

MD 355 FLASH Phase 2 Study Results

Briefing to the Montgomery County Council
Transportation and Environment Committee

July 25, 2019

Agenda

- Project Overview
- Alternatives Review
- Summary of Results
- Public Outreach



Project Overview

- Identify the recommended alternative for BRT on MD 355
 - Bethesda to Clarksburg (22 miles)
- Supporting Documents
 - Countywide Transit Corridors Functional Master Plan (2013)
 - City of Rockville Bus Rapid Transit Town Center Integration Study (2015)
 - City of Gaithersburg MD 355 Bus Rapid Transit Study (2015)
 - MD 355 Conceptual Alternatives Report (2017)
 - Various small area master plans and other studies



Project Purpose

The purpose of the project is to provide a new transit service with greater travel speed and frequency along MD 355 between Bethesda and Clarksburg that will help accomplish the following:

- Enhance transit **connectivity** and multimodal **integration**
- Improve bus **mobility**
- Address current and future bus **ridership** demands
- Attract **new** riders and provide improved service for **existing** riders
- Support approved Master Planned **growth**
- Improve transit **access** to major employment and activity centers
- Achieve Master Planned non-auto driver **modal share**
- Provide a **sustainable** and **cost-effective** transit service
- Improve **safety** for all

MD 355 BRT Project Process

We are here



Facility Planning
Phase 1 (Planning &
Conceptual
Engineering)

- Existing Conditions
- Modeling
- Purpose & Need
- Conceptual Alternatives
- Preliminary Impacts
- **Identify Recommended Alternative**



Facility Planning
Phase 2 (Preliminary
Engineering)

- Physical investigations
- Surveys
- Right-of-way
- Traffic studies
- Environmental assessments
- Final concepts
- Detailed Scope, Schedule, and Cost Estimate



Final Design

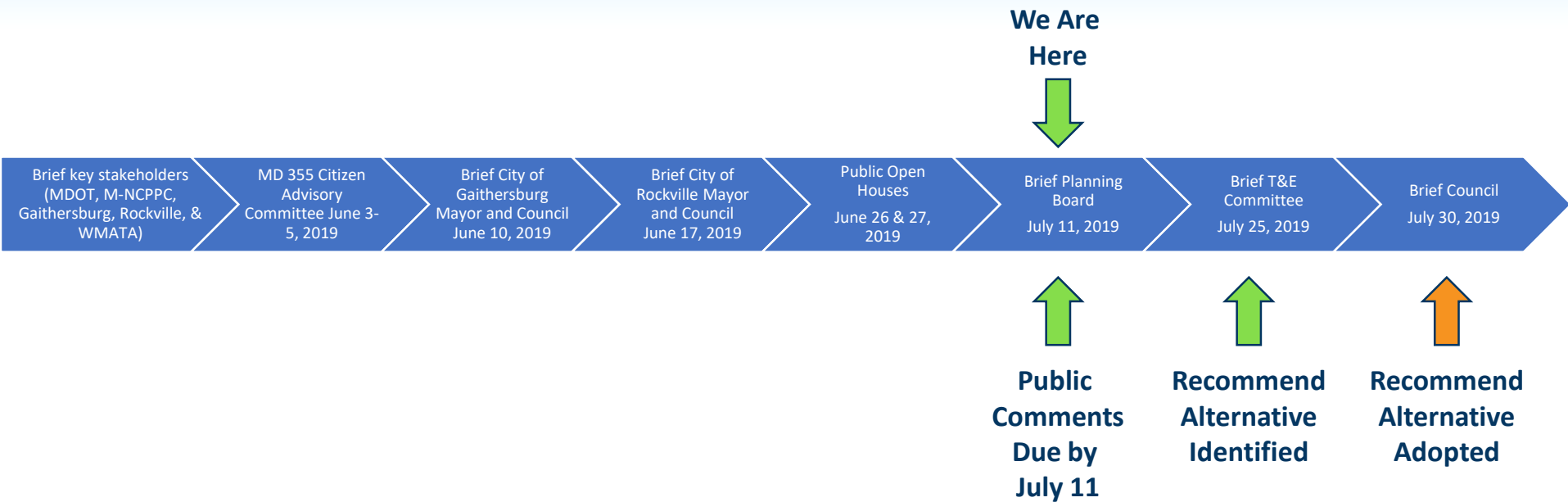


Construction



Funding Decision

Briefings and Community Input



Project Design Segments

Segment	Geographic Description
7	Clarksburg to Middlebrook Road
6	Middlebrook Road to MD 124
5	MD 124 to Summit Avenue
4	Summit Avenue to College Parkway
3	College Parkway to Dodge Street
2	Dodge Street to Grosvenor Metrorail
1	Grosvenor Metrorail to Bethesda Metrorail



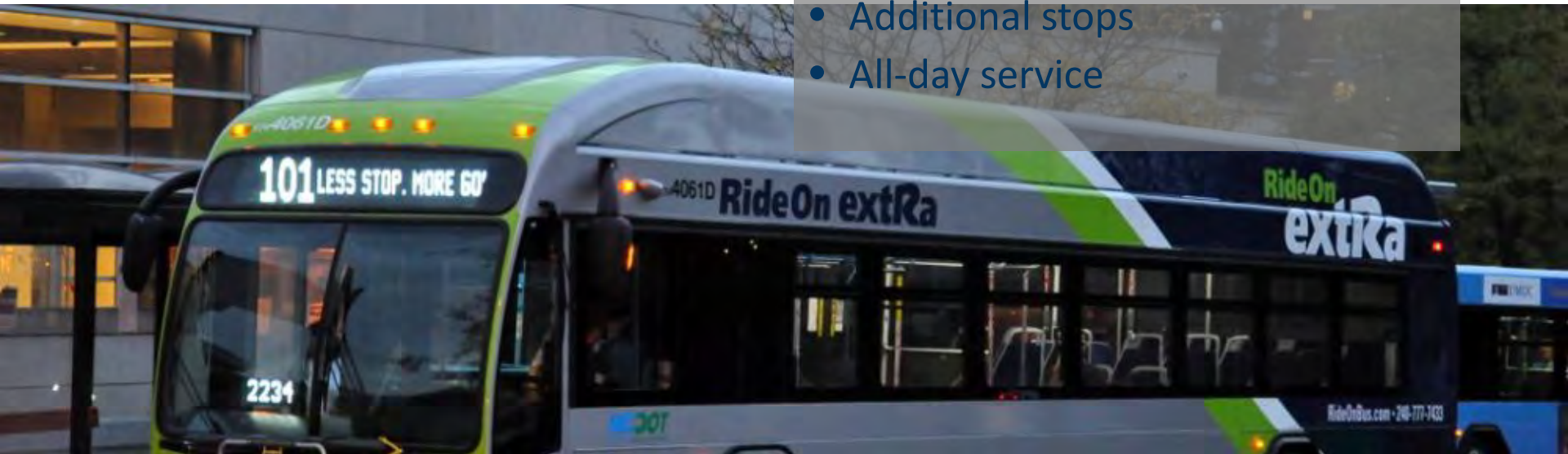
MD 355 BRT Alternatives

No Build

- Ride On extRa service, including Transit Signal Priority (TSP), implemented in October 2017

Transportation Systems Management (TSM) Alternative

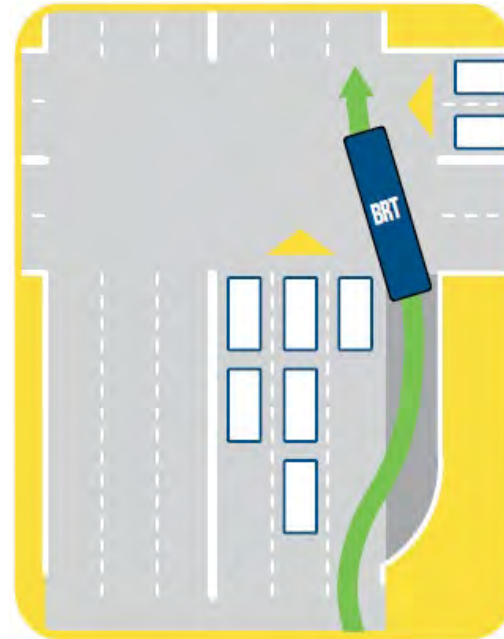
- Ride On extRa service extended to Bethesda to Clarksburg
- Extension of TSP
- Additional stops
- All-day service



MD 355 BRT Alternatives

Queue Jump and Mixed Traffic Alternative (A)

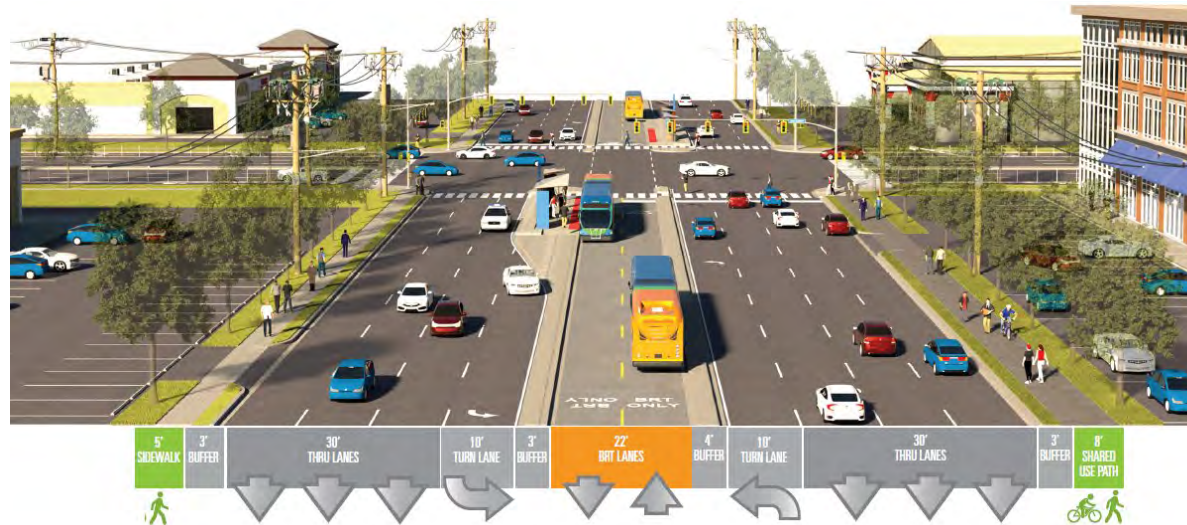
- FLASH in mixed traffic
- Queue jumps (20)
- Additional TSP
- Upgraded stations
 - Off-board fare collection
 - Level boarding
- FLASH vehicles and branding



