bus services, vanpools, ride shares and priority carpool parking. In addition, local transit services should also be encouraged to expand services in the corridor and utilize the carpool lane to provide more reliable travel times.

6.2.6 MD 100

MD 100 is projected to carry up to 112,000 vehicles per day by 2035. It provides an essential link to major roadways across the region including I-97, I-95, MD 2, and MD 295. It serves local traffic in Dorsey, Glen Burnie, and Lake Shore as well as long distance trips to regional attractions like Arundel Mills Mall and BWI Airport. The corridor currently sees some directional congestion (westbound in the morning peak and eastbound in the afternoon peak).

The toolbox strategies recommended for this corridor are:

1. Local and express lane separation. Separation of traffic into local and express lanes between I-95 and MD 2 could address the different trip types in this corridor and improve the flow through this highly traveled segment.

2. Advanced traveler information systems. Additional variable message signs, closed-circuit television cameras, automated traffic recorders, expanded transportation management centers, real-time parking, integration with local and regional transit systems for real-time transit information, freight carriers, and enhanced special event planning will help drivers navigate through the corridor by making advanced and informed decisions about travel.

3. Active traffic management. Using dynamic measures to manage traffic flow would increase the ability of the freeway to adapt to different conditions – whether regularly occurring or for seasonal traffic. Ramp metering is recommended between MD 295 and MD 2; variable speed limits, and dynamic lane markings are recommended for the entire corridor.

4. Interchange improvements. Interchange improvements should also be evaluated throughout the corridor (e.g. extensions of acceleration and deceleration lanes to enhance merging and weaving between I-97 and Catherine Avenue) where additional roadway widening of through travel lanes was not recommended.

6.2.7 Baltimore-Washington Parkway/MD 295

The Baltimore-Washington Parkway/ MD 295 is projected to carry up to 130,000 vehicles per day by 2035. It connects Washington, DC to Baltimore and provides a connection between many of the major east-west roadways in the region including MD 32, MD 100, I-195, I-695, and I-895 as well as major employment and activity centers such as Ft. Meade/ NSA, Arundel Mills and BWI Airport. MD 295 experiences congestion in both directions in both peak hours.

The toolbox strategies recommended for this corridor are:

1. Parallel roadway improvements. Construction of new roadways west of MD 295, and improvements to existing parallel roadways (e.g. MD 713/ Ridge Road, Telegraph Road – MD 170, Race Road/ Brock Ridge Road, and US 1 in Howard County) such as widening, signal coordination and pedestrian and bicycle provisions could improve travel times for local trips and divert some traffic from MD 295.

2. Implement enhanced local transit service. The MD 295 corridor has excellent regional transit options from intercity buses to WMATA to commuter rail. However, improving local feeder bus service through new routes, expanded service hours and more frequent service headways along parallel roadways could serve to shift local trips from auto to transit.

6.2.8 MD 3

MD 3 is projected to carry up to 109,000 vehicles per day by 2035. The roadway connects I-97 and MD 32 to points south. It serves local traffic in Millersville and Crofton as well as long distance trips from/to Southern Maryland. It currently experiences peak hour congestion through the Crofton area.

The toolbox strategies recommended for this corridor are:

1. Upgrade intersections to interchanges. Replace signalized intersections with interchanges to reduce delay and enhance safety

2. Priority treatments for bus transit. Prior to interchange construction, implement treatments such as queue jumps, signal priority for transit vehicles, and improved signal coordination to increase bus speeds and improve transit service along the corridor

3. Access controls and urban design and streetscape standards. As redevelopment occurs, develop an access management plan to consolidate driveways and access points, while also implementing urban design controls to bring buildings closer to the roadway, create frontage

roads, and construct streetscape treatments that could change the character of the roadway over time to better accommodate a more walkable network in select segments.

6.2.9 Magothy Bridge Road/Hog Neck Road/Fort Smallwood Road

Magothy Bridge Road/Hog Neck Road (MD 607)/Fort Smallwood Road (MD 173) projected to carry up to 27,000 vehicles per day by 2035. These roads traverse a number of neighborhoods in Northeast Anne Arundel County and connect to major regional roadways like MD 2, MD 100 and I-895. This corridor serves mainly local traffic in Pasadena, Lake Shore, and Riviera Beach.

The toolbox strategies recommended for this corridor are:

1. Access to transit. Improving sidewalks, bus stops, shelters, lighting and providing real-time transit information

2. Intersection improvements. Intersection improvements along Magothy Bridge Road at connecting roadways such as additional turn and through lanes at are essential to improve level of service and could be partially or fully funded through developer improvements

6.2.10 Benfield Boulevard

Most of the Benfield Boulevard corridor is two lanes with a maximum ADT of 25,000. The roadway operates at an acceptable LOS with the exception of the segments at the east and west termini, approaching MD 2 and I-97, respectively. The Benfield park-and-ride facility off of I-97 and the Severna Park park-and-ride have been identified as either transit system nodes or sites for transit oriented development and represent major connections to north-south premium transit. The Benfield corridor, however, currently lacks both transit and continuous pedestrian and bicycle facilities. Benfield Blvd is a major east-west connection in the Severna Park area. Although there are other connections to the north, there are none to the south of Benfield Blvd. Given the length of the corridor, less than five miles, it could be easily traversed by bicycle.

Given these conditions, the recommended toolbox strategies are:

1. Pedestrian and Bicycle Improvements. Construct missing sidewalk links and develop bicycle facilities including signed and marked routes along connecting and parallel streets and shared paths along segments of Benfield Blvd

2. Implement demand-responsive transit. The goal on this corridor is to improve access to the transit nodes that are proposed to operate at either end. Demand-responsive shuttle service would provide a direct connection between I-97 and Severna Park and would be able to quickly respond to customer calls due to the relatively short segment length.

3. Access Management and Intersection Improvements. Reducing conflicts between vehicles, pedestrians and bicycles by consolidating driveways and access points in the commercial areas is

recommended. Additionally, intersection improvements where appropriate such as roundabouts could be used to slow traffic to make pedestrian and bicycle travel more comfortable as well as encourage through traffic to use other facilities such as East-West Blvd.

4. Bicycle sharing programs/stations and car share parking. Bicycle sharing programs/stations and car share parking could also be implemented to help local residents reduce personal auto usage for some trips.

6.2.11 MD 176

MD 176 currently carries up to 24,900 vehicles per day. It provides an east-west connection between major regional roadways including I-97, MD 170, and MD 2. It runs through commercial, residential, and industrial areas – including the surroundings of the BWI airport.

The toolbox strategies recommended for this corridor are:

- Pedestrian and bicycle enhancements – developing bicycle lanes and new sidewalks along with enhance streetscapes such as lighting and buffer landscaping would encourage more local trips to be taken in alternative modes and reduce the need for additional roadway capacity.
- Access controls – reduce the number of driveways and site access points to reduce conflicts with pedestrians and bicycles
- Site design guidelines should be established to require more walkable streetscapes and building frontage to sidewalks as the area redevelops. Shared parking requirements can be a valuable tool in ensuring the most efficient use of parking facilities between different uses and prevent the oversupply of parking from taking up space from other land uses when not necessary.

6.2.12 MD 170

MD 170 currently carries up to 35,500 vehicles per day. It runs a mostly north-south route that connects residential, commercial, and industrial areas and provides access to BWI airport. It connects to several major regional roadways including: I-195, I-695, MD 2, MD 100, and MD 32. The corridor is currently not served by transit, although it does run through important transportation nodes such as the BWI airport and Central Light Rail line.

The toolbox strategies recommended for this corridor are:

1. Widen from 2 lanes to 4 lanes from MD 175 to MD 100 to improve access and connections between Odenton Town Center and BWI Airport

2. Access to transit. Improving sidewalks, bus stops, shelters, lighting and providing real-time transit information

6.2.13 MD 713/ Ridge Rd

MD currently carries up to 38,000 vehicles per day. It connects various residential neighborhoods to the commercial center around Arundel Mills Mall and to regional roadways including MD 100 and MD 175.

The toolbox strategies recommended for this corridor are:

1. Widen from 2 to 4 lanes from MD 175 to Arundel Mills Blvd, and from 4 to 6 lanes from Arundel Mills Blvd to MD 176. To accommodate future traffic from activity centers and employment centers and serve local traffic

2. Pedestrian and Bicycle Improvements. Construct missing sidewalk links and develop bicycle facilities including signed and marked routes along connecting and shared paths along segments of MD 713/ Ridge Road

3. Site design guidelines. Site design guidelines should be established to require more walkable streetscapes and building frontage to sidewalks as the area redevelops. Shared parking requirements can be a valuable tool in ensuring the most efficient use of parking facilities between different uses and prevent the oversupply of parking from taking up space from other land uses when not necessary.

4. Implement enhanced local transit service. Improving local feeder bus service through new routes, expanded service hours and more frequent service headways could serve to shift local trips from auto to transit.

CHAPTER 7: CORRIDOR FOOTPRINT ASSESSMENT

7.1 RECOMMENDED CROSS SECTIONS

Figures 1 through 12 illustrate the cross-sections of the seven corridors with physical widening improvements recommended in the Plan. New lanes are highlighted and changes are noted below each diagram. The recommended improvements are summarized below:

1. US 50. Widening from 6 to 8 lanes between Prince George's County Line and I-97 to accommodate an HOV lane in each direction restricted to 2+ person carpools and transit vehicles. Widening from 6 to 8 general purpose lanes between I-97 and the Chesapeake Bay Bridge.

2. I-97. Widening from 4 to 6 lanes from US 50 to MD 32. No proposed changes to 6 lane section between MD 32 and I-695 are recommended.

3. MD 32. Widening from 4 to 6 lanes between I-97 and MD 295 to accommodate an HOV lane in each direction restricted to 2+ person carpools. Between MD 295 and I-95 the roadway will be widened to 8 lanes, including one general purpose lane and one HOV lane in each direction restricted to 2+ person carpools.

4. MD 100. Widening from 4 to 6 lanes between MD 170 and I-95.

5. MD 295. Widening from 4 to 6 travel lanes between MD 100 and I-195.

6. MD 2. Widening from 4 to 6 lanes between US 50 and MD 10.

7. MD 3. Widening from 4 to 6 lanes between Stephens Church Rd and MD 32.

7.2 IMPACT ASSESSMENT

County GIS data was used to compare the proposed typical cross sections through each corridor to the existing Right-of-Way available in order to identify any constraints as well as any areas of environmental sensitivity that need to be considered. Detailed right-of-way summaries are included in **Appendix X**

