MD 5/US 301 Transit Service Staging Plan

Final Report

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MTA Maryland

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EXECUTIVE SUMMARY

The MD 5/US 301 Transit Service Staging Plan (TSSP) study is intended to guide the expansion of transit service in the corridor to the year 2025. The study focuses on major corridor level transit service, leaving specific route planning to be accomplished in the future by agencies that operate and fund transit.

The study represents a team effort supported by:

- Maryland Transit Administration (MTA),
- Maryland Department of Transportation (MDOT),
- Maryland State Highway Administration (SHA),
- Charles County Government (Planning Offices and VanGO),
- Prince George's County Department of Public Works and Transportation,
- Tri-County Council for Southern Maryland,
- Metropolitan Washington Council of Governments (MWCOG),
- Washington Metropolitan Area Transit Authority (WMATA),
- Maryland National Capital Park and Planning Commission (M-NCPPC).

There is considerable bus and van service already provided in the corridor. As of January 2003, the MTA operates the 901, 903, 905, 907, and 909 commuter bus routes that provide commuter oriented peak only service from selected park and ride facilities along the MD 5/US 301 corridor to Washington, D.C. Additionally, WMATA, Prince George's County and Charles County provide local and regional transit service through a wide variety of bus services and access to the Metrorail System at Branch Avenue.

In this study, four transit alternatives have been developed and evaluated:

- **Alternative 1 – Enhanced Commuter Bus:** Expands the existing commuter bus service, with additional park and ride lots and additional bus service. Peak directional service only.
- **Alternative 2 – Bus Rapid Transit – Moderate Level:** Expands existing bus service from park and ride lots with a new MD 5/US 301 shuttle bus service, expanded express and limited stop service, and adds shared and exclusive lanes to improve transit travel time. Provides both peak directional and reverse commute service. New park and ride lots and stations are added.
- **Alternative 3 – Bus Rapid Transit – High Level:** Provides the highest quality and level of bus service with exclusive bus lanes and grade separation. New shuttle service is combined with additional express and limited stop express bus service. Provides both peak directional and reverse commute service. This alternative closely simulates rail transit for the corridor.
- **Alternative 4 – Light Rail Transit:** Provides two-directional light rail service using exclusive right-of-way along the Pope's Creek Railroad Corridor and an exclusive right-of-way in the MD 5 corridor, directly connecting to Branch Avenue Metrorail.

Key findings of the study for each of the alternatives for ridership, capital costs and annual operating costs are shown in the TABLE E-1 below:

TABLE E-1

Transit Alternatives	2025 Ridership (*Daily Boardings*)	Capital Costs *(2003 dollars)*	Annual Operating Costs *(2003 dollars)*
Enhanced Commuter Bus	6,800	$255.1 million	$26.5 million
BRT – Moderate Level	19,500 – 23,600	$428.8 million	$32.1 million
BRT – High Level	26,400 – 31,000	$1.2 billion	$31.6 million
Light Rail Transit	22,600 – 26,800	$1.1 - 1.5 billion	$34.4 million

The MD 5/US 301 Staging Plan recommends that transit improvements be implemented for the corridor as follows:

2003 – 2015 — Continually expand service as part of the Enhanced Commuter Bus Alternative. By 2015, implement 66 additional bus trips as demand grows, bringing the total commuter bus service trips to 190. If existing bus ridership levels reach 10,000 boardings per day prior to meeting the horizon year timeframes in the staging plan, MTA will reassess the staging plan schedule and accelerate the schedule if necessary.

2015 – 2025 — Continue to expand Enhanced Commuter Bus Service, growing to 246 trips in 2025

2015 — Based upon the following factors, potentially initiate project planning for Alternatives 2, 3 and/or 4

- Availability of state and federal funding.
- Project is included in the 2009 federal re-authorization.
- Project has support of both Charles and Prince George's counties and is included in their master plans.
- Ridership on commuter buses has continued to increase.
- Metrobus, The Bus and VanGO have demonstrated increased ridership in the area.
- Land use densities have developed to support the consideration of BRT and/or LRT and growth is projected to continue to increase along the corridor.

2017 – 2025 — Implement Alternative 2, 3, or 4 based upon the project planning studies described in the step above.

1. INTRODUCTION

As southern Maryland continues to grow, demands for viable transportation options, including transit, are becoming more important. Understanding the importance of transportation and recognizing growing congestion in the US 301 corridor, a US 301 Task Force was formed in the 1990's and completed its work with a set of land use and transportation recommendations. To help with the implementation of its work, a US 301 Policy Oversight Committee was formed and managed through Maryland Department of Transportation (MDOT) Headquarters. This group has continued to recommend that transit improvements be part of the transportation solution for the MD 5/US 301 Corridor. The group recommended that in the near term, increased local and commuter bus service should be pursued and in the longer term, rail transit should be considered for implementation.

This MD 5/US 301 Transit Service Staging Plan (TSSP) presents a framework for implementing new transit services over the next twenty years. See FIGURE 1-1 for an overview map of the MD 5/US 301 TSSP project area.

The purpose of the study is to develop a range of alternatives for transit that will lead to implementation of services over the next twenty years. Ridership projections and the potential for transit alternatives to meet the projected demand for service to year 2025 are presented. For purposes of this study, the transit alternative alignments developed are conceptual and do not include any preliminary engineering or right-of-way analysis.

As of January 2003, the Maryland Transit Administration (MTA) operates the 901, 903, 905, 907, and 909 commuter bus routes that provide commuter oriented peak only service from selected park and ride facilities along the MD 5/US 301 corridor to Washington, D.C. Just a few years ago, Routes 901 and 905 were the only two routes that operated along the corridor. As the demand for commuter transit service has increased, MTA has continued to adjust the bus routes to accommodate the demand. However, if demand continues to grow the current commuter bus service may not be able to accommodate demand. The MD 5/US 301 TSSP evaluates the possibility of future transit alternatives to meet the projected demand. The study recommends a staging plan for the possibility of implementing transit over the study period. The 25-year study period includes the base year of 2001 and extends to year 2025, with incremental years of 2005, 2010, 2015 and 2020. Evaluations of transit alternatives were made as to determine the appropriate level of transit service for the time period.

The analysis for the TSSP includes development of transit alternatives, ridership projections, coordination with the jurisdictions and evaluation of the alternatives. Although, much of the work occurred concurrently, the project team developed and refined the potential transit alternatives initially to provide input for the modeling. The service assumptions for each alternative such as the alignments, headways and station locations were developed for modeling purposes and should be considered as conceptual. The recommended alternatives include the service type, travel time, alignments, span of service, frequency of service, station locations, and any other appropriate operating assumptions necessary to accurately project ridership forecasts.

The four transit alternatives that were developed for the TSSP include: Enhanced Commuter Bus (ECB), Bus Rapid Transit – Moderate Level (BRT-MOD), Bus Rapid Transit – High Level (BRT-HIGH), and Light Rail Transit (LRT).

- The ECB alternative builds upon the existing commuter bus routes with an increase in the frequency of service, improving travel time with queue jumps, and upgrading vehicles.
- The BRT-MOD alternative expands upon the existing commuter bus routes with increases in frequency, providing bus lanes along the MD 5 and US 301 corridors between Branch Avenue Metrorail Station and White Plains. Buses would no longer operate into downtown Washington, D.C., but would make a transfer connection at Branch Avenue Metro Rail Station.
- The BRT-HIGH option assumes a two-lane barrier separated busway from White Plains to T.B. with station locations at White Plains, Billingsley Road, St. Charles, Waldorf, Pinefield, Brandywine and T.B. North of T.B. to Branch Avenue Metrorail Station, the BRT proposal would include a bus lane in the median of MD 5 with stations at Southern Maryland Medical Center, Woodyard Road, Clinton, Allentown Road and Branch Avenue Metrorail Station. It is assumed the median bus only lane would operate at grade within state owned right-of-way. However, in areas where right-of-way may be limited, an aerial structure was assumed.
- The LRT alternative operates from White Plains and continues north to Branch Avenue Metrorail Station. It is assumed that the LRT alignment would parallel the existing Pope's Creek Branch from White Plains to T.B. and operate along MD 5 north to Branch Avenue Metrorail Station. A total of twelve station locations would be located on the LRT line.

To properly coordinate the TSSP study a committee was convened with representation from the following agencies:

- Maryland Transit Administration (MTA),
- Maryland Department of Transportation (MDOT),
- Maryland State Highway Administration (SHA),
- Charles County Government (Planning Offices and VanGO),
- Prince George's Department of Public Works and Transportation,
- Tri-County Council for Southern Maryland,
- Metropolitan Washington Council of Governments (MWCOG),
- Washington Metropolitan Area Transit Authority (WMATA),
- Maryland National Capital Park and Planning Commission (M-NCPPC).

The committee known as the Project Coordination Committee (PCC) met periodically to review and provide guidance through the duration of the study. The committee provided guidance in developing the methodology for the ridership modeling and refining the operational and service characteristics for the transit alternatives.

PREVIOUS STUDIES

A number of previous studies have investigated transit improvements in the MD 5/US 301 corridor. Improvements such as increased express and local bus service, transit oriented development, implementing High Occupancy Vehicle (HOV) or bus only lanes, and rail transit improvements have been considered in master plans and other planning studies. The studies reviewed for this project include:

US 301 Policy Oversight Committee (POC) Final Report, June 2001

The US 301 POC report recommended that viable transit options should be developed in the corridor to help meet the future projected demand and the development of a Transit Services Staging Plan to identify and begin preservation of a future light rail/express bus alignment in the MD 5/US 301 Corridor. The report also recommends that a "wider array of transportation options should be made available to residents and workers in the study area." Buses and carpools should use and benefit from HOV lanes on MD 5 constructed from the Capital Beltway to US 301, and on the western Waldorf bypass. Expanded express and local bus service, ridesharing incentives, new park-and-ride lots and other initiatives are needed to increase transit service and build ridership. MTA and Charles County should combine their resources to increase commuter and local bus service. The option for a future light rail system should be preserved through the acquisition of right-of-way from White Plains to the Branch Avenue Metrorail Station. Implementation of the light rail line should begin after it can be economically justified and suitable land use conditions exist. Identification of locations for improvements such as bus priority lanes and signal pre-emption will be identified as part of the development of a BRT planning study.

US 301 Task Force – Appendix A – Technical Report, Maryland Department of Transportation, November 1996

Appendix A provides land use guidelines that provide support for the types of transportation improvements to consider for the US 301 corridor study area. The transportation improvements considered in the technical report include:

- Express buses on HOV lanes on US 301 and MD 5 and MD 205.
- Enhanced express service on MD 4 from park-and-ride lots to Washington, D.C.
- Local circulator service would be provided between residential and commercial areas around Waldorf and La Plata and on US 301 linking park-and-ride and express bus facilities.
- HOV lanes, as proposed in the HOV/Bus study package, would be provided on MD 5/US 301 from Waldorf to US 50 (including a Waldorf bypass), and MD 205.

Maryland Comprehensive Transit Plan (MCTP), Volume I Executive Report, Maryland Transit Administration, December 2000

The MCTP is a collaboration among all of Maryland's public transit providers that identifies services, projects, programs and other transit improvements with the goal of doubling transit ridership in Maryland by year 2020. The recommendations consider two time periods for implementation of the recommendations, short-term which can be implemented within three fiscal years and long-term which can be implemented within the MCTP timeframe by year 2025. Nine themes were developed that became the strategic template from which the MCTP identified the programs, projects and services that were necessary for doubling transit. The

MCTP was organized into five volumes that were unique to each region in Maryland. The Executive report is Volume I and the following volumes include, Volume II: The Central Region of Baltimore and Washington, Volume III: The Eastern Shore of Maryland, Volume IV: Southern Maryland, and Volume V: Western Maryland.

Maryland Comprehensive Transit Plan, Volume IV Southern Maryland, Maryland Transit Administration, June 2001

MCTP recommends improvements to the bus network in southern Maryland for both the local county services and the commuter bus services operated by the MTA. Short-term recommendations include increasing the level of service on the 900 series commuter bus lines. Long-term recommendations include the recommendation for a transitway/rail line along the MD 5/US 301 corridor from White Plains to Branch Avenue Metrorail Station. The MCTP references *The Southern Maryland Mass Transit Alternatives Study 1996,* which considered potential transit mode options for the corridor such as light rail, commuter rail, HOV, and bus rapid transit.

The Southern Maryland Mass Transit Alternatives Study, Tri-County Council for Southern Maryland, May 1996

The study developed and evaluated a number of transit alternatives for the MD 5/US 301 Corridor. The alternatives included:

- No Build
- Transportation System Management (TSM)
- Pope's Creek Branch Commuter Rail (White Plains to US 50/Bowie)
- MD 5/US 301 Barrier Separated HOV (La Plata to I-495)
- MD 5/US 301 Concurrent Flow HOV (La Plata to I-495)
- MD 5/US 301 Busway (La Plata to Branch Avenue Metrorail Station)
- MD 5/US 301 Light Rail Transit (White Plains to Branch Avenue Metrorail Station)

After each alternative was evaluated, the Light Rail Alternative had the highest level of projected ridership and the strongest opportunity to support and reinforce local land use and economic development objectives of Charles County and Prince George's County. Short-term recommendations include continued increase in bus service along the corridor and to begin right-of-way preservation for a future light rail line.

Southern Maryland Regional Strategy 1999

The Strategy is the regional comprehensive plan of action, and was adopted by the three Boards of County Commissioners. In the chapter of Potential System Improvements of the Strategy's Action plan for Transportation, it recommends the Region to prepare for eventual implementation of light rail service in the MD 5 corridor.

WMATA Regional Bus Study Evaluation of Service Strategies, WMATA, December 2001

This study recommends service extensions to existing The Bus and Metrobus lines in Prince George's County as well as new bus lines within the service area. Southern Maryland is outside of the service area. The report also discussed "RapidBus" BRT, but the only corridors carried for further study were Annapolis Road, East-West Highway, University Boulevard, and US 1.

MD 5 / US 301 / MD 228 Corridors Park and Ride Feasibility Study, Maryland Transit Administration, October 2001

In October 2001, a park and ride sit0e identification report was completed for the MD 5/US 301 corridor. The *MD 5/US 301/MD 228 Corridors Park and Ride Feasibility Study* identified a total of 17 potential sites in the MD 5 corridor and a total of 16 sites were identified in the US 301 and MD 228 corridors. Potential sites were recommended for short-term (immediate to 3 years implementation), mid-term (3 years to 10 years implementation), long-term (beyond 10 years implementation period) and sites not to be considered. Within the MD 5 corridor, 4 sites were recommended for short-term, 1 site for mid-term and 7 sites for long-term implementation. Five sites were not to be considered. Within the US 301 and MD 228 corridors, 6 sites were recommended for short-term, 1 site for mid-term, and 2 sites for long-term implementation. Seven sites were not to be considered.

Prince George's County Five – Year Transit Development Master Plan, September 1995

The report represents a five-year master plan for public transit service in Prince George's County. The report included recommendations and cost estimates for funding services through Year 2000. This was an update to the *Prince George's County Bus Transportation Study* completed in 1988. Over the five-year implementation period, a number of improvements and new services were proposed and include:

- FY 1997 – Implement new Route 30 – Clinton/Camp Springs/Southern Maryland Medical Center.
- Over the five-year period continued implementation of service improvements to The Bus and Metrobus services.

Hughesville to Lexington Park Right-of-Way Preservation Study, Maryland Department of Transportation, January 1999

MDOT analyzed the feasibility of acquiring and preserving right-of-way for future transit use from Hughesville in Charles County to Lexington Park in St. Mary's County along the Popes Creek Railroad. The study recommends that the railroad right-of-way (ROW) be preserved. Short-term measures to protect the ROW include:

- A survey to identify boundaries
- Maintain ROW and enforce county ordinance which prohibits unauthorized use
- Adopt setback requirements for adjacent property
- Discontinue providing easements
- Reduce existing road crossings
- Develop a formal policy to protect ROW
- Consider an interim trail use
- Encourage utility companies to adjust utility lines for future transit as part of routine maintenance

Long term measures include:

- Title Report to identify what property acquisitions are required
- Work with utility companies on long term transit planning
- Coordinate highway improvements with the SHA for possible joint ROW use
- Design future major road crossings as underpasses or overpasses
- When needed, prepare a detailed planning and preliminary engineering analysis of transit needs and options
- Based on the planning and preliminary engineering analysis, acquire additional right-of-way

Charles County Comprehensive Transportation Network Strategy, March 2002

The strategy adopts guiding principles for state roads, county roads, mass transit , land use and other transportation options for the transportation network in Charles County. The guiding principles include:

- Provide timely transportation infrastructure to accommodate the county's growth.
- Coordinate transportation planning with land use planning as described in the 1997 Charles County Comprehensive Plan and Subarea Land Use Plans.
- Create a transportation network which maximizes our citizens choices of transportation options.
- Minimize negative impacts of transportation projects on existing neighborhoods and businesses.

Charles County Comprehensive Plan, Charles County Office of Planning, June 1997

The plan is an update to the 1990 Charles County Comprehensive plan and includes updates to plans to direct and manage future development in Charles County. The plan recommends that a multi-modal transportation system be developed and maintained to provide safe and efficient movement of people and goods within Charles County. The plan recognizes the Southern Maryland Mass Transit Alternatives Study and recommends preservation of right-of-way along Popes Creek Railroad to allow for construction of a light rail transit line and rail station locations. The plan also recommends additional park and ride locations along US 301.

Prince George's County General Plan, M-NCPPC, October 2002

The plan guides future development in Prince George's County by providing comprehensive countywide recommendations. This plan stipulates transportation is a major element of Smart Growth, a long-term statewide policy to which Prince George's County is committed. Achieving quality development is fiscally difficult, at best, unless that development is sited, and is at sufficient densities, to capitalize on all of the county's transportation assets, particularly the mass transportation infrastructure. Transportation Objectives: Increase average automobile occupancy by 25 percent by 2025; Reduce average commuter vehicle miles traveled countywide by 25 percent by 2025; Increase the proportion of transit trips by 25 percent by 2025; Reduce private automobile dependency, particularly for SOV trips.

Subregion V Master Plan and Sectional Map Amendment, M-NCPPC, September 1993

Subregion V covers an 88.5 square mile section of Prince George's County bounded on the north by Andrews Air Force base; to the east by Piscataway Creek, Boys Village, North Keys Power Line and the Cedar Point Railroad; to the south by Charles County; and to the west by

the Potomac River. The plan provides an overview of previous, planned and proposed development in the Subregion V area. The plan also recommends the infrastructure improvements required to support the project development and population growth in Subregion V. The plan considers recommendations to enable residents and employees to minimize vehicular miles traveled as well as total travel time, in order to reduce air pollution, conserve fuel, and limit the unproductive use of time by Subregion V travelers. Additionally, the plan encourages the use of mass transit, ridesharing, parking for transit and carpools, and express bus facilities. Transit should provide both an alternative to the automobile and desirable level of service to its users.

The Heights Master Plan and Sectional Map Amendment, M-NCPPC, November 2000

The Heights area encompasses Planning Area 76A and includes the Town of Forest Heights and the Town of Morningside. The area is bounded to the north by Suitland Parkway, to the south by the Capital Beltway, and to the west by the District of Columbia line and the Potomac River. This plan reinforces the use of public transportation by proposing an integrated transportation system composed of roadways, Metrorail, bus system and trails. It is important that residents have accessibility to the stations without the need of an automobile.

Metropolitan Washington Council of Governments, Regional Mobility and Accessibility Study, November 2000

The purpose of the study was to evaluate options that would improve mobility and accessibility between the regional activity centers and regional core. The study identified additional highway and transit facilities and capacity, including Potomac River crossings. The study also included the development of a regional congestion management program, including coordinated regional bus service, improved local transit, ridersharing, reducing single occupant vehicle travel and traffic operation improvements.

Dulles Final Alternatives Analysis Report, Virginia Department of Rail and Public Transportation, May 2001

This study was recommended for review by a member of the Project Coordination Committee to aid in the development of a BRT transit alternative. The study evaluated the potential transit mode alternatives to be considered for the Dulles Corridor. The study suggested that BRT would be a cost-effective, high quality rapid transit technology that could be implemented in the Dulles corridor more quickly than other alternatives under consideration. Because ridership would not be as high as that for a Metrorail alternative, and because of several capacity constraints, BRT may not perform effectively as a long-term, stand-alone transit option for the Dulles Corridor. However, the mode could perform well as an interim step to rail, introducing rapid transit service in the corridor at a lower cost.

2. DESCRIPTION OF EXISTING CONDITIONS

TRANSIT SERVICES

Transit services within the MD 5/US 301 corridor include commuter buses operated by MTA; Metrorail and Metrobus operated by WMATA, The Bus operated by Prince George's County, and VanGO operated by Charles County. In addition, there are numerous park and ride lots in the corridor. The existing transit services and park and ride lots are described in detail in the following sections:

MTA - Commuter Bus

MTA manages the operation of five commuter routes within the study area providing express trips to Washington, D.C. from Charles and St. Mary's Counties. Other transit service is operated within the study area by the Locally Operated Transit Systems (LOTS); however, this study will focus on the MTA commuter bus services to Washington, D.C. MTA commuter bus service operates weekday peak period express service from park and ride locations with no local stop service. MTA bus service in southern Maryland along the MD 5/US 301 corridor began with the implementation of the 905 bus line in 1995. Following this implementation, the service quickly increased as the demand for the service increased. In March 1996, the 905 bus route carried over 1,200 riders per day. By March 1999, ridership had increased to over 1,800 riders per day. To accommodate the increased demand, MTA implemented the 901 bus route. Demand for commuter bus service has continued to grow and in March 2002, the 903 bus route was added. Just recently in March 2003, the 907 and 909 bus routes were also added. Currently, all five routes follow similar paths along the MD 5/US 301 corridor alternating between park and ride locations in St. Mary's and Charles counties. Although the 901, 903, 905, 907, and 909 routes travel through Prince George's County to/from the Washington D.C. metro area, those routes do not provide service in Prince George's County. Under an established agreement, bus service in Prince George's County is provided by Prince George's County The Bus and WMATA's Metrobus services.

The five MTA commuter bus routes described below are the baseline for the development and evaluation of the transit alternatives in this study.

901 Commuter Bus Route

- Operates between La Plata/Waldorf and Washington, D.C.
- Stops at Food Lion, Smallwood Village Center, U.S. 301, and St. Charles Town Center park and ride lots.
- Provides twenty-four (24) AM and twenty-four (24) PM peak trips with one (1) mid-day trip.
- Operates Monday through Friday with an average headway of seven (7) minutes.
- One-way travel time is 1 hour 42 minutes from the end of the line to the last stop in downtown Washington, D.C.