MD 355 BRT Alternatives

Median Alternative (B)

- FLASH in dedicated **Median** lanes *where feasible*
- Additional TSP
- Upgraded stations
 - Off-board fare collection
 - Level boarding
- FLASH vehicles and branding



Segment 1: BRT in mixed traffic

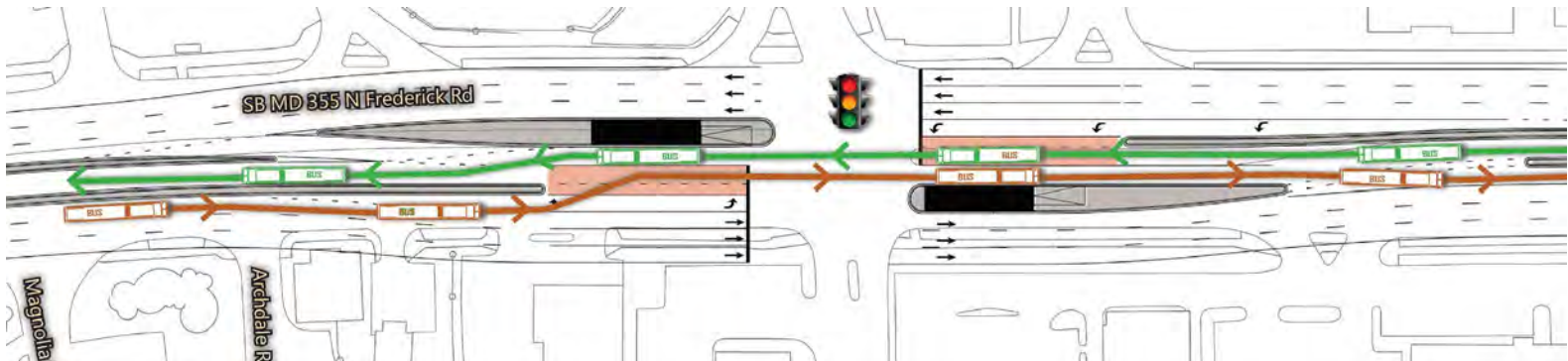
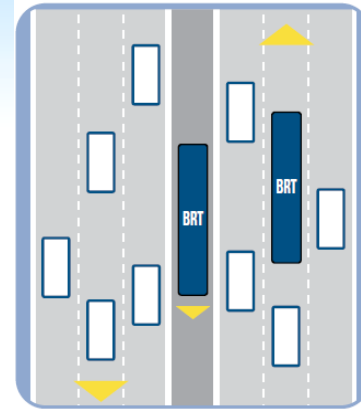
Segment 3: BRT in single, southbound median lane

Segment 5: BRT in single, reversible median lane

MD 355 BRT Alternatives

Median Alternative *Modified* (B Modified)

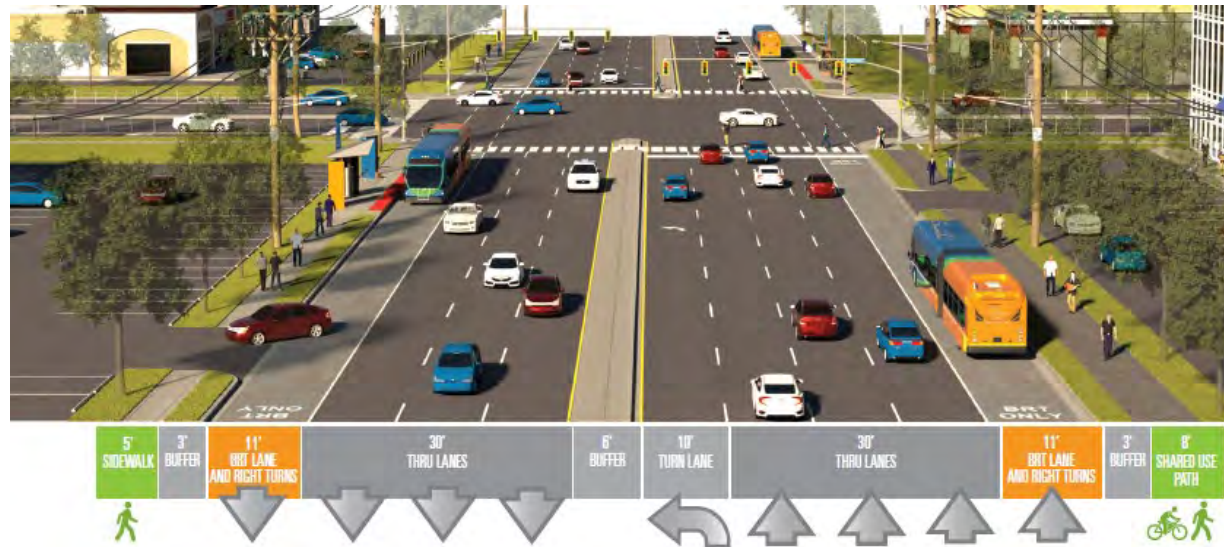
- FLASH in dedicated **Median** lanes where *feasible*
 - Single, reversible, peak direction dedicated lane north of Rockville (Segments 4-6)



MD 355 BRT Alternatives

Curb Alternative (C)

- FLASH in dedicated **Curb** lanes *where feasible*
- Queue jumps
- Additional TSP
- Upgraded stations
 - Off-board fare collection
 - Level boarding
- FLASH vehicles and branding



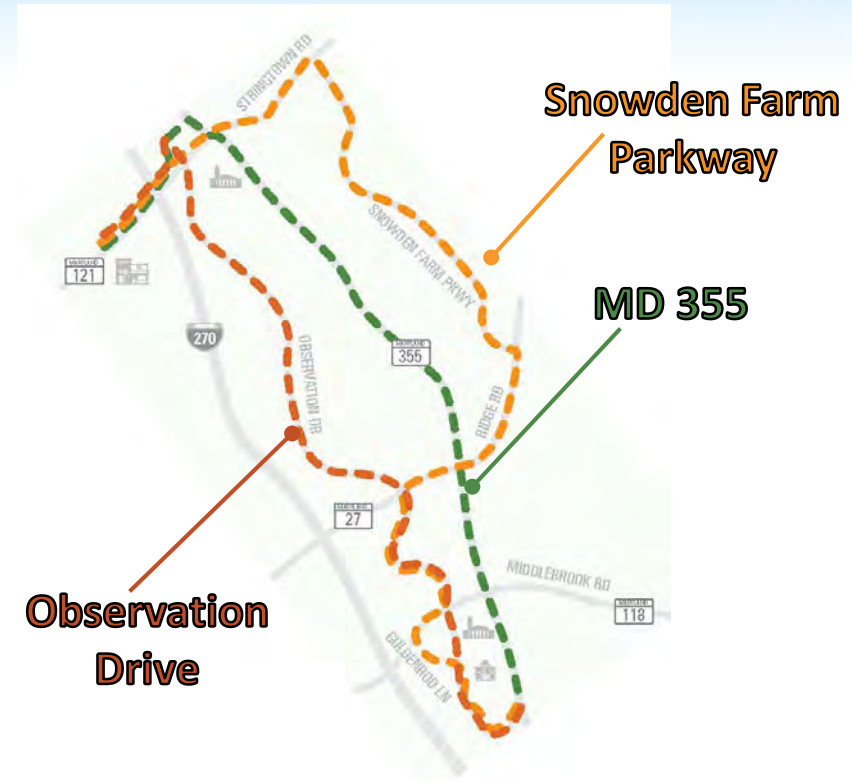
Segment 1: BRT in peak-direction curb lane

Segment 3: BRT in single, southbound curb lane

Segment 5: BRT in mixed traffic

MD 355 BRT Alignments

- Three different alignments studied for Segment 7 (Middlebrook Rd. to Clarksburg)
 - MD 355
 - Assumes future widening by MDOT SHA
 - Observation Drive
 - Assumes future extension by MCDOT
 - Snowden Farm Parkway
 - Only alignment that does not require extension or widening
 - Current “center” of Clarksburg



