# MD 355 - North Corridor Advisory Committee Meeting # 8

Montgomery County
RAPID TRANSIT
MD 355

**Upcounty Regional Services Center**
**Germantown, Maryland**
**October 19, 2016**
**6:30 pm to 9:00 pm**

Maryland Department of Transportation

MCDOT Montgomery County Department of Transportation

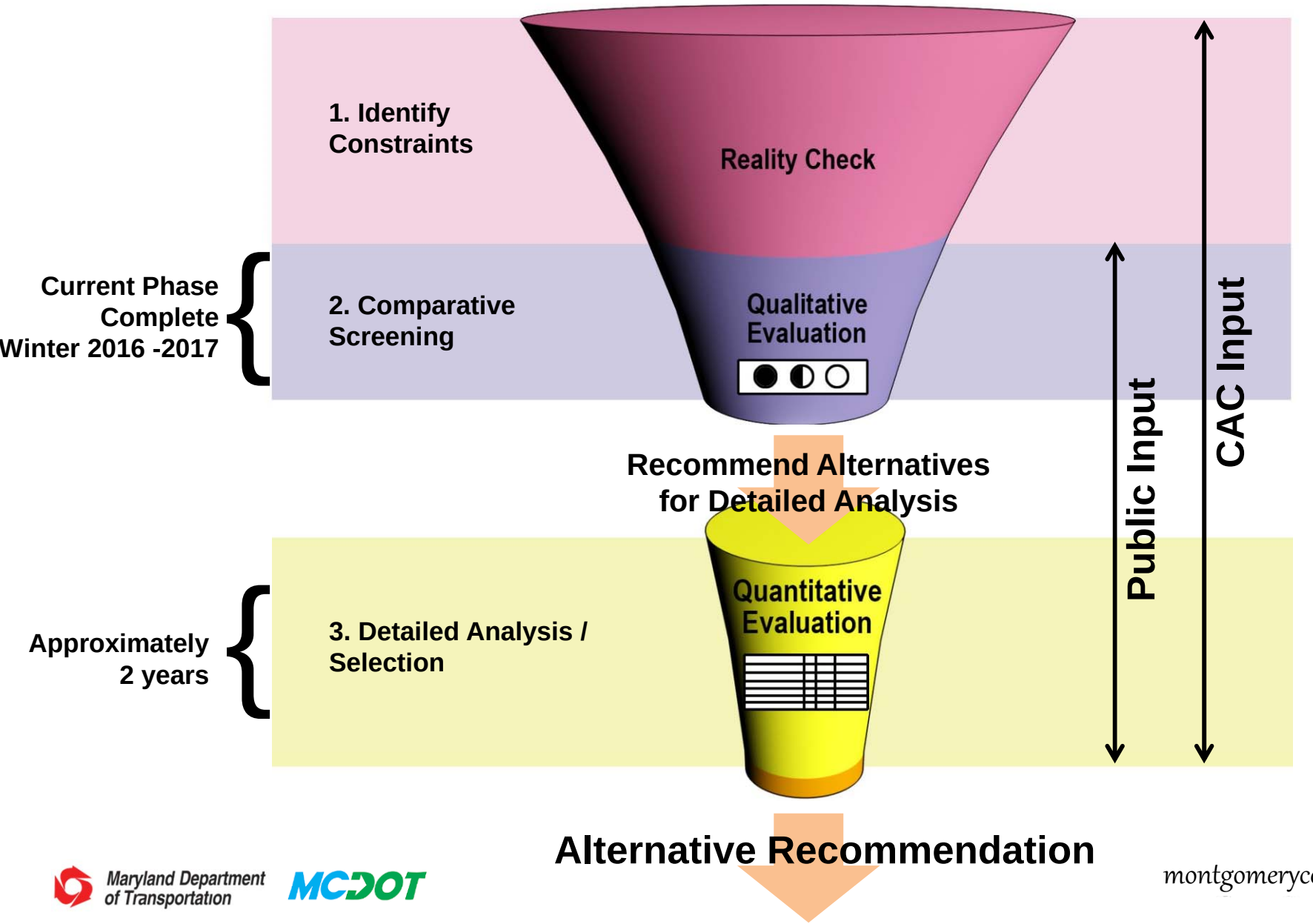
# Welcome

## Agenda:

- Corridor Planning Process……5 min
- Review of Conceptual Alternatives……20 min
  - Station Locations
  - Service Plan
  - Running ways
- Preliminary Analysis of Conceptual Alternatives……50 min
  - General Considerations
- Tabletop Discussion……60 min

