Application for URBAN DESIGN COMMITTEE Review

Department of Planning and Development Review
Planning & Preservation Division
900 E. Broad Street, Room 510
Richmond, Virginia 23219
(804) 646-6335
http://www.richmondgov.com/CommitteeUrbanDesign

Application Type

- ☐ Addition/Alteration to Existing Structure
- ☑ New Construction
- ☐ Streetscape
- ☐ Site Amenity
- ☐ Encroachment
- ☐ Master Plan
- ☐ Sign
- ☐ Other

Review Type

- ☑ Conceptual
- ☐ Final

Project Name: GRTC Bus Rapid Transit (BRT) Project

Project Address: Broad Street (Staples Mill Rd to 14th St.) and East Main Street (14th Street to Rockett's Landing)

Brief Project Description (this is not a replacement for the required detailed narrative) : The Bus Rapid Transit project sponsored by the Greater Richmond Transit Company (GRTC) is to be located primarily in the City of Richmond with a guideway of dedicated median bus lanes and curb lanes extending 7.6 miles from Willow Lawn in the west to Rockett's Landing in the east. A total of 14 station will be constructed along the guideway - 13 in the City.

Applicant Information

(on all applications other than encroachments, a City agency representative must be the applicant)

Name: Douglas C. Dunlap Email: Douglas.Dunlap@richmondgov.com

City Agency: Economic and Community Development Phone: 804.646.5663

Address: City Hall, 800 East Broad Street, Richmond VA

Main Contact (if different from Applicant): Steve McNally

Company: Greater Richmond Transit Company Phone: 804.358.3871 ext. 365

Email: SMcNally@RideGRTC.com

Submittal Deadlines

All applications and support materials must be filed no later than 21 days prior to the scheduled meeting of the Urban Design Committee (UDC). Please see the schedule on page 3 as actual deadlines are adjusted due to City holidays. **Late or incomplete submissions will be deferred to the next meeting.**

Filing

Applications can be mailed or delivered to the attention of "Urban Design Committee" at the address listed at the top of this page. **It is important that the applicant discuss the proposal with appropriate City agencies, Zoning Administration staff, and area civic associations and residents prior to filing the application with the UDC.**

UDC Background

The UDC is a ten member committee created by City Council in 1968 whose purpose is to advise the City Planning Commission on the design of projects on City property or right-of-way. The UDC provides advice of an aesthetic nature in connection with the performance of the duties of the Commission under Sections 17.05, 17.06 and 17.07 of the City Charter. The UDC also advises the Department of Public Works in regards to private encroachments in the public right-of-way.

GRTC TRANSIT SYSTEM | GET READY TO CONNECT



Application for
URBAN DESIGN COMMITTEE REVIEW

GRTC Bus Rapid Transit (BRT) Project Narrative

July 2015

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Contents

1. Purpose of the Project

The GRTC Bus Rapid Transit (BRT) project is a regional collaboration between GRTC Transit System, the Virginia Department of Rail and Public Transportation (DRPT), the City of Richmond, and Henrico County. GRTC BRT will improve transit service, increase quality of life, enhance economic opportunity, revitalize commercial properties, improve environmental sustainability, and stimulate economic development in the City, county, and the greater Richmond region.

The GRTC BRT Project will be 7.6 miles long and constructed in a busy transportation corridor that connects greater Richmond to growth areas in surrounding Henrico County. The project will provide service from Willow Lawn in the west through downtown Richmond to Rocketts Landing in the east, including 14 stations and more than 3 miles of dedicated travel lanes. The GRTC BRT route and station map is shown below in **Figure 1**.

As development has occurred along Broad Street in recent years, the corridor has become an important activity center and economic engine for the region. More than 33,000 people live and more than 77,000 jobs are located within a half-mile of the project stations. Importantly, the GRTC BRT Project will create economic opportunity in a city with the highest poverty rate in Virginia.

Currently, the Broad Street corridor does not adequately accommodate the needs of the region's residents and workers. The corridor faces many challenges, including:

- Long travel times for bus riders
- Service delays due to bunching
- Substandard bus lane widths
- Lack of bus lane exclusivity in off-peak times
- Reduced level of service for motor vehicles and buses
- Congested regional interstates increasing travel time delay and costly commutes for vehicular traffic accessing the corridor
- Limited and unreliable local access to employment, retail, educational institutions, and health care services for transit-dependent populations
- Lack of permanent infrastructure investment to support development and redevelopment initiatives that would stimulate the economy of the metropolitan area

The GRTC BRT Project will:

- Increase bus speeds by approximately 65 percent
- Reduce travel time for riders on BRT by approximately 33 percent
- Provide a permanent transit investment in the Broad Street corridor that will encourage economic development and stimulate property values
- Attract new riders with travel times that are competitive with the automobile

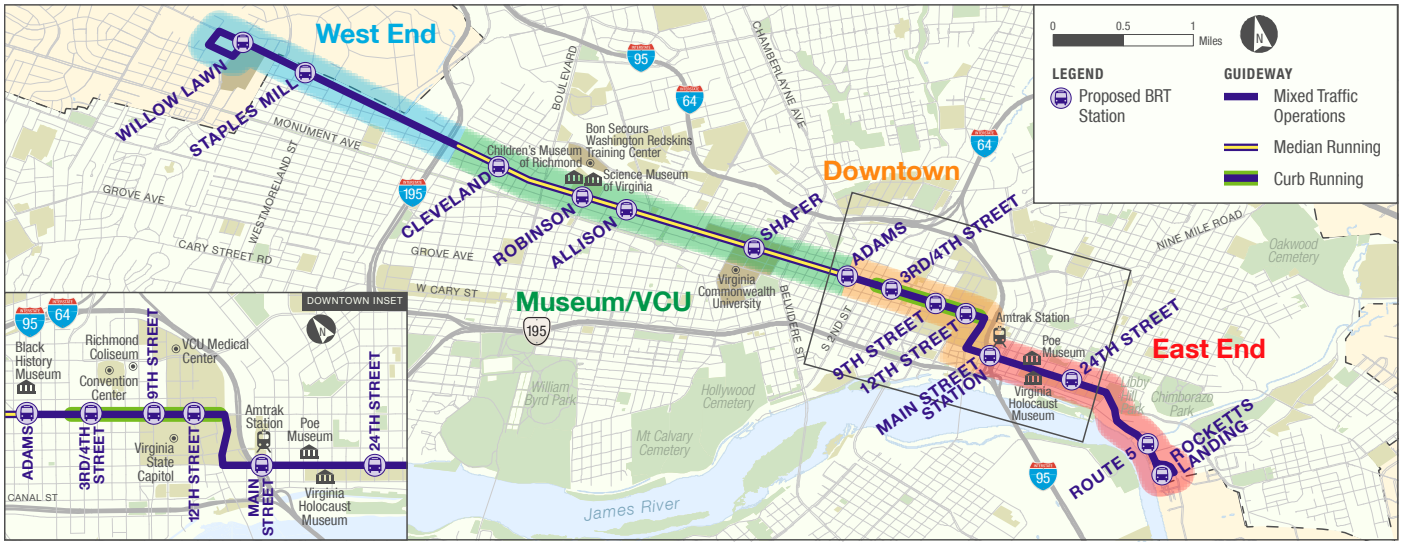


Figure 1: *GRTC BRT Route and Station Map*

- Improve the reliability of transit operations on Broad Street by providing a dedicated lane for BRT vehicles from Thompson to Adams Streets and by improving the dedicated bus lane between 4th and 14th Streets
- Expand the range of job opportunities for transit-dependent populations by increasing the areas accessible within a reasonable commute time
- Create additional opportunities to increase system-wide efficiency for GRTC and further improve service on local routes
- Leverage opportunities for mixed-use, transit-oriented development (TOD) that will revitalize an economically distressed corridor and improve jobs-housing balance
- Improve pedestrian safety at station areas with improved crosswalks and pedestrian refuge areas at station platforms.

2. Project Background

The origins of the GRTC BRT Project span 12 years in the City of Richmond and the region. The project first was recommended in the Richmond Rail Transit Feasibility Study completed by the Virginia Department of Transportation (VDOT) and the Richmond Regional Transportation Planning Organization (TPO) in 2003. The project was again recommended by the Richmond Regional Mass Transit Study completed by DRPT and the Richmond Regional TPO in 2008, and was incorporated into the plans for future bus service in GRTC's Comprehensive Operations Analysis the same year. The City of Richmond also embraced the GRTC BRT Project, and has included and incorporated the GRTC BRT Project into the City Master Plan, the Richmond Downtown Plan, the Richmond Strategic Multimodal Transportation Plan, and the Mayor's Anti-Poverty Commission Report.

The GRTC BRT Project moved toward implementation in 2010 with the Broad Street Bus Rapid Transit Study undertaken by DRPT and GRTC to evaluate different approaches to introducing BRT to Broad Street. A build alternative was developed and presented to the public in May 2014. The study concluded in 2014 with the preparation of an Environmental Assessment (EA) Document that was submitted to the Federal Transit Administration (FTA). In the spring of 2014, GRTC submitted an application to the United States Department of Transportation (USDOT) for funding to construct the BRT project. In September 2014, GRTC was notified by USDOT that its grant application had been approved under USDOT's Transportation Investment Generating Economic Recovery (TIGER) program. That same month, GRTC awarded a contract for the design of the BRT project and initiated the design process. Extensive documentation of the study, the EA, the grant application, and the design efforts to date can be found at **http://ridegrtc.com/brt/documents/**.

3. Project Budget and Funding Sources

The capital and construction budget for the project is $49.8 million, including the following funding:

- $24.9 million – FTA (TIGER Grant)
- $16.9 million – Virginia DRPT
- $7.6 million – City of Richmond
- $400,000 – Henrico County

4. Corridor Description

a. Station Locations

The locations for the GRTC BRT stations were initially designated by the Broad Street Bus Rapid Transit Study conducted by DRPT and GRTC. These locations were identified as the preferred local alternative for the project in the study and presented to the public in a meeting in May 2014. These locations were examined for any potential environmental impacts and any potential effects on nearby historic structures during the EA and Section 106 studies that were reviewed by FTA and the Virginia Department of Historic Resources (DHR). These locations were submitted to USDOT in the scope of work for the TIGER grant application and were subsequently approved by USDOT and FTA as integral components of the BRT project.

The station locations identified in the Broad Street Bus Rapid Transit Study were selected based on several criteria, including the recommendations from a Comprehensive Operations Analysis that had been conducted for GRTC, existing transit ridership, an examination of population and employment densities along the corridor, development along the corridor including current and future activity centers, accessibility to local bus service, and pedestrian and bicycle access. The study also examined each station site

for potential environmental impacts, impacts on historical structures, and suitability to surrounding current and future land use. The GRTC BRT Route and Station Map that was produced in the study is shown below in **Figure 2**.