BRT Operations on MD 355



10 minutes

5 minutes

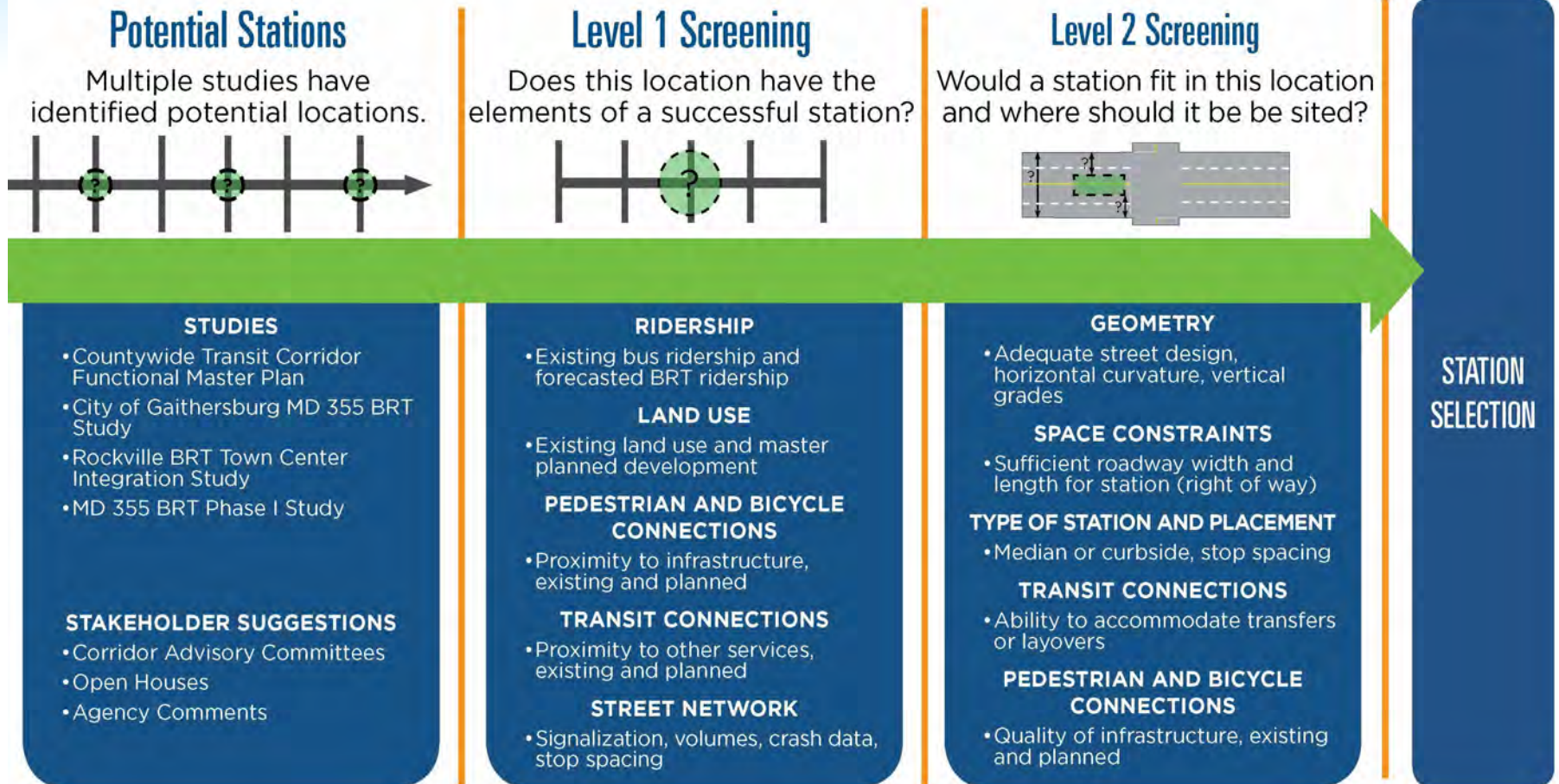
3.3 minutes

5 minutes

10 minutes

- There are four route patterns
 - Clarksburg to Montgomery College – Rockville
 - Germantown to Montgomery College – Rockville
 - Lakeforest Transit Center to Grosvenor Metro
 - Montgomery College – Rockville to Bethesda
- Each service pattern would operate every **10 minutes**

STATION SCREENING PROCESS



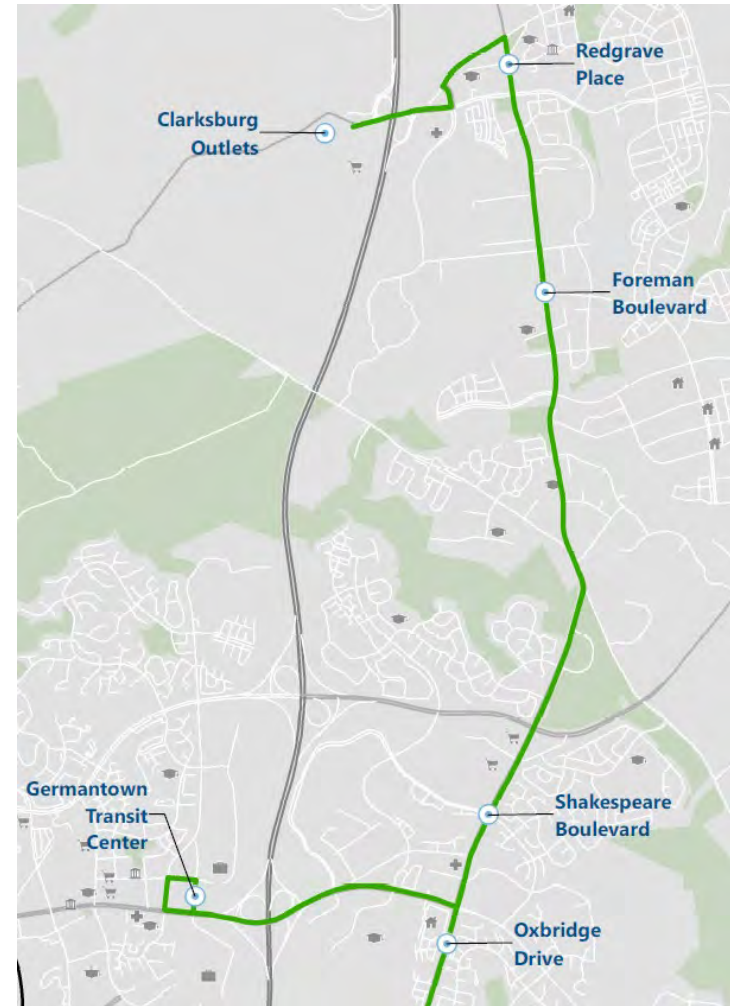
Proposed Station Locations between Middlebrook Rd. and Bethesda Metro

- Gunners Branch Road
- Professional Drive (infill)
- Watkins Mill Road
- Lakeforest Transit Center*
- Lakeforest Boulevard
- Chestnut Street/Walker Avenue (infill)
- Cedar Avenue/Fulks Corner Avenue
- Education Boulevard
- S Westland Drive
- Shady Grove Metro Station
- Indianola Drive (infill)
- Montgomery College - Rockville
- Dawson Avenue (infill)
- Rockville Metro Station
- Mount Vernon Place
- Edmonston Drive
- Templeton Place (infill)
- Halpine Road
- Bou Avenue
- White Flint Metro Station
- Security Lane
- Grosvenor Metro Station
- Pooks Hill (infill)
- Cedar Lane (infill)
- Medical Center
- Cordell Avenue
- Bethesda Metro Station (Future Second Entrance)



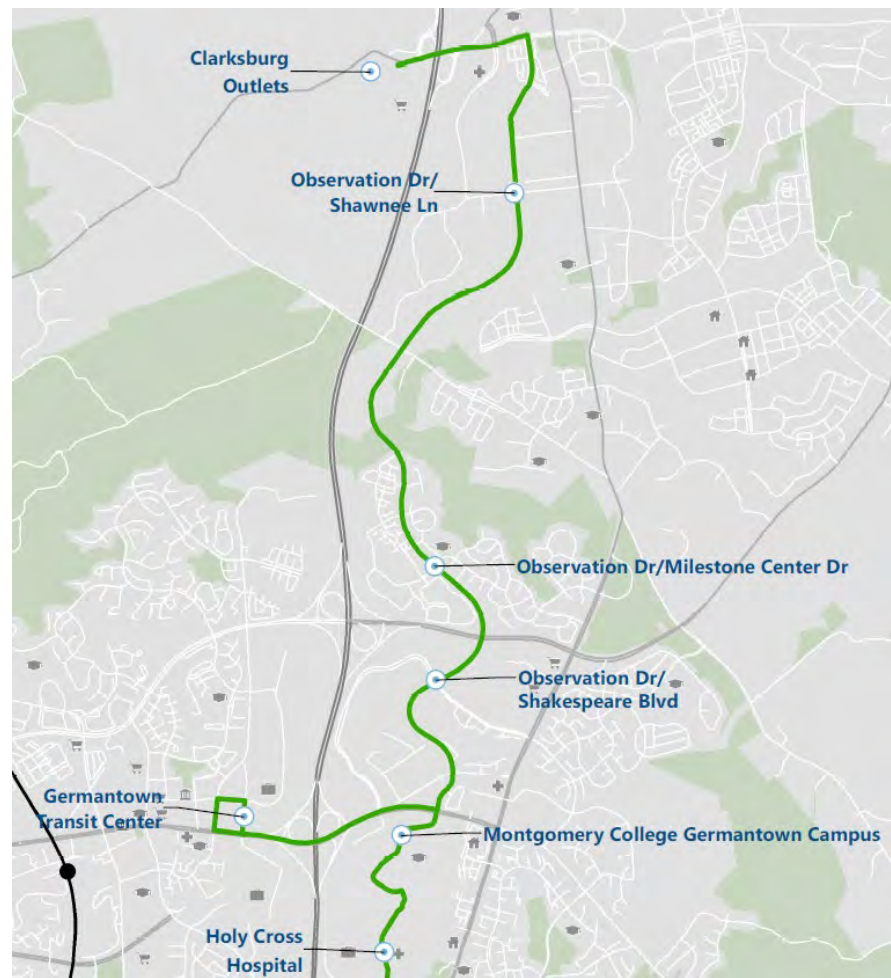
Proposed Station Locations in Segment 7 along MD 355

- Clarksburg Outlets
- Redgrave Place
- Foreman Boulevard
- Milestone Center
- Oxbridge Drive
- Germantown Transit Center



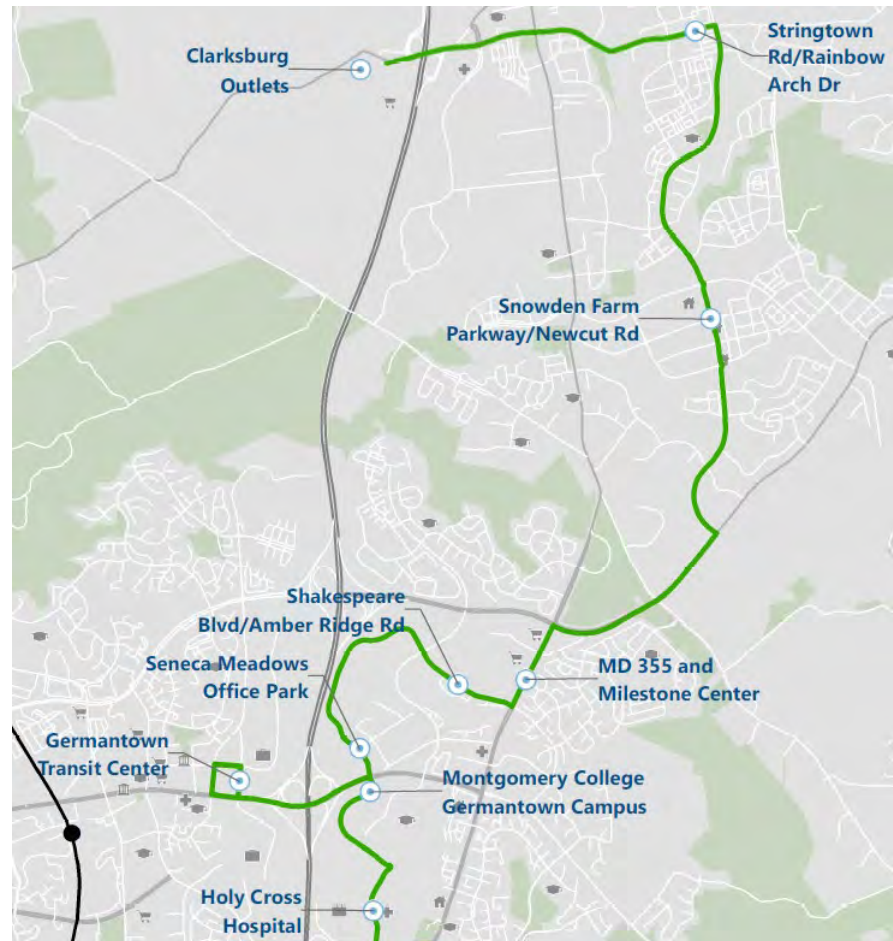
Proposed Station Locations in Segment 7 along Observation Drive

- Clarksburg Outlets
- Observation & Shawnee
- COMSAT (infill)
- Milestone Center Drive
- Milestone P&R
- Montgomery College – Germantown
- Holy Cross Hospital
- Germantown Transit Center



Proposed Station Locations in Segment 7 along Snowden Farm Parkway

- Clarksburg Outlets
- Stringtown & Gateway (infill)
- Stringtown & Rainbow Arch
- Snowden Farm & Newcut
- Milestone Center
- Milestone P&R
- Seneca Meadows Office Park
- Montgomery College – Germantown
- Holy Cross Hospital
- Germantown Transit Center



How Will The Alternatives Be Evaluated?

