MD 355 FLASH
Phase 2 Study Results

MD 355 Corridor Advisory Committee
June 3, 4, and 5, 2019
Agenda

• Project Overview

• Alternatives Review

• Summary of Results

• Discussion
Project Overview

• Identify the recommended alternative for BRT on MD 355
  • Bethesda to Clarksburg (22 miles)

• Supporting Documents
  • Countywide Bus Rapid Transit Study (2011)
  • Countywide Transit Corridors Functional Master Plan (2013)
  • Service Planning and Integration Report (2014)
  • 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
Several studies find MD 355 to have high potential ridership and strong support for a BRT line

Phase 1
Maryland Department of Transportation develops a Preliminary Purpose and Need Statement and Conceptual Alternatives Report for MD 355 BRT

Phased Design and Implementation

Phase 2
MD 355 BRT Alternatives Analysis, led by the Montgomery County Department of Transportation
MD 355 BRT Project Process

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

We are here

Corridor Advisory Committee Input

Public Input

Funding Decision
Briefings and Community Input

We Are Here

Brief key stakeholders (MDOT, M-NCPPC, Gaithersburg, Rockville, & WMATA)

MD 355 Citizen Advisory Committee June 3-5, 2019

Brief City of Gaithersburg Mayor and Council June 10, 2019

Brief City of Rockville Mayor and Council June 17, 2019

Public Open Houses June 26 & 27, 2019

Brief Planning Board

Brief Transportation & Environment (T&E) Committee

Brief Council

Public Comments Due by July 11

Recommend Alternative Identified

Recommend Alternative Adopted
Questions for MCDOT to answer
(with help from our Stakeholders, CACs, and community-at-large)

• Preferred alternative (by segment)

• Northern alignment(s)

• Project Phasing

• Station Locations
## Project Design Segments

<table>
<thead>
<tr>
<th>Segment</th>
<th>Geographic Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grosvenor Metrorail to Bethesda Metrorail</td>
</tr>
<tr>
<td>2</td>
<td>Dodge Street to Grosvenor Metrorail</td>
</tr>
<tr>
<td>3</td>
<td>College Parkway to Dodge Street</td>
</tr>
<tr>
<td>4</td>
<td>Summit Avenue to College Parkway</td>
</tr>
<tr>
<td>5</td>
<td>MD 124 to Summit Avenue</td>
</tr>
<tr>
<td>6</td>
<td>Middlebrook Road to MD 124</td>
</tr>
<tr>
<td>7</td>
<td>Clarksburg to Middlebrook Road</td>
</tr>
</tbody>
</table>
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
Median Alternative *Modified* (B Modified)

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

• 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

Potential Stations
Multiple studies have identified potential locations.

Level 1 Screening
Does this location have the elements of a successful station?

Level 2 Screening
Would a station fit in this location and where should it be sited?

STUDIES
• Countywide Transit Corridor Functional Master Plan
• City of Gaithersburg MD 355 BRT Study
• Rockville BRT Town Center Integration Study
• MD 355 BRT Phase I Study

RIDERSHIP
• Existing bus ridership and forecasted BRT ridership

LAND USE
• Existing land use and master planned development

PEDESTRIAN AND BICYCLE CONNECTIONS
• Proximity to infrastructure, existing and planned

TRANSIT CONNECTIONS
• Proximity to other services, existing and planned

STREET NETWORK
• Signalization, volumes, crash data, stop spacing

GEOMETRY
• Adequate street design, horizontal curvature, vertical grades

SPACE CONSTRAINTS
• Sufficient roadway width and length for station (right of way)

TYPE OF STATION AND PLACEMENT
• Median or curbside, stop spacing

TRANSIT CONNECTIONS
• Ability to accommodate transfers or layovers

PEDESTRIAN AND BICYCLE CONNECTIONS
• Quality of infrastructure, existing and planned
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
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)
How Will The Alternatives Be Evaluated?

