Project Description

The Bus Rapid Transit Project, sponsored by GRTC Transit System, is primarily in the City of Richmond with a guideway of dedicated median and curbside bus lanes extending from Willow Lawn in Henrico County to Rocketts Landing.
Where We Are Now

• Conceptual 30% Design Complete
• 14 Station Locations (5 Median, 9 Curbside)
Purpose of the Project

• Improve the mobility of transit users
• Develop a more efficient transit system
• Support existing transit oriented land use
• Support plans to generate new transit oriented development
• Provide an attractive alternative for east-west travel
Project Funding $49.8 Million

Funding Contribution

- $24,900,000 (50%)
- $16,900,000 (34%)
- $7,600,000 (15%)
- $400,000 (1%)

TIGER Grant – Transportation Investment Generating Economic Recovery
## Opinion of Probable Costs/Budget

<table>
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<tr>
<th>COST CATEGORY</th>
<th>SYSTEM WIDE ELEMENTS</th>
<th>MEDIAN RUNNING SEGMENTS</th>
<th>CURB RUNNING SEGMENTS</th>
<th>MIXED TRAFFIC SEGMENTS</th>
<th>TOTAL</th>
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<tr>
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<td>COST</td>
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<td>GUIDE WAY</td>
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<td>$ 1,643,667</td>
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<td>OTHER COSTS (Mobilization, Traffic Control,</td>
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<td>$ 1,444,518</td>
<td>$ 570,507</td>
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<td>Environmental, etc.)</td>
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<td>SUB-TOTAL BASE CONSTRUCTION</td>
<td>$ 2,349,102</td>
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<td>$ 6,518,985</td>
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<td>$ 4,994,430</td>
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<td>FINAL DESIGN</td>
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<td>$ 6,518,985</td>
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<td>CONSTRUCTION SUPPORT SERVICES</td>
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<td>$ 15,593,110</td>
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<td>TOTAL</td>
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<td>$ 48,188,034</td>
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<td>Inflation to 2016 based on Current Construction Index @ 3.3%</td>
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<td>$ 49,800,000</td>
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**NOTE:** ITS Equipment is approximately $3.6 Million (Under) $ (21,760)
Corridor Description

- **Route length**: 7.6 miles - from Willow Lawn to Rocketts Landing
- **Dedicated bus lanes**: Thompson Street to Foushee Street (median lanes) and 4th Street to 14th Street (curbside lanes)
- **14 stations**: 5 median and 9 curbside stations
Routes Connecting Into BRT

Figure 2  Daily Peak Ridership by Stop with Transfer Volumes To/From the Route 6

GRTC Weekday Peak Ridership Activity on BRT Route

Circle size indicates total activity (ONs + OFFs)
- GRTC stop locations
- BRT Route Alternative
- Half-Mile Buffer

Daily Transfers To/From Rt 6

10  100

Data Source: Ridership activity from GRTC automated passenger counters. Transfer data collected October 2014.
GRTC Local Bus Routes Study

- Study is on-going.
- Analyzing existing bus routes along the corridor & how they can improve trip efficiency along with Pulse service.
- Examples:
  - Bus stop locations
  - Links between Local Routes & Pulse service.
Station Locations

- Willow Lawn ✓
- Staples Mill
- Cleveland ★
- Robinson ★
- Allison Street ★
- Shafer Street ★
- Adams Street ★

- 3rd/4th Street
- 9th Street
- 12th Street
- Main Street Station
- 24th Street
- Route 5
- Rocketts Landing

✓ Henrico County
★ Median Station
Design Considerations

- Various station locations, median designs and vehicle alternatives were evaluated.
- Station locations are based on current and future activity centers to maximize ridership potential and connectivity.
- Utility conflicts and right of way constraints resulted in the final locations after extensive field review and evaluation of impacts to historical resources.
Vehicle Considerations

- Evaluated vehicle configurations
  - Articulated (60-foot) vehicles
  - Doors on one or both sides
  - Seating capacity
- Selected CNG 40-foot vehicles
  - $470,000 vs. $1 million for articulated
- Total project cost:
  - 40’ vehicles: $49.8 million
  - 60’ vehicles: $61.8 million
Median Station

Current Design

Platform on the right side
Typical 4FT Median

Sheppard to Foushee - Proposed Typical

11’ 10’ 11’ 4’ 11’ 10’ 11’
Typical Median Station

10.5' 10' 11' 11' 12' 10' 10.5'
Wider 6FT Median

Harrison to Pine - Left Turns

11' 11' 11' 6' 11' 10' 11' 11'
Wider 16FT Median Downtown

Proposed - 4 Lane Section

14' Sidewalk 4' 11' Bus lane 11' Drive lane 11' Drive lane 16' Planting strip 11' Drive lane 11' Drive lane 11' Bus lane 4' 14' Sidewalk

11' 11' 11' 16' 11' 11' 11' 11'
Public Involvement

• Extensive public outreach was conducted during both the planning and preliminary design phases
• 7 public meetings were held during the 5-year study
  6 public meetings were held during preliminary design
• During 2015, more than 20 other presentations were conducted at neighborhood and association meetings
• Direct contact was made with every business along the corridor
Public and Stakeholder Input

