

White Paper
Medium Investment BRT Variations Serving Medical Center
Purple Line AA/DEIS

Introduction

The Maryland Transit Administration, in response to a request by the Town of Chevy Chase, has conducted additional analysis of two routing variations for the Medium BRT option. The purpose of conducting this analysis was to determine if improved access to the Medical Center station area would provide benefits to the Purple Line project and perhaps provide impetus to consider alternatives that provide improved service to that area. The idea was forwarded that with employment and visitor growth at the National Naval Medical Center (NNMC) – to be re-named the Walter Reed National Military Medical Center (WRNMMC) – with Base Realignment and Closure (BRAC) activities there might be a positive impact on Purple Line ridership.

The variations tested for the Medium BRT options were developed through input from Sam Schwartz Engineering (SSE) – a consulting firm hired by the Town of Chevy Chase to represent their concerns on the project. The basics of the two developed alternatives were to explore routing options that would provide a “one seat ride” to both the Medical Center Station Area and to downtown Bethesda.

The analysis methodology used included the re-coding of the Medium BRT option in the project demand forecasting model to determine results of the two scenario options combined with a new BRT stop location near the intersection of Woodmont Avenue and St. Elmo Street in the northern Bethesda CBD area. Results of this assessment are presented in the following pages.

The MTA, throughout the project, has reiterated that the components of the various alternatives could be re-compiled as variations of the basic build alternatives where technically possible. As an example, this could include segments of Low-Investment BRT linked to Medium or High Investment BRT. The analysis presented in this white paper then represents an exploration of that type of linked improvement scenario. The environmental impacts of the various components would be comparable to the assessments of the Build alternatives in the DEIS. The benefits to travel through user benefit hours are outlined below. Results of calculations of FTA cost effectiveness measures for the two variations are also presented for comparison.

Demand Forecasting Model

The Purple Line project uses a model specifically adapted from the Metropolitan Washington Council of Governments (MWCOG) for use on the project. Background on the model development process has been included below for reference.

Maryland Transit Administration (MTA) developed a common travel demand forecasting model and procedures for two Alternatives Analyses in two separate corridors in the Washington DC regional modeling area. The intention was to use the same No Build

forecast as the starting point for future forecasts for both the Corridor Cities Transitway (CCT) and the Purple Line (PL). Preliminary work on the CCT forecasts indicated that some enhancements to the Washington Metropolitan Council of Governments (MWCOG) travel model would be required to provide transit corridor-level alternative analysis travel forecasts.

The enhanced model described in this document is referred to as the Maryland Alternatives Analysis Model, or the MDAA. It is based on the officially adopted MWCOG model version 2.1D#50, as modified by MWCOG for the 2007 Conformity Analysis, and referred to here as the COG Model. The COG model is a classic four step model with a static six iterations of feedback through trip generation, distribution, mode choice, and assignment. The COG mode choice model is a simple multinomial model that relies upon the path builder to distinguish choices among primary transit modes. It does not disaggregate transit trips into the various transit modes or transit access modes, nor does it accommodate transit assignment.

The COG Model was not fully developed to accommodate comprehensive transit analysis, and therefore a MWCOG model transit component post processor was developed, typically referred to as the COG Transit Component. Starting from the person trip tables that result from the sixth iteration of the full model feedback, the Transit Component applies a more sophisticated mode choice model which distinguishes between bus, bus/Metrorail, Metrorail only and commuter rail trips. Walk, Park and Ride, and Kiss and Ride trips are modeled separately and transit assignment is included. Full documentation of the Transit Component can be found in *Post MWCOG - AECOM Transit Component of Washington Regional Demand Forecasting Model Users Guide*, prepared by AECOM Consult, Inc. and dated March 2005.

The 2005 Transit Component was the starting point for modifications made for initial rounds of forecasts for the CCT. Additional modifications included edits to the networks, zones, and all files that are related to zonal-based demographics and walk percentages, to address corridor-level conditions and reporting needs. Changes were made to the Transit Component scripts in order to accommodate the new zone structure and network modifications. The resulting model referred to here as the CCT Model, was the starting point for the MDAA.

The MDAA starts with the CCT Model and incorporates modifications to improve confidence in transit forecasts in these two corridors. The MDAA replaces the COG Model home-based work trip distribution with the Census Transportation Planning Package (CTPP). The mode choice model is a nested logit model with bus, Metrorail, commuter rail, light rail and bus rapid transit alternative transit modes. A park-and-ride station capacity restraint model was implemented to account for limited capacity at key stations.