A much closer examination of the GRTC BRT Project station locations was undertaken with the initiation of project design. The design team visited the site of each platform at every station to analyze each from an engineering perspective. The site of each BRT station platform was examined with regard to criteria such as:

- Bus access to the platforms
- Sufficiency of right-of-way to accommodate the platform
- Utility relocations required
- Existing structural obstacles
- Traffic signage and signalization poles and light poles
- Impacts on underground utilities
- Drainage issues
- Slopes of streets and sidewalks
- Pedestrian access to stations at signalized stations
- Impacts on adjacent businesses and/or property owners

The design team notified in writing all property owners and tenants located adjacent to the GRTC BRT stations and offered to meet with those individuals to discuss the project, the station design, and any potential impacts the stations may have. In addition, all tenants of property located adjacent to curbside stations were visited by the design

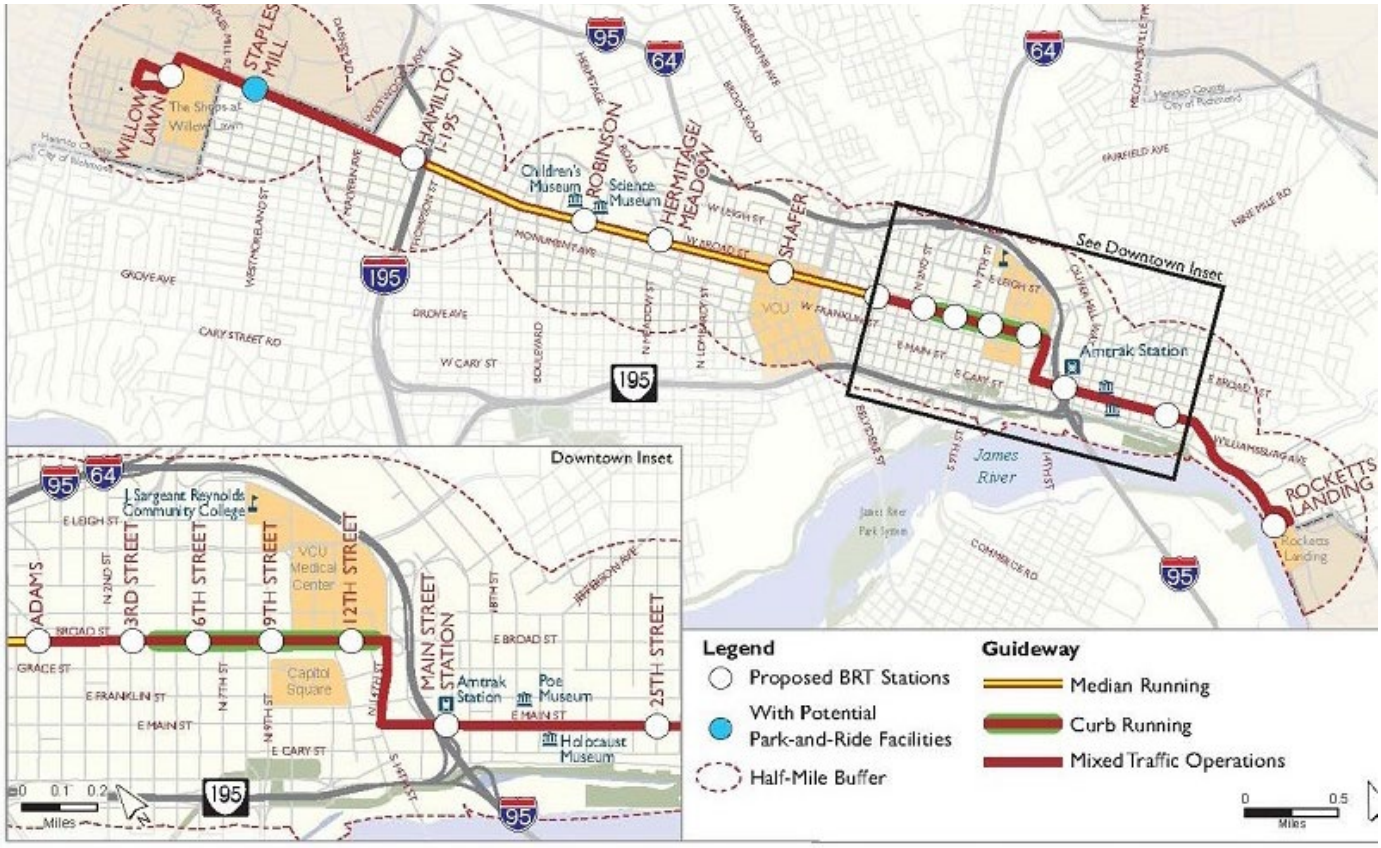


Figure 2: *GRTC BRT Route and Station Map recommended by Broad Street Bus Rapid Transit Study*

team and shown the plans and designs for the station. All concerns expressed by property tenants were discussed and addressed by the design team.

As a result of the engineering analysis and discussions with property owners, a number of changes were made to station locations. The changes that were made to station locations were sent to FTA and DHR for updated environmental and Section 106 review.

Figure 3 shows the new GRTC BRT Route and Station Map. Changes made to the station locations recommended in Broad Street BRT Study are shown in **Table 1** below. A full report of the engineering analysis that was performed to modify station locations, entitled "Final Station Location Report V3," can be found at **http://ridegrtc.com/brt/documents/**.

Architectural renderings of each platform shown in context with its surroundings are provided in the **Appendix** to this report. Both daytime and nighttime views of each platform are shown in the renderings.

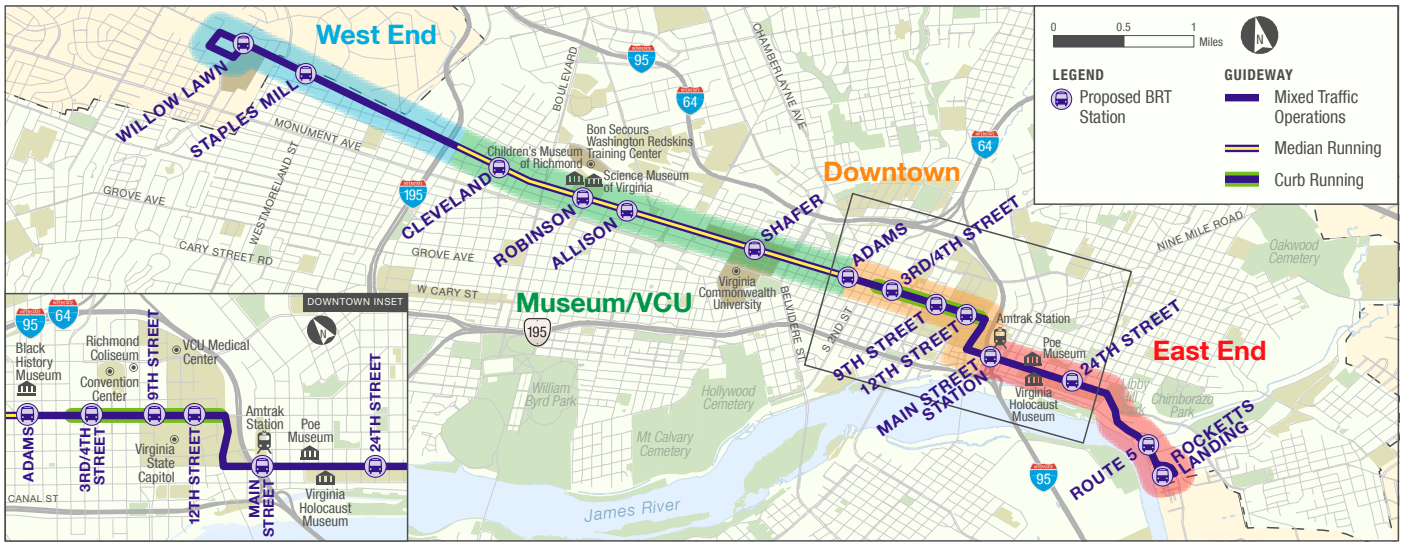


Figure 3: *Final GRTC BRT route and station map*

TABLE 1: CHANGES MADE TO GRTC BRT STATION LOCATIONS

Station Locations Recommended in the Broad Street BRT Study	Final GRTC BRT Station Locations
Willow Lawn: One platform on east side of Willow Lawn Drive, south of W. Broad Street intersection	Platform relocated to the south side of W. Broad Street, just west of the intersection with Willow Lawn Drive 
Staples Mill: Two platforms—one on south side of W. Broad Street, just west of Staples Mill Road; and the other on the North side of W. Broad Street, east of Staples Mill Road	Both platforms moved one block. One to the south side of W. Broad Street, 200 feet east of Chantilly Street; and the other on the north side of W. Broad Street, west of Chantilly Street 

TABLE 1: CHANGES MADE TO GRTC BRT STATION LOCATIONS

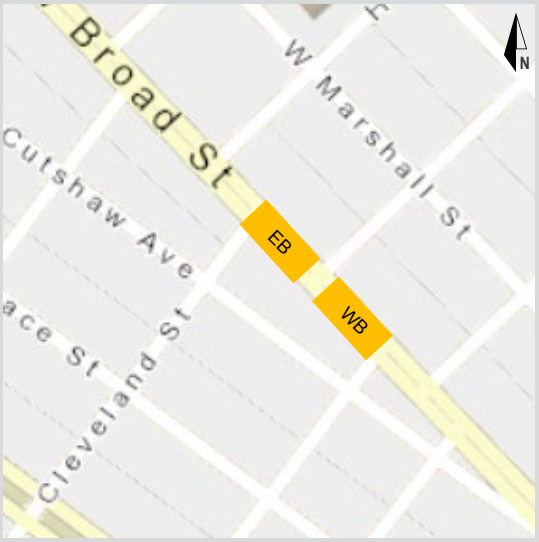
Station Locations Recommended in the Broad Street BRT Study	Final GRTC BRT Station Locations
Hamilton/I-195: Two platforms—one on south side of W. Broad Street, west of Hamilton intersection and the other on the north side of W. Broad Street, east of Hamilton Road intersection	Relocated to **Cleveland Street:** two platforms in W. Broad Street median on the east side of the intersection with Cleveland 
Robinson: Two platforms in W. Broad Street median—one on the west side of Robinson Street intersection, and the other on the east side thereof	Eastbound platform moved to Mulberry Street; westbound platform remains unchanged 

TABLE 1: CHANGES MADE TO GRTC BRT STATION LOCATIONS

Station Locations Recommended in the Broad Street BRT Study	Final GRTC BRT Station Locations
Hermitage/Meadow: Two platforms in W. Broad Street median—one on the west side of Meadow Street intersection, and the other on the east side of the intersection	Relocated to **N. Allison Street**, one block west on W. Broad Street 
Shafer: Two platforms in W. Broad Street median—one on the west side of Shafer Street intersection, and the other on the east side of the intersection	Unchanged 

TABLE 1: CHANGES MADE TO GRTC BRT STATION LOCATIONS

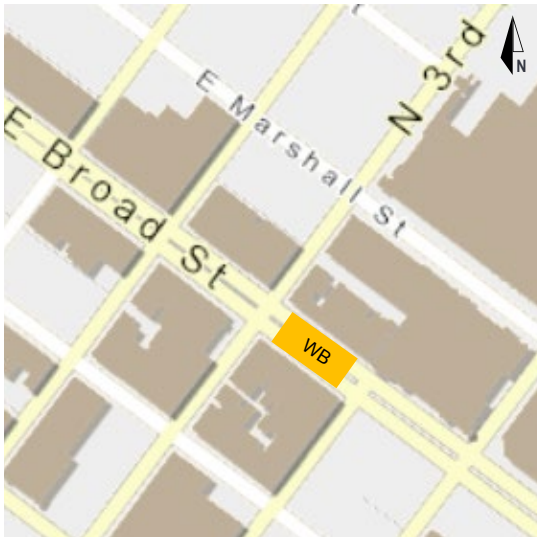
Station Locations Recommended in the Broad Street BRT Study	Final GRTC BRT Station Locations
Adams: Two platforms in W. Broad Street median—one on the west side of Adams Street intersection, and the other on the east side	Unchanged 
3rd/4th Street: Two platforms—one on the south side of E. Broad Street, just west of 3rd Street; the other on the north side of E. Broad Street, just east of 3rd Street	Westbound platform relocated to northwest corner of 3rd and E. Broad Streets. Eastbound platform relocated between 4th and 5th Streets, on the south side of E. Broad Street 
6th Street: Two platforms—one on the south side of E. Broad Street, just west of 6th Street; the other on the north side of E. Broad Street, just east of 6th Street	Removed

