Welcome

Route 1
Multimodal Alternatives Analysis

Public Meeting

October 8, 2014
Belmont Elementary School
Prince William County, VA

October 9, 2014
South County Government Center
Fairfax County, VA
**Project Schedule**

**1. Purpose and Need**
- Public Meeting #1: October 9, 2013
  - Purpose and Need, Goals and Objectives
  - Initial Set of Alternatives

**2. Data Collection**
- Public Meeting #2: March 26, 2014
  - Refined Alternatives
  - Forecasting Results
  - Land Use Assessment

**3. Multimodal Alternatives Development & Evaluation**
- Public Meeting #3: October 8-9, 2014
  - Draft Recommendation
  - Environmental Scan

**Project Phasing Approaches**
- Evaluation of Alternatives
- Additional Land Use & Traffic Analysis
- Project Phasing Approaches
- Implementation Considerations

**Environmental Scan**

**Funding Analysis**

**Traffic Impact Analysis and Travel Demand Modeling**

**Land Use Assessment and Economic Impact Analysis**

**Public Meeting #3**
- October 8-9, 2014
  - Draft Recommendation
  - Environmental Scan

**3. Public Meeting**
- (WE ARE HERE)

**Recommends Locally Preferred Alternative**

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**Route 1 Multimodal Alternatives Analysis**

**VDOT**
### Purpose & Need, Goals and Objectives

#### Purpose
The purpose of the project is to provide improved performance for transit, bicycle, and pedestrian, and vehicular conditions and facilities along the Route 1 corridor that support long-term growth and economic development.

#### Needs

<table>
<thead>
<tr>
<th>Transit</th>
<th>Pedestrian/Bicycle</th>
<th>Vehicular</th>
<th>Land Use/Economic Development</th>
</tr>
</thead>
</table>
| • Peak and off-peak transit service is infrequent  
• High transit dependent population  
• Traffic delays reduce transit reliability  
• High ridership potential for quality transit | • Pedestrian networks along and surrounding the corridor are disjointed, limiting pedestrian travel and reducing access to transit  
• Bicycle access is difficult with few alternative paths | • Users experience significant congestion along Route 1 during peak periods  
• Travel times are highly variable and unpredictable | • Significant population and employment growth is anticipated regionally and along Route 1 corridor  
• Current development patterns fail to optimize development potential |

#### Goals and Objectives

<table>
<thead>
<tr>
<th>Expand attractive multimodal travel options to improve local and regional mobility</th>
</tr>
</thead>
</table>
| • Increase transit ridership  
• Improve transit to reduce travel times and increase frequency, reliability, and attractiveness  
• Increase transportation system productivity (passengers per hour) within the corridor  
• Increase comfort, connectivity, and attractiveness of bicycle and pedestrian networks to and along the corridor  
• Integrate with existing and planned transit systems and services |

<table>
<thead>
<tr>
<th>Improve safety; increase accessibility</th>
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</thead>
</table>
| • Provide accessible pathways to and from transit service and local destinations  
• Reduce modal conflicts  
• Improve pedestrian crossings  
• Minimize negative impact on transit and auto operations in the corridor  
• Maintain traffic delays at acceptable levels |

<table>
<thead>
<tr>
<th>Increase economic viability and vitality of the corridor</th>
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</table>
| • Improve connectivity to local and regional activity centers  
• Encourage and support compact, higher density, mixed use development consistent with local plans, policies, and economic objectives  
• Secure public and investor confidence in delivery and sustainability of new transit investments  
• Provide high-capacity transit facilities at locations where existing and future land uses make them mutually supportive |

<table>
<thead>
<tr>
<th>Support community health and minimize impacts on community resources</th>
</tr>
</thead>
</table>
| • Minimize negative impacts to the natural environment  
• Contribute to improvements in regional air quality  
• Increase opportunities for bicycling and walking to improve health and the environment |
Refined Transit Alternatives

Alternative 1: Bus Rapid Transit - Curb Running
Summary
• Bus operates in curb, dedicated transit lanes from Huntington to Pohick Road North
• Bus operates in mixed traffic south of Pohick Road to Woodbridge

Key Factors
- Average Weekday Ridership (2035) 15,200
- Conceptual Capital Cost $832 M
- Annual O&M Cost $18 M
- Cost Effectiveness (Annualized capital + operating cost per rider) $19

Typical Intersection

Alternative 2: Bus Rapid Transit - Median
Summary
• Bus operates in median in dedicated lanes for the entire length of the corridor and in mixed traffic in Prince William County

