MD 355 - South Corridor Advisory Committee Meeting # 9

Montgomery County
RAPID TRANSIT
MD 355

Bethesda – Chevy Chase Regional Services Center
Bethesda, Maryland
November 9, 2016
6:30 pm to 9:00 pm

Maryland Department of Transportation

MCDOT
Montgomery County Department of Transportation

Welcome

Agenda:

- Review of Conceptual Alternatives……10 min
- Preliminary Analysis of Conceptual Alternatives……30 min
  - General Considerations
- Next Steps……10 min
- Breakout Session……70 min

Note: Each topic will be followed by a question and answer session. Please hold questions and comments until the section presentation is complete.

Conceptual Alternatives – Running Way Alternatives Under Consideration

- Alternative 1 No-Build
- Alternative 2 – Transportation System Management (TSM)

Moving forward to next phase of study

BRT Alternatives

- Alternative 3A (Mostly median, Grosvenor Metro to Clarksburg Outlets along Observation Drive)
- Alternative 3B (Mostly median, Bethesda Metro to Clarksburg along MD 355)
- Alternative 4A (Mostly curb, Grosvenor Metro to Clarksburg along MD 355)
- Alternative 4B (Mostly curb, Bethesda Metro to Clarksburg along MD 355)

Conceptual Alternatives – Running Way Alternatives Cheat Sheet

Alternative 3s

- Mostly median running way

Alternative 4s

- Mostly curb running way

A Alternatives

- Service from Grosvenor Metrorail Station to Clarksburg
- 3A – Terminates at Clarksburg Outlets along Observation Drive
- 4A – Terminates at Redgrave Place along MD 355

B Alternatives

- Service from Bethesda Metrorail Station To Redgrave Place along MD 355

Questions?

- ✓ **Review of Conceptual Alternatives**
  - ✓ **Q&A**
- Preliminary Analysis of Conceptual Alternatives
- Next Steps
- Breakout Session

Preliminary Analysis of Conceptual Alternatives

- A preliminary analysis of the conceptual alternatives has been conducted
- The purpose of the preliminary analysis was to:
  - **Make informed decisions on which BRT running way sections should not be carried forward**
    - Use information gathered in this phase to refine the alternatives
  - Understand how the alternatives compare amongst each other with respect to the screening criteria
  - Answer questions regarding the alignment, termini, transit operations, and station locations
  - For purposes of the screening criteria analysis presented at this and next meeting we will be focusing on four BRT alternatives (3A, 3B, 4A and 4B)

Screening Criteria Results

At this meeting we will present the screening criteria that address:

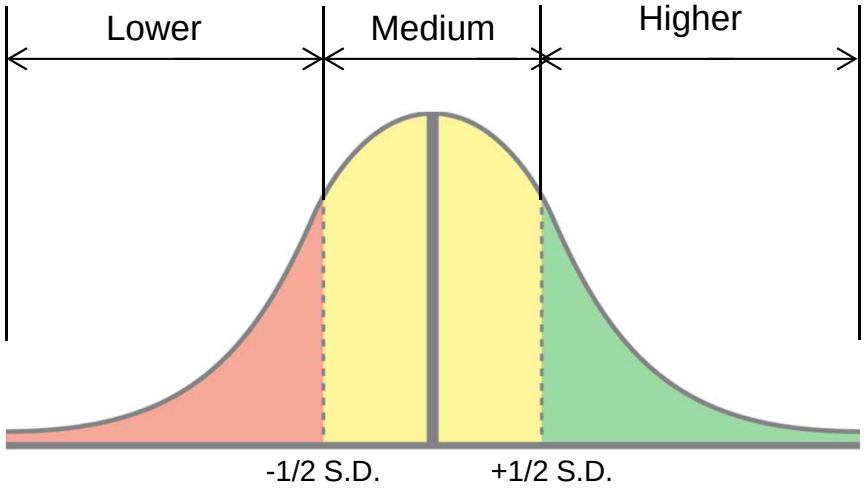
- Impacts
- Costs

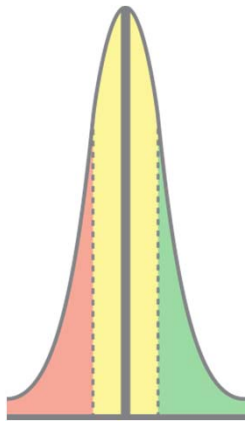
At the previous meeting we presented screening criteria that address:

- Transit ridership
- Travel times
- Person throughput
- Accessibility

Screening Criteria Results Qualitative Methodology

- Results of the analysis presented today will be presented as a Higher, Medium, Lower comparison
- The standard deviation (S.D.) of the results are computed for each screening criteria
  - The higher ranking is established for numbers more than half a standard deviation higher than the mean
  - The medium ranking is established for numbers that are within half a standard deviation of the mean
  - The lower ranking is established for numbers more than half a standard deviation lower than the mean





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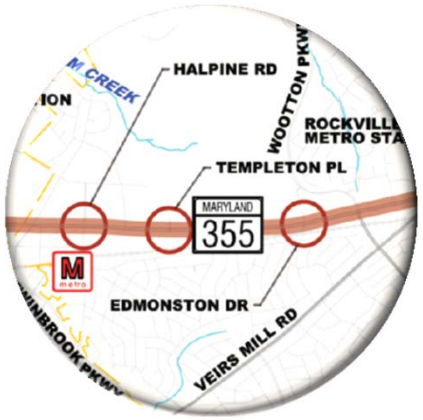
Screening Criteria

		Alt 3A	Alt 3B	Alt 4A	Alt 4B
CAC Meeting No. 8	Increase in total daily transit ridership	Medium	Higher	Lower	Higher
	Increase in total daily bus ridership	Medium	Higher	Lower	Higher
	Total daily BRT ridership	Medium	Higher	Lower	Higher
	Boardings by station – North Section (Section 7)	Higher	Medium	Medium	Lower
	Boardings by station – Central Section (Section 6 through Section 2)	Lower	Higher	Lower	Higher
	Boardings by station – South Section (Section 1)	Same for Alternative 3B and Alternative 4B			
	BRT travel time	See Appendix for detailed breakdown			
	BRT travel time vs. local bus travel time				
	BRT travel time vs. auto travel time				
	Change in peak hour person throughput				
	Change in daily person throughput				
	Increase in jobs within 45 minutes along the corridor	Medium	Higher	Lower	Lower
	Increase in jobs within 60 minutes along the corridor	Medium	Higher	Lower	Medium
	Increase in households within 45 and 60 minutes of activity centers	Lower	Higher	Lower	Higher
CAC Meeting No. 9	**Private property Impacts**				
	Total property impacts				
	Total operating costs				
	Construction costs				

Preliminary Analysis of Conceptual Alternatives



- How do the two northern alignments compare? MD 355 and Observation Drive
- How do the two southern termini compare? Grosvenor or Bethesda Metrorail Station
- What is causing differences in ridership for new BRT service between BRT Alternatives?
- What are the effects of lane repurposing?
- How does the bi-directional section operate?
- How do the median vs curb running ways compare?