**Provide an Appeal, 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)

<table>
<thead>
<tr>
<th></th>
<th>No Build</th>
<th>TSM</th>
<th>Mixed Traffic (A)</th>
<th>Median (B)</th>
<th>Curb (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRT</td>
<td>-</td>
<td>-</td>
<td>25,000</td>
<td>30,000</td>
<td>27,800</td>
</tr>
<tr>
<td>Local Bus</td>
<td>14,900</td>
<td>23,000</td>
<td>2,000</td>
<td>2,200</td>
<td>1,900</td>
</tr>
<tr>
<td>Total</td>
<td>14,900</td>
<td>23,000</td>
<td>27,000</td>
<td>32,200</td>
<td>29,700</td>
</tr>
</tbody>
</table>
Objective – Increase Transit Ridership

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

Approximately 9,000 new daily riders

Alternative A
Mixed Traffic
7,737,600

Alternative B
Median
9,282,000

Alternative C
Curb
8,262,800

ANNUAL BRT RIDERSHIP

= 150,000 Peak Riders

= 150,000 Off-Peak Riders
Objective – Increase Transit Ridership

- Highest ridership segments
  - White Flint (2)
  - Shady Grove (4)
  - Gaithersburg (5)

- Highest ridership stations
  - Metrorail (except Medical Center & Grosvenor)
  - Lakeforest Transit Center
  - Montgomery College – Rockville
  - Watkins Mill Road

- No clear ridership differences for Segment 7 alignments

<table>
<thead>
<tr>
<th>Segment 1</th>
<th>Segment 2</th>
<th>Segment 3</th>
<th>Segment 4</th>
<th>Segment 5</th>
<th>Segment 6</th>
<th>Segment 7</th>
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</thead>
<tbody>
<tr>
<td>Alt A</td>
<td>2,250</td>
<td>7,100</td>
<td>2,550</td>
<td>3,950</td>
<td>3,550</td>
<td>2,400</td>
</tr>
<tr>
<td>Alt B</td>
<td>2,500</td>
<td>7,850</td>
<td>3,450</td>
<td>5,300</td>
<td>4,550</td>
<td>2,600</td>
</tr>
<tr>
<td>Alt C</td>
<td>2,450</td>
<td>7,700</td>
<td>2,950</td>
<td>4,750</td>
<td>3,900</td>
<td>2,700</td>
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</tbody>
</table>

Weekday BRT Ridership by Segment (2040)
Objective – Increase Transit Ridership

• Park and Rides would support 900-1,800 daily BRT riders
  • 50% of boardings at Lakeforest Transit Center
  • 20% of boardings at Clarksburg
  • 20% of boardings at Milestone

• MCDOT needs to begin identifying suitable sites moving forward
Objective – Make bus trips faster and more competitive

<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
<th>No Build</th>
<th>TSM</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bus Extra</td>
<td>BRT</td>
<td>BRT</td>
<td>BRT</td>
<td>BRT</td>
<td>BRT</td>
</tr>
<tr>
<td><strong>AM Southbound</strong></td>
<td>Chestnut St</td>
<td>East-West Hwy</td>
<td>72.8</td>
<td>66.3</td>
<td>63.1</td>
<td>53.0</td>
</tr>
<tr>
<td><strong>AM Northbound</strong></td>
<td>East-West Hwy</td>
<td>Chestnut St</td>
<td>70.5</td>
<td>56.3</td>
<td>48.9</td>
<td>49.9</td>
</tr>
<tr>
<td><strong>PM Southbound</strong></td>
<td>Chestnut St</td>
<td>East-West Hwy</td>
<td>66.3</td>
<td>55.1</td>
<td>56.5</td>
<td>49.5</td>
</tr>
<tr>
<td><strong>PM Northbound</strong></td>
<td>East-West Hwy</td>
<td>Chestnut St</td>
<td>83.9</td>
<td>69.5</td>
<td>64.7</td>
<td>59.6</td>
</tr>
</tbody>
</table>