Key Factors
- Average Weekday Ridership (2035) 16,600
- Conceptual Capital Cost $1.01 B
- Annual O&M Cost $17 M
- Cost Effectiveness (Annualized capital + operating cost per rider) $20

Typical Intersection

Alternative 3: Light Rail Transit
Summary
• Light Rail operates in the median dedicated lanes for the entire length of the corridor

Key Factors
- Average Weekday Ridership (2035) 18,400
- Conceptual Capital Cost $1.56 M
- Annual O&M Cost $24 M
- Cost Effectiveness (Annualized capital + operating cost per rider) $27

Typical Intersection

Alternative 4: Metrorail/BRT Hybrid
Summary
• Metrorail underground from Huntington to Hybla Valley; transfer to BRT service from Hybla Valley to Woodbridge
• BRT operates in dedicated lanes and transitions into mixed-traffic in Prince William County

Key Factors
- Average Weekday Ridership (2035) 26,500* (BRT 10,600; Metrorail 15,900)
- Conceptual Capital Cost $2.46 B
- Annual O&M Cost $31 M
- Cost Effectiveness (Annualized capital + operating cost per rider) $28

Typical Intersection

*BART ridership, excluding transfers between Metrorail and BRT Portions

Proposed Alignment

Proposed Alignment
Evaluation of Multimodal Alternatives

Evaluation Criteria

Evaluation measures were used to assess how well each potential mode and cross-section met the project goals. Based on feedback from community members and other stakeholders (including members of the Technical Advisory Committee, Executive Steering Committee, and Community Involvement Committee), certain measures were weighted double or triple to reflect their importance. Bold measures below were weighted double, while italics indicate that a measure's weight was tripled.

Goals | Evaluation Measures
--- | ---
Goal 1: Local and regional mobility | • Project ridership • Number of transit dependent riders • Transit travel time savings • Provides connection to existing transit network • New transit riders • Person throughput • Number of riders who walked to access transit • Provides improved bicycle and pedestrian facilities
Goal 2: Safety and accessibility | • Auto Network Delay • Pedestrian access to stops • Pedestrian crossing time • Auto travel time • Impacts due to turns • Preserves flexibility for bike lane
Goal 3A: Economic Development | • Potential to begin transit within 10 years • Tendency to encourage additional development • Jobs within 60 minutes • Pen passenger O&M cost savings with growth • Tendency to accelerate development
Goal 3B: Cost Effectiveness | • Cost per rider • Estimated Capital Cost • Estimated Annual O&M cost
Goal 4: Community health and resources | • Change in VMT • Total Right of Way • Trips diverted from I-95 • Temporary construction impacts • Environmental benefits

Bold = measure weight doubled
Bold italics = measure weight tripled

Evaluation Process

1. Range of Alternatives
2. SCREEN 1: Basic Requirements
3. Initial Alternatives
4. SCREEN 2: Qualitative and Quantitative Measures
5. Multimodal Alternatives for Further Evaluation
6. Detailed Evaluation (Screen 3)

See “Evaluation of Alternatives - Results” Board

Recommended Program of Improvements

Transit Evaluation

<table>
<thead>
<tr>
<th>Evaluation of Modes</th>
<th>Evaluation of Cross-Sections</th>
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<tbody>
<tr>
<td>Bus Rapid Transit</td>
<td>Curb (BRT)</td>
</tr>
<tr>
<td>Light Rail Transit</td>
<td>Median (BRT, LRT)</td>
</tr>
<tr>
<td>Metrorail</td>
<td>Underground (Metrorail)</td>
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</table>

Recommended

Transit

Median-running Bus Rapid Transit System in the near-term, with a Metrorail extension to Hybla Valley in the long-term

Pedestrian/Bicycle

10-foot shared use path on both sides of street

Vehicular

3 general purpose travel lanes in each direction

Near-Term Vision

Long-Term Vision
### Summary Table

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<tr>
<th></th>
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<tbody>
<tr>
<td>Goal 1: Local and Regional Mobility</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>1.00</td>
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<tr>
<td>Goal 2: Safety and Accessibility</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
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<tr>
<td>Goal 3A: Economic Development</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.7</td>
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<tr>
<td>Goal 3B: Cost Effectiveness</td>
<td>1.0</td>
<td>0.9</td>
<td>0.7</td>
<td>0.5</td>
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<td>Goal 4: Community and Health Resources</td>
<td>0.7</td>
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<tr>
<td>Ability to Meet Project Goals - Average Score</td>
<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
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### Evaluation Details