903 Commuter Bus Route

- Operates between Charlotte Hall/Waldorf and Washington, D.C.
- Stops at Charlotte Hall and Mattawoman-Beantown park and ride lots.
- Provides five (5) AM and five (5) PM peak trips.
- Operates Monday through Friday with headways of thirty (30) minutes.

- One-way travel time is 1 hour 25 minutes from the end of the line to the last stop in downtown Washington, D.C.

905 Commuter Bus Route

- Operates between Charlotte Hall/Waldorf and Washington, D.C.
- Stops at California, Charlotte Hall, and Mattawoman-Beantown park and ride lots.
- Provides nineteen (19) AM and nineteen (19) PM peak trips with one mid-day trip.
- Operates Monday through Friday with headways of thirty (30) minutes.
- One-way travel time is 1 hour 35 minutes from the end of the line to the last stop in downtown Washington.

907 Commuter Bus Route

- Operates between La Plata/Waldorf and Washington, D.C.
- Stops at Laurel Springs Park, Food Lion, South Potomac Church, U.S. 301 and St. Charles Town Center park and ride lots.
- Provides eight (8) AM and eight (8) PM peak trips.
- Operates Monday through Friday with headways of twenty (20) minutes.
- One-way travel time is 1 hour 45 minutes from the end of the line to the last stop in downtown Washington, D.C.

909 Commuter Bus Route

- Operates between California/Charlotte Hall and Washington, D.C.
- Stops at California and Charlotte Hall park and ride lots.
- Provides five (5) AM and five (5) PM peak trips.
- Operates Monday through Friday with headways of thirty (30) minutes.
- One-way travel time is 2 hours 5 minutes from the end of the line to the last stop in downtown Washington, D.C.

WMATA - Metrorail and Metrobus

The Washington Metropolitan Area Transit Authority provides Metrorail, local and express bus services in the Washington D.C. metro region and the surrounding counties. WMATA operates three bus routes and one Metrorail line within the study area which includes Metrobus C11, C13 & C18 and Metrorail Green Line.

Green Line – Part of the 103-mile Metrorail System

- Provides Metrorail service from Branch Avenue Metrorail Station to Washington, D.C. and the entire region.
- Operates seven days a week from approximately 5:00 AM to 12:30 AM.
- Operates with peak headways of 3 to 5 minutes and off-peak headways of 10 minutes.
- One-way travel time from Branch Avenue Metrorail Station to Downtown Washington, D.C. is approximately 22 minutes.

WMATA Metrobus Routes C11, C13

- Provides Metrobus service from Branch Avenue Metrorail Station to Clinton Park and Ride Lot.

- Operates weekdays during AM and PM peak period with both local and express service. Express trips are provided in the peak period in the commute direction and local service is provided in the reverse commute direction.
- Operates with peak headways of 30 minutes.
- One-way travel time is approximately 19 minutes for local and 15 minutes for express trips.

WMATA Metrobus Route C18

- Provides Metrobus service from Branch Avenue Metrorail Station to Waldorf.
- Operates off-peak service weekdays and Saturday from 8:00 AM to 9:30 PM with service every 30 minutes.
- One-way travel time is approximately 1 hour 9 minutes.

Prince George's County - The Bus

Prince George's County Department of Public Works and Transportation provides local bus and paratransit services via The Bus. The Bus provides local bus service with connections to WMATA Metrorail stations located in the county. Three of The Bus routes operate within the study area - Routes 30, 32 and 33.

Route 30 – Camp Springs/Clinton

- Operates between the Branch Avenue Metrorail Station and the Southern Maryland Medical Center.
- Provides 33 trips per day Monday through Friday from 6:00 AM to 7:15 PM.
- Provides buses every 40 minutes during peak travel times and every 80 minutes during off-peak travel times.

Route 32 – Camp Springs/Iverson Mall

- Operates between Naylor Road Metrorail Station and the Clinton Park and Ride Lot.
- Provides 41 trips per day from Monday through Friday from 5:30 AM to 8:02 PM.
- Provides buses every 40 minutes.

Route 33 – Camp Springs/Owens Road

- Operates between Old Branch Avenue and Southern Avenue Metrorail Station.
- Provides 41 trips per day from Monday through Friday from 6:00 AM to 7:53 PM.
- Provides buses every 40 minutes.

Charles County - VanGO

Transit service in Charles County is administered by the Charles County Department of Community Services and operated by VanGO. VanGO services operate as loop routes rather than linear routing. The primary routes that provide transit service in the study corridor are listed below:

The Red Line – La Plata Loops A & B

- Operates Monday through Saturday from 8:00 AM to 10:00 PM.
- Provides service approximately every 50 minutes for a total of 16 daily trips for Loop A and 13 daily trips for Loop B.

The Green Line – St. Charles East Loops A & B

- Operates Monday through Saturday from 7:10 AM to 10:00 PM.
- Provides service approximately every 50 minutes for a total of 14 daily trips for Loop A and 14 daily trips for Loop B.

The Blue Line – Business Loops A & B

- Operates Monday through Saturday from 8:00 AM to 9:30 PM.
- Provides service approximately every 50 minutes for a total of 12 daily trips for Loop A and 16 daily trips for Loop B.

The Yellow Line – St. Charles West

- Operates Monday through Saturday from 7:10 AM to 10:00 PM.
- Provides service approximately every 50 minutes for a total of 18 daily trips.

The Gray Line – Pinefield

- Operates Monday through Saturday from 7:10 AM to 10:00 PM.
- Provides service approximately every 50 minutes for a total of 18 daily trips.

PARK AND RIDE LOTS

Currently, there are ten park and ride lots in the MD 5/US 301 corridor with transit service. TABLE 2-1 below identifies the capacity and utilization of the park and ride lots in the MD 5/US 301 corridor.

TABLE 2-1
Existing Park and Ride Lots

Park & Ride	Served By	# Spaces	% Utilization
Clinton	The Bus, Metrobus	424	100+
St. Charles Town Center	MTA	400	100+
U.S. 301	MTA	438	98
Food Lion (La Plata)	MTA	79	100+
Laurel Springs Park	MTA	136	29
Smallwood Village	MTA	125	92
Mattawoman-Beantown	MTA	550	83
South Potomac Church	MTA	200	16
Charlotte Hall	MTA	505	86
California	MTA	40	95

Source: MTA 2001 Parking Facility Manual

See FIGURE 2-1 for a map of existing transit services in the MD 5/US 301 Corridor.

ROADWAYS

The overall project limits extend from the Branch Avenue Metrorail Station, inside the Capital Beltway, to White Plains. The MD 5/US 301 Transit Service Staging Plan project has been separated into four segments based on the land use and potential location of the proposed transit alternatives and the typical sections of the transit alternatives. The following text describes the existing roadways within each segment.

Segment 1 – Branch Avenue Metrorail Station to I-495

The Branch Avenue Metrorail Station is located in the northeast quadrant of the I-495 and MD 5 Interchange. Access to the station from MD 5 is provided along three roads that run perpendicular to MD 5 into the station: Auth Road, Metro Access Road, and Auth Way. The SHA is currently working on roadway plans to improve the access to the Metrorail station. The improvements could include a partial grade-separated interchange at MD 5 and Metro Access Road. The configuration will allow the southbound MD 5 traffic to exit on the median side along a ramp that will rise and cross over northbound MD 5 and connect to Metro Access Road. Traffic exiting the Metrorail station westbound along Metro Access Road will also cross over the northbound MD 5 traffic and turn left onto an entrance ramp that merges with southbound MD 5. Northbound MD 5 traffic entering the station will use Auth Road and traffic exiting the station that is heading south or west will use Auth Way.

In addition, SHA is redesigning ramps in the I-495/MD 5 Interchange to eliminate some of the weaving conditions. Currently, I-495/Capital Beltway passes underneath MD 5 in a full cloverleaf interchange. The modifications will include a new flyover ramp for westbound inner loop traffic to head south on MD 5. Consequently, the loop ramp in the northwest quadrant will be eliminated. The outer ramp in the southwest quadrant will be modified to connect to the flyover ramp before they both enter southbound MD 5. Finally, the loop ramp in the northeast quadrant will be modified to include a direct connection for the traffic exiting the Metrorail Station from Auth Place.

Segment 2 – MD 5 from I-495 to T.B.

MD 5 from I-495 to Woodyard Road is a six-lane (three per direction) limited access roadway that is approximately four miles long. The outside shoulders vary between 8 feet and 10 feet and the inside shoulders vary between 4 feet and 10 feet. The median in this section varies from 20 feet to 40 feet, except for the area near Camp Springs where the median is reduced to approximately 5 feet to provide turn lanes into Old Alexander Ferry Road.

MD 5 from Woodyard Road to Brandywine Spine Road is a four-lane (two per direction) highway with a median that varies from approximately 26 feet to 76 feet wide. The outside shoulders vary between 6 feet and 10 feet and the inside shoulders vary between 4 feet and 12 feet.

Currently, MD 5 has two grade separated interchanges located at Allentown Road and Woodyard Road. Manchester Drive crosses over MD 5 just east of I-495 and provides a connection for the communities on the east and west sides of MD 5. These communities have access to MD 5 right-in / right-out ramp configurations for both northbound and southbound MD 5. Ramp movements are also provided to the north from Old Alexander Ferry Road and from the north to Old Branch Avenue. In addition, there are six at-grade signalized intersections located at Coventry Way, Schultz Road, Surratts Road, Burch Hill Road, Moores Road, and Brandywine Spine Road. SHA has preliminary design plans to provide interchanges at Surratts Road, Burch Hill Road, and Brandywine Spine Road.

Segment 3 – MD 5/US 301 from T.B. to Mattawoman Road

This segment is approximately 3.25 miles long and the typical section includes four lanes (two per direction) along MD 5 from Brandywine Spine Road to the merge of MD 5/US 301. From the merge to Mattawoman Road, there are six lanes (three per direction) plus auxiliary lanes to accommodate right and left turn movements. The outside shoulder is typically 10 feet to 12 feet wide and the inside shoulder varies between 2 feet and 6 feet.

There are two signalized intersections: Accokeek Road, just east of Brandywine Spine Road, and McKendree Road. Southbound US 301 crosses over MD 5 and merges into MD 5 east of Accokeek Road. There is an unsignalized intersection that provides access to an auto parts recovery center, and four additional median breaks for other driveways. The intersection of Mattawoman-Beantown Road is a T-intersection with MD 5 heading to the east. A signal controls the southbound left turns and the northbound through movements. TABLE 2-2 lists the approximate median widths in the MD 5 corridor.

TABLE 2-2
MD 5 Median Widths

Segment	Median Width	Description
1A	-	Branch Avenue Metrorail Station to Capital Beltway
2A	30'-35'	I-495 to Allentown Road
2B	40'	Allentown Road to Camp Springs/San Antonio Blvd.
2C	0'-5'	Camp Springs/San Antonio Blvd. to Old Alexander Ferry
2D	20'	Old Alexander Ferry to Schultz Road
2E	26'	Schultz Road to Surratts Manor Drive
2F	76'	Surratts Manor Drive to Surratts Road
3A	62'	Surratts Road to Brandywine Spine Road

Segment 4 – US 301 from Mattawoman Road to De Marr Road

US 301 and MD 5 are the same roadway, eight lanes (four per direction) for approximately 5.25 miles until MD 5 splits and turns east. US 301 then continues south for approximately 3 miles to De Marr Road where Segment 4 ends. The typical section for US 301 is six lanes (three per direction) from the intersection of MD 5 to south of Smallwood Drive. A 12-foot outside auxiliary lane runs along US 301 in some areas and it is used as a deceleration / right turn lane and an acceleration lane for the extensive adjacent development. The median width is 30 feet wide and includes single and double left turn lanes at the intersections.

The typical section from Smallwood Drive to De Marr Road is four lanes (two per direction) with a combination shoulder / auxiliary lane that is used for deceleration, right turns, and acceleration. There is minimal roadside development in this area.

The following nine intersections are signal-controlled with left turn lanes in the median: Mattawoman Road, Pierce Road, Acton Lane, Berry Road, Plaza Drive, St. Patrick's Drive, St. Charles Towne Center, Smallwood Drive, Substation Rd and Billingsley Road. In addition, there are five unsignalized intersections that have median turn pockets to allow turning vehicles to move out of the through lane while waiting for a gap in the through traffic:

a shopping center entrance, Holly Tree Road, Vernon Road, Holly Lane, and Waldorf Shopper's World. The segments can be seen on the plan sheets in Appendix A.

See FIGURE 2-2 for an overview map of the project segments along the MD 5/US 301 Corridor.

RAIL FREIGHT SERVICE

The Pope's Creek Railroad runs from its northern terminus point at the Northeast Corridor connection in Prince George's County at Bowie to the southern terminus point in St. Mary's County at Morgantown. The predominantly single-track freight line parallels highway US 301 to the west from Bowie to Upper Marlboro and crosses to the east from Upper Marlboro to Morgantown. Along the rail corridor four sidings are located at Collington, Marlboro, Wine and La Plata. The sidings are typically used to store empty rail cars. However, the sidings at Upper Marlboro and La Plata are currently out of service. The rail line is currently owned by CSXT, which operates two loaded coal trains southbound and two empty coal trains northbound each day to /from the PEPCO power generating plant in Morgantown. In addition to the daily CSXT freight service, local freight service operates twice a week. The local freight rail carries lumber serving industrial parks adjacent to the rail line in White Plains and Waldorf.

ENVIRONMENTAL RESOURCES

Existing historic sites, wetlands, floodplains, parklands and schools were inventoried in previous studies. For this study, the previously inventoried resources are identified on SHEETS 1 to 9, located in the appendix. The resources inventoried are from studies dating back to 1996 and earlier. These studies used sources such as National Wetland Inventory (NWI) wetland maps and Federal Emergency Management Administration (FEMA) maps and were not field verified. Therefore, detailed project planning would need to investigate and update resources.

Resources shown on the Transit Alternative SHEETS 1 through 9 in the appendix include the following:

- Floodplains
- Historical Resources
- Parklands
- Schools
- Streams
- Wetlands

3. PLANNED/PROGRAMMED IMPROVEMENTS

The following is a list of planned or programmed highway and transit improvements for the MD 5/US 301 Corridor. This list was compiled from the Maryland Consolidated Transportation Plan 2003-2008, Charles County Capital Improvements Program (CIP), Prince George's County CIP and discussions with MTA and SHA. Planned and programmed improvements were taken into consideration in the development of the capital cost estimates for each alternative. See FIGURE 3-1 following page 3-5 for a map of planned/programmed improvements.

MARYLAND CONSOLIDATED TRANSPORTATION PROGRAM 2003-2008

Transit Improvements

- **Project – Locally Operated Transit Systems (LOTS) Capital Procurement Project (Local Jurisdictions)**

  The MTA provides funding for local jurisdictions in rural and small urban areas for transit vehicles, equipment and facilities. In addition, the MTA provides funding to Baltimore City, Anne Arundel, Baltimore, Calvert, Carroll, Frederick, Harford, Howard, Montgomery, and Prince George's Counties, and the Tri-County Council for Southern Maryland to promote the use of carpools, vanpools and transit.

  Status – Ongoing

  Funding – part of federal grant

- **Project – Prince George's County Local Bus Program**

  Description – Funding for approximately 5 buses to replace existing vehicles in the County's The Bus fleet.

  Status – The FY 2003 grant for the County's capital bus program is currently under development.

  Funding - $4,201,000 is programmed over the next six years.

- **Project – Procure Lift-Equipped Over-the-Road Coaches**

  Description – Initiate acquisition of 50 over-the-road lift-equipped coaches. These coaches will be utilized by private contractors to provide commuter bus service in the Baltimore and suburban Maryland regions.

  Status – Delivery of 25 coaches is complete. Another 25 coaches are expected in FY 2004.

  Funding - $39,600,000 is funded through 2005.

- **Project – Southern Maryland Transportation Analysis**

  Description – In addition to this study, the project includes funding for feasibility studies and conceptual engineering for 6 proposed commuter bus park and ride lots.

  Status – Studies for new commuter bus park and ride lots underway.

Funding - $4,921,000 is programmed for studies, advanced land acquisition and new park ride lots through 2006.

▶ Project – Park and Ride Expansion

Description - Based on the *MD 5/US 301/MD 228 Corridors Park and Ride Feasibility Study*, MTA has begun project planning or engineering for three park and ride lots along the MD 5/US 301 corridor in Waldorf, La Plata and Charlotte Hall.

Status – The proposed 570 space lot in Waldorf and 500 space lot in Charlotte Hall is in project planning and are expected to be open spring/summer 2006. The 360 space lot in La Plata is in final design and right-of-way acquisition and is expected to open by spring/summer 2005. Project planning for a fourth park and ride in New Market has been put on hold.

Funding – Funding is pending.

Highway Improvements

▶ Project – US 301 South Corridor Transportation Study

Description – A multi-modal corridor study to consider highway/transit improvements from south of La Plata to US 301/US 50 interchange in Bowie and to Branch Avenue Metrorail Station. Includes preparing appropriate environmental approval for recommended alternates. Study being coordinated with other studies to identify short/long range transit alternatives. Bicycle and pedestrian access will be included in the study.

Status – Project planning underway. Right-of-way to be reinitiated in budget year.

Funding - $17,262,000 is programmed for planning and right-of-way over the next six years.

▶ Project – System Preservation, Minor Projects Program – Prince George's County

Description – Branch Avenue at Surratts Road; provide additional thru lane northbound.

Status – Construction scheduled for FY 2003.

Funding - $1,232,000

▶ Project – I-95/I-495, Capital Beltway

Description – Study to improve access from MD 5 (Branch Avenue) and I-95/I-495 to Branch Avenue Metrorail Station. Pedestrian and bicycle facilities will be included where appropriate.

Status – Final engineering underway.

Funding - $7,833,000 is programmed through 2005 for engineering.

Project – MD 5, Branch Avenue

Description – Study to upgrade access controls and widen existing MD 5 to a 6 lane expressway from the US 301 interchange at T.B. to north of the I-95/I-495 Capital Beltway (10.50 miles). Interchanges at Surratts Road and Burch Hill/Earnshaw Drive are not funded in the current program. Bicycles and pedestrians will be accommodated where appropriate.

Status – Project Planning complete.

Funding – Additional funding is not programmed.

Project – MD 5, Branch Avenue

Description – Study to construct a new interchange at MD 5, MD 373 and Brandywine Spine Road Relocated. Bicycle and pedestrian access will be included as part of this project where appropriate.

Status – Final Engineering on hold pending progress on connecting development roadways.

Funding - Additional funding is not programmed.

Project – MD 5 – Burch Hill Road Interchange

Description – The project is a diamond type interchange that would be constructed approximately 1,200 feet south of the existing Burch Hill Road/Earnshaw Drive intersection with MD 5.

Status – Final design has yet to be started for this project, however, a final alternate design 'E' has been selected for this project. Project on hold.

Funding – Additional funding is not programmed.

Project – MD 5 - Surratts Road Interchange

Description – The purpose of the project is to design the roadway alignment to eliminate the "S" curve on Surratts Road east of MD 5 by shifting the interchange north of the present intersection with MD 5.

Status – The selected alternate phase design has been completed. Build option 'E' has been selected as the alternate design. This project is on hold.

Funding – Additional funding is not programmed.

CHARLES COUNTY

Highway Improvements

Project – Acton Lane Improvements Phases II and III

Description – Dualization of Acton Lane between US 301 and Western Parkway.

Status – Bids for Phase II were due in August 2002.

Funding – $5,825,000 is programmed over the next four years.

Project – Cross County Connector – Phases IV through VII

Description – The road will provide the major east/west route across the County. It will provide a link between Waldorf and Bryans Road as well as points east and south via MD 5. It is identified as a short-range construction project in the Charles County Comprehensive Plan.

Status – The County has concurrence from the US ACOE on the Cross County alignment, but not the wetland permits.

Funding - $46,550,000 is programmed over the next five years.

Project – Rosewick Road Phases I through III

Description – Construction of a four-lane roadway from the existing intersection with Washington Avenue to US 301.

Status – Consistent with the Charles County Comprehensive Plan and listed as a priority in the FY 2003 CIP.

Funding - $12,482,000 is programmed for engineering, right-of-way and construction over the next four years.

Project – Western Parkway Phases 1A, 1B, II and III

Description – An extension of Western Parkway 1,300 feet to the north of MD 228 to serve the Waldorf Technology Park. This project is included as an important local road network link in the Charles County Comprehensive Plan. It provides an alternative north/south route and is a critical link for the Waldorf Technology Park. This project is also assumed by the Route 301 Task Force studies to be an existing part of the road network and will provide needed capacity.

Status - Consistent with the Charles County Comprehensive Plan and listed as a priority in the FY 2003 CIP.

Funding - $10,732,000 is programmed for engineering, right-of-way and construction over the next five years.

Project – Talbot Street

Description – Extend Talbot Street to US 301 in conjunction with the Town of La Plata's visioning plan and the Courthouse Expansion project.

Status – Ready for construction.

Funding - $2,000,000 is programmed for construction in FY 2003.

Project – White Plains Business Park Road Improvements

Description – Improvements at the intersection of US 301 and De Marr Road with double left turn lanes from southbound US 301 onto Eastbound De Marr Road, double left turn lanes from westbound De Marr Road onto southbound US 301, thru/right turn from westbound De Marr Road onto northbound US 301, and signal improvements. The limit of improvements on De Marr Road extends just beyond the CSXT railroad crossing.

Status – Not approved in the current five-year plan.

PRINCE GEORGE'S COUNTY

- **Project – Additional Bus Service**

  Description – Five new bus routes are planned for The Bus in 2003. The location of these routes is to be determined.

- **Project – Auth Road**

  Description – Auth Road is listed as a roadway project supporting economic development and revitalization. Specific improvements are to be determined.

FEDERAL RE-AUTHORIZATION REQUEST

The Governor's office has requested $29 million in federal reauthorization for the completion of planning, design and construction of The Southern Maryland Commuter Bus Initiative. Components of the initiative include construction of parking facilities in Charles, St. Mary's and Calvert counties, acquisition of over-the-road coaches to provide the service, and intersection improvements at key locations along the MD 5 corridor from Waldorf to Branch Avenue Metrorail Station just inside the Capital Beltway.

