

AGENDA ITEM #4
June 13, 2017
Action

MEMORANDUM

June 9, 2017

TO: County Council

FROM: Glenn Orlin, Deputy Council Administrator

SUBJECT: **Action**—resolution to select recommended alternative for the Veirs Mill Road (MD 586) Bus Rapid Transit (BRT) project

T&E Committee (and Council staff) recommendation (3-0): Select Alternative 2.5 as the recommended option to carry forward into preliminary design. Retain Alternative 3 as the master plan option, thus protecting the right-of-way for a potential upgrade to a continuous dedicated lane in the long term, if it is eventually warranted. A draft resolution is on ©38-39,

* * *

In 2009 the Council appropriated \$6 million to conduct planning and preliminary engineering for the Veirs Mill Road (MD 586) BRT line, extending about 6.7 miles between the Rockville and Wheaton Metro Stations. The technical study has been led by the State Highway Administration (SHA) and the community outreach and local agency coordination has been led by the County Department of Transportation (DOT). During the past several years of analysis and community input, the staffs winnowed the alternatives retained for detailed study to four, and have documented the benefits, costs, and impacts of those four alternatives:

- Alternative 1: no build.
- Alternative 2: minor improvements, including queue jumpers and transit signal priority. This alternative, and the next two, include limited stations, shelters, real-time information, larger branded rapid transit vehicles, off-board fare collection, etc. Cost = \$34.9 million.
- Alternative 3: widening or repurposing most of the existing curb lanes or shoulders to use exclusively for BRT and right-turning vehicles. Cost = \$148.2 million.
- Alternative 5B: create a single, two-way BRT lane in the median, with passing lanes at stations. Cost = \$289.4 million.

The documentation is found in the MD 586/Veirs Mill Road BRT Draft Corridor Study Report: http://apps.roads.maryland.gov/WebProjectLifeCycle/MO244_11/HTDOCS/Documents/Additional Documents/2016Sept6%20Revised%20Draft%20Corridor%20Report%20MD586%20BRT.pdf.

Councilmembers have received hard copies of this report. The Executive Summary is on ©1-8. Both the Planning Board and the Mayor and Council of Rockville recommend Alternative 3.

The Transportation, Infrastructure, Energy and Environment (T&E) Committee received a briefing on the report at its December 1, 2016 meeting. At this worksession the consensus was that Alternative 5B should be eliminated from consideration due to its high cost and that its travel time savings were not much different than much less costly alternatives. The Committee asked SHA to evaluate a new “BRT with queue jumps only” alternative; SHA presented the results of this evaluation on May 3, 2017. This alternative includes many of the elements of Alternative 3: longer (60’ long), multiple-door BRT buses, larger stations with canopies, level boarding, real-time information, and off-board fare collection. It would not have a continuous dedicated lane, however; like Alternative 2, it would feature queue jump lanes at Veirs Mill Road’s 12 busiest intersections between Rockville and Wheaton, and transit signal priority (TSP) that would often give BRT vehicles an advance green at these intersections. Therefore, it is a hybrid of Alternatives 2 and 3; from this point on in this memo it will be referred to as Alternative 2.5.

SHA’s evaluation of Alternative 2.5, compared to Alternatives 2 and 3, is described in its April 2017 technical report (©11-25). Its presentation at the May 3 T&E meeting is on ©26-37. In summary, SHA found that Alternative 2.5 would provide roughly the same or slightly less travel time savings (depending on the direction of travel and the time of day) than Alternative 3, but at a capital cost of \$79.2 million: \$69.0 million (47%) less than Alternative 3.

Council staff recommendation: Select Alternative 2.5 as the recommended option to carry forward into preliminary design. Retain Alternative 3 as the master plan option, thus protecting the right-of-way for a potential upgrade to a continuous dedicated lane in the long term, if it is eventually warranted.

The next step would be to carry the recommended option through preliminary (35%) design, which is estimated to cost about \$6.8 million of the \$79.2 million total (see Table 3 on ©20), an exercise that would take up to three years to complete. The Executive and Council should work on a funding strategy that would allow the \$6.8 million to be funded in the early years of the next CIP, if not sooner. Unlike the MD 355 and US 29 BRT routes under development, there is very little economic development anticipated to be spurred by the Veirs Mill Road BRT. But it would provide significant travel time relief and more reliability to many regular bus commuters, many of which are of low or moderate income.

Kate Sylvester, Assistant Chief of SHA’s Project Management Division, and Joana Conklin, DOT’s Rapid Transit System Development Manager, will be on hand to answer questions.

EXECUTIVE SUMMARY

This Corridor Study Report (CSR) documents the evaluation of alternatives to provide new Bus Rapid Transit (BRT) service along MD 586 (Veirs Mill Road). This study has been completed by the Maryland Department of Transportation's (MDOT) Maryland State Highway Administration (SHA) and Maryland Transit Administration (MTA), in cooperation with the Montgomery County Department of Transportation (MCDOT).

The proposed MD 586/Veirs Mill Road BRT Corridor Study extends approximately 6.7 miles from the Rockville Metrorail Station to the Wheaton Metrorail Station in Montgomery County, Maryland. This study also includes the extension of enhanced bus service from the Rockville Metrorail Station, north in mixed traffic along MD 355, an additional 1.5 miles to Montgomery College.

BRT was identified as a solution for this transit-dependent and congested corridor because it would increase transit reliability and opportunities for low-income and minority populations, as well as access to a larger supply of affordable housing. Additionally, enhanced transit access could play an integral role in revitalizing the adjacent neighborhoods, relieving congestion, supporting land conservation, and improving safety for bicyclists and pedestrians. It is expected that BRT improvements would increase the mobility, safety, and sustainability of the study corridor.

A federal lead agency has not been identified for this project as of the date of this CSR; however, the project team acknowledges that federal funding may be required to implement the proposed improvements. The project may seek funding from the Federal Transit Administration (FTA) or Federal Highway Administration (FHWA). Federal funding would require compliance with the National Environmental Policy Act (NEPA) and implementing regulations, as outlined in the Council of Environmental Quality (CEQ) 40 Code of Federal Regulations (CFR), Part 1500-1508. Anticipating that a federal funding source will be identified, the CSR that follows was written to inform future NEPA document(s) and implementing regulations.

PURPOSE AND NEED

The purpose of the MD 586/Veirs Mill Road BRT Corridor Study is to provide new, higher-speed, higher-frequency, premium transit bus service along Veirs Mill Road between the Rockville Metrorail Station and the Wheaton Metrorail Station.

Transportation data, planned developments, and feedback from individual citizens and community groups was obtained during the project scoping to identify the following needs for the project:

- 1. System Connectivity:** A high-quality, east-west transit connection is not currently available between the Rockville Metrorail Station and the Wheaton Metrorail Station.
- 2. Mobility:** The Veirs Mill Road corridor is characterized by traffic congestion that hinders bus mobility (speed and reliability), resulting in unpredictable service and travel times.

3. **Transit Demand/Attractiveness:** The current transit service does not meet existing demand; this coupled with reliability issues (adherence to schedule, bus bunching, and slow travel times), reduces serviceability for individuals who rely on public transit as their primary mode of transportation. In addition, issues associated with current bus service do not make buses attractive to individuals who have access to alternate modes of transportation.
4. **Livability:** Transit improvements are needed throughout the Veirs Mill Road corridor to create a more reliable, integrated and accessible transportation network that enhances choices for transportation users; provides easy access to affordable housing, employment, and other destinations; and promotes positive effects on the surrounding community.

ALTERNATIVES

Ten conceptual alternatives were developed for the study corridor by combining transit service options and runningway options. These conceptual alternatives were evaluated based on feasibility within the study corridor and expected right-of-way (ROW) and traffic impacts. Three build alternatives and the No-Build Alternative were retained for detailed study. The build alternatives were developed utilizing input from the appropriate environmental and regulatory agencies and the public. A detailed plan of each of the retained build alternatives, including the proposed limits of disturbance (LOD), is provided in **Appendix A**.

Alternative 1 – No-Build Alternative: Alternative 1 would not involve improvements to infrastructure or bus service along the Veirs Mill Road study corridor beyond those improvements already planned and programmed. The existing lane configurations and bus services would remain the same in the 2040 design year. The No-Build Alternative does not address the purpose and need for the project; however, it serves as a baseline for comparing the impacts and improvements associated with the build alternatives.

Alternative 2 – Transportation System Management (TSM) with Intersection Queue Jumps and Enhanced Bus Service: Alternative 2 would consist of minor infrastructure improvements at select intersections and the implementation of a limited-stop, enhanced bus service, similar to the proposed Washington Metropolitan Area Transit Authority (WMATA) Q9 route. The minor infrastructure improvements would include enhanced bus stops with features such as shelters, real time information, or off-board fare collection, installation of transit signal priority (TSP), and widening for the installation of queue jumps.

Alternative 3 – New Bus Rapid Transit Service in Dedicated Curb Lanes (where feasible): Alternative 3 would consist of widening or repurposing the existing travel lanes and shoulders along Veirs Mill Road to provide dedicated, curb-running bus lanes and a new BRT service. The dedicated lanes would be provided for the BRT service in areas where the improvements would result in minor ROW impacts and where doing so would improve bus service by increasing the travel speeds.

Alternative 5B – New Bus Rapid Transit Service in the Median, via One Dedicated Bi-directional Lane or in Two Lanes (where feasible): Alternative 5B would implement new BRT service in a dedicated, bi-directional median lane or in two dedicated median lanes from MD 28

to Newport Mill Road. In the bi-directional median lane segments, BRT buses would operate in both directions in a single-lane operation. Eastbound and westbound vehicles would alternate when using the lane. Transit vehicles traveling in opposite directions would pass each other at stations where the bi-directional travel lanes would widen to two lanes. A two-lane, dedicated median section would be provided, where feasible. Generally, the dedicated lanes would be created by pavement widening to the outside and shifting the existing vehicular travel lanes out to allow the BRT to fit within the median. The number of existing travel lanes would be maintained.

ALTERNATIVES COMPARISON

A comparative summary of transit and traffic operations associated with the No-Build and three build alternatives is described below and summarized in **Table S-1**. A comparative summary of costs, and environmental impacts associated with the No-Build and three build alternatives is also described below and summarized in **Table S-2**.

- The projected 2040 daily BRT boardings for the build alternatives would range from 2,600 to 7,300 passengers. The projected 2040 daily transit boardings in the corridor for the build alternatives would range from 33,400 to 35,300 passengers.
- In general, each of the build alternatives would improve travel times for cars and trucks traveling along MD 586, as compared to the No-Build while increasing delays for cars and trucks on side streets accessing MD 586.
- For the build alternatives, the number of miles of level of service (LOS) E or F along the corridor would range from 3.2 to 3.5 in the AM peak hour and from 3.8 to 4.2 in the PM peak hour, all of which are less than or equal to the No-Build distances of 3.5 miles in the AM peak hour and 5.8 miles in the PM peak hour.
- All three build alternatives would result in four or five intersections operating at LOS E or F in both the AM and PM peak hours.
- The cost to purchase the required ROW for the build alternatives would range from \$6.2 million to \$35.4 million and the amount of ROW required for the build alternatives would range from 0.7 acre to 6.7 acres.
- The cost of engineering and construction for the build alternatives would range from \$23.3 million to \$237.5 million and the total capital cost, including ROW and vehicles, would range from \$34.9 million to \$289.4 million.
- The annual operating costs of the build alternatives would range from \$3.1 million to \$4.8 million.
- The number of properties impacted by the build alternatives would range from 27 to 217. The number of residential relocations would range from four to 17 households and the number of business displacements would range from one to three. The residential relocations for Alternative 5B are presented as a range; the final locations of bus station locations would be determined following the identification of a Recommended Alternative.