#### Goal 1: Expand Multimodal Travel Options to Improve Local and Regional Mobility

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<tr>
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</thead>
<tbody>
<tr>
<td>Daily Project Riders (2025)</td>
<td>15,200</td>
<td>16,600</td>
<td>16,600</td>
<td>36,500 (BRT 10,500; LRT 26,000)</td>
</tr>
<tr>
<td>Number of New Transit Riders</td>
<td>1,500</td>
<td>2,000</td>
<td>2,040</td>
<td>2,050</td>
</tr>
<tr>
<td>Number of Total Passenger Riders</td>
<td>5,157</td>
<td>5,438</td>
<td>5,788</td>
<td>6,970</td>
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<tr>
<td>Transit Time Travel Savings (Ft. Belvoir to Huntington Metro Station)</td>
<td>6 min</td>
<td>9 min</td>
<td>9 min</td>
<td>10 min</td>
</tr>
<tr>
<td>Average Transit Person Throughput (Ft. Belvoir to Huntington Metro Station)</td>
<td>0.40</td>
<td>0.45</td>
<td>0.52</td>
<td>1.00</td>
</tr>
<tr>
<td>Provides Improved Bike and Pedestrian Facilities</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Provides Connections to Regional Transit Network*</td>
<td>Connects to Huntington Metro Station</td>
<td>Connects to Huntington Metro Station</td>
<td>Connects to Huntington Metro Station</td>
<td>Connects to Huntington Metro Station</td>
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<tr>
<td>AVERAGE SCORE</td>
<td>0.70</td>
<td>0.78</td>
<td>0.83</td>
<td>1.00</td>
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#### Goal 2: Improve Safety and Increase Accessibility

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</thead>
<tbody>
<tr>
<td>Pedestrian access to station (includes signal delay)</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Pedestrian crossing time (including signal delay)</td>
<td>102 sec</td>
<td>116 sec</td>
<td>116 sec</td>
<td>97 sec</td>
</tr>
<tr>
<td>Automobile travel time (minutes during peak hour, Ft. Belvoir to Huntington Metro Station)</td>
<td>24.0</td>
<td>23.7</td>
<td>24.0</td>
<td>23.7</td>
</tr>
<tr>
<td>Traffic impacts due to turning vehicles (left turns)</td>
<td>Moderate impact</td>
<td>Moderate impact</td>
<td>Moderate impact</td>
<td>Moderate impact</td>
</tr>
<tr>
<td>Impacts due to turning vehicles (right turns)</td>
<td>Significant impact</td>
<td>No impact</td>
<td>No impact</td>
<td>No impact</td>
</tr>
<tr>
<td>Preserves flexibility for bike lane is higher activity nodes</td>
<td>More flexible</td>
<td>More flexible</td>
<td>More flexible</td>
<td>More flexible</td>
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<tr>
<td>AVERAGE SCORE</td>
<td>0.71</td>
<td>0.79</td>
<td>0.79</td>
<td>0.82</td>
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#### Goal 3a: Economic Development

<table>
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</thead>
<tbody>
<tr>
<td>Estimated Capital Cost*</td>
<td>$832 M</td>
<td>$1.01 B</td>
<td>$1.56 B</td>
<td>$2.46 B</td>
</tr>
<tr>
<td>Estimated Annual O&amp;M cost*</td>
<td>$10 M</td>
<td>$17 M</td>
<td>$24 M</td>
<td>$31 M</td>
</tr>
<tr>
<td>Cost per ride* (yon 10% + operating cost)</td>
<td>$21</td>
<td>$22</td>
<td>$23</td>
<td>$30</td>
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<tr>
<td>AVERAGE SCORE</td>
<td>0.98</td>
<td>0.93</td>
<td>0.65</td>
<td>0.55</td>
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</table>