4. TRANSIT ALTERNATIVES

OVERVIEW

The alternatives developed for evaluation in this study were built upon previous planning studies identified in Section 1 of this report. Particularly relevant is the work of the US 301 Multi-modal Transportation Study, completed by the US 301 Task Force in 1996, and the work of the US 301 POC. This work was especially relevant because it analyzed the entire MD 5/US 301 corridor, and it looked at both transportation and land use issues.

The US 301 Study recommended land use goals such as a better housing/job balance in the corridor, as a means to minimizing the impact of increased growth and congestion.

The US 301 Study also recommended a balanced transportation solution, with improvements recommended for both highways and transit. As part of the transit portion of the solution, the US 301 Task Force recommended continuing improvements and expansion for existing WMATA, Prince George's County The Bus, Charles County VanGO, and MTA commuter bus services in the corridor, as well as consideration for light rail in the future, contingent upon growth and densities in the corridor occurring that could support rail transit.

The Enhanced Commuter Bus (ECB) and Light Rail Transit (LRT) recommendations were therefore the starting point in determining possible transit alternatives for this staging plan. Enhanced existing bus service and light rail represent the low and high ends of potential transit solutions. The ECB alternative requires an increase in contracted bus service, but the capital costs are relatively small with new parking lots and minor improvements to enhance travel time. LRT represents the highest cost alternative, with all new rail construction, new rail cars, stations, maintenance facilities and all associated capital and operating costs.

For the staging plan, two additional alternatives are added for evaluation: Bus Rapid Transit High Level (BRT-HIGH) and Bus Rapid Transit Moderate Level (BRT-MOD). The intent of adding these alternatives is to provide a better range of transit alternatives for analysis, both from the scale of the capital cost investment, as well as the speed and quality of service. The BRT-HIGH is intended to provide the highest level of quality bus service, both in terms of travel time, reliability and maximum separation from traffic. This option most clearly is similar to light rail service, and also would have the highest capital cost of any bus alternative. The BRT-MOD alternative seeks to provide an improvement to operating buses in mixed traffic, while recognizing that total separation is very costly and difficult to achieve. This alternative therefore seeks to improve bus transit travel in the corridor wherever practical and thereby improve transit service quality, while not requiring the larger capital investment of BRT-HIGH and LRT.

ECB has limited capacity to accommodate the future ridership growth. BRT-HIGH and LRT have the greatest potential to serve the transit need.

Four alternatives are therefore presented in this Staging Plan Study.

- **Alternative 1 – Enhanced Commuter Bus (ECB):** Expands the existing commuter bus service, with additional park and ride lots and additional bus service.

- **Alternative 2 – Bus Rapid Transit – Moderate Level (BRT-MOD):** Expands existing bus service from park and ride lots with a new MD 5/US 301 shuttle bus service, expanded express and limited stop service, and adds shared and exclusive lanes to improve transit travel time. New park and ride lots and stations are added.
- **Alternative 3 – Bus Rapid Transit – High Level (BRT-HIGH):** Provides the highest quality and level of bus service with exclusive bus lanes and grade separation. New shuttle service is combined with additional express and limited stop express bus service. This alternative closely simulates rail transit for the corridor and would operate in the same exclusive right-of-way as LRT.
- **Alternative 4 – Light Rail Transit (LRT):** Provides bi-directional light rail service using exclusive right-of-way along the Pope's Creek Railroad Corridor and an exclusive right-of-way in the MD 5 corridor, directly connecting to Branch Avenue Metrorail Station. Additional park and ride lots would be added as well as new shuttle bus service to the LRT stations.

Each of the alternatives is presented in detail in this chapter. For each alternative there is a description of the Alternative, including physical attributes, service characteristics, ridership projection, capital costs and operating costs.

Each of the alternatives is separated into four segments. These segments are constant for each alternative. They were chosen due to the different physical characteristics that they contain and the manner in which they relate to transit operations for each segment. The segments are:

- **Segment 1:** Branch Avenue Metrorail Station to I-495
- **Segment 2:** MD 5 from I-495 to T.B.
- **Segment 3:** MD 5/US 301 from T.B. to Mattawoman Road
- **Segment 4:** US 301/Pope's Creek Railroad from Mattawoman Road to De Marr Road

The methods used for estimating ridership, and calculating operating and capital costs for the alternatives are described in this Overview section, followed by the detailed descriptions of each alternative.

Express Toll Lanes

With the high capital costs of many highway and transit projects as well as the potential environmental impacts and limited available right-of-way for new alignments, many highway departments are realizing that they can no longer build their way out of congestion. As highway congestion continues to grow throughout Maryland, transportation officials are developing viable transportation management strategies that would help to provide additional highway capacity.

One concept being considered is Express Toll Lanes. Express Toll Lanes provide opportunities for eligible vehicles to maintain free-flow travel on designated lanes outside of general purpose lanes. Persons traveling in the Express Toll Lanes pay a fee for the use of the lane, and the level of usage in the lanes is regulated by the amount of the toll. Access to

Express Toll Lanes are from designated locations and may be restricted by time-of-day. Due to the nature of Express Toll Lanes, their application is suited for limited access highways such as interstates and parkways. Some of the potential benefits of Express Toll Lanes include:

- Offering commuters a new viable travel choice and an alternative to spending valuable time stuck in traffic.
- Travel time savings and travel time reliability for all area motorists.
- Access for buses to free-flowing lanes – thus offering similar travel time savings, travel time reliability, and enhanced operating efficiency for transit.
- The ability to manage demand and use of the lanes to keep traffic flowing smoothly and maintain the alternative over time, even as overall demand increases.
- The ability to generate revenue directly from users to help pay for construction, maintenance, and operation of the lanes.
- Improved traffic conditions and safety – by reducing traffic congestion and congestion-related accidents.
- Community and environmental benefits, including the potential for reduced impacts of highway expansion as well as possible air quality improvements resulting from lowered vehicle emissions on the less congested highway lanes.

The concept of Express Toll Lanes could be applicable to the MD 5 corridor between the Branch Avenue Metrorail Station and T.B. This section of MD 5 is a controlled access highway with planned grade separated interchanges at Brandywine and Surratts Roads. However, Express Toll Lanes are not suitable along the US 301 corridor from T.B. to White Plains. The numerous signalized intersections and access/egress into retail centers, neighborhoods and business centers reduces the opportunity to implement Express Toll Lanes.

Ridership Forecasting Methodology

The ridership modeling effort was conducted using Metropolitan Washington Council of Governments (MWCOG) Version 1 MINUTP, Round 6.2 land use and FY 2001-2006 TIP/CLRP Air Quality Conformity Network. The year 2000 based small-area land use forecasts were selected as the travel forecasting model input. The base network zone structure, from the MWCOG model, was refined to provide accurate data results. To ensure agreement on the travel demand modeling methodology the PCC formed a Modeling Sub-Committee with representatives from MWCOG, WMATA, MTA, Tri-County Council, Charles County and Prince George's County versed in modeling applications. The Modeling-Sub-Committee met independent of the PCC to develop the modeling methodology.

Transit ridership modeling is primarily a function of the network design and transit service parameters and attributes. Year 2003 was selected for modeling validation and comparison to existing MTA southern Maryland commuter bus ridership data. The TSSP modeling runs assumed parameters based on the service characteristics defined for each transit alternative.

After a successful validation run of the year 2003, all year 2025 transit alternatives were tested and corridor ridership projections were developed for year 2025 full-build of each transit alternative based on level of service, trip travel time and the existing highway network and 2025 highway network. The low end of the range is based on the standard bias constant used in the MWCOG travel demand model for bus modes, while the high end of the range represents what might be expected with the more attractive service offered by the BRT-MOD, BRT-HIGH and LRT alternatives. The higher bias constants were derived from the respective service characteristics of each alternative. The resultant ridership forecasts yielded 2025 average weekday home-based work trips for each alternative.

Operating Cost Methodology

Operating costs for the ECB, BRT-MOD and BRT-HIGH were calculated based on a FY 2003 per revenue mile cost of $8.50/mile. This cost is based upon current MTA contracts for the provision of private contractor operated commuter bus service. The per revenue mile cost includes all associated overhead and maintenance expenses for operating the service.

As reported in the 2001 National Transit Database Report (NTD), the cost per revenue vehicle mile for MTA light rail transit is $11.67/revenue vehicle mile. The per revenue vehicle mile cost includes all associated overhead and maintenance expenses for operating the service. This cost is used for light rail operating costs for this study.

Bus and rail operating costs assume weekday service based on a 255 day annualized service year and weekend service based on 104 day annualized service year. Passenger revenue is not taken into consideration in the operating costs for any alternative.

Capital Cost Methodology

Capital cost estimates in 2003 dollars are calculated for each alternative. The methodology uses standard MTA cost estimating procedures. Quantities are calculated for major categories as follows, for bus and rail alternatives as appropriate:

- Erosion and Sediment Control
- Drainage and Stormwater Management
- Guideway
- Structures
- Roadway Status
- Park and Ride Lots
- Traffic Signals
- Vehicles
- Traction Power
- Grade Crossings
- Trackwork
- Signalization
- Environmental Mitigation
- Right-of-Way
- Utilities

Standard MTA costs for administration, design, contingencies, construction management and force account work are included.
Contingencies used are as follows:

a. 40% Planning Contingency
b. 25% Right-of-Way Contingency
c. 10% Construction Contingency
d. 10% Future Changes and Claims
e. 8% Construction Inspection and CRS
f. 10% Consultant Design Fee
g. 2.5% MTA Administration
h. 3.5% MTA Construction Cost
i. 15% Drainage and Stormwater Management
j. 2% Erosion and Sediment Control
k. 15% Preliminary Engineering

The cost estimates are based on the concept level definition of the alternatives and a unit price of the alternatives and a unit price or lump sum per category. Cost estimates were developed without survey information, preliminary engineering or design. Those values would only be determined based upon engineering studies.

ALTERNATIVE 1 – ENHANCED COMMUTER BUS (ECB)

Alternative 1 would include the expansion of MTA Commuter Bus Service in the corridor. This expansion would be an increase in the level of service of existing routes 901, 903, 905, 907, and 909 that currently provide service from select park and ride locations in Charles County and St. Mary's County to the Washington D.C. metro area or the provision of new routes. Since this study does not include detailed service planning for new routes, the level of service upgrades for transit are being represented as an increase in service on the existing routes. However, over the next twenty years, it is likely that new routes would be added. The projected trips would be in the peak direction, with service to downtown Washington, D.C., in the AM peak and service to Charles and St. Mary's counties in the PM peak. The infrastructure improvements beyond the planned and programmed highway improvements would also include queue bypass lanes along US 301 and additional park and ride lots. Reverse commute service would not be provided. Seven park and ride lots in Charles County and two park and ride lots in St. Mary's County would be served under this alternative. Transit service in Prince George's County would continue to be provided by The Bus and WMATA Metrobus and Metrorail. See FIGURE 4-1 for map of Alternative 1 – ECB bus routes.

As of Spring 2003, the five southern Maryland commuter bus routes provide 124 daily trips (including 1 mid-day trip on 901 and 1 mid-day trip on 905) with an average headway of 7 minutes for the 901, 30 minutes for the 903, 10 minutes for the 905, 20 minutes for the 907, and 30 minutes for the 909. By year 2025, the build ECB alternative would double the amount of service on the five commuter lines to 246 daily trips (including mid-day trips on 901 and 905). Headways would be decreased to an average of 4 minutes for the 901, 10 minutes for the 903, 5 minutes for the 905, 8 minutes for the 907 and 10 minutes for the 909.

Reverse commute trips would not be included in this alternative. TABLE 4-1 below details the number of bus trips by route:

TABLE 4-1
2025 Enhanced Commuter Bus (ECB) Daily Trips by Route

Route	AM	Mid-Day	PM
901	40	1	40
903	14	0	14
905	36	1	36
907	18	0	18
909	14	0	14

Currently, private contractors provide nearly all buses for commuter service. The contractors effectively are paid for depreciation on those buses through their service contracts with MTA. To provide ADA compliant service in the corridor, MTA has also leased approximately 10 ADA accessible over-the-road coaches to contractors providing commuter bus service in the corridor for service to disabled customers. The 2003-2008 CTP allocates the purchase of an additional 25 ADA accessible over-the-road coaches in FY 2004, with 5 to10 coaches being placed into service in this corridor. For the purposes of this study, it is assumed that the MTA would begin to operate the ECB service requiring the purchase of new buses and the construction of a bus maintenance yard.

Segment 1 – Branch Avenue Metrorail Station to I-495

For the purposes of this study, the ECB alternative would not provide service to the Branch Avenue Metrorail Station. Routes 901, 903, 905, 907, and 909 would continue to operate directly to/from Washington, D.C. Buses would remain on MD 5 through this segment and would not stop at additional stations. In the future, MTA may consider terminating some ECB trips at the Branch Avenue Metrorail Station.

Segment 2 - MD 5 from I-495 to T.B.

The 901, 903, 905, 907, and 909 would continue to operate on the existing routes to and from Washington, D.C. along MD 5 and take advantage of the previously planned/programmed highway widening and grade separation at intersections in this area. The buses would not stop at additional stations in this segment.

If Express Toll Lanes were implemented by SHA along the MD 5 corridor, the proposed ECB transit option could take advantage of the benefits of the Express Toll Lanes. By using the Express Toll Lanes, buses would benefit with a decrease in the overall travel time as well as more consistent and reliable travel times for commuters on the southern Maryland commuter bus routes.

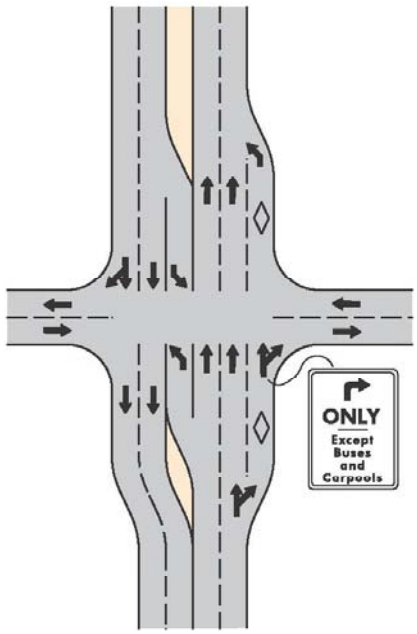
Segment 3 – MD 5/US 301 from T.B. to Mattawoman Road

The 901, 903, 905, 907, and 909 would continue to operate on the existing routes to and from Washington, D.C. along MD 5/US 301 and take advantage of the previously planned/programmed highway widening and grade separation at intersections in this area. The buses would not stop at additional stations in this segment.

Segment 4 – US 301 from Mattawoman Road to De Marr Road

Routes 903, 905, and 909 would continue south on MD 5 to the terminus points in St. Mary's County at Charlotte Hall and California. Routes 901 and 907 would continue south on US 301 to the terminus points in La Plata.

FIGURE 4-2
Queue Bypass at Intersection



These buses would operate in mixed traffic and consequently, they would be subject to the same traffic signal delays and congestion as the automobiles. By providing priority treatment, buses could reduce travel times by avoiding the typical mixed traffic delays and congestion. Queue bypasses are one type of priority treatment that would allow buses to avoid vehicle queues at signalized intersections by providing a special travel lane or shoulder use near the intersections to avoid vehicle queues. However, when the level of service would drop below an acceptable level, the proposed priority treatments would become less effective. FIGURE 4-2 depicts a typical queue bypass at an intersection. The ECB alternative would consider the use of queue bypass lanes along the US 301 Corridor from the Brandywine area to La Plata. Along this segment of US 301 there are sixteen signalized intersections where this could be considered:

- Mattawoman Road
- Pierce Road/VFW Road
- Holly Tree Avenue
- Acton Lane
- Leonardtown Road (MD 228)
- Plaza Drive
- St. Patricks Drive
- St. Charles Towne Center Entrance
- Smallwood Drive
- Billingsley Road
- De Marr Road
- Willetts Crossing Road/Marshall Corner (MD 227)
- Turkey Hill Road/Washington Avenue
- Mitchell Road
- Heritage Green Parkway
- Hawthorne Drive (MD 225)

The Transportation Cooperative Research Program (TCRP) report *Transit Capacity and Quality of Service Manual*[1] suggests that the minimum one-way peak hour bus volumes required to support the implementation of queue bypasses is 10 to 15 buses with a minimum

[1] Transit Capacity and Quality of Service Manual, Part 2 Bus Transit Capacity, Transportation Research Board, 1996

one-way peak hour passenger volume of 400 to 600 passengers. Considering the existing and assumed level of service for the ECB alternative, queue bypasses should be considered as a viable option to avoid expected delays and congestion improving operating time.

Stations/Park and Ride Lots

The ECB alternative would continue to operate closed-door service from select park and ride lots in Charles County and St. Mary's County. As demand and service levels grow, additional park and ride lots could be added to provide an adequate number of parking spaces for the commuter service. As of spring 2003, there are 2,333 parking spaces available among the nine park and ride locations. Three new park and ride locations are currently in design and would be completed by Spring/Summer 2006 pending funding. These lots will be replacing two smaller lots currently leased to MTA and would provide an additional 1,226 parking spaces. TABLE 4-2 lists the existing and planned park and ride locations.

Additional park and ride spaces are not needed beyond the planned 2006 expansion shown in TABLE 4-2. However, locations of future park and ride lots should be coordinated with future development to provide convenient access for residents and customers and provide convenient access to the highways for the buses.

TABLE 4-2
Existing and Planned Park and Ride Locations

Park and Ride	Number of Spaces
Food Line, La Plata (to be replaced)	79*
Smallwood Village Center (to be replaced)	125*
St. Charles Town Center Mall	400
Charlotte Hall Shopping Center	505
Mattawoman-Beantown	550**
California	40
Laurel Springs Park	136
South Potomac Church	200
US 301 Park and Ride	438
Waldorf (proposed)	512
La Plata (proposed)	360
Charlotte Hall (proposed)	500
Total	**3,641**

*Not included in total number of parking spots.
**An expansion of 275 parking spaces is anticipated at Mattawoman-Beantown.

Operating Costs

Assuming that the existing commuter bus routes would be expanded to the levels shown in TABLE 4-1 the estimated operating miles on the five routes would increase from 6,094 miles/day to 12,198 miles/day for the ECB alternative. Assuming $8.50/mile and 255 service days/year, the annualized operating cost would increase from $13,200,000 for the existing service to $26,440,726 for the ECB alternative.

Capital Costs

The estimated capital cost for Alternative 1 is $255,045,224. See Appendix B-1 for a capital cost summary sheet.

Ridership Projections

The projected total daily boardings for Alternative 1 is 6,800 per day.

ALTERNATIVE 2 – BUS RAPID TRANSIT – MODERATE LEVEL (BRT-MOD)

Alternative 2 would provide a moderate level bus rapid transit system between the Branch Avenue Metrorail Station and the terminus points in Charles County and St. Mary's County. It would operate three types of service: express, limited and shuttle.

Express service would operate similar to the existing commuter bus service by serving selected park and ride lots in Charles County and St. Mary's County and operate closed-door service to the Branch Avenue Metrorail Station. With this alternative, Routes 901, 903, 905, 907, and 909 would be modified to serve the Branch Avenue Metrorail Station instead of downtown Washington, D.C. Limited service would operate similar to the express service; however, bus routes would stop at additional stations along the US 301 corridor between White Plains and Brandywine. North of the Brandywine Station, the limited service would operate closed door to the Branch Avenue Metrorail Station. Shuttle service would operate as a local shuttle providing local stop service between the Branch Avenue Metrorail Station and White Plains. Both express and limited services would operate as peak-commute, one-directional service. The shuttle service would operate as two directional all day service.

Express and limited service would operate during the AM and PM peak periods. Headways would vary with 3 - 15-minute headways during the AM and PM peak periods only (5:00 AM – 8:00 AM, 3:00 PM to 6:00 PM) only with headways varying from 3 –10 minutes. Shuttle service would operate from 5:00 AM to midnight with 15-minute headways during the peak periods and 30-minute headways for the shuttle during off peak periods. Weekend local shuttle service would operate from 7:00 AM to 10:00 PM on 30-minute headways. Over-the-road coaches would be utilized for the express and limited service and standard transit style buses would be utilized for the shuttle service. With the addition of the express, limited and shuttle services, average headways of 3-10 minutes are achieved for the five routes during the peak periods, for a total of 426 trips provided (see TABLE 4-3).

TABLE 4-3
Bus Rapid Transit-Moderate (BRT-MOD)
Daily Trips by Route

Route	AM	Mid-Day	PM	Night	Weekend
901	62	-	62	-	-
903/905	51	-	51	-	-
907	30	-	30	-	-
909	28	-	28	-	-
Shuttle Bus	22	34	22	6	64

Segment 1 – Branch Avenue Metrorail Station to I-495

The bus service through this section would access the Branch Avenue Metrorail Station from MD 5. The improvements proposed by SHA, which include a grade-separated intersection at Metro Access Road, would facilitate this connection. Three potential options have been identified for buses entering the station:

- Buses would weave across the general-use lanes and utilize Auth Road.
- Buses would weave across the general-use lanes from the median and utilize a new exit ramp that would connect to Metro Access Road.
- Buses would utilize a new exit ramp in the median of MD 5 that would connect to SHA's proposed bridge over northbound MD 5.

When buses are leaving the Metrorail station they could use Metro Access Road, cross over northbound MD 5, and turn left onto the new median entrance ramp. Additional engineering would be required to determine the most feasible access options because the right-of-way in this area is constrained.

The Branch Avenue Metrorail Station would be the only station stop in this segment. The buses would utilize the existing transit bus stalls, which provide convenient access to the Metrorail platform without infrastructure improvements. TABLE 4-4 identifies the proposed station locations for BRT-MOD in Segment 1.

TABLE 4-4
BRT-MOD Segment 1 Stations

Proposed Station Area	Approximate Location
Branch Avenue Metrorail Station	Auth Road – Inside I-495

Segment 2 - MD 5 from I-495 to T.B.

In this 7.1-mile segment, the limited, express and shuttle buses would utilize an exclusive bus lane in the median of MD 5 between I-495 and T.B. The bus lane would be 12 feet wide and would be separated from the travel lanes by a 2-foot striped buffer (see FIGURE 4-3). The bus lane would also have a 10-foot left shoulder, where possible. In most locations along the MD 5 corridor, this widened section could be built within the existing median and inside shoulders; however, there would be locations where the median would be constrained and the highway would have to be widened to the outside of the existing roadway. Between Camp Springs/San Antonio Boulevard and Old Alexander Ferry Road, the median is approximately 5 feet wide and widening to the outside would be required. Between Old Alexander Ferry Road and Schultz Road, the median is approximately 20 feet wide and a small amount of outside widening would be required, depending on the existing inside shoulder widths.