- The number of public parks impacted by the build alternatives would range from one to five and the acreage would range from 0.2 acre to 1.6 acres.
- The number of public facilities impacted by the build alternatives would range from zero to three.
- The number of historic structures impacted by the build alternatives would range from zero to four. No archaeological sites would be impacted.
- The number of stream crossings impacted by the build alternatives would range from zero to ten. The 100-year floodplain impacts would range from zero to 0.3 acre. The wetland impacts would range from zero to less than 0.1 acre. The forest impacts would range from 0.8 acre to 3.1 acres. The Green Infrastructure impact would range from less than 0.1 acres to 1.7 acres.
- None of the build alternatives would have disproportionately high or adverse impact on minority or low-income populations.

Table S-1: Alternatives Comparison Matrix – 2040 Ridership and Traffic

COMPARISON FACTORS		ALTERNATIVE 1 (No-Build)		ALTERNATIVE 2		ALTERNATIVE 3		ALTERNATIVE 5B	
		AM	PM	AM	PM	AM	PM	AM	PM
Ridership									
Total Daily Transit Boardings ¹		32,300		33,400 ²		35,000		35,300	
Total Daily BRT/Enhanced Bus Service Boardings ¹		N/A		2,600 ²		6,400		7,300	
Non-Auto Driver Mode Share		36%		36%		36%		36%	
Peak Period Person Throughput¹									
South of First Street		3,800	4,000	3,900	3,900	3,900	4,000	3,900	4,000
South of Twinbrook Parkway		5,200	5,700	5,400	5,800	5,400	5,800	5,400	5,900
North of Connecticut Avenue		5,100	5,400	5,200	5,600	5,200	5,800	5,100	5,700
South of Newport Mill Road		4,600	5,000	4,700	4,900	4,700	5,100	4,800	5,100
Travel Times in Minutes: End-to-End (Rockville Metrorail Station to Wheaton Metrorail Station)									
EB	Peak-Hour Enhanced Bus/BRT	N/A	N/A	27.9	24.9	26.2	25.3	22.8	23.7
	Peak-Hour Other Buses	35.5	40.4	36.7	32.7	34.0	30.4	37.1	33.8
	Peak-Hour Automobile	22.5	27.9	20.7	22.3	21.3	20.2	22.1	22.1
WB	Peak-Hour Enhanced Bus/BRT	N/A	N/A	21.6	22.3	22.7	25.7	25.5	24.6
	Peak-Hour Other Buses	29.5	32.9	28.8	29.1	29.2	29.0	32.0	34.6
	Peak-Hour Automobile	19.6	24.4	18.6	18.6	20.5	20.2	24.6	23.6
Vehicle Miles Traveled (VMT) in Study Corridor									
Percent Change in Automobile VMT, as compared to the No-Build		N/A		<1%		<1%		<1%	
Percent Change in Transit VMT, as compared to the No-Build		N/A		15%		26%		26%	

COMPARISON FACTORS	ALTERNATIVE 1 (No-Build)		ALTERNATIVE 2		ALTERNATIVE 3		ALTERNATIVE 5B	
	AM	PM	AM	PM	AM	PM	AM	PM
Accessibility								
Change in Number of Jobs within 45 Minutes of the Corridor, via Transit, as compared to the No-Build	N/A		<1%		<1%		<1%	
Change in Number of Jobs within 60 Minutes of the Corridor, via Transit, as compared to the No-Build	N/A		<1%		<1%		<1%	
Change in Number of People within 45 Minutes of the Activity Centers, via Transit, as compared to the No-Build	N/A		<1%		<1%		<1%	
Change in Number of People within 60 Minutes of the Activity Centers, via Transit, as compared to the No-Build	N/A		<1%		<1%		<1%	
Traffic Operations								
Miles of LOS E or F Operations Along the Corridor	3.5	5.8	3.2	4.2	3.5	3.8	3.3	4.1
Intersections Operating at LOS E or F	4	5	4	4	4	4	4	5

1. Values are rounded to the nearest 100.
2. If the service frequencies of the enhanced bus service in Alternative 2 were increased to match the proposed BRT service in Alternatives 3 and 5B, the projected total daily transit boardings would increase to 33,600 and the total daily enhanced bus service boardings would increase to 3,200.

Table S-2: Alternatives Comparison Matrix – Costs and Environmental Impacts

COMPARISON FACTORS		ALTERNATIVE 1 (No-Build)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 5B
COSTS	Right-of-way (ROW)	\$0	\$6.2M	\$12.8M	\$35.4M
	Engineering and Construction	\$0	\$23.3M	\$118.9M	\$237.5M
	Vehicles	\$0	\$5.4M	\$16.5M	\$16.5M
	Total Capital Cost	\$0	\$34.9M	\$148.2M	\$289.4M
	Annual Operating Cost	\$0	\$3.1M	\$4.8M	\$4.6M
ENVIRONMENTAL IMPACTS	Socioeconomic				
	Total Permanent ROW Required (acres)	0	0.7	2.3	6.7
	Properties Impacted (number)	0	27	116	217
	Residential Relocations (number)	0	4	7	9-17 ¹
	Business Displacements (number)	0	1	2	3
	Public Parks Affected (number)	0	1	3	5
	Public Park Property Required (acres)	0	0.2	0.6	1.6
	Total Number of Public/Community Facilities Permanently Impacted	0	1	6	9
	Cultural Resources				
	Historic Structures (number)	0	0	4 ³	2
	Determination of Effects	<i>No Effect</i>	<i>No Effect</i>	<i>No Adverse Effect</i>	<i>Adverse Effect</i>
	Natural Resources				
	Stream Crossings (number)	0	0	2	10
	Stream Impact (linear feet)	0	0	47	864
	100-Year Floodplain (acres)	0	0	<0.1	0.3
	Wetlands (acres)	0	0	<0.1	<0.1
	Forests (acres)	0	0.8	1.2	3.1
	Green Infrastructure (acres)	0	0.2	<0.1	1.7
	Federally or State Listed RTE Species (number)	0	0	0	0
	Air Quality National Ambient Air Quality Standards (NAAQS)	No Exceedances	No Exceedances	No Exceedances	No Exceedances
Noise Receptors Impacted²	NA	NA	NA	NA	
Hazardous Waste Sites (number [square feet])	0 (0)	1 (2,940)	7 (17,800)	8 (36,870)	

1. The residential relocations for Alternative 5B are presented as a range due to the uncertainty in the final station locations. The range was developed by identifying potential displacements for the most likely station locations based on discussions with the City of Rockville.
2. Due to the differences in FHWA and FTA noise impact methodologies, it was determined that the analysis for this study would focus on predicted noise levels. Noise impacts and mitigation would need to be assessed following the identification of a lead funding agency.
3. Subsequent to the June 22 MHT letter, the project team revised the detailed alternatives mapping. Based on this mapping, Alternative 3 would have a reduced impact on historic properties. Further coordination with MHT will occur to make final effects determinations.

PUBLIC INVOLVEMENT

MCDOT maintains and regularly updates the county Bus Rapid Transit Project website to provide the public with information about the MD 586/ Veirs Mill Road BRT Corridor Study

(<https://www.montgomerycountymd.gov/brt/>). Project newsletters and Public Open House/Workshops were also used to engage the public with the planning process, including:

- In May 2012, MDOT mailed project newsletters and a BRT survey to more than 40,000 property owners throughout the study corridor.
- In May 2012, an Informational Open House was held at the Holiday Park Senior Center to introduce the purpose and need of the MD 586/Veirs Mill BRT Corridor Study.
- In November 2013, MDOT held an Alternatives Public Workshop at Richard Montgomery High School in Rockville to familiarize the public with the project planning process and to present the preliminary alternatives of the MD 586/Veirs Mill BRT Corridor Study.

Upon the Montgomery County Planning Board's approval of the *Countywide Transit Corridors Functional Master Plan* (2013), the Montgomery County Council called for the formation of a Corridor Advisory Committee (CAC) for the MD 586/Veirs Mill BRT Corridor Study. The CAC gives community residents and business owners/operators the opportunity to provide comments and make recommendations to the study team throughout the planning process. To date, seven CAC meetings have been held:

1. February 28, 2015, Montgomery County Executive Office Building, 11:00 AM to 12:15 PM
2. March 25, 2015, Montgomery County Executive Office Building, 6:30 PM to 8:30 PM
3. May 27, 2015, Montgomery County Executive Office Building, 6:30 PM to 8:30 PM
4. September 21, 2015, Rockville Memorial Library, 6:30 PM to 8:30 PM
5. January 20, 2016, Montgomery County Executive Office Building, 6:30 PM to 8:30 PM
6. February 17, 2016, Montgomery County Executive Office Building, 6:30 PM to 8:30 PM
7. April 13, 2016, Montgomery County Executive Office Building, 6:30 PM to 8:30 PM

CAC meetings have included exercises and open discussions to spur questions and comments that contribute to project planning and the community's understanding of the project. Information regarding past and planned CAC meetings is maintained on MCDOT's BRT website at: <http://www.montgomerycountymd.gov/BRT/md586.html>.

Emergency and public service providers in the study area were sent outreach letters on December 15, 2015. Details regarding these letters and responses are provided in the community facilities and services discussion (Chapter V.A.5.), while the letters are provided in **Appendix B**.

Public involvement and engagement with the CAC, associated with the public review of the Draft CSR, are detailed as part of the Next Steps.

NEXT STEPS

This Draft CSR will be made available for public and agency review and comment from September 6 through October 14, 2016. The Draft CSR and appendices, along with supporting technical reports and memos, will be made available, by link, on the project website: www.montgomerycountymd.gov/BRT. Additionally, hard copies of the Draft CSR and appendices will be made available at the following public libraries and community facilities:

**DRAFT Corridor Study Report
September 2016**

Rockville Memorial Library
21 Maryland Avenue
Rockville, MD 20850
Phone: 240-777-0140

Twinbrook Library
202 Meadow Hall Drive
Rockville, MD 20851
Phone: 240-777-0240

Wheaton Interim Library
2400 Arcola Avenue
Wheaton, MD 20902
Phone: 240-777-0678

Mid County Regional Services Center
2424 Reedie Drive
Wheaton, MD 20902
Phone: 240-777-8103

Holiday Park Senior Center
3950 Ferrara Drive
Holiday Park, MD
240-777-4999

CAC Meeting #8 is scheduled to occur on September 14th to review the alternatives analysis, and notify CAC members of the availability of the Draft CSR. Further, the project team will conduct a public meeting on September 28, 2016, between 6:30 and 8:30 PM, at the Montgomery County Executive Office Building Cafeteria, 101 Monroe Street, Rockville, MD 20850 to present the results of the alternatives analysis and Draft CSR. Additional stakeholder meetings will occur during the public and agency review and comment period.