GOALS



PROVIDE AN APPEALING, FUNCTIONAL, AND HIGH QUALITY TRANSIT SERVICE

- Reduce travel times
- Increase service reliability
- Increase ridership
- Be a user-friendly route
- Complement Metrorail and local bus service



IMPROVE MOBILITY OPPORTUNITIES, ACCESSIBILITY, AND TRANSPORTATION CHOICES FOR ALL

- Improve access to jobs and other destinations
- Minimize traffic impacts and use roadway space efficiently
- Improve bicycle and pedestrian facilities
- Improve service and increase transit options for everyone



SUPPORT MASTER PLAN DEVELOPMENT

- Improve transit service to existing and planned developments
- Locate stations to support walkability



SUPPORT SUSTAINABLE AND COST-EFFECTIVE TRANSPORTATION SOLUTIONS

- Minimize environmental, cultural, and property impacts
- Use practical design to minimize capital and operating costs

Objective – Increase Transit Ridership

- All three build alternatives perform better than the TSM
- The Median alternative is double the No Build
- Minimal impact on Metrorail ridership

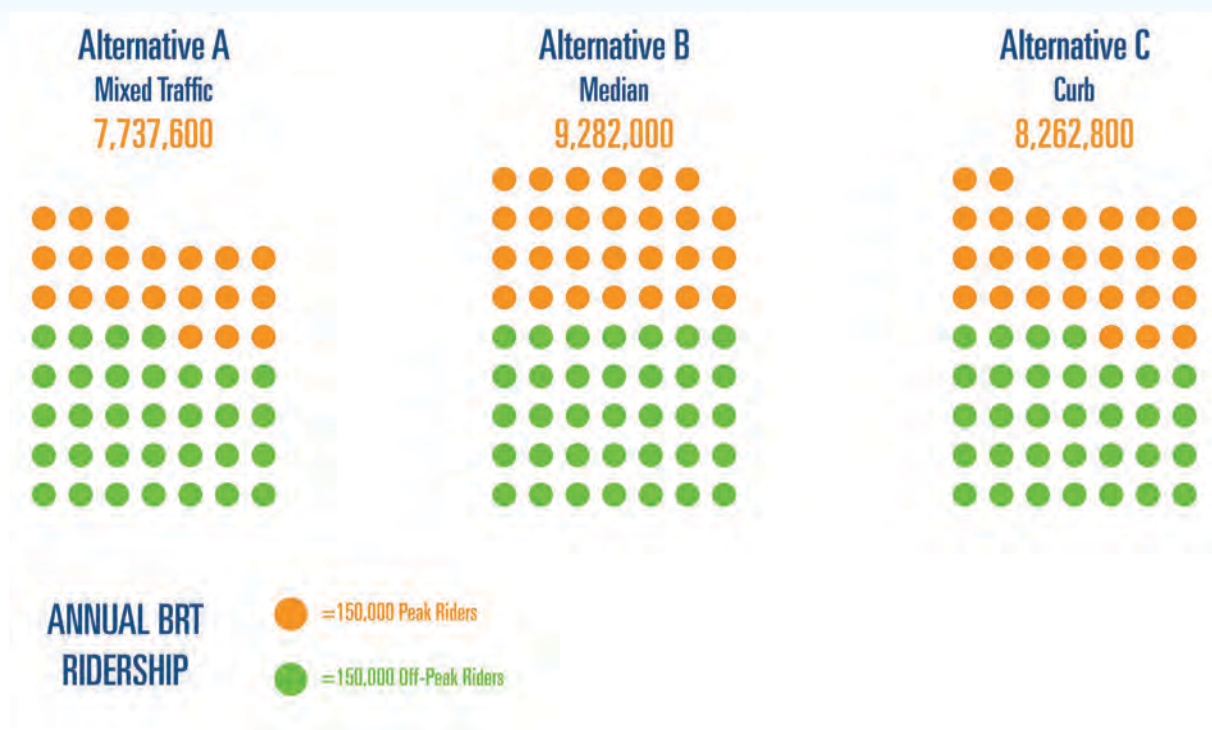
Weekday Bus Ridership (2040)



Objective – Increase Transit Ridership

Over 50% of the daily riders occur during the off-peak

Approximately 9,000 new riders



Objective – Make bus trips faster and more competitive

Alternatives B and C provide a travel time savings over the No Build, TSM, and Alternative A

Alternative C provides added benefit to local bus

Off-peak travel times are consistent across all Build alternatives

Travel Time (minutes)						
Origin	Destination	No Build	TSM	Alternative A	Alternative B	Alternative C
		Bus	Extra	BRT	BRT	BRT
AM Southbound						
Chestnut St	East-West Hwy	72.8	66.3	63.1	53.0	51.8
AM Northbound						
East-West Hwy	Chestnut St	70.5	56.3	48.9	49.9	53.7
PM Southbound						
Chestnut St	East-West Hwy	66.3	55.1	56.5	49.5	47.9
PM Northbound						
East-West Hwy	Chestnut St	83.9	69.5	64.7	59.6	62.8

MD 355 Reliability

- Along the MD 355 corridor, Metrobus and Ride On bus both suffer from service reliability
 - Metrobus on-time performance is 77.6% (goal of 79 percent)
 - Ride On on-time performance is 71-74% (goal of 90 percent)
- Reliability can be impacted by many factors
 - Traffic fluctuations
 - Bottlenecks
 - Traffic incidents (crashes, breakdowns, debris)
 - Work zones
 - Weather
 - Special events

Objective – Improve transit quality

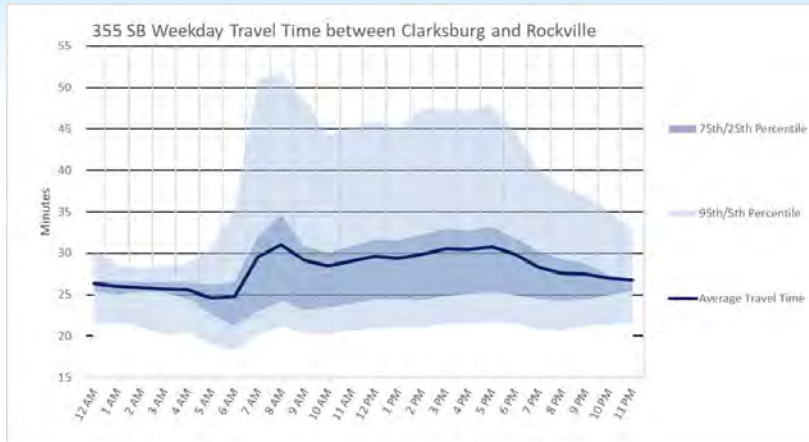
Generally Alternative B (median) shows better reliability in “normal” conditions

Percent of buses arriving between 7 and 13 minutes after the preceding bus (± 3 minutes headway variability)			
PM Peak Northbound			
Route Pattern	Alternative		
	Alternative A	Alternative B	Alternative C
Grosvenor to Lakeforest	92%	87%	93%
Montgomery College to Germantown	82%	94%	88%
Montgomery College to Clarksburg	64%	96%	83%

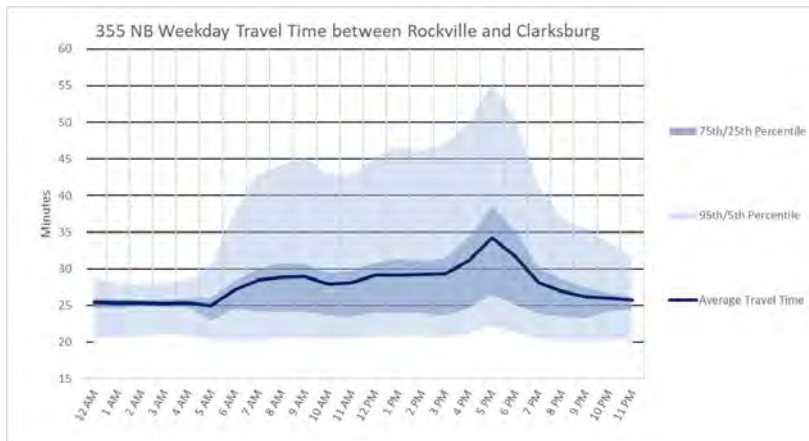


Traffic simulation does not model effects of traffic incidents or other non-recurring congestion on the alternatives

MD 355 Reliability



Morning and evening commute can require 11 to 21 minutes additional “planning” time to arrive on time



Alternative B should perform more consistently in line with the average travel time due to its physical separation from traffic

Source: Inrix data for 2018

Objective – Make bus trips faster and more competitive

The No Build Auto drive time is only 12% to 30% faster than Alternative B and C depending on the direction and time of day

These figures do not account for non-recurring congestion which would result in slower Auto travel time compared to Alternative B

Travel Time (minutes)						
Origin	Destination	No Build	TSM	Alternative A	Alternative B	Alternative C
		Auto	Extra	BRT	BRT	BRT
AM Southbound						
Middlebrook Rd	Tuckerman Ln	47.0	74.2	73.3	60.1	58.9
AM Northbound						
Tuckerman Ln	Middlebrook Rd	35.4	68.2	60.7	60.5	59.7
PM Southbound						
Middlebrook Rd	Tuckerman Ln	42.7	68.4	67.0	58.1	56.8
PM Northbound						
Tuckerman Ln	Middlebrook Rd	56.9	80.5	74.8	63.5	69.1