Exclusive median bus lanes were selected over shoulder bus lanes to minimize right-of-way impacts and to avoid conflicts with ramps exiting and entering MD 5. If Express Toll Lanes were implemented by SHA along the MD 5 corridor, the proposed BRT-MOD transit option could take advantage of the benefits of the Express Toll Lanes. By using the Express Toll Lanes, buses would benefit with a decrease in the overall travel time as well as more consistent and reliable travel times for commuters on the southern Maryland commuter bus

routes. If Express Toll Lanes are implemented by 2015, BRT–MOD could be implemented at that time.

Segment 3 – MD 5/US 301 from T.B. to Mattawoman Road

Three service routes would operate through this segment. Express buses would continue south along MD 5/US 301 and the limited and shuttle buses would access the proposed Brandywine Spine Road to serve the planned development in the Brandywine area. The typical section along MD 5/US 301 would remain the same as Segment 2, a 12-foot wide exclusive bus lane separated from the travel lanes by a 2-foot striped buffer (see FIGURE 4-3). Currently, the median is wide enough to allow for inside widening. However, coordination would be necessary with other future projects in the corridor, such as the relocation of Brandywine Spine Road and MD 5 widening.

Beginning near Cedarville Road and continuing through the MD 5/Mattawoman Road intersection area, buses would be required to move into the general use lanes due to the southbound triple left turn.

Limited and shuttle bus operation would serve a proposed park and ride location near the proposed development in the Brandywine area. The location of this park and ride would serve well to attract passengers traveling north prior to the heavy congestion of MD 5. TABLE 4-5 identifies the proposed station locations for BRT-MOD in Segment 3.

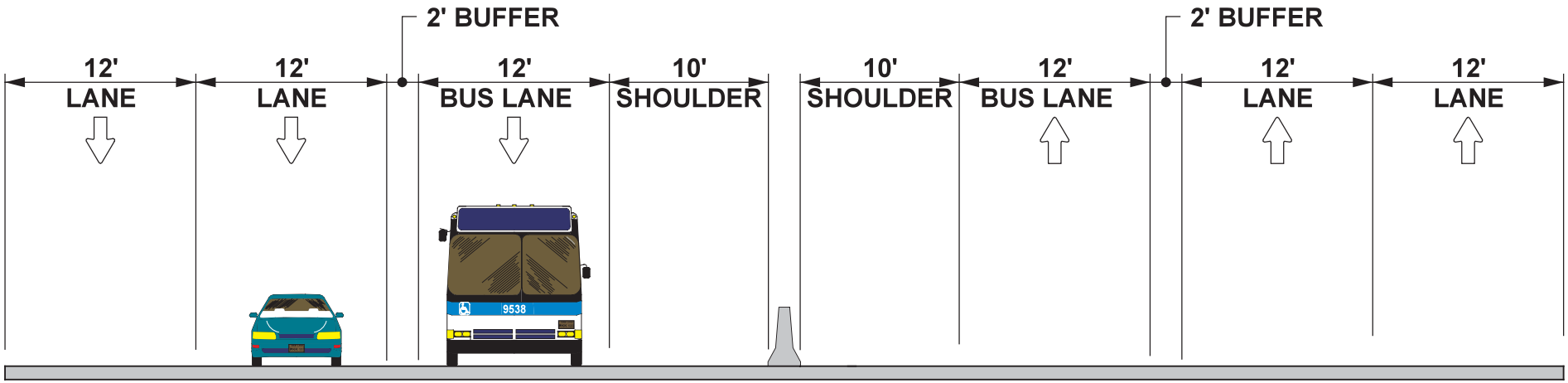
TABLE 4-5
BRT-MOD Segment 3 Stations

Proposed Station Area	Approximate Location
Brandywine	East of the Triangle Industrial Park and west of the U.S. Military Reservation Brandywine Communication Site

Segment 4 – US 301 from Mattawoman Road to De Marr Road

The buses in the BRT-MOD alternative would travel in the US 301 corridor south to De Marr Road in White Plains. Routes 905 and 909 would continue south on MD 5 to terminus points at Charlotte Hall and California in St. Mary's County. Routes 901 and 907 would continue south on US 301 to terminus points in La Plata.

This corridor has 16 at-grade signalized and non-signalized intersections. The median is approximately 30 feet wide, with left turn lanes at most intersections. TABLE 4-6 lists the intersections in the US 301 corridor.



SEGMENT 2 AND SEGMENT 3

SCALE: 1" = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 2 - BUS RAPID TRANSIT - MOD		
MTA Maryland	DATE: OCTOBER 2004	FIGURE 4 - 3

K:/PROJECTS/US301/DGN/TSSP2.DGN

TABLE 4-6
BRT-MOD Segment 4 Intersections

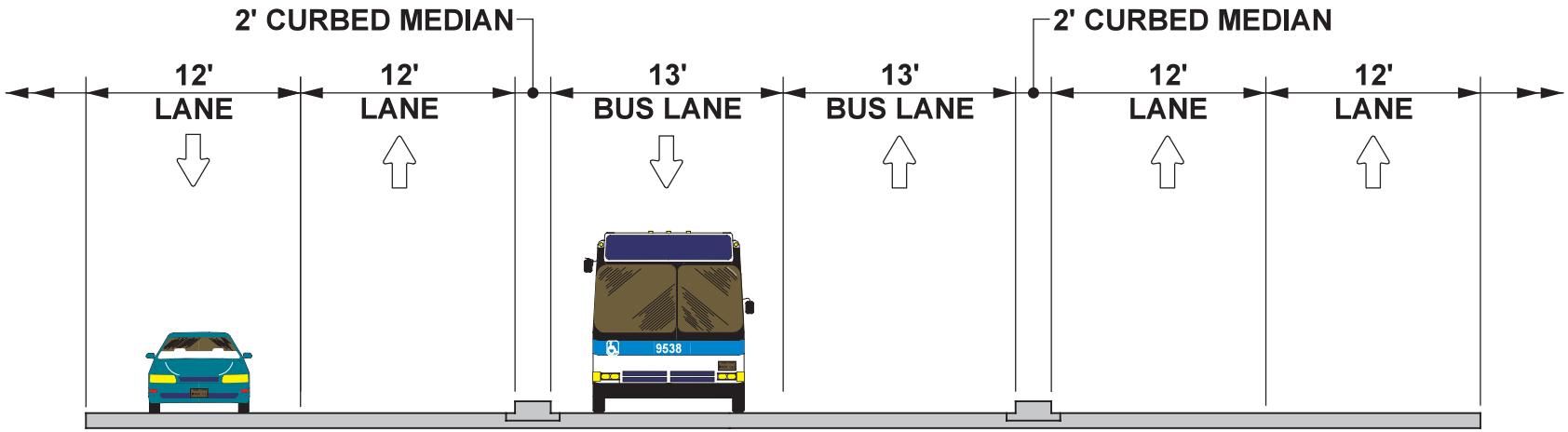
Intersection	Intersection Type	Median Width	# of Left Turn Lanes	
			NB 301	SB 301
US 301 and MD 5/Mattawoman Road (north)	-	0	3	0
US 301 and MD 5/Mattawoman Road (south)	B	30'	1	1
US 301 and Substation Road	C	30'	1	1
US 301 and Pierce Road	B	30'	1	1
US 301 and Shopping Center Entrance	C	30'	1	1
US 301 and Holly Tree Road	C	30'	1	1
US 301 and Acton Lane	B	30'	1	1
US 301 and Vernon Road	C	30'	1	1
US 301 and Holly Lane	C	30'	1	1
US 301 and Berry Road	A	30'	2	2
US 301 and Waldorf Shopper's World	C	30'	1	1
US 301 and Plaza Drive	A	30'	1	2
US 301 and St. Patrick's Drive	B	30'	1	1
US 301 and St. Charles Towne Center	A	30'	2	0
US 301 and Smallwood Drive	A	30'	2	2
US 301 and Billingsley Road	B	30'	1	1

Intersection types: A – Signalized intersection with double left turn lanes
B – Signalized intersection with single left turn lanes
C – Turn pockets (unsignalized)

Two options for traveling the US 301 corridor have been examined: buses can travel in the median of the highway or on the shoulders/auxiliary lanes. In the median, BRT-MOD would consist of two 13-foot exclusive bus lanes separated from the general use lanes by a 2-foot raised median (see FIGURE 4-4). At each intersection, the bus and the general-use lanes would shift to accommodate the left-turn lanes (see plan view sketch of intersection configurations, FIGURES 4-5 and 4-6). The widening required at the intersections appears feasible at most intersections, however, additional engineering would be required to determine the right-of-way impacts. Some of the left turn pockets could be eliminated to reduce the right-of-way impacts; however, those vehicles would need to make u-turn movements at the signals. Operationally, the buses would move with the through movement and signal pre-emption would not occur. Buses would be required to shift horizontally through the intersections by one or one half lane.

A second option would locate the BRT-MOD bus lanes on the existing shoulders and auxiliary lanes (see FIGURE 4-7). Additional pavement or widening would not be needed for this option; however, there would be an operational conflict between the BRT-MOD through movements and the cars seeking to enter or exit US 301 via the auxiliary lanes.

Along with the existing and proposed park and ride lots in Charles and St. Mary's counties (see TABLE 4-7), five additional stations/stops (see TABLE 4-8) would be created to serve the limited bus service. Based on the location of the bus lanes (either on the shoulder or in

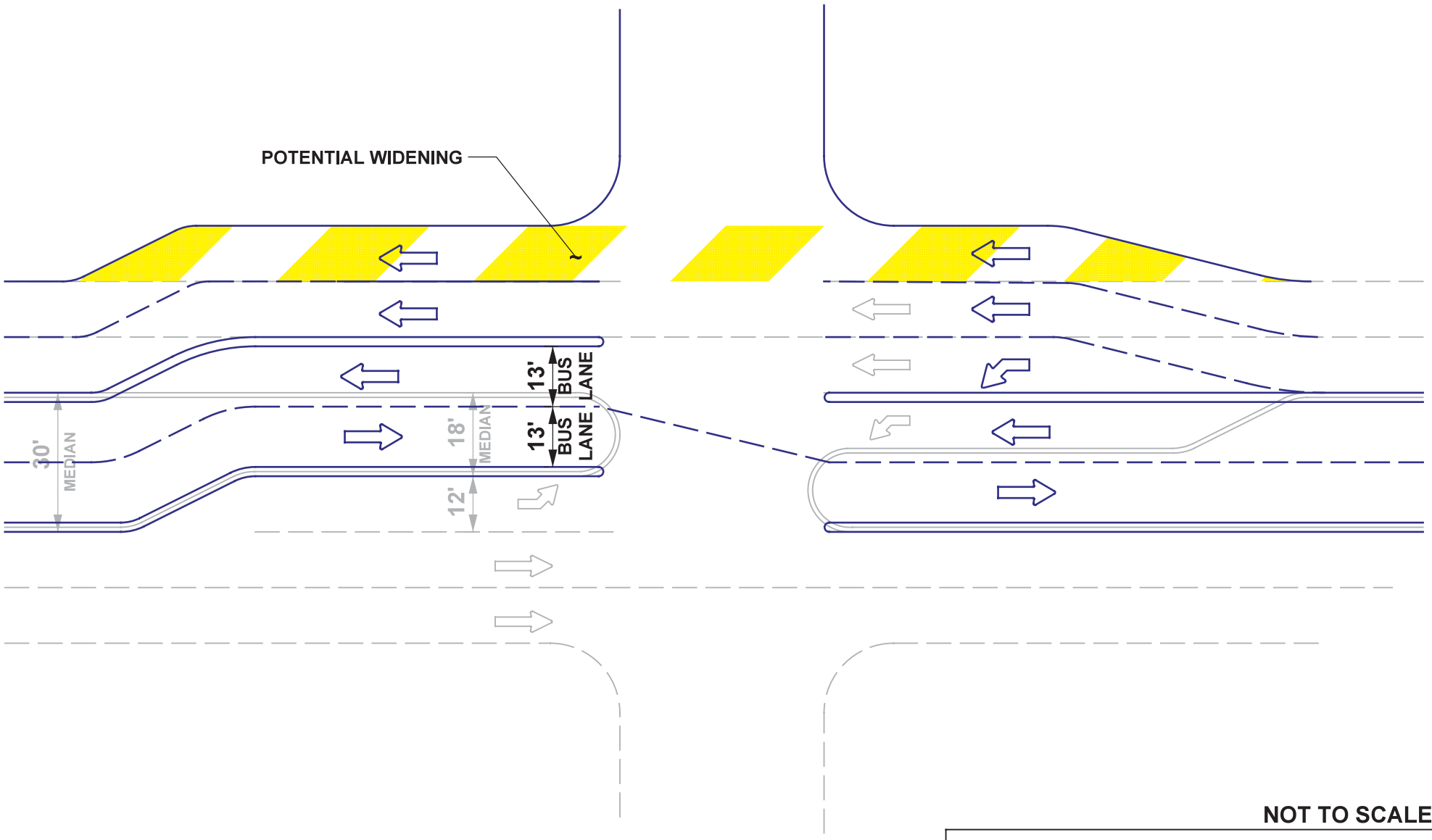


SEGMENT 4 - US 301 MEDIAN

SCALE: 1" = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 2 - BUS RAPID TRANSIT - MOD		
MTA Maryland	DATE: OCTOBER 2004	FIGURE 4 - 4

K:/PROJECTS/US301/DGN/TSSP4.DGN



NOT TO SCALE

SEGMENT 4 - INTERSECTION TYPE B
SINGLE LEFT TURN LANE

MD 5/US 301 TRANSIT SERVICE STAGING PLAN

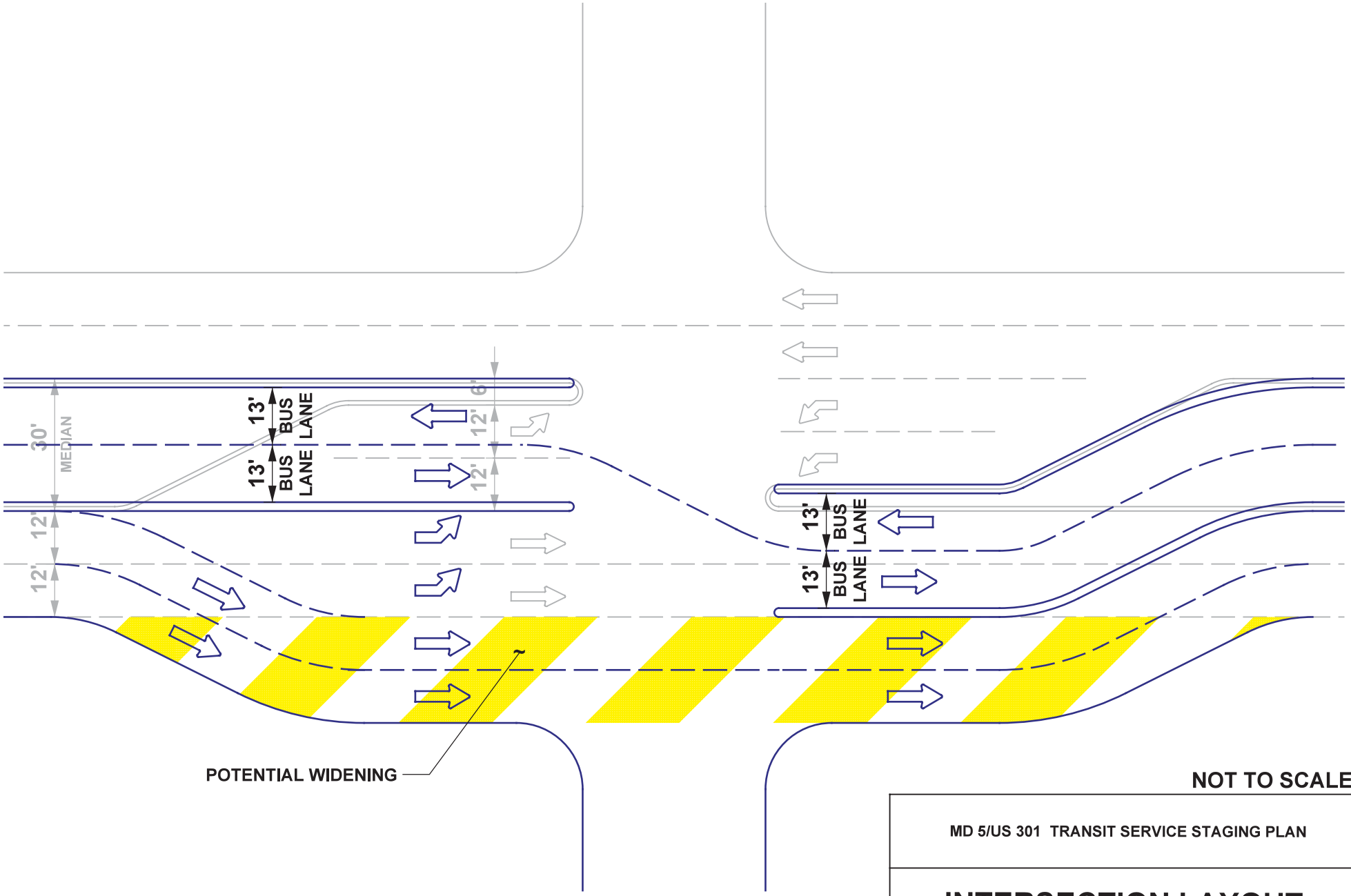
INTERSECTION LAYOUT

MTA Maryland

DATE: OCTOBER 2004

FIGURE 4 - 6

K:/PROJECTS/US301/DGN/SK-TSSP2.DGN



NOT TO SCALE

SEGMENT 4 - INTERSECTION TYPE A
DOUBLE LEFT TURN LANES

MD 5/US 301 TRANSIT SERVICE STAGING PLAN

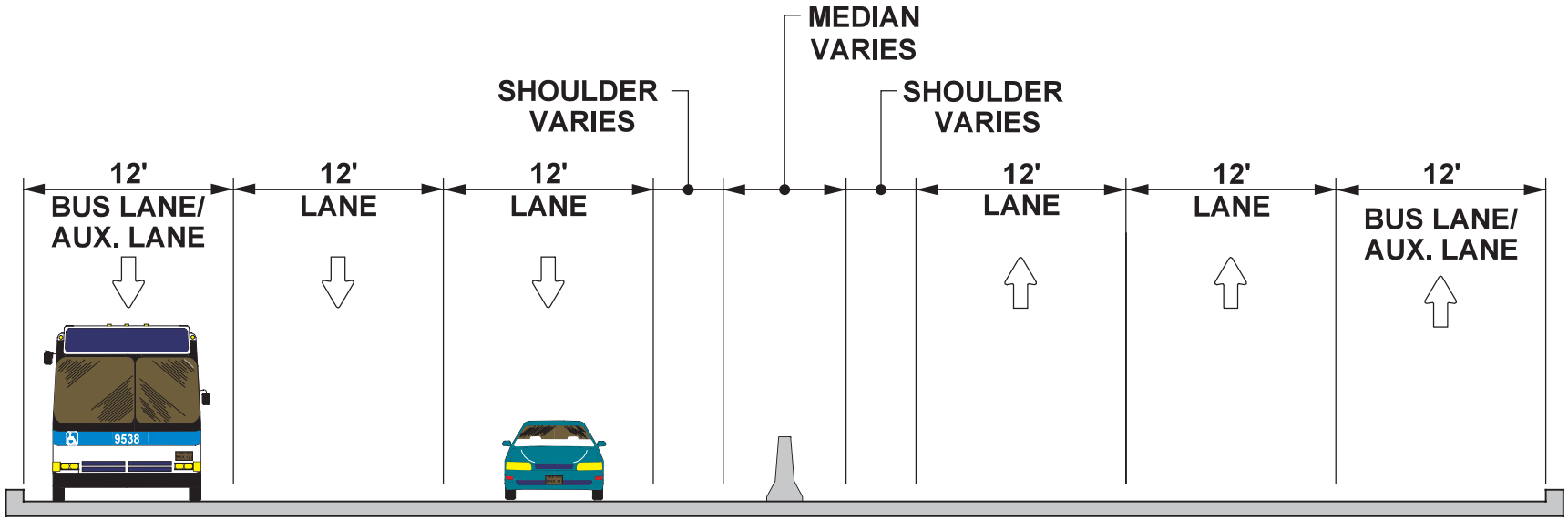
INTERSECTION LAYOUT

MTA Maryland

DATE: OCTOBER 2004

FIGURE 4 - 5

K:/PROJECTS/US301/DGN/SK-TSSP1.DGN



SEGMENT 4 US 301 - SHOULDER/AUXILIARY LANE

SCALE: 1" = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 2 - BUS RAPID TRANSIT - MOD		
MTA Maryland	DATE: OCTOBER 2004	FIGURE 4 - 7

K:/PROJECTS/US301/DGN/TSSP5.DGN

the median) pedestrian access would need to be provided to the station from both sides of US 301. In the more heavily congested areas of US 301, the traffic signals are near or at capacity and adding pedestrian signals to provide access across US 301 could cause additional backups. In these locations, overhead pedestrian bridges could be considered to connect the parking areas with the median or shoulder station stops.

TABLE 4-7
BRT-MOD Segment 4 Park and Ride Lots

Park and Ride	Number of Spaces
Food Line, La Plata (to be replaced)	79*
Smallwood Village Center (to be replaced)	125*
St. Charles Town Center Mall	400
Charlotte Hall Shopping Center	505
Mattawoman-Beantown	550**
California	40
Laurel Springs Park	136
South Potomac Church	200
US 301 Park and Ride	438
Waldorf (proposed)	512
La Plata (proposed)	360
Charlotte Hall (proposed)	500
Total	**3,641**

*Not included in total number of parking spots.
**An expansion of 275 spaces is anticipated at Mattawoman-Beantown.

TABLE 4-8
BRT-MOD Segment 4 Stations

Proposed Station Area	Approximate Location
Pinefield	West of White Oak Village
Waldorf	Leonardtown Road
St. Charles	Smallwood Drive
Billingsley Road	Billingsley Road
White Plains	De Marr Road

Operating Costs

Assuming $8.50/mile, 426 daily trips, 255 weekday service days/year and 104 weekends service days/year, the annualized operating cost is approximately $32,040,591 for the BRT-MOD alternative.

