Southern Maryland
Transit Corridor Preservation Study

Final Report

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Office of Planning
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Executive Summary

The Southern Maryland Transit Corridor Preservation Study is a result of the collaborative effort between the Maryland Transit Administration (MTA), Charles County, Prince George's County, and other members of the project team who all share a vision for improved transit in the corridor. The products of this initiative identify a corridor for future development into a high capacity transitway along the MD 5/ US 301 Corridor from White Plains in Charles County, Maryland to the Branch Avenue Metrorail station in Prince George's County, Maryland. Additionally, the study determines the locations of potential transit stations, parking and other facilities, and provides Charles and Prince George's counties with a specific transit alignment to protect in their local land use plans.

The approach to alternatives development and evaluation and selection of the Preferred Alternative used in this study consisted of eight steps:

1. Review previous plans, studies, and codes
2. Identify study area planning initiatives
3. Compile and map appropriate data
4. Develop potential alignments
5. Determine station locations
6. Review alignments for any "fatal flaws"
7. Identify a Preferred Alternative
8. Conduct a detailed analysis of the Preferred Alternative

The alternative alignments studied were identified early in the planning study in consultation with the project team. Three alternatives, nine alignment options for the alternatives, and six beltway options were identified in consideration of the existing transportation corridor and transportation infrastructure, existing development patterns and density, potential impacts to properties and resources, the counties' proposed development plans and economic development priorities and policies, and designs and plans for road improvements along the MD 5/US 301 corridor.

As a result of the discussions with and preferences of the Charles and Prince George's counties and other members of the project team, the Preferred Alternative was selected to be a combination of Alternative 4, which includes Option 7, and Beltway Option 2. The Preferred Alternative supports the counties' existing and future land uses by providing stations at key locations such as Acton Lane, where the *Waldorf Urban Design Study* proposes the highest density, and Brandywine Crossing, where there is a new commercial development and where Prince George's County has recommended a future mixed-use development in the Sub-region 5 Master Plan.

Potential station locations for the transitway were identified through recommendations from Senate Bill 281 and the input of the project team. Overall nine proposed station locations and two future station locations were identified. The proposed stations are those that would be in operation when the transitway is initially constructed. The future stations are those that could be added at a later date when development is available to support a station. The nine proposed stations include: DeMarr Road, Smallwood Drive, Acton Lane, Timothy Branch, Brandywine Road, Surratts Road, Woodyard Road, Coventry Way, and the Branch Aveue Metrorail station. The two future station locations include: Leonardtown Road and Mattawoman Beantown Road.

In addition to developing potential alignments and identifying station locations, an environmental analysis was conducted as part of the study to identify the potential for impacts that would severely affect the feasibility of developing the project. The impacts identified in this study were calculated to provide an order of magnitude comparison between the alternatives and options, and to identify any absolute “fatal flaws” of an alternative or option. The Preferred Alternative does not have any fatal environmental flaws; impacts that could not be avoided, minimized or mitigated in future study processes. When compared to the other alternatives, the Preferred Alternative has relatively similar impacts to environmental and community resources.

A travel demand analysis was also completed for the Preferred Alternative to obtain order of magnitude ridership numbers for comparison between modes. The travel demand analysis was performed using Round 7.1 of the MWCOG Cooperative Forecasts. Based on the analysis, the potential ridership within the MD 5/US 301 corridor ranged from approximately 23,500 riders to 26,500 riders. However, the results of the travel demand analysis show that the large majority of travel within the corridor is commuter-based, not bi-directional travel which best supports a high quality transit system that would operate all-day. To improve the expected ridership for the transit system, appropriate land use planning should be used to create transit focused destinations along the corridor.

Order of magnitude capital cost estimates were developed for the Preferred Alternative for a LRT and BRT system. Based on the estimates, a LRT system is expected to cost approximately $1.4 billion dollars (2009) and a BRT system is expected to cost approximately $1.0 billion dollars (2009). These capital cost estimates provide a planning level estimate useful for long-range project planning and as a result there is level of uncertainty that needs to be assumed. Therefore, the capital cost estimates provided in this report would need to be refined and inflated to future year dollars as the scope and engineering design is refined for the transitway.

A successful transit corridor requires proactive planning on the part of the local jurisdiction to plan and execute transit supportive land uses and a transportation vision for the corridor which is integrated into the county’s Master Plan and other appropriate land use policy documents. Acting now to preserve a transit right-of-way in the study area is the first step towards reaching the goal of a future transit system along the MD 5/US 301 corridor. Waiting to preserve a transit right-of-way could allow the inevitable continued growth in the region to occur, risking the loss of available land, and the loss of continued right-of-way for transit. Additionally, preserving right-of-way will help enable the counties to coordinate land use with the transit system so they complement each other. To assist the counties in preserving right-of-way for the Preferred Alternative, a transitway width of 70 feet has been identified. The 70-foot transitway width includes the proposed transit alignment, drainage ditches, sidewalks, and minimal grading. It does not include the right-of-way required for stations locations, storm water management ponds, parking lots, or operation and maintenance facilities.

The Preferred Alternative has been identified as an alignment Charles and Prince George’s county should protect through their Master Plans. Preservation will enable the counties to plan for transit by implementing policies supportive of densely developed, walkable, mixed-use centers that would attract and create transit trips, thus improving

the cost-effectiveness of providing service on the alignment. Nevertheless, future project planning and development processes, such as the Federal Transit Administration's (FTA) New Starts program and the National Environmental Policy Act (NEPA), will require revisiting potential alignments and modes.

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List of Technical Reports (separately bound)

Environmental Inventory
Conceptual Plan and Profile Drawings
Land Use Analysis & Guidance Report

1 Introduction

The Southern Maryland Transit Corridor Preservation Study is a result of the collaborative effort between the Maryland Transit Administration (MTA), Charles County, Prince George's County, and other members of the project team who all share a vision for improved transit in the corridor. The products of this initiative identify a corridor for future development into a high capacity transitway along the MD 5/ US 301 Corridor from White Plains in Charles County, Maryland to the Branch Avenue Metrorail station in Prince George's County.

1.1 Background and Corridor Definition

The MD 5/US 301 corridor is a major north/south transportation corridor in Maryland for commuting, recreational, and regional travel. It links Virginia and Southern Maryland to points north. Because of the continued growth in population and development over the last two decades, which is expected to continue, traffic congestion and safety issues have increased substantially and will only become worse if no improvements are made to the existing transportation system and the surrounding land use patterns.

Published in 2004, the *MD 5/US 301 Transit Service Staging Plan* (TSSP) was prepared to guide the expansion of transit service along the MD 5/US 301 corridor to the year 2025 in Charles and Prince George's counties. The study focused on major corridor level transit service, leaving specific route planning to be accomplished in the future by agencies that operate and fund transit. The TSSP identified four alternatives for public transit including enhanced commuter bus, two levels of bus rapid transit (BRT) (moderate and high level), and light rail transit (LRT).

Maryland Senate Bill 281 from the 2006 legislative session set forth a requirement for a study of light rail transit from White Plains to Branch Avenue as part of a comprehensive study of transportation needs in Southern Maryland. As a continuation of the TSSP and in support of Maryland Senate Bill 281 from the 2006 legislative session, the Southern Maryland Transit Corridor Preservation Study was initiated to define a specific alignment for future implementation of high capacity transit in the MD 5/US 301 corridor.

The study area of the Southern Maryland Transit Corridor Preservation Study lies within Charles County and Prince George's County and is shown in its regional context in **Figure 1-1** and in more detail in **Figure 1-2**. The study area has been defined as one mile on either side of the MD 5/US 301 corridor. The study area encompasses all major activity centers in the corridor including: Saint Charles Towne Center, Waldorf, Brandywine Crossing, Southern Maryland Hospital Center, Woodyard Crossing, Andrews Air Force Base (AFB), and the Branch Avenue Metrorail station. Additionally, both Charles and Prince George's counties have proposed developments within the corridor, that if developed could significantly contribute to transit usage in the study area.

1.2 Purpose and Need of Corridor Preservation Study

The purpose of the Southern Maryland Transit Corridor Preservation Study is to: determine the feasibility of a high capacity transit system on the MD 5/US 301 corridor; identify a specific alignment for future development into a transitway between White Plains and the Branch Avenue Metrorail station; determine the locations of potential transit stations, parking and other facilities; and provide Charles and Prince George's counties with a specific transit alignment to protect in their local land use plans.

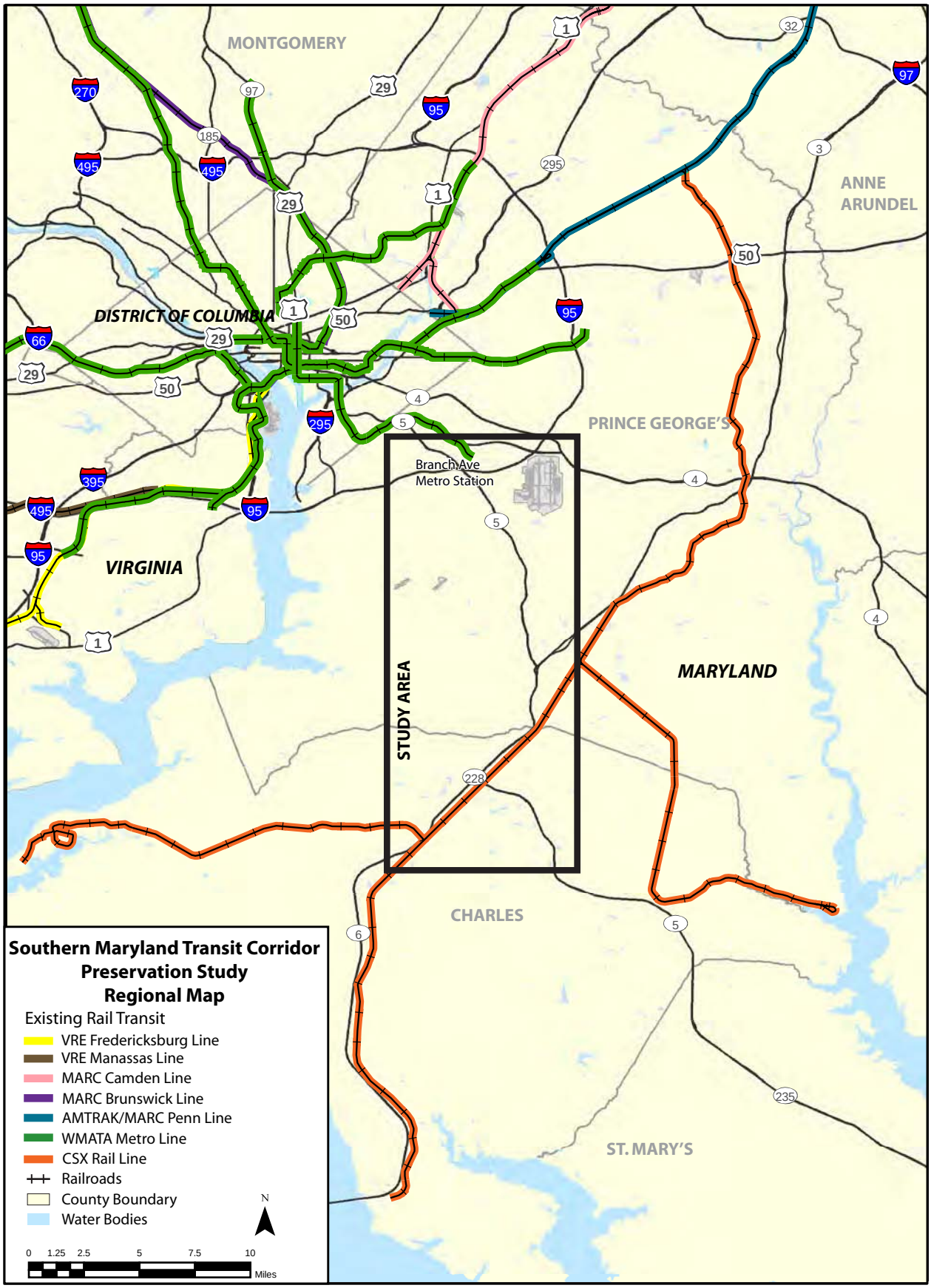
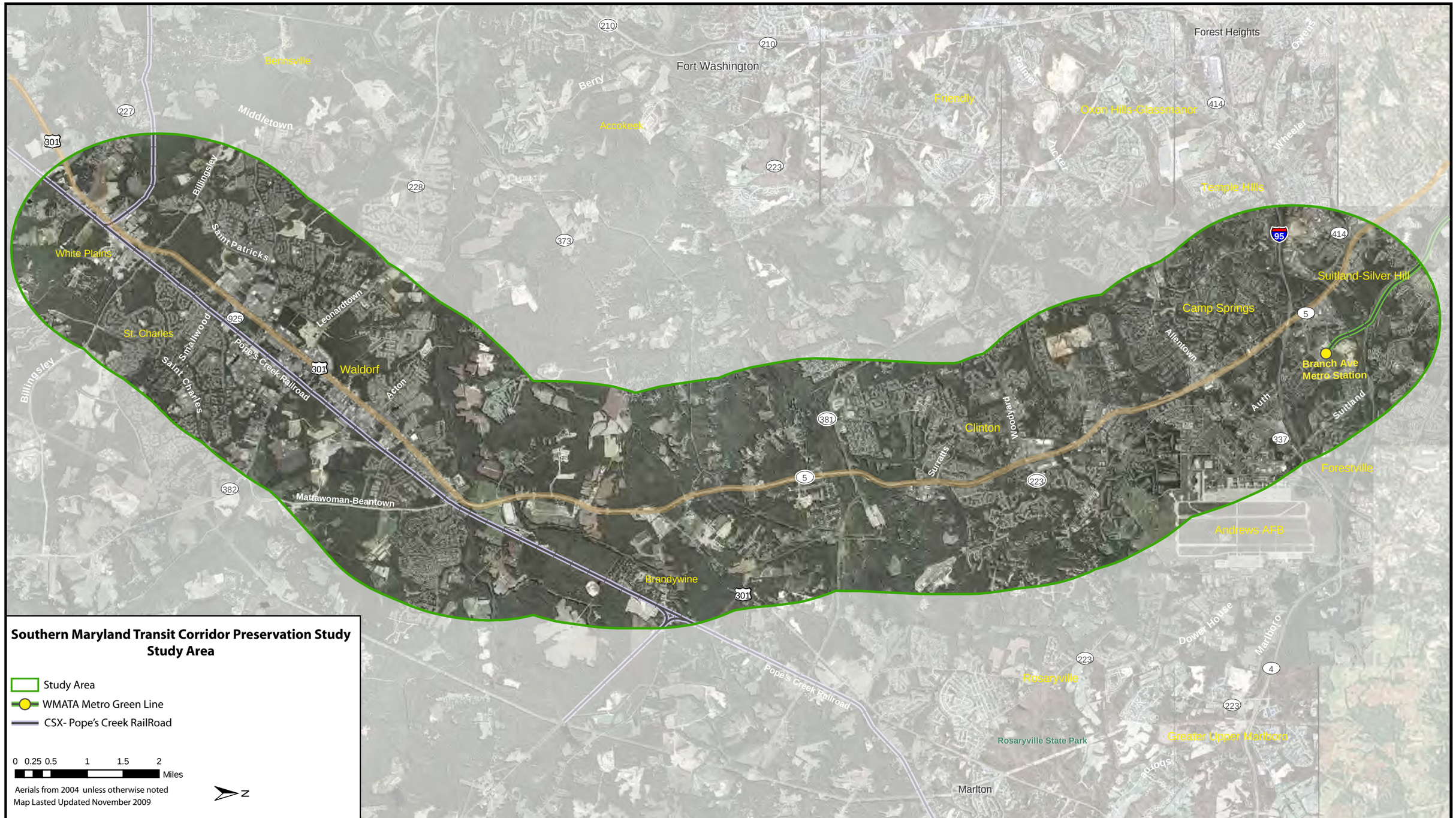

MONTGOMERY
ANNE ARUNDEL
DISTRICT OF COLUMBIA
PRINCE GEORGE'S
Branch Ave Metro Station
VIRGINIA
STUDY AREA
MARYLAND
CHARLES
ST. MARY'S
Southern Maryland Transit Corridor Preservation Study Regional Map
Existing Rail Transit
VRE Fredericksburg Line
VRE Manassas Line
MARC Camden Line
MARC Brunswick Line
AMTRAK/MARC Penn Line
WMATA Metro Line
CSX Rail Line
Railroads
County Boundary
Water Bodies
N
0 1.25 2.5 5 7.5 10
Miles

Figure 1-2:
Southern Maryland Transit Corridor Preservation Study Area



The development of a transit system should provide access to many of Charles and Prince George's counties' existing developments and it should support planned development throughout the study area. The transit system could be further enhanced through coordination of the area's existing bus services, operated by the MTA, Washington Metropolitan Area Transit Authority (WMATA), Prince George's County's The Bus, and Charles County's VanGo.

Acting now to preserve a transit right-of-way in the study area is the first step towards reaching the goal of a future transit system along the MD 5/US 301 corridor. Waiting to preserve a transit right-of-way could allow the inevitable continued growth in the region to occur, risking the loss of available land, and the loss of continued right-of-way for transit. Additionally, preserving right-of-way will help enable the counties to coordinate land use with the transit system so they complement each other.

The existing land use along the MD 5/US 301 corridor varies widely from large lot undeveloped parcels of land to highly developed regional shopping centers and big box retailers; from potentially historical dwellings to modern office buildings. Population estimates from the U.S. Census (2000) indicate that both Charles County and Prince George's County will continue to increase in population through 2030. Charles County is expected to gain an additional 81,200 persons (201,800 estimated population) and Prince George's County is expected to increase by 175,300 persons (976,800 estimated population). These increases will create more congestion on an already strained roadway network.