CAC No. 8

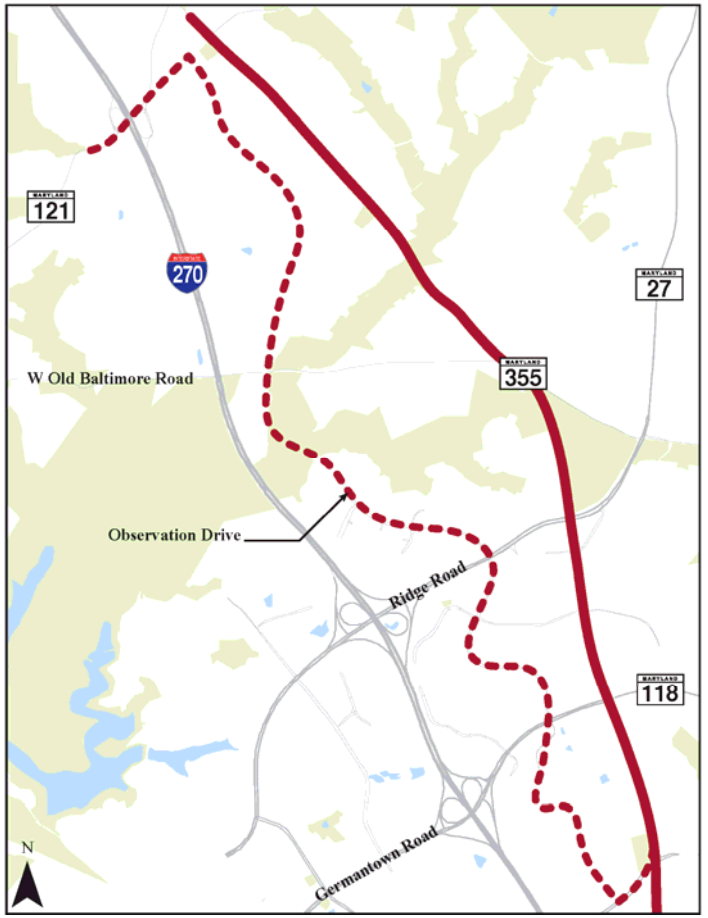
- What features of BRT are affecting property impacts?
- What features of BRT are affecting operational costs?
- What features of BRT are affecting construction costs?

CAC No. 9

General Considerations

- **How do the two northern alignments compare? MD 355 and Observation Drive**
  - Higher ridership and longer travel times along Observation Drive result in higher operating costs
  - The mixed traffic running way along Observation Drive results in lower property impacts and lower construction costs
  - *Higher ridership observed along Observation Drive alignment compared to MD 355*
  - *BRT Travel time along Observation Drive is higher due to longer distance and mixed traffic operations*
  - *Higher number of large trip generators along Observation Drive outweighs longer BRT travel times in attracting higher ridership*

Slides: 28, 29, 31, 32, 38, 42 & 43



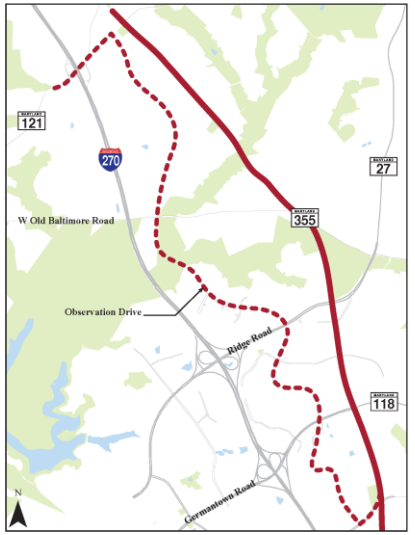
General Considerations

- **How do the two southern termini compare? Grosvenor or Bethesda Metrorail Station**
  - Terminating service at Grosvenor would result in lower property impacts
  - Terminating service at Grosvenor would result in lower operating and construction costs
  - *Approximately 15% of ridership is generated at stations south of Grosvenor Metrorail Station*
  - *Terminating at Bethesda Metrorail Station increases the ridership on the central section*
    - *Increases the number of potential destinations*
  - *Terminating at Bethesda Metrorail Station increases accessibility to households from activity centers*
  - *Terminating at Bethesda Metrorail Station provides access to key activity centers including Medical Center and downtown Bethesda*