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

# Alternatives Screening and Selection Process



# Conceptual Alternatives

- Conceptual Alternatives composed of three main components:
  - **Running way**: Designated facility in which the vehicle would travel between stations
  - **Station location**: Specific locations where passengers can access the service
  - **Service plan**: The way in which BRT operates including route, service frequency and hours of service

# 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

# Conceptual Alternatives – Station Locations

## Modifications Since Functional Master Plan

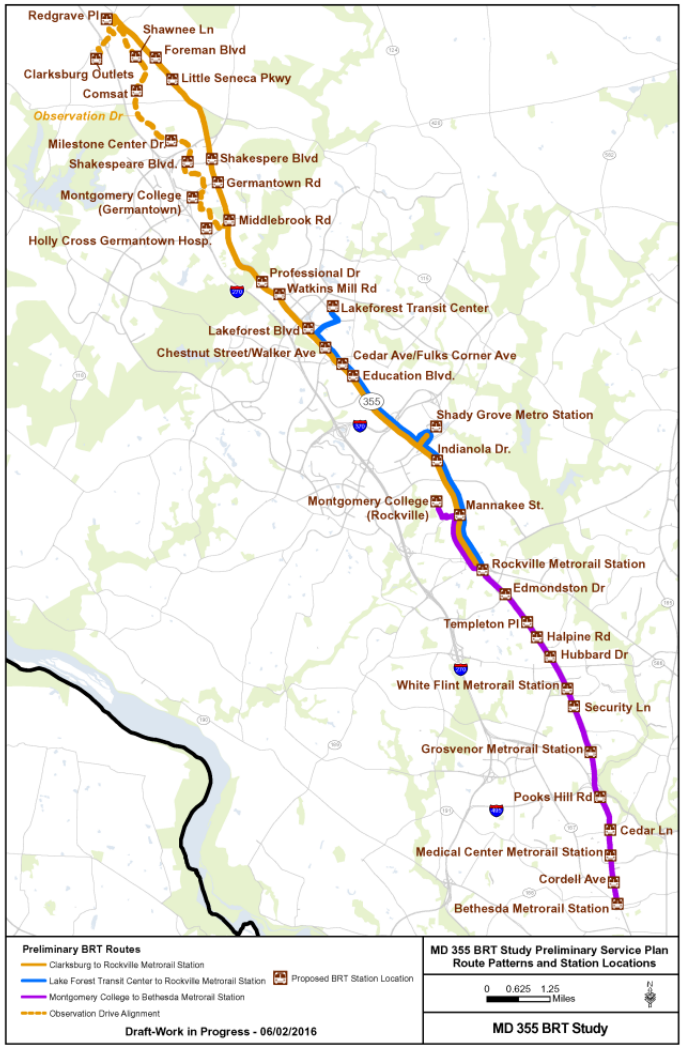
Based on stakeholder coordination and in response to CAC comments some of the changes include:

- Serve Montgomery College (Rockville and Germantown campus)
- Move the King Farm Boulevard Station into the Shady Grove Metrorail Station to provide closer access to Metrorail
- Revised locations within the City of Gaithersburg based on their BRT study
- Serve the Lakeforest Transit Center
- Study an additional alignment along Observation Drive on the northern end of the corridor terminating at the Clarksburg Outlets
- Consolidated or eliminated stations in Germantown and Clarksburg based on low density or close proximity to other proposed stations

# Conceptual Alternatives – Service Plan

## MD 355 BRT – Preliminary Service Plan

| BRT Route Pattern | Northern Terminal | Southern Terminal | Service Frequency (minutes) |
|---|---|---|---|
| Orange | Clarksburg Outlets or Redgrave Place | Rockville Metrorail Station | 3.5 - 5 |
| Blue | Lakeforest Transit Center | Rockville Metrorail Station | 12 |
| Purple | Montgomery College Rockville | Grosvenor Metrorail or Bethesda Metrorail Station | 10 |



# Questions?

- ✓ **Corridor Planning Process**
- ✓ **Review of Conceptual Alternatives**
  - ✓ **Q&A**
- Preliminary Analysis of Conceptual Alternatives
- Tabletop Discussion

# 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:

- A subset of the screening criteria
- The screening criteria that address:
  - Transit ridership
  - Travel times
  - Person throughput
  - Accessibility

Screening criteria for impacts and costs will be presented at the next CAC meeting