Capital Costs

The estimated capital cost for Alternative 2 is $433,670,496. See Appendix B-2 for a capital cost summary sheet.

Ridership Projections

The range for total daily boardings for Alternative 2 is 19,500 –23,600 per day.

ALTERNATIVE 3 – BUS RAPID TRANSIT – HIGH LEVEL (BRT-HIGH)

Alternative 3 proposes a high level Bus Rapid Transit (BRT-HIGH) system that includes a major investment in infrastructure to provide fast and reliable transit service between southern Maryland and the greater Washington, D.C. metropolitan area. The alignment covers an area of high density and high congestion and would operate three levels of service (express, limited, and shuttle) along a 20-mile exclusive two-lane busway between the Branch Avenue Metrorail Station and White Plains, providing transit access to the entire Washington, D.C. metropolitan area. Express and limited service would follow the current commuter bus routes, but would include increased frequency of buses and improved travel times. The shuttle service would emulate a light rail service, making stops at all twelve stations along the busway and providing reverse commute and midday trips.

The type and level of service provided is identical to the BRT-MOD alternative. The difference between the BRT-MOD and BRT-HIGH is the higher capital cost to achieve separation of right-of-way. The BRT-HIGH service would operate daily from 5:00 AM to midnight with 3–10 minute headways during the AM and PM peak periods (5:00 AM to 8:00 AM, 3:00 PM to 6:00 PM) and 30-minute headways for the shuttle during off peak hours and provide trips in both directions. Weekend shuttle service would operate from 7:00 AM to 10:00 PM on 30-minute headways. Over-the-road coaches would be utilized for the express and limited service and standard transit style buses would be utilized for the shuttle service. TABLE 4-9 shows the bus service for this alternative.

TABLE 4-9
Bus Rapid Transit-High (BRT-HIGH)
Daily Trips by Route

Route	AM	Mid-Day	PM	Night	Weekend
901	62	-	62	-	-
905	51	-	51	-	-
907	30	-	30	-	-
909	28	-	28	-	-
Shuttle Bus	22	34	22	6	64

Approximately ninety percent of the estimated BRT-HIGH ridership is expected to arrive at the stations via single occupant automobile. It is estimated that the entire system would require approximately 14,500 parking spaces to accommodate the projected average daily ridership on the busway by year 2025. It may be possible for surface lots to be constructed at some stations; for cost estimating purposes it is assumed both structured and surface parking lots would be constructed.

Segment 1 – Branch Avenue Metrorail Station to I-495

BRT-HIGH service is proposed to originate at the Branch Avenue Metrorail Station and connect with the MD 5 corridor. The surrounding area is already heavily developed both commercially and residentially, limiting the potential options for access to the station. Considering the existing infrastructure and development it is unlikely that an at-grade or elevated structure would be viable to provide access to/from the Branch Avenue Metrorail Station for the proposed BRT-HIGH service. Consequently, a tunnel would be proposed to

connect the busway from the Branch Avenue Metrorail Station to MD 5. The 0.75-mile long tunnel would daylight near Manchester Drive. The only station in this segment would be the Branch Avenue Metrorail Station. However, detailed project planning should investigate the possibility of accessing Branch Avenue Metrorail Station without the use of a tunnel. If a viable alternative can be developed capital costs could be reduced. TABLE 4-10 lists the BRT-High station stops in Segment 1.

TABLE 4-10
BRT-HIGH Segment 1 Stations

Proposed Station Area	Approximate Location
Branch Avenue Metrorail Station	Auth Road – Inside I-495

Segment 2 - MD 5 from I-495 to T.B.

In this segment, the BRT-HIGH alternative would continue south from I-495 and it would operate in an exclusive-use busway either in the median of MD 5 or on one side of the highway. Service through this segment would continue approximately 7.1 miles to the area of T.B.

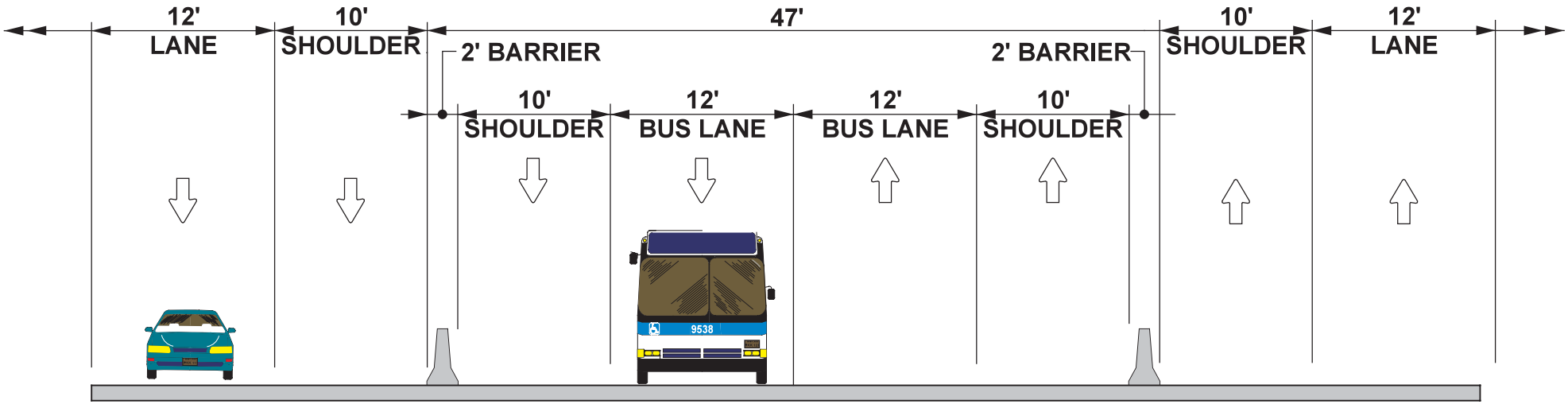
The BRT-HIGH busway would be separated from the existing general-use lanes by concrete barriers. The at-grade busway would consist of two 12-foot lanes, 10-foot shoulders, and concrete barriers (see FIGURE 4-8), for a total width of 47 feet. In areas where the existing median and inside shoulders is less than 47 feet, the busway would be elevated above the existing roadway and supported by approximately 8-foot wide piers. (See FIGURE 4-9).

A second option in the Branch Avenue corridor would locate the busway on one side of the highway. The busway would require approximately 46 feet of lateral space, including a barrier to separate the busway from the roadway. In interchange areas, the busway would be required to bridge over the entrance and exit ramps. Based on land use in this corridor, the east side of MD 5 would be the preferred location because Andrews Air Force Base, Southern Maryland Medical Center, and the Branch Avenue Metrorail Station would have better access on the east side of MD 5. However, additional engineering would be required to confirm the placement of the line on the east side.

TABLE 4-11 shows the 5 BRT-HIGH station stops proposed in Segment 2.

TABLE 4-11
BRT-HIGH Segment 2 Stations

Proposed Station Area	Approximate Location
Allentown Road	MD 337 (Allentown Road) – northwest side of Andrews Air Force Base
Clinton	Coventry Way – southwest side of Andrews Air Force Base
Woodyard Road	MD 223 (Woodyard Road)
Southern Maryland Medical Center	Surratts Road
T.B.	North of Brandywine Spine Road

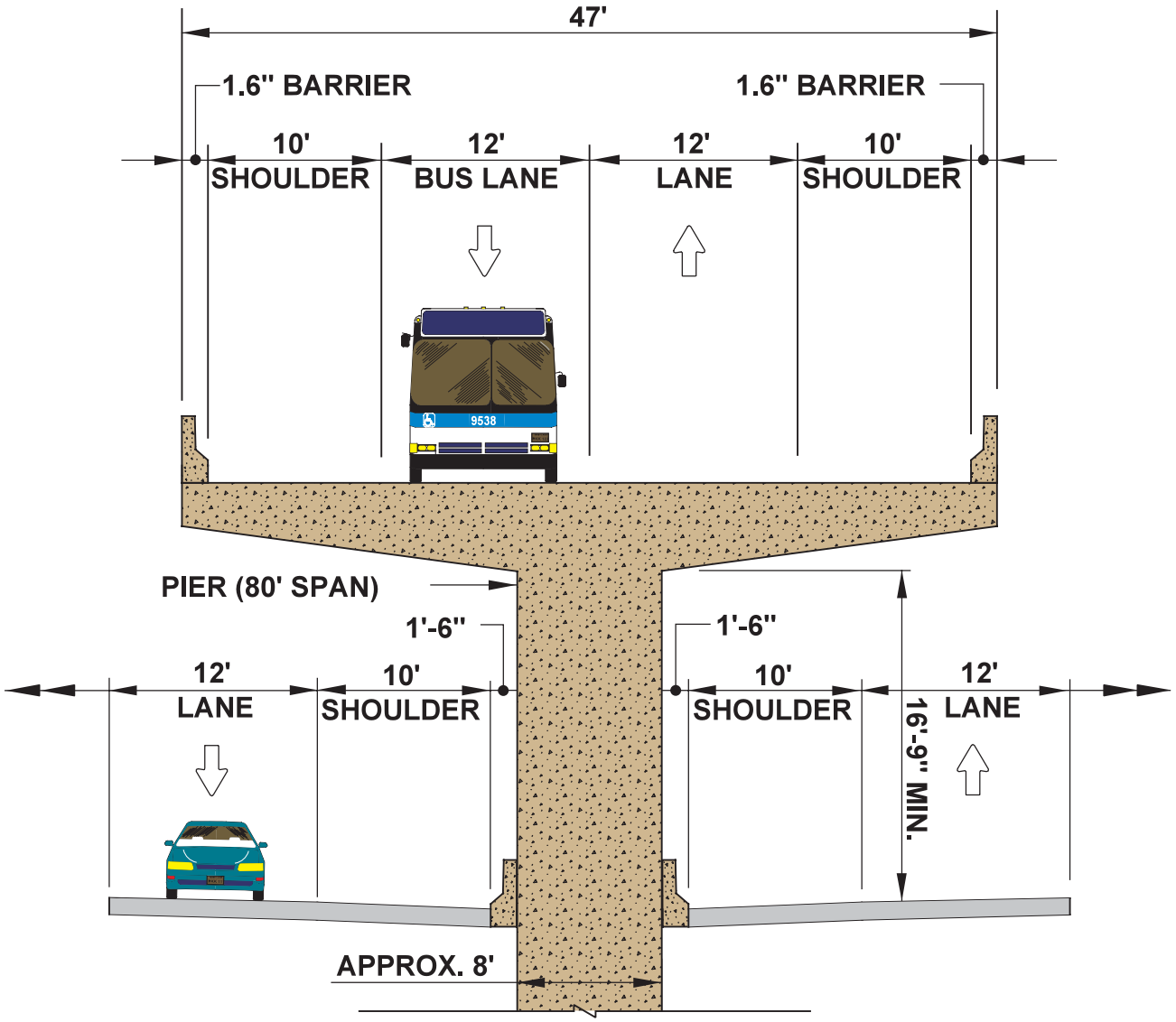


SEGMENT 2 MD 5 MEDIAN: AT GRADE

SCALE: 1' = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 3 - BRT-HIGH		
MTA Maryland	DATE: OCTOBER 2004	FIGURE 4 - 8

K:/PROJECTS/US301/DGN/TSSP6.DGN



SEGMENT 2 - MD5 MEDIAN: ELEVATED

SCALE: 1" = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 3 - BRT-HIGH		
MTA Maryland	DATE: OCTOBER 2004	FIGURE 4 - 9

K:/PROJECTS/US301/DGN/TSSP7.DGN

Segment 3 – MD 5/US 301 from T.B. to Mattawoman Road

South of the T.B. station, the BRT-HIGH busway would diverge from the MD 5 right-of-way and head southeast. If the busway were located in the median of MD 5, the profile would need to rise to allow it to span northbound MD 5 prior to following the proposed Brandywine Spine Road. South of the Brandywine Spine Road, the busway would operate parallel to the Brandywine Spine Road and it would cross Dyson Road, US 301, and MD 381 through at grade intersections. Near the SMECO Generating Station, the BRT-HIGH would merge into the Popes Creek Railroad right-of-way.

Along the proposed Brandywine Spine Road, the BRT-HIGH busway would operate in an exclusive 12-foot lane adjacent to and on the outside of the general-use travel lanes (see FIGURE 4-10). One station stop would be provided in this section as shown in TABLE 4-12.

TABLE 4-12
BRT-HIGH Segment 3 Stations

Proposed Station Area	Approximate Location
Brandywine	East of the Triangle Industrial Park and west of the U.S. Military Reservation Brandywine Communication Site

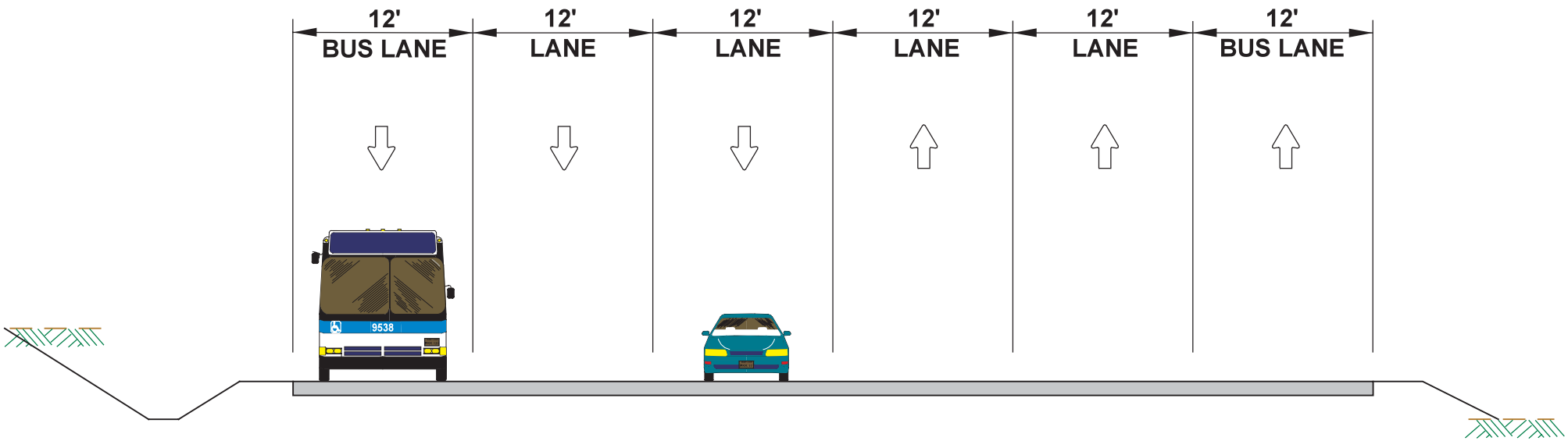
Segment 4 – US 301 / Pope's Creek Railroad from Mattawoman Road to De Marr Road

After accessing the Popes Creek Railroad right-of-way south of the proposed Brandywine Spine Road, the BRT-HIGH busway would continue south paralleling the existing CSXT freight line for approximately 8 miles to White Plains.

Two exclusive bus lanes are proposed partially within in the Popes Creek Railroad right-of-way. As required by CSXT (the owner of the existing tracks), bus operations would be separated from the freight railroad operations by 25 feet and a crash wall would separate the two operations.

The BRT-HIGH would require approximately 44 feet of lateral distance in addition to the 25 foot required CSXT offset (see FIGURE 4-11). Since the CSXT right-of-way is 66 feet wide, 44 feet of right-of-way would need to be purchased adjacent to and throughout the 12-mile length of the railroad corridor in order to satisfy the CSXT offset requirement. Additional engineering would be required to confirm the placement of the line on the east or west side of the tracks.

Five stations would be proposed through this segment, as shown in TABLE 4-13.



SEGMENT 3

SCALE: 1" = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN

ALTERNATIVE 2 -
BUS RAPID TRANSIT - HIGH

MTA Maryland

DATE:
OCTOBER 2004

FIGURE
4 - 10

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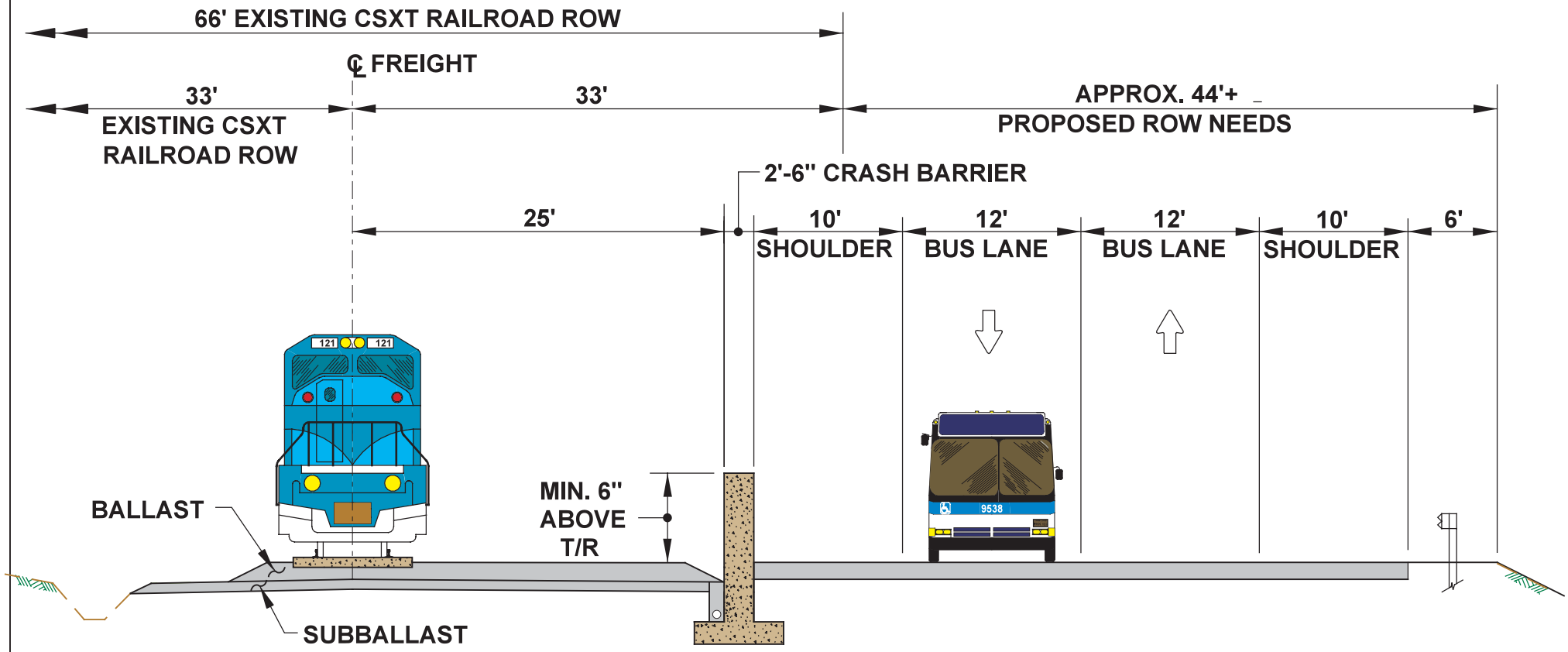

SEGMENT 4

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 3 - BRT - HIGH		
MTA Maryland	DATE: OCTOBER 2004	FIGURE 4 - 11

SCALE: 1" = 10'

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TABLE 4-13
BRT-HIGH Segment 4 Stations

Proposed Station Area	Approximate Location
Pinefield	West of White Oak Village
Waldorf	Leonardtown Road
St. Charles	Smallwood Drive
Billingsley Road	Billingsley Road
White Plains	De Marr Road

Operating Costs

Assuming $8.50/mile, 426 daily trips, 255 weekday service days/year and 104 weekends service days/year, the annualized operating cost is approximately $31,590,184 for the BRT-HIGH alternative.

Capital Costs

The estimated capital cost for Alternative 3 is $1,179,704,320. See Appendix B-3 for a capital cost summary sheet.

Ridership Projections

The range for total daily boardings for Alternative 3 is 26,400 – 31,000 per day.

ALTERNATIVE 4 – LIGHT RAIL TRANSIT (LRT)

Alternative 4 proposes a LRT service along a 20-mile exclusive right-of-way double track rail system from the Branch Avenue Metrorail Station to White Plains. As recommended by the US 301 Task Force, the alignment covers an area of high density and high congestion. The connection to the Branch Avenue Metrorail Station would provide transit access to the entire Washington, D.C. metropolitan area.

Approximately ninety percent of the estimated LRT ridership is expected to arrive at the LRT stations via single occupant automobile. It is estimated that the entire LRT system would require approximately 12,000 parking spaces to accommodate the projected average daily ridership on the LRT line by year 2025. Two stations are expected to serve as catchment stations along the line: White Plains Station and Brandywine Station. The White Plains Station would be the southernmost terminus point of the proposed LRT. The Brandywine Area Station location would be located in the vicinity of the MD 5/US 301interchange and would be an access point for persons west and east of the rail line. Considering the potential attraction at these station locations, it would be expected that these two catchment stations would require more parking than the other nine stations. It may be possible for surface lots to be constructed at some stations, but for cost estimating purposes it is assumed that all parking would be in structured decks.

Transit bus access to stations would also be provided to support the feeder bus systems along the corridor. The feeder buses would provide local access to neighborhoods and businesses around each station. Pedestrian and bicycle access would also be included.

The LRT service would operate daily from 5:00 AM to midnight with 5-minute headways during the AM and PM peak periods (5:00 AM to 8:00 AM, 3:00 PM to 6:00 PM) with three car train sets and 15-minute headways during off-peak hours (8:00 AM to 3:00 PM and 6:00 PM to 12:00 AM) with a one-car train set. Weekend service would operate on 15-minute headways from 7:00 AM to 10:00 PM. Along the 19.3-mile rail line, twelve station locations (including Branch Avenue Metrorail Station) are proposed to provide access to the service. Locally operated transit systems (LOTS) in Prince George's County and Charles County as well as WMATA Metrobuses could provide service to the station locations.

The service span and headways closely meet the standards set forth in the *Maryland Transit Guidelines*[2] which recommends weekday service from 5 AM to midnight with a desirable headway of 6 minutes for peak service, 10 minutes for midday service, and 15 minutes for evening service.

Low floor light rail cars should be considered for this service. By providing a level surface for boardings, these vehicles improve the speed and ease of passenger boarding, therefore reduce dwell times at stations.