7.3 RIGHT-OF-WAY CONSIDERATIONS

7.3.1 US 50:

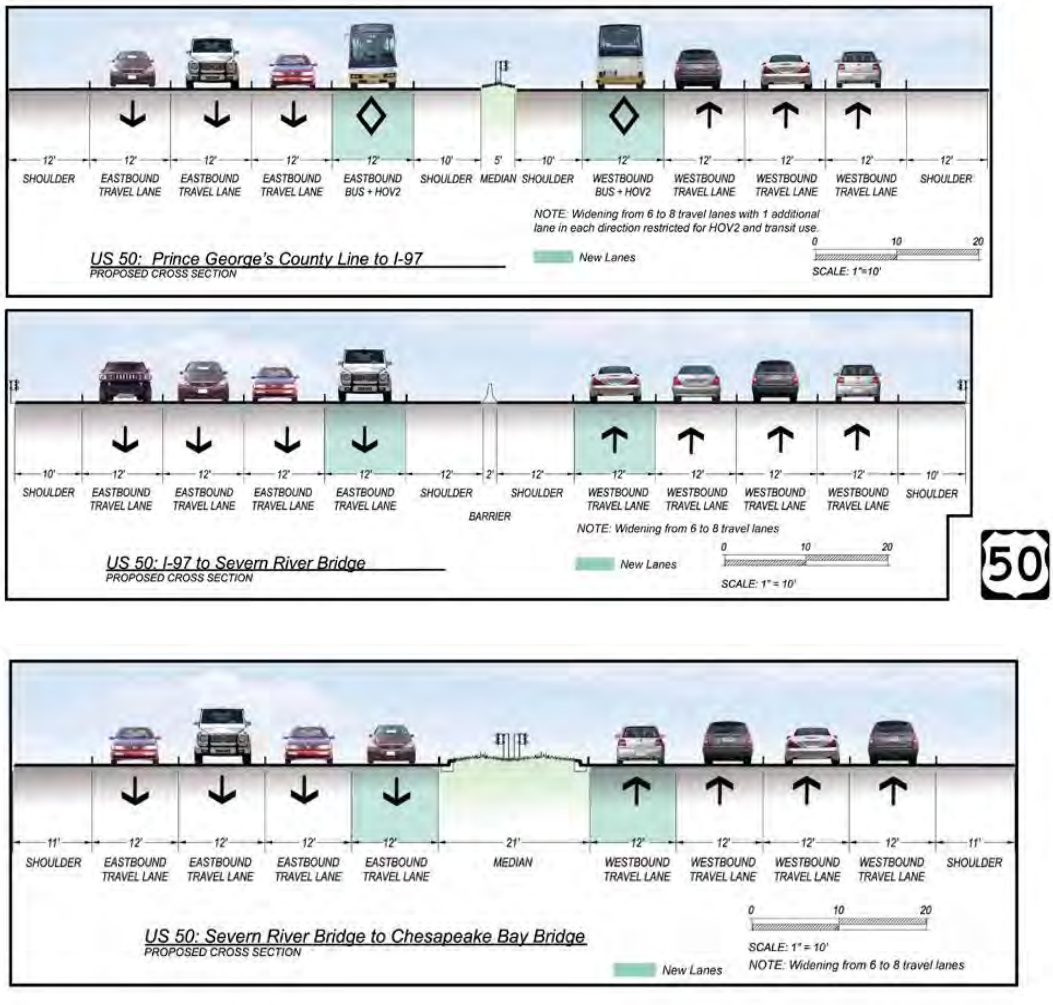
With the exception of two bridge segments, the total available right-of-way in the US 50 corridor is over 200'. When proposed improvements are considered, 170 total feet are needed to accommodate the width of the roadway between the Prince George's County line and I-97. The proposed cross section

includes 4 lanes each way, shoulders, and a median. Along the majority of this segment, the existing 25' median is proposed to be reduced to accommodate the additional 24 feet of travel lanes. Although there is limited right-of-way to the south of the roadway between Patuxent River Rd and MD 424, there is enough right-of-way overall to accommodate the proposed improvements.

Widening between I-97 and the Severn River Bridge requires a total 142 feet of right-of-way. The proposed cross section along this segment includes 4 total lanes each way, shoulders, but no median. Additional right-of-way is available right-of-way throughout much of the segment to accommodate the recommended improvements.

Between the Severn River Bridge and the Chesapeake Bay Bridge, the proposed widening of US 50 would result in a cross section of 139 feet. This includes 4 lanes each way, shoulders, and a median. There is a 400-foot section just east of the Severn River Bridge where right-of-way is tight to the south of the roadway and may not be adequate for the proposed widening. See Figure 7-1.

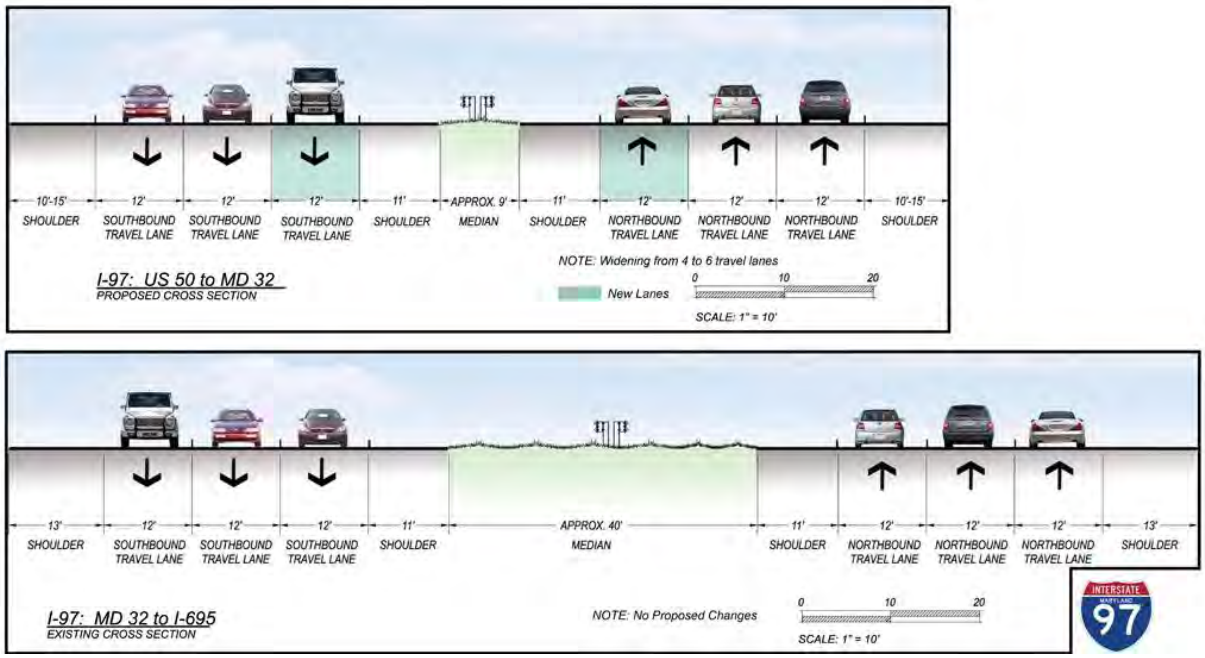
Figure 7-1: US 50 Right-of-Way Considerations



7.3.2 I-97:

In all segments of I-97, over 200' of right-of-way is available. Along I-97 between US 50 and MD 32, there are no right-of-way impacts to accommodate the proposed 133-foot wide cross section. The proposed cross section includes 3 lanes each way, shoulders, and a median. The existing 45' median could be reduced to accommodate the additional 24' of travel lanes. Between MD 32 and I-695 no widening is proposed, and no further right-of-way is needed. See Figure 7-2.

Figure 7-2: I-97 Right-of-Way Considerations



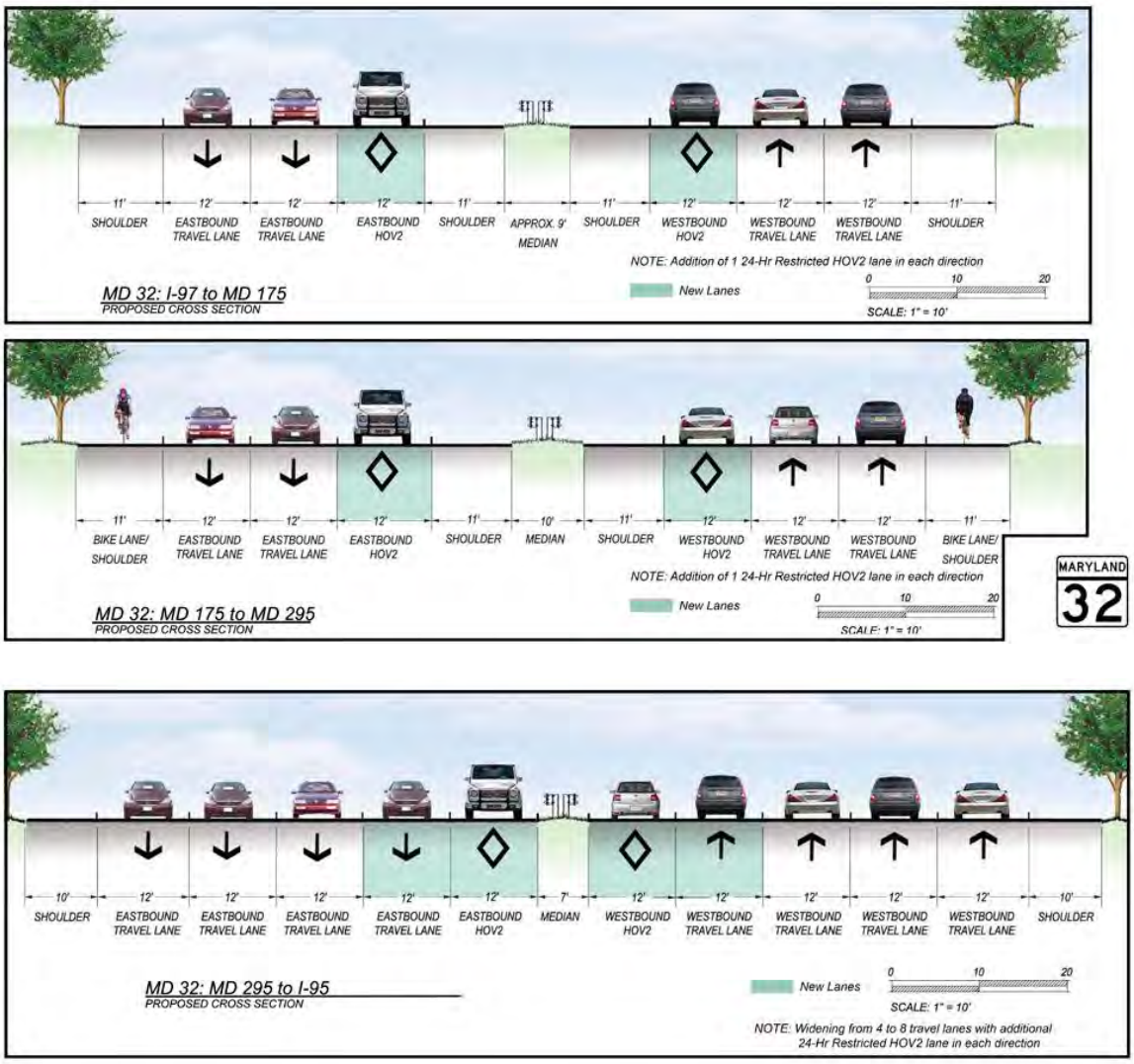
7.3.3 MD 32:

For the section between I-97 and MD 175, a cross section of 125 feet is being proposed for the roadway. The proposed cross section consists of 3 lanes each way, shoulders, and a median. The existing 45' median could be narrowed to accommodate the proposed 24' of additional travel lanes. However, there are two points where it appears that additional ROW may be required. West of the Gambrills Road overpass, a 50-foot section will not be able to accommodate the widening within the existing right-of-way. There is a small segment where a pinch point in the right-of-way would prove insufficient on the west side of the roadway near Icy Run Terrace.

Between MD 175 and MD 295, 125 total feet of width are needed to accommodate the recommended improvements. The cross section includes 3 lanes each way, shoulders, and a median. Between MD 175 and MD 198, the existing 45' median can be reduced from existing conditions to accommodate the additional lanes. ***Between MD 198 and MD 295, the existing right-of-way in this section will not be able to accommodate the recommended improvements***.

Between MD 295 and the Howard County line, 147 feet of right-of-way are needed. The proposed cross section includes 5 lanes each way, shoulders, and a median. The median is narrowed from existing conditions to accommodate the additional lanes. However, due to the magnitude of the widening, not all lanes can be added to the inside of the roadway. Nevertheless, existing right-of-way through this segment is wide enough to accommodate the proposed improvements. See Figure 7-3.