Both written and private recorded comments may be submitted at the public meeting. Comments may also be submitted throughout the public comment period by email to: MD586BRT@sha.state.md.us or mail to:

Laura Barcena, Consultant Project Manager
State Highway Administration
707 N. Calvert Street, Mail Stop C-301
Baltimore, MD 21202.

Following public and agency review and comment, it is anticipated that the project team, including MDOT and MCDOT, will identify a Recommended Alternative which will be presented to the County Planning Board and County Council.

Following presentation of the Recommended Alternative, a Final CSR, called Volume I, will be prepared to include all of the chapters in this Draft CSR, an updated Executive Summary, and a new chapter describing the Recommended Alternative in detail, and an updated Next Steps Chapter. Additionally, Volume II will include all of the technical reports prepared over the course of the study. This document will be made available on the project website and the findings of the Final CSR will be presented in a final CAC meeting.

Following the Final CSR and the identification of the Recommended Alternative, further detailed design, operational analysis, and environmental study will be conducted to refine the project details of the Recommended Alternative to the extent possible. The Final CSR will be the basis for that analysis.



MONTGOMERY COUNTY PLANNING BOARD
THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

OFFICE OF THE CHAIR

November 14, 2016

The Honorable Roger Berliner
Chair - Transportation, Infrastructure, Energy & Environment Committee (T&E)
Council Office Building
100 Maryland Avenue, 5th Floor
Rockville, Maryland 20850

Re: Draft MD 586 / Veirs Mill Road Bus Rapid Transit Corridor Study

Dear Councilmember Berliner:

On November 3, 2016, the Montgomery County Planning Board reviewed the Draft MD 586 / Veirs Mill Road Bus Rapid Transit Corridor Study. During the meeting the Planning Board expressed support for Alternative 3, as long as a more in depth analysis of this alternative indicates that bus rapid transit in dedicated curb lanes will not be degraded by non-transit vehicles. The Board also made the following comments:

1. Upgrade bus service along the corridor immediately, including a limited stop service with higher quality buses and more frequent service.
2. Supplement the ridership forecasts in the *Draft Corridor Study Report*, which included only the Veirs Mill Road corridor, with forecasts that include a network of planned bus rapid transit corridors.
3. Conduct a more rigorous evaluation of Alternatives 4A and 4B to determine how converting general purpose travel lanes to bus-only lanes would impact person throughput and person travel time savings.
4. Reconsider whether off-road shared use paths are a more appropriate bicycle facility than conventional bike lanes on a 4 – 6 lane roadway with 35 – 45 mph speed limits.

The Honorable Roger Berliner
November 14, 2016
Page Two

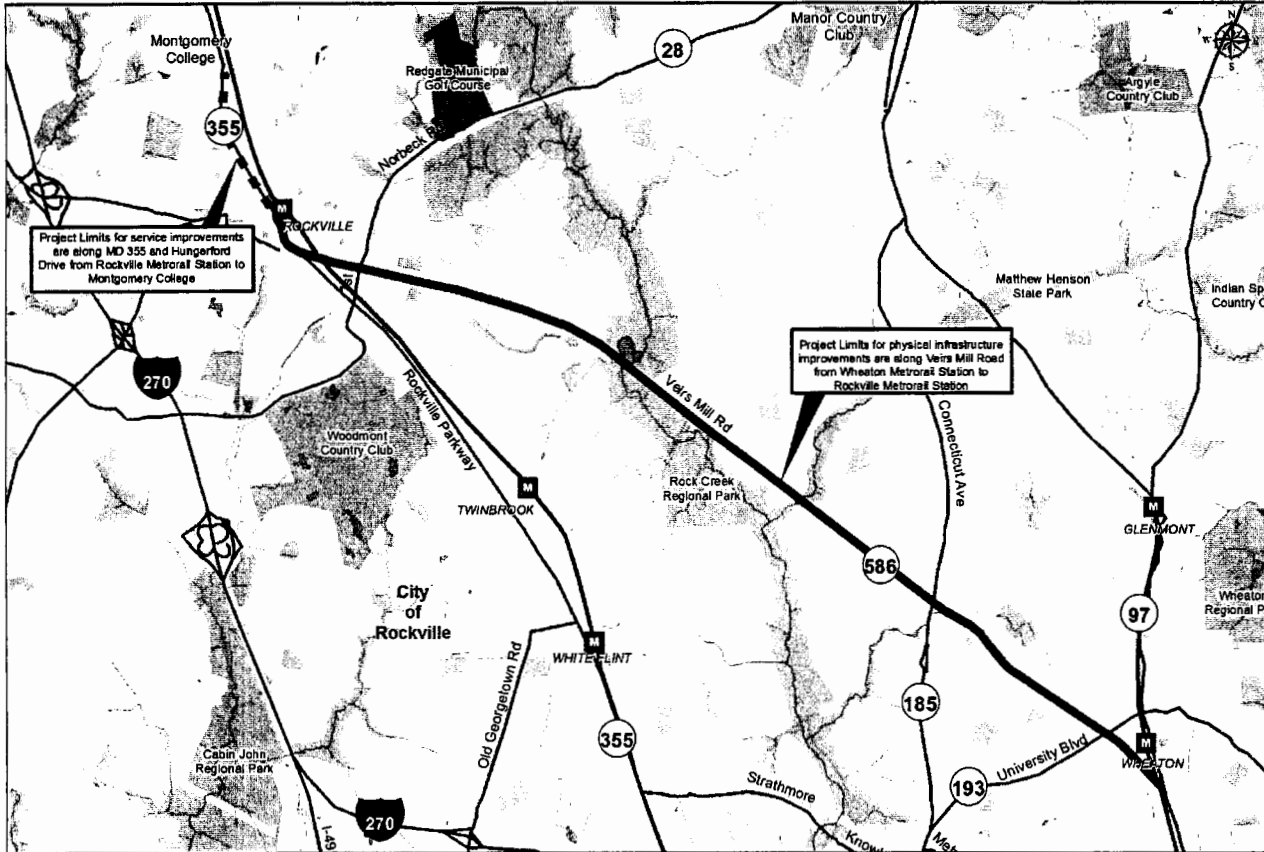
It is our understanding the T&E Committee is scheduled to be briefed on the Study on December 1, 2016. Staff will be available at that briefing to further expand on the Board's recommendations, if needed. In the interim, if you have any questions or comments concerning our review, please do not hesitate to contact David Anspacher at 301-495-2191.

Sincerely,


Casey Anderson
Chair

cc: Al Roshdieh, Montgomery County Department of Transportation
Emil Wolanin, Montgomery County Department of Transportation
Glenn Orlin, Montgomery County Council
Joanna Conklin, Montgomery County Department of Transportation
Kate Sylvester, Maryland State Highway Administration
Laura Barcena, Maryland State Highway Administration
Alison Davis, Washington Metropolitan Area Transit Authority
Pam Dunn, Montgomery County Planning
Tom Autrey, Montgomery County Planning
David Anspacher, Montgomery County Planning

Additional Analysis Technical Report



MD 586 / Veirs Mill Road Bus Rapid Transit Study

PREPARED FOR:

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF PLANNING AND PRELIMINARY ENGINEERING
707 NORTH CALVERT STREET
BALTIMORE, MARYLAND 21202

April 2017

MDOT
MARYLAND DEPARTMENT
OF TRANSPORTATION

MCDOT

11

Executive Summary

Per the request from the Transportation, Infrastructure, Energy and Environment (T&E) Committee of the Montgomery County Council at the December 1, 2016 briefing, the project team analyzed the operations and costs of a new BRT scenario for the MD 586 corridor that included the infrastructure improvements in Alternative 2 (TSM) with the transit service improvements of Alternative 3 (Dedicated Curb BRT). The resulting scenario includes 14 queue jumps, transit signal priority (TSP), six minute headways during peak periods, 10 minute headways during off-peak periods, new BRT stations, and 60-foot articulated buses. The analysis findings indicate that the “BRT with Queue Jumps Only” scenario would provide most of the transit benefits of Alternative 3 at approximately 53 percent of the cost. The key findings of the analysis are summarized below.

- **Transit-User Time Savings:** Overall, transit users would save the most time under Alternative 3 (143 person-hours total during the combined AM and PM peak hours each day). Time savings are 11 percent lower (127 person-hours) for the “BRT with Queue Jumps Only” scenario and 34 percent lower (95 person-hours) for Alternative 2. (Note that time savings during off-peak times are not included in these figures.)
- **Eastbound Travel Time:** All options, including Alternative 2, “BRT with Queue Jumps Only”, and Alternative 3, would reduce transit travel times by at least 7.5 minutes in the AM peak hour and 13 minutes in the PM peak hour. The “BRT with Queue Jumps Only” scenario would travel 1 to 2 minutes slower than Alternative 3.
- **Westbound Travel Time:** All options would reduce transit travel times by at least 6.5 minutes in the AM peak hour and 7 minutes in the PM peak hour. There would be no notable difference in the travel times of the “BRT with Queue Jumps Only” scenario and Alternative 3.
- **Ridership:** It is expected that the “BRT with Queue Jumps Only” scenario would attract ridership very close to the levels projected for Alternative 3 (6,400 daily riders), which is approximately 2.5 times the ridership projected for Alternative 2 (2,600 daily riders). While a ridership model was not re-run for this supplementary analysis, the scenario and Alternative 3 have the same BRT service amenities and very similar travel times, which are primary factors in ridership modeling.
- **Vehicle Cost:** BRT vehicle costs are estimated to be \$16.5 million for the 15 buses needed to operate the “BRT with Queue Jumps Only” scenario. This is the same as Alternative 3.
- **Roadway and Station Cost:** The estimated cost of the roadway and station improvements for the “BRT with Queue Jumps Only” scenario is \$62.7 million, including right-of-way costs. This is approximately \$33 million more than Alternative 2, primarily due to the right-of-way and construction costs associated with providing full BRT stations throughout the corridor. The cost savings of the scenario relative to Alternative 3 is \$69 million.

It should be noted that environmental impact analyses, such as socioeconomic, cultural and natural resources, air quality, noise, hazardous materials, and indirect and cumulative effects, were not completed for the “BRT with Queue Jumps Only” scenario. For planning purposes, it could be assumed that the environmental impacts for the “BRT with Queue Jumps Only” scenario would be greater than or equal to those for Alternative 2 and less than those for Alternative 3.

Introduction

On December 1, 2016, the project team, including the Montgomery County Department of Transportation (MCDOT) and the Maryland Department of Transportation (MDOT), presented the information contained in the Draft Corridor Study Report (DCSR) for the MD 586 Bus Rapid Transit (BRT) Study to the Transportation, Infrastructure, Energy and Environment (T&E) Committee of the Montgomery County Council. The presentation primarily focused on the details of the Alternatives Retained for Detailed Study (ARDS) and the benefits and impacts of each alternative.

During the presentation to the Committee, the Team received comments and questions from the Committee on the results of the analysis. One of the major concerns that was discussed was why the projected travel times among the build alternatives were so similar to each other, despite the wide range in dedicated lanes and infrastructure improvements included in each alternative. The Committee asked the project team to perform additional analysis to determine how Alternative 2 would operate if it included a new BRT service instead of the enhanced bus service as defined in the DCSR. The purpose of this technical report is to summarize the results of the additional analyses that were completed to evaluate a new scenario that would include the infrastructure improvements of Alternative 2 with a new BRT service.