Objective – Improve access

- All Build Alternatives increase accessibility to high frequency transit for key demographic groups along the corridor
- Improvements in travel speed result in greater access (travelshed) for transit users coming from the corridor as well as traveling to the corridor



Objective – Balance the mobility needs of all users

- Most alternatives show an **increase** in miles of LOS E/F
 - Increases associated with changes such as TSP, queue jumps, and phase changes
- Average person delay only increases a small amount (**half a minute or less**) compared to the No Build for each alternative
- AM Peak Intersection LOS remains relatively **unchanged** compared to the No Build except for Alternative B
- PM Peak intersection LOS **degrades** for Alternatives B and C
 - Total intersection delay ↑ between **4-6 minutes** across 77 intersections
- All Alternatives experienced some localized **reductions** in delay
- **Further refinement may address impacts**

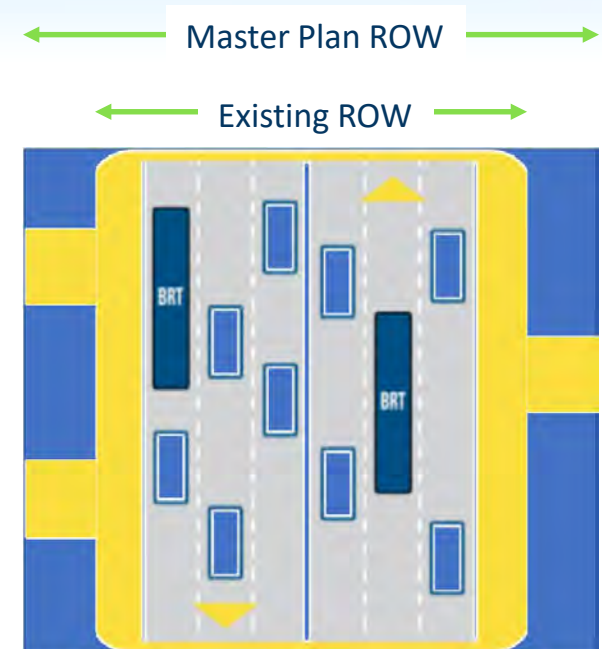
Objective – Minimize environmental impacts

- Build alternatives results in **greater reductions** in CO₂ equivalent emissions
- Build alternatives have **no impact** on Streams of Forests
- Build alternatives have **minimal** (less than 1 acre) impact on Wetlands, Parks, and Floodplains
- Additional assessment required to determine impacts on Architectural and Archeological sites



Objective – Minimize impacts to private and public property

- The conceptual design fits within the Master Plan right of way
 - Much of this right of way is not currently available
- As properties come before the up for development/redevelopment the Master Plan ROW can be acquired
 - Relying on this process to acquire all the ROW could take decades



Objective – Minimize impacts to private and public property

- Conceptual design has sought to reduce the right of way needs as much as possible at this early stage of design
 - Reducing buffers, where necessary
 - Reducing lane widths
 - Including retaining walls
- Work will continue to reduce right of way needs as design advances
- All alternatives require some degree of right of way beyond what currently exists in certain locations
- Most of the right of way needs are partial and along the roadway frontage of properties along MD 355
 - Alternative B - 61 acres
 - Alternative B Modified - 54 acres
 - Alternative C - 39 acres
 - Alternative A - 13 acres
 - TSM - less than 1 acre

Objective – Minimize the cost of transportation services

- BRT alternatives have a range of costs based on the infrastructure investment and the location along the corridor
- Costs are comparably low to other major regional transportation projects
 - MD 355 BRT – \$7M to \$36M per mile
 - Purple Line - \$163M per mile
 - Silver Line - \$248M per mile
 - I495/I270 Managed Lanes - \$200M per mile

Objective – Minimize the cost of transportation services

- Annualized Cost per Rider supports the Build alternatives
- Alternatives B and C produce higher benefits (travel time savings and ridership)
- Right of way costs are a major contributor
 - Master plan right of way not available in most areas
 - Design efforts will continue to reduce right of way needs
 - Efforts will continue to work with development proposals to dedicate the appropriate right of way which can reduce project costs

Objective – Minimize the cost of transportation services

Estimated Capital Costs						
Segment	Length (miles)	TSM	Alternative A	Alternative B	Alternative B Mod.	Alternative C
1 – Bethesda	3.31	\$0.7M	\$18M	\$19M	\$19M	\$37M
2 – White Flint	4.15	\$0.9M	\$50M	\$346M	\$346M	\$190M
3 – Rockville	1.76	\$0.2M	\$11M	\$92M	\$92M	\$65M
4 – Shady Grove	3.18	\$0.3M	\$26M	\$170M	\$141M	\$123M
5 – Gaithersburg	3.14	\$0.5M	\$9M	\$86M	\$80M	\$10M
6 – Germantown	2.26	\$1M	\$9M	\$121M	\$91M	\$59M
7 - Clarksburg	Varies	\$2M	\$19M	\$15M	\$15M	\$13M
Vehicles	N/A	\$10M	\$43M	\$37M	\$37M	\$37M
Total		\$15.6M	\$185M	\$886M	\$821M	\$534M

Objective – Minimize the cost of transportation services

Annualized Costs					
	TSM	Alternative A	Alternative B	Alternative B <i>Modified</i>	Alternative C
Annual Net Operating Costs	\$6,995,000	\$22,758,900	\$17,525,900	\$17,525,900	\$18,160,700
Annualized Capital Costs	\$5,939,645	\$10,950,321	\$34,826,671	\$23,635,569	\$22,714,430
Total Annual Capital and Operating Costs	\$12,934,645	\$33,709,221	\$52,352,571	\$41,161,469	\$40,875,130
Annual BRT Riders	3,816,800*	7,737,600	9,282,000	9,282,000	8,626,800
Total Annualized Cost per Rider	\$3.39	\$4.36	\$5.64	\$4.43	\$4.74

* Annual BRT Riders are Ride On extRa riders in the TSM alternative

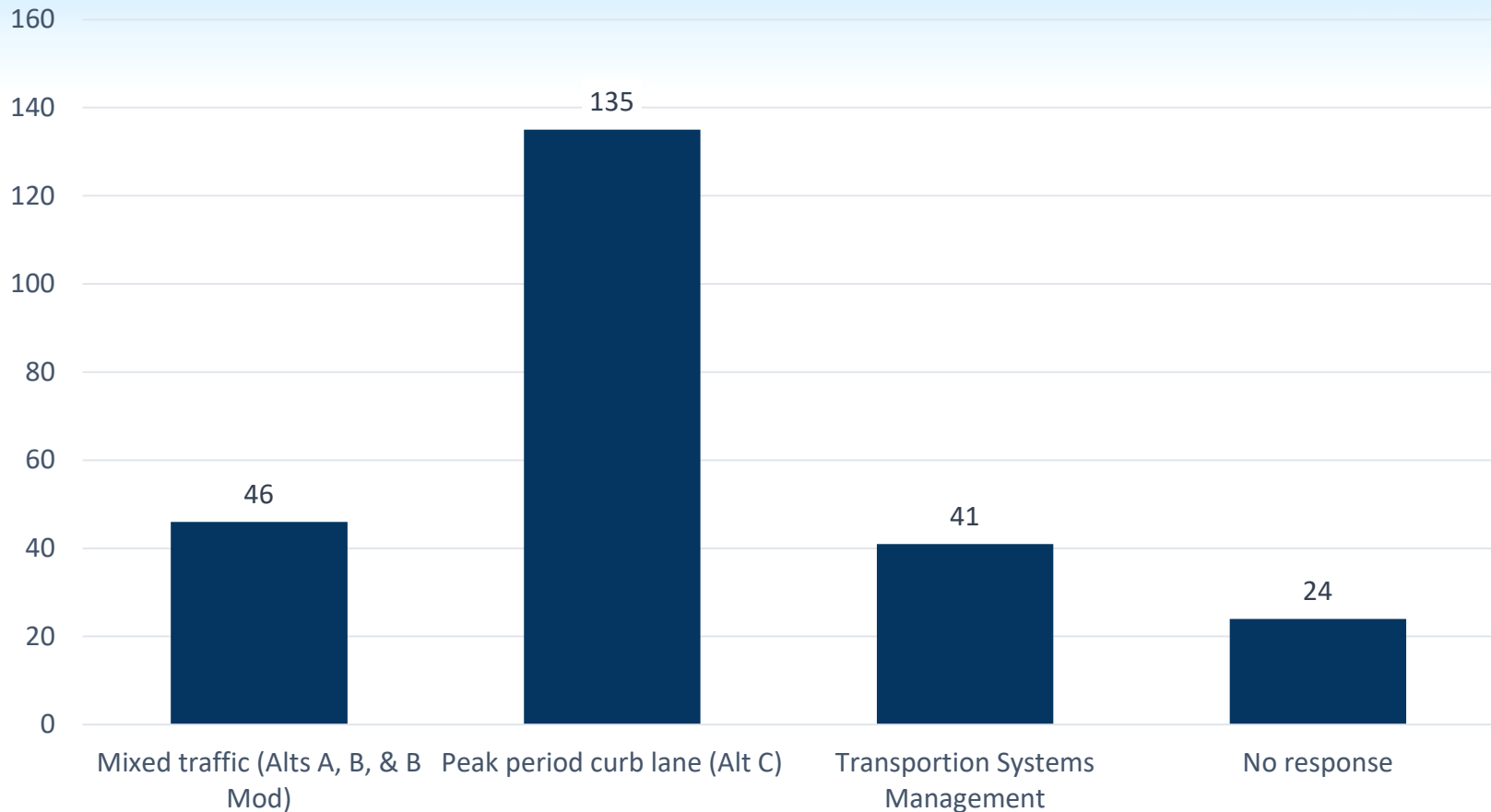
MD355 BRT Phase 2

Public Outreach

- Corridor Advisory Committee meetings (9)
- Stakeholder meetings with Rockville, Gaithersburg, M-NCPPC, MDOT, and WMATA (15)
- Briefings to the Mayor & Council of Rockville & Gaithersburg (3)
- Briefings to other interested groups (22)
- Open Houses (229 total attendees)
- Virtual Open House (71 visits)
- Community Survey (246 responses)

Which alternative do you prefer in Segment 1?