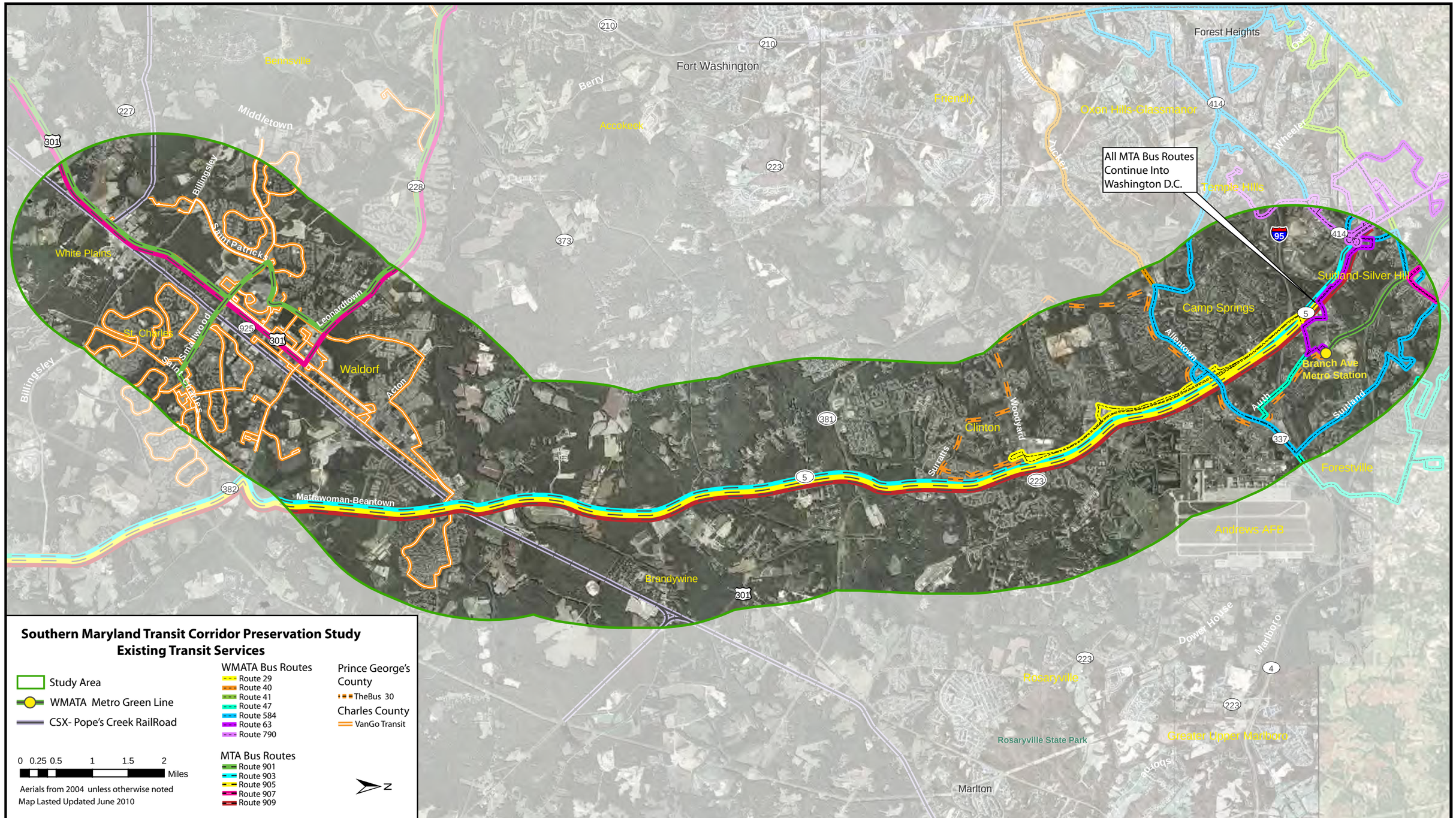
The existing transit network within the MD 5/US 301 corridor includes commuter buses on five routes (901, 903, 905, 907, 909) operated by MTA, Metrobus on two routes (C11 and C13) operated by WMATA, The Bus operated by Prince George's County, and VanGO operated by Charles County. The existing transit network, including bus routes, is shown in **Figure 1-3**. The MTA commuter bus system primarily transports its riders in 73 AM and 73 PM peak hour trips, plus two mid-day trips, between Charles County and Washington DC. The MTA system does not provide service in Prince George's County although the buses travel the MD 5/US 301 corridor to Washington DC. Observed boardings for the MTA routes is close to 6,000 persons daily and the demand for the commuter bus service is likely greater than the existing capacity as the existing routes are currently at or near capacity. In order to meet the future demand for transit service in the study area, the existing transit service requires an increase in transit capacity.

Bus service in Prince George's County is provided by WMATA's Metrobus. Routes C11 and C13 provide weekday service to and from the Branch Avenue Metro Station during the AM and PM peak periods.

Paratransit services are provided in Charles County by VanGO and in Prince George's County by The Bus. Loop routes are run providing service in LaPlata, St. Charles and Pinefield. The Bus provides local bus service in Prince George's County to WMATA Metrorail stations with three routes operating in the study area (30, 32, 33).

There are also numerous park and ride lots located strategically along the corridor. In 2004, the *MD 5/US 301 Transit Service Staging Plan* indicated that eight of the 10 park and ride lots in the study area were heavily utilized (over 80 percent) with three lots at 100%.

Figure 1-3:
Existing Transit Services in the Study Area



1.3 Report Organization

This report is organized to detail the elements of the overall study. The study process provides a summary of the development of the project, generally covering the development and evaluation of the alternatives and the coordination among the Interagency Project Management Team (IPMT). Following the study process, the report provides further detail on the assumptions, alignment alternatives, and transit operations. The environmental analysis was completed next and this section provides a summary of the impacts for each alignment alternative, as well as a description of the resources within the study area. Upon completion of the environmental analysis, the Preferred Alternative was selected and the remainder of the report provides specific information and studies that were completed for the Preferred Alternative including: more detailed engineering; a traffic impact analysis; the development of a conceptual maintenance and storage facility; and the preliminary placement of storm water management facilities. In addition to the engineering evaluation, a travel demand forecasting model was created to determine the expected ridership for the base year, the 2030 No-Build scenario, the 2030 Enhanced Commuter Bus scenario, the 2030 BRT scenario and a 2030 LRT scenario. Capital cost estimates were also developed for both the BRT and LRT scenarios. The report closes with a section on the findings of the report and the recommended next steps that should be pursued by the counties to successfully execute the vision of the Southern Maryland Transit Corridor Preservation Study.

2 Study Process

2.1 Alternatives Development and Evaluation

This report details the development, evaluation, and preliminary selection of a Preferred Alternative for a high capacity transit system from White Plains to the Branch Avenue Metrorail station. The approach to alternatives development and evaluation and selection of the Preferred Alternative used in this study consisted of eight steps:

1. **Review previous plans, studies, and codes** – Both Charles and Prince George's counties have developed planning documents that establish a vision and goals to assess the needs for and guide future development, transportation and infrastructure. These documents were reviewed to help determine the existence of current and future transit-supportive land uses and zoning within each county.
2. **Identify study area planning initiatives** – Throughout the study area there are several land use and transportation planning initiatives underway. Members of the IPMT as well as other appropriate staff and consultants were consulted to provide technical information and input on the status of these initiatives and how they could be best coordinated with the design of the transitway.
3. **Compile and map appropriate data** – Data such as topographic features, the existing transit network, environmental constraints, and planned initiatives was collected and displayed on mapping to assist in the development of potential alignments. This data was used to determine areas where it was important to provide connections, as well as to determine areas where there would be design constraints or environmental resources that should be avoided.
4. **Develop potential alignments** – Potential alignments were initially developed by the MTA after completing steps 1 through 3 above. The MTA then presented the potential alignments to the IPMT and made adjustments and added options based on input from the IPMT. Additional coordination occurred between the MTA, Prince George's County, Andrews AFB, and WMATA to determine potential alignments between Woodyard Road (MD 223) and the Branch Avenue Metrorail station.
5. **Determine station locations** – Station locations were selected based on the location of existing and proposed developments, input from the IPMT, and transit operation design criteria.
6. **Review alignments for any "fatal flaws"** – The proposed alignments were analyzed at a conceptual level to examine the feasibility of the alignment and to identify any "fatal flaws" that would prevent the alignment from further consideration. The following factors were considered in this analysis:
   - Support of local land use plans and economic development goals
   - Environmental constraints
   - Transit performance
   - Engineering feasibility
7. **Identify a Preferred Alternative** – The MTA consulted Charles County, Prince George's County, and Andrews AFB to determine each agency's preferred alignment. In addition to the agency input, transit performance and environmental impacts were also reviewed. The Preferred Alternative was selected because it supports the counties' existing and future land uses, it does

not have any fatal environmental flaws, it supports the local economic development goals of each county. Although there are anticipated environmental impacts, they are not considered fatal and can be avoided or mitigated during future stages of project planning, development and design.

8. **Conduct a detailed analysis of the Preferred Alternative** – After the Preferred Alternative was selected, additional design and analysis was completed to better define the future transit system. This analysis consisted of:
    - Refined alignment
    - Traffic impact analysis
    - Storm water management
    - Maintenance and storage facility locations
    - Travel demand forecasting
    - Capital cost

2.2 Interagency Project Management Team

The development of alternatives and the overall study process was guided by an Interagency Project Management Team (IPMT) comprised of the following agencies:

- Maryland Transit Administration (MTA)
- Charles County Department of Planning and Growth Management
- Maryland-National Capital Park and Planning Commission (M-NCPPC)
- Prince George's County Department of Public Works and Transportation (DPW&T)
- Tri-County Council for Southern Maryland (TCC)
- Maryland State Highway Administration (SHA)
- Maryland Department of Transportation (MDOT)
- Maryland Department of Planning (MDP)

These agencies met regularly through the course of the project to receive briefings on progress and to provide comment and direction. Five IPMT meetings were held in total. Additionally, smaller meetings were held throughout the course of the study to gain additional input on specific areas within the corridor such as: the Waldorf Urban Design Study, the Sub Region V Master Plan, the Prince George's County Master Plan of Transportation, US 301 and MD 5 projects, the Joint Land Use Study with Andrews AFB, and the Branch Avenue Metrorail Station Area Plan. For these meetings only the agencies pertinent to the specific area attended. These meetings were held with the Charles County Department of Planning and Growth Management, the M-NCPPC and Prince George's County DPW&T, SHA, Andrews AFB, and WMATA.

No public involvement was conducted for this study but it will be a critical part of the next phases of the project planning and development process. Public input will be important for verifying: the purpose and need for the project; the transitway alignment; the transit mode; transit operations; design; and other factors. Public involvement is also an important part of County master planning initiatives. Any master plans or other planning documents in which the transitway is shown will need to be developed in consultation with affected stakeholders.

3 Alternatives

3.1 Physical Assumptions

In order to meet the purpose and need of this study, several assumptions were made. The first major assumption was that the transit system could be developed as either LRT or BRT; however, the design analysis uses the more conservative LRT-based transit design criteria. Other assumptions that were made are that the transit system would be double-tracked or double-laned with both tracks or lanes together at all times and that the travel speeds of the transit vehicles would match the posted speeds of the adjacent roadway corridor.

For the alternatives that run adjacent to the Pope's Creek Railroad, which is owned and operated by CSX, it was assumed that the travel speeds of the transit vehicles would be 55 miles per hour. It was also assumed that a crashwall would be located 25 feet from the centerline of the Pope's Creek Railroad. The transitway would be located on the other side of the crashwall. This assumption was made as based on input the MTA has received on other transit projects that would be constructed adjacent to CSX railroads.

Operating assumptions, such as headways, are discussed in Section 6: Travel Demand Forecasting.

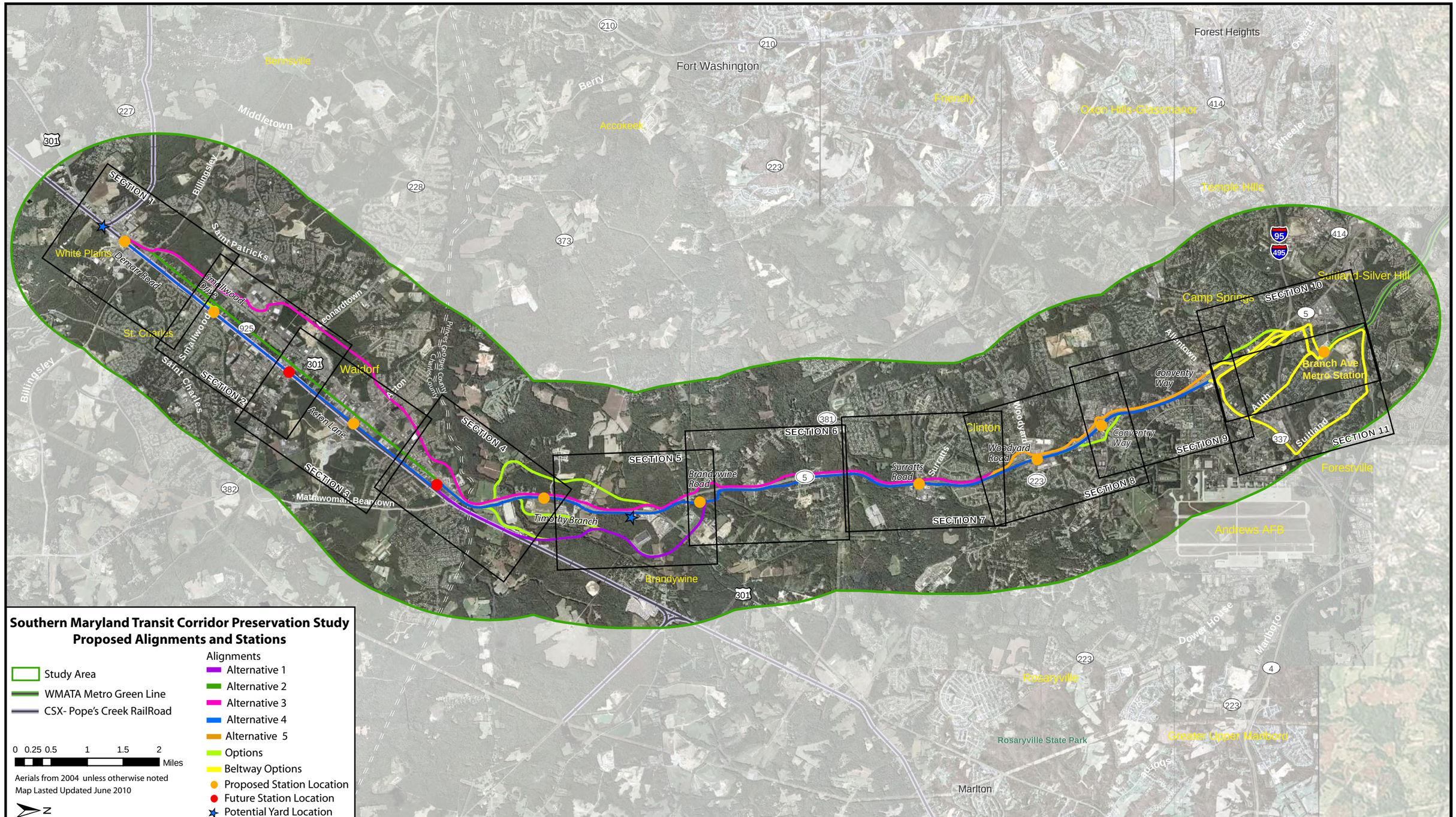
3.2 Alignment Alternatives

The alternative alignments studied were identified early in the planning study in consultation with the IPMT. Three alternatives, nine alignment options for the alternatives, and six beltway options were identified in consideration of the existing transportation corridor and transportation infrastructure, existing development patterns and density, potential impacts to properties and resources, the counties' proposed development plans and economic development priorities and policies, and designs and plans for road improvements along the MD 5/US 301 corridor.

Additionally, during the development of the alternatives and options, potential station locations were identified. For each of the alternatives and options the potential station locations are similar, and therefore, were not a discriminating factor in the development or selection of the alternatives. Specific information regarding station locations is presented in more detail in Section 5.2.

Figure 3-1 presents an overview of the alternatives, options and beltway options that were developed and **Figure 3-2 (sheets 1-11)** provides greater detail of the alignments. The following discussion addresses each alignment in detail.

Figure 3-1:
Alignments Considered in the Study Area



For pages 3-3 through 3-13 refer to separate PDF files
(Figure 3-2 Alignment Alternatives - Section 1 through Section 11)

Alternatives

Five alternatives were developed to provide transit operations from White Plains to the Branch Avenue Metrorail station. Each alternative was developed to connect existing and planned development and activity centers, while avoiding sensitive socioeconomic and environmental resources.

Alternative 1: The southern terminus of Alternative 1 begins in Charles County and runs adjacent to the west side of Pope's Creek Railroad right-of-way from DeMarr Road over Mattawoman Creek, entering into Prince George's County. Within Charles County all road crossings (Billingsley Road, Leonardtown Road, Acton Lane, and Sub Station Road) would be at-grade, with the exception of Smallwood Drive. At Smallwood Drive the transitway would go under Smallwood Drive, adjacent to the Pope's Creek Railroad, and would require the existing bridge over the Pope's Creek Railroad to be lengthened to accommodate the transitway underneath. The transitway crosses Mattawoman Creek adjacent to the existing Pope's Creek Railroad bridge. In Prince George's County, Alternative 1 merges off the Pope's Creek Railroad and follows Prince George's County's proposed Spine Road over Timothy Branch. Alternative 1 follows the proposed Spine Road past the Gwynn Park Middle School, and then continues along the east side of MD 5 from south of Moore's Road to Allentown Road (MD 337). Alternative 1 follows the on- and off-ramps of the proposed interchanges along MD 5 (Burch Hill Road and Surratts Road), as well as the existing Coventry Way interchange, crossing the lower volume road at-grade before returning to the east side of MD 5. Alternative 1 is in an aerial structure for the crossing of both Woodyard Road (MD 223) and Malcolm Road. Alternative 1 then crosses Old Alexandria Ferry Road at-grade and runs adjacent to the off-ramp for Allentown Road (MD 337) before connecting with Beltway Options 2 through 6, which connect to the Branch Avenue Metrorail station.