Review of Alternatives

Including the No-Build, four alternatives were analyzed and evaluated in detail in the MD 586 BRT Study. The results of the analysis are presented in the DCSR that was published in September 2016. The alternatives were developed by combining various levels of transit service and physical infrastructures improvements. The four alternatives are:

Alternative 1 – No-Build Alternative: Alternative 1 would not include improvements to infrastructure or bus service along Veirs Mill Road beyond those improvements already planned and programmed. The existing lane configurations and bus services would remain the same in the 2040 design year. The No-Build Alternative would not address the purpose and need for the project; however, it serves as a baseline for comparing the impacts and improvements associated with the build alternatives.

Alternative 2 – Transportation System Management (TSM) with Intersection Queue Jumps and Enhanced Bus Service: Alternative 2 would consist of minor infrastructure improvements at select intersections and the implementation of an enhanced bus service, similar to the proposed WMATA Q9 limited-stop service. Minor infrastructure improvements would include the construction of queue jumps at select intersections and enhanced bus stops with features such as shelters, real-time information, or off-board fare collection. In addition, transit signal priority (TSP) would be installed at several signalized intersections along the corridor to help decrease the travel time delay at those intersections. Including queue jumps in the dedicated lanes calculation, dedicated lanes would be provided for approximately 26 percent of the corridor in Alternative 2, with 2.4 miles (37 percent) in the eastbound direction and 0.9 miles (14 percent) in the westbound direction.

Alternative 3 – New BRT Service in Dedicated Curb Lanes: Alternative 3 would consist of widening or repurposing the existing travel lanes and shoulders along Veirs Mill Road to provide dedicated, curb-running bus lanes, as well as the implementation of a new BRT service. The dedicated lanes would be provided in areas with minor impacts. New, larger BRT stations would be constructed at each stop and the stations would include features such as canopies, level boarding, real-time information, and off-board fare collection. In addition, TSP would be installed at several signalized intersections along the corridor to help decrease the travel time delay at those intersections. Including queue jumps in the dedicated

lanes calculation, dedicated lanes would be provided for approximately 70 percent of the corridor in Alternative 3, with 4.4 miles (69 percent) in the eastbound direction and 4.5 miles (70 percent) in the westbound direction.

Alternative 5B – New BRT Service in Dedicated Median Lanes: Alternative 5B would include reconstructing the entire roadway to provide one or two dedicated median lanes, as well as the implementation of a new BRT service. The dedicated lane(s) would be provided from MD 28 to Newport Mill Road. In areas with constrained right-of-way (ROW), only one dedicated median lane would be provided and the BRT would operate as a bi-directional system. New, larger BRT stations would be constructed at each stop and the stations would include features such as canopies, level boarding, real-time information, and off-board fare collection. In addition, TSP would be installed at several signalized intersections along the corridor to help decrease the travel time delay at those intersections. Dedicated lanes would be provided for approximately 78 percent of the corridor in Alternative 5B, with 5.3 miles (83 percent) in the eastbound direction and 4.7 miles (73 percent) in the westbound direction.

Stops/Stations

All three of the build alternatives assumed that the enhanced bus stops or stations would be implemented at the eleven locations identified in the *Countywide Transit Corridors Functional Master Plan*, which was approved and adopted in December 2013. Additionally, the service was extended along MD 355 and included an enhanced bus stop or station at Montgomery College. However, the specific placement of the stop at each location (near-side versus far-side and curb versus median) varies by alternative. The assumed station locations include:

- Montgomery College
- Rockville Metrorail station (west entrance)
- MD 28/Norbeck Road
- Broadwood Drive
- Twinbrook Parkway
- Aspen Hill Road
- Parkland Drive
- Randolph Road
- MD 185/Connecticut Avenue
- Newport Mill Road
- MD 193/University Boulevard
- Wheaton Metrorail station

The station locations are subject to change as the project moves forward and discussions with stakeholders continue. For example, the City of Rockville has expressed interest in a station at Atlantic Avenue, either in addition to or in lieu of the stations at Twinbrook Parkway and Broadwood Drive.

Transit Service

Table 1 displays the assumed operating characteristics for each of the build alternatives. The differences between the enhanced bus service in Alternative 2 and the new BRT service in Alternatives 3 and 5B are the frequency of the service, the vehicles, and the improvements at the stops.

Table 1: Assumed Transit Service for Build Alternatives

Alternative	Proposed Service	Headway				Vehicles	Stops
		Peak		Off-Peak			
		Wheaton to Rockville	Rockville to College	Wheaton to Rockville	Rockville to College		
2	Enhanced Bus Service	12 min	36 min	15 min	45 min	40' hybrid	Upgrades to existing stops
3	New BRT Service	6 min	18 min	10 min	30 min	60' artic. hybrid	New BRT stations
5B							

Alignment Description

Table 2 displays the locations of queue jumps and dedicated lanes for each build alternative.

Table 2: Alignment Description of Build Alternatives

Alternative	Queue Jumps	Dedicated Lanes
2	<ul style="list-style-type: none"> • MD 28 (WB) • Edmonston Drive (EB) • Atlantic Avenue (EB) • Twinbrook Parkway (EB and WB) • Aspen Hill Road (EB and WB) • Parkland Drive/Montrose Parkway (EB and WB) • Gridley Road (WB) • Randolph Road (WB) • MD 185 (EB and WB) • MD 193 (EB) 	<ul style="list-style-type: none"> • MD 185 to MD 193 (EB – existing)
3	<ul style="list-style-type: none"> • MD 28 (WB) • Edmonston Drive (EB) 	<ul style="list-style-type: none"> • Midway Avenue to MD 193 (EB) • Kensington Boulevard to Claggett Drive (WB)
5B	None	<ul style="list-style-type: none"> • MD 28 to MD 193 (EB) • Newport Mill Road to MD 28 (WB)

Alternative 5B – Not Preferred

At the presentation to the T&E Committee on December 1, 2016, the Committee and the project team agreed that Alternative 5B was not preferred due to the high costs and lack of travel time benefit, as compared to the other build alternatives. Therefore, the remaining analyses presented in this technical report focuses only on build Alternatives 2 and 3.

New Scenario: “BRT with Queue Jumps Only”

Much of the discussion at the December 1, 2016 T&E briefing focused on the transit travel times of Alternatives 2 and 3, and why they are so similar despite the large difference in the length of dedicated lanes (3.3 miles in Alternative 2 compared to 8.9 miles in Alternative 3). Other factors such as daily boardings, pedestrian activity, and station locations all affect the travel times, and since these factors were different between Alternatives 2 and 3, it was not possible for the

project team to identify the effect that the dedicated lanes were having on the travel times. For example, Alternative 3 has a higher projected ridership than Alternative 2, which results in longer dwell times at the stations in Alternative 3. In addition, the higher ridership in Alternative 3 results in more pedestrian activity around the stations, which affects the signal timings and causes more delay for the BRT vehicles. Finally, the stations were placed differently (near-side versus far-side) between Alternatives 2 and 3 in an effort to reduce the ROW impacts of the larger stations in Alternative 3. However, while the station placement did minimize ROW impacts, in some cases, the placement negatively affected the BRT travel time.

BRT with Queue Jumps Only Scenario Description and Assumptions

To complete the additional analysis requested by the T&E Committee, the project team created a new test scenario, called “BRT with Queue Jumps Only,” that combined the service plan from Alternative 3 in **Table 1** with the alignment description of Alternative 2 in **Table 2**. Since the travel speeds for Alternatives 2 and 3 were similar and the “BRT with Queue Jumps Only” scenario would include the same attractive BRT elements that would be included in Alternative 3, the ridership for the scenario was assumed to be the same as what was projected for Alternative 3 (6,400 daily boardings). The stations in the “BRT with Queue Jumps Only” scenario were also adjusted to match the station locations in Alternative 3, to eliminate any discrepancy in travel time that was caused by different station locations. The “BRT with Queue Jumps Only” scenario was setup so that the only differing characteristic between it and Alternative 3 would be the length of dedicated lanes.

BRT Corridor Travel Times (2040)

Projected transit travel times are summarized in **Figure 1**. The key findings are summarized below:

- All options would reduce eastbound transit travel times by at least 7.5 minutes in the AM peak hour and 13 minutes in the PM peak hour. The “BRT with Queue Jumps Only” scenario would travel 1 to 2 minutes slower than Alternative 3. Additionally, all options would reduce westbound transit travel times by at least 6.5 minutes in the AM peak hour and 7 minutes in the PM peak hour. There would be no notable difference in the travel times of the “BRT with Queue Jumps Only” scenario and Alternative 3.
- The “BRT with Queue Jumps Only” scenario provides a faster BRT travel time as compared to Alternative 2 during the AM peak hour in the eastbound direction. Alternative 2 provides a faster BRT travel time during the PM peak hour in both the eastbound and westbound directions and during the AM peak hour in the westbound direction. However, this likely can be attributed to the lower ridership that is anticipated with Alternative 2, which results in shorter dwell times and fewer pedestrians.
- The “BRT with Queue Jumps Only” scenario provides comparable BRT travel times to Alternative 3 in the westbound direction during both the AM and PM peak hours. However, Alternative 3 provides a travel time savings in the eastbound direction during both peaks (1 minute during the AM peak hour and 2 minutes during the PM peak hour) when compared to the “BRT with Queue Jumps Only” scenario.

Total Peak Hour Person Travel Time Savings (2040)

The projected total peak hour person travel time savings by mode were calculated by summing up the individual vehicular travel time savings for each segment and multiplying that savings by the number of people in that mode of travel. For buses, this equated to the average bus load in the desired segment, while for automobiles, this equated to a 1.2 average persons per vehicle. Total peak hour person transit travel time savings (including BRT and local bus travelers) are outlined

in **Figure 2**, total peak hour person travel time savings (including BRT, local bus, and automobile travelers) are outlined in **Figure 3**, and the key findings are summarized below:

- The “BRT with Queue Jumps Only” scenario provides a greater peak hour transit (BRT and local bus) person travel time savings for both directions and peaks when compared to Alternative 2.
- Alternative 3 provides a greater peak hour transit (BRT and local bus) person travel time savings than Alternative 2 and the “BRT with Queue Jumps Only” scenario in the eastbound direction in both peaks. In the westbound direction during both peak hours, the “BRT with Queue Jumps Only” scenario is nearly equal to Alternative 3.
- The greatest total person peak hour travel time savings for the PM peak occurs under Alternative 3.
- The greatest peak hour total person travel time savings for the AM peak occurs under the “BRT with Queue Jumps Only” scenario.
- Overall, transit users would save the most time under Alternative 3 (143 person-hours total during the combined AM and PM peak hours each day). Time savings are 11 percent lower (127 person-hours) for the “BRT with Queue Jumps Only” scenario and 34 percent lower (95 person-hours) for Alternative 2. (Note that time savings during off-peak times are not included in these figures.)