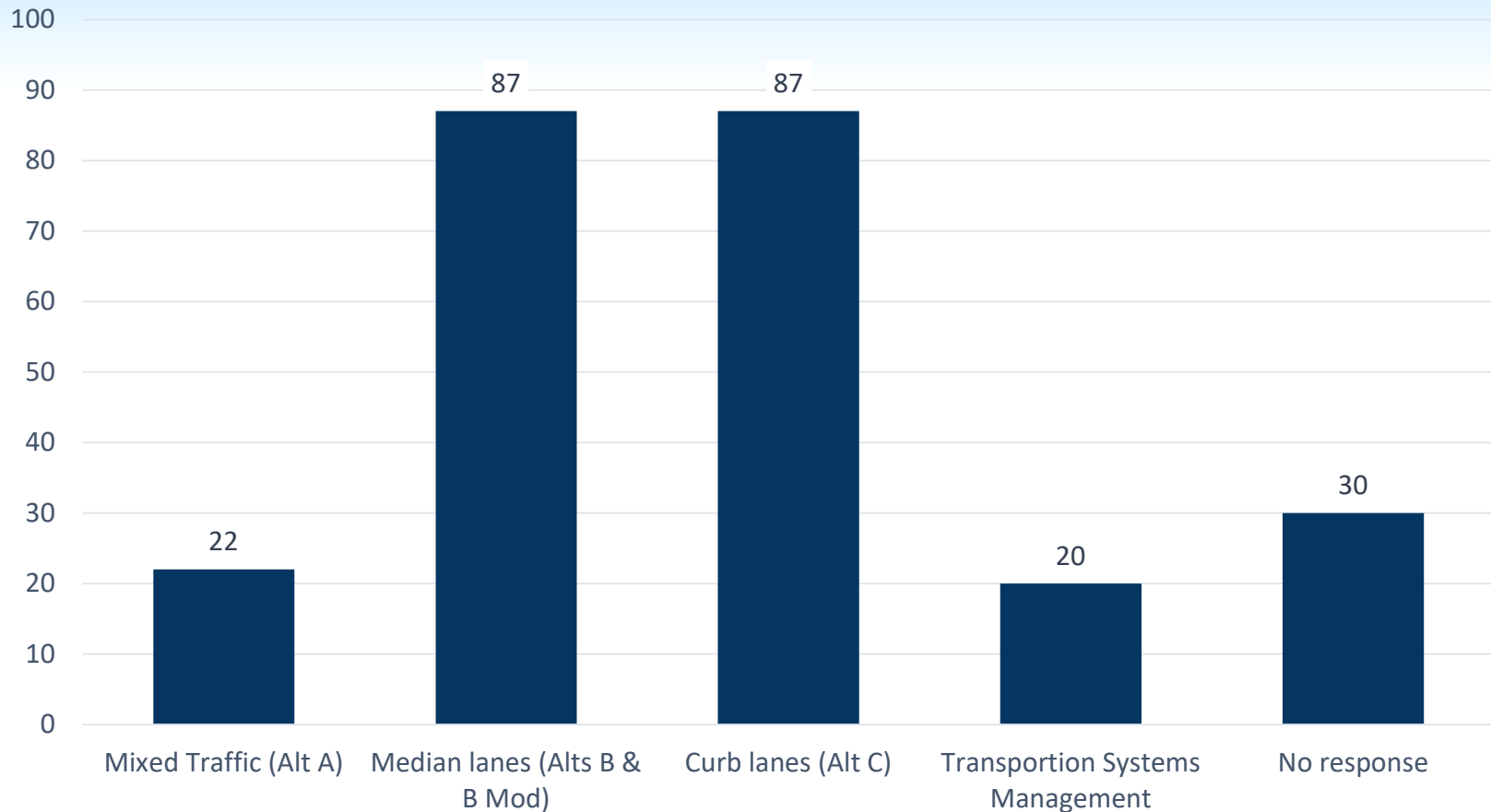
(Bethesda Metro – Grosvenor Metro)



Additional comments: There should be dedicated lanes in this segment

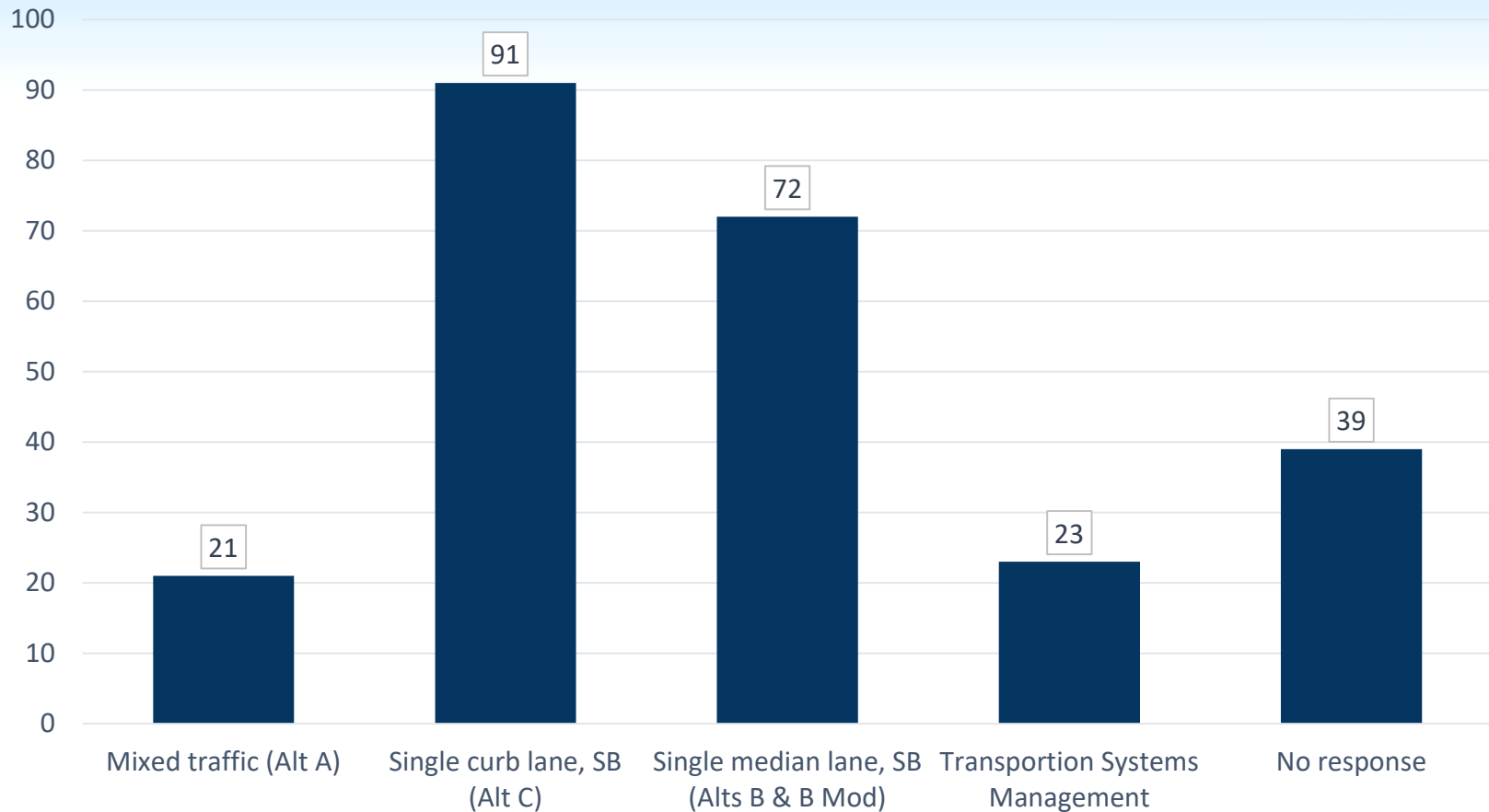
Which alternative do you prefer in Segment 2?

(Grosvenor Metro to Dodge Street)



Which alternative do you prefer in Segment 3?

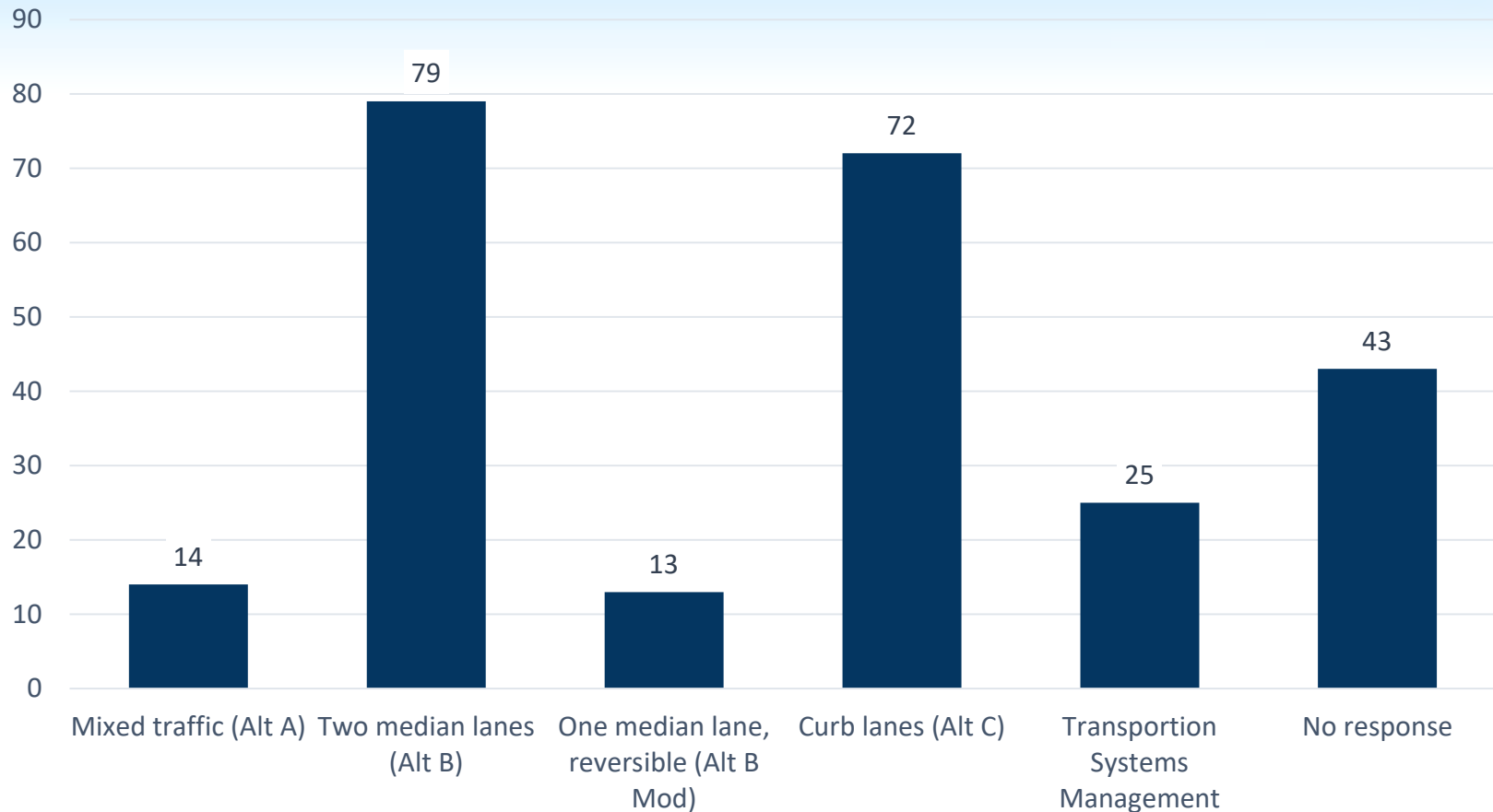
(Dodge Street to College Parkway)