Slides: 28, 29, 31, 32, 39 & 56

General Considerations

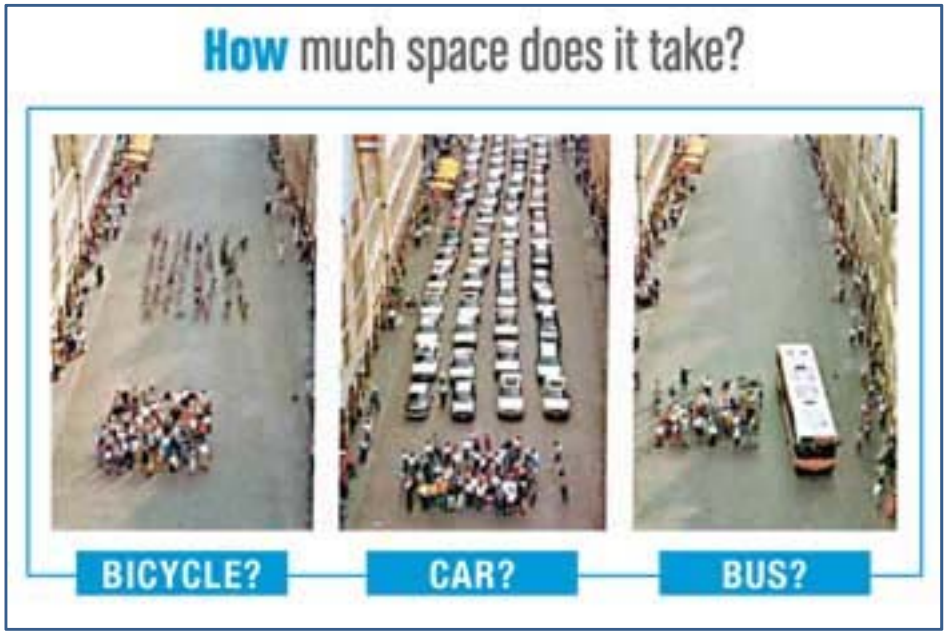
- **What is causing differences in ridership for new BRT service between BRT Alternatives?**
  - *Higher ridership along Observation Drive alignment (greater number of large trip generators)*
  - *Extending service to Bethesda increases ridership by expanding BRT market and providing access to additional activity centers*
  - *In general the median running way sections have shorter BRT travel times generating higher ridership within those sections*



Slides: 38, 39, 42 & 43

General Considerations

- **What are the effects of lane repurposing?**
  - *The running ways where lane repurposing is being evaluated result in lower impacts and lower costs*
  - *Transit person throughput increases on all alternatives and all alignment sections compared to the No-Build*
  - *In general person throughput decreases in sections where lane repurposing is being proposed due to a decrease in auto person throughput*



Slides: 28, 29, 32, 51, 52 & 53

General Considerations

- **How does the bi-directional section operate?**
  - Wider footprint of the bi-directional running way compared to lane repurposing options results in higher construction costs
  - *Longer BRT travel times in both Alternatives with bi-directional operations (Alternatives 3A and 4A)*
  - *Lower ridership in both Alternatives with bi-directional operations (Alternatives 3A and 4A)*

Slides: 32, 39, 42 & 43

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General Considerations

- **How do the median vs curb running ways compare?**

  - Impacts and Costs
    - Median running way has a wider footprint and results in higher property impacts and construction costs
  - *BRT Travel Time*
    - *Median alternatives generally experience shorter BRT travel times relative to auto and local bus*
      - *Median running generally provides greater benefit to BRT relative to other modes*
  - *Ridership*
    - *Alternative 3B, the median running alternative that runs the full length of the corridor, scores highest in all ridership categories*