#### Goal 3b: Cost Effectiveness

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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Tendency to encourage additional development*</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Medium-High</td>
</tr>
<tr>
<td>Tendency to accelerate pace of development</td>
<td>Some potential to increase</td>
<td>Some potential to increase</td>
<td>More potential to increase</td>
<td>More Potential to increase</td>
</tr>
<tr>
<td>Per passenger NOD cost savings associated with increased population and employment growth</td>
<td>$3.75</td>
<td>$6.8</td>
<td>$1.14</td>
<td>$0.86</td>
</tr>
<tr>
<td>Jobs within 60 minutes change over No Build*</td>
<td>623</td>
<td>920</td>
<td>1,143</td>
<td>2,078</td>
</tr>
<tr>
<td>Potential to offset Transit Operations within 10 years*</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>BRT portion is high; development is very slow</td>
</tr>
<tr>
<td>AVERAGE SCORE</td>
<td>0.56</td>
<td>0.62</td>
<td>0.60</td>
<td>0.72</td>
</tr>
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</table>

* Based on input from the community and other stakeholders, these measures were weighted more heavily during score calculation.
Current and Ongoing Projects in the Corridor

Segments

**Route 1 Improvements at Ft. Belvoir (Under construction)**
- Road widening, including right-of-way reservation for future median transit lanes

**Route 1 Improvements near Woodbridge (Ongoing)**
- Route 1/123 Interchange Project, Route 1 Widening. Other pedestrian facility improvement projects (see inset map).

**Richmond Highway Public Transportation Initiative**

**Sidewalk Projects Under Construction:**
- Northbound from Mt. Vernon Highway/Buckman Road to north of Napper Road

**Sidewalk Projects to be constructed in 2015:**
- Northbound from Virginia Lodge to Huntington Avenue
- Northbound from Fairhaven Avenue/Quander Road to hotel complex
- Southbound from Russell Road to Gregory Drive
- Northbound from Roxbury Drive to Russell Road
- Northbound from Radford Avenue to Frye Road
- Northbound from Engleside Street to Forest Place

Intersections

**New REX stops and pedestrian safety improvements (To be constructed in 2015)**

- Southgate Drive (new REX stops with sidewalk and accessibility improvements, four new crosswalks, median pedestrian refuge)
- Lockheed Boulevard (new REX stops with sidewalk and accessibility improvements, one new crosswalk, median pedestrian refuge)
- Arlington Drive (new REX stops with sidewalk and accessibility improvements, two new crosswalks, median pedestrian refuge, curb ramps)
- Belford Drive (new REX stop with sidewalk and accessibility improvements, three new crosswalks, median pedestrian refuge)
- Ladson Lane (new REX stops with sidewalk and accessibility improvements, two new crosswalks, median pedestrian refuge)
- Mohawk Lane (sidewalk and accessibility improvements to existing bus stops, two new crosswalks, median pedestrian refuge)
- Frye Road (new REX stops with sidewalk and accessibility improvements, four new crosswalks, median pedestrian refuge)
- Lukens Lane (new REX stops with sidewalk and accessibility improvements, one new crosswalk, close entrance to service drive)
Existing and Projected Level of Service

**Level of Service**

Highway traffic congestion is expressed in terms of Level of Service (LOS) as defined by the Highway Capacity Manual (HCM). LOS is a letter code ranging from “A” for excellent conditions to “F” for failure conditions. The conditions defining the LOS for roadways are summarized as follows:

- **LOS A**
  - Represents the best operating conditions and is considered free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.

- **LOS B**
  - Represents reasonably free-flowing conditions but with some influence by others.

- **LOS C**
  - Represents constrained constant flow below speed limits, with additional attention required by the drivers to maintain safe operations. Comfort and convenience levels of the driver decline noticeably.

- **LOS D**
  - Represents traffic operations approaching unstable flow with high passing demand and passing capacity near zero, characterized by drivers being severely restricted in maneuverability.

- **LOS E**
  - Represents unstable flow near capacity. LOS E often changes to LOS F very quickly because of disturbances (road conditions, accidents, etc.) in traffic flow.

- **LOS F**
  - Represents the worst conditions with heavily congested flow and traffic demand exceeding capacity, characterized by stop-and-go waves, poor travel time, low comfort and convenience, and increased accident exposure.

Addition of median transit lanes:
- Improves transit travel time
- Incrementally increases automobile travel time
- Left turns impacted
- Does not significantly degrade overall intersection performance
Public Infrastructure and Services

- Major growth is anticipated in the Route 1 corridor in all scenarios including COG 2035 forecast.
- In Comprehensive Plan updates, corridor infrastructure needs will be evaluated:
  - Streets
  - Schools
  - Parks and public space
  - Public safety
  - Water and utilities
- Metrorail supportive growth levels require significantly more infrastructure investment than BRT levels.