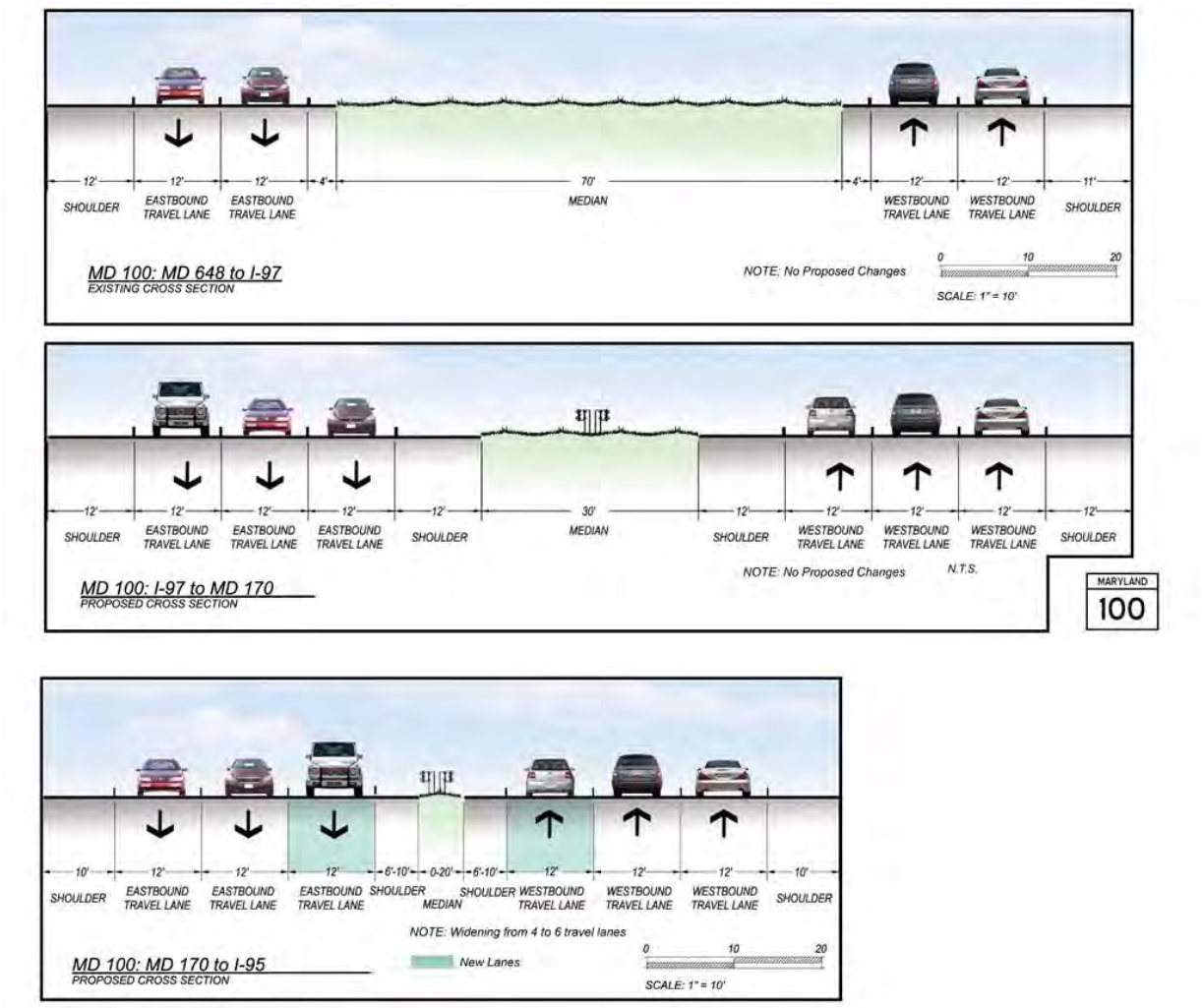
Figure 7-3: MD 32 Right-of-Way Considerations



7.3.4 MD 100:

A total of 132 feet of right-of-way are needed for the proposed widening of MD 100 from MD 170 to the Howard County line. The cross section for this segment includes 3 lanes each way, shoulders, and a median. The median width is reduced from approximately 30' to accommodate the additional lanes. It is expected that all widening will be accommodated within the median and no additional right-of-way will be required. See Figure 7-4.

Figure 7-4: MD 100 Right-of-Way Considerations



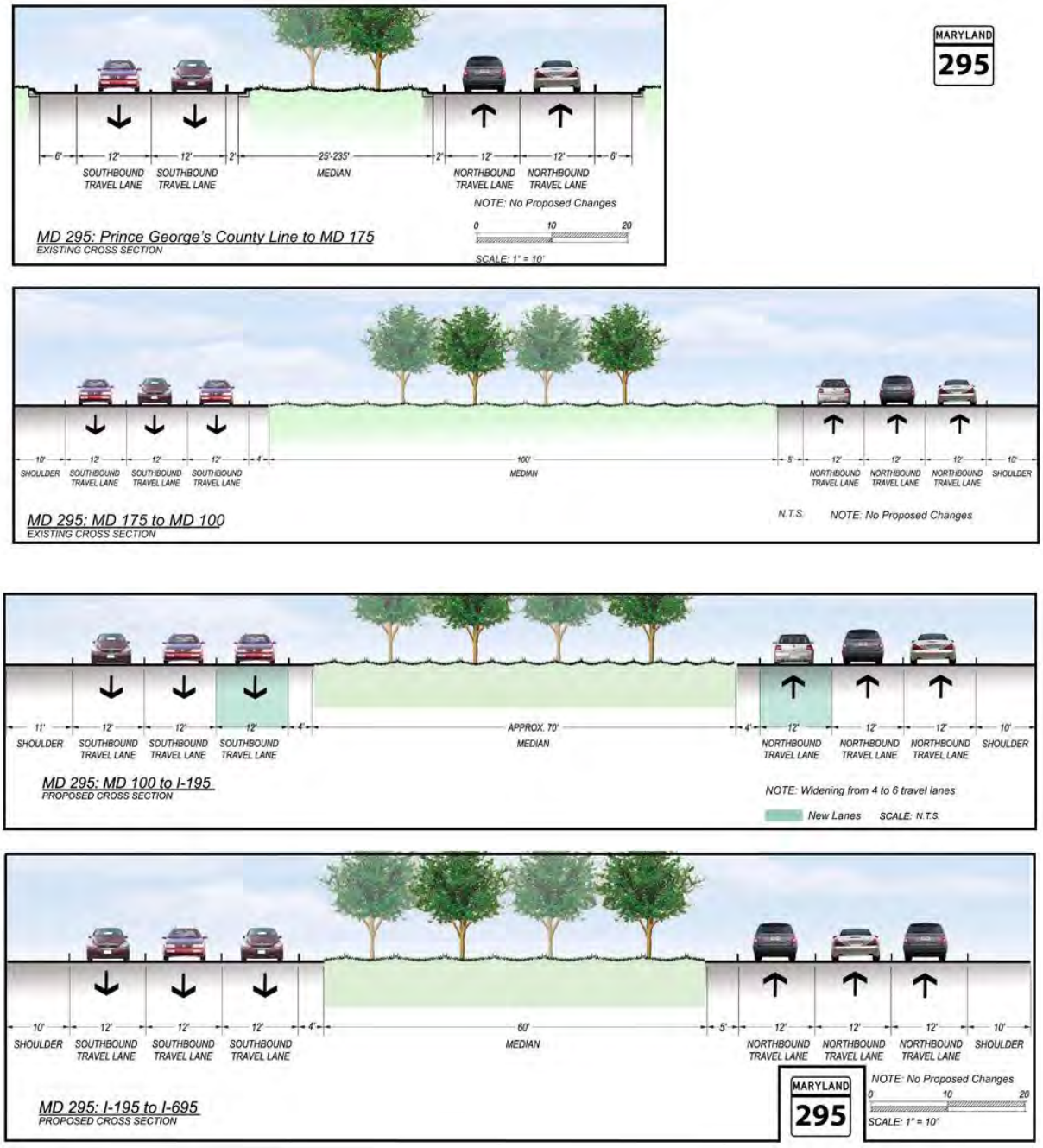
7.3.5 MD 295:

170 total feet of right-of-way is required to accommodate the improved cross section of MD 295 from MD 100 to I-195. The proposed cross section consists of the addition of one lane each way. The wide 100' median allows for construction on the inside of the roadway so no additional right-of-way is needed. See Figure 7-5.

7.3.6 MD 2:

To accommodate the proposed cross-section, 112 total feet of right-of-way is along MD 2 from US 50 to MD 10. The proposed cross section includes 3 lanes each way, shoulders, sidewalks, and a median. The additional lanes are expected to be accommodated within the existing 30' median so that no additional right-of-way is necessary. No widening is proposed for MD 2 between MD 10 and MD 3 or south of US 50. See Figure 7-6.

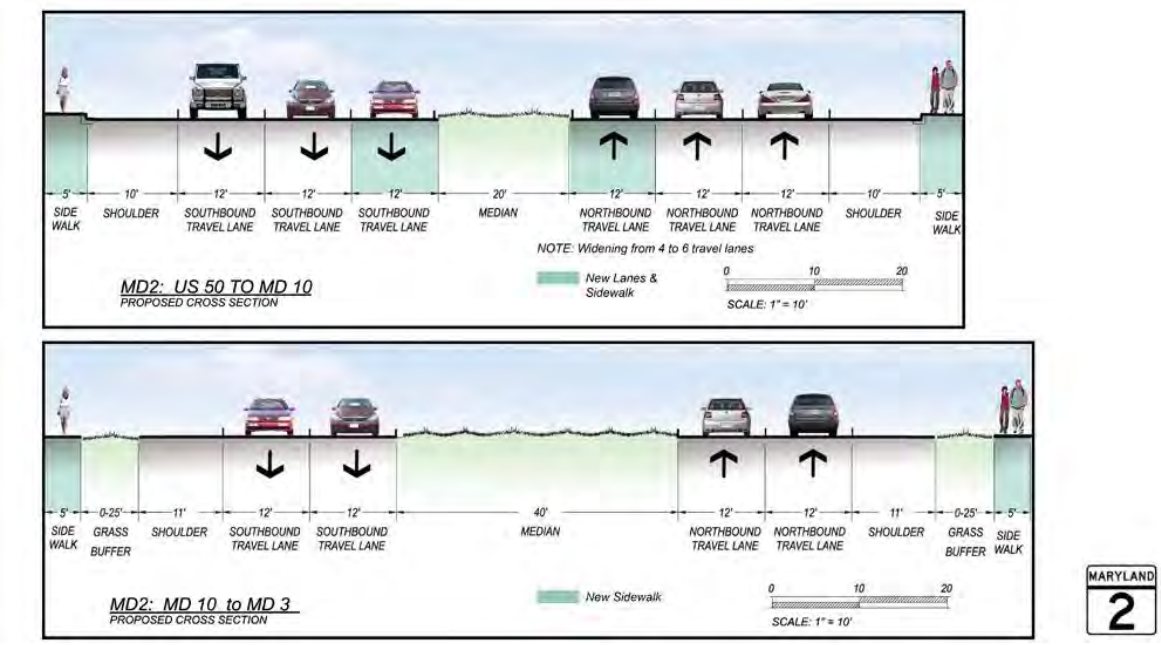
Figure 7-5: MD 295 Right-of-Way Considerations