TABLE 1: CHANGES MADE TO GRTC BRT STATION LOCATIONS

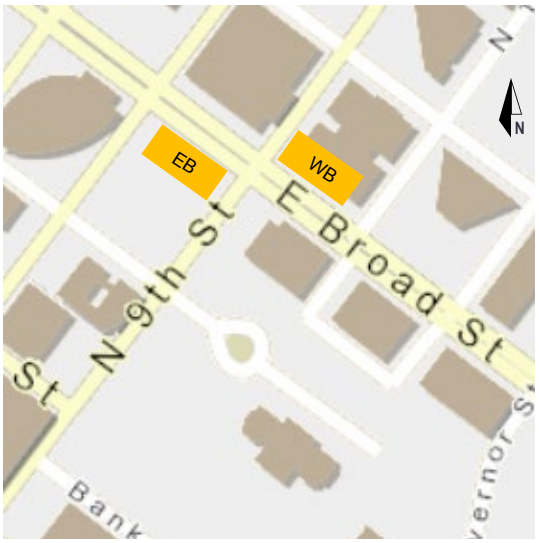
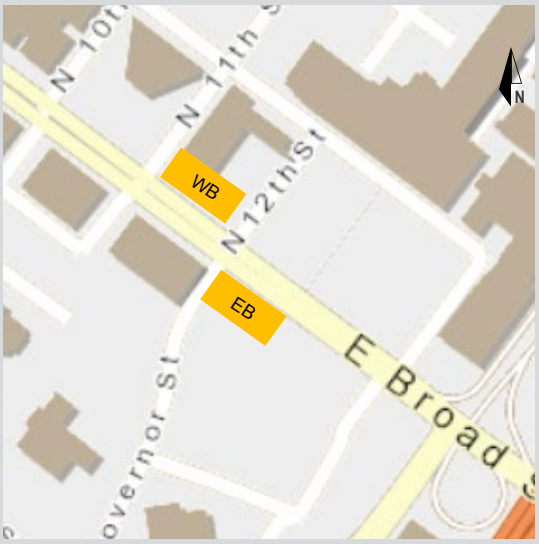
Station Locations Recommended in the Broad Street BRT Study	Final GRTC BRT Station Locations
9th Street: Two platforms—one on the south side of E. Broad Street, just east of 9th Street; the other on the north side of E. Broad Street, just east of 9th Street	Unchanged 
12th Street: Two platforms—one on the south side of E. Broad Street, just east of 12th Street; the other on the north side of E. Broad Street, just west of 12th Street	Platform on the north side of Broad Street moved to just west of 12th Street 

TABLE 1: CHANGES MADE TO GRTC BRT STATION LOCATIONS

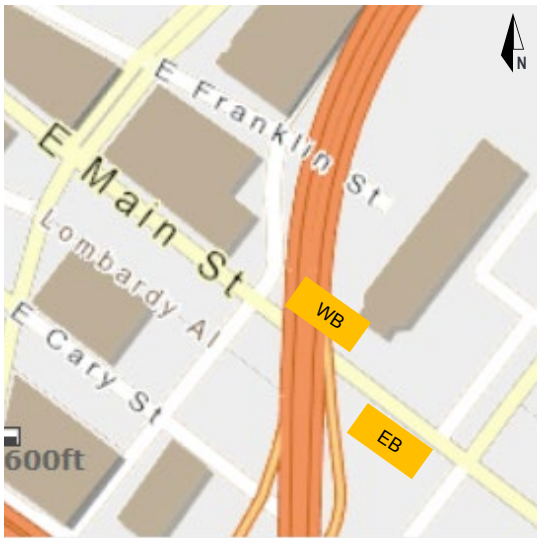
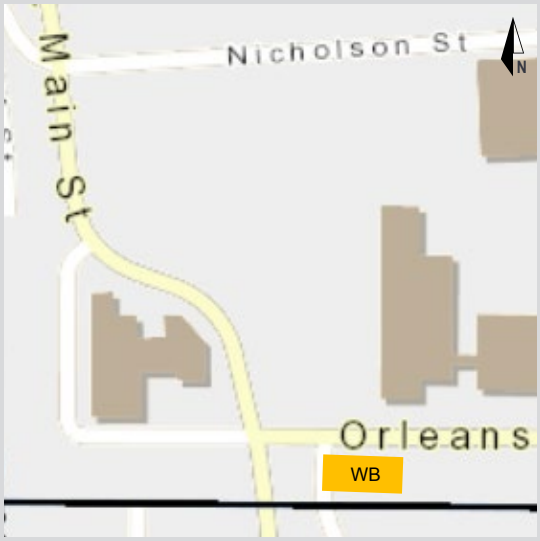
Station Locations Recommended in the Broad Street BRT Study	Final GRTC BRT Station Locations
Main Street Station: Two platforms on either side of E. Main Street in front of the entrance to Main Street Station	The platform on the north side of the street moves ½ block west to just east of 15th Street. The platform on the south side moves ½ block east to just beyond the train trellis. 
25th Street: Two platforms—one on the south side of E. Main Street, east of 25th Street; the other on the north side of E. Main Street, just east of 25th Street	Relocated to **24th Street**, one block east on E. Main Street 

TABLE 1: CHANGES MADE TO GRTC BRT STATION LOCATIONS

Station Locations Recommended in the Broad Street BRT Study	Final GRTC BRT Station Locations
None	New stop added along **Route 5**, two stations on either side of the roadway (E. Main Street) 
Rocketts Landing: One station on east side of Orleans Street, south of E. Main Street intersection	Unchanged 

b. Roadway Modifications

All roadway modifications related to the BRT transitway, general purpose travel lanes, and other geometric roadway features within the right-of-way will follow this established set of design criteria. These criteria are a collection of design standards and/or guidance from local, state, and national sources. The American Association of State Highway and Transportation Officials (AASHTO) is the national body that has developed design standards and guidance for transportation infrastructure through practice, policy testing, research, and experience. AASHTO's *A Policy on Geometric Design of Highways and Streets* (also referred to as the "Greenbook") provides guidance on roadway design. AASHTO's Guide of Geometric Design of Transit Facilities on Highways and Streets provides supplemental information with regard to roadway designs specific to transit applications. The design criteria for this project are based largely on these two manuals. Additional state and local standards provided by VDOT, Henrico County, and the City of Richmond also will be utilized.

The majority of the proposed BRT route follows Broad Street in the City of Richmond, which is classified by VDOT as an Urban Principal Arterial. The route also will follow a few other streets, including 14th Street, Main Street, Old Main Street, and Orleans Street in the City of Richmond, and Byrd Avenue, Markel Road, and Willow Lawn Drive in Henrico County. The design standards for each of these streets are governed by the agency that owns and maintains the facility. All streets within the City of Richmond are owned and maintained by the City.

This project does not propose to widen any streets for BRT operations; therefore, it is important to balance the needs of the many users along the corridor within the existing roadway width. Along Broad Street specifically, roadway width must be appropriately allotted to general purpose travel lanes, BRT lanes, parking lanes, left-turn lanes, and median width while maintaining safety for all users.

Lane width is an important aspect of the design of the BRT system along Broad Street. AASHTO guidance recommends a minimum of 10 feet for all general purpose travel lanes and 11 feet for bus lanes. Additionally, the City of Richmond has expressed a desire for 11 feet to be used for travel lanes where possible, and a minimum width of 11 feet for bus lanes.

Raised median width also is an important aspect of the design. VDOT and AASHTO both recommend using 4-foot medians, but narrower medians are acceptable. The City of Richmond has expressed a desire for 4-foot medians, but will accept narrower medians to avoid widening the roadway to the outside in order to maintain sidewalk width.

c. Mixed Traffic Segments

The segments of the project where the bus will not operate in its own dedicated lane are referred to as "mixed-traffic" segments. Three separate sections will operate in mixed-traffic: from Willow Lawn Drive to Thompson Street, from Foushee Street to 4th Street, and along 14th Street and Main Street. In these segments, the bus will operate in lanes shared with general traffic, the same way it does today.

Where the bus transitions from median-running to curb-running between Foushee Street and 4th Street, no changes are proposed to the existing median or curbs. From Foushee Street to 2nd Street, no changes are proposed to the existing lane striping; however, the section between 2nd Street and 4th Street will be restriped to add additional parking where the GRTC fixed-route service currently operates in dedicated curb lanes. Eastbound and westbound travel lanes (two in each direction) also will be restriped from 2nd Street to 4th Street as 11-foot wide lanes by narrowing the parking lane as necessary.

Minor roadway widening is required on Main Street just west of 17th Street. The existing curb lane is too narrow for a BRT vehicle to stop at the proposed station without encroaching upon the adjacent travel lane. The outside lane will be constructed to be 2 to 3 feet wider directly in front of the station to allow the BRT vehicle to fit.

The remainder of the mixed-traffic segments—from Willow Lawn Drive to Thompson Street and along 14th Street and Main Street—are not expected to require roadway widening, modification, or restriping.

d. Median-Running Transitway

This segment of the corridor provides dedicated lanes for the bus in the center of the roadway from Thompson Street to Foushee Street. Running the BRT in the center of the roadway, as opposed to the outside, will help to minimize conflicts with vehicles turning to/from side streets and private entrances and allow parallel parking along the curb. The two bus lanes (eastbound and westbound) located in the center of the roadway also help enhance the look and feel of a dedicated transitway.

The existing section of Broad Street in this segment includes three 10-foot through lanes in each direction, with parking on both sides, and a raised concrete median that will vary between 4 and 6 feet in width. No existing dedicated turn lanes exist at any intersection other than at Belvidere Street. The existing roadway is approximately 76 feet measured from curb face to curb face from Thompson Street to Sheppard Street, shown in **Figure 4**, and approximately 82 feet from Sheppard Street to Foushee Street, shown in **Figure 5**.