In Charles County, Alternative 1 runs behind several large industrial properties and is offset from most of the existing development along US 301. However, this alternative would provide access to the MTA's proposed park and ride facility at Smallwood Drive, as well as provide access to the two activity centers being developed in the *Waldorf Urban Design Study*. In northern Charles County, Alternative 1 would provide access to an area zoned for transit-oriented development by Charles County at the county border. Additionally, in Charles County transit vehicles would be able to travel at a maximum speed of 55 miles per hour (mph) adjacent to the Pope's Creek Railroad. In Prince George's County, Alternative 1 runs adjacent to or through mostly undeveloped land until the Southern Maryland Hospital Center near Surratts Road. Portions of the undeveloped land have proposed developments such as Brandywine Crossing, the Villages at Timothy Branch and a proposed park and ride at the Brandywine interchange. Between Surratts Road and Woodyard Road (MD 223), Alternative 1 runs along the back side of residential neighborhoods that back to MD 5. From Woodyard Road (MD 223) to Old Alexandria Ferry Road, there is mostly commercial development adjacent to MD 5. From Old Alexandria Ferry Road to Allentown Road, Alternative 1 runs adjacent to Andrews AFB property. In Prince George's County, transit vehicles would be able to travel at a maximum speed of 35 mph adjacent to the County's proposed Spine Road, and where the transitway runs adjacent to MD 5 the maximum speed would be 55 mph.

Alternative 2: Initiating in Charles County, Alternative 2 is located in the median of Old Washington Road (MD 925) from DeMarr Road to Sub Station Road. It then merges over to the east side of US 301 and continues over Mattawoman Creek entering into Prince George's County. In Charles County, all road crossings (Billingsley Road, Smallwood Drive, Leonardtown Road, Acton Lane, Sub Station Road, Nike Drive, and Mattawoman Beantown Road) would be at-grade. Alternative 2 crosses Mattawoman Creek adjacent to the east side of US 301. The crossing would either be a separate structure or a widened US 301 bridge. In Prince George's County, Alternative 2 follows the east side of MD 5/US 301. At the proposed interchanges (McKendree Road, Accokeek (MD 373), Burch Hill Road, and Surratts Road), as well as the existing Coventry Way interchange, Alternative 2 follows the on- and off-ramps, crossing the lower volume road at-grade before returning to the east side of MD 5/US 301. The exception to this is the Brandywine interchange where Alternative 2 pulls away from the east side of MD 5 to allow room for a proposed park and ride facility at the interchange. Alternative 2 is in an aerial structure for the crossing of both Woodyard Road (MD 223) and Malcolm Road. Alternative 2 then crosses Old Alexandria Ferry Road at-grade and runs adjacent to the off-ramp for Allentown Road (MD 337) before connecting with Beltway Options 2 through 6, which connect to the Branch Avenue Metrorail station.

In Charles County, Alternative 2 runs through a residential neighborhood from Billingsley Road to just south of Leonardtown Road. North of Leonardtown Road the area is mostly commercial with some light industrial use. Alternative 2 would provide access to the MTA's proposed park and ride facility at Smallwood Drive, as well as access to the activity centers in the *Waldorf Urban Design Study* and an area zoned for transit-oriented development by Charles County at the county border. In Charles County the maximum speed of the transit vehicle would be 35 mph as the transitway is located in the median of Old Washington Road (MD 925). In Prince George's County, Alternative 2 would provide direct access to Brandywine Crossing and future mixed use development proposed in the Sub-region V Master Plan. This alternative would also provide access to the proposed park and ride facility at the Brandywine interchange. North of Brandywine, Alternative 2 is located in undeveloped land until the Southern Maryland Hospital Center near Surratts Road. Between Surratts Road and Woodyard Road (MD 223), Alternative 2 runs along the back side of residential neighborhoods that back to MD 5. From Woodyard Road (MD 223) to Old Alexandria Ferry Road, there is mostly commercial development adjacent to MD 5. From Old Alexandria Ferry Road to Allentown Road, Alternative 2 runs adjacent to Andrews AFB property. In Prince George's County, transit vehicles would be able to travel at a maximum speed of 55 mph adjacent to MD 5.

Alternative 3: Initiating in Charles County, Alternative 3 begins at DeMarr Road, follows the east side of US 301, crosses US 301 at Billingsley Road at-grade, and then follows the west side of US 301, crossing Smallwood Drive at-grade and entering into the St. Charles Towne Center. Alternative 3 exits the St. Charles Towne Center and follows the west side of the existing and proposed Western Parkway until it connects back to the west side of US 301 just prior to entering Prince George's County. All road crossings along Western Parkway (St. Patrick's Drive, Berry Road, Acton Lane, etc.) are at-grade. Alternative 3 crosses Mattawoman Creek adjacent to the west side of US 301. The crossing would either be a separate structure or a widened US 301 bridge. Alternative 3 then follows the west side of MD 5/US 301. At the proposed interchanges (McKendree Road, Accokeek Road (MD 373), Burch Hill Road, and Surratts Road), as well as the existing Coventry Way interchange, Alternative 3 follows the on- and off-ramps, crossing

the lower volume road at-grade before returning to the west side of MD 5/US 301. The exception to this is the Brandywine interchange where Alternative 3 pulls away from the west side of MD 5 to allow room for a proposed park and ride facility at the interchange. Just south of Woodyard Road (MD 223) Alternative 3 follows the perimeter of the existing park and ride lot and then crosses Woodyard Road (MD 223) at-grade. Prior to the MD 5 southbound on-ramp from Allentown Road (MD 337), Alternative 3 pulls off of MD 5 to run adjacent to the east side of Old Branch Avenue ending near Allentown Road (MD 337). At Allentown Road (MD 337), Alternative 3 connects with Beltway Option 1, which connects to the Branch Avenue Metrorail station.

In Charles County, Alternative 3 runs through undeveloped land prior to entering St. Charles Towne Center. Alternative 3 provides access to the existing park and ride lot at Smallwood Drive, as well as the shopping mall and commercial development at St. Charles Towne Center. Along Western Parkway, Alternative 3 runs through residential neighborhoods and undeveloped land. In northern Charles County, Alternative 3 would provide access to an area zoned for transit-oriented development by Charles County at the county border. In Charles County the transit vehicles would be able to travel at a maximum speed of 45 mph adjacent to US 301, however, in the Saint Charles Towne Center the speeds would drop as low as 10 mph, and along Western Parkway the maximum speed would be 35 mph. In Prince George's County, Alternative 3 runs through undeveloped land on the west side of US 301, however, this alternative could provide access to Brandywine Crossing or the future mixed used development proposed in the Sub-region V Master Plan, but it would require riders to cross US 301 at some point. This alternative would also provide access to the proposed park and ride facility at the Brandywine interchange. North of the Brandywine interchange, Alternative 3 runs through undeveloped land until Surratts Road. Between Surratts Road and Woodyard Road (MD 223), Alternative 3 runs along the back side of residential neighborhoods that back to MD 5. Alternative 3 would provide direct access to the existing park and ride facility at Woodyard Road (MD 223). From Woodyard Road (MD 223) to Kirby Road, there is mostly commercial development adjacent to MD 5. Just north of Kirby Road there is a small area of residential properties before reverting to commercial development near Allentown Road. In Prince George's County, transit vehicles would be able to travel at a maximum speed of 55 mph adjacent to MD 5.

Alternative 4: The southern terminus of Alternative 4 begins in Charles County and runs adjacent to the west side of Pope's Creek Railroad right-of-way from DeMarr Road over Mattawoman Creek, entering into Prince George's County. Within Charles County all road crossings (Billingsley Road, Leonardtown Road, Acton Lane, and Sub Station Road) would be at-grade, with the exception of Smallwood Drive. At Smallwood Drive the transitway would go under Smallwood Drive, adjacent to the Pope's Creek Railroad, and would require the existing bridge over the Pope's Creek Railroad to be lengthened to accommodate the transitway underneath. At Sub Station Road, Alternative 4 crosses to the east side of US 301 (Option 7), over Mattawoman Creek continuing into Prince George's County. The Mattawoman Creek crossing would either be a separate structure or a widened US 301 bridge. In Prince George's County, Alternative 4 follows the east side of MD 5/US 301. At the proposed interchanges (McKendree Road, Accokeek Road (MD 373), Burch Hill Road, and Surratts Road), as well as the existing Coventry Way interchange, Alternative 4 follows the on- and off-ramps, crossing the lower volume road at-grade before returning to the east side of MD 5/US 301. The exception to this is the Brandywine interchange where Alternative 4 pulls away from the east side of MD 5 to allow room for a proposed park and ride facility at the interchange. Alternative 4 is in an

aerial structure for the crossing of both Woodyard Road (MD 223) and Malcolm Road. Alternative 4 then crosses Old Alexandria Ferry Road at-grade and runs adjacent to the off-ramp for Allentown Road (MD 337) before connecting with Beltway Options 2 through 6, which connect to the Branch Avenue Metrorail station.

In Charles County, Alternative 4 runs behind several large industrial properties and is offset from most of the existing development along US 301. However, this alternative would provide access to the MTA's proposed park and ride facility at Smallwood Drive, as well as provide access to the two activity centers being developed in the *Waldorf Urban Design Study*. In northern Charles County, Alternative 4 would provide access to an area zoned for transit-oriented development by Charles County at the county border. Additionally, in Charles County transit vehicles would be able to travel at a maximum speed of 55 mph adjacent to the Pope's Creek Railroad. In Prince George's County, Alternative 4 would provide direct access to Brandywine Crossing and future mixed use development proposed in the Sub-region V Master Plan. This alternative would also provide access to the proposed park and ride facility at the Brandywine interchange. North of Brandywine, Alternative 4 is located in undeveloped land until the Southern Maryland Hospital Center near Surratts Road. Between Surratts Road and Woodyard Road (MD 223), Alternative 4 runs along the back side of residential neighborhoods that back to MD 5. From Woodyard Road (MD 223) to Old Alexandria Ferry Road, there is mostly commercial development adjacent to MD 5. From Old Alexandria Ferry Road to Allentown Road, Alternative 4 runs adjacent to Andrews AFB property. In Prince George's County, transit vehicles would be able to travel at a maximum speed of 55 mph adjacent to MD 5.

<u>Alternative 5:</u> The southern terminus of Alternative 5 begins in Charles County and runs adjacent to the west side of Pope's Creek Railroad right-of-way from DeMarr Road over Mattawoman Creek, entering into Prince George's County. Within Charles County all road crossings (Billingsley Road, Leonardtown Road, Acton Lane, and Sub Station Road) would be at-grade, with the exception of Smallwood Drive. At Smallwood Drive the transitway would go under Smallwood Drive, adjacent to the Pope's Creek Railroad, and would require the existing bridge over the Pope's Creek Railroad to be lengthened to accommodate the transitway underneath. At Sub Station Road, Alternative 5 crosses to the east side of US 301 (Option 7), over Mattawoman Creek continuing into Prince George's County. The Mattawoman Creek crossing would either be a separate structure or a widened US 301 bridge. In Prince George's County, Alternative 5 follows the east side of MD 5/US 301. At the proposed interchanges (McKendree Road, Accokeek Road (MD 373), Burch Hill Road, and Surratts Road), as well as the existing Coventry Way interchange, Alternative 5 follows the on- and off-ramps, crossing the lower volume road at-grade before returning to the east side of MD 5/US 301. The exception to this is the Brandywine interchange where Alternative 5 pulls away from the east side of MD 5 to allow room for a proposed park and ride facility at the interchange. Alternative 5 follows the east side of MD 5 until shortly after Surratts Road where it crosses in an aerial structure to the west side of MD 5 (Option 9). This alternative then follows the perimeter of the existing park and ride lot at Woodyard Road (MD 223) and crosses Woodyard Road (MD 223) at-grade. Prior to the MD 5 southbound on-ramp from Allentown Road (MD 337), Alternative 5 pulls off of MD 5 to run adjacent to the east side of Old Branch Avenue ending near Allentown Road (MD 337). At Allentown Road (MD 337), Alternative 5 connects with Beltway Option 1, which connects to the Branch Avenue Metrorail station.

In Charles County, Alternative 5 runs behind several large industrial properties and is offset from most of the existing development along US 301. However, this alternative would provide access to the MTA's proposed park and ride facility at Smallwood Drive, as well as provide access to the two activity centers being developed in the *Waldorf Urban Design Study*. In northern Charles County, Alternative 5 would provide access to an area zoned for transit-oriented development by Charles County at the county border. Additionally, in Charles County transit vehicles would be able to travel at a maximum speed of 55 mph adjacent to the Pope's Creek Railroad. In Prince George's County, Alternative 5 would provide direct access to Brandywine Crossing and future mixed use development proposed in the Sub-region V Master Plan. This alternative would also provide access to the proposed park and ride facility at the Brandywine interchange. North of Brandywine, Alternative 5 is located in undeveloped land until the Southern Maryland Hospital Center near Surratts Road. Between Surratts Road and Woodyard Road (MD 223), Alternative 5 runs along the back side of residential neighborhoods that back to MD 5. Alternative 5 would provide direct access to the existing park and ride facility at Woodyard Road (MD 223). From Woodyard Road (MD 223) to Kirby Road, there is mostly commercial development adjacent to MD 5. Just north of Kirby Road there is a small area of residential properties before reverting to commercial development near Allentown Road. In Prince George's County, transit vehicles would be able to travel at a maximum speed of 55 mph adjacent to MD 5.

Other Alternatives: Early in the alternatives development process, an alternative was considered that would be located in the median of MD 5. After coordination with SHA this alternative was dropped due to limited available median space, potential conflict with proposed roadway improvements, distance between stations and surrounding development and residential areas, and conflicts associated with moving in and out of the median.

Options

Nine options that connect to an alternative or beltway option were developed after reviewing potential alignments with the counties. These options either provide a transition from one of the alternatives to another, provide an alignment that coordinates with proposed development, or were designed to minimize impacts in certain areas. Out of the nine options initially studied, only Option 7 and Option 9 were retained and incorporated into Alternatives 4 and 5. The remaining options were dropped after further discussions with the Charles and Prince George's counties. Each option is described below:

Option 1: Located in Charles County, Option 1 is a crossover from Alternative 1 to Alternative 2 just south of the intersection of Smallwood Drive and Old Washington Road (MD 925).

Option 2: Located in Prince George's County, Option 2 provides a variation for Alternative 3. Option 2 extends from McKendree Road to the intersection of MD 5 and US 301, running along Prince George's County's proposed Spine Road on the west side of US 301.

Option 3: Located in Prince George's County, Option 3 is a crossover from Alternatives 2, 4 and 5 to Alternative 1. Option 3 begins after the crossing of Timothy Branch, turning off US 301 to run behind the Brandywine Crossing development on Mattapeake Business Drive. Option 3 ties into Alternative 1 after Alternative 1 crosses Timothy Branch.

Option 4: Located in Prince George's County, Option 4 is a crossover from Alternatives 2, 4 and 5 to Alternative 1. Option 4 begins near the intersection of US 301 and Cedarville Road and follows Prince George's County's proposed Spine Road on the east side of US 301. Option 4 ties into Alternative 1 prior to crossing Timothy Branch.

Option 5: Located in Prince George's County, Option 5 provides a variation for Alternatives 1, 2 and 4. Option 5 veers off of MD 5 at Malcolm Road, then follows Old Alexandria Ferry Road, and connects back to the east side of MD 5 after the Old Alexandria Ferry Road on-ramp.

Option 6: Located in Prince George's County, Option 6 provides a variation for Beltway Option 1. Option 6 runs along Old Branch Avenue from the intersection of Old Branch Avenue and Trueman Drive to north of Manchester Drive where it ties into Beltway Option 1.

Option 7: Located in Charles County, Option 7 is a crossover from Alternative 1 to Alternative 2 in the vicinity of Sub Station Road. Option 7 provides a crossing from the west side of Pope's Creek Railroad to the east side of US 301. Option 7 has been incorporated into Alternatives 4 and 5.

Option 8: Located in Charles County, Option 8 crosses over from Old Washington Road (MD 925) to Pope's Creek Railroad at Sub Station Road to connect Alternative 2 with Alternative 1.

Option 9: Located north of Surratts Road in Prince George's County, Option 9 provides an aerial crossing from the east side of MD 5, west of Foxbranch Court, to the west side of MD 5 at Jordan Lane. Option 9 has been incorporated into Alternative 5.

Beltway Options

Six beltway options were developed in Prince George's County to connect the proposed alternatives across the Capital Beltway (I-495/I-95) to the Branch Avenue Metrorail station. Each beltway option is described below:

Beltway Option 1: Beltway Option 1 extends from the west side of MD 5 at Allentown Road (MD 337) (at the northern end of Alternatives 3 and 5), enters into a tunnel just south of Deerpond Lane, tunnels underneath the I-495/MD 5 interchange, and resurfaces just after Mercedes Boulevard. Beltway Option 1 then extends along the south side of Auth Road at-grade into the Branch Avenue Metrorail station.

Beltway Option 1 is adjacent to commercial developments along MD 5 prior to entering the tunnel. After resurfacing, this option runs adjacent to a small residential neighborhood along Auth Road before entering the Branch Avenue Metrorail station.

Beltway Option 2: Beltway Option 2 extends from the east side of MD 5 at Allentown Road (MD 337) (at the northern end of Alternatives 1, 2, and 4), enters into a tunnel just south of Deerpond Lane, tunnels underneath the I-495/MD 5 interchange, and resurfaces just after Mercedes Boulevard. Beltway Option 2 extends along the south side of Auth Road at-grade into the Branch Avenue Metrorail station.

Beltway Option 2 runs through undeveloped land adjacent to MD 5 prior to entering the tunnel. After resurfacing, this option runs adjacent to a small residential neighborhood along Auth Road before entering the Branch Avenue Metrorail station.