7.3.7 MD 3:

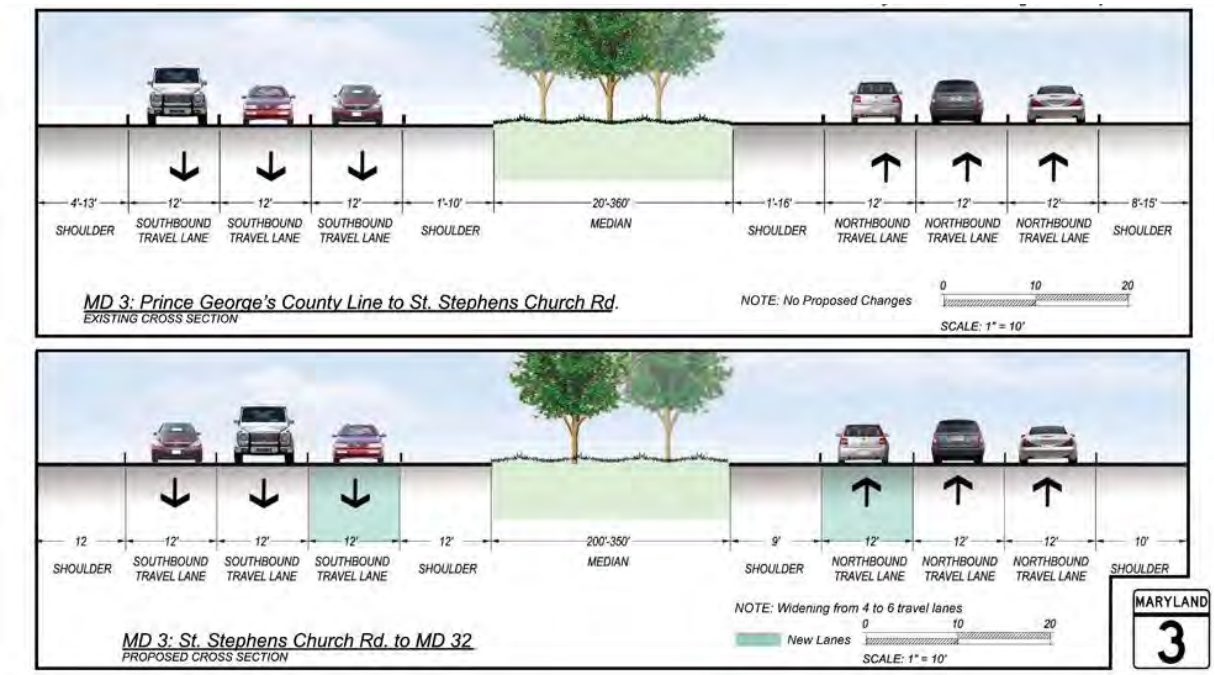
120’ total feet of right-of-way is required to accommodate the widening of MD 3 between St. Stephens Church Road and MD 32. The proposed cross section includes 3 lanes each way, shoulders, and a median. The existing 200’+ median may allow for the additional lanes to be constructed in the inside of

Figure 7-6: MD 2 Right-of-Way Considerations



the roadway so that no additional right-of-way is needed, however there are private parcels inside the median so some property may be impacted. See Figure 7-7.

Figure 7-7: MD 3 Right-of-Way Considerations



7.4 ENVIRONMENTAL FEATURES

A preliminary assessment of the impact of the proposed roadway cross-sections to streams and wetlands is summarized, based on the available County GIS mapping.

7.4.1 US 50:

There are several streams running under the US 50 alignment throughout the entire stretch of the roadway. These include:

- one at the Prince George's County line,
- one 0.4 miles east of the county line,
- one 0.25 miles east of Patuxent Rd,
- three east of the Davidsonville Rd interchange,
- seven between the Rutland Rd bridge and the South River,
- two west of Southhaven Dr,
- one east of Southhaven Dr,
- one east of the I-97 interchange
- one along the Aris T Allen Blvd interchange
- one west of Solomon's Island Rd
- one 0.6 miles east of MD 2
- one 0.6 miles east of Bay Dale Drive,
- three west of St. Margarets Road
- one 1,200 feet east of Whitehall Road, and
- one 430 feet east of Log Inn Road.

Additionally, the areas surrounding the South River and the Severn River are designated Resource Conservation Areas (RCA) and a Limited Development Areas (LDA). Detailed attention to specific constraints in these specially designated areas will be necessary during project development for improvements along this corridor.

7.4.2 I-97:

There are streams running under the alignment of I-97 at 18 different points within the study corridor. Proper planning is important to ensure these resources are not adversely affected during construction or by highway operations.

7.4.3 MD 32:

There are streams crossing under the alignment of MD 32, at the following five locations:

- one adjacent to Fellowship Way,

- one adjacent to Severn Run Court,
- one adjacent to the intersection of Royal Oak Lane and Waterloo Boulevard,
- one west of the Annapolis Road interchange, and
- one 0.3 miles north of the MD 295 interchange.

Additionally, at the interchange with I-97, two streams run parallel to the roadway for over 1,000 feet. Between the Dennington Lane and Laurel-Fort Meade Road. Similarly, a network of streams approaches the MD 295 interchange. A detailed wetland analysis will have to be completed to understand the impacts that construction could have on these resources.

7.4.4 MD 100:

There are five streams crossing under the alignment of MD 100 at the following locations:

1. 0.5 miles west of Telegraph Road,
2. 0.25 miles east of Harmans Road,
3. 0.3 miles north of Harmans Road,
4. north of Arundel Mills Boulevard, and
5. south of Wright Road.

7.4.5 MD 295:

There are 8 streams running under the alignment of MD 295 between MD 100 and I-195. Detailed environmental analysis has been completed to ensure these resources are not adversely affected during construction or by highway operations.

7.4.6 MD 2:

No environmental concerns were identified for this corridor.

7.4.7 MD 3:

Three streams cross MD 3 between St Stephens Church Road and MD 32. Additionally, there is water within the ROW – in the median – near the interchange with MD 32. Detailed environmental analysis has already been completed as part of the Location and Design Approval to document the significance, impact construction, and necessary mitigation measures.

CHAPTER 8: COST ASSESSMENT

8.1 ROADWAY IMPROVEMENTS

Roadway improvements include both widening for general purpose lanes as well as carpool lanes. Construction costs were estimated in current year dollars using the Maryland State Highway Administration's 2009 *Highway Construction Cost Estimating Manual*. The Manual describes a cost estimating procedure used by the State to develop estimates for the Consolidated Transportation Program (CTP). The CTP is prepared on a yearly basis to assist in the allocation of funds and relies on a high level analysis to estimate costs for projects at all stages of development.

The Manual describes an average cost per mile that has been established based on current data by type of improvement. The cost per mile is a rough estimate that can be adapted for different regions and terrains, but is not specific to any one project. The costs included in this calculation are:

- Preliminary engineering
- Earthwork
- Drainage
- Paving
- Shoulders
- Landscaping
- Signing, marking, lighting, and signalization

Conversely, there are factors that the cost per mile calculation does not consider. Any foreseeable costs in these categories need to be added on top of cost per mile estimate. The major factors not included in the cost per mile calculation are:

- Additional right-of-way acquisition
- Structures
- Sidewalks
- Curb and gutter
- Environmental costs

A cost of $6,000,000 per lane-mile was assumed for the improvements in this plan as stated in the Manual for the cost of reconstruction. Lanes are assumed to have a width of 12 feet – any other widths are considered proportionally based on this. Full depth reconstruction of the existing shoulders and construction of new shoulders was also assumed. The cost per mile was applied to the additional lanes (and adjacent shoulders) recommended in the plan. The cost of interchange reconstruction was added to the cost per mile estimate at the rate of $40,000,000 per interchange, given that the structural costs would not be included in the estimate. The table below summarizes the costs associated with each of the proposed improvements. See Table 8-1.

Table 8-1: Summary of Roadway Construction Cost Estimates

Corridor	Corridor Section	Proposed Changes	Corridor Length (mi)	Additional Width (ft)	No. of Interchanges	Cost of Improvements
US 50	Prince George's County Line to I-97	2 HOV lanes added	6.75	44	1	$188,500,000
US 50	I-97 to Severn River Bridge	2 Travel lanes added	4.5	48	4	$268,000,000
US 50	Severn River Bridge to Chesaoeake Bay Bridge	2 Travel lanes added	6.75	48	4	$322,000,000
Total cost for corridor						**$778,500,000**
I-97	US 50 to MD 32	2 Travel lanes added	7.1	46	3	$283,300,000
Total cost for corridor						**$283,300,000**
MD 32	I-97 to MD 175	2 HOV lanes added	5.85	46	3	$254,550,000
MD 32	MD 175 to MD 295	2 HOV lanes added	4.4	46	2	$181,200,000
MD 32	MD 295 to I-95	4 Travel lanes and 2 HOV lanes added	4.15	72	2	$229,400,000
Total cost for corridor						**$665,150,000**
MD 100	MD 170 to I-95	2 Travel lanes added	5.75	44	5	$326,500,000
Total cost for corridor						**$326,500,000**
MD 295	MD 100 to I-195	2 Travel lanes added	3	32	0	$48,000,000
Total cost for corridor						**$48,000,000**
MD 2	US 50 to MD 10	2 Travel lanes added	8.4	24	0	$100,800,000
Total cost for corridor						**$100,800,000**
MD 3	St. Stephens Church Rd. to MD 32	2 Travel lanes added	2.5	24	0	$30,000,000
Total cost for corridor						**$30,000,000**
Total cost for all corridors						**$3,180,700,000**

8.1.1 US 50

The improvements for US 50 between the Prince George's County line and I-97 consist of one additional 12-foot lane in each direction and two 10-foot shoulders for a total of 44 feet of widening reconstruction. Additionally, there is one interchange in this segment that will need improvements.

Between I-97 and the Severn River Bridge, the reconstruction consists of one 12-foot lane in each direction and one 12-foot shoulder for a total of 48 feet along the 4.5 mile segment. This segment also includes four interchanges that will need to be improved to accommodate the widening.

Similarly, 48 feet of roadway would be reconstructed along the 6.75 mile stretch between the Severn River Bridge and the Chesapeake Bay Bridge. There are also four interchanges in this section of US 50.

8.1.2 I-97

One 12-foot travel lane in each direction and two 11-foot shoulders are being added to the section of I-97 between US 50 and MD 32 for a total of 46 feet of reconstruction along the 7.1 mile segment. Three interchanges are added to the cost estimate for this section of I-97.

8.1.3 MD 32

One 12-foot travel lane in each direction and two 11-foot shoulders are being added to MD 32 between I-97 and MD 295 for a total of 46 feet of reconstruction along the 10.25 mile segment. Additionally there are 5 interchanges in this section that were added to the cost of the project.

Between MD 295 and I-95, the reconstruction includes two 12-foot lanes in each direction for a total of 72 feet along the 4.15 mile segment. Two interchanges in this segment were included in the estimate.

8.1.4 MD 100

The proposed improvement for MD 100 between MD 170 and I-95 consists of one 12-foot lane in each direction and two 10-foot shoulders for a total of 44 feet. Five interchange reconstructions were included in the estimate for this 5.75 mile long segment.

8.1.5 MD 295

One 12-foot travel lane in each direction and two 4-foot shoulders are proposed to be added to MD 295 between MD 100 and I-95 for a total of 32 feet of reconstruction along this 3 mile segment. There were no interchanges to improve on this corridor.

8.1.6 MD 2

One 12-foot travel lane in each direction and no shoulders are being added to MD 2 from US 50 to MD 10 for a total of 24 feet of reconstruction along this 8.4 mile segment. As this is an arterial roadway, there are no interchanges to improve.

8.1.7 MD 3

One 12-foot lane in each direction and no shoulders are being added to MD 3 from St Stephens Church Road to MD 3 for a total of 24 feet of reconstruction along this 2.5 mile segment. As this is an arterial roadway, there are no interchanges to improve.

8.2 TRANSIT OPERATING AND CAPITAL COST ESTIMATES

Costs for new transit services proposed in the plan are estimated and include both operating and capital costs. All cost assumptions are based on the Maryland Transit Administration's most recent unit cost figures.

8.2.1 Operating Costs

Operating costs vary directly in terms of how long the bus is operated and is expressed as a cost per mile and per hour.

- Per mile cost relates to items that are consumed on the basis of mileage of operations, i.e., the fuel and lubricants, tires and tubes, other material supplies labor for vehicle maintenance, causality and liability insurance, etc.

- Per hour costs relates to items that are consumed on an hourly basis of operations, such as operator salaries and wages, other salaries and wages (employees who are non-drivers but their work relates to hours of operations, for example cleaners), fringe benefits, and services.

Operating costs presented here represent the cost of operating the service on the street and do not include other related costs such as general administration nor non-vehicle maintenance that are associated in maintaining a transit property, or maintenance of additional vehicles in the existing bus maintenance facility.

One of the reasons for recommending premium bus service is the cost-effectiveness of bus service over other transit modes. In comparison to the cost of operating a rail service, light rail or street car, a bus system will be significantly less expensive. The infrastructure for a bus system is currently in place and does not have to be created. A review of light rail costs built in the US indicates that the per mile construction cost ranges from $15 million to over $100 million per mile. Furthermore the per vehicle costs for a light rail or street car system is significantly more than the cost of a bus. San Diego's most recent light rail vehicle (LRV) purchase was almost $3.6 million per car.