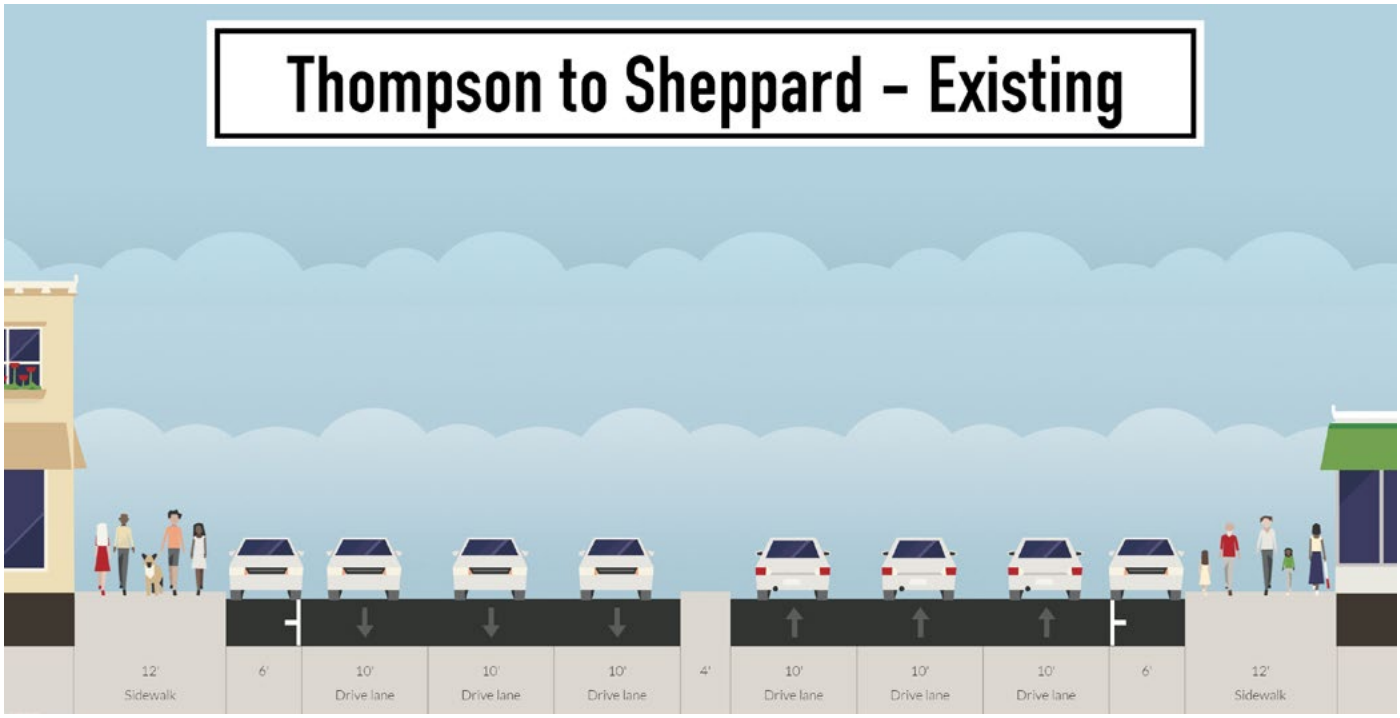


Figure 4: *Existing typical section for Broad Street between Thompson and Sheppard Streets*

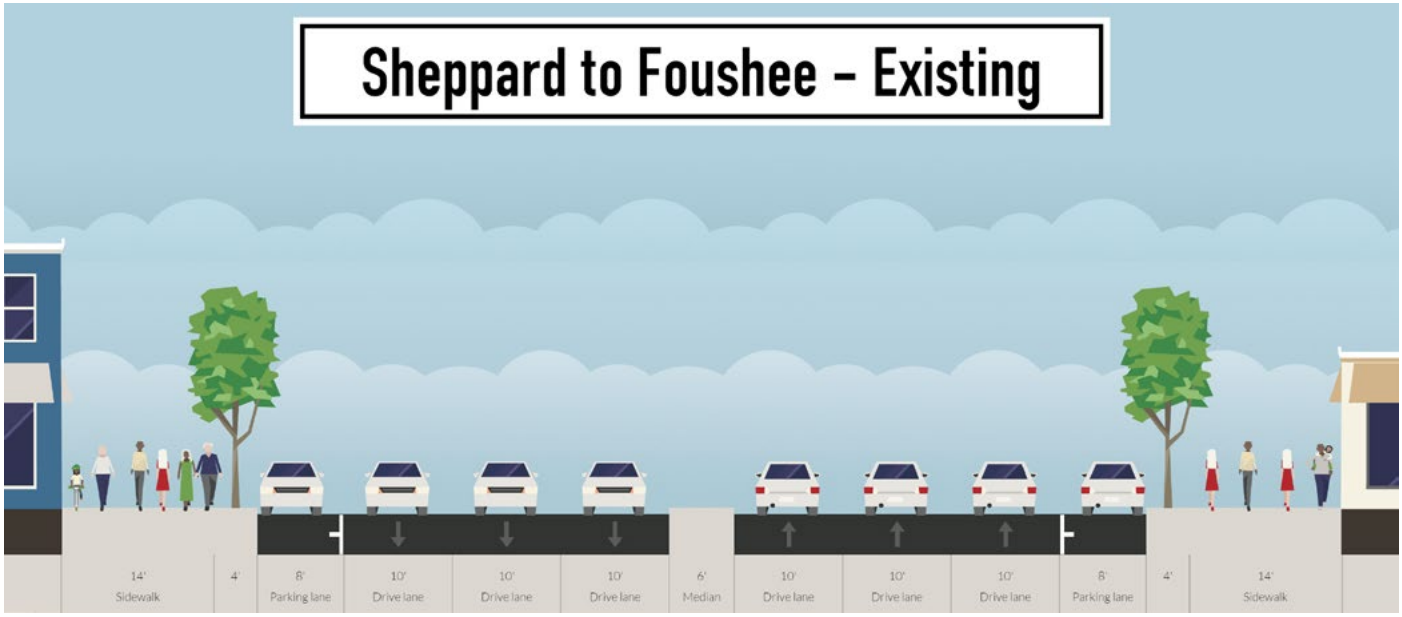


Figure 5: *Existing typical section for Broad Street between Sheppard and Foushee Streets*

Throughout the median-running segment of Broad Street, there are several competing uses. The proposed typical section shown in **Figure 6** balances the needs of all uses to the maximum extent possible. These different uses include the number of general purpose travel lanes and lane width, BRT lane width, median width, presence of on-street parking or loading zones and their corresponding widths, left-turn lane width (where applicable), and BRT station platform width.

The proposed typical section for the median-running transitway, shown in **Figure 6**, is a "typical" divided roadway, where opposing directions of travel are separated by a raised median in the center of the roadway and where the BRT vehicles would be separated from general purpose vehicles traveling in the same direction only by lane markings. The number of general purpose travel lanes in each direction will be reduced from three to two. Two dedicated median-running BRT lanes will be added (one in each direction). From Thompson Street to Sheppard Street, parking will be provided on one side of the street, except in the vicinity of turn lanes and stations, where no parking will be provided. From Sheppard Street to Foushee Street, existing parking lanes will be preserved on both sides of the street except in the vicinity of turn lanes and stations, where only one parking lane will be preserved. The area of Broad Street near VCU's Monroe Park Campus is an exception. From Harrison Street to Pine Street, additional parking will be eliminated in order to provide a 6-foot median, which is considered wide enough for safe pedestrian refuge. When parking is provided only on one side of the street, the adjacent land use will factor into whether parking is provided on the north side or south side of the street.

The following three sections, **Figure 6** to **Figure 8**, show the proposed roadway typical sections on Broad Street from Thompson Street to Sheppard Street in three different scenarios: the "typical" section, the design at left-turn lanes, and the design at BRT stations.

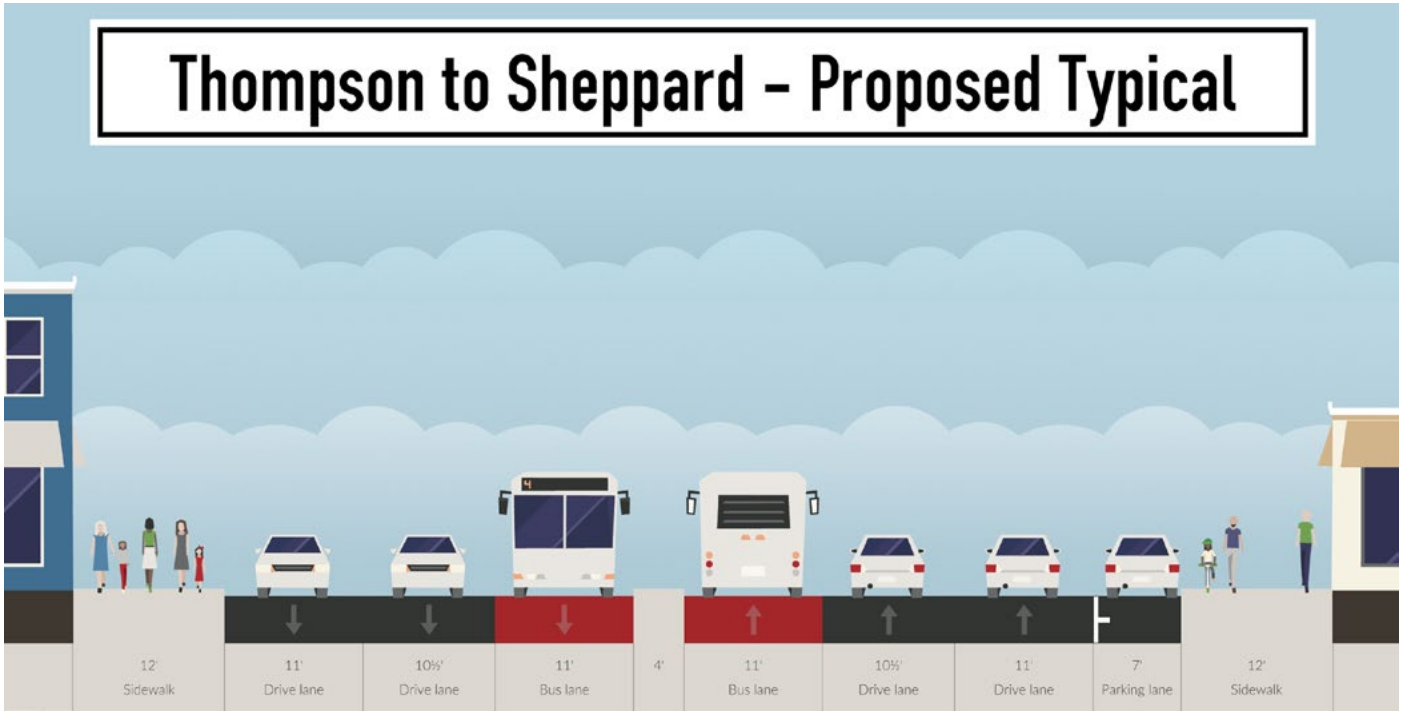


Figure 6: *Proposed typical section for Broad Street between Thompson and Sheppard Streets*