Additional comments: Would be good to have dedicated lanes in both directions

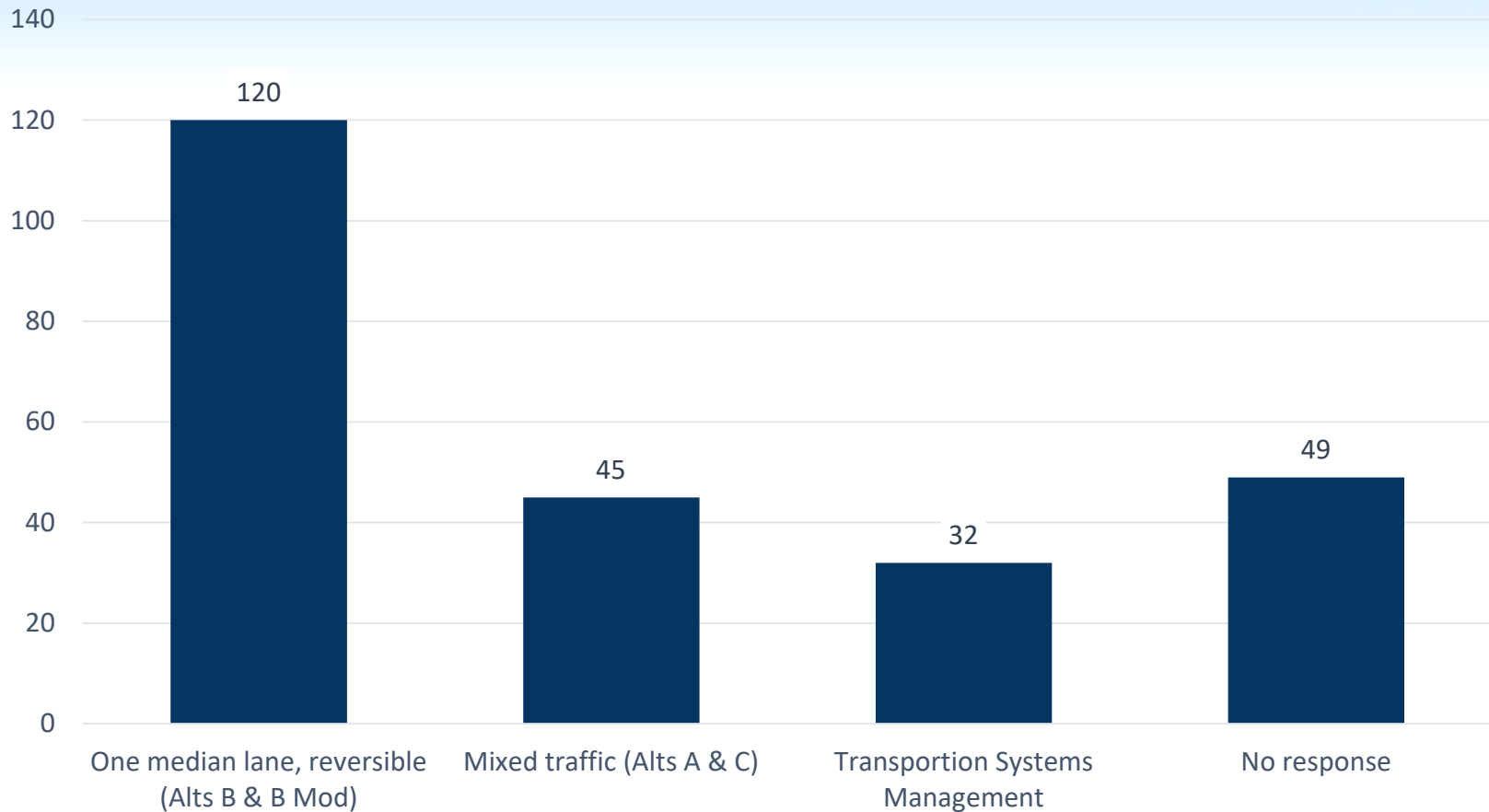
Which alternative do you prefer in Segments 4 and 6?

(College Parkway to Summit Avenue & MD 124 to Middlebrook Road)



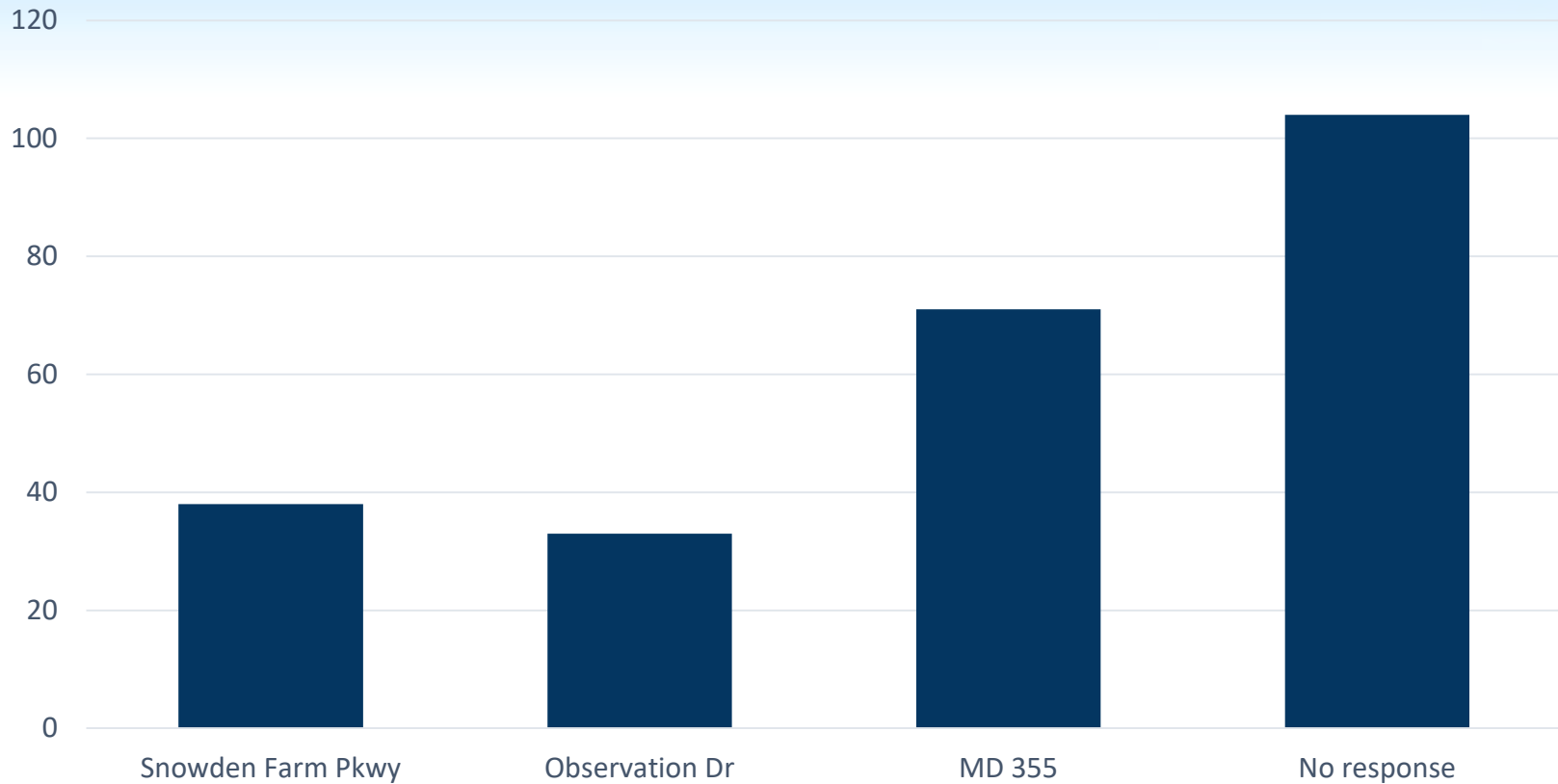
Which alternative do you prefer in Segment 5?