Slides: 28, 29, 32, 39, 42, 43, 45, 46, 48 & 49

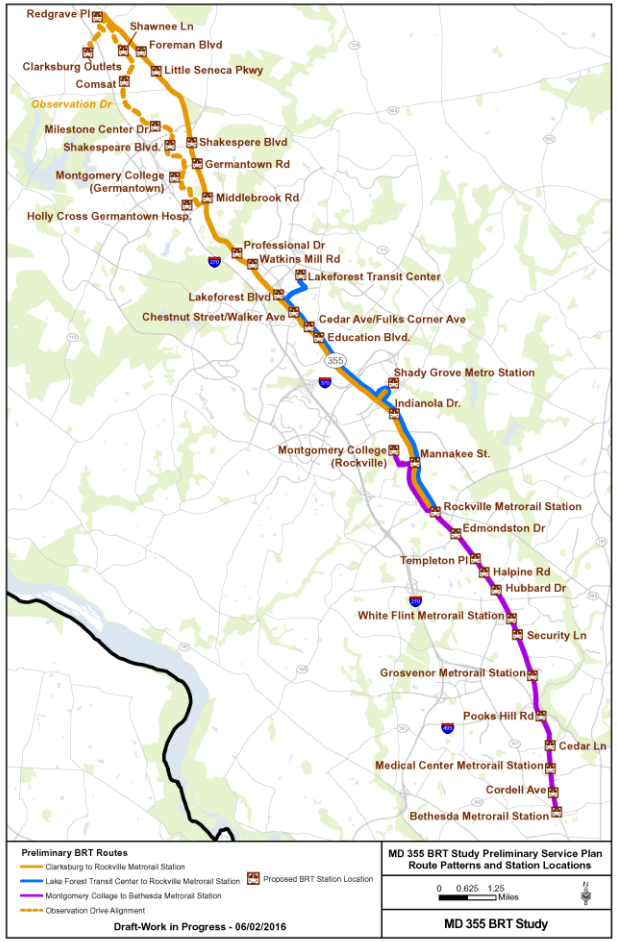
General Considerations

- **What features of BRT are affecting property impacts?**
  - Wider footprint of median alternatives result in higher property impacts compared to curb running BRT
  - Mixed traffic running way along Observation Drive is reducing the overall property impacts on Alternative 3A
  - Extending service to Bethesda results in additional property impacts for stations

Slides: 28 & 29

General Considerations

- **What features of BRT service are affecting operational costs?**
  - Trip Pattern 1A (Clarksburg to Rockville in orange) is the most expensive to run for all BRT alternatives
    - Longest alignment
    - Higher ridership
  - Higher ridership and slower travel times (longer alignment and running in mixed traffic) for Alternative 3A along Observation Drive results in higher operational costs



Slides: 31

General Considerations

- **What features of BRT are affecting construction costs?**
  - Wider footprint of median alternatives result in higher construction costs compared to curb running BRT
    - Increase in costs related to roadway reconstruction, drainage, utility relocation and stormwater management

Slides: 32

Screening Criteria

		Alt 3A	Alt 3B	Alt 4A	Alt 4B
CAC Meeting No. 8	Increase in total daily transit ridership	Medium	Higher	Lower	Higher
	Increase in total daily bus ridership	Medium	Higher	Lower	Higher
	Total daily BRT ridership	Medium	Higher	Lower	Higher
	Boardings by station – North Section (Section 7)	Higher	Medium	Medium	Lower
	Boardings by station – Central Section (Section 6 through Section 2)	Lower	Higher	Lower	Higher
	Boardings by station – South Section (Section 1)	Same for Alternative 3B and Alternative 4B			
	BRT travel time vs. local bus travel time	See Appendix for detailed breakdown			
	BRT travel time vs. auto travel time				
	Change in peak hour person throughput				
	Change in daily person throughput				
	Increase in jobs within 45 minutes along the corridor	Medium	Higher	Lower	Lower
	Increase in jobs within 60 minutes along the corridor	Medium	Higher	Lower	Medium
	Increase in households within 45 and 60 minutes of activity centers	Lower	Higher	Lower	Higher
CAC Meeting No. 9	Private property Impacts	Lower	Higher	Medium	Medium
	Total property impacts	Lower	Higher	Medium	Lower
	Total operating costs	Higher	Medium	Lower	Medium
	Construction costs	Medium	Higher	Medium	Lower

Questions?