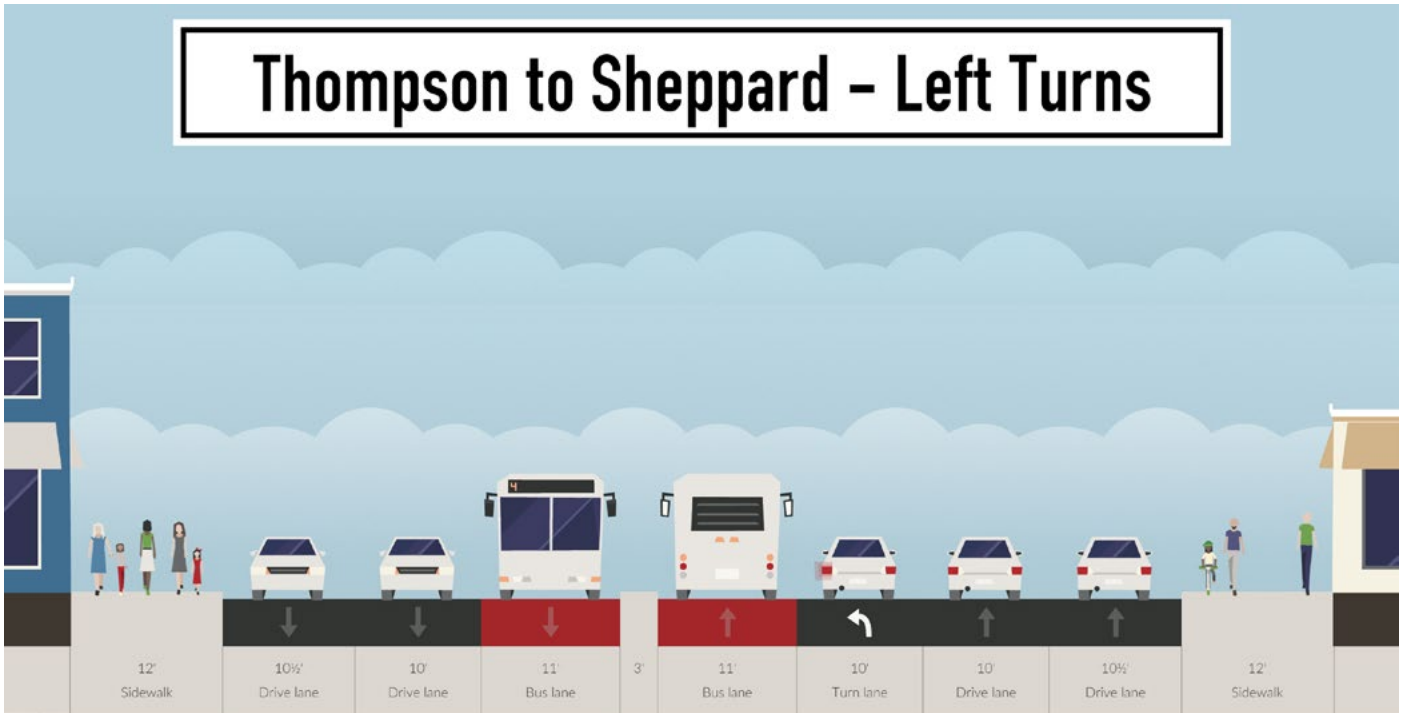


Figure 7: *Proposed left-turn typical section design for Broad Street between Thompson and Sheppard Streets*

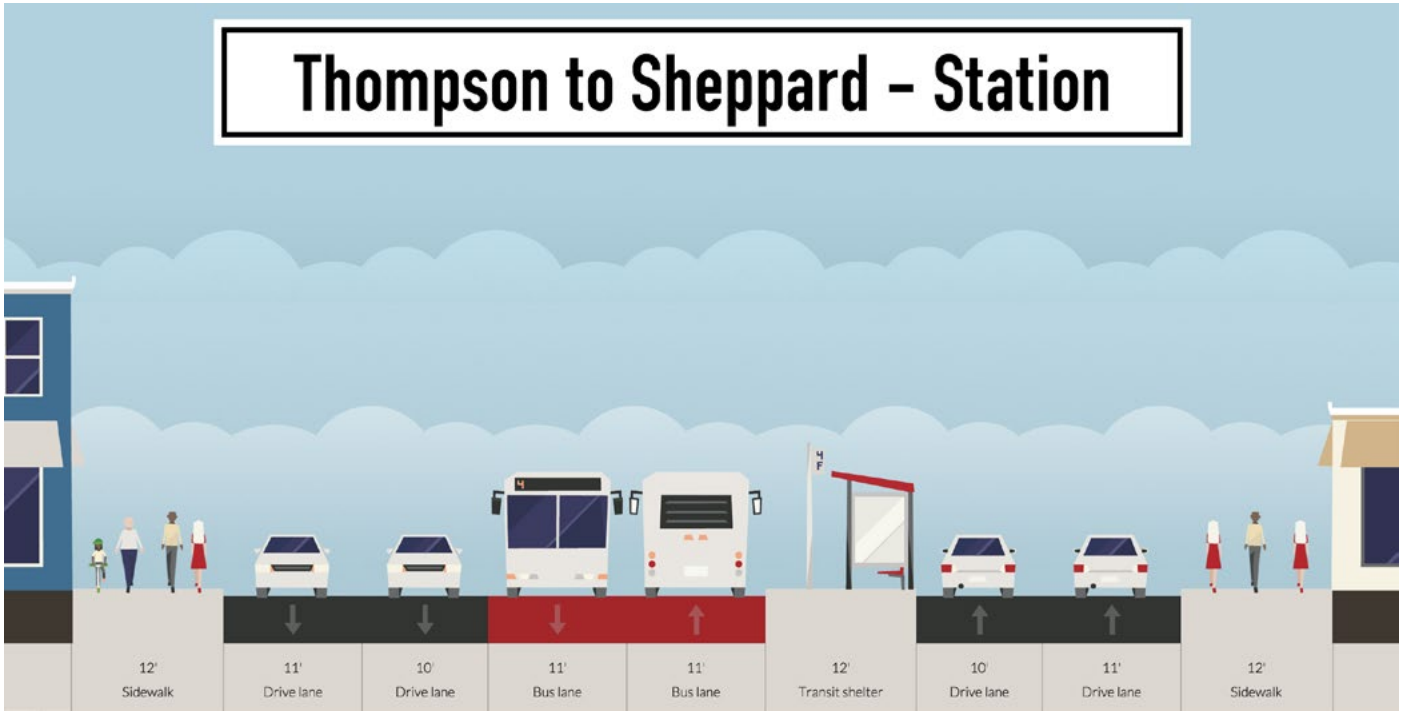


Figure 8: *Proposed station typical section design for Broad Street between Thompson and Sheppard Streets*

Figure 9 through **Figure 11** show the proposed roadway typical sections on Broad Street from Sheppard Street to Foushee Street in three different scenarios: the "typical" section, the design at left-turn lanes, and the design at BRT stations.

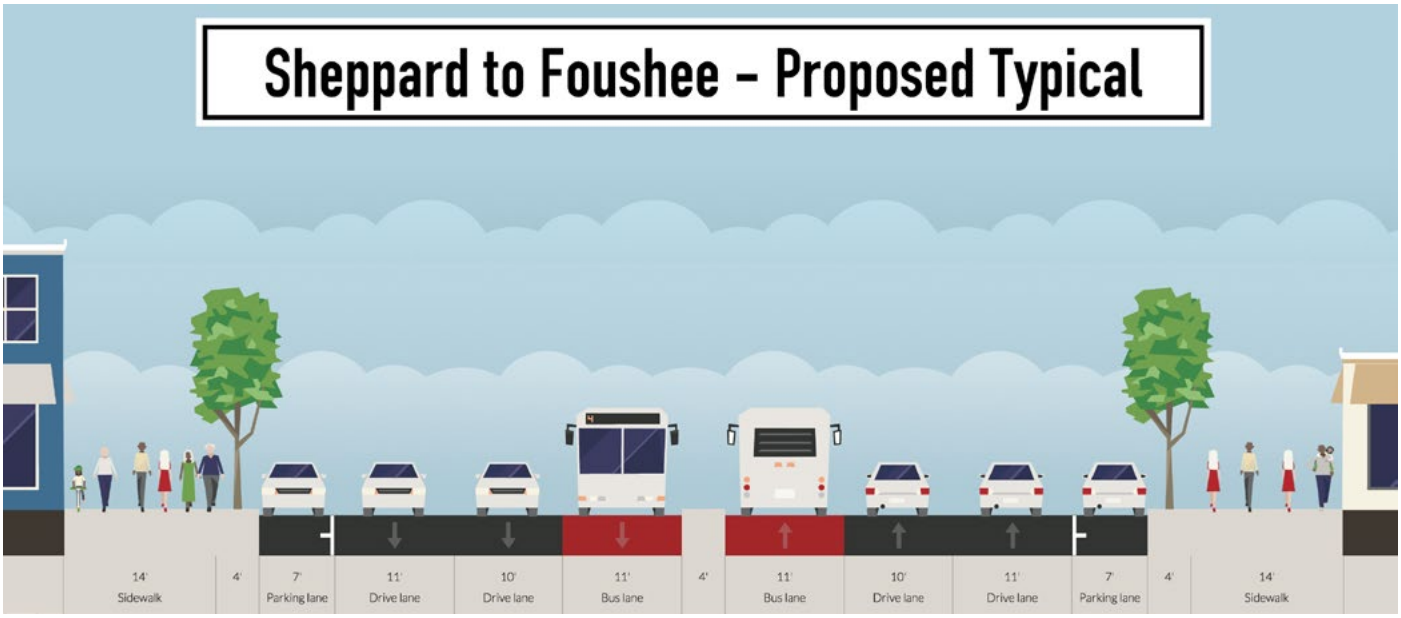


Figure 9: *Proposed typical section for Broad Street between Sheppard and Foushee Streets*

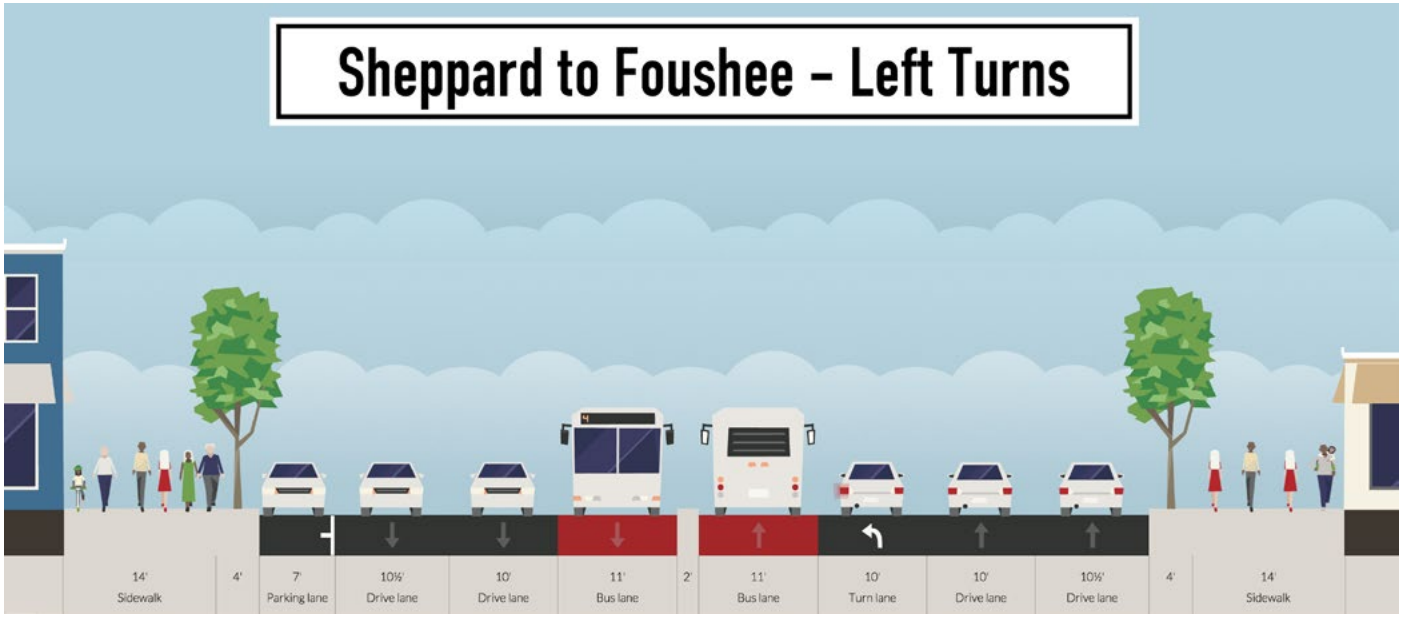


Figure 10: *Proposed typical section design of left-turns for Broad Street between Sheppard and Foushee Streets*