(Summit Avenue to MD 124)



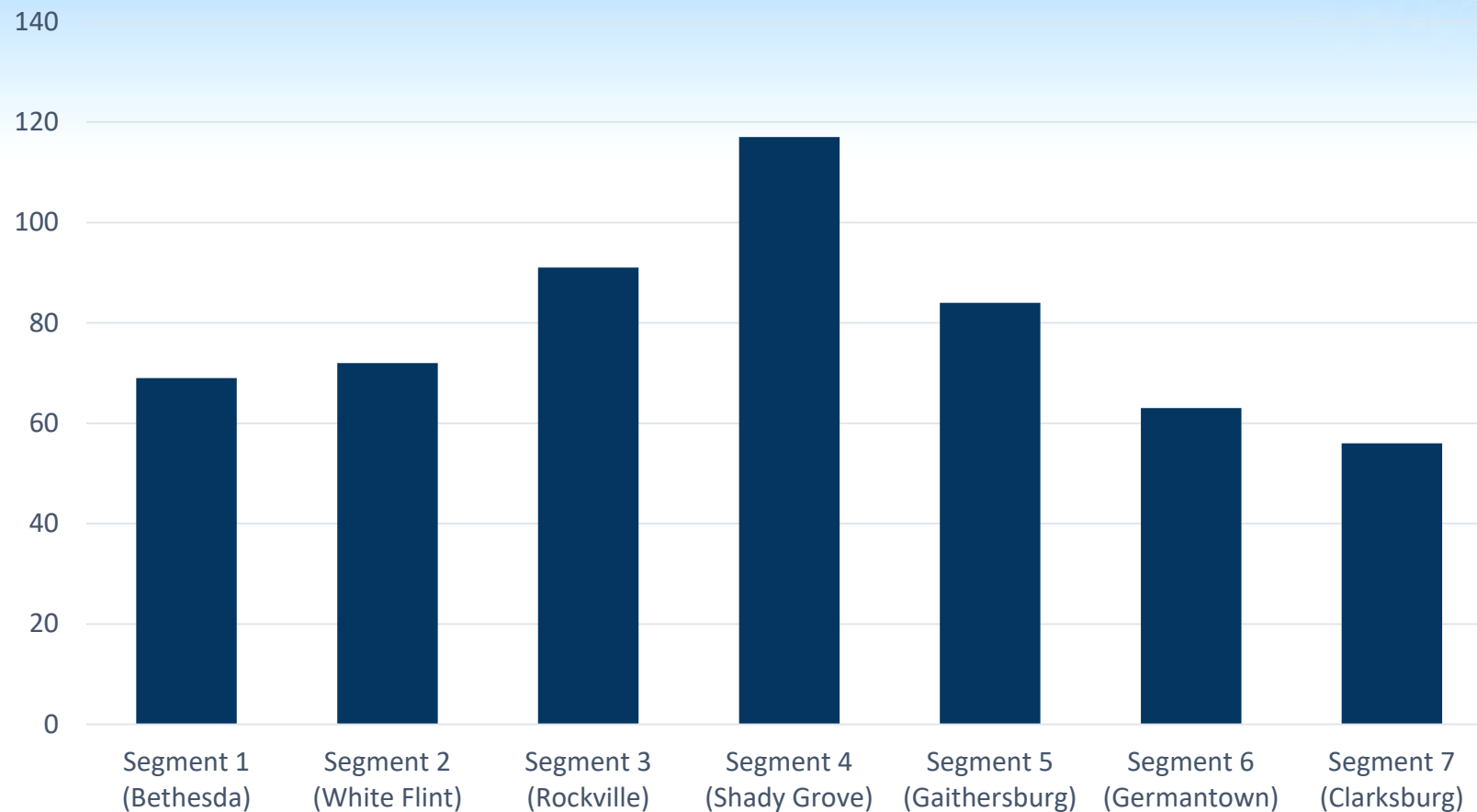
Additional comments: Would be good to have dedicated lanes in both directions

Which route would you like the BRT to take in the Clarksburg area?



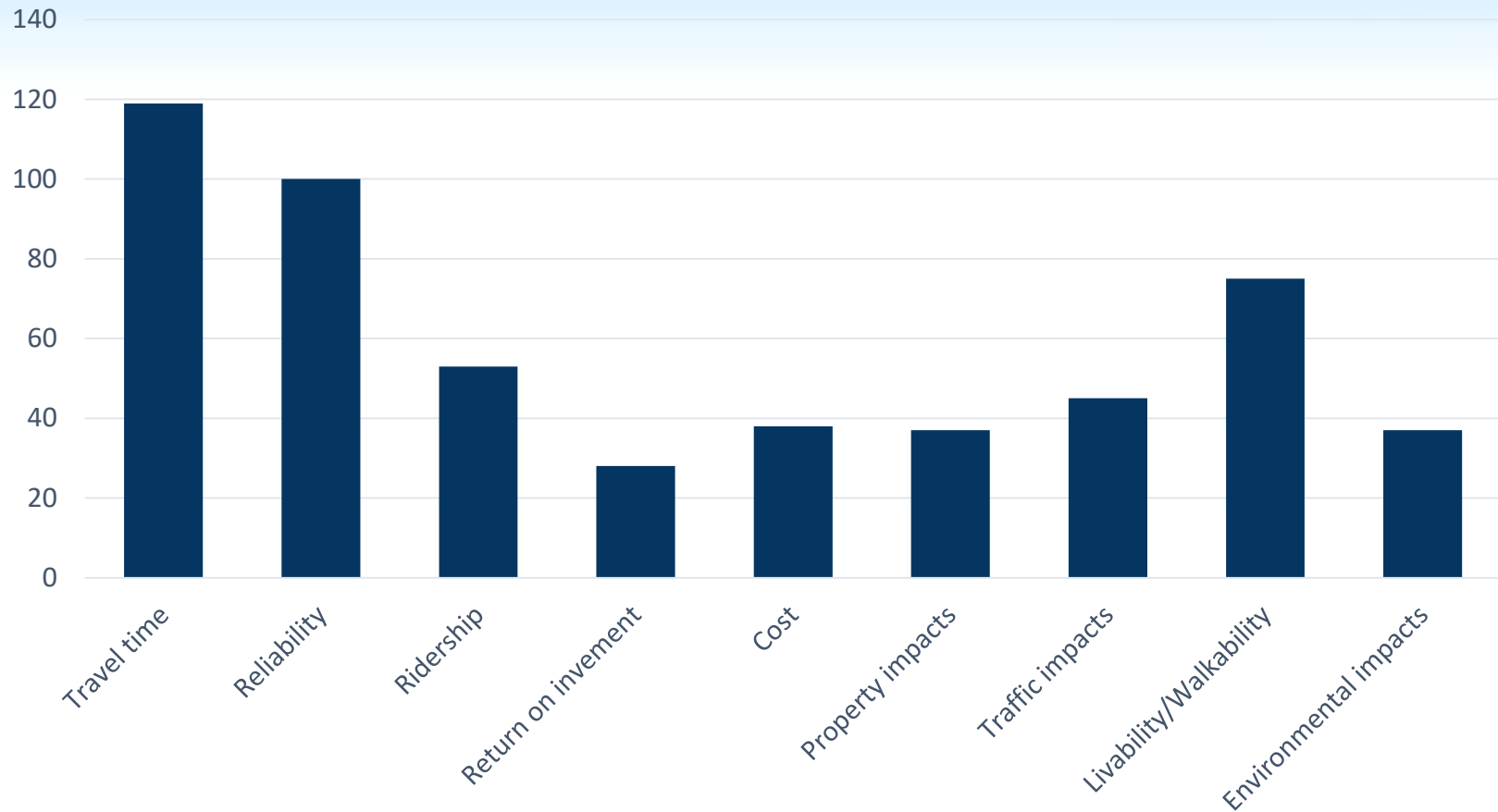
Additional comments: Route should be selected based on where people are, and BRT should be in dedicated lanes

Number of Times a Segment Was Identified as a Phasing Priority

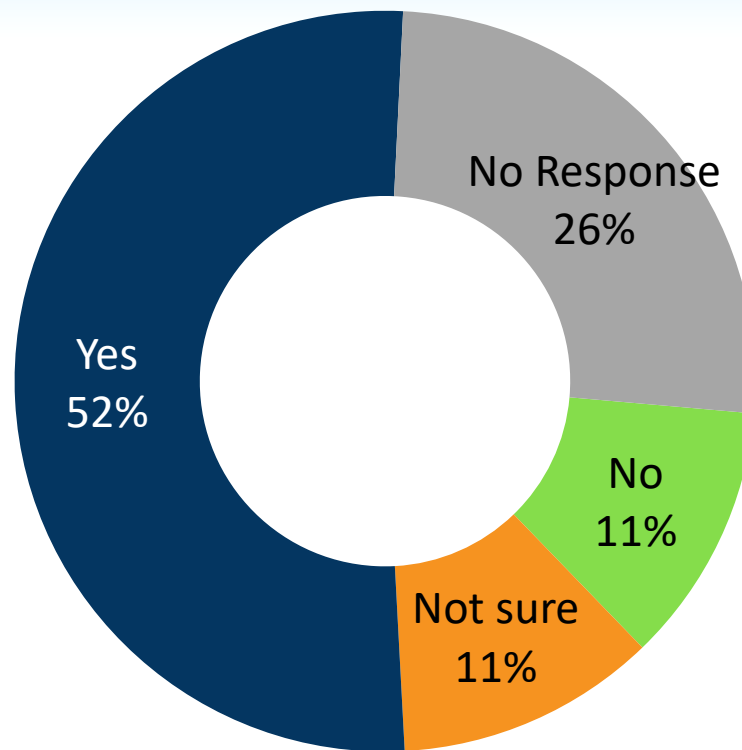


Additional comments: Focus on the north, there is a lack of transit options and the south already had Metrorail

In thinking about BRT on MD 355, which factors matter most to you? (Select your top three priorities)



Do you think BRT on MD 355 would have a positive impact on your community?



Other Community Feedback

- Numerous emails/letters from the Crest of Wickford community regarding ROW needs, **not opposed to the project**
- Project needs dedicated lanes
- Concerns voiced about property/business and traffic impacts
- Various comments about overlap with Metro in the south, “makes sense in the north” and service is needed in the north
- Comments from the White Flint “community” that BRT is needed to achieve the vision
- Can we look at repurposing lanes to minimize impacts?
- Comments supporting BRT as a part of addressing the climate goals and supporting smart growth

Planning Board Feedback

1. Advance Alternative B, Median Transitway
2. Consider increasing two-lane median transitways, especially south of Shady Grove Metro & include dedicated transit lanes in Bethesda
3. Advance preliminary engineering for the Veirs Mill Road BRT & MD 355 BRT concurrently
4. Prioritize construction of Veirs Mill Rd BRT and MD 355 BRT from Clarksburg to Rockville Metro (with spur to Germantown) & consider finer grained phasing south of Rockville
5. Proceed with the Snowden Farm Parkway alignment in Segment 7

Planning Board Feedback continued

6. Concur with the recommended station locations and phasing
7. Conduct additional traffic evaluation and mitigation to determine feasibility of converting general purpose traffic lanes to transit only lanes
8. Develop and implement interim improvements to Rockville Pike in White Flint to spur redevelopment and property dedication
9. Identify a transit service plan for BRT along MD 355 that integrates local bus service

City of Rockville Feedback

- Mayor and Council support Alternative B
- Urge the County to fund the next phase of design in the FY20 budget year
- Encourage allocation of funds to implement Veirs Mill Road BRT in the FY20 budget year
- If ROW needs are too great north of College Parkway, would support reduction to a single lane

City of Gaithersburg Feedback



- Mayor and Council support Alternative C
- Urge the County to fund the next phase of design in the FY20 budget year

Questions