Peak Hour Person Throughputs (2040)

Forecasted person throughputs are summarized in the **Attachment** (rounded to the nearest 50 persons). The key findings are summarized below:

- Overall, the total person throughput along the corridor sees a slight increase (less than 10 percent) or remains the same for both Alternatives and the “BRT with Queue Jumps Only” scenario at most locations, as compared to the 2040 No-Build conditions.
- The total person throughput differences between the Alternatives and the “BRT with Queue Jumps Only” scenario are marginal.

Figure 1: Projected 2040 Peak Hour Transit Travel Times

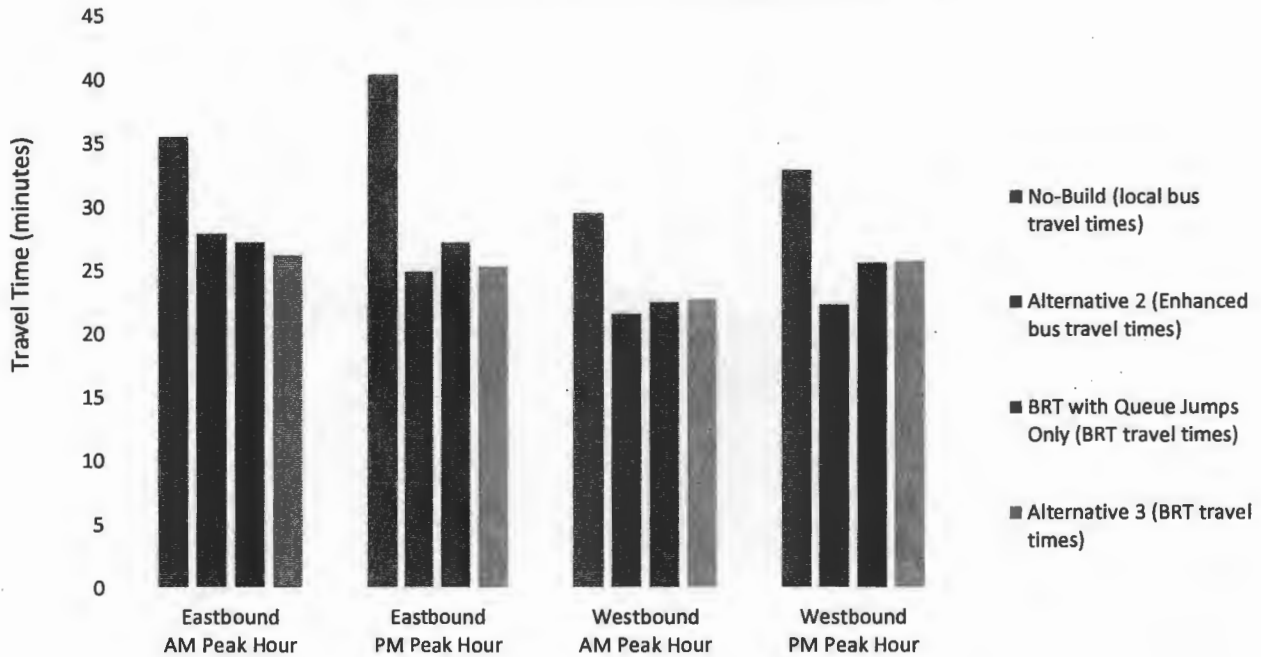
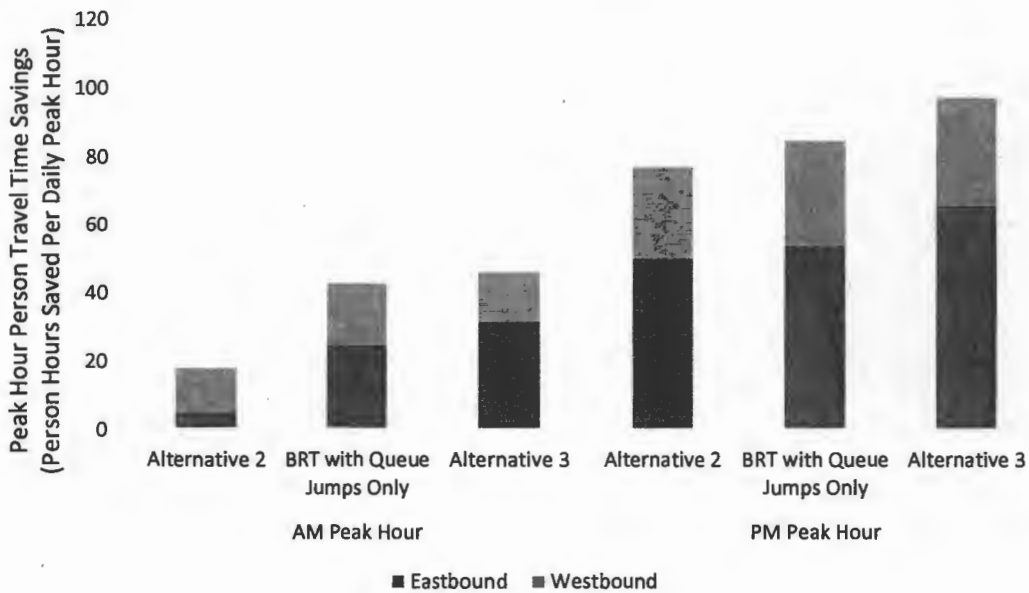
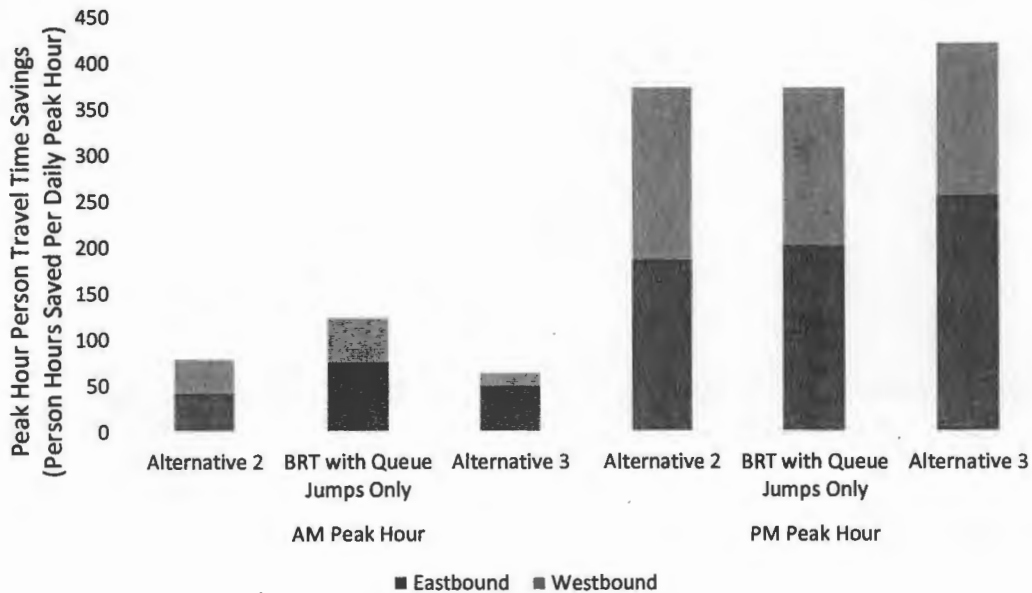


Figure 2: 2040 Total Peak Hour Person Transit Travel Time Savings (Includes Local Bus and BRT)



**Figure 3: 2040 Total Peak Hour Person Travel Time Savings
(Includes Auto, Local Bus, and BRT)**



Cost Estimate Methodology and Assumptions

For each of the build Alternatives, Alternatives 2, 3, and 5B, a “major quantities estimate” was prepared based on the guidance in the State Highway Administration (SHA) Cost Estimating Manual (CEM). The CEM recommends that a major quantities estimate be prepared during planning when a project reaches the Alternatives Retained for Detailed Study stage. The engineering completed on the build alternatives allowed the team to quantify several of the major cost items, such as grading, paving, structures, and the roadside features.

To aid in the cost estimating process, stormwater management (SWM), utility, and right-of-way (ROW) impact analyses were completed for each build alternative. The SWM analysis identified the treatment quantity and quality requirements for the alternatives and the associated costs for meeting those requirements. The utility impact analysis documented the existing utilities in the corridor, how each alternative would impact the existing utilities, and the estimated costs for relocating the impacting utilities. The ROW analysis, completed by the SHA District 3 Office of Real Estate (ORE), determined which properties would be displacements and estimated the ROW costs based on the amount of ROW and/or easement purchase required for each parcel.

To further compare the “BRT with Queue Jumps Only” scenario to Alternatives 2 and 3, a capital cost estimate was developed for the scenario, and is presented in Table 3. The “BRT with Queue Jumps Only” scenario was engineered to a similar level of detail of Alternatives 2 and 3 so that the major cost items could be estimated. However, due to time constraints, the same detailed SWM, utility, and ROW analyses that were completed for Alternatives 2 and 3 were not completed for the “BRT with Queue Jumps Only” scenario. Therefore, the cost estimates for those categories had to be

roughly estimated based on their estimated costs in Alternative 2 and 3 and the change in footprint that would be expected between the “BRT with Queue Jumps Only” scenario and Alternatives 2 and 3. More detailed analysis would be required to more accurately estimate those categories.

The estimated cost to design and construct the “BRT with Queue Jumps Only” scenario is \$62.7 million, including ROW costs. This is approximately \$33 million more than Alternative 2, with the majority of the cost difference due to the construction of the larger BRT stations. The “BRT Queue Jumps Only” would be approximately \$69 million cheaper than Alternative 3 due to the reduction in dedicated lanes.

Table 3: Capital Cost Estimates (in millions)

	Alternative 2	“BRT with Queue Jumps Only” Scenario	Alternative 3
TOTAL CONSTRUCTION	\$23.3	\$51.6	\$118.9
<i>NEAT Construction</i>	<i>\$17.5</i>	<i>\$38.9</i>	<i>\$89.5</i>
BRT Stops	\$1.0	\$17.2	\$17.2
Signals and TSP	\$1.8	\$2.5	\$3.0
MOT	\$1.7	\$2.1	\$9.0
Earthwork	\$1.0	\$1.1	\$3.8
Drainage/SWM	\$3.8	\$5.0	\$19.8
Structures	\$0.6	\$0.6	\$1.5
Roadway	\$3.0	\$4.1	\$17.6
Landscaping	\$0.4	\$0.5	\$1.8
Utilities	\$4.2	\$5.8	\$15.8
<i>Engineering</i>	<i>\$3.1</i>	<i>\$6.8</i>	<i>\$15.7</i>
<i>Construction Overhead</i>	<i>\$2.7</i>	<i>\$5.9</i>	<i>\$13.7</i>
RIGHT-OF-WAY	\$6.2	\$11.1	\$12.8
VEHICLES	\$5.4 (9 buses)	\$16.5 (15 buses)	\$16.5 (15 buses)
TOTAL CAPITAL COST	\$34.9	\$79.2	\$148.2

Summary

Per the request from the T&E Committee at the December 1, 2016 briefing, the Team analyzed the benefits and costs of implementing a BRT service with queue jumps and no dedicated lanes. While the “BRT with Queue Jumps Only” scenario did not undergo the same level of detailed analysis that was performed on the build alternatives, Alternatives 2, 3, and 5B, the findings indicate that the scenario could provide most of the transit benefits of Alternative 3 at approximately 53 percent of the cost.