Beltway Option 3: Beltway Option 3 extends from the east side of MD 5 at Allentown (MD 337) (at the northern end of Alternatives 1, 2, and 4), enters into an aerial structure just south of Deerpond Lane, goes aerial over Deerpond Lane and then returns to grade, crossing Manchester Drive at-grade before entering into another aerial structure over the I-495/MD 5 interchange. Beltway Option 3 comes back to grade just before Mercedes Boulevard and then extends along the south side of Auth Road at-grade into the Branch Avenue Metrorail station.

Beltway Option 3 is located adjacent to a small residential neighborhood and undeveloped land along MD 5, and runs through commercial development after the overpass of the Capital Beltway (I-495/I-95). This option also runs adjacent to a small residential neighborhood along Auth Road prior to entering the Branch Avenue Metrorail station.

Beltway Option 4: Beltway Option 4 extends from the east side of MD 5 at Allentown Road (MD 337) (at the northern end of Alternatives 1, 2, and 4), turns right onto the south side of Allentown Road (MD 337), turns left onto the east side of Auth Road, crossing Allentown Road (MD 337) at-grade, and continues into the Branch Avenue Metrorail station. This alternative runs at-grade and requires an overpass at the Capital Beltway (I-495/I-95) adjacent to Auth Road.

Beltway Option 4 is located adjacent to Andrews AFB along Allentown Road (MD 337) and runs through a densely settled residential neighborhood along Auth Road.

Beltway Option 5: Beltway Option 5 extends from the east side of MD 5 at Allentown Road (MD 337) (at the northern end of Alternatives 1, 2, and 4), enters into an aerial structure just south of Deerpond Lane, goes aerial over Deerpond Lane and then returns to grade, crossing Manchester Drive at-grade before entering into another aerial structure over the I-495/MD 5 interchange. Beltway Option 5 returns to grade along the proposed Metro Access Road and extends along the proposed Metro Access Road at-grade into the Branch Avenue Metrorail station.

Beltway Option 5 is located adjacent to a small residential neighborhood and undeveloped land along MD 5, and runs through commercial development after the overpass of the Capital Beltway (I-495/I-95).

Beltway Option 6: Beltway Option 6 extends from the east side of MD 5 at Allentown Road (MD 337) (at the northern end of Alternatives 1, 2, and 4), turns right onto the south side of Allentown Road (MD 337), left onto the east side Suitland Road, crossing Allentown Road (MD 337) at-grade. Beltway Option 6 then turns left onto the south side of Suitland Parkway, before turning left again, crossing Hensen Creek and entering into

the Branch Avenue Metrorail station. This alternative runs at-grade and requires widening of the existing underpass of the Capital Beltway (I-495/I-95).

Beltway Option 6 is located adjacent to Andrews AFB along Allentown Road (MD 337), runs through a densely settled residential neighborhood along Suitland Road, and runs through undeveloped land along Suitland Parkway.

3.3 Transit Operations

Planning level transit operations were developed for the five alternatives. In order to develop the operations from DeMarr Road to the Branch Avenue Metrorail station, it was assumed that Alternatives 1, 2 and 4 would connect to Beltway Option 2, and that Alternatives 3 and 5 would connect to Beltway Option 1. **Table 3-1** provides a summary of the transit operations. The transitway was designed to accommodate the more restrictive LRT design criteria. Therefore, because of the difference in the minimum turning radius required for the LRT and BRT vehicles and the corresponding operating speed of each curve the BRT system would have faster travel times and higher operating speeds than a LRT system.

For the purposes of this study, it was assumed that at-grade crossings of state roads would require a signal and that at-grade crossings of county/local roads would either be unsignalized or signalized with preemption. A signalized intersection with preemption uses the sequence or timing of traffic signals to provide priority treatment for transit vehicles.

Table 3-1: Transit Operations

	Alternative 1		Alternative 2		Alternative 3	
Engineering & Operations	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Length of Alignment (miles)	19.4		18.8		19.1	
Length of Alignment by County (miles)	6	13.4	5.8	13	6.2	12.9
LRT One-Way Travel Time (min.)	36		40		43	
BRT One-Way Travel Time (min.)	34		37		38	
LRT Average Operating Speed (mph)	46		40		35	
BRT Average Operating Speed (mph)	50		45		42	
Signalized Intersection Crossing (No.)	1	7	7	6	3	7
Unsignalized Intersection or Signalized Intersection with Preemption* (No.)	7	4	9	4	11	8
Potential Station Locations by County (No.)	3	6	3	6	3	6
Future Station Locations by County (No.)	2	0	2	0	2	0

	Alternative 4		Alternative 5	
Engineering & Operations	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Length of Alignment (miles)	18.8		18.8	
Length of Alignment by County (miles)	5.9	12.9	5.8	13
LRT One-Way Travel Time (min.)	36		39	
BRT One-Way Travel Time (min.)	33		35	
LRT Average Operating Speed (mph)	45		42	
BRT Average Operating Speed (mph)	51		49	
Signalized Intersection Crossing (No.)	3	6	3	7
Unsignalized Intersection or Signalized Intersection with Preemption* (No.)	6	4	6	7
Potential Station Locations by County (No.)	3	6	3	6
Future Station Locations by County (No.)	2	0	2	0

4 Environmental Analysis

The purpose of the environmental analysis conducted as part of the corridor preservation study was to identify the potential for impacts that would severely affect the feasibility of developing the project. Additionally, the impacts identified in this study were calculated to provide an order of magnitude comparison between the alternatives and options, and to identify any absolute "fatal flaws" of an alternative or option.

Information on environmental resources within the study area was derived from existing mapping, GIS data, data provided by Charles and Prince George's counties, and information provided through consultation with regulatory agencies. No field surveys were conducted as part of this effort. More detailed studies and coordination with environmental and regulatory agencies would be required during a National Environmental Policy Act (NEPA) planning study for the selected corridor as the environmental inventory completed for this study does not fulfill NEPA or other regulatory requirements. The NEPA process requires coordination with various environmental agencies to obtain information on cultural, socio-economic and natural resources within the study area, documentation of any impacts upon those resources, and consideration of ways to avoid or minimize impacts as appropriate.

Sections 4.1 through 4.3 provide a brief summary of the natural, socioeconomic, and cultural/historic resources gathered for this study. Additionally, **Table 4-1 through Table 4-3** provides a summary of the environmental impacts for each alternative, option, and beltway option, respectively. The full environmental analysis is located in a separately bound technical report. The environmental impacts were calculated early in the study to determine whether an alignment under consideration would have any "fatal flaws" that would preclude its implementation. As a result of this early analysis and the preliminary level of design conducted for each alignment, a conservative 128-foot limit of disturbance was assumed for each alignment studied. The 128-foot limit of disturbance was determined by using the 58 feet required for a LRT ballasted track section (see Figure 6-1) plus an additional 35 feet on each side of the ballasted track section. The limit of disturbance for each alternative, option and beltway option is depicted on the maps in Appendix B of the separately bound Environmental Analysis technical report.

4.1 Natural Resources

Wetlands and Waters of the United States (WUS)

Existing GIS data was used to assist in the identification of potential wetlands and waterways in the study area. Information reviewed included the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps (NWI), Maryland Department of Natural Resources (MD DNR) wetland mapping, the soil survey reports for Prince George's County (1967) and Charles County (1974), and topographic maps of the study area.

The study area is located within the Piscataway Creek, Potomac River Upper Tidal, and Lower Potomac River watersheds. All streams within the study area are classified as Use I streams (Water Contact Recreation, and Protection of Aquatic Life) and are restricted from instream work from March 1 through June 15, inclusive, during any year.

Table 4-1: Environmental Impacts – Alternatives

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Environmental/Community Impacts										
Socio-Economic	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Properties/Resources Affected										
Residential (No. of structures)	20	15	6	15	22	7	20	15	20	7
Other Business/Commercial (No. of structures)	25	18	38	30	7	47	27	30	27	39
Environmental Justice Areas (No.)	3	1	3	1	1	1	3	1	3	1
Churches (No.)	2	0	2	0	0	1	2	0	2	1
Schools (No.)	0	0	0	1	0	0	0	1	0	1
Cemeteries (No.)	0	0	0	0	0	0	0	0	0	0
Natural Environment	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Stream Crossings										
New Stream Crossing (No.)	0	2	0	0	0	0	0	0	0	0
Existing Stream Crossing (No.)	2	4	2	5	3	5	2	5	2	5
Wetland (Acres)	4.49	3.55	1.11	2.05	6.17	0.92	5.08	2.05	5.08	1.65
FEMA 100-year floodplain (Acres)	1.88	7.74	0.5	8.12	2.85	7.14	0.5	8.1	0.5	7.27
Forest (Acres)	40.99	74.43	8.6	53.77	35.67	58.57	38.45	53.72	38.45	49.82
Potential FIDS habitat (Acres)	9.14	36.08	1.31	8.3	13.53	28.26	7.68	8.29	7.68	8.29
Hazardous Material Sites (No.)	2	3	45	6	4	9	2	6	2	8
Sensitive Species Project Review Areas (No.)	0	0	1	0	1	0	0	0	0	0
County Parks (Acres)	0	0	0	0	0	0	0	0	0	0
State Parks (Acres)	0	0	0.56	0	0	0	0	0	0	0
Cultural Resources	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Historic Sites										
NR Sites or MIHP Recommended Eligible (No.)	0	0	0	2	0	1	0	2	0	2
MIHP Not on File (No.)	1	1	12	1	0	1	1	1	1	1
MIHP Eligibility Not Recommended (No.)	0	0	2	1	0	3	0	1	0	2
MIHP Not Evaluated (No.)	0	0	0	0	0	0	0	0	0	0
MIHP Demolished (No.)	0	0	0	1	0	0	0	1	0	1
Previous Archaeology Survey Areas (No.)	0	6	0	5	0	5	0	5	0	5

Table 4-2: Environmental Impacts – Options

	Option 1		Option 2		Option 3		Option 4		Option 5		Option 6		Option 7		Option 8		Option 9	
Environmental/Community Impacts																		
Socio-Economic	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Properties/Resources Affected																		
Residential (No. of structures)	0	0	0	8	0	0	0	0	0	19	0	10	0	0	0	0	0	3
Other Business/Comm. (No. of structures)	1	0	0	0	0	1	0	4	0	5	0	0	3	0	2	0	0	0
Environmental Justice Areas (No.)	2	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0
Churches (No.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schools (No.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cemeteries (No.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Environment	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Stream Crossings																		
New Stream Crossing (No.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Stream Crossing (No.)	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Wetland (Acres)	0.08	0	0	0.9	0	0.33	0	0	0	0	0	0	0	0	0	0	0	0
FEMA 100-year floodplain (Acres)	0	0	0	1.12	0	0.82	0	0.78	0	0	0	0.14	0	0	0	0	0	0
Forest (Acres)	1.86	0	0	24.83	0	4.4	0	9.73	0	4.29	0	1.24	0	0	0	0	0	1.98
Potential FIDS habitat (Acres)	0	0	0	18.19	0	0.53	0	0	0	0	0	0	0	0	0	0	0	0
Hazardous Material Sites (No.)	0	0	0	0	0	0	0	1	0	7	0	2	0	0	0	0	0	0
Sensitive Species Project Review Areas (No.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
County Parks (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
State Parks (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cultural Resources	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**	**Charles**	**Prince George's**
Historic Sites																		
NR Sites or MIHP Recommended Eligible (No.)	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIHP Not on File (No.)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
MIHP Eligibility Not Recommended (No.)	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
MIHP Not Evaluated (No.)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
MIHP Demolished (No.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Previous Archaeology Survey Areas (No.)	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	

Table 4-3: Environmental Impacts – Beltway Options

	Beltway Option 1	Beltway Option 2	Beltway Option 3	Beltway Option 4	Beltway Option 5	Beltway Option 6
Environmental/Community Impacts						
Socio-Economic						
Properties/Resources Affected						
Residential (No. of structures)	12	10	10	40	7	39
Other Business/Commercial (No. of structures)	4	5	5	7	5	8
Environmental Justice Areas (No.)	1	1	1	1	1	4
Churches (No.)	3	1	1	1	2	2
Schools (No.)	1	0	0	1	0	1
Cemeteries (No.)	0	0	0	1	0	1
Natural Environment						
Stream Crossings						
New Stream Crossing (No.)	0	0	1	0	1	1
Existing Stream Crossing (No.)	1	1	0	0	0	2
Wetland (Acres)	0	0	0	2.04	2.04	2.76
FEMA 100-year floodplain (Acres)	0	0	0	0	0	9.46
Forest (Acres)	14.4	14.97	16.88	2.14	6.66	13.36
Potential FIDS habitat (Acres)	0	0	0	0	0	5.13
Hazardous Material Sites (No.)	2	0	1	3	5	0
Sensitive Species Project Review Areas (No.)	0	0	0	0	0	1
County Parks (Acres)	0	0	0	6.04	0	1.87
State Parks (Acres)	0	0	0	0	0	0
Natural Environment						
Historic Sites						
NR Sites or MIHP Recommended Eligible (No.)	0	0	0	1	0	3
MIHP Not on File (No.)	2	0	0	0	0	0
MIHP Eligibility Not Recommended (No.)	1	0	0	2	0	1
MIHP Not Evaluated (No.)	0	0	0	2	0	0
MIHP Demolished (No.)	0	0	0	0	0	0
Previous Archaeology Survey Areas (No.)	0	0	0	0	0	0

FEMA 100-Year Floodplains
A review of Federal Emergency Management Agency (FEMA) *Flood Insurance Rate Maps* or *Flood Insurance Studies* (2006) was conducted to identify any designated 100-year floodplains within the study area.

There are FEMA 100-year floodplains associated with Piney Branch, Mattawoman Creek, Timothy Branch, Piscataway Creek, Zekiah Swamp Run, an unnamed tributary to Piscataway Creek, Meetinghouse Branch, Tinkers Branch, Burch Creek, Henson Creek, and Port Tobacco Creek occurring within the study area.

Forest Habitat
Forested cover types were identified via existing GIS data (Prince George's Tree Canopy 2005, Charles County Forest 2002). The MD DNR Forest Interior Dwelling Species (FIDS) data was used to identify potential habitat. This data is the result of a model depicting where FIDS habitat might occur based on certain criteria.

Potential forest and FIDS habitat occur within the study area, with most of the forested cover located in Prince George's County. There are also areas of MD DNR designated Green Infrastructure present within the study area. It should be noted that the impacts to the forest habitat are likely to represent an over-estimation because of recent development that has occurred between 2002/2005 and the present, which was not captured in the GIS data used for calculating impacts.

Rare, Threatened, and Endangered Species
The MD DNR, National Marine Fisheries Service (NMFS) and the USFWS were contacted to determine if there are any records of rare, threatened or endangered species in the study area. Because specific occurrences of rare, threatened, and endangered species have been previously documented within the study area, additional coordination with these agencies would need to occur in the NEPA planning process.

Hazardous Waste
A hazardous waste database search was conducted to identify properties within the study area where hazardous materials are generated, stored, or where previous incidents carry the potential for construction related exposures or contaminant releases.

Air and Noise
Detailed air and noise analyses would be required to determine the effects of the proposed alternatives and options.

4.2 Socioeconomic Resources

A review of U.S. Census (2000) data for the study area revealed that the total population of the study area census tracts was 151,549, with 60,686 residing in Charles County, and 90,863 in Prince George's County. The total percentage of minority populations within the Charles County portion of the study area is approximately 31%, while the percentage of minorities within the Prince George's County portion of the study area is 60%. The reported median household income in 1999 for the Charles County portion of the study area was $63,040, while the Prince George's County portion of the study area was $60,245.

Property Impacts
The number of impacted residential and commercial structures was calculated to be any existing physical structure located within the limit of disturbance line for an alternative or option. It does not represent the number or acreage of individual parcels being affected. Structures such as detached garages and sheds were not included in the impacts. Impacts may be able to be reduced or avoided as more detailed engineering is performed and the limit of disturbance is better defined.

Environmental Justice Areas
Potential environmental justice populations were identified as those census tracts within the study area having either of the following:

- Portions of low income populations living below the poverty level greater than one percent over the county average. The county averages for Charles and Prince George's county are 5.56 percent and 7.69 percent, respectively.
- Portions of minority populations greater than 10 percent over the county average. The county averages for Charles and Prince George's county are 29 percent and 72.9 percent, respectively.

Ten census tracts (four in Charles County, and six in Prince George's County) have been identified as potentially containing environmental justice populations. Subsequent stages of project development will require in depth field studies and public involvement to identify the exact locations of properties and facilities of value to environmental justice communities. Additionally, further analysis will be necessary to determine where environmental justice populations are specifically located within the study area, and to determine the potential for impacts to those populations and properties by the proposed project.

Community Facilities
Several community facilities are located within the limits of disturbance for the proposed alternatives and options. These community facilities include schools, places of worship, cemeteries, and State- and County-owned lands.

4.3 Cultural/Historic Resources

Cultural and historic resources identified include previously recorded archeological sites and historic sites listed in the National Register of Historic Places (NRHP) and/or the Maryland Inventory of Historic Places (MIHP). As outlined below, additional studies would be required as the project moves forward. Those resources eligible for listing in the NRHP have certain levels of legal protection and avoidance options would need to be considered.

Archeology
All alternatives and options have the potential to impact areas with previously identified archeological resources. Additionally, each alternative and option would impact areas with the potential for previously undiscovered archeological resources. Because of this potential, additional archeological investigations would be required for the Preferred Alternative.

Historic Sites

Based on a review of NRHP and MIHP data, 42 sites were identified within the study area that would require further evaluation. In addition, a full assessment would be required to identify other structures within the study area that are over 50 years in age, and to determine their eligibility for the NRHP or MIHP.

5 Preferred Alternative

5.1 Selection of Preferred Alternative

The goal of this study is to find an alignment between White Plains and the Branch Avenue Metrorail station for future use as either a BRT or LRT system. Selection of the Preferred Alternative was made by comparing all of the alternatives and options developed with their topographic features, existing and proposed activity centers, trip generators, environmental constraints, planned initiatives, and obvious physical barriers such as major roadway facilities and structures. Additionally, Charles County and Prince George's County both provided critical input regarding their preference for the transitway location.