Annual operating cost are presented in Table 2 and are based on MTA's current per hour operating cost of $40.64 and the per mile cost of $5.08. Total operating cost for the corridor in current dollars is $27,060,627.

8.2.2 Capital Costs

Vehicle capital costs are based on two recent MTA vehicle purchases, New Flyer Hybrid buses recently ($619,000 per vehicle) acquired in 2011 and the acquisition of 30-ft. clean diesel Optima buses acquired in 2006 ($263,000 per vehicle). While the MTA did purchase 40-ft. clean diesel New Flyer vehicles in 2004 the per vehicle cost of $219,000 is the lowest of all recent acquisitions and was not used in the capital cost estimate as the cost of bus vehicles has been increasing. Thirty-four vehicles are required to provide the proposed service as determined by cycle time and headway along the five corridors where the plan recommended new transit service (US 50, MD 2 North, MD 100, I-97 and MD 3).

Transit vehicle costs are presented in Table 2 and are based on the Maryland Transit Administration's most recent vehicle acquisition of New Flyer hybrid buses and the 2006 30-ft. Optima vehicle purchase. Both vehicles have recorded announcements and Closed Circuit Television; however the significant difference between the two vehicles is that the New Flyer vehicles are electric hybrids and only clean diesel. The total vehicle capital cost, assuming hybrid vehicles are purchased $22,950,000 in current dollars and the cost of clean diesel vehicles is $8.9 million.

Additional capital costs that may be required are 1) expansion or construction of a new maintenance facility, 2) bus stop amenities such as shelters, benches, lighting, real-time transit information, etc. Bus shelters can vary in cost from $4,000 dollars to over $10,000 or more depending on the specifications such as size of the unit, capacity, style, etc. 3) Hardware and software for transit signal priority, which based on recent SHA studies is estimated at $7,500 per vehicle hardware, $10,000 to $15,000 per signal hardware, and $10,000 per intersection for system software. The initial capital cost estimate for signal priority improvements is estimated at $2.5 million.

Total annual operating cost and initial capital cost therefore ranges between over $61.5 million using clean diesel vehicles and over $75.5 million using hybrid electric vehicles.

However, some of the operating costs may be able to be recovered through the collection of fare payments by passengers along each route. Farebox recovery is the ability of the fares collected to cover the operating cost of the service. It is determined by dividing the amount of fares collected by the cost of operating the service. No public transit agency is able to pay for itself exclusively through the collection of transit fares; the vast majority of public transportation services in the U.S. receive a subsidy. As a result, many localities have established a farebox recovery ratio for transit systems, i.e., a percentage of the operations that must be covered by the collection of fares. The State of Maryland mandates a 35% farebox recovery ratio for transit service; however, the MTA has not been able to meet that requirement as its farebox recovery ratio is between 28% and 29% with anticipated ratio reductions in the future as costs increase. The MTA is unable to improve its farebox ratio due to restrictions on reducing service and/or raising fares. A farebox recovery analysis was performed for the proposed

service using the mandated 35% ratio and an anticipated future ratio of 25%. A 35% farebox recovery generates an annual total of $9,471,220 and a 25% farebox recovery results in $6,607,973. See Table 8-2

Table 8-2: Summary of Annual Transit Operating Costs

Route	Distance	Cycle Time (min)	Headway Peak	Headway Off-Peak	Vehicle Requirements Peak	Vehicle Requirements Off Peak	Span of Service	Total Time Peak	Total Time Off Peak	Annual Per Hour Cost	Annual Per Mile Cost	Annual Total Estimated Cost*	Farebox Recovery 35%	Farebox Recovery 25%
US 50	41.31	118	10	20	12	6	13.56 hrs.	4 hrs.	9.56 hr	$1,117,558	$11,541,578	$12,659,135	$4,430,697.33	$3,164,783.81
MD 2	37.15	61.25	10	20	7	4	12 hrs.	4 hrs.	8 hr.	$636,422	$5,910,773	$6,547,195	$2,291,518	$1,636,799
I-97	31.7	82	20	60	5	2	12 hrs.	4 hrs.	8 hr.	$434,889	$3,026,189	$3,461,077	$1,211,377	$865,269
MD 100	18	62.6	20	60	4	2	12 hrs.	4 hrs.	8 hr.	$339,425	$1,527,414	$1,866,839	$653,394	$466,710
MD 3	22.2	92.2	20	60	5	2	12 hrs.	4 hrs.	8 hr.	$381,853	$2,113,724	$2,495,578	$873,452	$466,710
MTA 64B**	2.2	5.3	60	NA	1	NA	1 hr.	1 hr.	NA	$7,467	$23,335	$30,803	$10,781	$7,701
Grand Total Operating Cost												**$27,060,627**	**$9,471,220**	**$6,607,972**
Total Shuttle Cost												**$22,950,000**		

* Calculated at 261 operating days per year

** An extension of the existing MTA bus route #64

8.2.3 Summary

In order to estimate the total Plan costs, the roadway costs for each corridor were aggregated, and the annual transit costs over an assumed 15-year life cycle were converted to present net dollars (without adjusting for inflation or farebox recovery), the total estimated cost to implement this plan on the nine primary corridors is **$3.6 billion** as shown in Table 3. However, given the potential right-of-way issues along portions of US 50, MD 32, and MD 3, and environmental issues noted along all corridors, a contingency factor of 20% should be applied, bringing the total Plan cost to **$4.3 billion**. See Table 8-3.

Table 8-3: Total Plan Costs

Corridor	Roadway Cost	Transit Operating Costs (15-year service life)
US 50	$778,500,000	$189,887,000
MD 2 North	$100,800,000	$98,207,900
MD 2 South	$0	$0
I-97	$283,300,000	$51,916,200
MD 32	$665,150,000	$0
MD 100	$326,500,000	$28,002,600
BW Parkway/ MD 295	$48,000,000	$0
MD 3	$30,000,000	$37,433,700
Magothy Bridge/ Fort Smallwood	$0	$462,000
Transit Fleet Cost (Hybrid)		**$22,950**
GRAND TOTAL	**$3,180,700,000**	**$428,859,500**

CHAPTER 9: SUMMARY AND RECOMMENDATIONS

9.1 SUMMARY AND RECOMMENDATIONS

This report focused on identifying, analyzing, and understanding the relationship between land use patterns and the mobility and accessibility constraints and opportunities within each corridor and their interaction within the region. This document and the proposed recommendations will assist County planners, land developers, decision makers, and budgets regarding future investments and improvements for highway, transit and non-motorized facilities.

The existing conditions were documented, a travel demand model was refined and validated, alternative scenarios and traffic forecasts were developed and tested at both a corridor and network level, for the following scenarios:

1. A No Build Alternative (Existing Plus Committed). Only including roadways that have improvements currently funded for construction, with no transit or carpool lane improvements

2. A Roadway Widening Only Alternative (Constrained Long-Range Plan). Only constructing roadways that are currently proposed to be widening in the Baltimore Region's Constrained Long Range Plan, with no transit or carpool lane improvements

3. A Managed Lane Only Alternative. Only constructing new travel lanes on the existing corridors to provide priority carpool (High Occupancy Vehicle) and/ or tolled access for general purpose traffic (Express Toll/ High Occupancy Toll)

4. An Enhanced Transit Only Alternative. Providing new bus transit service in each corridor without necessarily providing new exclusive rights-of-way or priority treatments

5. A Preferred Alternative. Which includes combinations of Roadway Widening, Managed Lanes, Transit with priority treatments and land use changes

Based on the results of the alternatives analysis, the Hyrbrid alternative developed, tested, and recommended herein is a combination of the optimal roadway widening, managed lanes, and transit service with supporting select transit priority treatments and transit-oriented land use changes in each corridor. **It should be noted that the land use changes and densities that were used in the scenario testing in this report are not consistent with the currently approved General Development Plan (2009) and would require a full public process to seek County Council approval for land use change and zoning for land use conformity**. It is also anticipated that such changes may likely be opposed by local residents and community groups.

This effort was a Countywide approach, and built upon the currently adopted BMC Transportation Improvement Plan and Constrained Long Range Plan, which are the current policies of the County for future improvements to the transportation network.

Balancing the need for added roadway footprint with limited right of way, environmental constraints, and the need to provide for more travel choices was carefully considered on a corridor-by-corridor and segment-by-segment basis to identify which roadway and transit capacity improvements will be most operationally beneficial and justified. The following factors are considered in both screening alternatives to identify preferred concepts as well as among the final set of recommendations for ranking corridor implementation priorities for advancement into detailed project planning, preliminary and final engineering design, acquisition, and construction:

9.2 PRIMARY SCREENING CRITERIA:

In screening the alternatives to evaluate the preferred option, several factors are considered:

1. Travel Time Reliability. The ability of one or more travel options in each corridor to provide consistent future peak hour travel times based either on the lack of peak hour vehicle congestion or the provision of alternative modes of travel with priority treatments and exclusive right-of-way to ensure faster travel times (e.g. carpool or transit lanes)

2. Level of Service. A qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed, travel time, freedom to maneuver, traffic interruption, comfort and convenience. For example, LOS A represents free flow, almost complete freedom to maneuver within the traffic stream. LOS F represents forced flow, more vehicles are attempting to use the freeway than can be served resulting in stop and go traffic. See **Appendix W**.

3. Travel Choices. The number of future available options to travel from one point in a corridor to another, in comparison to existing conditions

4. Feasibility (environmental, right-of-way impact). The amount of impact from construction of proposed improvements due to sensitive environmental features such as streams, wetlands or personal property such as homes and business

5. Land Use Compatibility. The consistency of recommendations with currently zoned land use regulations and small area plans

9.3 SECONDARY SCREENING CRITERIA

1. Cost. The total dollar value to design and construct a proposed improvement

2. Average Daily Traffic. The total daily number of vehicles traversing a particularly point along a roadway over a 24-hour period

3. Transit Ridership. The number of passengers using a public transportation system such as a bus

A summary of the five alternative network scenarios is presented in Table 9-1, with a subsequent narrative justifying the Hybrid Option as the preferred alternative.

Table 9-1: Alternative Network Scenarios

Table 1. Alternatives Screening Summary Table																									
STUDY CORRIDOR	**E + C Scenario #1**					**CLRP Scenario #2**					**Managed Lanes Scenario #3**					**Enhanced Transit Scenario #4**					**Hybrid Option Scenario #5**				
	a	**b**	**c**	**d**	**e**	**a**	**b**	**c**	**d**	**e**	**a**	**b**	**c**	**d**	**e**	**a**	**b**	**c**	**d**	**e**	**a**	**b**	**c**	**d**	**e**
US 50	×	×	n/a	×	n/a	×	✓	✓	✓	×	✓	✓	✓	✓	×	✓	×	✓	✓	n/a	✓	✓	✓	✓	×
MD 2 (north)	×	×	n/a	×	n/a	×	×	✓	✓-	✓	×	n/a	n/a	n/a	✓	✓	×	✓	×	n/a	✓	×	×	✓-	✓
MD 2 (south)	×	×	n/a	×	n/a	×	×	✓	n/a	n/a	×	n/a	n/a	n/a	n/a	n/a	n/a	n/a	×	n/a	✓	×	✓	n/a	n/a
I-97	×	×	n/a	×	n/a	×	✓	✓	✓	×	✓	✓	✓	✓-	×	✓	×	✓	×	n/a	✓	✓	✓	✓	×
MD 100	×	×	n/a	×	n/a	×	×	✓	✓-	×	✓	✓	✓	×	×	✓	×	✓	×	n/a	✓	×	✓	✓-	×
MD 295	×	×	n/a	✓	n/a	×	×	✓	✓-	✓	✓	✓	✓	×	✓	✓	×	✓	×	n/a	✓	×	✓	✓-	✓
MD 3	×	×	n/a	×	n/a	×	×	✓	✓-	×	×	n/a	n/a	n/a	×	✓	×	✓	×	n/a	✓	×	✓	✓-	×
MD 32	×	×	n/a	×	n/a	×	×	✓	✓-	×	✓	✓	✓	✓	×	✓	×	✓	×	n/a	✓	×	✓	✓-	×
Ft Smallwood/ Magothy Br	×	×	n/a	×	n/a	×	×	✓	n/a	n/a	×	n/a	n/a	n/a	n/a	✓	×	n/a	×	n/a	✓	×	✓	n/a	n/a

LEGEND		
	a	Improves Travel Choices
	b	Provides reliable travel times
	c	Consistent w/ Land-Use Plans
	d	Improves Overall Highway LOS
	e	No Right-of-Way or Environmental Impacts

✓ = Yes × = No N/A = Not Applicable

✓- = Improved LOS where network enhancement was made, but LOS issues in corridor remain.