The analysis showed that there are significant travel time benefits with providing such improvements, such as a BRT travel time savings of 13 minutes along eastbound MD 586 in the PM peak hour, as compared to the No-build. The analysis also showed that the “BRT with Queue Jumps Only” scenario would result in the same BRT westbound travel times as Alternative 3 and would operate one to two minutes slower than Alternative 3 in the eastbound direction. Due to lower ridership and less pedestrian activity, Alternative 2 would operate faster than the “BRT with Queue Jumps” scenario in both directions and peak hours, except for the eastbound AM peak hour, where the scenario would operate faster.

The projected daily BRT boardings for the “BRT with Queue Jumps Only” scenario would be similar to the projected boardings for Alternative 3, which is 3,800 boardings higher than the boardings for Alternative 2. The total transit person travel time savings for Alternative 3 would be higher than the “BRT with Queue Jumps Only” scenario in the eastbound direction in the peak hours and nearly equal to the scenario in the westbound direction in the peak hours. The “BRT with Queue Jumps Only” scenario would have a higher total transit person travel time savings for both directions and peak hours, when compared to Alternative 2.

The cost estimate for the “BRT with Queue Jumps Only” scenario is \$79.2M, which is \$69.0M lower than Alternative 3 and \$44.3M higher than Alternative 2. The cost would be lower than Alternative 3 due to the reduction in dedicated lanes and would be higher than Alternative 2 due to the inclusion of BRT stations and the impacts associated with the stations. Detailed SWM, utility, and ROW analyses were not performed on the “BRT with Queue Jumps Only” scenario and the costs for those elements were roughly estimated.

In summary, compared to Alternatives 2 and 3, the “BRT with Queue Jumps Only” scenario would:

- **Daily BRT Boardings:** Provide 2.5 times more boardings than Alternative 2 and a similar number for Alternative 3
- **Peak Hour Transit Person Travel Time Savings:** Provide a greater savings by serving more riders than Alternative 2. Provide less savings in the eastbound direction and equal savings in the westbound direction than Alternative 2
- **BRT Travel Times:** Provide slightly slower BRT travel times than Alternative 2 (except for along eastbound in the AM peak hour, due to higher ridership). Provide slower BRT travel times than Alternative 3 eastbound (up to 2 minutes) and equal BRT travel times in the westbound direction
- **Cost:** \$44.3M more to design and construct than Alternative 2 and \$69.0M less to design and construct than Alternative 3

It should be noted that environmental impact analyses, such as socioeconomic, cultural, and natural resources, air quality, noise, hazardous materials, and indirect and cumulative effects, were not completed for the “BRT with Queue Jumps Only” scenario. For planning purposes, it could be assumed that the environmental impacts for the “BRT with Queue Jumps Only” scenario would be greater than or equal to those for Alternative 2 and less than those for Alternative 3.

Future Refinements

In addition to the comparison of the “BRT with Queue Jumps Only” to the alternatives, there are other considerations worth noting relative to the larger study effort:

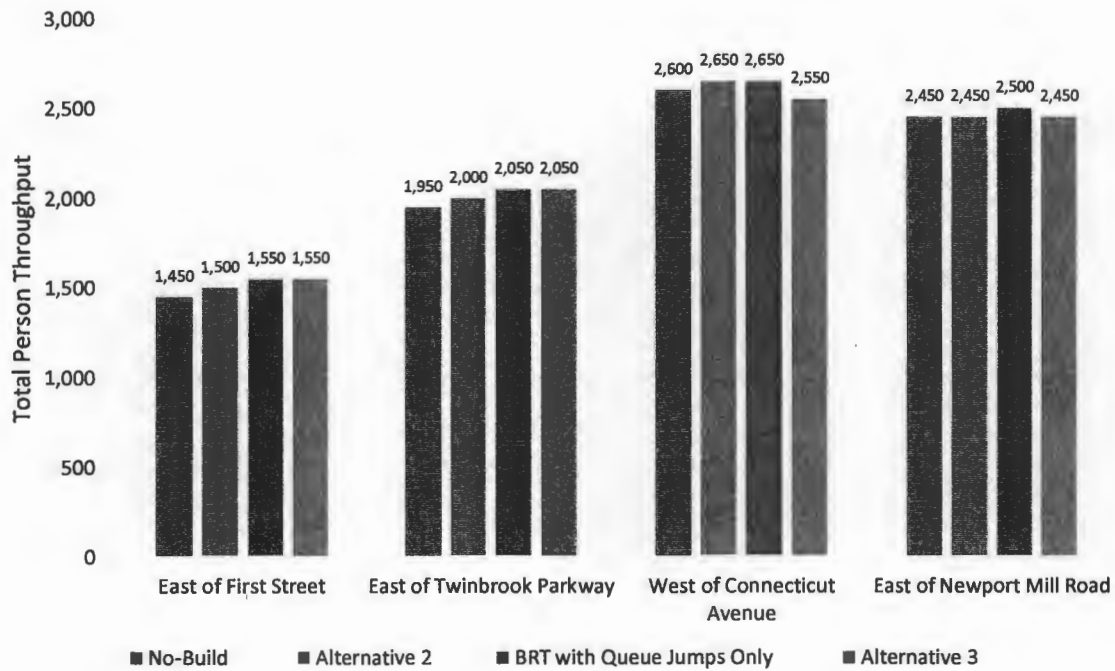
- The MD 586 corridor was modeled by itself, as would be required by NEPA, however, it is possible that the analysis would show different results once the other planned BRT corridors (MD 355, Randolph, Georgia Ave) are constructed.
- Veirs Mill Road is a major east-west connection between other planned north-south BRT lines, so if those lines are constructed, it would be beneficial to have BRT service on this corridor; otherwise, there would be a gap in the east-west connectivity of the BRT network.
- A phased approach to building a BRT along Veirs Mill Road may make sense, by starting with Alternative 2 or “BRT with Queue Jumps Only” and then re-evaluating for dedicated lanes in the future, once the system is demonstrating benefits to transit riders.

Once the recommended alternative is selected, additional refinements, including modifications to queue jump locations and station locations, may be considered to further maximize operations while reducing project costs and impacts. Station locations may be shifted from near-side to far-side and vice versa and queue jump locations may be refined based on how the BRT is expected to operate near each intersection. Additional ridership modeling may also be performed to refine the projected ridership for the recommended alternative.

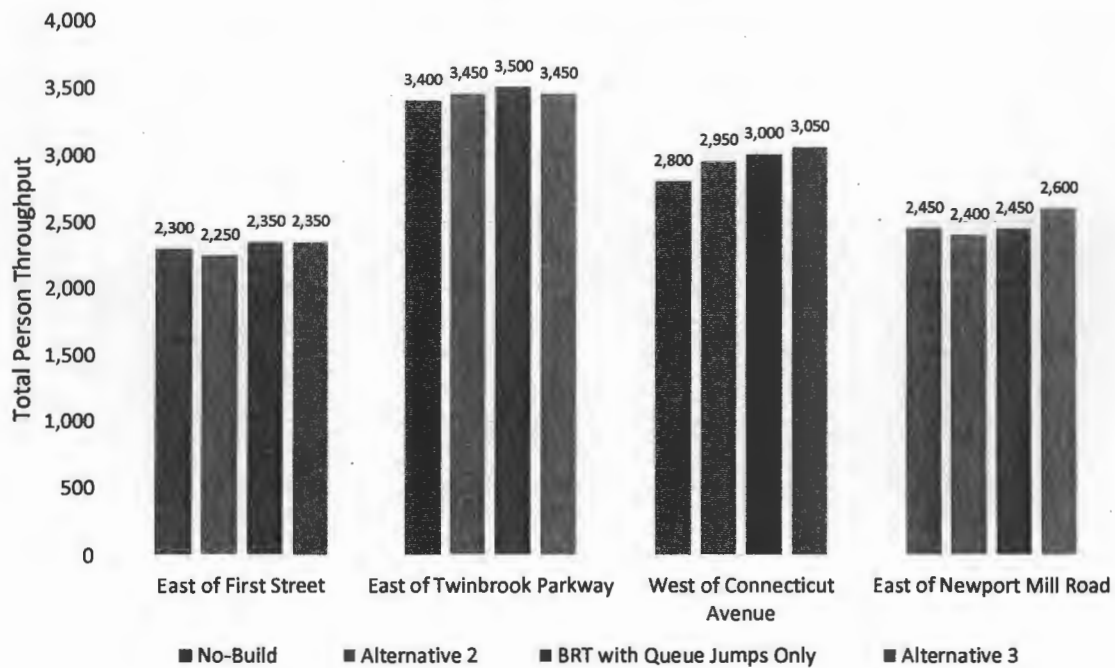
Attachment

Peak Hour Person Throughputs (2040)

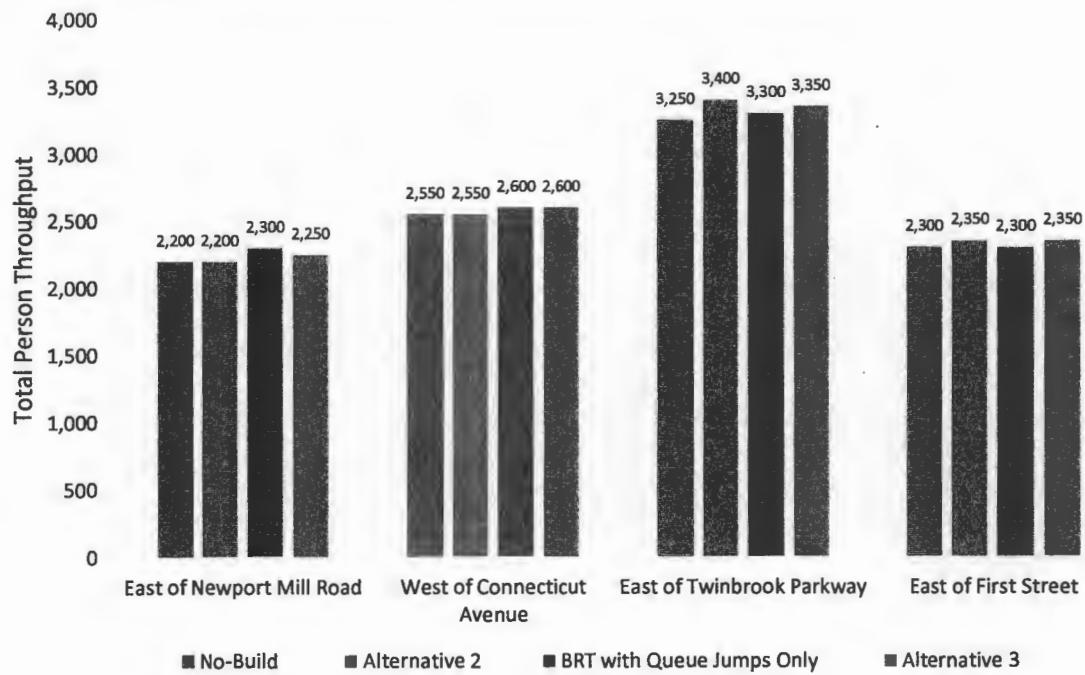
2040 AM Peak Hour Eastbound Total Person Throughput