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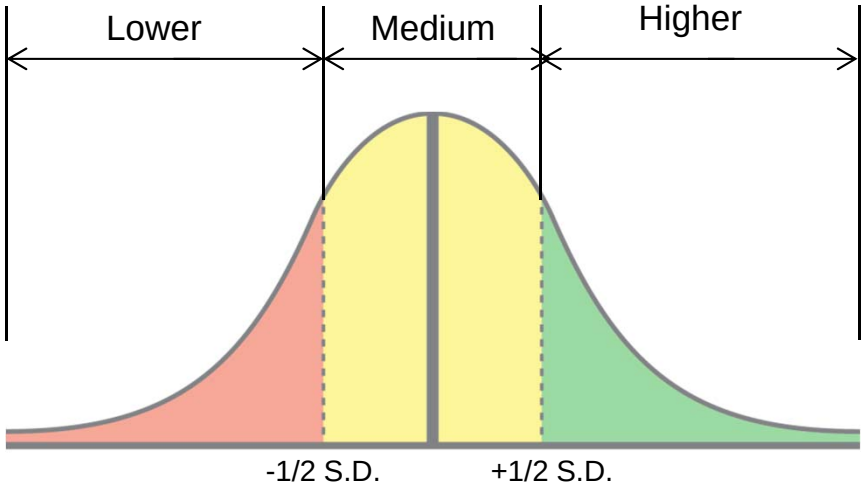
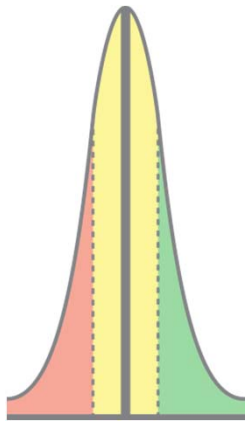
# Screening Criteria

| | | Alt 3A | Alt 3B | Alt 4A | Alt 4B |
|---|---|---|---|---|---|
| CAC Meeting No. 8 | Increase in total daily transit ridership | | | | |
| | Increase in total daily bus ridership | | | | |
| | Total daily BRT ridership | | | | |
| | Boardings by station – North Section (Section 7) | | | | |
| | Boardings by station – Central Section (Section 6 through Section 2) | | | | |
| | Boardings by station – South Section (Section 1) | | | | |
| | BRT travel time | | | | |
| | 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 | | | | |
| | Increase in jobs within 60 minutes along the corridor | | | | |
| | Increase in households within 45 and 60 minutes of activity centers | | | | |
| CAC Meeting No. 9 | Private property impacts | | | | |
| | Total property impacts | | | | |
| | Total operating costs | | | | |
| | Construction costs | | | | |

# 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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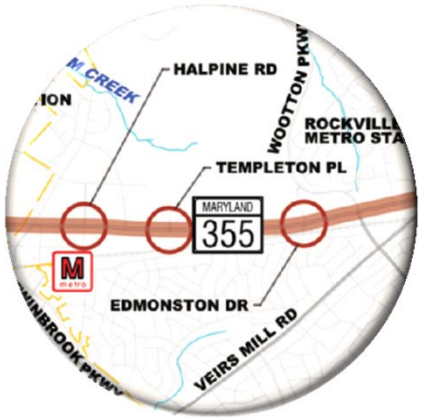
# Screening Criteria

| | | 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?