The MTA met individually with both Charles and Prince George's counties to discuss which alternative each county preferred. Charles County preferred an alignment that was located adjacent to the Pope's Creek Railroad. This alignment location fit with what Charles County is currently planning in the *Waldorf Urban Design Study*. Prince George's County preferred an alignment that was located adjacent to MD 5/US 301 as opposed to following their proposed Spine Road, because it would help to improve the speed and visibility of the transit system and because it was consistent with land uses off of MD 5/US 301. After further discussion with Prince George's County, they determined that an alignment along the east side of MD 5/US 301 would best fit the proposed improvements being recommended in Sub-region V Master Plan. Additionally, north of Woodyard Road (MD 223), only the tunnel options for crossing the Capital Beltway (I-495/I-95) were determined to be feasible pending further design and environmental analysis. The at-grade and aerial options for accessing the Branch Avenue Metrorail station were not selected as a result of potential environmental and community impacts and design constraints.

Andrews AFB was also consulted to determine their preference for a transitway located in the vicinity of the base. Andrews AFB supported the idea of a transitway along the east side of MD 5 and would like to have a station to provide access to the base.

As a result of the discussions with and preferences of the counties and Andrews AFB, the Preferred Alternative was selected to be a combination of Alternative 4, which includes Option 7, and Beltway Option 2. The Preferred Alternative supports the counties' existing and future land uses by providing stations at key locations such as Acton Lane, where the *Waldorf Urban Design Study* proposes the highest density, and Brandywine Crossing, where there is a new commercial development and where Prince George's County has recommended a future mixed-use development in the Sub-region 5 Master Plan.

The Preferred Alternative does not have any fatal environmental flaws; impacts that could not be avoided, minimized or mitigated in future study processes. When compared to the other alternatives and the aerial and tunnel beltway options (the at-grade beltway options had significant impacts to residential neighborhoods and were not considered feasible), the Preferred Alternative has relatively similar impacts to environmental and community resources. The Preferred Alternative has the second least floodplain impacts (8.6 acres) and a similar number of stream crossings (8 crossings) and historic resource impacts. The Preferred Alternative has fairly substantial

impacts to forested areas (107.14 acres), however, the transitway is located mostly on the edge of forested areas and it is expected that this impact will be substantially reduced due to recently completed development not captured in the data, as well as proposed development within the study area. Additionally, the Preferred Alternative has 92 potential property impacts, compared to 78 and 83 potential property impacts for Alternatives 1 and 3, respectively. The Preferred Alternative also has a relatively high amount of wetland impacts (7.13 acres), most of which are in Charles County (5.08 acres). However, as the design of the transitway progresses, it is likely that the impacts will be reduced as the limit of disturbance is further refined.

The Preferred Alternative (Alternative 4 and Beltway Option 2) begins in Charles County at DeMarr Road. It runs adjacent to the Pope's Creek Railroad from DeMarr Road to Sub Station Road. At Sub Station Road, the Preferred Alternative crosses to the east side of US 301, goes over Mattawoman Creek, and continues into Prince George's County. In Prince George's County, the Preferred Alternative follows the east side of MD 5/US 301 until it enters a tunnel underneath the I-495/MD 5 interchange prior to Deerpond Lane. The Preferred Alternative then extends along Auth Road at-grade into the Branch Avenue Metrorail station.

Within the study area there are current planning studies being conducted by SHA for the upgrade of MD 5 and US 301. Both planning studies have developed preliminary designs for proposed interchanges and improvements to the existing roads. The design for the Preferred Alternative has incorporated the roadway improvements under consideration. At most interchanges the Preferred Alternative runs adjacent to the on- and off-ramps and crosses the local road at-grade. The three exceptions are Woodyard Road (MD 223) and Malcolm Road where the transitway would be on an aerial structure over the interchange and the I-495/MD 5 interchange where the transitway would be in a tunnel underneath the interchange.

The Preferred Alternative would provide service to all important trip generators including: Saint Charles Towne Center, Waldorf, Brandywine Crossing, Southern Maryland Hospital Center, Woodyard Crossing, Andrews AFB, and the Branch Avenue Metrorail station. Additionally, the Preferred Alternative would provide service to both Charles and Prince George's counties proposed developments within the corridor.

The Preferred Alternative has been identified as an alignment Charles and Prince George's county should protect through their Master Plans. Preservation will enable the counties to plan for transit by implementing policies supportive of densely developed, walkable, mixed-use centers that would attract and create transit trips, thus improving the cost-effectiveness of providing service on the alignment. Nevertheless, future project planning and development processes, such as the FTA's New Starts program and NEPA, will require revisiting potential alignments and modes.

5.2 Station Locations & Connectivity

The potential station locations for the transitway were identified through recommendations from Senate Bill 281 and the input of the IPMT members. Overall nine proposed station locations and two future station locations were identified. The proposed stations are those that would be in operation when the transitway is initially constructed. The future stations are those that could be added at a later date when development is available to support a station. The nine proposed stations include:

DeMarr Road, Smallwood Drive, Acton Lane, Timothy Branch, Brandywine Road, Surratts Road, Woodyard Road, Coventry Way, and the Branch Aveue Metrorail station. The two future station locations include: Leonardtown Road and Mattawoman Beantown Road. The station locations are shown graphically in **Figure 3-1 and Figure 3-2 (sheets 1-11)** and on the plan and profile drawings located in a separately bound technical report.

The stations are defined as either a commuter station or a walk-up station. A commuter station is a station that is intended for use mainly by commuters. This station would require a large amount of parking (100 or more spaces). A walk-up station is intended for use by people within one-half mile of the station. The large majority of transit users would walk to the station, eliminating the need for parking accommodations as part of the station.

The station locations discussed below are relative to the Preferred Alternative and are approximate locations. In the future when Charles and Prince George's counties begin coordinating transit-supportive development, these station locations may shift along the alignment to best accommodate the plans while minimizing environmental and community impacts. Additionally, as development occurs, existing bicycle and pedestrian facilities and local bus service could change as the design for the transitway is further refined.

DeMarr Road

The DeMarr Road station is the southern terminal station, and therefore, is expected to draw a substantial amount of ridership from areas further south. The station would serve as a commuter station. The location is currently bordered by commercial buildings that have large surface parking lots, however, the Charles County Planning Office has suggested that this area could potentially be the site of a future transit-oriented development (TOD). In addition to a TOD, the DeMarr Road station would also require a park and ride lot to support the ridership demand. In order to accommodate the expected demand from commuters the MTA is recommending a 1,500 space surface parking lot.

Currently sidewalks and bicycle lanes are not present in the vicinity of the DeMarr Road station. Safe crossings of DeMarr Road, Popes Creek Railroad, and US 301 are needed for pedestrians and bicyclists accessing the transit system. Additionally, local bus (VanGo) service or express shuttle service to the southern and eastern St. Charles neighborhoods and across US 301 could help increase ridership at this location.

Smallwood Drive

The Smallwood Drive station would serve as a commuter station using the MTA's proposed 500 space park and ride lot between Pope's Creek Railroad and Old Washington Road (MD 925). The proposed park and ride lot would provide a sufficient amount of demand without the need to redevelop the area surrounding the station. Potential shuttle service from existing park and ride lots and the St. Charles Towne Center to the station could also increase ridership.

Sidewalks and bicycle lanes are not present in the vicinity of the Smallwood Drive station. Smallwood Drive and US 301 is a large intersection and would need to have adequate crosswalks, bicycle lanes, and sidewalks for those that are walking or cycling between the station and the commercial and residential areas.

Leonardtown Road – future station

The Leonardtown Road station is recommended as a future walk-up station location when the development is there to support a station. The existing development in the area is commercial, but not supportive of transit use. However, the Leonardtown Road station is identified in the *Waldorf Urban Design Study*. If the recommendations presented in the *Waldorf Urban Design Study* are fully implemented the recommended development and pedestrian and bicycle networks would make this location a viable transit stop. The Charles County VanGO Business Loop currently runs past the Leonardtown Road station and could be used as a feeder bus system for the station.

Acton Lane

The Acton Lane station is expected to function as both a commuter station and a walk-up station. The existing development surrounding the station is mostly light industrial and big-box retail; however, the area is part of the *Waldorf Urban Design Study*. In the Acton Lane station area, the *Waldorf Urban Design Study* recommends high density, mixed uses that would support the transit system. Chaney Enterprises also has a proposed development on the east side of Pope's Creek Railroad. In addition to walk-up demand created by the proposed development, a 1,500 space parking garage may be needed to accommodate the expected demand from commuters.

The *Waldorf Urban Design Study* includes pedestrian and bicycle access throughout the activity center. The activity center at the Acton Lane station would be the source of many destinations and the connections to this area are very important to Charles County's economy. There is also potential for possible shuttle bus service from the business park and hotels on the west side of US 301 to the Acton Lane station.

Mattawoman Beantown Road - future station

The Mattawoman Beantown Road station is recommended as a future walk-up station location when the development is there to support a station. Several residential neighborhoods, commercial buildings, and automobile service stations are located in the vicinity of the station; however, the existing land uses are not supportive of transit use. Chaney Enterprises has an approved master plan development located on both the east and west side of US 301 in this area. If the approved development is implemented, it would support a station.

Timothy Branch (TB)

The TB Station is the southern most station in Prince George's County and expected to be mostly a walk-up station. However, to support potential drive access from the west side of MD 5/US 301, a 200 space surface parking lot is recommended. The station is located at Brandywine Crossing, a new commercial development. Additionally, the Sub-region V Master Plan has identified a community center on the east side of MD 5/US 301 within walking distance of the TB station. The community center would provide mixed-use buildings and interconnected walking and bicycle paths, which are optimal around transit stations.

Brandywine Road
The Brandywine station is located just north of the TB interchange and is expected to be a commuter station. The SHA is proposing a park and ride lot adjacent to the station as part of the Brandywine Interchange project. The park and ride lot would provide a minimum of 500 spaces, but could potentially include up to 1,500 spaces.

In addition to the park and ride lot, Gwynn Park Middle School and High School, as well as low density residential neighborhoods are within walking distance of Brandywine Station. Although bicycle and pedestrian connections do not currently exist in the area, a shared bicycle path and walking trail would improve access from the transit system to the schools and neighborhoods.

Surratts Road
The Surratts Road station would be a walk-up station as it is primarily an employment destination with the Southern Maryland Hospital being within short walking distance. Most of the adjacent neighborhoods on both the east and west side of MD 5 have sidewalks, but bicycle lanes, a shuttle service, and a safe crossing of MD 5 are additions that could increase ridership from the neighborhoods.

Woodyard Road
The Woodyard Road station would be an aerial station located in the northeast corner of the existing interchange of Woodyard Road and MD 5. The station would function as both a walk-up and commuter station, with a possible pedestrian overpass to the west side of MD 5. The station is within walking distance of the Clinton Shopping Center and Woodyard Crossing, as well as, low to medium density residential development. The 425-space Clinton Fringe Park and Ride lot is located in the southwest corner of the interchange and Prince George's County "The Bus" Route #30 has a stop at the this lot. Additionally, WMATA Metrobus Routes C-11 and C-13 stop at this lot during weekday peak hours. This site could create an intermodal transfer facility between local bus service and the transit system. Sidewalks and safe crossings from the neighborhoods are present, but bicycle access is not.

Coventry Way
The Coventry Way station would be a walk-up station providing access to Andrews AFB. This station location provides a stop within a ½-mile walk to the Virginia Gate. However, the Virginia Gate is not the primary entrance to Andrews AFB and it is likely that Andrews AFB would need to provide shuttle bus service from the gate to destinations within Andrews AFB. Aside from Andrews AFB, the area around the station is mostly commercial development with large parking lots and not supportive of transit use. Sidewalks are present in the vicinity of the station, except along MD 5.

As a result of discussions with Andrews AFB, a station at Allentown Road (MD 337) has also been considered. This station would replace the station at Coventry Way. Future discussions with Andrews AFB are needed to determine the optimal location for Andrews AFB, as a station at Allentown Road (MD 337) is a further distance from an access gate to Andrews AFB, but closer to destinations within Andrews AFB.

Branch Avenue Metrorail

The Branch Avenue Metrorail station is the northern terminal station and, based on the existing land uses, would primarily serve riders transferring to the WMATA Green Line. However, the *Branch Avenue Metro Station Vision Plan* calls for varying intensities of residential, commercial and employment land uses immediately adjacent to the Branch Avenue Metrorail station. If this development is implemented the station could become an employment destination, as well as, support an increase in ridership to developments at the southern end of the study area. The station would share the parking currently provided by WMATA at the Branch Avenue Metrorail station.

6 Engineering Evaluation

6.1 Plan and Profile Drawings

To demonstrate the technical feasibility of the Preferred Alternative and to allow for the preservation of right-of-way, plan and profile drawings were created. Typical cross sections were prepared for a LRT ballasted section, a LRT ballasted section adjacent to the Pope's Creek Railroad, a LRT embedded section, and a BRT section; however, the more conservative LRT sections were used in developing the transitway width. The typical cross sections are shown in **Figure 6-1**, **Figure 6-2, Figure 6-3** and **Figure 6-4** respectively. Ballasted sections consist of crushed stone (ballast) and wood or concrete rail ties. It is used when the transitway is in an exclusive right-of-way. Embedded track sections consist of rails that are flush with the surface of the road, allowing vehicular traffic to share or cross the transitway.

The typical cross sections do not include the grading or retaining walls that would be required to tie the edge of the proposed transitway into the existing ground. However, they include tracks or pavement surface, landscaping buffers, ditches for the ballasted sections, and sidewalks. For the ballasted section adjacent to the Pope's Creek Railroad, it was assumed that a crashwall would be located 25 feet from the centerline of the Pope's Creek Railroad. The transitway would be located on the other side of the crashwall. This assumption was made as a result of CSX requirements the MTA has been made aware of on other projects.

It was assumed that the LRT system would be mostly a ballasted section, except for: at-grade crossings and driveway entrances, the Option 7 transition from running adjacent to the Pope's Creek Railroad to the east side of MD 5, and the segment along Auth Road entering into the Branch Avenue Metrorail station. These segments would use the embedded section. Embedded track is used when vehicular traffic will need to cross over the transitway. It is also used when vehicular traffic shares lanes with the LRT system, however, the use of shared lanes does not apply to this study. The BRT system was assumed to be the same typical throughout.

The horizontal and vertical alignments developed for the Preferred Alternative followed MTA design standards, including maximum grades, minimum tangent lengths, minimum curve radii, definition of transition curves, and allowances for special trackwork and stations.

After completing the design of the horizontal and vertical alignment, right-of-way limits were calculated and displayed on the plan sheets. The project definition for right-of-way was a transitway width of 70 feet, which provides room the transit system elements, as well as room for grading, retaining walls, etc. to tie the transitway into the existing ground. Where applicable, the location of the 70-foot transitway is immediately adjacent to and west of the existing CSX right-of-way, and the existing or proposed edge of road. In areas where this does not apply, the transitway is centered on the alignment's centerline. The 70-foot transitway width includes the proposed transit alignment, drainage ditches, sidewalks, and minimal grading. It does not include the right-of-way required for stations locations, storm water management ponds, parking lots, or operation and maintenance facilities. However, the recommended locations for these items are designated on the plans.

The drawings were developed using MTA design standards. Due to the conceptual nature of the design, the drawings were prepared at a scale of 1" = 200' on half-size sheets (11" x 17") and are included in a separately bound technical report.