- Safety for all users
- Preservation of parking/loading zones on Broad Street wherever possible
- North/South access across Broad Street for vehicles, pedestrians, and bicyclists (includes left turns)
- Median and lane widths
- Station locations and spacing
Current Parking

• Today: 708 on-Broad Street free, paid, & loading spaces
• 8,000+ parking spaces within one block of Broad
  ▪ 6,434 short-term & long-term public & private off-street parking facilities
  ▪ On side streets: 1,008 free, paid, & loading spaces
Parking Preservation Plan
Thompson to 14th

• Proposed balanced solution:
  ▪ Preserves approximately 402 parking spaces on Broad St.
  ▪ Maximum parking usage based on occupancy studies: 406

• Loading zone proposal:
  ▪ Preserves 35 of today’s 90 loading zones
  ▪ 105 loading zones on side streets within one block of Broad St.
  ▪ Shared usage during morning delivery times with other parking spaces

• Parking Overlay District
  ▪ City of Richmond is considering a curb management study that could result in revisions to the existing overlay district ordinances.
Pedestrian / Bicyclist Access

• 6 dedicated pedestrian crosswalks across Broad at controlled crossings (Strawberry, Goshen, Pine, Henry, Madison and Jefferson) AND at 37 signalized intersections

• 6-foot pedestrian refuges
Left Turn Access

• Westbound: Adams to Thompson
  ▪ 7 left turns – Monroe, Belvidere, Harrison, Meadow, Robinson, Sheppard and Tilden (Boulevard under review by City)

• Eastbound: Thompson to Adams
  ▪ 10 left turns – Roseneath, Sheppard, Terminal, Davis, DMV, Allison, Meadow, Allen, Bowe and Belvidere (Boulevard under review by City)

• New Signals
  ▪ Tilden, Monroe, Byrd and Orleans
Established Project Elements

- Project limits
- Project length
- Corridor alignment
- Length & location of dedicated lanes
- Minimum lane width
- Number of stations
- Location of stations
- Project Budget
- Funding partners & portions
- Median width
- Project schedule
- BRT name & logo
- BRT branding
- Number & type of vehicles
- Service frequency
- Colorized pavement
Flexible Project Elements

- Location of parking on Broad Street
- Location of loading zones
- Location of left turns
- Location of pedestrian crossings
- Station architectural features
- Station amenities
- Station bicycle storage
- Landscaping type & locations
- Station technology
- Roadway technology
- Sequencing of station construction
- Hours of operation
- Public art
- Streetscape features
- Fixed route service connections
Station Design Overview
GRTC Bus Rapid Transit (BRT) Project
ELEVATION - 9TH STREET WEST BOUND

FLOOR PLAN - 9TH STREET WEST BOUND

EAST ELEVATION - 9TH STREET WEST BOUND

GRTC Bus Rapid Transit (BRT) Project

CURBSIDE WITH SIDEWALK BEHIND
CURBSIDE STEEP SLOPE WITH SIDEWALK BEHIND

ELEVATION - 12TH STREET EAST BOUND

1. 336" x 144" PLANTER
   - TICKET MACHINE
   - WIND SCREEN
   - BRT SYSTEM MAP
   - BENCH
   - TRUSS
   - LEAN RAIL
   - PRECAST CAP
   - TICKET MACHINE
   - ART PANELS
   - TRASH
   - TOTEM SIGN
   - BIKE RACKS

FLOOR PLAN - 12TH STREET EAST BOUND

2. 336" x 144" 40' BUS

WEST ELEVATION - 12TH STREET EAST BOUND

CURBSIDE STEEP SLOPE WITH SIDEWALK BEHIND STATIONS
- 12TH STREET EAST

GRTC Bus Rapid Transit (BRT) Project
Rocketts Landing (Day)
Shafer Eastbound (Day)
Robinson Eastbound (Day)
Staples Mill Westbound (Day)
BRT Simulation (VISSIM)
Areas of Construction

• Most of the construction will be at the station locations
• There are 5 median stations and 9 curbside stations
• There are only 3 curbside stations in Downtown at 3\textsuperscript{rd}/4\textsuperscript{th}, 9\textsuperscript{th} and 12\textsuperscript{th}
• Construction work is limited to only the stations, medians and traffic signals/ curb ramps areas
Construction Schedule

• Start of Construction: August 2016
• End of Construction: October 2017
• Total Duration: About 15 months
Construction Requirements

• Construction will be sequenced and localized to minimize impacts on businesses and properties.

• The Contractor will be required to maintain pedestrian access and access to businesses at all times.

• Road closures will be limited to temporary lane closures during non-peak hours.
Construction Requirements

• During non-working times, the contractor will accommodate roadway and pedestrian access in construction areas with safety being the primary objective.