Segment 1 – Branch Avenue Metrorail Station to I-495

LRT service is proposed to originate at the Branch Avenue Metrorail Station and connect with the MD 5 corridor. The surrounding area is already heavily developed both commercially and residentially, limiting the potential options for access to the station. Considering the existing infrastructure and development it is unlikely that an at-grade or elevated structure would be viable to provide access to/from the Branch Avenue Metrorail Station for the proposed LRT service. Consequently, a tunnel would be proposed to connect the LRT from the Branch Avenue Metrorail Station to MD 5. The 0.75-mile long tunnel would daylight near Manchester Drive. The only station in this segment would be the LRT station at Branch Avenue Metrorail Station. However, detailed project planning should investigate the possibility of accessing the Branch Avenue Metrorail Station without the use of a tunnel. If a viable aerial alignment could be developed capital costs could be reduced. TABLE 4-14 lists the LRT station stops in Segment 1.

TABLE 4-14
LRT Segment 1 Stations

Proposed Station Area	Approximate Location
Branch Avenue Metrorail Station	Auth Road – Inside I-495

Segment 2 – MD 5 from I-495 to T.B.

Service would continue from the MD 5 access point and travel south operating in the median of MD 5 and/or outside of the MD 5 travel lanes. LRT service through this segment would operate as an exclusive double track LRT line south approximately 7.1 miles to the area of T.B.

[2] *Maryland Transit Guidelines*, Maryland Transit Administration, May 2001.

Along the MD 5 right-of-way, LRT could operate double track operations in either the median or on one side of the highway. In order to operate in the median of MD 5, the LRT would have to run on an elevated structure in areas where the median is restricted. At grade, the LRT would require approximately 39 feet of clearance, including the spacing between the double track, catenary poles, and 1'-6" concrete barriers to separate the LRT from the highway (see FIGURE 4-12). In areas where 39 foot median space is not available, and geographic or right-of-way constraints do not permit widening, the LRT would travel the corridor on an elevated structure, with 8' minimum pier widths spaced approximately 80 feet apart (See FIGURE 4-13). The elevated structure would provide at least 16'-9" vertical clearance above the roadway.

A second option in the Branch Avenue corridor would locate the LRT on one side of the highway. The LRT would require approximately 37 feet of lateral space, including a barrier to separate the LRT from the roadway (see FIGURE 4-14). In interchange areas, the LRT would be required to bridge over the entrance and exit ramps. Based on land use in this corridor, the east side of MD 5 would be the preferred location because Andrews Air Force Base, Southern Maryland Medical Center, and the Branch Avenue Metrorail Station would have better access on the east side of MD 5. However, additional engineering would be required to confirm the placement of the line on the east side. TABLE 4-15 lists the LRT station stops in Segment 2.

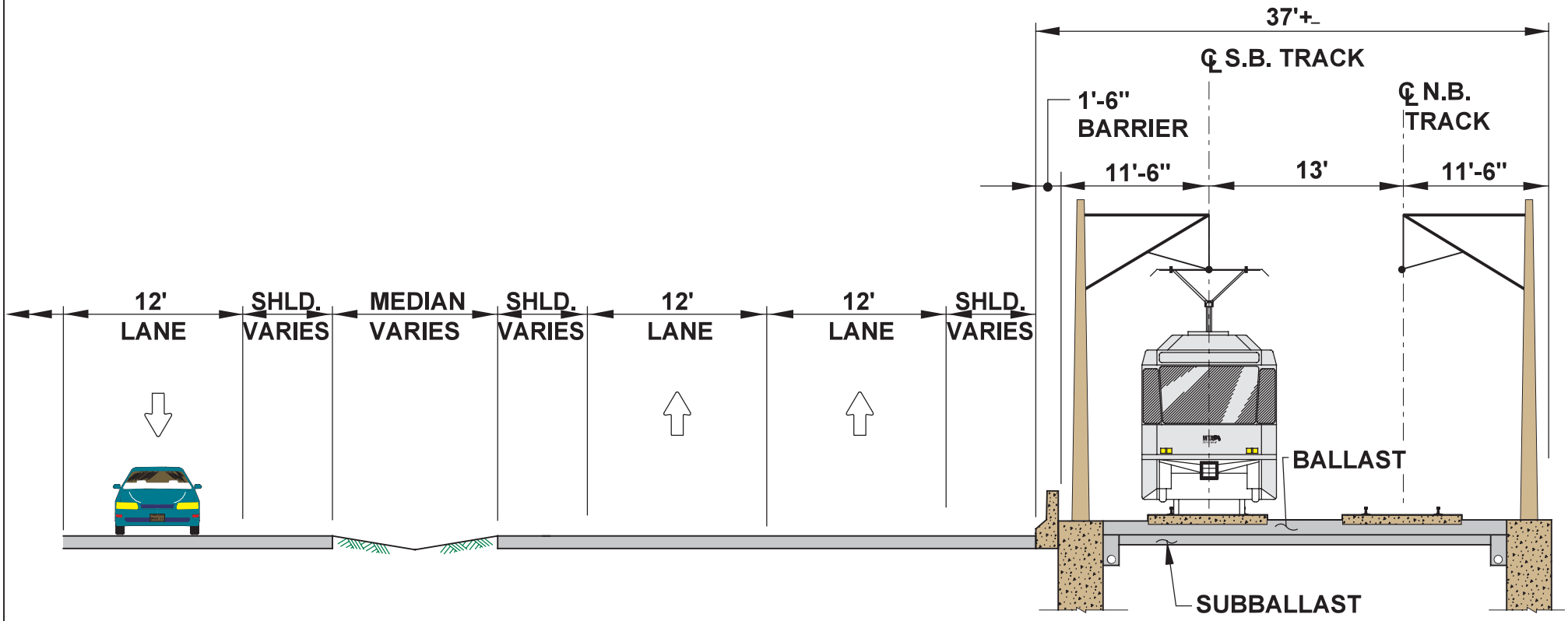
TABLE 4-15
LRT Segment 2 Stations

Proposed Station Area	Approximate Location
Allentown Road	MD 337 (Allentown Road) – northwest side of Andrews Air Force Base
Clinton	Coventry Way – southwest side of Andrews Air Force Base
Woodyard Road	MD 223 (Woodyard Road)
Southern Maryland Medical Center	Surratts Road
T.B.	North of Brandywine Spine Road

Segment 3 – MD 5/US 301 from T.B. to Mattawoman Road

Operating south from T.B. station, LRT service would divert from the MD 5 right-of-way heading southeast crossing Dyson Road, US 301, and MD 381. South of Brandywine Spine Road, LRT would operate parallel to the Brandywine Spine Road (arterial road proposed for the future development in this area). East of the Triangle Industrial Park and west of the U.S. Military Reservation Brandywine Communication Site, LRT would merge into the Popes Creek Railroad right-of-way.

After exiting the MD 5 right-of way, double track operations would continue through the proposed development area around Brandywine. The grade crossings at Dyson Road and MD 381 would be at-grade; however, the volume of traffic on US 301 indicates that a grade separated crossing is required at this location. The LRT would parallel and split the proposed

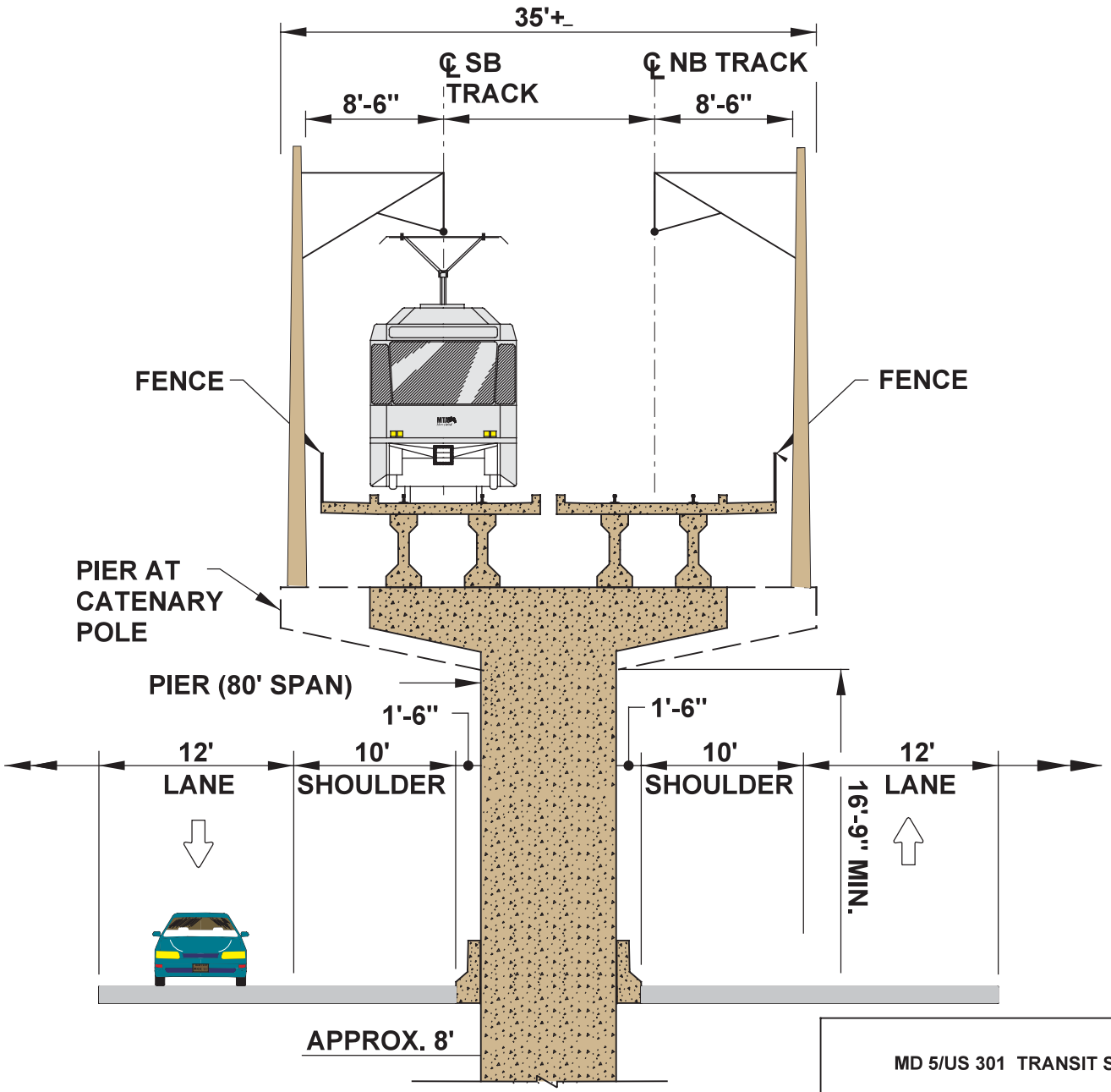


SEGMENT 2 - ADJACENT TO MD 5

SCALE: 1" = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 4 - LIGHT RAIL		
MTA Maryland	DATE: OCTOBER 2004	FIGURE 4 - 12

K:/PROJECTS/US301/DGN/TSSP11.DGN



SEGMENT 2 - MD5 MEDIAN: ELEVATED

SCALE: 1" = 10'

MD 5/US 301 TRANSIT SERVICE STAGING PLAN

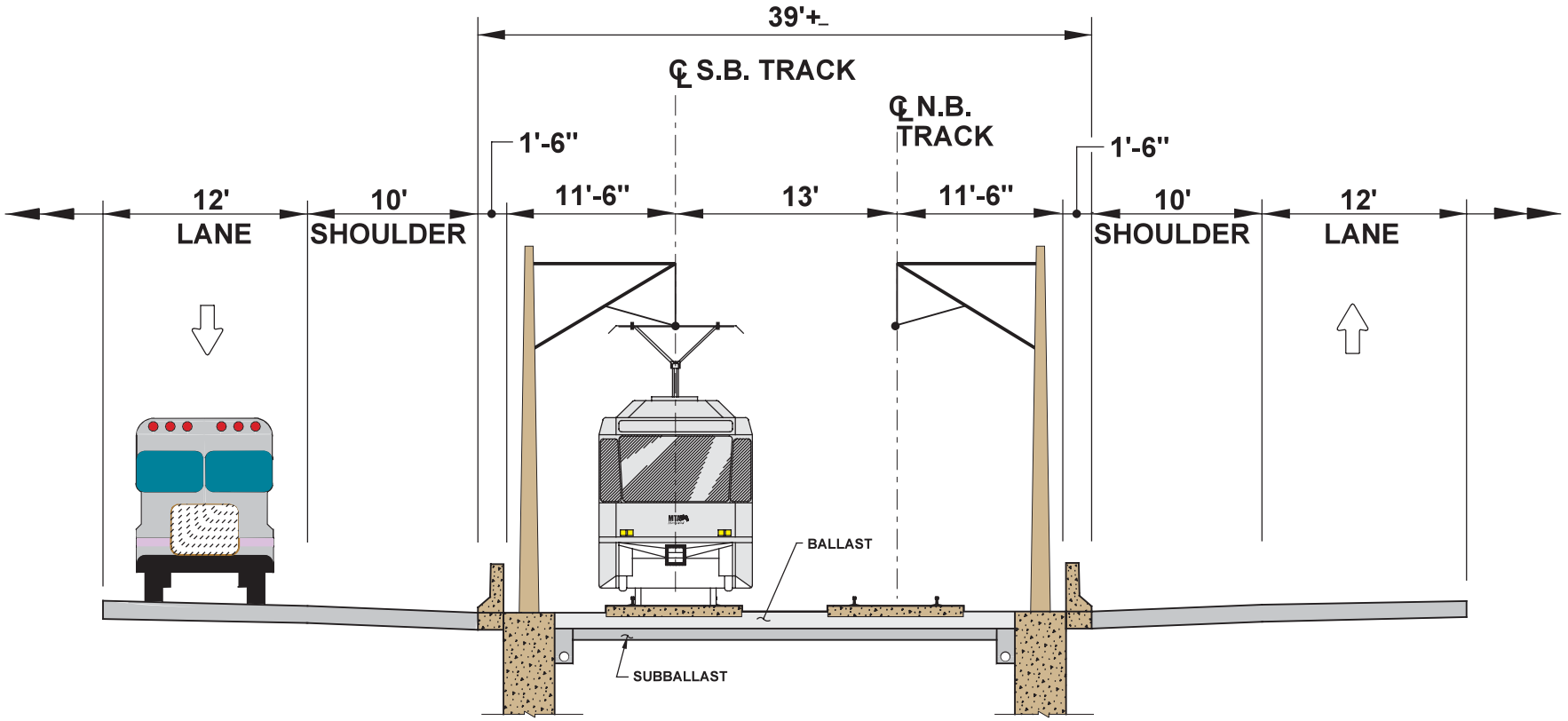
ALTERNATIVE 4 - LIGHT RAIL

MTA Maryland

DATE: OCTOBER 2004

FIGURE 4 - 13

K:/PROJECTS/US301/DGN/TSSP10.DGN



SEGMENT 2

MD 5/US 301 TRANSIT SERVICE STAGING PLAN

ALTERNATIVE 4 - LIGHT RAIL

SCALE: 1" = 10'

MTA Maryland

DATE: OCTOBER 2004

FIGURE 4 - 14

K:/PROJECTS/US301/DGN/TSSP12.DGN

Brandywine Spine Road through this corridor. Ballast curbs would separate the tracks and travel lanes (see FIGURE 4-15), with grade crossings provided at property entrances. One station stop is planned in this section. TABLE 4-16 lists the LRT station stops in segment 3.

TABLE 4-16
LRT Segment 3 Stations

Proposed Station Area	Approximate Location
Brandywine	East of the Triangle Industrial Park and west of the U.S. Military Reservation Brandywine Communication Site

Segment 4 – US 301 / Pope's Creek Railroad from Mattawoman Road to De Marr Road

After accessing the Popes Creek Railroad right-of-way, the LRT service would continue south paralleling the existing CSXT freight line for approximately 8 miles to White Plains.

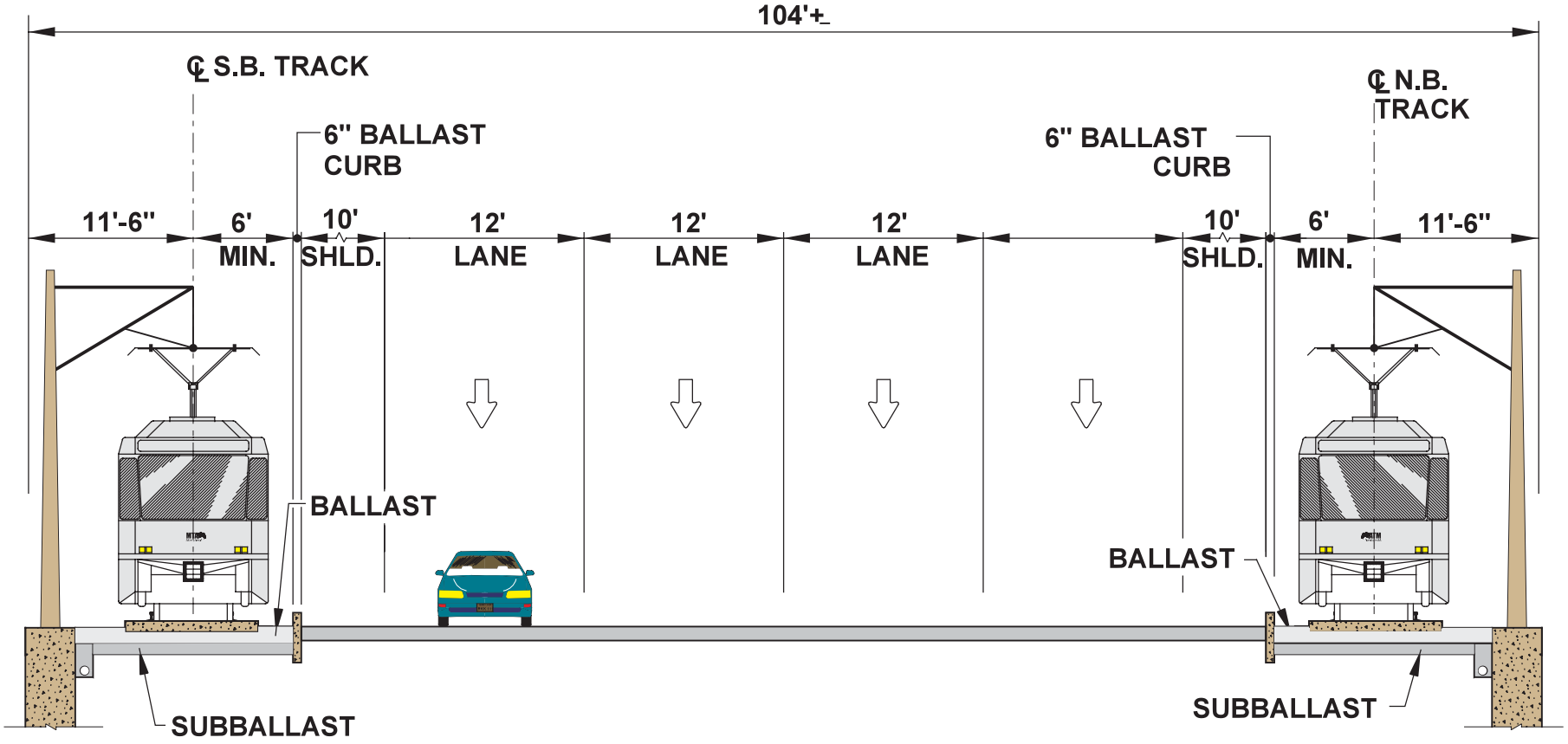
Exclusive double track is proposed in the Popes Creek Railroad right-of-way. As required by CSXT, passenger operations must be separated from freight operations by 25-feet and a crash wall. Separating passenger and freight operations is also desired to improve scheduling flexibility and maintenance. Since freight and passenger trains cannot operate on the same tracks at the same time due to federal safety requirements, freight operators would only have a 4 to 5 hour window to make freight movements if freight and passenger service used the same tracks. This would also prohibit any expansion to freight traffic in the area.

There are 13 current at-grade crossings of Popes Creek Railroad. Mattawoman-Beantown Road (2 at-grade crossings), Substation Road, Acton Lane, Leonardtown Road, Smallwood Drive, Billingsley Road, De Marr Road, Willetts Crossing Road, Jaybee Lane, Rosewick Road, Kent Avenue, and Charles Street all have existing grade crossings. Signals and gates would be required at all crossings, with preemption for LRT.

It has not been determined whether the LRT corridor would be located on the east or west side of the CSXT alignment. However, the west side is preferred in order to avoid crossing CSXT to reach Segment 3 at Brandywine Spine Road.

The LRT would require approximately 40 feet of lateral distance in addition to the 25 foot required CSXT offset (see FIGURE 4-16). The CSXT right-of-way is 66-feet wide and the LRT would travel in the Popes Creek Railroad corridor for approximately 12 miles. Approximately 40 feet of right-of-way would need to be purchased adjacent to and throughout the length of the railroad corridor in order to satisfy the CSXT offset requirement.

At the proposed stations, either center or side platforms would be utilized, and additional right-of-way would be required for the platforms and the necessary track shifts. TABLE 4-17 lists the proposed station locations.



