Duke Street in Motion Advisory Group #4 Advance Materials

• 2012 High Capacity Transit Corridor Working Group Recommendation
• Conceptual design phase process graphic
• Conceptual design alternative summaries for Segments 1 and 3
• Design alternatives screening evaluation
The 2012 recommendation by the CWG is the type of recommendation the Duke Street in Motion Advisory Group is expected to make in terms of level of detail, including consideration of phasing, where appropriate.
Corridor B (Duke Street) Recommendation by High Capacity Transit Corridor Work Group, March 15, 2012

The following motion was passed by the High Capacity Transit Corridor Work Group at its March 15, 2012, meeting, regarding transit in Corridor B:

"The combination of Duke Street Alternatives 1a and 3c, are the preferred approach for phased implementation of a dedicated transitway in Corridor B. Alternative 1a would be the first phase of transitway implementation on Duke Street. It would create dedicated transit lanes in existing six-lane sections of Duke Street between Landmark Mall and Jordan Street and between Roth Street and Diagonal Road. In the remaining section of Duke Street between Jordan Street and Roth Street, transit would operate in mixed flow.

A parallel off-corridor bicycle facility should be examined to accommodate bicyclists along Duke Street and improved pedestrian facilities would be provided at intersections and near transit stations. Preliminary implementation should prioritize enhanced pedestrian safety and improvements at Taylor Run Parkway.

Alternative 3c would be the subsequent phase of transitway implementation on Duke Street. It would build on Alternative 1a by widening Duke Street to provide a reversible lane between Jordan Street and Roth Street. The reversible lane would be configured to allow Duke Street to accommodate a dedicated transit lane in the peak hour and peak direction of traffic flow during the a.m. and p.m. peak periods along Duke Street. Alternative 3c should continue to examine a bicycle facility along Duke Street along with corridor-wide pedestrian improvements. However, the Work Group believes that bicycles should be accommodated in this corridor if studies demonstrate that the streetscape can still be enhanced."
This graphic shows the general process for the conceptual design phase of Duke Street in Motion. The Advisory Group Input section is based on the Advisory Group mission and charge that Council adopted in March 2022.
Vision & Guiding Principles

Study Process

Advisory Group Action

Advisory Group Input

Public Engagement Visioning

Public Engagement Alternatives

Public Engagement Preferred Alternative

Vision & Guiding Principles

Alternative development

Evaluate alternatives

Evaluate preferred alternative against adopted 2012 recommendation

We Are Here

Provide comments on 2012 design

Reduce the number of alternatives under consideration based on screening criteria and public input

Consider analysis in context of guiding principles to help arrive at a single, refined preferred alternative

Determine if preferred alternative is within the parameters of the recommendation for the corridor adopted in 2012, or if Council needs to reconsider 2012 recommendation

Endorse a preferred alternative

Adopt Vision & Guiding Principles

Further analysis to inform and refine preferred alternative

Council consideration of preferred alternative to advance to final design

Study Process

Advisory Group Input

April 2022

Fall 2023

DRAFT FOR DISCUSSION PURPOSES
Design Alternatives for Segments 1 and 3

This section includes one-page summaries of the major design elements, benefits, and tradeoffs for each of the three proposed alternatives for Segments 1 and 3.

A notes section is included if you want to capture any questions or comments prior or during the meeting.

The questions on the next page will help address meeting goals outlined in the agenda.
Preliminary Questions to consider

Do you understand the design alternatives?

Are these a good range of options to bring to the community?

Are we missing any benefits/tradeoffs?
**EXISTING CORRIDOR**

- Three travel lanes in each direction
- Median with trees
- Sidewalk on both sides of the street
- Some areas with commercial frontage roads
- Some curbside bus pull off areas

**PROPOSED DESIGN**

- Two travel lanes with turn lanes in each direction
- A dedicated bus lane in each direction
- Median buffers
- Sidewalk on both sides of the street buffered from vehicles
- Two-way cycle track with buffer
- Opportunities for additional landscaping on the buffered cycle track side
- Opportunity to relocate utilities underground

**KEY TRADE OFFS**

- Number of general travel lanes reduced
- Changes to commercial frontage road and related access