• Most of the construction will be in the median area with the exception of curb-side stations, at ramp improvements locations and for signal upgrades at intersections.
Construction Requirements

- Duration of work for stations will be typically 3 or 4 months per station
- The contractor will be required to maintain parking spaces on Broad Street with short-term adjustments to accommodate construction, with the exception of parking directly in front of proposed curb-side stations that will be removed
- Construction work will be performed in compliance with daytime and nighttime noise ordinances
Curb Side Station – Willow Lawn
Curb Side Station – Staples Mill EB

Area of Construction
Curb Side Station – 3rd Street WB
Curb Side Station – 4th Street EB
Curb Side Station – 9th Street EB
Curb Side Station – 9th Street WB
Curb Side Station – 12th Street EB
Curb Side Station – 12th Street EB
Curb Side Station – 12th Street WB
Coordination with Businesses and Residents

- Construction Manager will oversee all construction activities.
- A **24-hour hotline** will be established.
- Regular public meetings will be scheduled.
- Advance schedule for all particular work will be provided.
- GRTC will post signs during construction.
- Safe pedestrian access will be provided at all times.
Landscape and Urban Design Features

Cleveland- East
Landscape and Urban Design Features

Cleveland- East
Landscape and Urban Design Features

Robinson - East
Robinson- East
Landscape and Urban Design Features

Robinson-West
Landscape and Urban Design Features

Robinson- West
Landscape and Urban Design Features

Allison - East
Landscape and Urban Design Features

Shafer- East
Landscape and Urban Design Features

Adams - East
3RD/4TH- East
12th- West
12th- West
24TH- East
Route 5- East
Route 5- West
**Landscape and Urban Design Features**

**Typical Plant List (Acceptable Options)**

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
<th>Size and Specifications</th>
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</thead>
<tbody>
<tr>
<td>1. BOSTON IVY AT THE BASE OF COLUMN</td>
<td>BOSTON IVY</td>
<td>D. 2.5&quot; x T. 84&quot;</td>
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<tr>
<td>2. BOSTON IVY AT THE BASE OF COLUMN</td>
<td>BOSTON IVY</td>
<td>D. 2.5&quot; x T. 84&quot;</td>
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<tr>
<td>3. ANNABELLE HYDRANGEA</td>
<td>ANNABELLE HYDRANGEA</td>
<td>D. 2.5&quot; x T. 84&quot;</td>
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<tr>
<td>4. SEA GREEN JUNIPER</td>
<td>SEA GREEN JUNIPER</td>
<td>D. 2.5&quot; x T. 84&quot;</td>
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<tr>
<td>5. SEA GREEN JUNIPER</td>
<td>SEA GREEN JUNIPER</td>
<td>D. 2.5&quot; x T. 84&quot;</td>
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**Landscape Floor Plan - Shafer West Bound**

GRTC Bus Rapid Transit (BRT) Project
Partner with State, RRPDC, & Stakeholders to Plan for Corridor

- $150,000+/Budget City and DRPT
- Revitalization Plan
  - Land Use Analysis & Recommendations
  - Zoning Implications & Changes
  - Urban Design Guidelines
  - Bike/Ped/Transit Connections
- ¼ and ½ Mi. Radii from Stations
Phase 1: Data & Analysis

- Review of Exist’g Plans and Studies Along Corridor
- Land Use
- Real Estate
- Demographic & Economic
- Base mapping
Phase 2: Engagement, Design, Implementation

- Community Input & Feedback Process
- Station Area Framework
  - Type. Form, Mix of uses
- Development Opportunities
  - Potential
  - Est. of Costs/Benefits
- TOD Strategy
  - Financing
  - Public Policy Changes, etc.
- Corridor Urban Design
- 12 months to complete
Median Widths

- Thompson to Sheppard: 4-foot median
  3 feet at left turns
- Sheppard to Harrison: 4-foot median
  2 feet at left turns
- Harrison to Pine: 6-foot median
- Pine to Foushee: 4-foot median
  2 feet at left turns
GRTC On-Offs in Corridor
Population Density 2008 to 2035

Population Density 2008

Population Density 2035

Legend
- BRT Stations
- BRT Alignment

Persons Per Square Mile
- <= 3,333
- 3,334 to 6,666
- 6,667 to 10,000
- 10,001 to 15,000
- > 15,000

FIGURE 8: Population Density in 2008 and 2035
Corridor Disadvantaged Population

FIGURE 6: Disadvantaged Populations within the Corridor

Legend:
- Proposed BRT Stations
- Proposed BRT Alignment
- Half-Mile Buffer
- 2010 Census Tracts

- Minority
- Low-Income
- Both Minority & Low-Income
- Zero Car Household > 10% of all Households
Corridor Development Potential

FIGURE 5: Development Potential

Legend
- Proposed BRT Alignment
- Half-Mile Buffer

Development Potential
- Vacant and Developable
- Underutilized
- Utilized
- Undevelopable

Miles
Study Phase: Median Station Option 2

Center platform
with BRT Signals at Gateways
Study Phase: Median Station Option 3

Single Center Platform
Platform on Left Side with Custom Doors on Left Side