Figure 6-1: LRT Ballasted Track Section

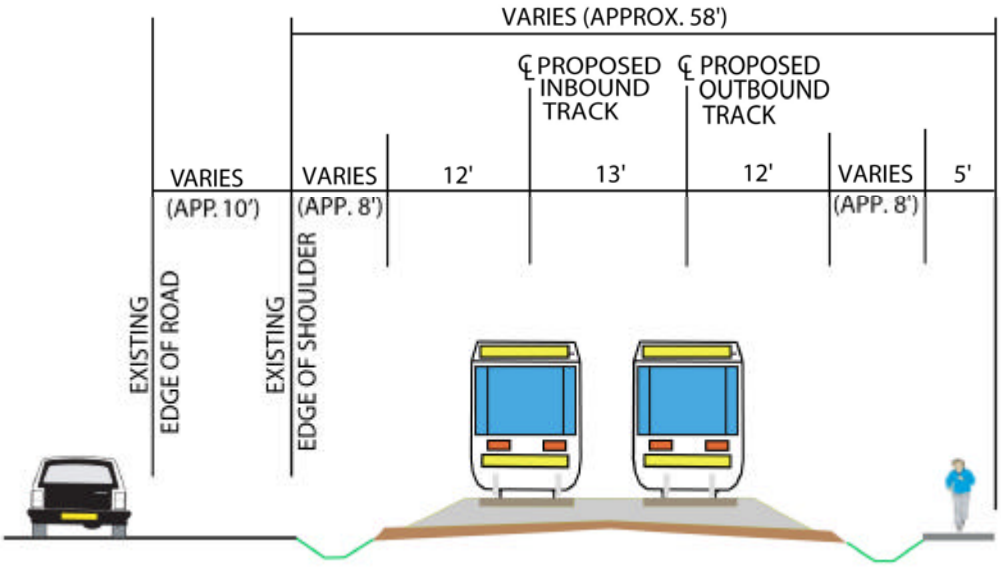


Figure 6-2: LRT Ballasted Track Section Adjacent to Pope's Creek Railroad

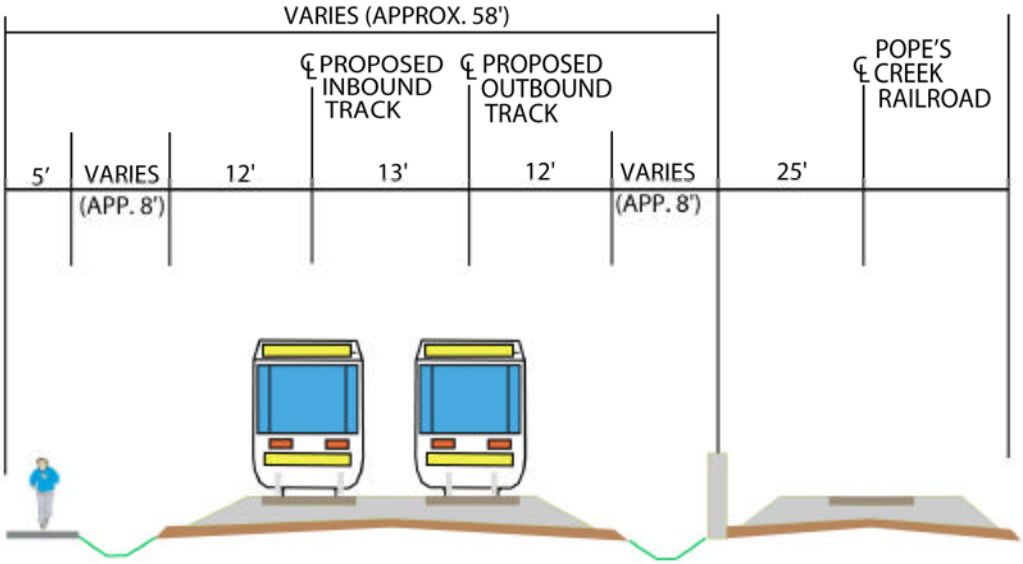


Figure 6-3: LRT Embedded Track Section

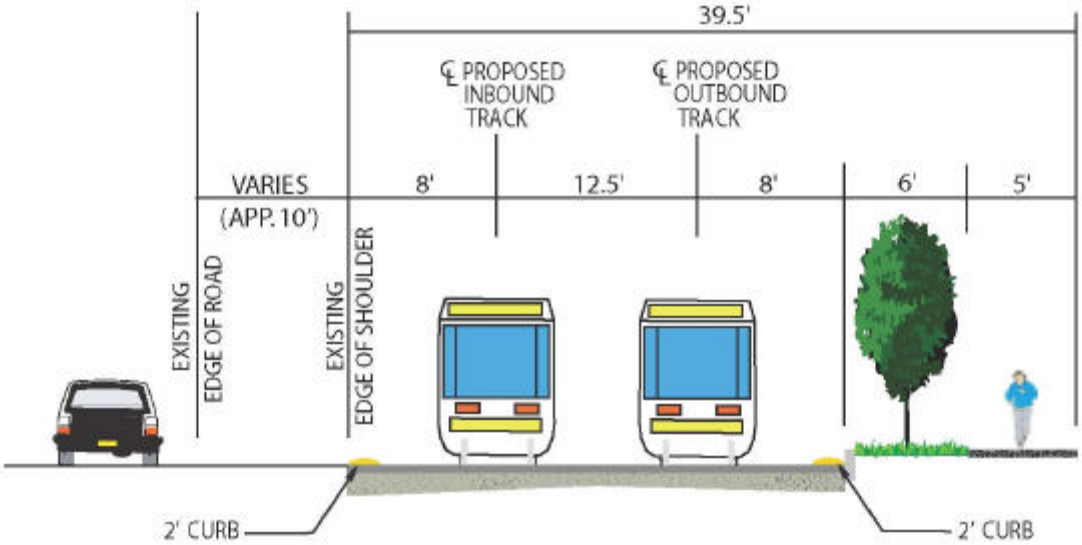
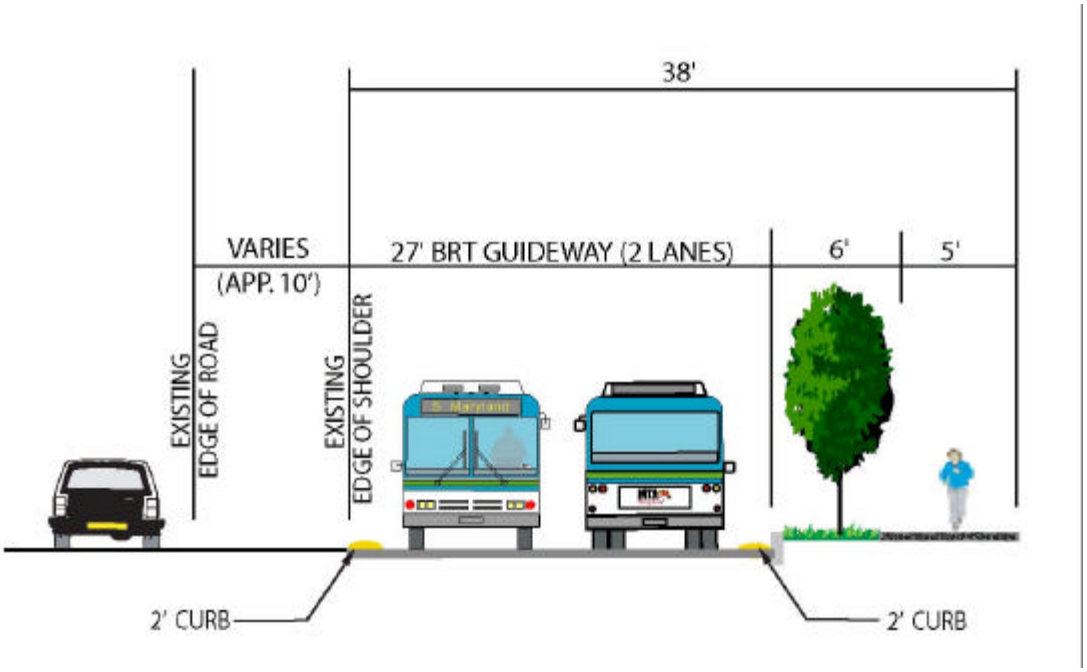


Figure 6-4: BRT Section



6.2 Traffic Impact Analysis

A traffic impact analysis was completed to determine expected impacts of a transit system on adjacent or intersecting roadways. The analysis included capacity, level of service (LOS), delay and queuing under the Preferred Alternative. **Table 6-1** provides a summary of the analysis.

The ten intersections were selected based on consideration of the proximity of the Preferred Alternative, local land use and commute characteristics, and representation of future roadway improvements. The following ten intersections were studied:

- Old Washington Road (MD 925) and Billingsley Road
- Old Washington Road (MD 925) and Smallwood Drive
- Old Washington Road (MD 925) and Leonardtown Road
- Old Washington Road (MD 925) and Acton Lane
- Old Washington Road (MD 925) and Sub Station Road
- MD 5/US 301 and Mattawoman Drive
- MD 5/US 301 and McKendree Road
- MD 5 and Brandywine Road (MD 381)
- MD 5 and Burch Hill Road
- MD 5 and Surratts Road

The traffic data used in the analysis were collected from on-field counting, Metropolitan Washington Council of Government's (MWCOG) regional travel demand model, and the SHA's travel forecasting. The analyses were conducted using the CORSIM and SYNCHRO traffic simulation packages and the impacts were evaluated under three scenarios: 2008 Base Year, 2030 No-Build, and 2030 Build. Additionally, the impact of the transitway crossing a roadway was evaluated with the operational parameters of 12 minute headways and a 35 second blockage of the roadway crossing.

The results of the traffic impact analysis presented in **Table 6-1** show that the transit system would have no effect on any of the intersections except for the following:

- Old Washington Road (MD 925) and Leonardtown Road: AM Peak would improve from LOS E to LOS C
- MD 5 and Burch Hill Road: AM Peak for the west ramp would decrease from LOS A to LOS B, and the PM Peak for the east ramp would decrease from LOS B to LOS E
- MD 5 and Surratts Road: AM Peak for the east ramp would decrease from LOS B to LOS C, and the PM Peak for the east ramp would decrease from LOS B to LOS C

Additionally, the delay to local roadway traffic caused by the transit system signal would have an insignificant effect (LOS A) at all crossings, except for the grade crossing at Brandywine Road (MD 381) where a minor effect (LOS B) would be encountered.

Table 6-1: Traffic Impact Summary

		Base Year 2008				2030 No Build				2030 Build				
Study Location	**Peak**	**LOS**	**Delay (sec/veh)**	**V/C Ratio**	**Queue****	**LOS**	**Delay (sec/veh)**	**V/C Ratio**	**Queue****	**LOS**	**Delay (sec/veh)**	**V/C Ratio**	**Queue****	**Rail Crossing Delay**
MD 925 at Billingsley Road	AM	**B**	10.6	0.35	1	**D**	45.1	0.61	5	**D**	44.1	0.61	5	Insignificant (LOS A)
	PM	**B**	10.2	0.39	1	**C**	31	0.76	3	**C**	30.9	0.76	3	
MD 925 at Smallwood Road	AM	**B**	10.1	0.46	1	**B**	10.5	0.51	1	**B**	10.1	0.46	1	Insignificant (LOS A)
	PM	**B**	19.5	0.84	2	**C**	31.9	0.98	4	**C**	22.6	0.87	3	
MD 925 at Leonardtown Road	AM	**B**	12.1	0.46	1	**E**	57.8	0.92	22	**C**	31.1	1.11	3	Insignificant (LOS A)
	PM	**B**	13.5	0.73	1	**F**	127.7	1.33	135	**F**	81.7	1.68	66	
MD 925 at Acton Lane	AM	**A**	8.2	0.18	0	**B**	10.2	0.38	1	**B**	10.4	0.39	1	Insignificant (LOS A)
	PM	**A**	9.2	0.33	0	**B**	14.6	0.53	1	**B**	16.2	0.57	1	
MD 925 at Sub-Station Road	AM	**B**	10.2	0.41	1	**B**	17.1	0.75	1	**B**	16.6	0.75	1	Insignificant (LOS A)
	PM	**B**	10.1	0.38	1	**B**	16.9	0.73	1	**B**	12.7	0.49	1	
MD 5/US 301at Mattawoman Drive	AM	**B**	12.6	0.56	1	**D**	46.7	0.71	5	**D**	46.8	0.71	4	Insignificant (LOS A)
	PM	**F**	105.3	0.9	121	**F**	162.7	1.03	138	**F**	163.6	1.03	101	
MD 5/US 301at McKendree Road	AM	**B**	14.7	0.86	2	**F**	216.6	1.54	177	**F**	621	1.72	282	Insignificant (LOS A)
	PM	**C**	31.1	0.86	3	**F**	130.3	1.39	135	**F**	220	1.54	152	
MD 5 at Brandywine Road*	AM	**F**	125.1	1.32	145	**C/B**	24.9/13.5	0.48/0.56	1/0	**C/B**	26.4/15	0.57/0.77	1/1	Minor (LOS B)
	PM	**D**	46.2	1.05	6	**C/B**	25.8/15.1	0.58/0.53	1/1	**C/B**	28.5/15.1	0.72/0.53	1/1	
MD 5 at Burch Hill Road*****	AM	**F**	91.3	1.5	76	**A/A**	8.4/9	0.2/0.21	0/0	**A/B**	8.8/12.5	0.31/0.5	0/1	Insignificant (LOS A)
	PM	**C**	27	0.69	3	**B/A**	18.1/8.1	0.46/0.16	1/0	**E/A**	55.6/9.6	0.64/0.37	15/0	
MD 5 at Surratts Road*****	AM	**E**	61.2	1.54	28	**B/E**	19.2/56.2	0.57/0.85	2/6	**C/E**	22/63.5	0.61/0.94	2/12	Insignificant (LOS A)
	PM	**C**	23.7	1.04	4	**B/C**	18.3/25.7	0.72/0.66	2/0	**C/C**	27.5/29.5	0.81/0.68	2/2	

* Interchange proposed for 2030, results are presented in the format of east ramp/west ramp along MD 5.

**Number of vehicles in the queue for worst approach of intersection (based on CORSIM simulation).

***Rail crossing delay refers to the delay at the roadway crossing adjacent to the intersection.

6.3 Maintenance and Storage Facilities

LRT and BRT transit systems both require maintenance and storage facilities; however, the requirements in terms of location and size are not the same. LRT requires a facility located directly adjacent to the transitway, whereas a BRT facility can be located elsewhere but preferably in close proximity to the transitway. Depending on the construction phasing and mode chosen, two maintenance facilities (one in Charles County and one in Prince George's County) are ideal.

The size of the facility depends on the number of vehicles required. A fleet of 30 to 35 LRT vehicles, including spares, would require approximately 20 acres total (approximately 10 acres per location). A BRT facility would generally require facilities of similar size. The facility would also require storage for non-revenue vehicles and equipment such as maintenance, supervisory, and security vehicles.
Activities at the maintenance and storage facility would include:

- Vehicle storage area (tracks for LRT)
- Inspection and cleaning
- Running way repairs
- Vehicle maintenance and repair
- Operations
- Security
- Parking
- Materials and equipment storage

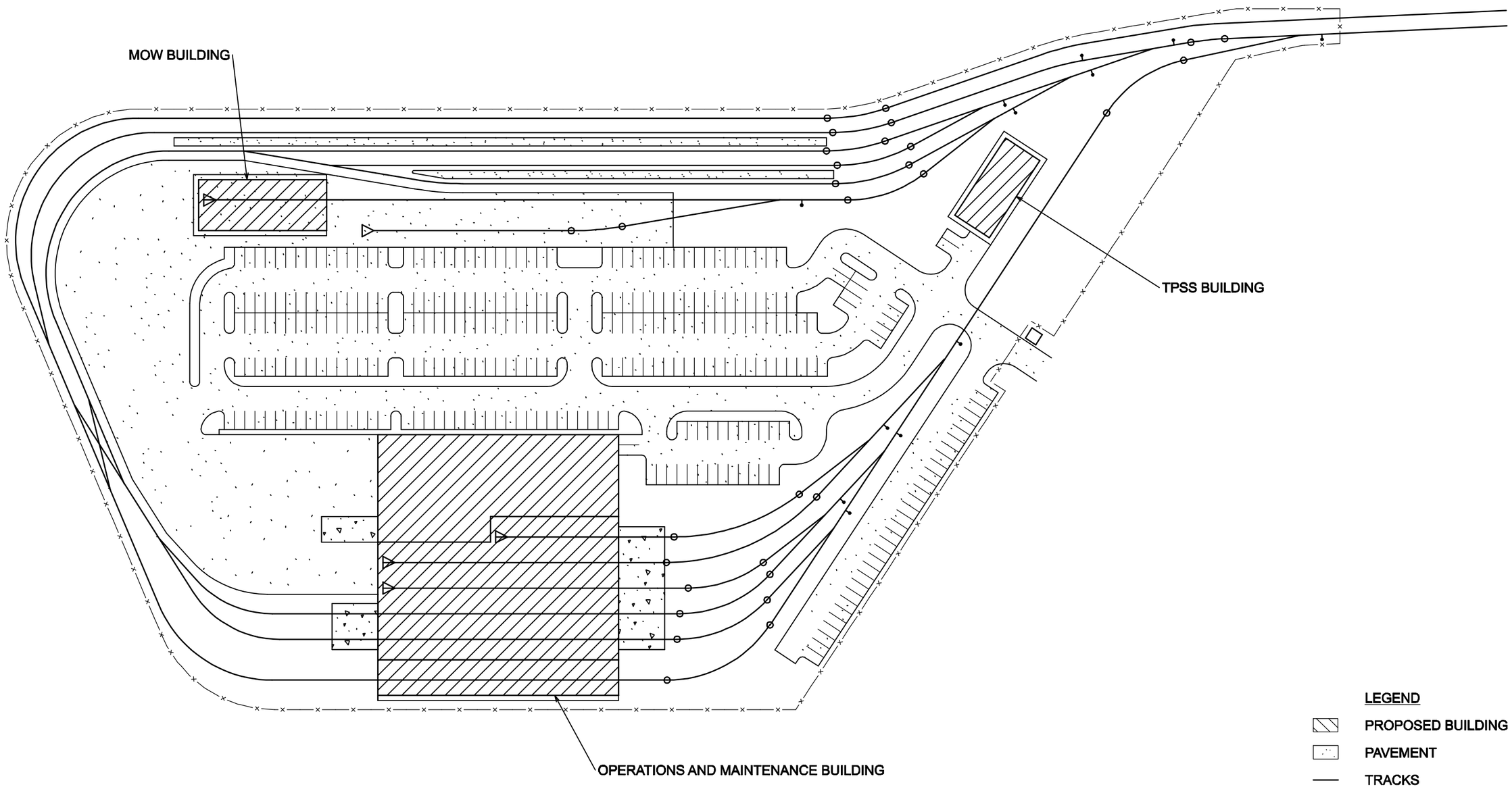
As part of this study, a conceptual design for a maintenance and storage facility has been established (see **Figure 6-5**). Additionally, general locations have been identified for the facility. In Charles County the facility would be located south of DeMarr Road on the east side of US 301. In Prince George's County the facility would be located just south of the TB interchange on the east side of US 301. However, because the facility locations are only general, the conceptual design should only be used to typify the land requirements of an operation and maintenance facility. The design has not been arranged or optimized for a specific location.

6.4 Storm Water Management

A storm water management (SWM) analysis was completed to provide a preliminary calculation of the expected SWM needs and potential locations for SWM facilities in the study area.

Basic Approach

To identify potential SWM locations, sag areas were identified along the proposed vertical alignment, and existing contours and topography, as well as aerial photography, were used to identify drainage areas. The proposed LRT ballasted transitway typical section was used to identify the increase in impervious area (compacted ballast). The pre-condition and post-condition data were compiled and calibrated to produce a "target" pond area for each location.



LEGEND

- PROPOSED BUILDING
- PAVEMENT
- TRACKS
- FENCE

DRAFT WORK-IN-PROGRESS

The Southern Maryland Transit Corridor Preservation Study information shown shall be used for general planning/information only.
The locations of the proposed transit facilities are approximate and subject to change during subsequent stages of project development.