The MDAA was used to test all project alternatives for this project through coding modifications to station locations and routing. Resulting corridor ridership figures were used in later calculations. As part of the Federal New Starts coordination process the MTA demand forecasting team met with Federal Transit Administration (FTA) demand

forecasting representatives to discuss methodology applied to insure that it meets federal guidelines.

Variations Tested

As noted above two variations providing access to the Medical Center station area have been assessed for comparison to the Medium BRT alternative defined and analyzed during preparation of the Draft Environmental Impact Statement (DEIS). The Medium BRT alternative as defined in the DEIS provides improved BRT service the length of the corridor at an estimated cost of \$580 million dollars. The two variations to this alternative that were tested are identical to the Medium BRT alternative from east to west through the station at Lyttonsville. From there access to Bethesda and the Medical Center station are differs from service assumptions in the DEIS. For the purposes of this analysis the two alternatives have been termed: “Medium BRT – Jones Bridge Road” and “Medium BRT – Medical Center Access”. Both alternatives assume a new station at the intersection of Woodmont Avenue and St. Elmo Street, providing access to the population center in the area – a new station location not included in project analysis to date.

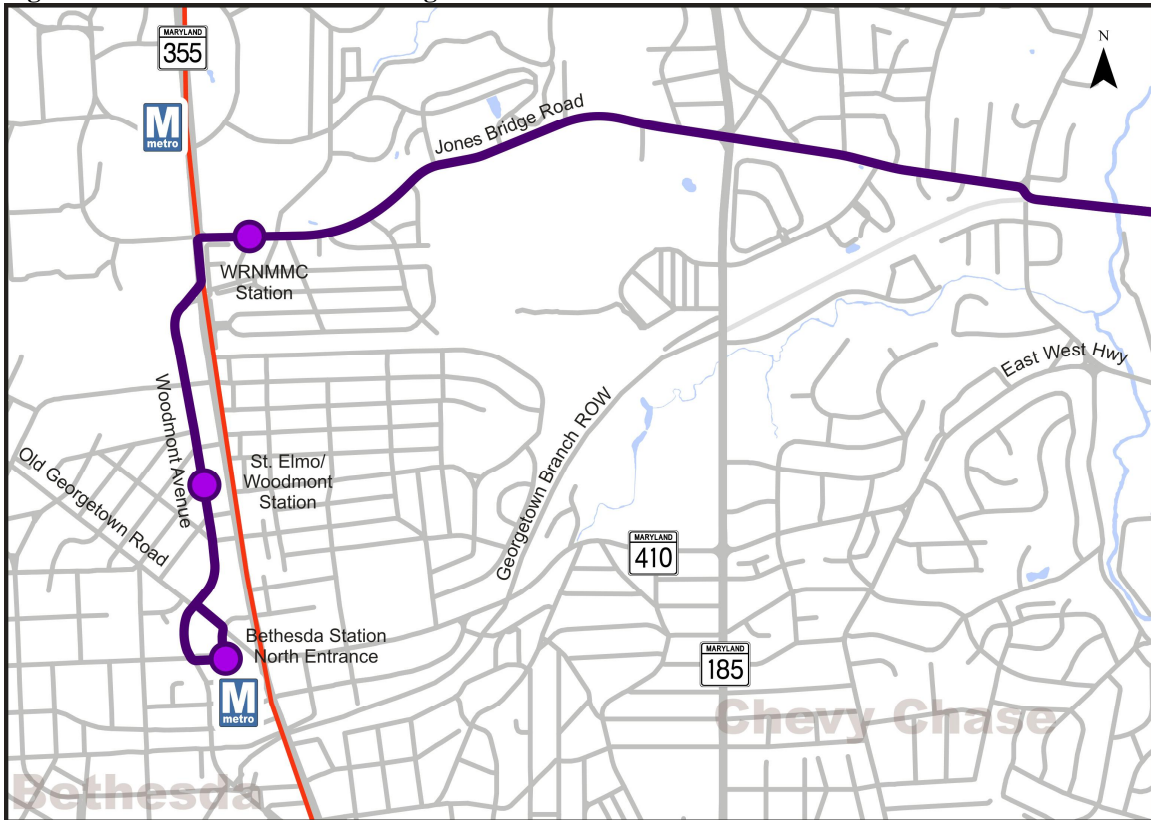
Access to the Medical Center area is different for the two alternative variations. The Medium BRT – Jones Bridge Road alternative assumes a new station at the northeast corner of the Jones Bridge Road / Rockville Pike intersection with full access to the Red Line Metro station. The Medium BRT – Medical Center Access variation assumes a connection to the existing Medical Center Metro Station transit area. For the purposes of this analysis full transit access (Metro rail and bus) has been assumed to be similar for both station locations.