SEGMENT 3

MD 5/US 301 TRANSIT SERVICE STAGING PLAN

ALTERNATIVE 4 - LIGHT RAIL

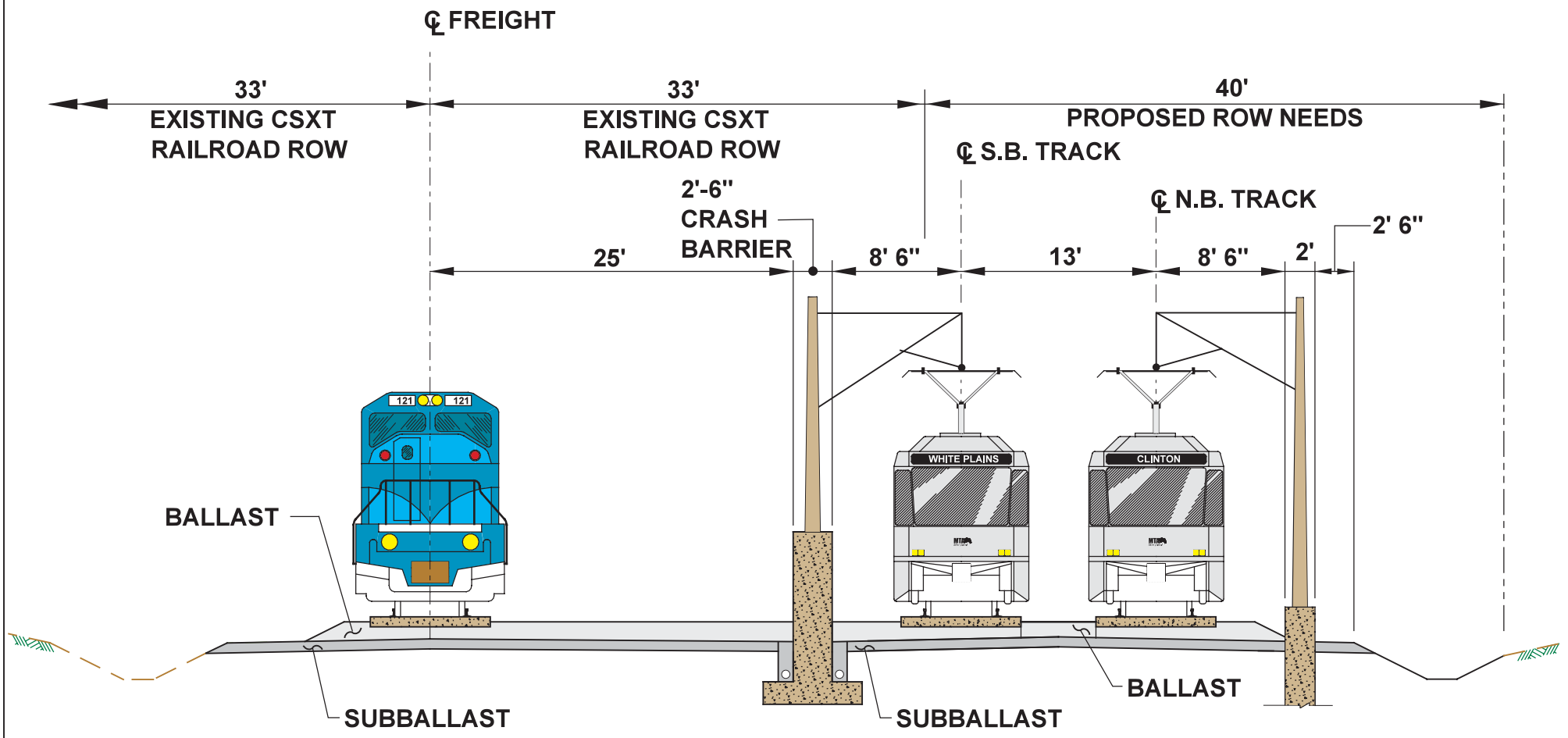
MTA Maryland

DATE: OCTOBER 2004

FIGURE 4 - 15

SCALE: 1" = 10'

K:/PROJECTS/US301/DGN/TSSP13.DGN



SEGMENT 4

MD 5/US 301 TRANSIT SERVICE STAGING PLAN		
ALTERNATIVE 4 - LIGHT RAIL		
SCALE: 1" = 10'	DATE: OCTOBER 2004	FIGURE 4 - 16

K:/PROJECTS/US301/DGN/TSSP14.DGN

TABLE 4-17
LRT Segment 4 Stations

Proposed Station Area	Approximate Location
Pinefield	West of White Oak Village
Waldorf	Leonardtown Road
St. Charles	Smallwood Drive)
Billingsley Road	Billingsley Road
White Plains	De Marr Road

Operating Costs

Assuming $11.67/revenue vehicle mile, 255 weekday service days/year and 104 weekends service days/year, the annualized operating cost is approximately $34,397,283 for the LRT alternative.

Capital Costs

The estimated capital cost for Alternative 4 is $1,480,564,878. If a viable aerial alternative could be developed, the capital cost for the LRT alternative could be reduced to $1,081,780,273. See Appendix B-4 and B-5 for the capital cost summary sheets.

Ridership Projections

The range for total daily boardings for Alternative 4 is 22,600 – 26,800 per day.

5. COMPARISON OF ALTERNATIVES

The results of the analysis of alternatives in the MD 5/US 301 Transit Study are presented in TABLE 5-1.

Highlights of some of the key comparisons are:

- **Ridership** – The Enhanced Commuter Bus alternative primarily serves one trip purpose, suburban commuters from southern Maryland to Washington. Ridership is limited to 6,800 boardings per day.

  Alternatives 2, 3 and 4 all serve multi-trip purposes, commuter trips to Washington, D.C. as well as intra-corridor work trips, and other trips. Ridership gains are significant, up to the 20,000 – 30,000 boardings per day range.

- **Operations** – The clear variable among the alternatives is the degree of separation from mixed traffic. LRT and BRT-HIGH offer predominantly exclusive right-of-way while BRT-MOD has a combination of mixed traffic and exclusive right-of-way service, and Enhanced Commuter Bus is totally mixed in traffic.

- **Service Area Coverage** – One of the key variations in the alternatives is the level of service provided to each County. The Enhanced Commuter Bus serves only southern Maryland counties and not Prince George's County, however Prince George's County does benefit from reduced vehicles on its roadways.

  The BRT-MOD offers limited service in Prince George's County, while BRT-HIGH and LRT offer more full intra- and inter-county service for Prince George's County. MTA bus, local bus, feeder service and shuttles would be available to provide all Southern Marylanders service to the transit stations.

- **Capital Costs** – There are clearly three thresholds of capital costs. Enhanced Commuter Bus Service can continue to grow with relatively minor capital investment. BRT-MOD offers a mid-level, yet still appreciable, investment of capital funds. LRT and BRT-HIGH each require significant investment and will take many years to construct.

- **Operating Costs** – This variable is simply in direct relationship to the level of transit service provided and ridership forecasts. These numbers do not reflect any estimate for revenue achieved, and thereby only provide an operating budget, which would be required for each alternative.

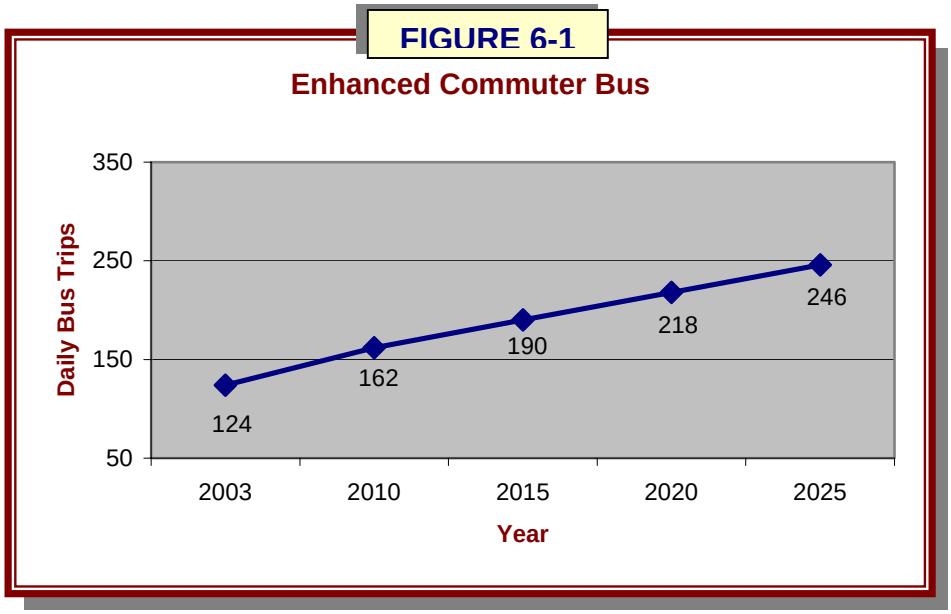
6. RECOMMENDED STAGING PLAN

STAGE 1

The first stage of the Transit Service Staging Plan would begin with the implementation of Alternative 1 – Enhanced Commuter Bus (ECB). In developing the alternative for analysis purposes, it was recommended that ECB increase the level of service on commuter bus routes 901, 903, 905, 907, and 909 in southern Maryland from their current service level of 124 daily trips to 246 daily trips by 2025. In addition to the increased level of service, it is recommended that the number of park and ride lots increase to be able to accommodate the increased service levels and the introduction of queue bypasses along the US 301 corridor. Though the increased number of trips in Alternative 1 was applied to the existing five commuter bus routes, it is believed that new routes or variations of the existing routes would be developed over time. The new or modified routes would be developed to better serve the potential new park & ride lots and the growing demand in the MD 5/US 301 corridor.

FIGURE 6-1 below illustrates how the service levels should be increased between now and 2025.

FIGURE 6-1



Three new park and ride lots are currently in project planning and design waiting for the appropriate funding and, if these phases are completed this year, the construction of the projects should be completed by FY 2006. These lots will be replacing two smaller lots currently leased by MTA and would provide an additional 1,226 parking spaces. Additional park and ride lots beyond these programmed lots, are not required for ECB.

Funding for planning and engineering of bus queue bypass lanes and park and ride lots should begin to appear in the Maryland Consolidated Transportation Program in 2005 in order to ensure that the funding is appropriated for the projects, with construction of these improvements between 2010 and 2020. SHA and Charles County also need to consider queue bypass lanes in current and future transportation plans for the corridor.

STAGE 2

In 2015, MTA should begin evaluation and detailed project planning for Alternatives 2 – 4. The following factors should be taken into consideration in the decision to move forward with the study of the alternatives:

- Availability of state and federal funding.
- Project is included in the 2009 federal re-authorization.
- Project has support of both Charles and Prince George's counties and is included in their master plans.
- Ridership on commuter buses has continued to increase.
- WMATA, The Bus and VanGO have demonstrated increased ridership in the area.
- Land use densities have developed to support the consideration of BRT and LRT and growth is projected to continue to increase along the corridor.

Based upon the aforementioned evaluation factors, three paths forward could be considered;

1. Proceed with detailed project planning for the BRT-HIGH and/or LRT alternative,
2. Move forward with a BRT-MOD alternative or
3. Continued implementation of the ECB alternative.

If project planning for the BRT-HIGH or LRT alternative is selected, the following schedule could be considered:

TABLE 6-1
BRT-HIGH and LRT Project Planning Schedule

2015 - 2019	Project Planning, DEIS, FEIS, Preliminary Engineering
2019 - 2021	Final design and Right-of-Way Acquisition
2022 - 2025	Construction

Prior to 2015 an alignment study, which includes public input, should be conducted to identify the right-of-way requirements for the transit alternatives. Since the study could identify impacts to MD 5, US301 and local roads, MTA should coordinate with SHA during the alignment study. The results of this study could be used by Charles County and Prince George's County to preserve right-of-way through their master plans.

A BRT-MOD alternative would also require a project planning effort that could have construction completed within 5 years of initiation. The following is an estimated schedule for the BRT-MOD project planning effort:

TABLE 6-2
BRT-MOD Project Planning Schedule

2015 - 2016	Project Planning, Environmental Documentation
2016 - 2018	Design and Right-of-Way Acquisition
2019 - 2020	Construction

If existing bus ridership levels reach 10,000 passengers per day prior to meeting the horizon year timeframes in the staging plan, MTA will reassess the staging plan schedule and accelerate the schedule if necessary.

APPENDIX

Appendix B

Project Name: MD 5/US 301 Transit Service Staging Plan
Description: Alternative 1 - Enhanced Commuter Bus (ECB)

Date Prepared: October 2004 *Project Phase:* Service Staging

ID	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL 2003 DOLLARS
	BASE ESTIMATE:				
1	Mobilization and MOT (15% of items 2-12)		lump sum		$ 50,000
2	Signing	10	per intersection	$ 5,000	$ 50,000
3	Parking (Surface)		per space	$ 5,000	$ -
4	Environmental Mitigation		lump sum		$ 500,000
A	**BASE ESTIMATE SUBTOTAL (Lines 1 thru 4)**				**$ 100,000**
B	PLANNING CONTINGENCY (40% of line A)				$ 40,000
C	CONSTRUCTION CONTINGENCY (10% of line A)				$ 10,000
	NEAT CONSTRUCTION COSTS (A+B+C)				**$ 150,000**
D	FUTURE CHANGES AND CLAIMS (10% of Lines (A+B+C)				$ 15,000
E	CONSULTANT DESIGN FEE (10% of Lines A+B+C)				$ 15,000
F	MTA DESIGN COST (2.5% of Lines A+B+C)				$ 3,750
G	CONSTRUCTION INSPECTION AND CRS (8% of Lines A+B+C+D)				$ 13,200
H	MTA CONSTRUCTION COST (3.5% of Lines A+B+C+D)				$ 462
I	RIGHT-OF-WAY (ROW)	0		0	$ -
J	VEHICLES - Over-the-road coach	205	EA	$ 550,000	$ 112,750,000
	- Articulated Buses	0	EA	$ 450,000	$ -
K	VEHICLE YARD	0	lump sum		$ 25,000,000
L	UTILITIES	0	lump sum		$ 1,075,200
M	AGENCIES/FORCE ACCOUNT		lump sum		$ 1,000,000
	Total Project Cost				**$ 140,022,612**

Consolidated Transportation Plan (CTP)	
Preliminary Engineering:	**$ 18,750**
Construction:	**$ 255,026,474**
Right-of-Way:	**$ -**
Total:	**$ 255,045,224**

Appendix B

Project Name: MD 5/US 301 Transit Service Staging Plan
Description: Alternative 2 - Moderate Level Bus Rapid Transit (BRT-MOD)

Date Prepared: October 2004 *Project Phase:* Service Staging

ID	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL 2003 DOLLARS
	BASE ESTIMATE:				
1	Mobilization and MOT (15% of items 2-8)		lump sum		$ 17,842,268
2	Erosion and Sediment Control (2% of items 3-8)		lump sum		$ 2,332,323
3	Drainage and Stormwater Management (15% of excavation and Roadwork costs)		lump sum		$ 6,810,800
4	Structure Work				
	Crash Walls	0	LF	$ 600	$ -
	Aerial Structures (Light Rail Bridge)	0	LF	$ 5,000	$ -
	Aerial Structures (Pedestrain Overpass)	7	EA	$ 300,000	$ 2,100,000
	Tunnel	0	mile	$ 250,000,000	$ -
5	Stations				
	Station and Shelters	6	EA	$ 150,000	$ 900,000
	Parking (Structure)	4,700	per space	$ 10,000	$ 47,000,000
	Parking (Surface)	2,500	per space	$ 5,000	$ 12,500,000
	Fare Collection	0	EA	$ 160,000	$ -
6	Roadwork*				
	2-lane, 12' roadway, 10' shoulders	20	mile	$ 2,300,000	$ 44,988,000
	Fencing		LF	$ 25	$ -
	Pavement Marking and signing	20	mile	$ 21,336	$ 417,332
	Lighting		mile	$ 396,000	$ -
7	Traffic Signals	9	each	$ 100,000	$ 900,000
8	Environmental Mitigation		lump sum		$ 1,000,000
A	**BASE ESTIMATE SUBTOTAL (Lines 1 thru 8)**				**$ 136,790,723**
B	PLANNING CONTINGENCY (40% of line A)				$ 54,716,289
C	CONSTRUCTION CONTINGENCY (10% of line A)				$ 13,679,072
	NEAT CONSTRUCTION COSTS (A+B+C)				**$ 205,186,084**
D	FUTURE CHANGES AND CLAIMS (10% of Lines (A+B+C)				$ 20,518,608
E	CONSULTANT DESIGN FEE (10% of Lines A+B+C)				$ 20,518,608
F	MTA DESIGN COST (2.5% of Lines A+B+C)				$ 5,129,652
G	CONSTRUCTION INSPECTION AND CRS (8% of Lines A+B+C+D)				$ 18,056,375
H	MTA CONSTRUCTION COST (3.5% of Lines A+B+C+D)				$ 631,973
I	RIGHT-OF-WAY (ROW)				
	Railroad ROW	0	mile	$ 2,000,000	$ -
	ROW (non-rr) urban	2	acre	$ 750,000	$ 1,500,000
	ROW (non-rr) suburban	10	acre	$ 350,000	$ 3,543,196
J	ROW CONTINGENCY (25% of Line I)				$ 1,260,799
K	VEHICLES - Over the Road Coach	205	EA	$ 550,000	$ 112,750,000
	- Transit Bus	30	EA	$ 450,000	$ 13,500,000
L	VEHICLE YARD		lump sum		$ 25,000,000
M	UTILITIES		lump sum		$ 1,075,200
N	AGENCIES/FORCE ACCOUNT		lump sum		$ 5,000,000
	Total Project Cost				**$ 433,670,496**

* Expansion of 12' travel lane actual cost estmates would be based on future detailed study

Consolidated Transportation Plan (CTP)		
Preliminary Engineering:	**$**	**25,648,261**
Construction:	**$**	**401,718,241**
Right-of-Way:	**$**	**6,303,994**
Total:	**$**	**433,670,496**

Appendix B

Project Name: MD 5/US 301 Transit Service Staging Plan
Description: Alternative 3 - High Level Bus Rapid Transit (BRT-HIGH)

Date Prepared: October 2004 *Project Phase:* Service Staging

ID	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL 2003 DOLLARS
	BASE ESTIMATE:				
1	Mobilization and MOT (15% of items 2-9)		lump sum		$ 63,719,018
2	Erosion and Sediment Control (2% of items 3-9)		lump sum		$ 8,329,283
3	Drainage and Stormwater Management (15% of excavation and Roadwork costs)		lump sum		$ 6,748,200
5	Structure Work				
	Crash Walls	38,122	LF	$ 600	$ 22,873,200
	Aerial Structures (Light Rail Bridge)	0	LF	$ 5,000	$ -
	Aerial Structures (Highway Bridge)	47,000	SF	$ 120	$ 5,640,000
	Tunnel	0.75	mile	$ 250,000,000	$ 187,500,000
6	Stations				
	Station and Shelters	11	EA	$ 150,000	$ 1,650,000
	Parking (Structure)	12,000	per space	$ 10,000	$ 120,000,000
	Parking (Surface)	2,500	per space	$ 5,000	$ 12,500,000
	Fare Collection	0	EA	$ 160,000	$ -
7	Roadwork*				
	2-lane, 12' roadway, 10' shoulders	20	mile	$ 2,300,000	$ 44,988,000
	Fencing	76,243	LF	$ 25	$ 1,906,080
	Pavement Marking and signing	20	mile	$ 31,336	$ 612,932
	Lighting	20	mile	$ 396,000	$ 7,745,760
8	Traffic Signals	13	EA	$ 100,000	$ 1,300,000
9	Environmental Mitigation		lump sum		$ 3,000,000
A	**BASE ESTIMATE SUBTOTAL (Lines 1 thru 9)**				**$ 488,512,474**
B	PLANNING CONTINGENCY (40% of line A)				$ 195,404,990
C	CONSTRUCTION CONTINGENCY (10% of line A)				$ 48,851,247
	NEAT CONSTRUCTION COSTS (A+B+C)				**$ 732,768,711**
D	FUTURE CHANGES AND CLAIMS (10% of Lines (A+B+C)				$ 73,276,871
E	CONSULTANT DESIGN FEE (10% of Lines A+B+C)				$ 73,276,871
F	MTA DESIGN COST (2.5% of Lines A+B+C)				$ 18,319,218
G	CONSTRUCTION INSPECTION AND CRS (8% of Lines A+B+C+D)				$ 64,483,647
H	MTA CONSTRUCTION COST (3.5% of Lines A+B+C+D)				$ 2,256,928
I	RIGHT-OF-WAY (ROW)				
	Railroad ROW	7	mile	$ 2,000,000	$ 14,440,000
	ROW (non-rr) urban	3	acre	$ 750,000	$ 2,250,000
	ROW (non-rr) suburban	73	acre	$ 350,000	$ 25,707,500
J	ROW CONTINGENCY (25% of Line I)				$ 10,599,375
K	VEHICLES - Over the Road Coach	205	EA	$ 550,000	$ 112,750,000
	- Transit Bus	30	EA	$ 450,000	$ 13,500,000
L	VEHICLE YARD		lump sum		$ 25,000,000
M	UTILITIES		lump sum		$ 1,075,200
N	AGENCIES/FORCE ACCOUNT		lump sum		$ 10,000,000
	Total Project Cost				**$ 1,179,704,320**

* Expansion of 12' travel lane actual cost estmates would be based on future detailed study

Consolidated Transportation Plan (CTP)	
Preliminary Engineering:	**$ 91,596,089**
Construction:	**$ 1,035,111,356**
Right-of-Way:	**$ 52,996,875**
Total:	**$ 1,179,704,320**

Appendix B

Project Name: MD 5/US 301 Transit Service Staging Plan
Description Alternative 4 - Light Rail Transit (LRT)