Traffic Assessment

Population and employment levels beyond the MWCOG projections require:

- Completing planned widening of Route 1 to consistent 6-lanes
- Mixed use development
- Walkable, pedestrian friendly environment
- Investment in high-quality, higher-capacity public transit
- Network of local streets

Street Infrastructure Required to Accommodate Growth

Highest density proposed station areas: Beacon Hill and Hybla Valley

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Share of trips</th>
<th>Add street capacity</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>transit, walk, bike, internal, and peak spreading</td>
<td>to supplement Route 1, equivalent to:</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>20%</td>
<td>One new 2-lane street</td>
</tr>
<tr>
<td></td>
<td>25%</td>
<td>One new 2-lane street</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>25%</td>
<td>Six new 2-lane streets</td>
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<tr>
<td></td>
<td>40% to 50%</td>
<td>Three new 2-lane streets</td>
</tr>
</tbody>
</table>
Median-Running Bus Rapid Transit (BRT)

**What is Median-Running BRT?**

Median-running bus rapid transit operates in designated lanes at the center of the roadway.

- Dedicated lanes for transit
- High-quality stations
- High-quality pedestrian safety & access
- Traffic signal priority for transit
- Off-board fare collection for expedited boarding
- System-wide branding

**Features**

**Where else do bus rapid transit systems exist in the U.S.?**

Map showing locations of bus rapid transit systems in the U.S.
Transportation Recommendations, Phasing, and Funding

**Recommendations**

**Transit**
- Median-running Bus Rapid Transit System in the near-term, with a Metrorail extension to Hybla Valley in the long-term

**Pedestrian/Bicycle**
- 10-foot shared use path on both sides of street

**Vehicular**
- 3 general purpose travel lanes in each direction

**Near-Term Vision**

**Phase I+II: BRT from Huntington to Fort Belvoir**
- Potentially competitive segments for federal New Starts/Small Starts funding
- Highest population and employment
- Highest ridership potential

**Phase III: BRT from Fort Belvoir to Woodbridge**
- Less competitive for federal funding
- Lower population and employment
- Includes planned VDOT widening

**Phase IV: Metrorail Extension to Hybla Valley**
- Potentially competitive for federal New Starts funding in 2040
- Contingent upon increased future land use density

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**Proposed Transit Phasing & Funding**

**Phases I+II: BRT from Huntington to Fort Belvoir**
- Potentially competitive segments for federal New Starts/Small Starts funding
- Highest population and employment
- Highest ridership potential

**Phase III: BRT from Fort Belvoir to Woodbridge**
- Less competitive for federal funding
- Lower population and employment
- Includes planned VDOT widening

**Phase IV: Metrorail Extension to Hybla Valley**
- Potentially competitive for federal New Starts funding in 2040
- Contingent upon increased future land use density
The vision for Route 1, as expressed in County land use plans and through the public visioning process, is a place that attracts the next generation of growth to promote economic competitiveness.

Station areas have:
- Focused growth that “steps down” as a transition to existing neighborhoods
- Compact, mixed-use development patterns
- Walkable and bikeable streets
- A development-focused rather than parking-focused design
- High-quality parks and public spaces

Transit investments help increase the economic viability and vitality of the corridor, and create an opportunity for high-quality community development.
Understanding the activity levels and land use configurations to support high-quality transit.

- Focused growth at centers
- Compact, mixed-use development
- Walkable streets
- High-quality public realm
### Action Plan for Implementation

<table>
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<tr>
<th>2014-2015</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
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<tbody>
<tr>
<td><strong>Adopt Transportation Recommendations:</strong>&lt;br&gt;Local Plans, Constrained Long Range Plan, TransAction2040</td>
<td></td>
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</tr>
<tr>
<td><strong>For Near-Term BRT Project</strong></td>
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<tr>
<td>Environmental Documentation (NEPA), Concept Engineering, Funding Plan</td>
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<tr>
<td>Identify necessary Comprehensive Plan updates and infrastructure investments, conduct market studies</td>
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<tr>
<td>Design and construct multimodal investments</td>
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<tr>
<td>Continue economic development, build ridership</td>
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<tr>
<td><strong>For Long-Term Metrorail Extension</strong></td>
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<tr>
<td>Expand economic development and conduct additional market studies</td>
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<tr>
<td>Identify necessary Comprehensive Plan updates and infrastructure investments</td>
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<tr>
<td>NEPA, Concept Engineering, Funding Plan</td>
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<tr>
<td>Design and construct Metrorail</td>
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