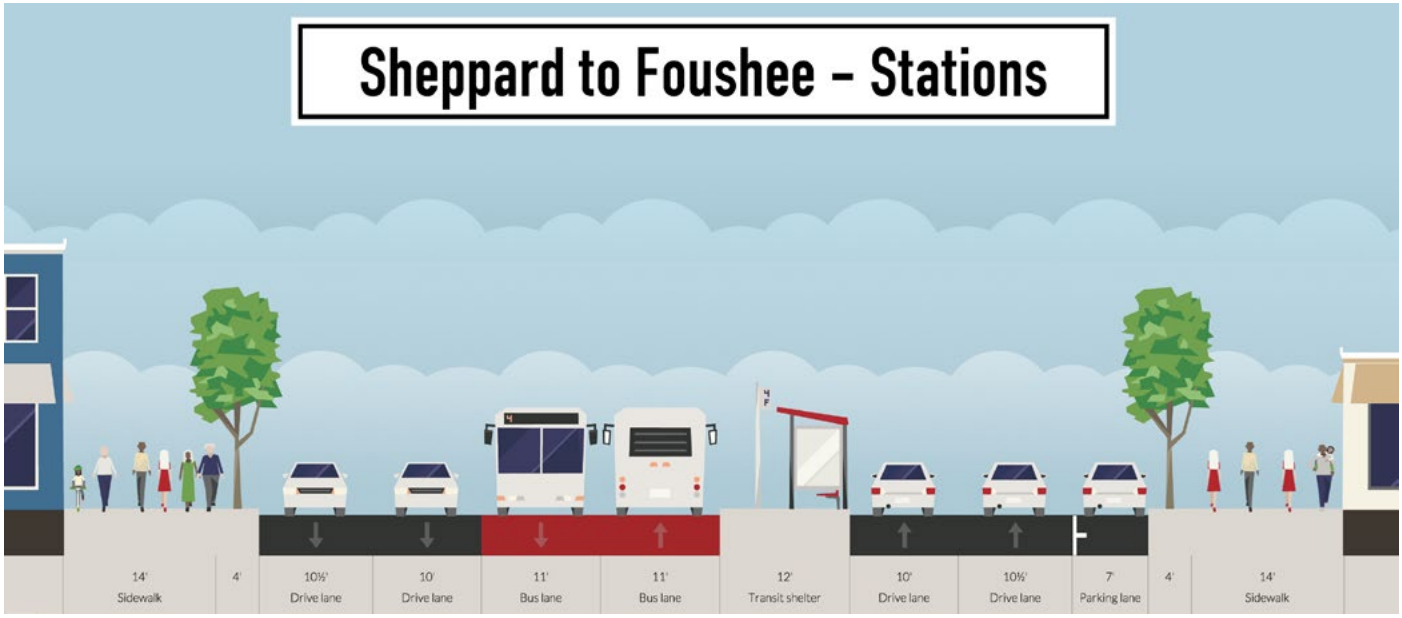


Figure 11: *Proposed typical section design of stations for Broad Street between Sheppard and Foushee Streets*

The following section for Harrison Street to Pine Street is the lone exception to the sections shown for Sheppard Street to Foushee Street. In this area, special consideration was given to median width for pedestrian safety due to high pedestrian activity around the VCU Monroe Park campus. This is demonstrated in **Figure 12**, which has a 6-foot median.

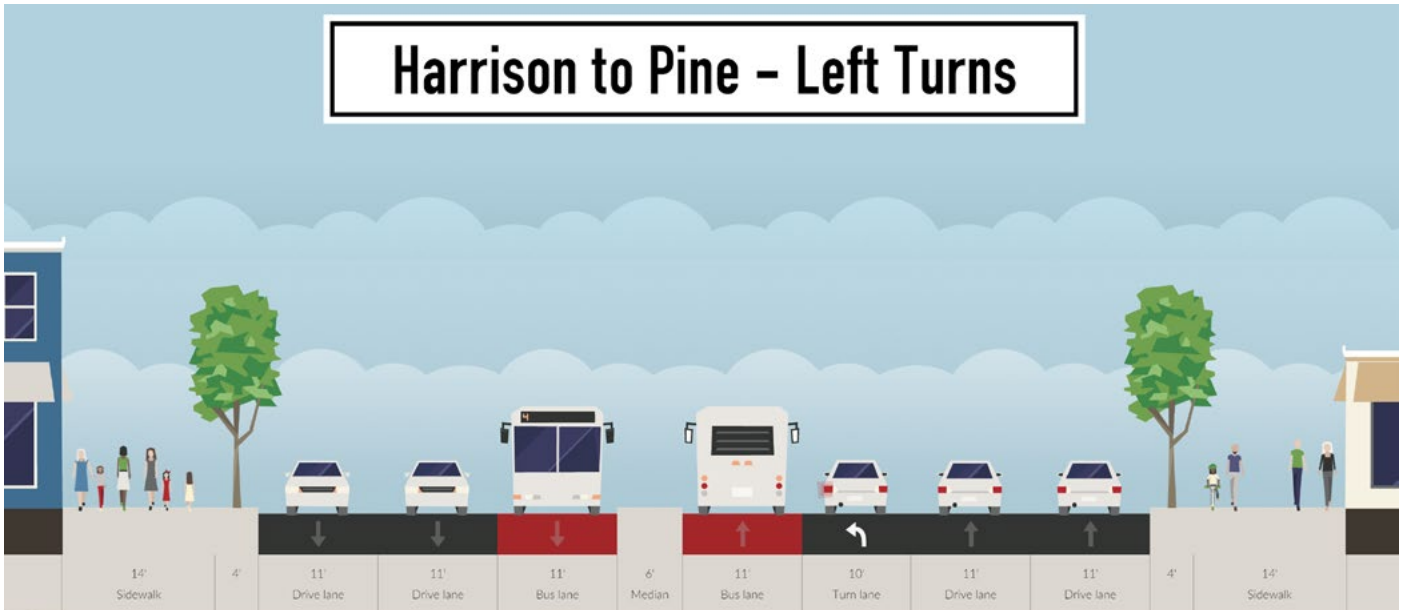


Figure 12: *Proposed 6-foot median for Broad Street between Harrison and Pine Streets*

The existing and proposed typical sections also are summarized in **Table 2** and **Table 3**.

TABLE 2: THOMPSON STREET TO SHEPPARD STREET – TYPICAL SECTIONS

Scenario	Parking Lane	Outside Lane	Middle Lane	Inside Lane	Median	Inside Lane	Other	Middle Lane	Outside Lane	Parking Lane
Existing Section	6'	10'	10'	10'	4'	10'	n/a	10'	10'	6'
Scenario	**Parking Lane**	**Outside Lane**	**Middle Lane**	**BRT Lane**	**Median**	**BRT Lane**	**Other**	**Middle Lane**	**Outside Lane**	**Parking Lane**
Proposed Section	7'	11'	10.5'	11'	4'	11'	n/a	10.5'	11'	n/a
Proposed Left-Turn Lanes	n/a	10.5'	10'	11'	3'	11'	10' Left-Turn Lane	10'	10.5'	n/a
Proposed Station Locations	n/a	11'	10'	11'	n/a	11'	12' Station Platform	10'	11'	n/a

TABLE 3: SHEPPARD STREET TO FOUSHEE STREET – TYPICAL SECTIONS

Scenario	Parking Lane	Outside Lane	Middle Lane	Inside Lane	Median	Inside Lane	Other	Middle Lane	Outside Lane	Parking Lane
Existing Section	8'	10'	10'	10'	6'	10	n/a	10'	10'	8'
Scenario	**Parking Lane**	**Outside Lane**	**Middle Lane**	**BRT Lane**	**Median**	**BRT Lane**	**Other**	**Middle Lane**	**Outside Lane**	**Parking Lane**
Proposed Section	7'	11'	10'	11'	4'	11'	n/a	10'	11'	7'
Proposed Left-Turn Lanes	7'	10.5'	10'	11'	2'	11'	10' Left-Turn Lane	10'	10.5'	n/a
Proposed Station Locations	7'	10.5'	10'	11'	n/a	11'	12' Station Platform	10'	10.5'	n/a
Proposed Harrison Street to Shafer Street	8'	12'	11'	11'	6'	11'	n/a	11'	12'	n/a

No roadway widening to the outside or narrowing of the existing sidewalk width is proposed with the typical sections. Minor widening (1 to 2 feet) is required in the immediate vicinity of the intersection of Broad Street and Meadow Street/Hermitage Road to allow both eastbound and westbound left turns.

Other alternatives were considered during the early development of typical section options, such as a "protected transitway" where a median is installed between the BRT lanes and general purpose travel lanes on either side. However, the section shown in this report was selected because it would cost significantly less—the "protected transitway" would require demolishing the entire existing median and repaving it, constructing two new raised medians, and constructing an extensive storm sewer system to convey stormwater runoff between the medians of the "protected transitway."

e. Curb-Running Transitway

This segment of the project provides dedicated BRT lanes along the outer curb face between 4th Street and Old 14th Street. This segment will be modified to provide appropriate travel lane widths (achieved with pavement markings) and necessary raised median modifications for dedicated left turns. Median modifications will be necessary along some blocks to provide minimum lane widths from 4th Street to 9th Street. The existing median from 9th Street to 11th Street will be reconstructed to provide the required minimum lane widths and necessary turn lanes. The remaining curb running transitway segment from 11th Street to Old 14th/College Street will require existing raised median modifications and lane restriping to provide the minimum recommended lane widths.

In this segment, a critical balance must be accomplished to provide appropriate lane widths for dedicated BRT lanes, general purpose travel lanes, and critical left-turn and right-turn movements, while also maintaining raised median width for pedestrian refuge and existing median trees and landscaping, where practical.

All existing left-turn and right-turn movements allowed along Broad Street between 4th Street and 14th Street will be maintained. Along the curb lanes, vehicles turning right and traffic accessing businesses can use the BRT lane to make turns along the same block. This lane is often referred to as a Business Access Transit (BAT) lane. Signing and special pavement markings will indicate to drivers that right turns are allowed from the curb-running bus lane in these marked locations.

The existing and proposed typical sections in this area are shown in **Figure 13** through **Figure 17**.