- ✓ Review of Conceptual Alternatives
- ✓ **Preliminary Analysis of Conceptual Alternatives**
  - ✓ **Q&A**
- Next Steps
- Breakout Session

Next Steps

- Draft Conceptual Alternatives Report – January 2017
- Public Meeting – February 2017
  - Conceptual Alternatives
  - Screening Criteria Results

Questions?

- ✓ Review of Conceptual Alternatives
- ✓ Preliminary Analysis of Conceptual Alternatives
- ✓ **Next Steps**
  - ✓ **Q&A**
- Breakout Session

Breakout Session

- In breakout groups, CAC members will have the opportunity to:
  - Discuss the general findings results related to the screening criteria presented at CAC Meeting No. 8 & CAC Meeting No. 9
  - Use the information from the analysis to provide input on how to improve the BRT alternatives and which elements should move forward

Additional Questions

Adjournment

Appendix CAC Meeting No. 9

Number of Private Properties Impacted

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	Lower	Higher	Medium	Medium
Section 6	Higher	Higher	Lower	Lower
Section 5	Same for all Alternatives			
Section 4	Higher	Higher	Higher	Lower
Section 3	Medium	Higher	Medium	Lower
Section 2	Higher	Higher	Lower	Lower
Section 1	Same for Alternatives 3B and 4B			
Total	Lower	Higher	Medium	Medium

Number of Total Properties Impacted

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	Lower	Higher	Medium	Medium
Section 6	Higher	Higher	Lower	Lower
Section 5	Same for all Alternatives			
Section 4	Higher	Higher	Higher	Lower
Section 3	Medium	Higher	Medium	Lower
Section 2	Higher	Higher	Lower	Lower
Section 1	Same for Alternatives 3B and 4B			
Total	Lower	Higher	Medium	Lower

Properties Impacted

- Median running way has a wider footprint resulting in overall higher property impacts
- Alternative 3B has higher property impacts due to running way being mostly in the median

Total Operating Costs

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Total Operating Costs	Higher	Medium	Lower	Medium

- Operating costs driven by buses in service
- Two primary reasons driving high operating costs on Alternative 3A
  - Higher ridership along Observation Drive requires more frequent service
  - Observation Drive alignment also has longer travel time due to longer alignment therefore requiring more buses in service to maintain required service frequency
- Lower operating cost on Alternative 4A and 4B due mostly to lower ridership in the northern trip pattern requiring lower service frequency

Construction Costs by Section

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	Lower	Higher	Medium	Medium
Section 6	Higher	Higher	Lower	Lower
Section 5	Same for all Alternatives			
Section 4	Higher	Higher	Higher	Lower
Section 3	Higher	Medium	Higher	Lower
Section 2	Higher	Higher	Lower	Lower
Section 1	Same for Alternatives 3B and 4B			
Total	Medium	Higher	Medium	Lower

Construction Costs

- Median running way has a wider footprint resulting in overall higher construction costs
    - Higher costs driven by additional roadway reconstruction, utility relocation and stormwater management costs
- Alternative 3B has higher construction cost due to running way being mostly in the median

Appendix CAC Meeting No. 8

Increase in Total Daily Transit Ridership

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Increase in Total Daily Transit Ridership	Medium	Higher	Lower	Higher

- Total daily transit ridership increases for all BRT Alternatives relative to the No-Build
  - Total daily transit ridership includes WMATA Metro, local buses and BRT
- Compared to Alternative 4A, Alternatives 3B and 4B have a higher increase in total daily transit ridership compared to No-Build due additional ridership south of the Grosvenor Metro Station

Increase in Total Daily Bus Ridership

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Increase in Total Daily Bus Ridership	Medium	Higher	Lower	Higher

- Total daily bus ridership includes local buses and BRT
- Total daily bus ridership increases in all BRT Alternatives relative to the No-Build
- Compared to Alternative 4A, Alternatives 3B and 4B have a higher increase in total daily bus ridership compared to No-Build due additional ridership south of the Grosvenor Metro Station

Total Daily BRT Ridership

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Total Daily BRT Ridership	Medium	Higher	Lower	Higher