MARYLAND DEPARTMENT OF TRANSPORTATION
MTA Maryland

JACOBS

50' 0 50' 100'
SCALE: 1"=100'

SOUTHERN MARYLAND TRANSIT CORRIDOR PRESERVATION STUDY

FIGURE 6-5
CONCEPTUAL YARD AND SHOP LAYOUT

DATE: JANUARY 2010 1" = 100'

CONTRACT NO.
DRAWING NO.
SHEET NO.
OF

PLOTTED: THURSDAY, MAY 27, 2010 AT 04:52 PM
FILE: P:\E4X45600 MTA1085C\700CADD\702CIVIL\TASK 02 SOUTHERN MARYLAND\SM_Y&S LAYOUT.DGN

Pond Placement, Type and Size

With an assumed "target" pond area in hand, specific locations of the ponds were identified and are shown on the plan sheets located in a separately bound technical report. In general, the locations were selected near low lying areas, but outside the assumed banks of existing channels and crossings.

All of the proposed ponds identified are above-ground, extended-detention basins. The exception is the pond adjacent to MD 5 just north of Malcolm Road, which is assumed to be an underground detention structure due to the extensive development in the area. Specific locations along the Preferred Alternative such as Brandywine Crossing, Andrews AFB, and the Capital Beltway (I-495/I-95) would require additional study to minimize impacts and coordinate pond locations with property owners.

Preliminary pond locations have been identified and are based on the best information available. The analysis was completed using the April 15, 2009 Maryland Department of the Environment (MDE) regulations; however many assumptions were made due to the study's conceptual level of design. As design for the transitway progresses the SWM facility sizes, types, and locations may be adjusted. The assumed areas of the ponds are based on the assumption that the majority of the offsite flow will be directed around and not through the facilities. This approach requires proposed diversion ditches of varying size depending on the off-site drainage areas. It should also be noted that the recommended right-of-way preservation area (70-foot transitway) does not include SWM ponds or diversion ditches; however, it does include an 8-foot drainage ditch on both sides of the transitway.

7 Travel Demand Forecasting

The goal of the travel demand analysis for this study was to obtain “order of magnitude” ridership numbers for comparison between modes. The travel demand analysis was performed using the MWCOG regional transportation model. The MWCOG model is a classic four-step modeling process consisting of the following four basic procedures: trip generation, trip distribution, mode choice, and network assignment.

The modeling assumptions used in this study are listed below:

- Model: MWCOG Travel Forecasting Model Version 2.2
- Highway and Transit Networks: 2007 Constrained Long Range Plan (CLRP)/FY 2008-13 Transportation Improvement Program (TIP) Air Quality Conformity regional modeling process
- Land Use Data: Round 7.1 of the MWCOG Cooperative Forecasts
- Base Year: 2008 (with minor adjustments to the highway network along MD 5/US 301, mainly to facilitate the highway traffic analysis)
- Future Year: 2030 (with minor adjustments to the highway network along MD 5/US 301, mainly to facilitate the highway traffic analysis)
- Zone Structure: 2,191 traffic analysis zones (TAZ)

It should be noted that Round 7.1 of the MWCOG Cooperative Forecasts does not include future land use in the corridor such as the Waldorf Activity Center, the Sub-Region V Master Plan, or the Base Realignment and Closure (BRAC) study. Additionally, the proposed improvements to US 301 were not included as they were not part of the 2007 CLRP. Round 7.1 was not updated to the current Round 7.2a as the updates in Round 7.2a would not make a substantial difference in the study area in terms of the transportation network or development. In the future, as additional ridership analyses are performed for the transitway it is expected that the MWCOG Cooperative Forecasts would include the future land uses mentioned above, as well as the improvements to US 301.

For all of the scenarios discussed below AM peak and PM peak periods were assumed to be from 6:00 AM to 9:00 AM and 4:00 PM to 7:00 PM, respectively. All other hours were assumed to be off-peak. The MWCOG model was designed to estimate the travel demand for an average weekday. However, service would also be provided on the weekends commensurate with demand.

Additionally, the modeling process adopted in this study did not consider the qualitative (or non-measurable) attributes of individual behaviors such as traveling convenience, comforts, and safety associated with a specific mode (e.g., LRT versus BRT or bus versus LRT). The forecasting process assumed an identical fare structure and level between the base and future years.

7.1 Base Year Model

The existing MWCOG travel demand model is a regional model. It was calibrated and validated using region-wide data. It may not be adequately reliable for predicting transit demand in specific areas or corridors. To investigate the performance of the MWCOG model, in terms of reasonably representing the transit demand level (i.e. mainly the MTA 900 series commuter buses) on the MD 5/US 301 corridor, a base year model run was performed and validated using observed passenger counts.

Table 7-1 summarizes the 2008 daily observed boarding and bus trips, as well as, modeled boarding numbers under both the original and revised MTA bus coding. The percentage difference between the modeled and observed data was able to improve from a 25.8% overestimate (modeled = 7,527 riders; observed = 5,984 riders) under MWCOG's original coding to a nearly perfect match (modeled = 5,926 riders; observed = 5,984 riders) under the revised coding. Based on the observed boardings and the number of daily trips, the existing service is reaching capacity.

Table 7-1: Base Year Model Refinement

Route	Daily Trips	Observed Boardings	Original Modeled Boardings	Refined Modeled Boardings
901	57	2,439	1,210	1,432
903	12	510	132	332
905	43	1,821	4,637	3,106
907	16	596	734	458
909	10	356	650	204
913	16	262	164	394
Total	**154**	**5,984**	**7,527**	**5,926**

Route 913 was discontinued in January 2009, and therefore, was not accounted for in the 2030 scenarios below.

7.2 2030 No-Build Scenario

Existing transit service in the corridor is provided by MTA commuter bus, Charles County VanGo, Prince George's County The Bus, and WMATA Metrobus. For the No-Build scenario it was assumed that service would be increased on the existing MTA commuter bus routes. No improvements were assumed for VanGo, The Bus, or Metrobus. The increase in MTA commuter bus service is summarized in **Table 7-2** below. The number of 2030 trips was generated based on a 59% increase in the 2008 trips, which matches the 59% increase in households in Charles County by 2030 predicted by the Round 7.1 Cooperative Forecast. For the No-Build scenario it was also assumed that the routes, stops and travel times would remain the same as the existing service.

Table 7-2: 2030 No-Build Scenario – Number of Trips

Route	AM	Mid-Day	PM
901	48	2	48
903	11	1	11
905	37	2	37
907	13	1	13
909	8	1	8

Based on the assumptions listed above, the expected ridership for the 2030 No-Build scenario is 13,615 riders. This number could be increased by removing the current closed door policy in Prince George's County. Currently the MTA does not provide commuter bus service to Prince George's County given a long held agreement with WMATA to maintain separate service markets.

7.3 2030 Enhanced Commuter Bus Scenario

The Enhanced Commuter Bus (ECB) service would be an all-day, bi-directional service on two routes: 900A (LaPlata, MD to the Branch Avenue Metrorail station) and 900B (California, MD to the Branch Avenue Metrorail station) as shown in **Figure 7-1**. The two ECB routes, 900A and 900B, would replace the existing MTA commuter buses operating within the corridor (901, 903, 905, 907 and 909). The ECB scenario would consist of a limited-stop bus route which would include stops in both Charles and Prince George's counties. The stop locations from DeMarr Road to the Branch Avenue Metrorail station would be consistent with those of the LRT and BRT scenarios.

A principal difference between the ECB scenarios and the LRT or BRT scenarios is that the ECB Alternative would operate in mixed traffic on US 301 in Charles and Prince George's counties, rather than in a dedicated transitway adjacent to the Pope's Creek Railroad and US 301. Additionally, the ECB scenario would operate in the proposed managed lanes or bus only shoulder on MD 5, rather than in a dedicated transitway adjacent to MD 5. **Table 7-3** provides a summary of the ECB scenario's operating

Based upon the assumptions state above and in **Table 7-3**, the expected ridership for the 2030 ECB scenario is 26,516 riders.

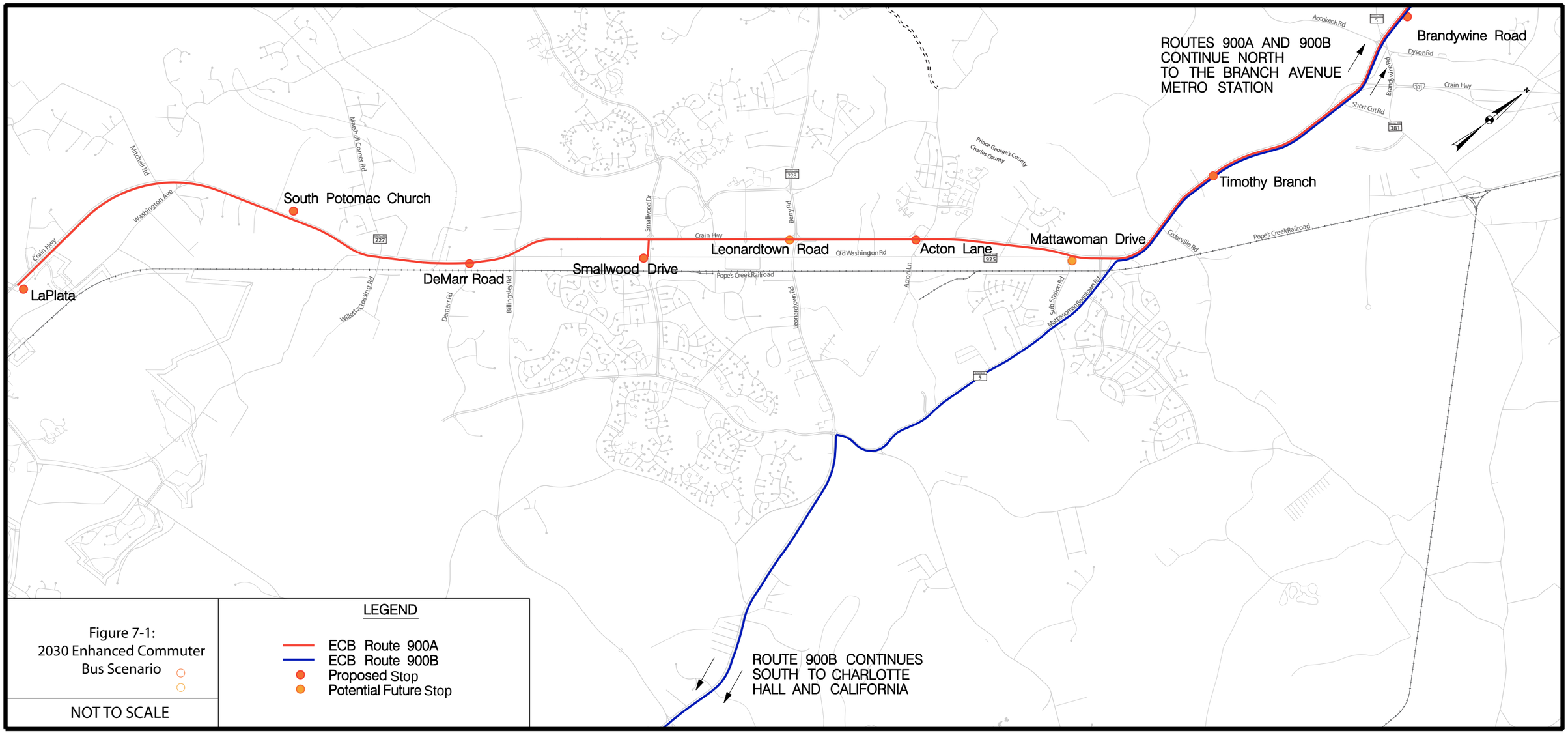
7.4 2030 Bus Rapid Transit Scenario

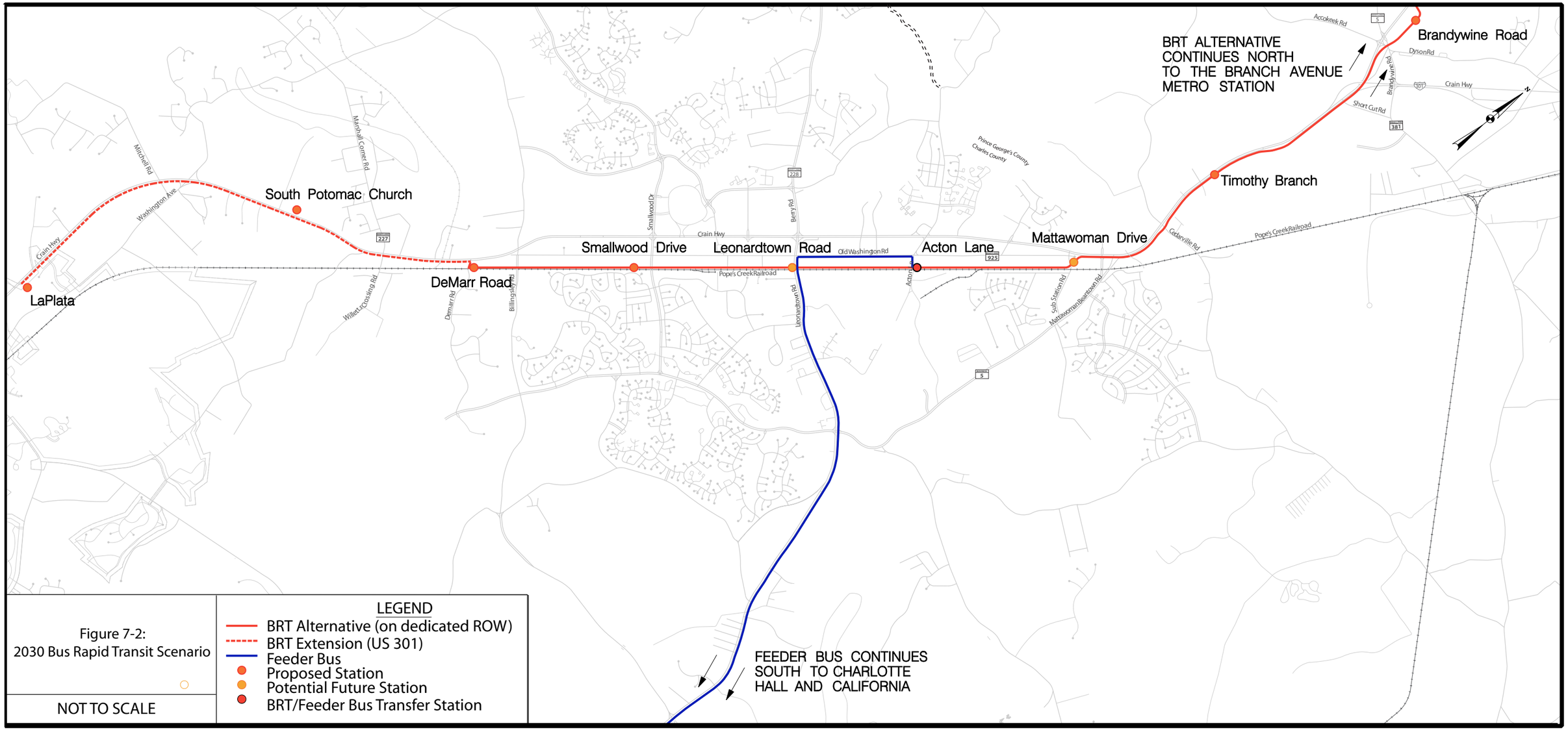
The BRT scenario would be an all-day, bi-directional service operating in dedicated right-of-way from DeMarr Road to the Branch Avenue Metrorail station, except at grade crossings. This scenario also assumes the extension of the BRT service on US 301 between DeMarr Road and LaPlata, which would not require a transfer at DeMarr Road. Additionally, a commuter-based feeder bus would provide service between California/Charlotte Hall and the Acton Lane station where a transfer to the BRT system would be required. **Figure 7-2** provides a conceptual layout of the BRT scenario and **Table 7-3** provides a summary of the BRT scenario's operating assumptions.

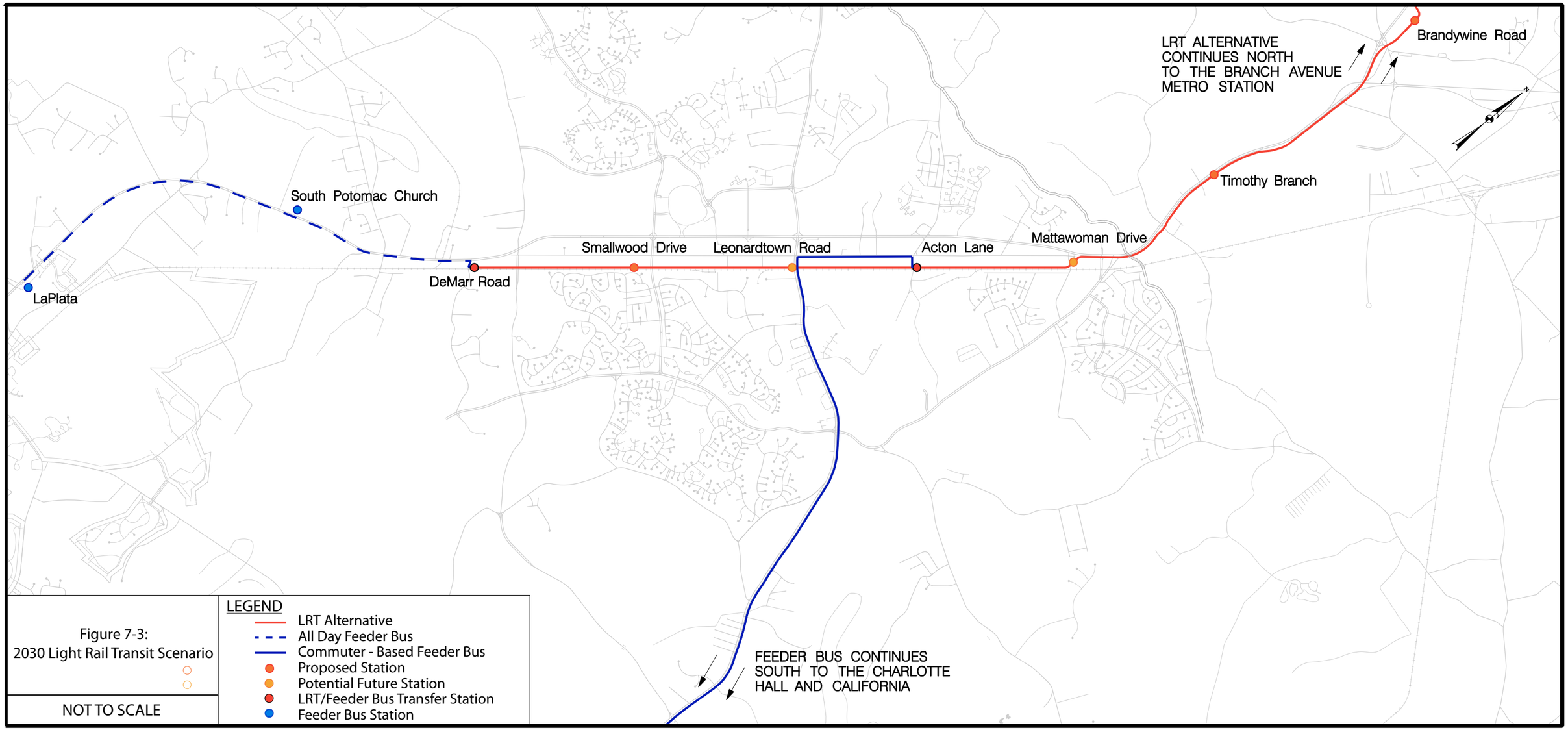
Based upon the assumptions stated above and in **Table 7-3**, the expected ridership for the 2030 BRT scenario is 25,330 riders.