**SEGMENT 1: CENTER RUNNING BRT (1A)**

**EXISTING TYPICAL SECTION**

**CENTER RUNNING BRT (ALTERNATIVE 1A)**

**BENEFITS**

- **Convenient**
  - Dedicated transit lane improves transit reliability and bus rider experience

- **Efficient**
  - Dedicated center transit lane provide maximum travel time savings for bus riders

- **Safe**
  - Improved pedestrian access and safety with buffered sidewalks and shorter crossings
  - Increased bicyclist safety, comfort, and convenience
  - Improved vehicle safety from separating car and transit traffic and reducing conflict areas

- **Vibrant and Sustainable**
  - Increased area for trees, streetscaping, stormwater management

- **Equitable**
  - Enhanced stations located near high ridership/high need communities

**NOTES**

- AlexandriaVA.gov/DukeInMotion
- Convenient
  - Dedicated transit lane improves transit reliability and bus rider experience
- Efficient
  - Dedicated center transit lane provide maximum travel time savings for bus riders
- Safe
  - Improved pedestrian access and safety with buffered sidewalks and shorter crossings
  - Increased bicyclist safety, comfort, and convenience
  - Improved vehicle safety from separating car and transit traffic and reducing conflict areas
- Vibrant and Sustainable
  - Increased area for trees, streetscaping, stormwater management
- Equitable
  - Enhanced stations located near high ridership/high need communities
**Segment 1: Curb Running BRT (1B)**
West End Alexandria to Jordan Street

**EXISTING TYPICAL SECTION**

- Sidewalk
- Travel Lanes
- Median
- Travel Lanes
- Frontage Road
- Sidewalk

**EXISTING CORRIDOR**
- Three travel lanes in each direction
- Median with trees
- Sidewalk on both sides of the street
- Some areas with commercial frontage roads
- Some curbside bus pull off areas

**PROPOSED DESIGN**
- Two travel lanes with turn lanes in each direction
- A dedicated bus lane in each direction with vehicles sharing the bus lane to make right turns
- No change to median
- Sidewalk will be buffered from vehicles on the south side of the street
- Two-way shared use path with buffer from vehicle traffic on the north side of the street
- Opportunities for additional landscaping on the shared use path side
- Opportunity to relocate utilities underground

**KEY TRADE OFFS**
- Number of general travel lanes reduced
- Right turning vehicles use bus lanes, which reduces bus reliability
- Changes to commercial frontage roads and related access

**BENEFITS**

- **Convenient**
  - Dedicated transit lane improves transit reliability and bus rider experience

- **Efficient**
  - Dedicated bus lane in each direction with vehicles sharing the bus lane to make right turns provides travel time savings for bus riders

- **Safe**
  - Improved pedestrian access and safety with buffered sidewalk, and a buffered shared use path
  - Increased bicyclist safety, comfort, and convenience

- **Vibrant and Sustainable**
  - Center median and tree canopy remain as is with an increased area for trees to buffer the shared use path

- **Equitable**
  - Enhanced stations located near high ridership/high need communities

**NOTES**
- Dedicated transit lane improves transit reliability and bus rider experience
- Improved pedestrian access and safety with buffered sidewalk, and a buffered shared use path
- Increased bicyclist safety, comfort, and convenience
- Enhanced stations located near high ridership/high need communities
Segment 1: Mixed Traffic BRT (1C)
West End Alexandria to Jordan Street

### EXISTING CORRIDOR
- Three travel lanes in each direction
- Median with trees
- Sidewalk on both sides of the street
- Some areas with commercial frontage roads
- Some curbside bus pull off areas

### PROPOSED DESIGN
- Three travel lanes in each direction
- No dedicated bus lane in either direction
- No change to median
- Sidewalk will be buffered from vehicles
- Two-way shared use path with buffer from vehicle traffic
- Opportunities for additional landscaping on the shared use path side
- Opportunity to relocate utilities underground

### KEY TRADE OFFS
- Limited/reduced improvement to bus operation and reliability
- No changes to vehicle safety in the corridor
- Changes to commercial frontage road and related access