- Compared to Alternative 4A, Alternatives 3B and 4B have a higher increase in total daily BRT ridership compared to No-Build due additional ridership south of the Grosvenor Metro Station
- Significant number of Ride-On users move to new BRT service
- Boardings by station provide more insight into the differences between Alternatives

Boardings by Station – North Section (Section 7)

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
North Section (Section 7)	Higher	Medium	Medium	Lower

- North Section: North of Middlebrook Road
  - Within the north section, the Observation Drive alignment under Alternative 3A has higher ridership compared to other BRT Alternatives

Boardings by Station – Section 6 through Section 2

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 6	Higher (M)	Higher (M)	Lower (C)	Lower (C)
Section 5	Higher (R)	Medium (R)	Medium (R)	Lower (R)
Section 4	Higher (M)	Medium (M)	Lower (M)	Lower (C)
Section 3	Lower (B)	Higher (R)	Lower (B)	Higher (R)
Section 2	Lower (M)	Higher (M)	Lower (C)	Higher (C)
Central Section	**Lower**	**Higher**	**Lower**	**Higher**

Legend

M – Median

R – Lane Repurposing

C – Curb

B – Bi-directional

Boardings by Station – Central Section (Section 6 through Section 2)

- Central Section: Between Grosvenor Metrorail Station and Middlebrook Road
  - In general median running way generates higher ridership compared to other running way types
  - Extended service to the Bethesda Metrorail Station improving overall ridership of Alternatives 3B and 4B within Central Section

Boardings by Station – South Section (Section 1)

- South Section: South of Grosvenor Metrorail Station
  - No appreciable difference in forecasted ridership between Alternative 3B and Alternative 4B in the south section

BRT Travel Time – AM Peak Southbound

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	Higher	Lower	Medium	Medium
Section 6	Lower	Medium	Higher	Higher
Section 5	Lower	Medium	Higher	Lower
Section 4	Lower	Medium	Medium	Higher
Section 3	Higher	Lower	Higher	Lower
Section 2	Lower	Lower	Medium	Higher
Section 1	Same for Alternatives 3B and 4B			

BRT Travel Time – PM Peak Northbound

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	Higher	Medium	Lower	Lower
Section 6	Medium	Lower	Medium	Higher
Section 5	Lower	Medium	Higher	Medium
Section 4	Lower	Medium	Medium	Higher
Section 3	Higher	Lower	Higher	Medium
Section 2	Lower	Lower	Higher	Medium
Section 1	Same for Alternatives 3B and 4B			

BRT Travel Times

- In general, median running way generates shorter travel times compared to other running way types
- BRT travel times are longer for the bi-directional Section 3 under Alternatives 3A and 4A compared to the other BRT Alternatives

BRT Travel Time vs. Local Bus Travel Time (BRT/Local Bus) – AM Peak Southbound

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	-	Lower	Higher	Higher
Section 6	Lower	Lower	Higher	Higher
Section 5	Lower	Higher	Medium	Higher
Section 4	Lower	Lower	Lower	Higher
Section 3	Higher	Lower	Higher	Medium
Section 2	Lower	Lower	Higher	Medium
Section 1	Same for Alternatives 3B and 4B			

BRT Travel Time vs. Local Bus Travel Time (BRT/Local Bus) – PM Peak Northbound

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	-	Lower	Higher	Higher
Section 6	Higher	Lower	Medium	Medium
Section 5	Lower	Medium	Higher	Medium
Section 4	Lower	Medium	Medium	Higher
Section 3	Higher	Lower	Medium	Medium
Section 2	Lower	Lower	Higher	Higher
Section 1	Same for Alternatives 3B and 4B			

BRT Travel Times vs. Local Bus Travel Time (BRT/Local Bus)

- All BRT alternatives results in shorter BRT travel times compared to local bus
- The BRT travel times when compared to local bus travel times generally performs better in the median running BRT alternatives than the curb running alternatives