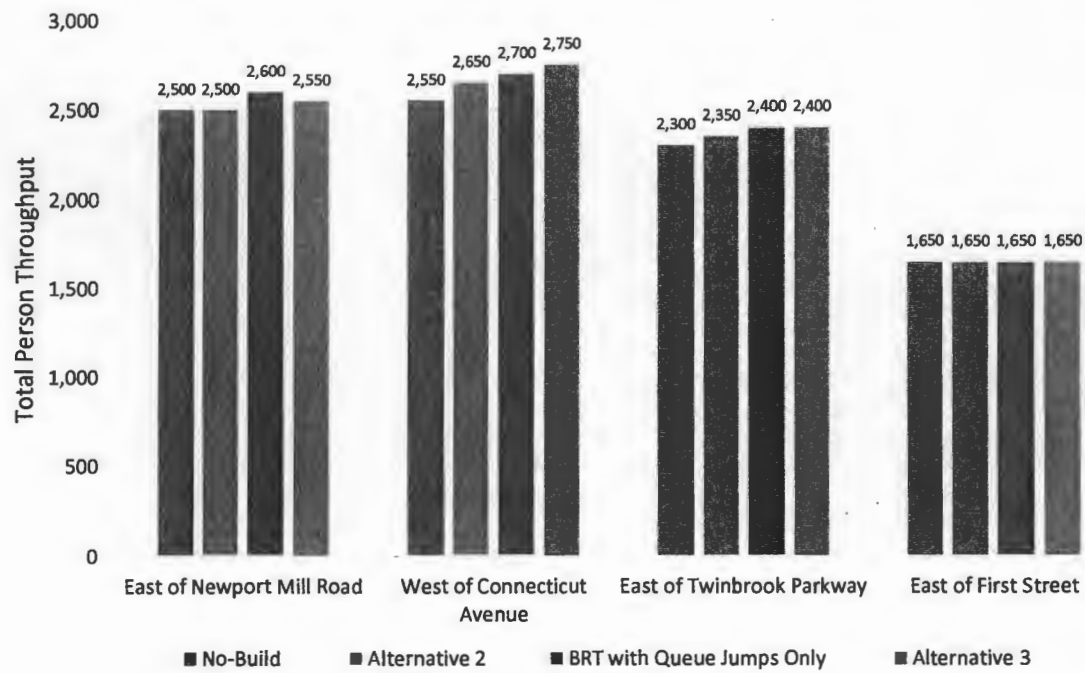
2040 PM Peak Hour Eastbound Total Person Throughput



2040 AM Peak Hour Westbound Total Person Throughput



2040 PM Peak Hour Westbound Total Person Throughput



(26)

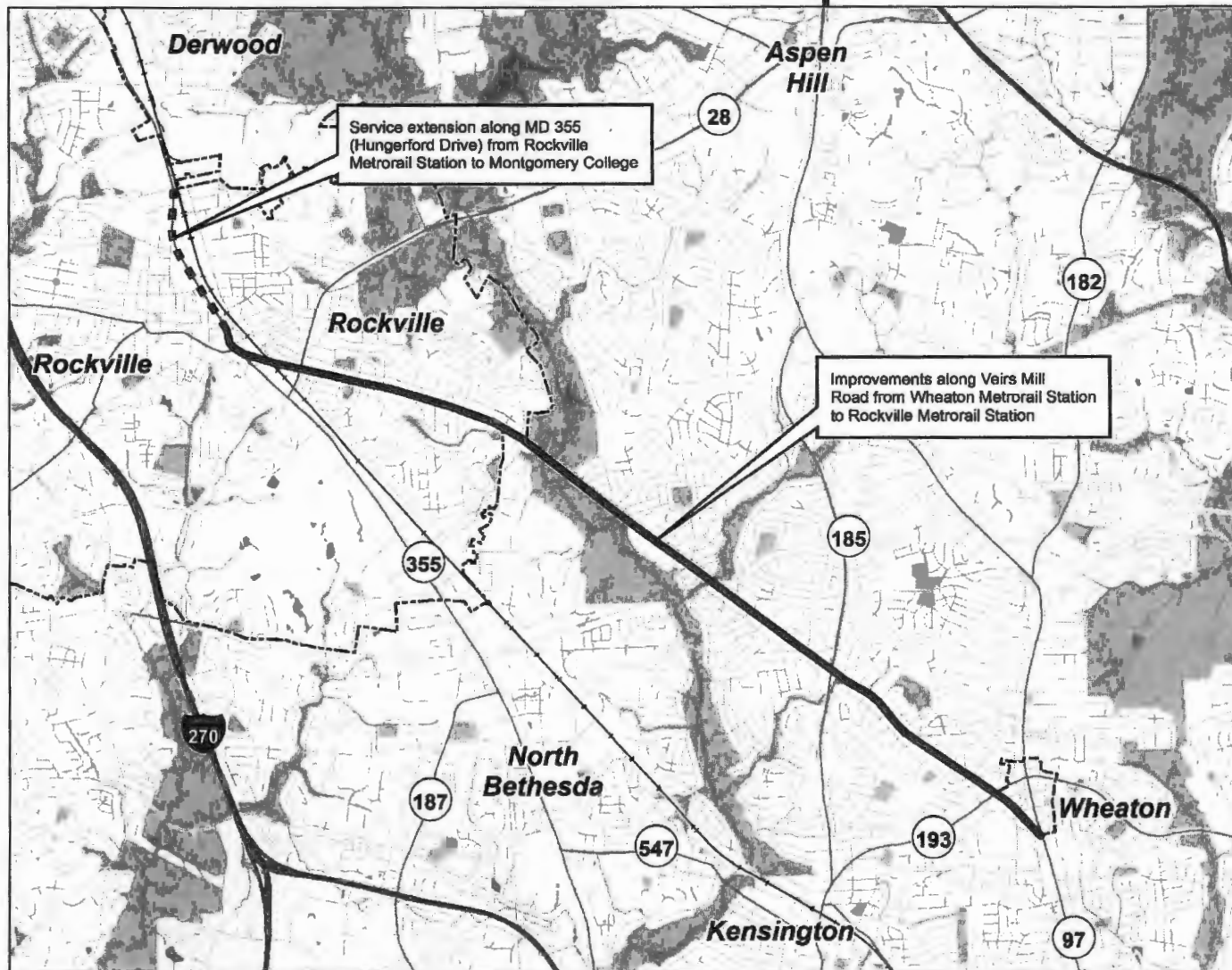
Montgomery County **RAPID TRANSIT**

MD 586

Veirs Mill Road
T&E Committee Briefing
May 3, 2017



Corridor Map



Review of Alternatives

- Alternative 1: No-build
- Alternative 2: Queue jumps with enhanced bus service (\$35M)
- Alternative 3: Dedicated curb lanes with new BRT service (\$148M)
- Alternative 5B: Dedicated median lanes with new BRT service (\$289M)

28

Initial Transit/Traffic Modeling Results

- All build alternatives increased transit ridership in the corridor
- BRT service and amenities (Alt 3 and 5B) attracted more riders than Enhanced Bus (Alt 2)
- All build alternatives improved 2040 transit travel times over the No-build (by as much as 15 minutes along EB in the PM peak hour)
- Among the build alternatives, there were only minor differences in 2040 transit travel times

29

December 2016 T&E Work Session

Conclusion:

- Alt. 5B (median BRT) is not preferred due to the high cost and lack of travel time benefit, as compared to other build alternatives

36

Follow-Up Questions:

- How would a new scenario that contains the infrastructure improvements of Alternative 2 (queue jumps) and the service improvements of Alternative 3 (BRT) operate? How much would it cost?

New Analysis: BRT with Queue Jumps Only

- Runningway (same as Alt 2): queue jumps at select intersections; use existing lanes with mixed traffic otherwise; no change to service roads
- BRT service (same as Alt 3 – curb BRT):
 - Headways 6 min. in peak, 10 min. in off-peak
 - Transit Signal Priority (TSP)
 - 12 new BRT stations
 - Off-board fare collection
 - 60' articulated buses
- Assumed Daily BRT Boardings in 2040 (same as Alt. 3 – curb BRT): 6,400

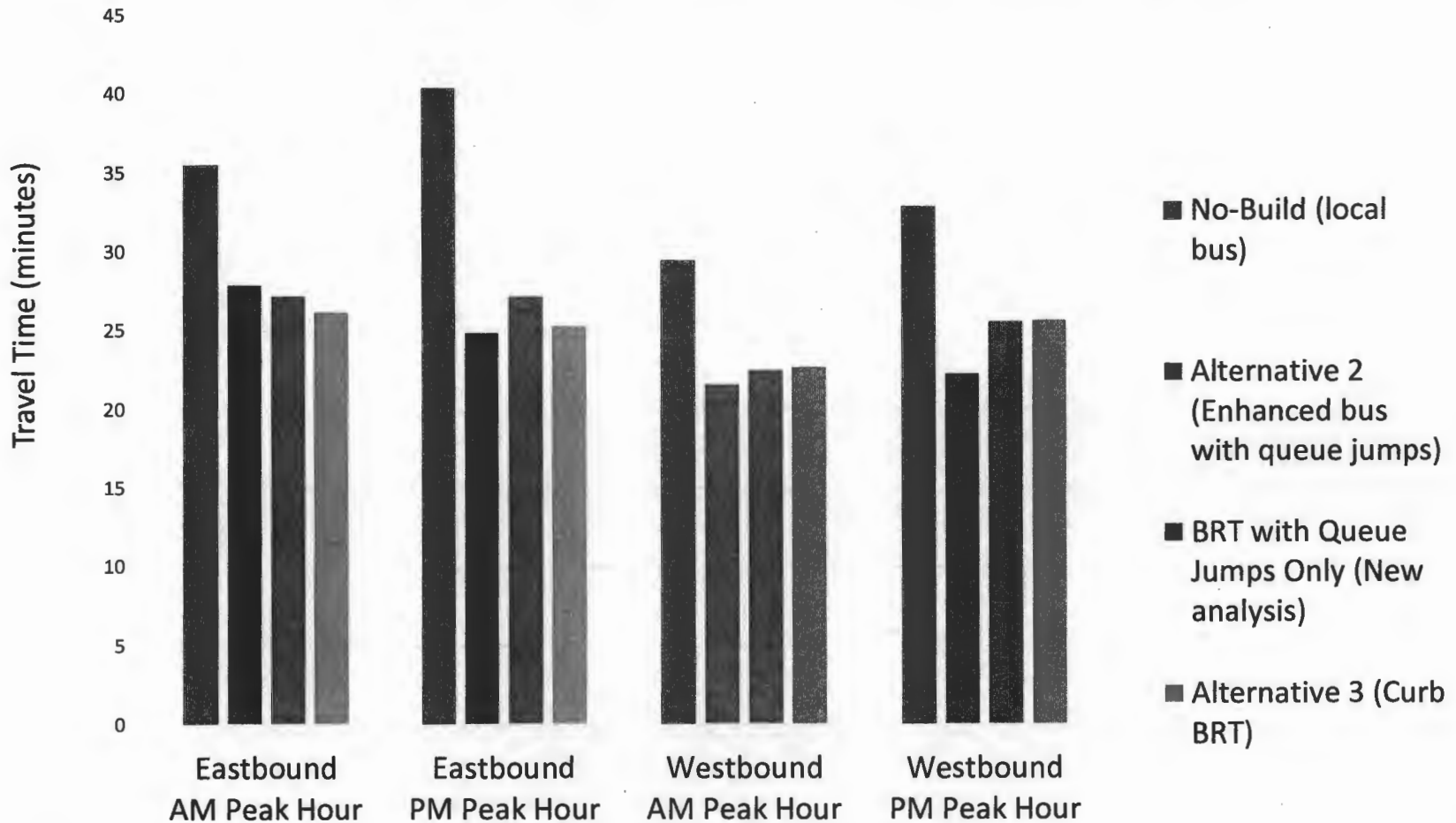
31

Transit Service Improvements

	Enhanced Bus Service	New BRT Service
Alternatives	<ul style="list-style-type: none"> Alt. 2 (Queue Jumps) 	<ul style="list-style-type: none"> Alt. 3 (Curb BRT) New Analysis (BRT with Queue Jumps Only)
Headway (Peak)	12 minutes	6 minutes
Headway (Off-Peak)	15 minutes	10 minutes
Daily Bus Trips	79 express bus trips	136 BRT trips
Vehicles	40' Hybrid	60' Articulated Hybrid
Stops	Upgrades to the existing bus stops	New BRT stations
Projected 2040 Daily Boardings	2,600	6,400