Medium BRT – Jones Bridge Road

Figure 1 below graphically depicts variation 1 to the Medium BRT option – the Medium BRT – Jones Bridge Road variation. From Lyttonsville the variation travels along the Master Plan alignment to Jones Mill Road. At this point the variation follows the alignment described by the Low Investment BRT alternative – traveling along Jones Bridge Road to a new station area at the northeast corner of the Jones Bridge Road / Rockville Pike intersection. From this station the variation crosses the intersection to Woodmont Avenue and the new station at Woodmont Avenue and St. Elmo Street. The BRT vehicles would then travel along Woodmont Avenue to the western terminus at the Bethesda Metro station. BRT vehicles would turn around at the Bethesda Station to begin eastbound service.

It should be noted that full transit access at the Medical Center station has been assumed for this analysis. That is that transfers between Metrorail and the Purple Line and between buses and the Purple Line are all possible at this station location.

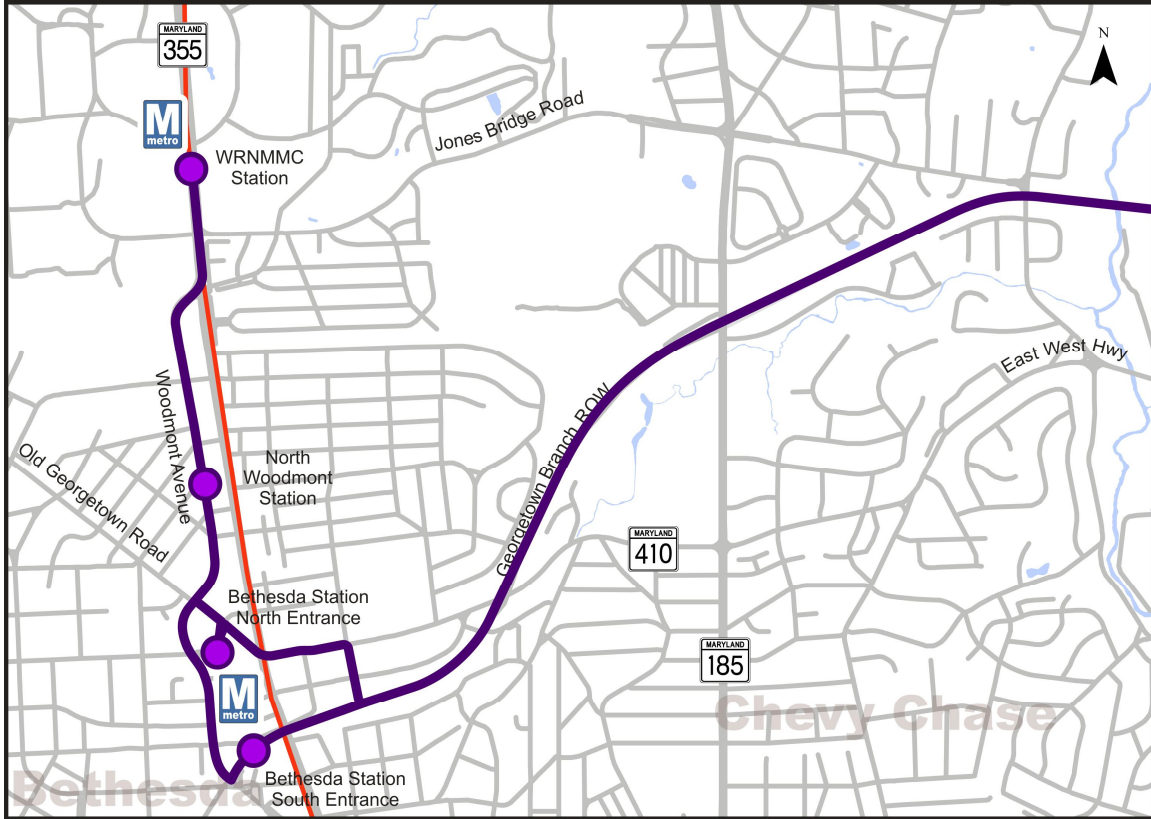
Figure 1 - Medium BRT - Jones Bridge Road Variation