**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**
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

<table>
<thead>
<tr>
<th>Route Pattern</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grosvenor to Lakeforest</td>
<td>92%</td>
<td>87%</td>
<td>93%</td>
</tr>
<tr>
<td>Montgomery College to Germantown</td>
<td>82%</td>
<td>94%</td>
<td>88%</td>
</tr>
<tr>
<td>Montgomery College to Clarksburg</td>
<td>64%</td>
<td>96%</td>
<td>83%</td>
</tr>
</tbody>
</table>

Percent of buses arriving between 7 and 13 minutes after the preceding bus (± 3 minutes headway variability)

Traffic simulation does not model effects of traffic incidents or other non-recurring congestion on the alternatives.
MD 355 Reliability

Morning southbound commute can require 8 to 21 minutes additional “planning” time to arrive on time

Source: Inrix data for 2018
MD 355 Reliability

Evening commute can require from 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

<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
<th>No Build</th>
<th>TSM</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>Extra</td>
<td>BRT</td>
<td>BRT</td>
<td>BRT</td>
<td>BRT</td>
<td>BRT</td>
</tr>
<tr>
<td>Middlebrook Rd</td>
<td>Tuckerman Ln</td>
<td>47.0</td>
<td>74.2</td>
<td>73.3</td>
<td>60.1</td>
<td>58.9</td>
</tr>
<tr>
<td>AM Southbound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuckerman Ln</td>
<td>Middlebrook Rd</td>
<td>35.4</td>
<td>68.2</td>
<td>60.7</td>
<td>60.5</td>
<td>59.7</td>
</tr>
<tr>
<td>AM Northbound</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Middlebrook Rd</td>
<td>Tuckerman Ln</td>
<td>42.7</td>
<td>68.4</td>
<td>67.0</td>
<td>58.1</td>
<td>56.8</td>
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<tr>
<td>PM Southbound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuckerman Ln</td>
<td>Middlebrook Rd</td>
<td>56.9</td>
<td>80.5</td>
<td>74.8</td>
<td>63.5</td>
<td>69.1</td>
</tr>
<tr>
<td>PM Northbound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

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.
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.
Objective – Make bus trips faster and more competitive

• Additional benefits beyond travel time
  • Reduction in vehicle ownership costs
    • Insurance
    • Parking
    • Fuel
    • Maintenance
  • Increases in traffic safety
  • Increases in walking (health)
  • Productive use of traveling time
  • Environmental benefits
Objective – Improve transit services for key demographics

<table>
<thead>
<tr>
<th>Group</th>
<th>No Build</th>
<th>TSM</th>
<th>Builds</th>
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<tbody>
<tr>
<td>Minority</td>
<td>28,400</td>
<td>31,700</td>
<td>34,700</td>
</tr>
<tr>
<td>Low income</td>
<td>3,788</td>
<td>3,858</td>
<td>5,096</td>
</tr>
<tr>
<td>Low English proficiency</td>
<td>2,376</td>
<td>1,982</td>
<td>2,908</td>
</tr>
<tr>
<td>65 and older</td>
<td>5,819</td>
<td>7,648</td>
<td>8,920</td>
</tr>
</tbody>
</table>

All Build Alternatives increase accessibility to high frequency transit for key demographic groups along the corridor.
Objective - Provide improved accessibility to jobs and activity centers

<table>
<thead>
<tr>
<th>Alternative</th>
<th>30 minutes</th>
<th>45 minutes</th>
<th>60 minutes</th>
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</thead>
<tbody>
<tr>
<td>No-Build Alternative</td>
<td>130,900</td>
<td>395,500</td>
<td>832,300</td>
</tr>
<tr>
<td>TSM Alternative</td>
<td>131,100</td>
<td>397,100</td>
<td>835,600</td>
</tr>
<tr>
<td>Build Alternatives</td>
<td>140,300</td>
<td>414,400</td>
<td>860,600</td>
</tr>
</tbody>
</table>

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

TSM Alternative

Alternative A
Mixed Traffic

Alternative B
Median

Alternative C
Curb

Reduction of 271,962 lbs of CO$_2$-equivalent emissions

Reduction of 733,646 lbs of CO$_2$-equivalent emissions

Reduction of 731,605 lbs of CO$_2$-equivalent emissions

Reduction of 729,173 lbs of CO$_2$-equivalent emissions
Objective – Minimize environmental impacts