9.3.1 US 50

The No-Build and Transit Only scenarios fail to address problems with congestion that are forecasted to affect the roadway by 2035. The CLRP option includes additional roadway capactiy to address level of service, but do not provide any options for alternative transportation. The Managed Lane only option provides alternative travel choices and reliable travel times but does not improve level of service. The Hybrid alternative for US 50 improves the roadway to provide reliable travel times through the provision of carpool lanes and premium transit services, which also provides additional travel choices throughout the corridor. Model runs show the HOV network to significantly reduce daily traffic volumes on the

existing general purpose lanes. The HOV lanes proposed are in addition to the existing footprint of the roadway and will enhance the ability to provide reliable carpool and transit service times between Annapolis and Washington, DC.

9.3.2 MD 2 (North)

The No-Build and Transit Only options do not address failing levels of service forecasted for this roadway in the future. Given that MD 2 is an arterial with a high frequency of access points, carpool lanes are not suitable for this corridor. The CLRP scenario address deficiencies in roadway capacity by targeting the segment with the highest forecasted volumes. The Hyrbird alternative goes one step further in building on the CLRP widening to also include premium transit to provide reliable travel times through priorty treatments and limited stops, as well as land use changes to provide densities that support premium transit service and encourage more walking and bicycle trips in commercial areas.

9.3.3 MD 2 (South)

No roadway or new transit service improvements are proposed in the any of the alternatives due to constrained growth forecasts in South County, but the Hybrid alternative provides additional travel choices through enhancements to existing transit service and pedestrian and bicycle facilities along the corridor.

9.3.4 I-97

Under No-Build conditions, the I-97 corridor is expected to experience failing levels of service during both the morning and afternoon peak periods. The improvements included in the CLRP would address this issue and provide reliable travel times based on forecasted volumes for the year 2035. Although an HOV lane tested in the model showed a potential for shifting some travel from the general purpose lanes to the HOV lanes, an HOV lane alone did not improve the Level of Service in the existing lanes. Additinallly, the benefit of an HOV lane along I-97 as part of a larger regional system in comparison to the HOV volumes along US 50 was marginal in comparison to the cost of adding two travel lanes (CLRP widening plus HOV) in each direction of I-97 between US 50 and MD 32. Expanded transit service did was not beneficial in terms of providing reliable travel times, attracting riders and reducing daily vehicle traffic volumes The Hybrid alternative includes the improvement from the CLRP as well as premium transit to not only improve travel times but also enhance transportation oprions along the corridor.

9.3.5 MD 100

The No Build and Transit Only options do not sufficiently address failing peak hour level of service forecasted for this roadway in the future. The managed lane option did not yield a high enough HOV volume, nor did it significantly impact daily vehicle traffic volumes in the general purpose lanes. The HOV option was also shown to increase volumes on MD 100 east of I-97 where improvements are not proposed. Lastly, MD 32 yielded stronger HOV demand, and is therefore proposed as the HOV facility

for east-west regional traffic. The proposed CLRP widening improvement is shown to improve peak hour level of service west of I-97. The Hybrid alternative proposes roadway widening, new premium bus transit service and transit-supporting density around a potential new MARC infill station which satisfies the increased travel choices and improved level of service screening criteria.

9.3.6 MD 295

The No-Build and Transit-Only options do not address failing levels of service forecasted for this roadway in the future, and fail to yield significant commuter ridership due to the provision of parallel commuter rail service. The Managed Lane option would not be successful because, based on the results of the study by the National Park Service, it could only be built north of MD 175 where the roadway is maintained by the Maryland State Highway Adminsitration, which fails to provide a system-level benefit to carpoolers. The CLRP and Hybrid option provides improved level of service by expanding the roadway capacity. The Hybrid option includes toolbox strategies to provide transit on parallel local roadways, and does not preclude future premium transit service running along the shoulders in segments of MD 295.

9.3.7 MD 3

The No Build option does not address projected failing levels of service, and the Transit Only option does not yield signficant ridership due to low densities and long distances between activity centers in this corridor. The Managed Lane option is not suitable for an arterial with a high frequency of access points. The CLRP includes added capacity to improve the level of service. The Hybrid alternative includes in addition to the CLRP widening the provision of premium transit service – resulting in both improved level of service and increased transportation choices.

9.3.8 MD 32

The No-Build and Transit Only options do not address failing level of service forecasted for this roadway in the future, and do not yield significant ridership. The CLRP option improves level of service but does not provide reliable travel times or increase travel choices. The Managed Lane scenario provides reliable travel times through the entire corridor, reduces volumes in the general purpose lanes, and increases travel choices, but would not alleviate failing levels of service. The Hybrid alternative provides improved level of service, reliable travel times, increased travel chocies and allows for the future provision of premium transit service when land use densities support it.

9.3.9 Fort Smallwood/ Magothy Bridge Road

No roadway or new transit service improvements are proposed in the any of the alternatives due to constrained growth forecasts in the northeast portion of the County. The Hyrbid plan recommends enhancements to existing service as well as bicycle and pedestrian improvements to increase the transportation options along the corridor.

9.4 PLAN RECOMMENDATION

The following summarizes the combined recommended roadway, transit, bicycle and pedestrian, land use and toolbox strategy elements for each corridor.

9.4.1 US 50

US 50 (John Hanson Highway) is a six to eight lane expressway that is projected to carry up to 200,000 vehicles per day by the year 2035, an increase of up to 40% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Annapolis area, long-distance commuter traffic destined for downtown Washington, D.C. and regional traffic destined to the Eastern Shore.

The recommendations for US 50 include roadway improvements, carpool lanes, widening of the Severn River Bridge, new premium transit service and improved intermodal connections. See Table 9-2.

The provision of carpool lanes reduces daily general purpose traffic volumes by up to 10% in some segments in comparison to a roadway widening-only option, and the provision of premium bus service increases transit ridership in this corridor by up to 150% over existing conditions. It is also recommended to strengthen partnerships with local and state law enforcement agencies during the design and operation of the carpool lanes to provide enforcement of HOV regulations and penalties to ensure maximum efficiency of the lanes.

Table 9-2: US 50 Plan Recommendation

Mode/ Strategy	Description
Roadway	• **Widen from 6 to 8 lanes between I-97 and the Chesapeake Bay Bridge (including widening the Severn River Bridge)** • Extend the existing carpool (HOV 2 or more persons) lanes from the Prince George's County Line to I-97
Transit	• Operation of all-day weekday high quality transit service (four routes) along this corridor with stops in Annapolis, Navy Stadium Park & Ride lot, Parole Town Center, Davidsonville, Bowie and continued service to key destinations in downtown Washington, D.C. The transit service would be permitted to run in the carpool lanes at all times. This service would be in addition to the existing MTA express bus services (922 and 950)
Bicycle and Pedestrian	• Bicycles and pedestrians will remain prohibited along US 50
Land Use	• Develop an intermodal hub in the Parole Town Center area, with direct access to/ from US 50 and expanded park and ride capacity
Toolbox Elements	• Configure separate express and local travel lanes between I-97 and MD 2 • Implement ramp metering between MD 665 and MD 2 • Enhance Active and Event Traffic Management through implementation of variable speed limits, dynamic lane marking, Variable Message Signs, and enhanced traveler information systems

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

9.4.2 Maryland Route 2 North

Maryland Route 2 North (Governor Ritchie Highway) is a four to six-lane arterial roadway that is projected to carry up to 76,000 vehicles per day by the year 2035, an increase of up to 26% over existing daily traffic volumes. The corridor serves both local traffic in the Annapolis, Severna Park, Pasadena and Glen Burnie areas, as well as long-distance commuter traffic destined for downtown Baltimore or bypassing I-97.

The recommendations for MD 2 include roadway improvements, new premium transit service, new sidewalks, and permitting land use densities that support transit in select locations where redevelopment might occur. See Table 9-3.

Table 9-3: MD 2 (North) Plan Recommendation

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between US 50 and MD 10**
Transit	• Operation of all-day weekday high quality limited stop transit service along this corridor with stops at the Navy Stadium Park and Ride lot, Anne Arundel Community College, Jones Station Park and Ride, Severna Park Plaza, Marley Station, Glen Burnie Town Center and key destinations in downtown Baltimore. This service would not replace the existing MTA local bus route #14
Bicycle and Pedestrian	• New sidewalk on both sides of MD 2
Land Use	• Allow for transit-oriented development in Severna Park Marketplace, Harundale Plaza, Marley Station Mall and Glen Burnie Town Center
Toolbox Elements	• Implement bus priority treatments such as queue jumps, signal priority and enhanced signal coordination • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The additional land use density increased projected daily traffic volumes by 10% in one segment, but resulted in overall only one additional failing segment than a roadway-only widening option. However, the plan recommendation for this corridor significantly increased walking and biking trips, and increased transit ridership by up to 125% over existing levels.

9.4.3 Maryland Route 2 South

Maryland Route 2 South (Solomon's Island Road) is a four to six-lane arterial roadway that is projected to carry up to 63,000 vehicles per day by the year 2035, an increase of up to 46% over existing daily traffic volumes. The corridor serves both local traffic in the Annapolis area, as well as long-distance commuter traffic from South County.

The recommendations for MD 2 include primarily pedestrian and bicycle improvements and toolbox strategies to better manage congestion. See Table 9-4.

Table 9-4: MD 2 Plan Recommendation

Mode/ Strategy	Description
Roadway	• none
Transit	• no new service but improve existing service frequency, span, and upgrade bus stops with real-time transit information, shelters, lighting and benches
Bicycle and Pedestrian	• construct missing sidewalks, evaluate feasibility to add bike lanes and/ or signed routes along side streets, parallel routes or MD 2
Land Use	• incorporate improved site design to orient new buildings to the street and encourage more walkable frontage
Toolbox Elements	• Implement bus priority treatments such as queue jumps, signal priority and enhanced signal coordination • Develop improved access controls such as frontage road creation and streetscape treatments as redevelopment occurs to create a boulevard style cross-section • Evaluate the need for improvements to connecting roadways such as MD 214 to improve intersection level of service • Evaluate MD 2 South from Aris T. Allen Blvd to and including the South River Bridge

The proposed roadway cross-sections and transit routing remains unchanged from existing conditions.

9.4.4 I-97

I-97 is a four to six lane expressway that is projected to carry up to 150,000 vehicles per day by the year 2035, an increase of up to 30% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Millersville, Severna Park and Glen Burnie area, and commuter traffic destined for downtown Baltimore and Annapolis.

The recommendations for I-97 include roadway improvements, and new premium transit service. See Table 9-5.

The roadway widening proved to provide adequate levels of service in all but one segment near the MD 3 Business interchange, and the provision of high quality bus service reduced daily traffic volumes by 1% in some segments.