Medium BRT – Medical Center Access

Figure 2 below graphically depicts variation 2 to the Medium BRT options – the Medium BRT – Medical Center Access variation. From Lyttonsville the variation travels along the Master Plan alignment to the Connecticut Avenue station. From this station the variation continues along the Master Plan alignment to Pearl Street where it travels on-street to the Bethesda Metro Station – North Entrance. From the Bethesda Metro Station the variation travels along Woodmont Avenue to the new station at the intersection of Woodmont Avenue and St. Elmo Street. BRT vehicles would then travel from this station location to Rockville Pike to the western terminus at the Medical Center Metro station. The BRT vehicles would then travel south along Rockville Pike to Woodmont Avenue to the new station at Woodmont Avenue and St. Elmo Street. The vehicles would then travel to the Bethesda Metro Station - South Entrance before re-entering the Master Plan alignment and access to Connecticut Avenue and the remaining stations to the east.

Figure 2 - Medium BRT - Medical Center Access Variation



Technical Analysis

The technical analysis conducted for the testing of variations to the Medium BRT alternative applied the same methodology as that used in project alternatives tested to date, including the determination of ridership estimates and associated capital and operating cost estimates. These estimates were used to determine the cost per user benefit hour – one of the criteria the FTA uses in assessing the viability of New Starts projects. A table which compares ridership estimates, capital cost estimates, operation and maintenance costs and costs effectiveness measures of the alternative variations as compared to the Medium BRT alternative have been included below.

Estimates for the Medium BRT – Jones Bridge Road variation have been determined based on the assumption that a \$60 million dollar investment would be required to provide the connection from the proposed station area to the Medical Center Metro platform as well as to provide a grade-separated connection across Rockville Pike for travelers to both NIH and the new Walter Reed facility. This level of connectivity (as well as full bus transfers) was assumed in the modeling effort as noted above.

For the purposes of this analysis an estimate of user benefit hours has also been presented which assumes that this cost is not part of this variation for the purposes of providing a point of comparison.

Table 1 - Analysis Results - Medium BRT Variations

Measure	Medium Investment BRT (DEIS)	Variation 1 Medium Investment BRT via Jones Bridge Road	Variation 2 Medium Investment BRT extended to Medical Center
2030 Daily Boardings	52,000	50,000	58,000
<i>Change Relative to Med Invest. BRT</i>	NA	-2,000	6,000
2030 Annual User Benefits (hours)	5,008,000	4,783,000	5,244,000
<i>Change Relative to Med Invest. BRT</i>	NA	-225,000	236,000
Capital Costs (2007 dollars)	\$580,000,000	\$597,000,000	\$585,000,000
<i>Change Relative to Med Invest. BRT</i>	NA	\$17,000,000	\$5,000,000
Annual O&M Cost (2007 dollars in millions)	\$17,300,000	\$17,300,000	\$18,300,000
<i>Change Relative to Med Invest. BRT</i>	NA	\$0.00	\$1,000,000
FTA Cost-Effectiveness Measure (cost per hour of User Benefit) relative to TSM	\$14.01	\$15.62 \$14.04 w/o New South Medical Center Entrance	\$13.43

Conclusion

Variation 1 – Medium BRT - Jones Bridge Road shows that the travel time increase of the longer routing to the larger Bethesda travel market results in a loss of 2,000 daily boardings and 225,000 hours of annual user benefits relative to the Medium Investment BRT alternative. The FTA cost effectiveness index for this variation increases to \$15.62 with the new station entrance - which is essential for the connection to the Metrorail Red Line at Medical Center. Without the capital costs associated with this entrance, the index goes to \$14.04.

Variation 2 – Medium BRT – Medical Center Access - extending the service to Medical Center from Bethesda increases the daily boardings by 6,000 and the annual user benefits by 236,000 hours. The cost effectiveness index for Variation 2 improves to \$13.43 with this routing. This result indicates the benefits of serving the major Bethesda market directly while also providing a one-seat ride to the Medical Center area.