7.5 2030 Light Rail Transit Scenario

The LRT scenario would be an all-day, bi-directional service operating in dedicated right-of-way from DeMarr Road to the Branch Avenue Metrorail station, except at grade crossings. This scenario also assumes the use of an all-day feeder bus to provide service from LaPlata to DeMarr Road and the use of a commuter-based feeder bus service between California/Charlotte Hall and the Acton Lane station. Both of the feeder buses would require riders to transfer to the LRT system. **Figure 7-3** provides a conceptual layout of the LRT scenario and **Table 7-3** provides a summary of the LRT scenario's operating assumptions.


ROUTES 900A AND 900B CONTINUE NORTH TO THE BRANCH AVENUE METRO STATION
Brandywine Road
Timothy Branch
Mattawoman Drive
Acton Lane
Leonardtown Road
Smallwood Drive
DeMarr Road
South Potomac Church
LaPlata
Crain Hwy
Pope's Creek Railroad
Prince George's County
Charles County
ROUTE 900B CONTINUES SOUTH TO CHARLOTTE HALL AND CALIFORNIA
LEGEND
ECB Route 900A
ECB Route 900B
Proposed Stop
Potential Future Stop
Figure 7-1:
2030 Enhanced Commuter Bus Scenario
NOT TO SCALE


BRT ALTERNATIVE CONTINUES NORTH TO THE BRANCH AVENUE METRO STATION
Brandywine Road
Timothy Branch
Mattawoman Drive
Acton Lane
Leonardtown Road
Smallwood Drive
DeMarr Road
South Potomac Church
LaPlata
Crain Hwy
Pope's Creek Railroad
Old Washington Rd
Prince George's County
Charles County
FEEDER BUS CONTINUES SOUTH TO CHARLOTTE HALL AND CALIFORNIA
Figure 7-2:
2030 Bus Rapid Transit Scenario
NOT TO SCALE
LEGEND
BRT Alternative (on dedicated ROW)
BRT Extension (US 301)
Feeder Bus
Proposed Station
Potential Future Station
BRT/Feeder Bus Transfer Station


LRT ALTERNATIVE CONTINUES NORTH TO THE BRANCH AVENUE METRO STATION
Brandywine Road
Timothy Branch
Mattawoman Drive
Acton Lane
Leonardtown Road
Smallwood Drive
DeMarr Road
South Potomac Church
LaPlata
FEEDER BUS CONTINUES SOUTH TO THE CHARLOTTE HALL AND CALIFORNIA
Figure 7-3:
2030 Light Rail Transit Scenario
NOT TO SCALE
LEGEND
LRT Alternative
All Day Feeder Bus
Commuter - Based Feeder Bus
Proposed Station
Potential Future Station
LRT/Feeder Bus Transfer Station
Feeder Bus Station

Based upon the assumptions stated above and in **Table 7-3**, the expected ridership for the 2030 LRT scenario is 23,750 riders.

Table 7-3: 2030 Operating Assumptions for ECB, BRT and LRT Scenarios

Operating Assumptions	2030 ECB	
	900A	900B
Replaces existing MTA route	901 & 907	903, 905 & 909
Distance (miles)	23.5	47.8
Travel Time (min)	45	63
Average Operating Speed (mph)	21	45
Peak Headways (min)	6	12
Off-Peak Headways (min)	15	15

Operating Assumptions	2030 BRT		2030 LRT
	DeMarr to Branch Avenue	LaPlata to Branch Avenue	DeMarr to Branch Avenue
Replaces existing MTA route	N/A	N/A	N/A
Distance (miles)	18.7	23.5	18.7
Travel Time (min)	34	45	36
Average Operating Speed (mph)	33	31	31
Peak Headways (min)	12*	12*	6
Off-Peak Headways (min)	24*	24*	12

*From DeMarr Road to the Branch Avenue Metrorail station BRT vehicles would operate at a combined 6 minute (peak) and 12 minute (off-peak) headways because there would be an overlap of service from the two routes within this segment.

In summary, the potential ridership within the MD 5/US 301 corridor ranged from approximately 23,500 riders to 26,500 riders. The ECB scenario was the strongest because no transfer penalties were assumed in the model and the improvements to MD 5 (managed lanes or bus-only shoulders) provide a travel time advantage for commuter buses. Travel time includes the time duration of the trip (including stops), as well as the time it takes to transfer from one mode to another. A transfer penalty is the additional time added to represent the inconvenience and risk to reliability that a user experiences. Additionally, as a result of the simplicity of the model assumptions, the ECB scenario provides more frequent service in Prince George's County. The LRT scenario had the least ridership of the build options, which is likely due to the fact that the transitway was designed using LRT-based design criteria. As a result of the design criteria assumptions, a BRT system would have faster travel times and higher operating speeds than a LRT system, and therefore, higher ridership.

The results of the travel demand analysis show that the large majority of travel within the corridor is commuter-based, not bi-directional travel which best supports a high quality transit system that would operate all-day. This would contrast to the commuter focused transit that is currently provided and assumed in the ECB alternative. A commuter focused transit system would not require the same capital investment as a high quality system, instead it could operate on a managed lane during peak hours with upgrades during the off-peak as modeled in the ECB alternative. To improve the expected ridership for a transit system, appropriate land use planning could create transit focused destinations along the corridor.

8 Capital Cost

Order of magnitude capital cost estimates were developed for the Preferred Alternative for a LRT and BRT system. The capital cost estimates will provide a planning level estimate useful for long-range project planning. It is based on top-level unit construction elements and also includes costs for vehicles and right-of-way for the transitway. Additional cost variables such as right-of-way for parking and station areas, as well as operation and maintenance costs were not included in the estimate. These cost variables would be addressed as the design of the transitway progresses.

The unit costs were derived from recent MTA planning project cost estimates, as well as, current assessed property values for the right-of-way cost. All costs shown are present value – 2009 – estimates, with applied allocated contingencies. Unit quantities were calculated from the conceptual engineering drawings shown in the technical report. The estimates are structured by the FTA's Standard Cost Categories (SCC).

8.1 Standard Cost Categories

Guideway and Track Elements: This category includes those items required to prepare the physical way upon which the transit system will be constructed. The guideway elements can be broken down into three primary types of construction – at-grade construction, aerial structure construction, and retained cut or fill/underground construction. The guideway elements also include traffic control, drainage systems for the guideway, site work, structural elements, erosion and sediment control, roadway paving (BRT only), and ballasted or embedded guideway elements up to the subballast level (LRT only).

The track elements (LRT only) include the running rails, ties, ballast, direct fixation track, embedded track, and special trackwork components (turnouts, crossovers, etc.) associated with the guideway construction.

Stations, Stops, Terminals, Intermodal: This category includes all station elements including station structures, platforms, ramps, elevators/escalators, station access, as well as, structured parking facilities where applicable.

Support Facilities: Yards Shops, Admin. Buildings: This category includes vehicle maintenance and storage buildings, trackwork for storage of rail vehicles, vehicle cleaning and painting facilities, office support areas, maintenance of way facilities, and general major shop equipment.

Sitework and Special Conditions: This category includes demolition, utility relocation, hazardous materials and environmental mitigation, site structures, pedestrian access, landscaping, surface parking lots, and temporary facilities.

Systems: This category includes train control and signals (LRT only), traffic signals and crossing protection, traction power sub-stations (LRT only), catenary and third rail (LRT only), communications, fare collection system and equipment, and central control.

Right-of-way, Land, Existing Improvements: This category includes the right-of-way necessary for a 70-foot transitway width. It does not include right-of-way needed for station areas, maintenance and storage facilities, or storm water management facilities.

Costs for right-of-way are largely dependent on changing economic conditions and the type of development around the Preferred Alternative. The right-of-way estimate is very preliminary and is based on current conditions with a 50% contingency.

Vehicles: This category includes the cost for revenue and non-revenue vehicles.

Professional Services: This category includes allowances for preliminary engineering, final design, project and construction management, agency program management, project insurance, surveys and testing, and start-up costs. These allowances were calculated by applying a percentage to the total construction cost estimated for each cost category (excluding right-of-way and vehicle costs).

Unallocated Contingency: This category addresses the unknowns and uncertainties in the project scope and schedule. The unallocated contingency was calculated as five percent of the total of the cost categories listed above, except for the right-of-way, vehicles and professional service categories which assumed an unallocated contingency of two percent of the total.

8.2 Capital Cost Results

Capital cost estimates, in 2009 dollars, were prepared for the Preferred Alternative for both a LRT and BRT system. **Table 8-1** provides a summary of the LRT and BRT cost estimates. A detailed tabulation of each cost category is presented in **Appendix A**.

Based on the estimate, a LRT system is expected to cost approximately $1.4 billion dollars (2009) and a BRT system is expected to cost approximately $1.0 billion dollars (2009). The cost categories where there is the most noticeable difference between a LRT and BRT system are guideway and track elements, support facilities, systems, and vehicles. Additionally, the cost items that appear to be driving the overall cost are:

- Distance – almost 19 miles of transitway
- Tunnel underneath the Capital Beltway (I-495/I-95)
- Aerial structure over Woodyard Road (MD 223)
- Right-of-way acquisition

These capital cost estimates provide a planning level estimate and as a result there is level of uncertainty that needs to be assumed. Uncertainty can result in a difference between the estimated cost of a project as defined during the planning stage and the actual cost of the project that is ultimately implemented. Therefore, the capital cost estimates provided in this report would need to be refined and inflated to future year dollars as the scope and engineering design is refined for the transitway.

Table 8-1: Capital Cost Estimate Summary

Cost Category	LRT ($MIL)	BRT ($MIL)
Guideway and Track Elements	$433.0	$395.0
Stations, Stops, Terminals, Intermodal	$78.0	$78.0
Support Facilities: Yards, Shops, Admin. Buildings	$64.0	$24.0
Sitework and Special Conditions	$70.0	$70.0
Systems	$122.0	$19.0
ROW, Land, Exisitng Improvements	$173.0	$173.0
Vehicles	$131.0	$47.0
Professional Services	$245.0	$187.0
Unallocated Contingency	$49.0	$38.0
Total	**$1,365.0**	**$1,031.0**

* 2009 dollars

9 Study Findings and Recommended Next Steps

9.1 Findings

The Preferred Alternative has been identified as a combination of Alternative 4, which includes Option 7, and Beltway Option 2. This alignment should be protected by Charles and Prince George's counties through their Master Plans. Preservation will enable the counties to plan for transit by implementing policies supportive of densely developed, walkable, mixed-use centers that would attract and create transit trips, thus improving the cost-effectiveness of providing service on the alignment. Nevertheless, future project planning and development processes, such as the FTA's New Starts program and NEPA, will require revisiting potential alignments and modes.

The station locations identified in Section 5.2 are relative to the Preferred Alternative and are approximate locations. When Charles and Prince George's counties begin coordinating transit-supportive development, these station locations may shift along the alignment to best accommodate the counties plans while minimizing environmental and community impacts.

To assist the counties in preserving right-of-way for the transitway, a transitway width of 70 feet has been identified. The 70-foot transitway is depicted on the plan sheets, which are included in a separately bound technical report. The 70-foot transitway width includes the proposed transit alignment, drainage ditches, sidewalks, and minimal grading. It does not include the right-of-way required for stations locations, storm water management ponds, parking lots, or operation and maintenance facilities. However, in order to assist the counties in preserving right-of-way for these additional system needs, the recommended locations for these items are designated on the plans.

The horizontal and vertical alignments created for this study demonstrate that the Preferred Alternative would likely be feasible and form the basis for a right-of-way boundary to be preserved for a future transitway between White Plains and the Branch Avenue Metrorail station. However, given the level of detail inherent in a centerline-only design, they do not preclude any difficulty in the full design of a transitway in this corridor. Through the design of the centerline-only alignment, several areas were identified that could increase the complexity of a detailed design for the transitway.

Environmental Impacts along the Transit Corridor: The Preferred Alternative does not have any "fatal" environmental flaws, but a NEPA study in subsequent stages of design is required to examine environmental issues at a much more detailed level and may result in the need to modify the alignment in order to avoid or mitigate environmental impacts.

Alignment Adjacent to the Pope's Creek Railroad: Design of the transitway adjacent to the Pope's Creek Railroad would have to be coordinated with CSX to minimize impacts to CSX property, as well as to determine CSX requirements such as offsets from the existing railroad, crashwall design standards, etc.

Interchange at the MD 5/US 301 Split: Design of the transitway at the TB interchange would require on-going coordination with SHA. The SHA currently has several design concepts for this interchange as part of the US 301 Bypass and the US 301 Upgrade studies. In addition to coordinating with SHA, there are historic properties in the vicinity and the area has a high water table, which may limit the ability of the transitway to tunnel underneath the interchange.

Upgrades to US 301 and MD 5: Future design of the transitway would require on-going coordination with SHA regarding the proposed improvements to US 301 and MD 5. The MD 5 planning study currently being conducted by SHA proposes upgrading MD 5 to a freeway, and the US 301 planning study has an Upgrade option which would convert US 301 to a freeway as well. If these proposed improvements are implemented additional design would need to be completed to determine the cost-benefit ratio of going around, over or under the proposed interchanges. Currently, the Preferred Alternative assumes the transitway would go around all interchanges except for Woodyard Road (MD 223) and the Capital Beltway (I-495/I-95).

Construction of Transitway North of Woodyard Road (MD 223): Approximately one-half mile south of Woodyard Road (MD 223) the existing state-owned right-of-way drops from 300 feet to 200 feet. The large majority of this 200-foot right-of-way is currently used by the existing MD 5 and the proposed improvements to MD 5 would utilize any remaining state-owned right-of-way. Therefore, north of Woodyard Road (MD 223), it is expected that the transitway would have substantial property impacts as the land adjacent to MD 5 is already built-out.

Provision of Transit Service to Andrews AFB: Design of the transitway currently assumes a station at Coventry Way. This location was selected because it provided the shortest walking distance (0.35 mile) from the transitway to a gate on Andrews AFB (Virginia Gate). However, transit-oriented destinations within Andrews AFB are not located near the Virginia Gate. The transit-oriented destinations are closer to the gates on Allentown Road (MD 337), therefore a station at Allentown Road (MD 337) has also been considered. An additional concern has to do with the proximity of the proposed transitway along MD 5 to residential development that is ongoing on the base. As design of the transitway progresses, additional coordination would be required with Andrews AFB and Prince George's County to determine an optimal station location to provide service to the base and the surrounding communities, as well as any needed changes to the alignment to avoid or minimize impacts to the base community.

Tunnel Structure at the Capital Beltway (I-495/I-95): Several beltway options were considered in this study to connect the transitway with the Branch Avenue Metrorail station, which requires crossing the Capital Beltway (I-495/I-95). The Preferred Alternative assumes the use of a tunnel underneath the Capital Beltway (I-495/I-95) because the other beltway options studied had more substantial environmental and community impacts. Further design would need to be completed to determine the optimal location of the tunnel, horizontally and vertically, the locations of the tunnel portals, and the type of tunnel construction to be employed.

Interface of Transit Services at the Branch Avenue Metrorail Station: In the area adjacent to the Branch Avenue Metrorail station WMATA is currently developing the *Branch Avenue Metro Station Vision Plan*. The plan includes mixed-use development, parking structures and surface lots, and open space. On-going coordination would need to occur with WMATA to ensure that the necessary right-of-way for the transitway is preserved to provide a good interface with the existing Branch Ave Metrorail station. Coordination with WMATA would also require discussions regarding potential capacity issues for the Branch Avenue Metrorail station.

9.2 Recommended Next Steps

The Southern Maryland Transit Corridor Preservation Study was conducted by the MTA in partnership with the IPMT members to define a high capacity transit alignment along the MD 5/US 301 corridor from White Plains to the Branch Avenue Metrorail station. The objectives of the study were to:

- Study the physical feasibility of a high capacity transit system in the MD 5/US 301 corridor
- Identify a specific alignment for future development into a rapid transit system between White Plains and the Branch Avenue Metrorail station
- Determine the locations of potential transit stations, parking and other facilities
- Provide counties with a specific transit alignment to protect in local land use plans

Included in the separately bound *Land Use Analysis & Guidance Report*, several suggestions are recommended to assist the Charles and Prince George's counties in preparing to take the project into the next phases of project development. The report identifies a range of activities that should be completed prior to the project entering the NEPA process and the Alternative Analysis phase of New Starts project development.

The *Land Use Analysis & Guidance Report* also provides recommendations to the counties on the steps that they should take in order to successfully execute the vision of the Southern Maryland Transit Corridor Preservation Study. The report will assist the counties in properly preserving and zoning the land within the corridor in order to leave adequate space for the transitway, thus helping to avoid future impacts. Additionally, the report provides guidance on the appropriate mixes of land use, land use designs, and land use densities needed to support future transit.