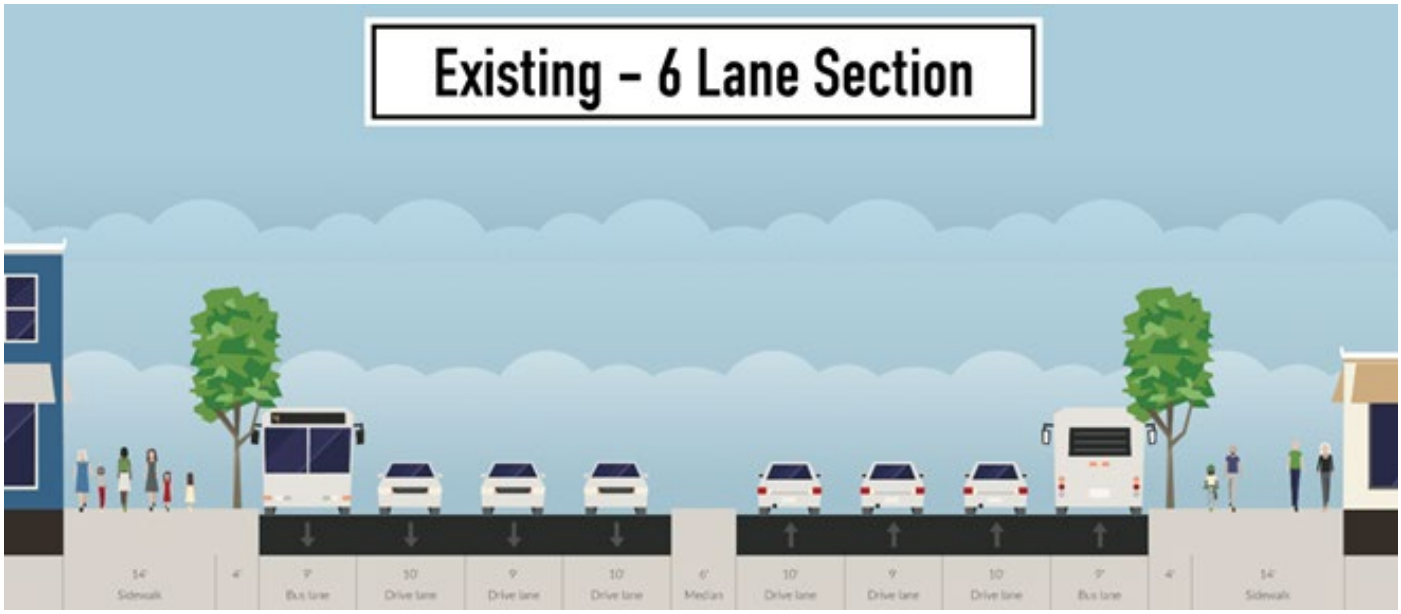


Figure 13: *Existing six-lane typical section along Broad Street*

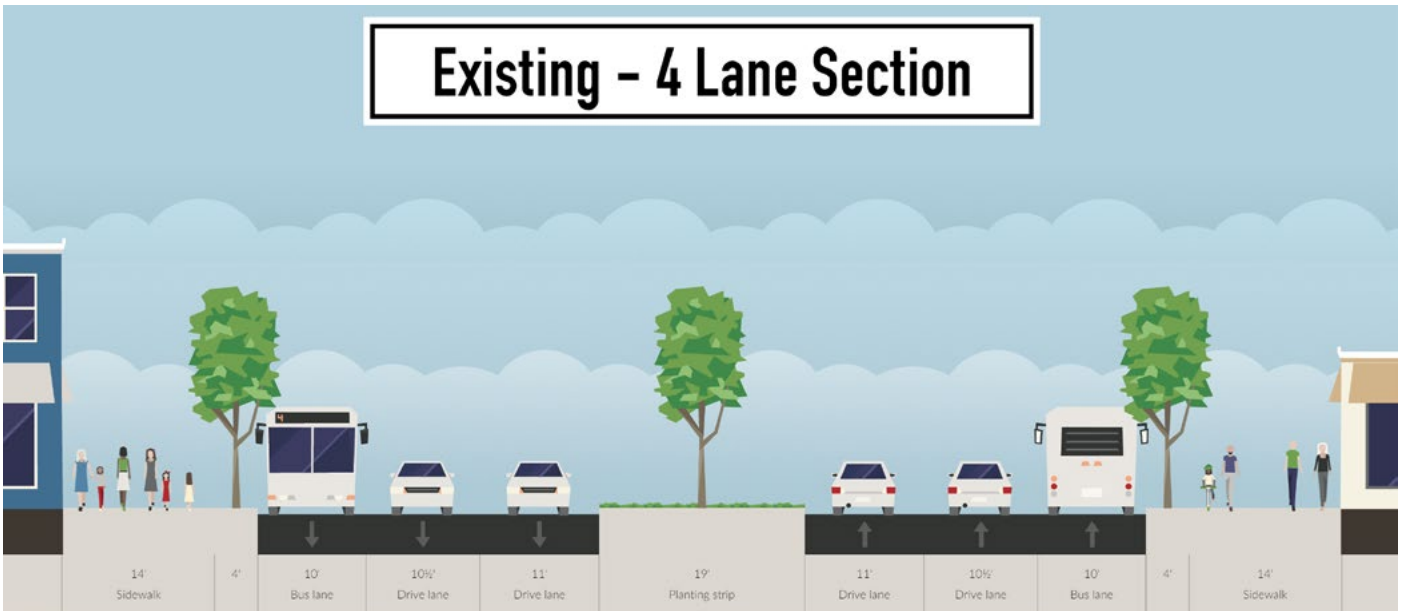


Figure 14: *Existing four-lane typical section along Broad Street*

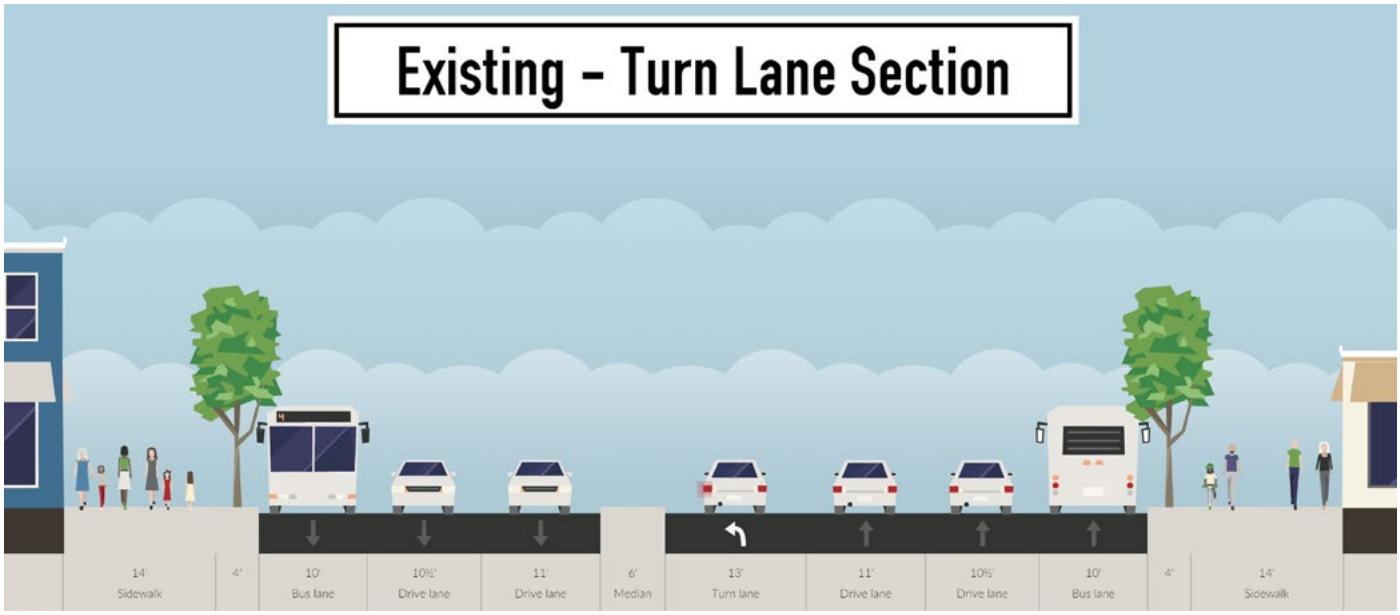


Figure 15: *Existing turn-lane typical section along Broad Street*

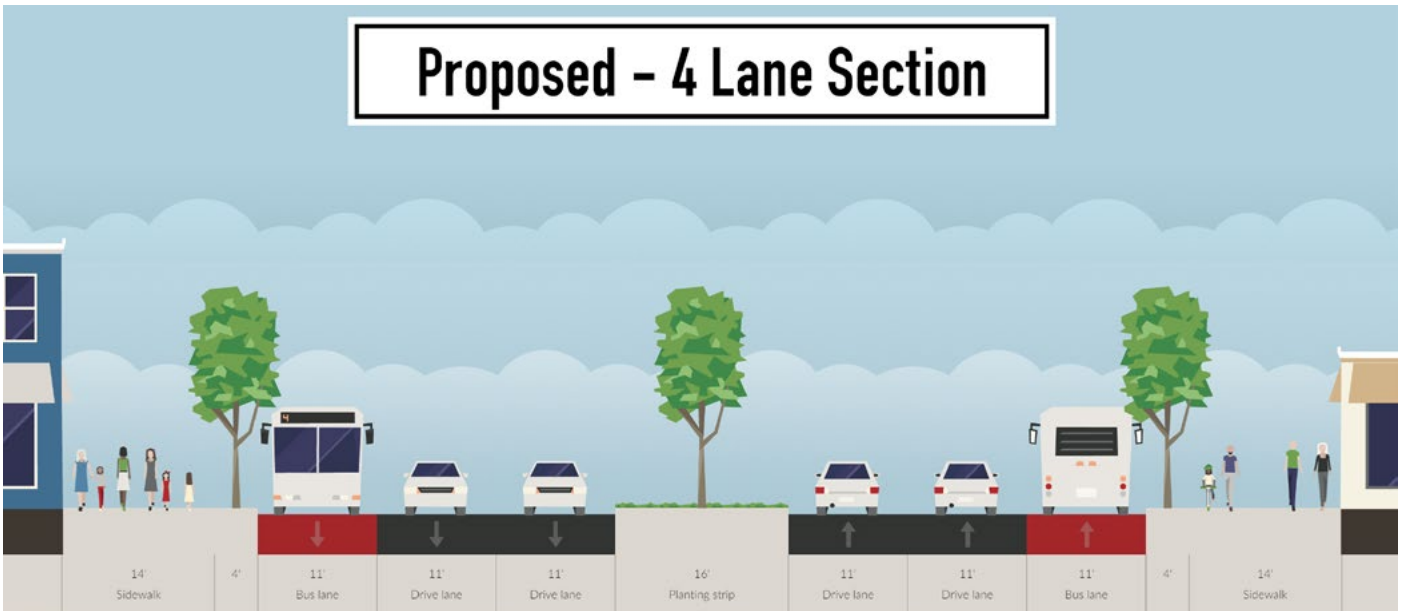


Figure 16: *Proposed four-lane typical section along Broad Street*

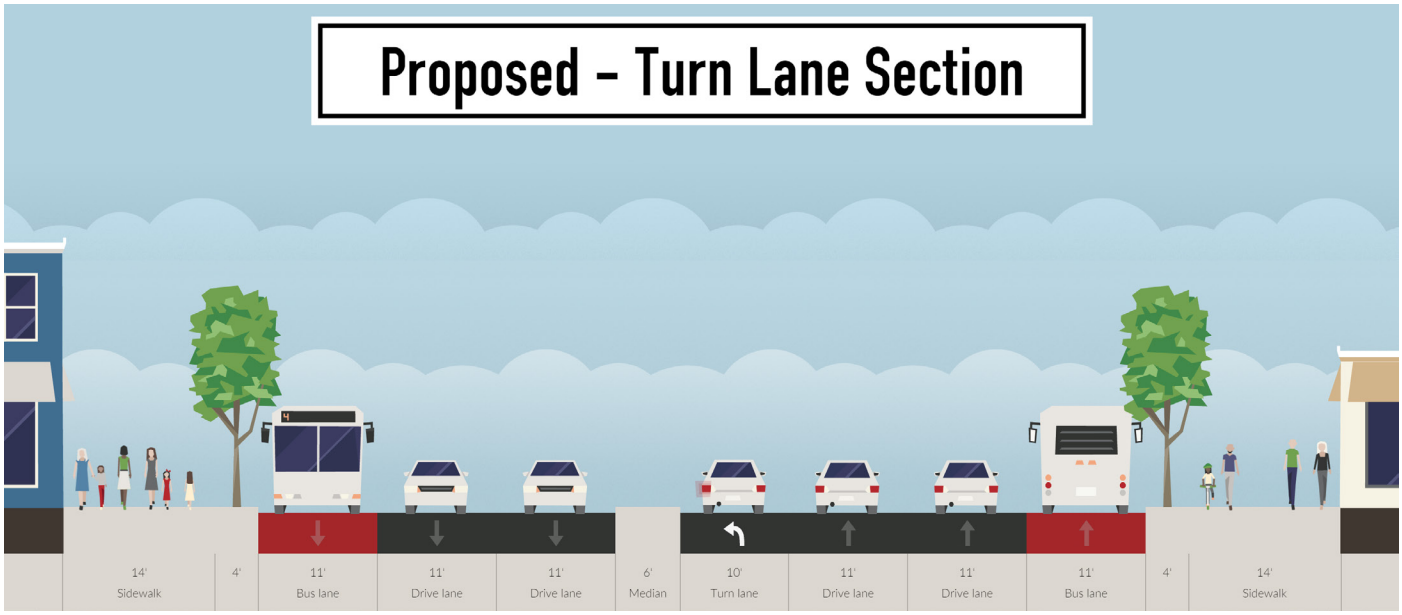


Figure 17: *Proposed turn lane section along Broad Street*

The existing and proposed typical sections in this area also are shown in **Table 4**.