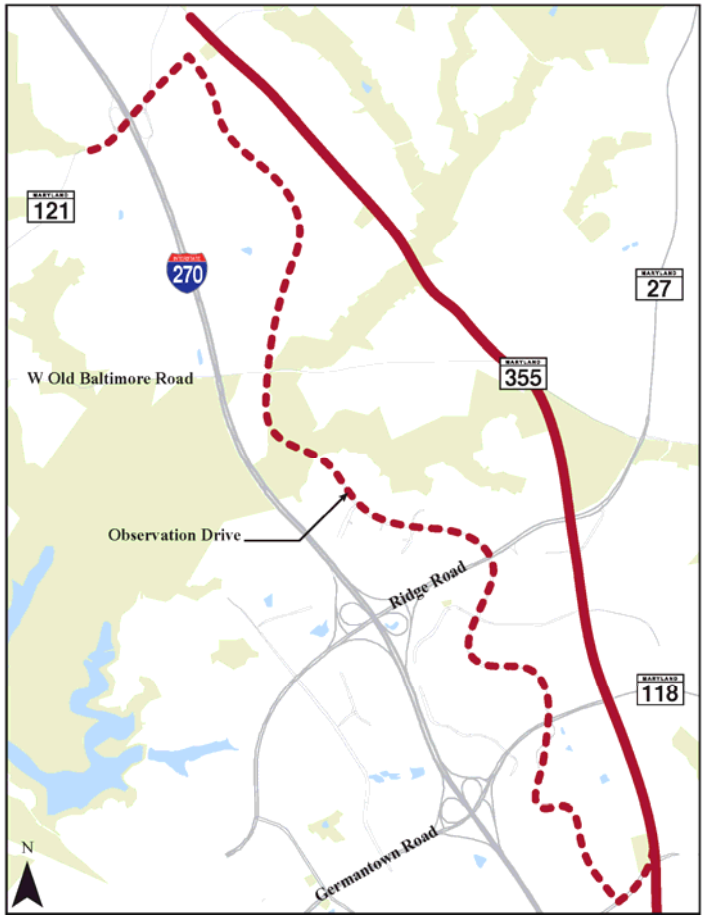
CAC No. 8

- 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 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: 30, 34 & 35

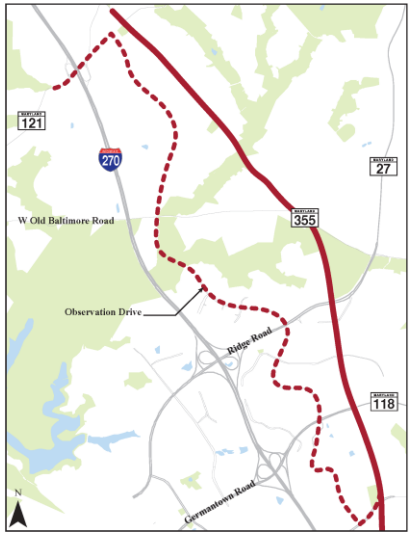
# General Considerations

- **How do the two southern termini compare? Grosvenor or Bethesda Metrorail Station**
  - 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: 31 & 48

# 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

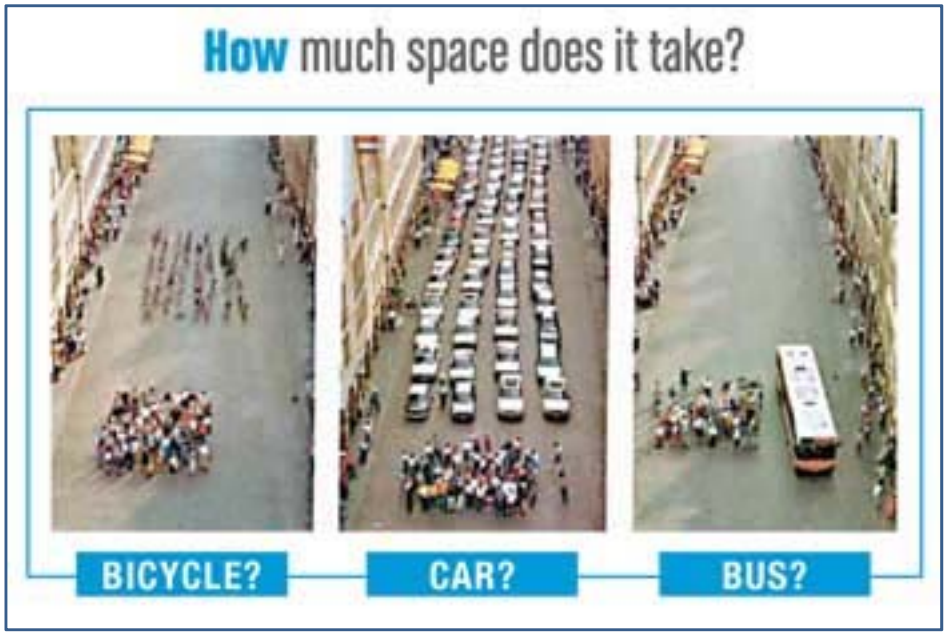






Slides: 30, 31, 34 & 35

# General Considerations

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




Slides: 43, 44 & 45

# General Considerations

- **How does the bi-directional section operate?**
  - 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: 31, 37 & 38

# General Considerations

- **How do the median vs curb running ways compare?**
  - 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: 31, 34, 35, 37, 38, 40 & 41

# Questions?

- ✓ Corridor Planning Process
- ✓ Review of Conceptual Alternatives
- ✓ **Preliminary Analysis of Conceptual Alternatives**
  - ✓ **Q&A**
- Tabletop Discussion

# Tabletop Discussion

- In an open house format, CAC members will have the opportunity to:
  - Discuss the general findings results related to the screening criteria presented at CAC Meeting No. 8
  - Tables with staff organized around three criteria subjects:
    - Transit ridership
    - Travel times
    - Person throughput
    - Accessibility

# Additional Questions

# Adjournment

# Appendix

# 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