9.4.5 MD 32

MD 32 is a four to six lane expressway that is projected to carry up to 93,000 vehicles per day by the year 2035, an increase of up to 55% over existing daily traffic volumes. The corridor serves a diverse

Table 9-5: I-97 Plan Recommendation

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between US 50 and MD 32**
Transit	• Operation of all-day weekday high quality transit service along this corridor with stops in Parole Town Center, Benfield Blvd, Glen Burnie Town Center, Glen Burnie Light Rail Station, BWI Airport and Arundel Mills Mall
Bicycle and Pedestrian	• Bicycles and pedestrians will remain prohibited along I-97
Land Use	• No land use changes are proposed
Toolbox Elements	• Enhance Active and Event Traffic Management through implementation of variable speed limits, dynamic lane marking, Variable Message Signs, and enhanced traveler information systems • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

traffic mix including local traffic in the Savage, Odenton and Millersville areas, and commuter traffic destined for Ft. Meade, NSA job centers as well as Annapolis.

The recommendations for MD 32 include roadway improvements. See Table 9-6.

Table 9-6: MD 32 Plan Recommendation

Mode/ Strategy	Description
Roadway	• **Widen to 8 lanes (between I-95 and MD 295)** • Construct new carpool (HOV 2 or more persons) lanes from I-95 to I-97
Transit	• Provide subscription transit services and eventually express bus service
Bicycle and Pedestrian	• None other than where located today
Land Use	• No land use changes are proposed due to federal ownership of land on both sides of the roadway
Toolbox Elements	• Evaluate operation of subscription (van pool) and local bus service, and having those vehicles use the HOV lanes

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The carpool lanes reduce daily traffic volumes from a roadway-widening only option by up to 12% in some segments. Volumes on the carpool lanes are projected to reach up to 19,000 vehicles per day.

9.4.6 MD 100

MD 100 is a four to six lane expressway that is projected to carry up to 112,000 vehicles per day by the year 2035, an increase of up to 37% over existing daily traffic volumes. The corridor serves a diverse

traffic mix including local traffic in the Dorsey, Glen Burnie and Lake Shore, and traffic destined for major activity centers such as BWI Airport, Arundel Mills Mall and the Maryland Live casino.

The recommendations for MD 100 include roadway improvements, and new premium transit service. See Table 9-7.

Table 9-7: MD 100 Plan Recommendation

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between I-95 and I-97**
Transit	• Operation of all-day weekday high quality transit service along this corridor with stops in Marley Station, BW Medical Center, MD 170 (potential future MARC Station), Arundel Mills, Dorsey MARC Station, Snowden River Park & Ride, and Long Gate Park & Ride/ Ellicott City
Bicycle and Pedestrian	• Bicycles and pedestrians will remain prohibited along MD 100
Land Use	• Allow for transit-oriented development around the MD 170 interchange to support a future infill commuter rail station
Toolbox Elements	• Configure separate express and local lanes between I-97 and MD 2 • Implement ramp metering between MD 295 and MD 2 • Enhance Active and Event Traffic Management through implementation of variable speed limits, dynamic lane marking, Variable Message Signs, and enhanced traveler information systems • Evaluate interchange improvements such as extended acceleration and deceleration lanes to enhance merging and weaving between I-97 and Catherine Ave • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The roadway widening proved to provide adequate levels of service in all segments west of I-97, and the transit-oriented development along with the high quality transit service also projected over 2,300 transit trips per day

9.4.7 The Baltimore-Washington Parkway (MD 295)

The Baltimore-Washington Parkway (MD 295 north of MD 175) is a four to six-lane expressway that is projected to carry up to 130,000 vehicles per day by the year 2035, an increase of up to 44% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Savage, Jessup, and Linthicum areas, long-distance commuter traffic destined for downtown Washington, D.C., Baltimore and regional traffic destined to major activity centers such as Fort Meade/ NSA, Arundel Mills, the Maryland Live casino and BWI Airport.

The recommendations for MD 295 include roadway improvements, and new local transit service. See Table 9-8.

Table 9-8: MD 295 Plan Recommendation

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between MD 100 and I-195**
Transit	• Operation of new local transit service in parallel corridors such as MD 176 and MD 713
Bicycle and Pedestrian	• Bicycles and pedestrians will remain prohibited along MD 295
Land Use	• none
Toolbox Elements	• enhance signal coordination on parallel corridors such as MD 713, MD 170 • Evaluate improved local road connectivity west of MD 295 • Improvements to Race Road, Brock Bridge, Ridge Road and US 1 to carry additional local traffic

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

The Baltimore-Washington Parkway/ MD 295 corridor is owned and maintained by the National Park Service (NPS) south of MD 175. A recent NPS planning study recommended no widening, carpool lanes or new transit service south of MD 175.

9.4.8 MD 3

MD 3 is a four to six lane expressway that is projected to carry up to 109,000 vehicles per day by the year 2035, an increase of up to 38% over existing daily traffic volumes. The corridor serves a diverse traffic mix including local traffic in the Millersville and Crofton areas, regional traffic destined for Bowie and points south in southern Maryland and long-distance traffic destined to other states..

The recommendations for MD 3 include roadway improvements, and new premium transit service. See Table 9-9.

The roadway widening will still result in some rush hour congestion in the peak direction; however, the provision of premium bus service in this corridor reduces daily traffic volumes by 1%.

9.4.9 Magothy Bridge Road/ Hog Neck Road/ Fort Smallwood Road

Magothy Bridge Road/ Hog Neck Road (MD 607) and Fort Smallwood Road (MD 173) are two to four lane arterials that are projected to carry up to 27,000 vehicles per day by the year 2035, an increase of up to 14% over existing daily traffic volumes. The corridor serves local traffic in the Pasadena, Lake Shore and Riviera Beach areas.

The recommendations for Magothy Bridge/ Fort Smallwood/ Hog Neck Road include extended local transit service and improved access for pedestrians, bicycles, and transit users.

The roadway cross-section remains unchanged from existing conditions.

Table 9-9: MD 3 Plan Recommendation

Mode/ Strategy	Description
Roadway	• **Widen from 4 to 6 lanes between the Prince George's County line and MD 32**
Transit	• Operation of all-day weekday high quality transit service along this corridor with stops in Bowie MARC, Bowie Town Center, Crofton, Waugh Chapel, Odenton, Benfield Blvd, Glen Burnie Light Rail, BWI Airport and Arundel Mills
Bicycle and Pedestrian	• Construct a new sidewalk and trail between MD 450 and MD 32 (per NEPA documentation)
Land Use	• none
Toolbox Elements	• upgrade all signalized intersections to interchanges • Priority bus treatments such as queue jumps, signal priority as enhanced/upgraded transit services are provided. • Access management/ driveway consolidation and frontage road creation for bicycle and pedestrian access as redevelopment occurs • Provide additional park and ride capacity

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

Table 9-10: Magothy Bridge Rd/ Hog Neck Rd/ Ft Smallwood Rd Plan Recommendation

Mode/ Strategy	Description
Roadway	• none
Transit	• Extend the existing MTA bus route #64 to Chesterfield Plaza and increase peak hour headways
Bicycle and Pedestrian	• Construct new sidewalks and evaluate feasibility for bicycle lanes or signed routes along the corridor
Land Use	• None
Toolbox Elements	• Improve amenities for transit users including shelters, benches, lighting and provision of real-time transit information • Evaluate developer-funded intersection improvements along Magothy Bridge Road

9.4.10 Secondary Corridors:

Secondary Corridors: A summary of recommended toolbox strategies for Benfield Blvd, MD 176, MD 170 and MD 713/ Ridge Road is presented in Table 9-11.

Table 9-11: Secondary Corridors

Benfield Blvd: I-97 to MD 2
• Improve the cross-section to accommodate bicycles and pedestrians, including designated bike lanes/ route signing • Implement access management/ driveway consolidation in the more commercial area • Implement a demand-responsive shuttle service between the Benfield Park &Ride and the Jones Station Park & Ride to connect with proposed high quality transit along MD 2 and I-97 • Implement bike shares and car shares at the Benfield Park &Ride and the Jones Station Park & Ride
MD 176: MD 170 to MD 2
• Improve bicycle and pedestrian facilities such as sidewalks and bicycle lanes/ signed routes • Implement access management • Implement new site design guidelines/ overlay district to provide a more walkable streetscape/ building frontage • Implement shared parking requirements
MD 170: MD 2 to MD 175
• **Widen from 2 lanes to 4 lanes from MD 175 to MD 100** • Implement subscription bus service and install amenities for transit users such as shelters, benches, lighting and real-time transit information
MD 713/ Ridge Road: MD 176 to MD 175
• **Widen from 2 lanes to 4 lanes from MD 175 to Arundel Mills Blvd to relieve traffic on MD 295** • **Widen from 4 lanes to 6 lanes from Arundel Mills Blvd to MD 176 to relieve traffic on MD 295** • Provide more frequent local transit service and install transit amenities for transit users such as shelters, benches, lighting and real-time transit information, • Improve bicycle and pedestrian facilities such as bicycle lanes/ signed routes • Implement new site design guidelines/ overlay district to provide a more walkable streetscape/ building frontage

Recommendations in bold are currently part of the Baltimore Metropolitan Council's Constrained Long Range Plan

9.4.11 Corridor Prioritization

The Corridor Growth Management Plan comprises numerous recommendations across 13 corridors and multiple modes of travel that cannot be implemented all at once. Decisions will have to be made as to which projects and which corridors should be prioritized to make the most efficient use of available resources. Similar measures of performance to the criteria used to screen among corridor alternatives is again proposed including Average Daily Traffic (ADT) volumes, level of service, and travel time.

- The higher the ADT, the more travelers will be impacted by the improvement to the corridor, thus providing a greater benefit to the traveling public.

- For Level of Service, the difference in the number of failing segments between the No Build scenario and the Plan recommended alternative was used

- Where implemented, HOV lanes and priority transit service will offer carpools and transit users an opportunity to bypass congestion and traverse the corridor in predictable travel times that will be competitive with travel by private/ single occupant automobile.

Table 9-12 summarizes the factors considered in the evaluation of the 9 corridors. The ADT shown is the highest occurrence along each corridor. The existing congested travel times illustrate how forecasted HOV travel times and premium transit travel times would compare to existing conditions. The relative priority of each of the corridors based on the stated criteria is also included in the table. The color coding indicates the performance of each factor – with red green representing a high score, yellow a medium score, and red a low score.

Table 9-12: Corridor Prioritization Screening Summary Table

Corridor Prioritization Screening Summary Table								
STUDY CORRIDOR	**ADT**	**Congested Travel Time - Existing (min)**	**Future HOV Travel Time (min)**	**Future Transit Travel Time (min)**	**# of Failing Segments (No-Build)**	**# of Failing Segments (Plan Recommended)**	**Reduction in failing LOS segments**	**Priority**
US 50	191,100	20	18	23	3	0	100%	High
MD 2 (north)	76,500	35	N/A	39	7	9	-29%	Low
MD 2 (south)	63,000	11	N/A	N/A	10	10	0%	Low
I-97	149,500	29	N/A	25	7	1	86%	High
MD 100	112,000	19	N/A	23	8	4	50%	Med
MD 295	130,000	21	N/A	N/A	9	5	44%	Med
MD 3	109,000	16	N/A	N/A	14	12	14%	Med
MD 32	81,800	12	12	N/A	7	4	43%	Med
Fort Smallwood/ Magothy Bridge Road	27,000	18	N/A	N/A	5	4	20%	Low

US 50 and I-97 are forecasted to experience the highest increases in the number of segments with improved roadway level of service when the Plan recommendation is implemented. US 50 is projected to have 3 sections performing at LOS F by 2035 under no-build conditions and none if the plan recommended projects are implemented. I-97 is projected to have 7 failing segments under no-build conditions and only 1 in the plan recommended scenario. Additionally, out of the 9 study corridors, these two carry the highest daily traffic volumes. Furthermore, US 50 has HOV lanes proposed that will offer enhanced travel time reliability for carpoolers and transit users that take advantage of them. Although there will be some minor right-of-way needed in the US 50 corridor, and environmental impacts in both corridors, given their regional significance in connecting the County to the urban core

job centers, and the effects that the planned projects would have on the transportation network, these two corridors stand out as the top priorities in the plan. Collectively, the estimated costs would be $1 billion.