Streams
- NO IMPACT

Forests
- NO IMPACT

Wetlands
- MINIMAL
  All less than one acre

Parks
- MINIMAL
  All less than one acre

Floodplains
- MINIMAL
  All less than one acre

Endangered Species
- MINIMAL
  TSM & Alt C - no impact
  Alts A & B - one potentially impacted area
Objective – Minimize environmental impacts

**Architectural Properties within Limit of Disturbance (LOD)**
- 30 sites require additional assessment

**Archaeological Sites**
- Alternative A: 10 sites require additional assessment
- Alternative B: 1 site requires additional assessment
- Alternative C: 3 sites require additional assessment

**Hazardous Materials**
- Alternative A: 173 sites require additional assessment
- Alternative B: 170 sites require additional assessment
- Alternative C: 174 sites require additional assessment
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 Planning Board for development/redevelopment the Master Plan ROW is 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

<table>
<thead>
<tr>
<th>Segment</th>
<th>TSM</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative B Mod.</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Bethesda</td>
<td>$0.7M</td>
<td>$18M</td>
<td>$19M</td>
<td>$19M</td>
<td>$37M</td>
</tr>
<tr>
<td>2 – White Flint</td>
<td>$0.9M</td>
<td>$50M</td>
<td>$346M</td>
<td>$346M</td>
<td>$190M</td>
</tr>
<tr>
<td>3 – Rockville</td>
<td>$0.2M</td>
<td>$11M</td>
<td>$92M</td>
<td>$92M</td>
<td>$65M</td>
</tr>
<tr>
<td>4 – Shady Grove</td>
<td>$0.3M</td>
<td>$26M</td>
<td>$170M</td>
<td>$141M</td>
<td>$123M</td>
</tr>
<tr>
<td>5 – Gaithersburg</td>
<td>$0.5M</td>
<td>$9M</td>
<td>$86M</td>
<td>$80M</td>
<td>$10M</td>
</tr>
<tr>
<td>6 – Germantown</td>
<td>$1M</td>
<td>$9M</td>
<td>$121M</td>
<td>$91M</td>
<td>$59M</td>
</tr>
<tr>
<td>7 - Clarksburg</td>
<td>$2M</td>
<td>$19M</td>
<td>$15M</td>
<td>$15M</td>
<td>$13M</td>
</tr>
<tr>
<td>Vehicles</td>
<td>$10M</td>
<td>$43M</td>
<td>$37M</td>
<td>$37M</td>
<td>$37M</td>
</tr>
<tr>
<td>Total</td>
<td>$15.6M</td>
<td>$185M</td>
<td>$886M</td>
<td>$821M</td>
<td>$534M</td>
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Objective – Minimize the cost of transportation services

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

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

All Build alternatives (A, B, C):

• improve accessibility
  • Key demographic groups
  • Jobs
  • Activity Centers

• Do not display a significant negative impact on traffic

• Display minimal environmental and cultural impacts
Summary of Findings

All Build alternatives (A, B, C):

• Display high ridership
  • The Median (B) alternative displays the highest ridership (2x the No Build)
  • 50% of the ridership is in the off peak

• Snowden Farm Parkway is the alignment that best supports existing conditions
  • Current center of activity in Clarksburg
  • Only alignment that can be implemented in the near term
  • Selecting Snowden Farm Parkway does not preclude the other alignments
Summary of Findings

• The Median (B) and Curb (C) alternatives provide travel time savings over local bus, the TSM, and the Mixed Traffic (A) alternative
  • The Median alternative also provides an advantage during more congested corridor conditions (travel time and reliability)

• The conceptual design fits within the master plan right of way, which in most cases is not currently available
  • Future design efforts will continue to reduce right of way needs

• Build alternatives have a range of costs based on the infrastructure investment and the location along the corridor

• Annualization of capital and operating costs provides a better comparison for the alternatives and supports selecting a build alternative
Discussion/Questions