### EXISTING TYPICAL SECTION
- Sidewalk
- Travel Lanes
- Median
- Travel Lanes
- Frontage Road
- Sidewalk

### MIXED TRAFFIC BRT (ALTERNATIVE 1C)
- Sidewalk
- Travel Lanes
- Median
- Travel Lanes
- Buffered Shared Use Path

### BENEFITS
- **Convenient**
  - Transit signal priority and queue jump at intersections improve transit reliability and bus rider experience
- **Safe**
  - Improved pedestrian access and safety with buffered sidewalk, and a buffered shared use path
  - Increased bicyclist safety, comfort, and convenience
- **Vibrant and Sustainable**
  - Minimal changes required for only a small change to project footprint
  - Center median and tree canopy remain as is with an increased area for trees to buffer the shared use path
- **Equitable**
  - Enhanced stations located near high ridership/high need communities

### NOTES
- Draft for discussion purposes
Segment 3: Center Running (3A)
Roth Street to King Street Metro Station

EXISTING CORRIDOR

- Three travel lanes in each direction
- Median with trees
- Sidewalk on both sides of the street (northern sidewalk along elevated frontage road)
- Some areas with frontage roads
- Existing bicycle sharrows on frontage road

PROPOSED DESIGN

- Two travel lanes in westbound (WB) direction
- Three travel lanes in eastbound (EB) direction
- One dedicated transit lane in each direction
- Median buffer with space for landscaping and stormwater features
- Sidewalk with buffer on both sides of the street
- Two-way cycle track with buffer
- At-grade pedestrian/bicycle facilities on the north side at grade with Duke Street
- Additional landscaping/greenspace along the buffered cycle track

KEY TRADE OFFS

- Number of general travel lanes WB reduced
- Changes to frontage road and related access

EXISTING TYPICAL SECTION

CENTER RUNNING (ALTERNATIVE 3A)

- Dedicated transit lane improves transit reliability and bus rider experience
- Dedicated center transit lane provide maximum travel time savings for bus riders
- Improved pedestrian access and safety with buffered sidewalks and shorter crossings
- Increased bicyclist safety, comfort, and convenience
- Improved vehicle safety from separating car and transit traffic and reducing conflict areas
- Increased area for trees, street-scaping, stormwater management
- Enhanced stations located near high ridership/high need communities

NOTES

DRAFT FOR DISCUSSION PURPOSES
**Segment 3: Curb Running (3B)**
Roth Street to King Street Metro Station

**EXISTING CORRIDOR**
- Three travel lanes in each direction
- Median with trees
- Sidewalk on both sides of the street (northern sidewalk along elevated frontage road)
- Some areas with frontage roads
- Bicycle sharrows on frontage road

**PROPOSED DESIGN**
- Two travel lanes in the westbound (WB) direction
- Three travel lanes in eastbound direction (EB)
- Dedicated transit lane in the westbound direction
- Enhanced median buffers
- Two-way cycle track on the elevated frontage road

**KEY TRADE OFFS**
- Number of general travel lanes WB reduced
- Changes frontage road and related access
- Cycle track provides less direct connectivity to Duke Street, but at less cost using existing frontage road
- Number of travel lanes EB maintained

**EXISTING TYPICAL SECTION**

**CURB RUNNING (PROPOSED DESIGN 3B)**

**BENEFITS**
- **Convenient**
  - Dedicated transit lane improves transit reliability and bus rider experience
- **Efficient**
  - Dedicated curbside transit lane provide maximum travel time savings for bus riders in the westbound direction.
- **Safe**
  - Improved pedestrian access and safety with buffered sidewalks and shorter crossings
  - Increased bicyclist safety, comfort, and convenience
  - Improved vehicle safety from separating car and transit traffic and reducing conflict areas
- **Vibrant and Sustainable**
  - Increased area for trees, streetscaping, stormwater management
- **Equitable**
  - Enhanced stations located near high ridership/high need communities

**NOTES**

DRAFT FOR DISCUSSION PURPOSES
**Segment 3: Mixed Traffic (3C)**
Roth Street to King Street Metro Station