BRT Travel Times vs. Auto Travel Time (BRT/Auto) – AM Peak Southbound

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	Higher	Lower	Medium	Medium
Section 6	Lower	Higher	Higher	Medium
Section 5	Lower	Medium	Lower	Higher
Section 4	Medium	Lower	Medium	Higher
Section 3	Higher	Lower	Higher	Lower
Section 2	Lower	Lower	Higher	Higher
Section 1	Same for Alternatives 3B and 4B			

BRT Travel Times vs. Auto Travel Time (BRT/Auto) – PM Peak Northbound

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	Higher	Lower	Medium	Medium
Section 6	Higher	Lower	Medium	Medium
Section 5	Higher	Lower	Medium	Medium
Section 4	Lower	Medium	Lower	Higher
Section 3	Higher	Lower	Medium	Higher
Section 2	Lower	Lower	Higher	Higher
Section 1	Same for Alternatives 3B and 4B			

BRT Travel Times vs. Auto Travel Time (BRT/Auto)

- The BRT travel times when compared to auto travel times generally performs better in the median running BRT alternatives than the curb running alternatives

Increase in AM Peak Hour Total Person Throughput Transit + Auto

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	-	Medium	Higher	Lower
Section 6	Higher	Medium	Medium	Lower
Section 5	Higher	Medium	Medium	Lower
Section 4	Higher	Medium	Medium	Lower
Section 3	Higher	Decrease*	Lower	Decrease*
Section 2	Higher	Higher	Lower	Medium
Section 1	-	Decrease*	-	Decrease*

* Section with a decrease in person throughput compared to No-Build

Increase in PM Peak Hour Total Person Throughput Transit + Auto

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	-	Medium	Higher	Lower
Section 6	Higher	Medium	Medium	Lower
Section 5	Higher	Medium	Lower	Lower
Section 4	Higher	Medium	Medium	Lower
Section 3	Lower	Decrease*	Higher	Decrease*
Section 2	Higher	Higher	Lower	Lower
Section 1	-	Decrease*	-	Decrease*

* Section with a decrease in person throughput compared to No-Build

Increase in Total Daily Person Throughput Transit + Auto

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
Section 7	-	Medium	Higher	Lower
Section 6	Higher	Medium	Lower	Lower
Section 5	Higher	Medium	Medium	Lower
Section 4	Higher	Medium	Medium	Lower
Section 3	Higher	Decrease*	Lower	Decrease*
Section 2	Lower	Higher	Lower	Higher
Section 1	Same for Alternatives 3B and 4B			

* Section with a decrease in person throughput compared to No-Build

Person Throughput

- Person throughput measures how productively MD 355 is being used to move people, not just vehicles
- Person throughput changes compared to No Build under all alternatives are based on the combination of changes in auto person throughput and transit person throughput
- Transit person throughput increases for all alternatives compared to the No-Build
- Person throughput generally decreases under Alternatives 3B and 4B in Sections 1 and 3 due to a decrease in auto person throughput

Increase in Jobs Within 45 and 60 Minutes Along the Corridor

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
45 minutes	Medium	Higher	Lower	Lower
60 minutes	Medium	Higher	Lower	Medium

- Transit accessibility to jobs increases for all BRT Alternatives relative to the No-Build
- Lower accessibility identified for Alternative 4A due to service terminating at Grosvenor Metrorail Station and alignment along MD 355 in the north
    - Alternative 3A ranks higher than Alternative 4A because the additional accessibility along Observation Drive compared to the MD 355 alignment in the north

Increase in Households Within 45 and 60 Minutes of Activity Centers

	Alternative 3A	Alternative 3B	Alternative 4A	Alternative 4B
45 minutes	Lower	Higher	Lower	Higher
60 minutes	Lower	Higher	Lower	Higher

- Household accessibility to corridor increases for all BRT Alternatives relative to the No-Build
- Lower accessibility identified for BRT Alternatives that terminate at Grosvenor Metrorail Station