MD 100, MD 295, and MD 32 all experience significant reductions in the number of segments operating at level of service F. Almost half of all the failing segments in each of these corridors would experience a better level of service with the recommended projects. They also carry significant volumes with MD 295 ranking 3rd among the nine primary corridors, MD 100 ranking 4th, and MD 32 ranking 6th. Additionally, MD 32 stands out because of the proposed HOV lanes that would provide an additional opportunity for carpools and transit vehicles. The projects in these corridors would represent significant benefits to the county's transportation network, and as such should also be considered as priority projects, behind the US 50 and I-97 improvements. The MD 295 project, as the least expensive at an estimated $48 million and would require no right-of-way. The MD 100 corridor is the next least expensive at $326 million and would require no right-of-way. The MD 32 corridor is the most expensive of this second tier group at $665 million and would require additional right-of-way.

Improvements to MD 3 do not improve the LOS of this corridor to the same extent as the previously listed corridors. However, there are improvements to the roadway LOS, and the implementation of premium transit will improve travel times for that mode as well.

Improvements to MD 2 North and Ft. Smallwood/ Magothy Bridge Road are minor compared to other major corridors, and traffic volumes are the bottom 3 in the study. Even though transit and other enhancements along these corridors have great potential to improve reliability in service, as they represent less important links in the transportation network when compared to the other study corridors, they rank the lowest lower in priority. In addition, to implement the full recommendation for the MD 2 corridor, several rezoning changes would be required.

9.5 US 50 CHESAPEAKE BAY CROSSING

Improvements to the crossing of the Chesapeake Bay are vital, but beyond the scope of the plan, or jurisdiction of Anne Arundel County government. The Maryland Transportation Authority, which owns and operates the Chesapeake Bay Bridge, has been a key technical partner in the development of improvements along US 50. While the Authority is undertaking short-term studies to consider enhanced bus service, variable toll pricing, and improved incident response services on the bridge, no formal initiation of the required federal environmental studies for an improved or additional bay crossing is currently planned. The Authority has been fully engaged with the County in long-range transportation and long range planning and has pledged to carefully consider the recommendations developed for this study in developing their own improvements for additional roadway capacity across the Chesapeake Bay to address both weekday and seasonal travel demand. The ultimate configuration of additional Bay Bridge capacity will require detailed studies that involve multiple state and federal agencies that will extend in duration well beyond the timeline of this plan. The current status of additional Chesapeake Bay roadway crossings is that the Maryland Transportation Authority has not formally initiated the required federal environmental studies, nor coordinated long-range land use

planning with local jurisdictions. It is recommended that the authority initiate necessary environmental and engineering studies to determine location and design feasibility of an additional bay crossing.

9.6 NEXT STEPS AND IMPLEMENTATION

9.6.1 Coordination with Further County Planning Efforts

This document is a stand-alone report that is intended to justify advancing each of these corridors into detailed project planning and preliminary engineering, and identifying and securing funding commitments in partnership with appropriate State, Federal and private partners. This document builds on and supports the findings and recommendations of the recently adopted *General Development Plan (2009) Chapters 7, 9, 11 and 12; GDP Background Report on Transportation, (2008) and the currently underway Anne Arundel County Pedestrian and Bicycle Master Plan, (2012).* This report, along with future studies of additional secondary corridors, and new policy and design guidelines for developing Complete Streets that incorporate all modes of travel, will be integrated into a single Countywide Transportation Master Plan Document slated for completion in 2014.

9.6.2 Segmented Approach and Modal Priorities

In developing each corridor into appropriately scaled projects that can be designed, approved, funded and constructed in a reasonable time frame it is suggested to consider a segmented and modal approach.

- Along US 50 premium transit service could be implemented before any roadway widening occurs, potentially using the shoulder in peak hours; local/ express lanes could be configured, ramp metering installed and active traffic management strategies employed as well. Widening could initially construct the HOV lanes from the Prince George's County Line to I-97, and then build the segment between I-97 and the Severn River Bridge, and lastly the segment between the Severn River Bridge and the Bay Bridge where additional right-of-way is required.

- Along MD 2 North, premium transit service and priority treatments could be implemented prior to roadway widening

- Along MD 2 South, an access management plan could be developed to guide future redevelopment and access controls in conjunction with intersection improvement

- Along I-97, premium transit service could be introduced in advance of roadway widening and potentially use the shoulder in peak hours

- Along MD 32, the segment between I-95 and MD 295 can be constructed first, where no right-of-way is needed, and then segments east of MD 295 toward I-97.

- Along MD 100, local/ express reconfiguration, ramp metering and active traffic management strategies, and premium transit service (potentially using the shoulder in peak hours) could be introduced in advance of roadway widening

- In the MD 295 corridor, lower cost improvements to parallel roads and operation of new local transit service can be implemented in advance of roadway widening

9.6.3 Partnering and Funding

Within the County, the Corridor Plan, as part of the ultimate Transportation Master Plan, will need formal adoption by the County Council. Once adopted it becomes a formal policy, the County can then revise the priority letter to the State Secretary of Transportation. This letter will serve as justification for revising the County's transportation priorities for the Baltimore Metropolitan Council's Consolidated Long-Range Transportation Plan, and ultimately, if successfully advanced through Project Development, the State's Consolidated Transportation Program.

As the nine primary corridors are all State or Federal roadways, in order to advance each project, extensive project coordination with State and Federal agencies, and detailed environmental documentation will be required. Each project will need to go through the following steps in coordination with the Maryland State Highway's Office of Planning and Preliminary Engineering:

1. Detailed Project Planning Study. During this phase the project's logical termini, and purpose and need are identified, and alternatives are developed, and initial public outreach begins

2. Project Development. During this phase, detailed environmental analyses is undertaken, such as development of peak-hour traffic forecasts, capacity and level of service/ traffic simulation, air and noise analyses, development of preliminary geometry (cross-sections and vertical and horizontal alignment), hydraulic analysis, environmental impacts (streams, wetlands, historical and cultural resources), right-of-way impacts, construction cost estimates, refinement of alternatives, as well as Federal Highway coordination and additional public outreach. Specific steps include:

   a. Alternatives Retained for Detailed Study

   b. Environmental Alternatives/ Draft and Final Environmental Impact Statement

   c. Location and Design Approval/ Record of Decision of Preferred Alternative

3. Final Engineering Design. During this stage, final construction documents are prepared including specific mitigation for any utility, environmental or property impacts, detailed field reviews are performed, approvals from necessary permitting agencies such as the Maryland Department of the Environment are sought, and final itemized construction costs are developed. In addition, a

detailed Transportation Management Plan is developed to minimize impacts to traffic during construction.

4. Acquisition. During this stage all right-of-way is acquired, and relocation is performed

5. Construction. During this stage, the improvement is constructed.

Funding sources may include the US DOT (Federal Highway Administration, Federal Transit Administration), State (Maryland Department of Transportation CTP), Grants (e.g. Transportation Investments Generating Economic Recovery) or private funding (developer improvements)

In addition, as several of the corridors are roadways that span several jurisdictions, it is paramount to continue to coordinate with adjacent jurisdictions such as Howard County and Prince George's County so that roadway improvements, cross-sections, and transit services are seamless across County lines.

It should again be noted that all of the aforementioned agencies have been engaged in the development of this plan and are receptive to considering each of the recommended improvements for more detailed planning and project development.

9.6.4 US 50 Chesapeake Bay Crossing

The Maryland Transportation Authority, which owns and operates the Chesapeake Bay Bridge, has been a key technical partner in the development of improvements along US 50. While the Authority is undertaking short-term studies to consider enhanced bus service, variable toll pricing, and improved incident response services on the bridge, no formal initiation of the required federal environmental studies for an improved or additional Bay Crossing is currently planned. The Authority has been fully engaged with the County in long-range land use and transportation planning and has pledged to carefully consider the recommendations developed for this study in developing their own improvements for additional roadway capacity across the Chesapeake Bay to address both weekday and seasonal travel demand. The ultimate configuration of additional Bay Bridge capacity will require detailed studies that involve multiple State and Federal agencies that will extend in duration well beyond the timeline of this Plan. The current status of additional Chesapeake Bay roadway crossings is that the Maryland Transportation Authority has not formally initiated the required federal environmental studies, nor coordinated long-range land use planning with local jurisdictions. It is recommended that the Authority initiate necessary environmental and engineering studies to determine location and design feasibility of an additional Bay crossing.

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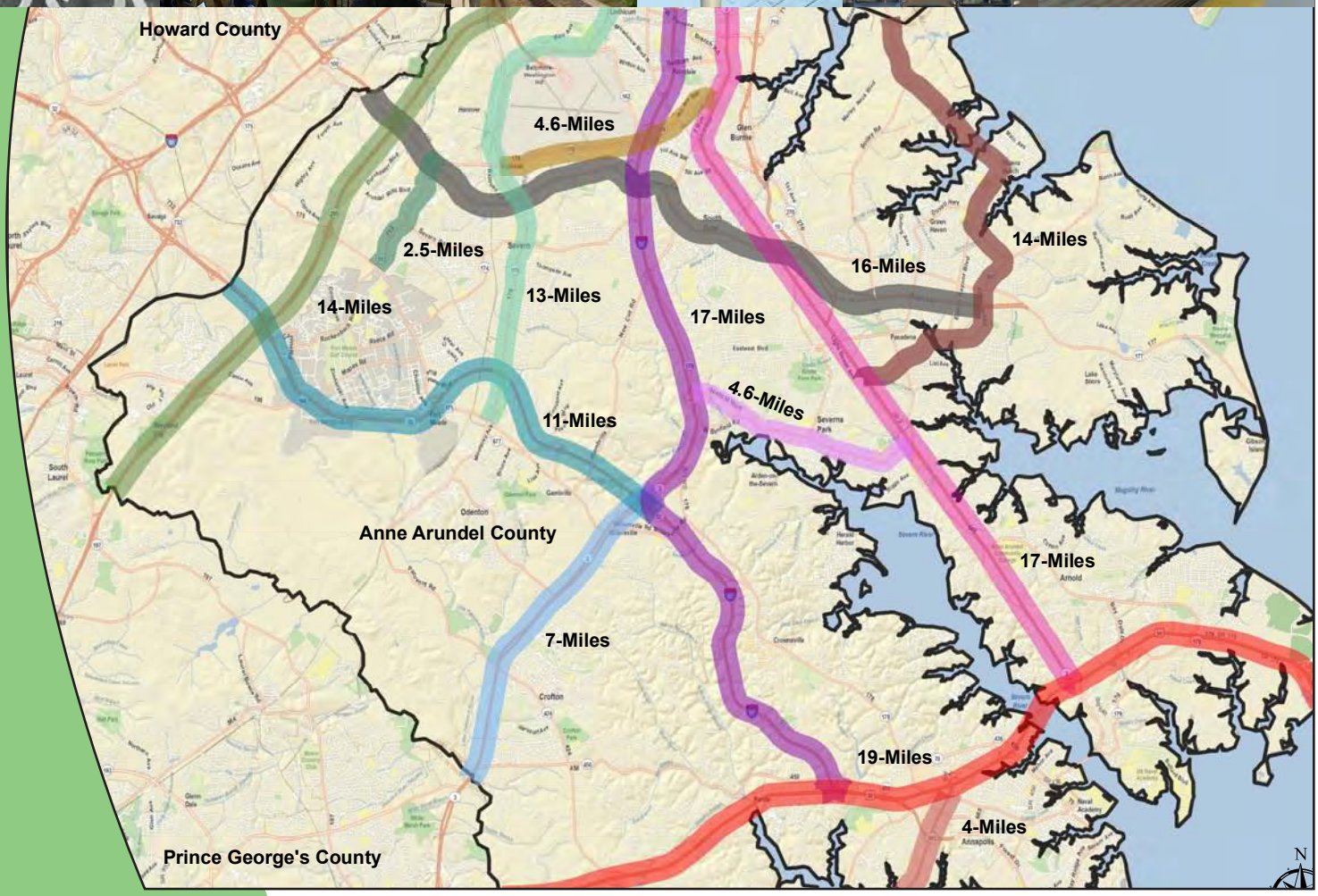

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