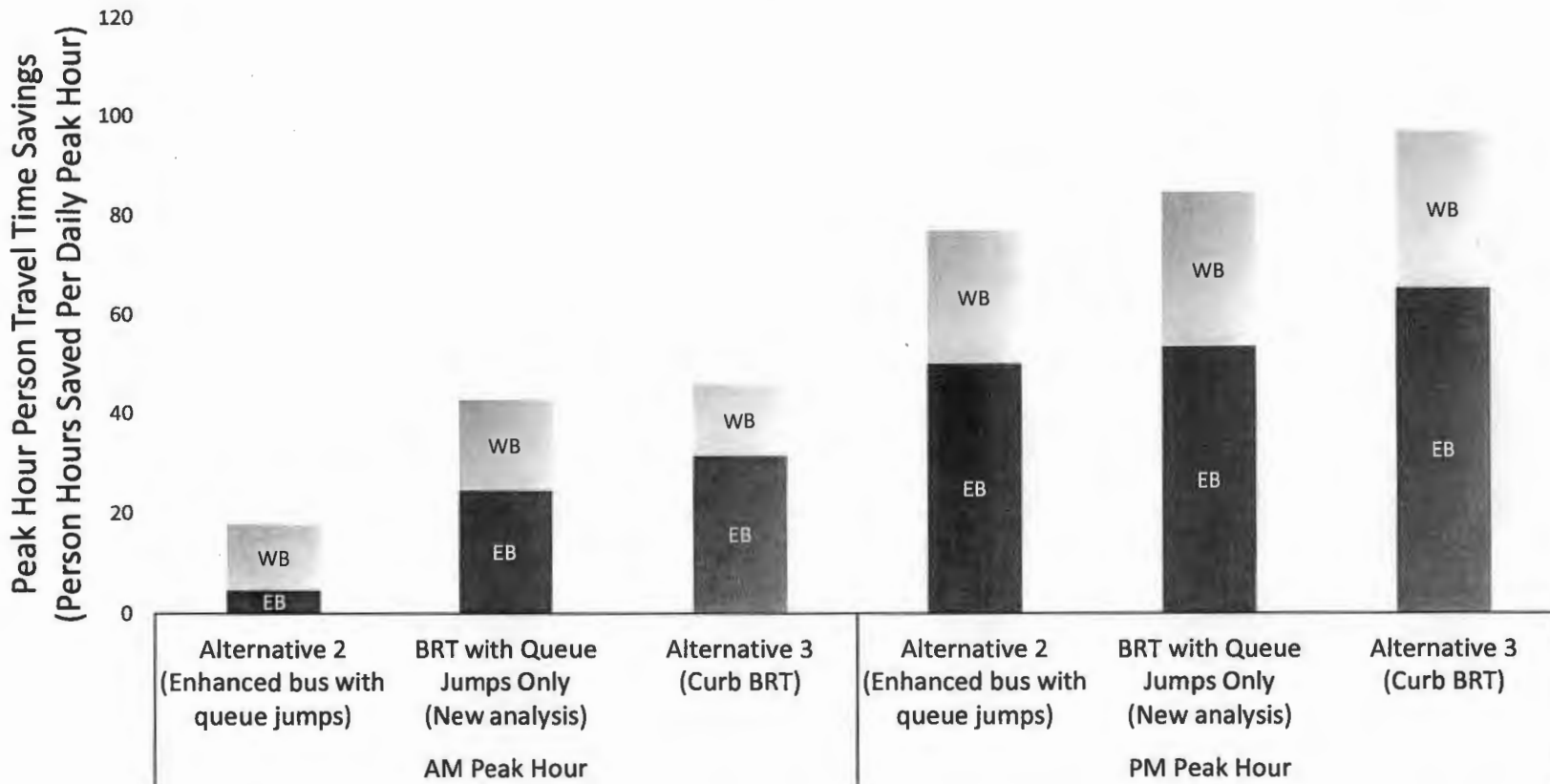
32

Projected 2040 Peak Hour Transit Travel Times



23

2040 TOTAL Peak Hour Person Transit Travel Time Savings (Includes Local Bus and BRT)



34

Costs (in millions)

	Alt. 1 (No-Build)	Alt. 2 (Enhanced bus with queue jumps)	BRT with Queue Jumps Only (New analysis)	Alt. 3 (Curb BRT)
Right-of-Way (ROW)	-	\$6	\$11	\$13
Engineering and Construction	-	\$23	\$52	\$119
Vehicles	-	\$5	\$17	\$17
Total Capital Cost	-	\$35	\$80	\$148
Annual Operating Cost	-	\$3	\$5	\$5

35

Findings of New Analysis

A BRT with queue jumps and no dedicated lanes:

- Provides the same travel time savings in the **westbound** direction as dedicated curb lanes (Alt. 3)
- Operates 1 to 2 min slower in the **eastbound** direction than dedicated curb lanes (Alt. 3)
- Has the potential to attract 2.5 times more (6,400 v. 2,600) daily riders than enhanced bus service (Alt. 2 - queue jumps)
- 36 ▪ Provides a greater time savings by serving more riders than Alternative 2
- Provides less time savings in the eastbound direction and equal time savings in the westbound direction than Alternative 3
- Veirs Mill Road is a major east-west connection between other planned north-south BRT lines. If the north-south lines are constructed the benefit of BRT along Veirs Mill Road could increase
- Costs \$80M to design and build, which is \$44M more than Alternative 2 and \$69M less than Alternative 3

Conclusions of Study

- Dedicated curb lanes are consistent with the Master Plan vision for the County's BRT network
 - Supported by the Montgomery County Planning Board, WMATA, and the City of Rockville
 - As the full BRT network is built, greater benefits may be achieved with dedicated lanes
 - Queue jumps would not preclude future construction of dedicated curb lanes
 - Keeping curb lane BRT as an option continues to allow for right-of-way dedication
- 37) ▪ Several options for phasing of short-term improvements include: "Extra" service, new BRT vehicles, construction of queue jumps, new larger stations, and added TSP
- Short-term improvements could be initiated in the near future with Alternative 3 in place for the Master Plan
- At this time, given financial constraints, MCDOT recommends "Extra" service implementation for this corridor

Resolution: _____
Introduced: _____
Adopted: _____

**COUNTY COUNCIL
FOR MONTGOMERY COUNTY, MARYLAND**

By: Council President

SUBJECT: Selection of Recommended Alternative for the MD 586/Veirs Mill Road Bus Rapid Transit Study

Background

1. In September 2016 the Maryland Department of Transportation (MDOT), in coordination with the Montgomery County Department of Transportation (MCDOT), completed a Draft Corridor Study Report for the MD 586/Veirs Mill Road Bus Rapid Transit (BRT) Study. The study examined four alternatives in detail:
 - Alternative 1 (No Build): assumes no improvements to the corridor other than what is included in the Fiscally-Constrained Long Range Plan and serves as a baseline to measure other alternatives
 - Alternative 2 (Transportation Systems Management): Minor infrastructure improvements, including construction of queue jumpers, installation of Transit Signal Priority (TSP), and bus stop improvements. This alternative includes implementation of limited-stop service. Cost = \$34.9 million.
 - Alternative 3 (Curb-running BRT): Provision of dedicated curb BRT lanes along most of the corridor through widening or use of existing bus lanes. Curb lanes would also accommodate local buses and right-turning vehicles. BRT stations would be constructed along the corridor with features such as level-boarding, off-board fare collection, and real-time information, and new BRT service would be provided using new, branded, and larger BRT vehicles. Cost = \$148.2 million.
 - Alternative 5B: Creation of a single, two-way BRT lane in the median, with passing lanes at stations or two dedicated median lanes where feasible. As in Alternative 3, BRT stations would be constructed along the corridor with features such as level-boarding, off-board fare collection, and real-time information, and new BRT service would be provided using new, branded, and larger BRT vehicles. Cost = \$289.4 million.
2. The County Council's Transportation, Infrastructure, Energy, and Environment (T&E) Committee received a briefing on the report at its December 1, 2016 meeting. At this worksession the

consensus was that Alternative 5B should be eliminated from consideration due to its much higher cost and relatively small

Selection of Recommended Alternative for the MD 586/Veirs Mill Road Bus Rapid Transit Study
Page Two

improvement in travel time savings compared to the other build alternatives. The Committee asked MDOT to evaluate a new “BRT with queue jumps only” alternative. This alternative includes many of the elements of Alternative 3: longer (60’ long), multiple-door BRT buses, larger stations with canopies, level boarding, real-time information, and off-board fare collection. It would not have a continuous dedicated lane; however, like Alternative 2, it would feature queue jump lanes at Veirs Mill Road’s 12 busiest intersections between Rockville and Wheaton, and TSP that would give BRT vehicles an advanced or extended green at these intersections. Since it is a hybrid of Alternatives 2 and 3, it is referred to as Alternative 2.5.

3. The T&E Committee received a second briefing from MDOT and MCDOT on May 3, 2017. MDOT found that Alternative 2.5 would provide roughly the same or slightly less travel time savings (depending on the direction of travel and the time of day) than Alternative 3, but at a cost of \$79.2 million: \$69.0 million (47%) less than Alternative 3. The Committee proposed Alternative 2.5 as the recommended option to carry forward into preliminary design, and it proposed Alternative 3 to be retained as the master plan option, protecting the right-of-way for a potential upgrade to a continuous dedicated lane in the long term, if it is eventually warranted.

Action

The County Council for Montgomery County, Maryland, approves the following resolution:

The Council selects Alternative 2.5 as the recommended option to carry forward into preliminary design, and identifies Alternative 3 to be retained as the master plan option, protecting the right-of-way for a potential upgrade to a continuous dedicated lane in the long term, if it is eventually warranted.

This is a correct copy of Council action.

Linda M. Lauer, Clerk of the Council