Date Prepared: October 2004 *Project Phase:* Service Staging

ID	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL 2003 DOLLARS
	BASE ESTIMATE:				
1	Mobilization and MOT (15% of items 2-12)		lump sum		$ 77,072,140
2	Erosion and Sediment Control (2% of items 3-12)		lump sum		$ 10,074,790
3	Guideway				
	At Grade	50,872	LF	$ 220	$ 11,191,840
	Total Cut	7,000	LF	$ 750	$ 5,250,000
	Total Fill	37,000	LF	$ 625	$ 23,125,000
4	Drainage and Stormwater Management (15% of excavation and track work costs)		lump sum		$ 8,872,440
5	Structure Work				
	Crash Walls	62,251	LF	$ 600	$ 37,350,600
	Aerial Structures (Light Rail Bridge)	3,200	LF	$ 5,000	$ 16,000,000
	Tunnel	0.75	mile	$ 250,000,000	$ 187,500,000
6	Stations				
	Platforms - At Grade	6	EA	$ 800,000	$ 4,800,000
	Platforms - Elevated	5	EA	$ 1,200,000	$ 6,000,000
	Parking (Structure)	12,000	per space	$ 10,000	$ 120,000,000
	Fare Collection	12	EA	$ 160,000	$ 1,920,000
7	Trackwork				
	Ballasted	96,922	LF	$ 300	$ 29,076,600
	Embedded	300	LF	$ 1,160	$ 348,000
	Grade Crossing	2,000	LF	$ 675	$ 1,350,000
8	Traction Power	19	mile	$ 1,550,000	$ 29,140,000
9	Grade Crossings (including traffic control)	10	EA	$ 275,000	$ 2,750,000
10	Special Trackwork				
	Universal Crossover	3	EA	$ 320,000	$ 960,000
	Double Crossover	3	EA	$ 335,000	$ 1,005,000
11	Signalization	19	mile	$ 750,000	$ 14,100,000
12	Environmental Mitigation		lump sum		$ 3,000,000
A	**BASE ESTIMATE SUBTOTAL (Lines 1 thru 13)**				**$ 590,886,410**
B	PLANNING CONTINGENCY (40% of line A)				$ 236,354,564
C	CONSTRUCTION CONTINGENCY (10% of line A)				$ 59,088,641
	NEAT CONSTRUCTION COSTS (A+B+C+D)				**$ 886,329,615**
D	FUTURE CHANGES AND CLAIMS (10% of Lines A+B+C)				$ 88,632,962
E	CONSULTANT DESIGN FEE (10% of Lines A+B+C)				$ 88,632,962
F	MTA DESIGN COST (2.5% of Lines A+B+C+D)				$ 22,158,240
G	CONSTRUCTION INSPECTION AND CRS (8% of Lines A+B+C+D)				$ 77,997,006
H	MTA CONSTRUCTION COST (3.5% of Lines A+B+C+D)				$ 34,123,690
I	RIGHT-OF-WAY (ROW)				
	Railroad ROW	7	mile	$ 2,000,000	$ 14,440,000
	ROW (non-rr) urban	3	acre	$ 750,000	$ 2,250,000
	ROW (non-rr) suburban	73	acre	$ 350,000	$ 25,707,500
J	ROW CONTINGENCY (25% of Line I)				$ 10,599,375
K	VEHICLES	50	EA	$ 3,100,000	$ 155,000,000
L	VEHICLE YARD		lump sum		$ 58,500,000
M	UTILITIES		lump sum		$ 6,193,528
N	AGENCIES/FORCE ACCOUNT		lump sum		$ 10,000,000
	Total Project Cost				**$ 1,480,564,878**

Consolidated Transportation Plan (CTP)	
Preliminary Engineering:	**$ 110,791,202**
Construction:	**$ 1,316,776,801**
Right-of-Way:	**$ 52,996,875**
Total:	**$ 1,480,564,878**

Appendix B

Project Name: MD 5/US 301 Transit Service Staging Plan
Description Alternative 4 - Light Rail Transit (LRT) - Non-Tunnel Option

Date Prepared: October 2004 *Project Phase:* Service Staging

ID	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL 2003 DOLLARS
	BASE ESTIMATE:				
1	Mobilization and MOT (15% of items 2-12)		lump sum		$ 51,414,040
2	Erosion and Sediment Control (2% of items 3-12)		lump sum		$ 6,720,790
3	Guideway				
	At Grade	50,872	LF	$ 220	$ 11,191,840
	Total Cut	7,000	LF	$ 750	$ 5,250,000
	Total Fill	37,000	LF	$ 625	$ 23,125,000
4	Drainage and Stormwater Management (15% of excavation and track work costs)		lump sum		$ 8,872,440
5	Structure Work				
	Crash Walls	62,251	LF	$ 600	$ 37,350,600
	Aerial Structures (Light Rail Bridge)	7,160	LF	$ 5,000	$ 35,800,000
	Tunnel	0	mile	$ 250,000,000	$ -
6	Stations				
	Platforms - At Grade	6	EA	$ 800,000	$ 4,800,000
	Platforms - Elevated	5	EA	$ 1,200,000	$ 6,000,000
	Parking (Structure)	12,000	per space	$ 10,000	$ 120,000,000
	Fare Collection	12	EA	$ 160,000	$ 1,920,000
7	Trackwork				
	Ballasted	96,922	LF	$ 300	$ 29,076,600
	Embedded	300	LF	$ 1,160	$ 348,000
	Grade Crossing	2,000	LF	$ 675	$ 1,350,000
8	Traction Power	19	mile	$ 1,550,000	$ 29,140,000
9	Grade Crossings (including traffic control)	10	EA	$ 275,000	$ 2,750,000
10	Special Trackwork				
	Universal Crossover	3	EA	$ 320,000	$ 960,000
	Double Crossover	3	EA	$ 335,000	$ 1,005,000
11	Signalization	19	mile	$ 750,000	$ 14,100,000
12	Environmental Mitigation		lump sum		$ 3,000,000
A	**BASE ESTIMATE SUBTOTAL (Lines 1 thru 13)**				**$ 394,174,310**
B	PLANNING CONTINGENCY (40% of line A)				$ 157,669,724
C	CONSTRUCTION CONTINGENCY (10% of line A)				$ 39,417,431
	NEAT CONSTRUCTION COSTS (A+B+C+D)				**$ 591,261,465**
D	FUTURE CHANGES AND CLAIMS (10% of Lines A+B+C)				$ 59,126,147
E	CONSULTANT DESIGN FEE (10% of Lines A+B+C)				$ 59,126,147
F	MTA DESIGN COST (2.5% of Lines A+B+C+D)				$ 14,781,537
G	CONSTRUCTION INSPECTION AND CRS (8% of Lines A+B+C+D)				$ 52,031,009
H	MTA CONSTRUCTION COST (3.5% of Lines A+B+C+D)				$ 22,763,566
I	RIGHT-OF-WAY (ROW)				
	Railroad ROW	7	mile	$ 2,000,000	$ 14,440,000
	ROW (non-rr) urban	3	acre	$ 750,000	$ 2,250,000
	ROW (non-rr) suburban	73	acre	$ 350,000	$ 25,707,500
J	ROW CONTINGENCY (25% of Line I)				$ 10,599,375
K	VEHICLES	50	EA	$ 3,100,000	$ 155,000,000
L	VEHICLE YARD		lump sum		$ 58,500,000
M	UTILITIES		lump sum		$ 6,193,528
N	AGENCIES/FORCE ACCOUNT		lump sum		$ 10,000,000
	Total Project Cost				**$ 1,081,780,273**

Consolidated Transportation Plan (CTP)	
Preliminary Engineering:	**$ 73,907,683**
Construction:	**$ 954,875,715**
Right-of-Way:	**$ 52,996,875**
Total:	**$ 1,081,780,273**

RIDERSHIP ANALYSIS

The travel demand-modeling task for the MD 5/US 301 TSSP provides the basis for the development of ridership estimates for the transit alternatives. Recent studies, such as those conducted by the *US 301 Task Force* have projected the potential for significant population and employment growth in Southern Maryland. In anticipation of the projected future congestion and demand for transit service within the study area, it was critical to ensure that the demand modeling effort was as accurate as possible. To ensure agreement on the travel demand modeling methodology the PCC formed a Modeling Sub-Committee with representatives versed in the various modeling applications. The Modeling-Sub-Committee met independent of the PCC to develop the modeling methodology.

Modeling Assumptions and Validation

The transit ridership modeling is primarily based on the following adopted components obtained from MWCOG:

- MWCOG Version 1 MINUTP Model,
- FY 2001-2006 TIP/CLRP Air Quality Conformity Network,
- Round 6.2 Cooperative Land Use Forecasting Data.

Other relevant modeling assumptions include:

- A refined zonal structure and highway network along the study corridor,
- Limitation of modeling Home-Based Work (HBW) trips only,
- Unconstrained demand,
- Application of mode-specific constant coefficient in mode choice model for BRT and LRT transit alternatives.

The MWCOG network zone structure did not provide the necessary zone detail for this level of evaluation. To improve the zone and network representations of the study corridor, the committee recommended refining the MWCOG model network zonal structure. Since the study area was centered along the MD 5/US 301 corridor it was not necessary to adjust the entire zone structure in Charles and Prince George's Counties. The committee recommended a five-mile wide band along the study corridor. After initial assessment of the existing zone structure within this study area limit, it was decided that eight (8) and ten (10) current MWCOG zones located in Charles and Prince George's Counties respectively would be further refined. Based on the availability of demographic data of the new zone structure, it was also decided to use the following adopted zone system to split these existing MWCOG zones:

- For Charles County: zone structure developed for the previous US 301 Transportation Study.

- For Prince George's County: zone structure from the M-NCPPC travel demand modeling system.

After refining the MWCOG TAZ zone structure, a total of 80 new zones (57 for Charles County and 23 for Prince George's County) and their associated changes to the highway network were developed for years 2003 (i.e., the base year) and all the future simulated years.

Concluding that the MWCOG and TSSP zone compatibility check was acceptable, a year 2003 validation check was performed to ensure existing MTA's observed ridership data was compatible with the boarding figures from the TSSP modeling results. The goal of this TSSP model run was to reproduce the observed ridership by further verifying and adjusting the following transit service assumptions and parameters for MTA routes 901 and 905 from the existing MWCOG model coding:

- Route alignment, bus stops, park and ride locations, headway, and travel time,
- Drive and walk access connections,
- Walk access connections for MTA Routes 901 and 905.

The results of this task indicated an acceptable difference of 0.94% (2,123 versus 2,143 daily boardings) between existing MTA ridership data and model run for Route 901, and a difference of 2.03% for Route 905 (1,920 versus 1,881 daily boardings).

Coding Future Year (2025) Transit Alternatives

The next step in applying the modeling procedure was to prepare the transit coding data based on the definition of the transit alternative parameters for the 2025 options. Typical transit input coding data for each alternative include the following components:

- Transit routing and service design,
- Station/stop coding,
- Transit route/link coding,
- Transfer link coding,
- Drive (park & ride) access coding,
- Zonal percentages walk accessible to transit.

The future year 2025 transit alternatives include Enhanced Commuter Bus (ECB), BRT- MOD (BRT-M), BRT – HIGH (BRT-H), and LRT. For this study only weekday peak period service between 5:30 AM – 8:30 AM and 3:30 PM – 6:30 PM was modeled. The resulting projected ridership data does not include mid-day service.

The transit alternative service assumptions for each transit alternative used for modeling parameters are listed below:

TABLE C-1 Current Service					
	901	903	905	907	909
Service Area	La Plata-Waldorf	Charlotte Hall-Waldorf	Charlotte Hall-Waldorf	La Plata-Waldorf	California-Charlotte Hall
Headways	7	30	10	20	30
Morning Trips	24	5	19	8	5
Midday Trips	1	0	1	0	0
Evening Trips	24	5	19	8	5
2003 Travel Time to D.C.	93 min	75 min	95 min	105 min	125 min

*Service to Washington, D.C.

TABLE C-2 Enhanced Commuter Bus					
	901	903	905	907	909
Service Area	La Plata-Waldorf	Charlotte Hall-Waldorf	Charlotte Hall-Waldorf	La Plata-Waldorf	California-Charlotte Hall
Headways	4	10	5	8	10
Morning Trips	40	14	36	18	14
Midday Trips	1	0	1	0	0
Evening Trips	40	14	36	18	14
Travel Time to D.C.	91 min	73 min	93 min	103 min	123 min

*Service to Washington, D.C.

TABLE C-3					
BRT – MOD					
	901	905	907	909	Shuttle
Service Area	La Plata-Waldorf	Charlotte Hall-Waldorf	La Plata-Waldorf	California-Charlotte Hall	White Plains-Branch Ave.
Headways	3	4	7	10	15 - 30
Morning Trips	62	51	30	28	22
Midday Trips	0	0	0	0	34
Evening Trips	62	51	30	28	22
Night	0	0	0	0	6
Travel time - Express	41 min	74 min	46 min	74 min	N/A
Travel time local	45 min	75 min	52 min	75 min	45 min
Travel time – Express 2025	53 min	95 min	59 min	95 min	N/A
Travel time local 2025	58 min	97 min	67 min	97 min	58 min

* Service to Branch Avenue Metrorail Station

TABLE C-4					
BRT – HIGH					
	901	905	907	909	Shuttle
Service Area	La Plata-Waldorf	Charlotte Hall-Waldorf	La Plata-Waldorf	California-Charlotte Hall	White Plains-Branch Ave.
Headways	3	4	7	10	15 - 30
Morning Trips	62	51	30	28	22
Midday Trips	0	0	0	0	34
Evening Trips	62	51	30	28	22
Night	0	0	0	0	6
Travel time - Express	31 min	64 min	36 min	64 min	N/A
Travel time local	37 min	66 min	44 min	66 min	34 min
Travel time – Express 2025	35 min	73 min	41 min	78 min	N/A
Travel time local 2025	41 min	75 min	49 min	81 min	34 min

* Service to Branch Avenue Metrorail Station

TABLE C-5	
LRT	
Service Area	**White Plains – Branch Avenue**
Headways	5 - 15
Morning Trips	40
Midday Trips	30
Evening Trips	34
Night	19
Travel Time	42 min

It is assumed that BRT (both BRT-M and BRT-H) and LRT transit alternative options include feeder bus service to the proposed station locations along the alignments. The feeder bus service for Prince George's County -The Bus and Charles County - VanGO were developed in cooperation with both jurisdictions. The feeder service reflects adjustments to existing service as well as new services to feed the station locations. It is assumed that the 2025 headways for these services would be 30 minutes for feeder service in each of the respective counties. TABLES C-6 and C-7 list travel times for the feeder routes:

TABLE C-6	
Prince George's County – The Bus	
Route	**One-Way Travel Time**
30	40 minutes
32	60 minutes
33	60 minutes
34	50 minutes
35	45 minutes

TABLE C-7	
Charles County – VanGO	
Loop	**Loop Travel Time**
A	35 minutes
B	45 minutes
C	45 minutes
D	45 minutes
E	45 minutes
F	45 minutes
G	45 minutes
H	90 minutes
I	60 minutes

In the conventional mode choice model, all of the coefficients for the utility equations applied to the transit modes for those measurable service parameters, such as travel time, wait time, and fare are usually the same among different transit modes. In other words, the only way to differentiate between bus and rail modes, within the modeling environment, is through the different levels of service these two modes provide. However, the transit users generally agree that certain qualitative (or unmeasured)

attributes will also affect their decision in choosing a specific transit mode. According to the research paper "Comparing Ridership Attraction of Rail and Bus", June 1991, by Professor Moshe Ben-Akiva of MIT, there should be a different mode specific constant coefficient for each modal alternative based on the similarities of the following unmeasured attributes among these transit modes:

- Off-peak service,
- Reverse commute,
- Standing-moving in vehicle,
- Riding comfort,
- Sheltered stations,
- Reliability,
- Fare collection.

Currently, only the Metrorail mode was assigned a modal specific constant coefficient within the MWCOG Version 1 mode choice model used for this study. Accordingly, it was also necessary to account for these unmeasured attributes for BRT (both BRT-M and BRT-H) and LRT modes and derive separate mode-specific constant coefficients for them. A value of one was assigned to each attribute for BRT or LRT if its service was considered to be identical to Metrorail. Members of the PCC reviewed each attribute and assigned the appropriate value for each attribute as it compares Metrorail to BRT and LRT respectively. If an attribute was not identical but was similar, a value of less than one was assigned to each attribute to reflect its degree of similarities. Consensus among the committee was reached, based on the proposed BRT and LRT services from this study, and is summarized in TABLE C-8.

Assuming the attribute value of Metrorail equals 7, in comparison, LRT has a value of 5 and BRT has a value of 4.25. These relative weights derived from this comparison were used as the factors to develop the corresponding mode–specific constant coefficient for BRT and LRT modes during the TSSP model application for these transit options.

TABLE C-8
Unmeasured Attributes of BRT and LRT

Attribute	BRT	LRT
Off-Peak Service	1	1
Reverse Commute	1	1
Standing-Moving Vehicle	0	1
Riding Comfort	1	0.5
Sheltered Stations	0	0
Reliability	0.25	0.5
Fare Collection	1	1
Total	4.25	5

1=Identical to metro rail

Ridership Analysis and Projections

To gain understanding of the ridership for various transit modes for the future year, it is crucial to realize the different level of services, through modeled travel time comparison, on both highway and transit network under various alternatives. It is also very important to understand that these different service levels among these alternatives significantly contribute to the relative magnitudes of their ridership projections. TABLE C-9 indicates the highway travel time comparison between 2003 and 2025 for two selected points along the study corridor. With an approximate 40% increase of highway travel time between 2003 and 2025, one can easily perceive the severity of highway congestion as well as its potential effect on the transit mode share in the study corridor.

TABLE C-9
Highway Travel Time Comparisons (Minutes)

	2003	2025
SE of La Plata (TAZ 635) to DC (TAZ 4)	86	119
St. Charles (TAZ 1315) to DC (TAZ 4)	77	108

For the transit side, TABLE C-10 represents the total transit travel time by drive and walk access between the same two points as mentioned above among the existing 2003 and future 2025 transit alternatives proposed in this study. Both 2025 BRT-H and 2025 LRT alternatives show significant travel time improvements with respect to not only other transit modes but also highway mode.

TABLE C-10
Transit Travel Time Comparisons (Minutes)

	2003	2025 ECB	2025 BRT-M	2025 BRT-H	2025 LRT
Drive Access SE of La Plata (TAZ 635) to DC (TAZ 4)	112.48	147.73	131.25	93.22	92.8
Walk Access St. Charles (TAZ 1315) to DC (TAZ 4)	96.58	131.83	119.35	77.32	77.93

Transit ridership modeling is primarily a function of the network design and transit service parameters and attributes. A number of modeling runs to test the sensitivity of the selected variables were conducted under the 2025 LRT scenario. The results indicated that adjustments to the service parameters and attributes may have a significant impact on the modeling results. For example, adjusting the LRT headway from 8 to 15 minutes significantly decreased the transit demand from Charles County by nearly 10%. On the other hand, adjusting headway of those feeder bus routes from 15 to 30 minutes only decreased the same demand by nearly 4%.

The TSSP modeling runs assumed parameters based on the service characteristics defined for each transit alternative. After a successful validation run of the year 2003, all

four year 2025 transit alternatives were tested and their corridor ridership comparison is summarized in TABLE C-11. These values indicate the daily boarding number of home base work (HBW) purpose trips using the transit services provided for the MD 5/US 301 corridor in each transit alternative. For BRT-M, BRT-H, and LRT alternatives, the low end of the range was based on the standard biased constant used in the MWCOG travel demand model (i.e., for Metro rail mode only), while the high end of the range represented what might be expected with the more attractive service offered by the BRT-M, BRT-H and LRT alternatives (i.e., through applying those mode-specific constant coefficients derived from the respective unmeasured attributes of each alternative discussed earlier).

TABLE C-11
Corridor Ridership Comparisons
(Total Daily Boardings)

	2003	2025 ECB	2025 BRT-M	2025 BRT-H	2025 LRT
Drive Access	3,660	6,590	18,100 – 21,900	24,250 – 28,475	19,250 –23,650
Walk Access	365	230	1,400 – 1,700	2,150 – 2,525	2,650 – 3,150
Total	**4,025**	**6,820**	**19,500 – 23,600**	**26,400 –31,000**	**22,600 –26,800**

Walk access includes persons that arrive bus stop by walk or bus transfer.

Drive access includes persons that arrive bus top by automobile, i.e. either park & ride or kiss & ride.

In terms of transit services alternatives, 2003 and 2025 ECB were designed as commuter services with stops outside of Prince George's County. However, 2025 LRT, 2025 BRT-H, and 2025 BRT-M were designed to serve the entire MD 5/US 301 study area having stops in both Charles and Prince George's counties. A pattern of drive access dominated travel market is clearly illustrated for all alternatives in Table C-11. Also indicated in the table, the 2025 BRT-H and LRT transit alternative result in the highest potential for transit ridership in the corridor. The following factors contribute to the much higher BRT-H ridership as compared with LRT:

- BRT-H and LRT unmeasured attributes are similar,
- BRT-H has more frequent services than LRT,
- BRT-H travel time is marginally faster than LRT.

To have a better understanding of how service characteristics affect the demand markets for the 2025 BRT-H and 2025 LRT alternatives, TABLE C-12 represents the percentage of trips that originated outside of Prince George's County for the BRT-H and LRT options. This table illustrates that more residents, in terms of market share, in the areas such as Charles and Saint Mary Counties will take advantages of utilizing BRT-H than LRT services. The main reason is due to the difference in the locations of stations between BRT-H and LRT options. More stations (i.e., accessibility) are proposed within Prince George's County for the LRT option.

TABLE C-12 BRT/LRT Trips Originating Outside of Prince George's County		
	2025 BRT-H	2025 LRT
Drive Access	63.4 %	48.6 %
Walk Access	74.6 %	60.8 %
Total	**66.0 %**	**52.4 %**

TABLE C-13 indicates the percentage of total boardings that occurred in BRT-H or LRT stations located in Charles County. This table illustrates the relative degrees of utilization in terms of geographical locations of the stations. For example, more passengers in terms of market share will board on the stations located in Prince George County (i.e., 55.6% or 100% minus 44.4%) under LRT option as compared with BRT-H one (i.e., 33.3% or 100% minus 66.7%). This information would be useful in designing the scale of park and ride lots for the stations located in Prince George's County under the LRT option and BRT-H option.

TABLE C-13 BRT/LRT Boardings at Stations in Charles County		
	2025 BRT-H	2025 LRT
Drive Access	65.2 %	39.1 %
Walk Access	71.7 %	55.5 %
Total	**66.7 %**	**44.4 %**

The ridership numbers developed here by the TSSP modeling procedure will be difficult to compare with those results from the previous 1996 *US 301 Transportation Study* (US 301 TS) modeling procedure due to the following general reasons:

- Different land use data,
- Different travel demand model set and methodology,
- Different highway and transit network assumptions.

Based on understandings of the previous travel demand modeling methodology adopted in the US 301 study, TABLE C-14 compares the key assumptions that differentiated it from the TSSP modeling procedure used in this study.

TABLE C-14 Comparison of Key Assumptions between TSSP and US 301 TS Models		
Model Assumptions	**TSSP Model**	**US 301 TS Model**
MWCOG Model Version	Version 1	Prior to Version 1
Cooperative Forecasts	Round 6.2	Round 5.2
Forecasted Future Year	2025	2020
Validated Base Year	2001	1990
MD 5 HOV Assumption	No HOV	HOV from TB to I-495
Transit Mode-Specific Constants	Yes	No
TAZ Structure	Refined	More Refined

One other assumption, unconstrained versus constrained demand, can definitely affect the forecasting outcomes. As we described earlier, TSSP Model assumes the results representing unconstrained demand, i.e., assuming that there are no capacity limits on any part of the transit system. For the purpose of developing the TSSP for the MD 5/US 301 corridor, this assumption can measure the level of potential transit market under each improvement option without bias. It will be more appropriate to consider an assumption of constrained demand when the specific transit improvement option starts considering operation-related issues. It was not clear, based on our collection of information, whether US 301 TS Model considered constrained demand assumption or not.