### EXISTING CORRIDOR
- Three travel lanes in each direction
- Median with trees
- Sidewalk on both sides of the street (northern sidewalk along elevated frontage road)
- Some areas with frontage roads
- Bicycle sharrows on frontage road

### PROPOSED DESIGN
- Three travel lanes in each direction
- No dedicated transit lane in either direction
- Median remains unchanged
- Existing bicycle sharrows on frontage road remains as is
- Queue jump areas at spot locations along the corridor to help provide transit reliability and reduction in transit travel time

### KEY TRADE OFFS
- Limited/reduced improvement to transit operation and reliability
- No changes to corridor safety
- No changes to frontage road and related access
- General traffic capacity and travel time remains unchanged

### BENEFITS
- **Convenient**
  - Transit signal priority and queue jump at intersections improve transit reliability and bus rider experience
- **Safe**
  - Some improvements to crosswalks and pedestrian safety and access to station areas
- **Equitable**
  - Enhanced stations located near high ridership/high need communities

### NOTES
- West End Alexandria
- Equitable
  - Enhanced stations located near high ridership/high need communities

---

DRAFT FOR DISCUSSION PURPOSES
Design Alternatives
Screening Evaluation

This section includes a screening of the design alternatives based on the guiding principles. This level of screening presents the relative benefits/impacts between the alternatives. Future work will make this exercise more quantitative.
**Segment 1: WestEnd to Jordan Street**

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Center Running BRT Alternative 1A</th>
<th>Curb Running BRT Alternative 1B</th>
<th>Mixed Traffic BRT Alternative 1C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Convenient</strong></td>
<td>⚫⚫⚫</td>
<td>⚫⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Bus schedule reliability and user experience</td>
<td>⚫⚫⚫</td>
<td>⚫⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Pedestrian improvements and accessibility features</td>
<td>⚫⚫⚫</td>
<td>⚫⚫</td>
<td>⚫</td>
</tr>
<tr>
<td><strong>Safe</strong></td>
<td>⚫⚫⚫</td>
<td>⚫⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Bicycle facilities and connectivity</td>
<td>⚫⚫⚫</td>
<td>⚫⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Corridor and intersection safety features</td>
<td>⚫⚫⚫</td>
<td>⚫</td>
<td></td>
</tr>
<tr>
<td><strong>Vibrant</strong></td>
<td>⚫⚫⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Areas for green space and streetscaping</td>
<td>⚫⚫⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Areas for tree canopy and stormwater management features</td>
<td>⚫⚫⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td><strong>Sustainable</strong></td>
<td>⚫⚫⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Bus travel time*</td>
<td>⚫⚫⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td><strong>Efficient</strong></td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Non-transit vehicle travel time*</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Property acquisition</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td><strong>Vibrant</strong></td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Service/frontage road</td>
<td>⚫⚫⚫</td>
<td>⚫⚫⚫</td>
<td>⚫⚫⚫</td>
</tr>
<tr>
<td>Business/residential access or parking</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
</tbody>
</table>

*High level estimate based on bus running way configuration, signal delay. More detailed corridor end-to-end travel time will be provided during refinement of preferred alternative(s).
### Segment 3: Roth Street to King St Metro Station

#### Benefits

**Convenient**
- Bus schedule reliability and user experience

**Safe**
- Bicycle facilities and connectivity
- Corridor and intersection safety features

**Vibrant**
- Areas for green space and streetscaping
- Areas for tree canopy and stormwater management features

**Sustainable**
- Bus travel time*

#### Impacts

**Efficient**
- Non-transit vehicle travel time*

**Vibrant**
- Property acquisition
- Service/frontage road
- Business/residential access or parking

#### Key

- No Benefit
- Minor Benefit
- Moderate Benefit
- Large Benefit
- No Impact
- Minor Impact
- Moderate Impact
- Large Impact

#### Alternative 3A
- Center Running BRT

#### Alternative 3B
- Curb Running BRT

#### Alternative 3C
- Mixed Traffic BRT

### Notes
- *High level estimate based on bus running way configuration, signal delay. More detailed corridor end-to-end travel time will be provided during refinement of preferred alternative(s).