TABLE 4: SHEPPARD STREET TO FOUSHEE STREET – TYPICAL SECTIONS

Scenario	Parking Lane	Outside Lane	Middle Lane	Inside Lane	Median	Inside Lane	Other	Middle Lane	Outside Lane	Parking Lane
Existing Six Lanes	9'	10'	9'	10'	6'	n/a	10'	9'	10'	9'
Existing Four Lanes	10'	10.5'	n/a	11'	19'	n/a	11'	n/a	10.5'	10'
Existing Turn Lane	10'	10.5'	n/a	11'	6'	13'	11'	n/a	10.5'	10'
Scenario	**BRT Lane**	**Outside Lane**	**Middle Lane**	**Inside Lane**	**Median**	**Left-Turn Lane**	**Inside Lane**	**Middle Lane**	**Outside Lane**	**BRT Lane**
Proposed Four Lanes	11'	11'	n/a	11'	16'	n/a	11'	n/a	11'	11'
Proposed Turn Lanes	11'	11'	n/a	11'	6'	10'	11'	n/a	11'	11'

A full description of the roadway design elements can be found in the GRTC "BRT Roadway Modifications Basis of Design Report" at **http://ridegrtc.com/brt/documents/**.

f. Technology Components

The incorporation of technology components into the BRT stations, BRT vehicles, and traffic signal systems is a critical aspect of an effective and efficient BRT system. The GRTC BRT Project will implement multiple technology elements that will reduce dwell time and delay, improve safety, and provide passenger convenience.

STATIONS

The GRTC BRT Project will use an off-board fare collection system that will allow patrons to purchase and/or validate fares prior to boarding the BRT vehicles, versus purchasing and/or validating fares while boarding. A ticket vending machine will be located at each station platform that will accept credit cards, debit cards, and cash for the purchase of fare media. GRTC is planning to facilitate full feature integration between the fixed-route buses and the BRT system, allowing riders to transfer from one service to the other using the same fare media. Once GRTC's mobile ticketing application is implemented, patrons will also have the ability to purchase BRT fares on their mobile phones.

For safety and security, closed-circuit television cameras (CCTV) and emergency phones will be installed at each station platform. The CCTV camera system will provide the means to deter and subsequently apprehend individuals who vandalize or linger in the station areas as well as to monitor conditions at the BRT stations so that service adjustments can be made based on congestion. Video feeds from each station will be streamed in real-time to the GRTC Transit Operations Center on Belt Boulevard as well as to the Richmond Police Department via the Emergency Communications Center on Hopkins Road. Liability claims may also be verified by the Richmond Police using the CCTV camera systems if desired. BRT patrons will have additional comfort knowing that emergency telephones will connect directly with the City's 9-1-1 dispatch.

Real-time transit information systems (RTIS) will provide up-to-date information for riders using GPS data transmitted from the BRT vehicles. Each BRT station will have a message board to display the anticipated arrival time of the next BRT vehicle, and audio announcements will indicate arrival times to those who are visually impaired. Real-time display boards may also be located inside of public buildings along the project corridor including City Hall and the Science Museum of Virginia.

VEHICLES

Several technology components will be integrated into the BRT vehicles that will provide passenger convenience. An automated annunciation system will make riders aware of the next station by use of both audio and visual annunciation. GRTC plans to provide a free on-board Wi-Fi service that will allow BRT riders to conduct business, check emails, or use for other means while riding the GRTC Pulse.

Similar to the safety and security provided at the stations, CCTV cameras will be utilized on-board the BRT vehicles to provide the ability to view in-vehicle activities. In addition, a pedestrian warning system will provide audio warning to pedestrians to stay clear of the bus and bus maneuvers in and out of the stations and when making turns along the project corridor.

GPS positioning transmitters will be installed on each BRT vehicle. The on-board systems will communicate their location one per second with the GRTC Transit Operations Center. This will allow GRTC to make real-time headway adjustments to ensure the BRT provide reliable on time operations for its riders.

TRAFFIC SIGNAL SYSTEMS

To improve schedule reliability and reduce delay, transit signal priority (TSP) will be implemented throughout the BRT corridor. TSP is an operational strategy that facilitates the movement of transit vehicles through a signalized corridor. This strategy provides a 5- to 10-second preferential treatment to transit vehicles and is typically accomplished with limited disruption to passenger vehicle progression and pedestrian and bicycle movements. Unlike signal preemption by emergency vehicles, signal priority maintains coordination amongst the signals by making minor timing adjustments as opposed to immediately interrupting the normal process of the traffic signal. The BRT vehicles will request priority to a signal and the signal will adjust the timing based on predetermined parameters such as whether the BRT vehicle to behind schedule or too far from the vehicle ahead of it.

The BRT vehicles will use queue jump phases, which serve as another TSP strategy that allow the BRT vehicles to bypass regular traffic through a special signal phasing operation. This operation provides a certain level of time savings that the BRT would not otherwise receive. The GRTC Pulse will utilize queue jumps when transitioning from dedicated median transit lanes to the mixed-flow lanes or vice versa.

5. Public Involvement

Public involvement has been an integral part of the GRTC BRT Project throughout the planning and development processes. Beginning in 2003, all of the studies that have examined and recommended a BRT project have included public involvement in the study process. The Broad Street Corridor Bus Rapid Transit Study completed in 2014 included four rounds of public meetings, with the final meeting held in May 2014.

Since the start of design work, GRTC has greatly expanded and accelerated public involvement during the project development process. GRTC initiatives have included direct mailings to property owners, public meetings, presentations to community groups, and extensive communications with the public via the GRTC website, Facebook, Twitter, and a separate blog. In addition, GRTC staff representatives are visiting every business located along the BRT corridor to inform them about the project and to answer any questions regarding the project. In July 2015, leading up to the next round of public meetings, GRTC staff representatives also have been riding bus routes to inform and engage current riders about the project.

The following are GRTC Pulse-related meetings that have occurred, whether as an official public meeting, or a neighborhood meeting or group presentation, in order from most to least recent:

- July 27 and 28, 2015: Public meetings on BRT Pulse
- June 30, 2015: Carver Area Civic Improvement League presentation
- June 10, 2015: Urban Land Institute presentation
- June 4, 2015: Richmond Regional Transportation Planning Organization presentation
- June 2, 2015: Short Pump Rotary Club presentation
- May 13, 2015: Petersburg Rotary Club presentation
- May 5, 2015: Rocketts Landing Association presentation
- April 28, 2015: Multi-neighborhood association meeting held at DMV Broad Street Cafeteria. Groups represented: West Grace Street Association, Church Bethlehem, Coliseum Loft Deli/Market, Museum District Association, Midtown, Fan District Association, SIR Research, MAPS, Byrd Park, Fan Area Business Alliance
- April 21, 2015: Historic Jackson Ward Association presentation
- April 20, 2015: Museum District Association presentation
- April 18, 2015: Participation in RVA Rapid Transit “Canvass the Corridor” event
- April 15, 2015: Sports Backers meeting
- April 15, 2015: RideFinders Employer Transportation Coordinator (ETC) presentation
- April 13, 2015: Jefferson Terrace and Sauer Gardens presentation
- April 6 and 7, 2015: Public meetings on BRT project
- April 6, 2015: Richmond Kiwanis Club presentation
- April 1, 2015: Joint City of Richmond and Henrico County Business Council presentation
- March 20, 2015: MPACT presentation at Byrd Park Round House
- February 11, 2015: Presentation to Gumenick Properties
- February 9, 2015: Fan District Association and West Grace Street Merchants Association meeting
- February 2, 2015: MPACT presentation at Southside Community Services Center
- January 29, 2015: Church Hill Association and five other East End civic associations, including Union Hill
- January 26 and 27, 2015: Public meetings on BRT project
- January 14, 2015: Museum District Association and Scott’s Addition Business Association
- December 22, 2014: Richmond Police Department
- December 8, 2014: Sandston Rotary Club presentation
- May 20 & 21, 2014: Public meetings on BRT study
- August 27, 2013: Public meetings on BRT study
- October 19 & 20, 2010: Public meetings on BRT study
- February 24 & 25, 2010: Public meetings on BRT study

The public input that GRTC has received to date has indicated broad support for the project, with certain areas

of concern. GRTC has received **numerous letters of support** for the project, including from Virginia Governor Terry McAuliffe, U.S. Senators Mark Warner and Tim Kaine, Richmond Mayor Dwight Jones, and Jennifer Mitchell, the director of DRPT. Other letters of support from Richmond leaders and businesses have been received from the Henrico County Manager, the President of the Richmond City Council, the president of the Greater Richmond Chamber of Commerce, and the President of VCU, among many others. These letters can be found here: http://ridegrtc.com/media/news/Appendix_A_Broad_Street_BRT_Letters_of_Support.pdf. Areas of concern that have been expressed include proposed station locations and spacing, a desire to preserve as much parking on Broad Street as possible, and maintaining as much vehicular and pedestrian access across Broad Street as possible.

6. Response to Public and Stakeholder Input

a. Parking

Currently, more than 8,000 parking spaces are located within one block of Broad Street between Thompson Street and 14th Street, not including parking lots and garages for private residences and commercial businesses. Of these spaces, 6,434 comprise short-term and long-term public and private off-street parking facilities; 1,008 spaces comprise on-street free, paid, and loading spaces on side streets between Grace Street to the south of Broad Street and Marshall Street to the north of Broad Street; and the remaining 708 spaces comprise on-street free, paid, and loading spaces on Broad Street.

The earliest BRT conceptual design concept presented to the public proposed the removal of all 708 on-street spaces on Broad Street in order to accommodate exclusive BRT lanes, wider general purpose travel lanes than currently exist, and a 6-foot median to provide refuge for pedestrians crossing Broad Street. This concept was met with deep concern by area businesses, residents, neighborhoods, and associations.

For the preliminary design phase, proposed lane widths and median widths were reduced to preserve on-street parking. At every location where roadway geometry would accommodate the placement of a parking space, a parking space was drawn on the concept plan. For locations on the corridor where multiple viable approaches for geometric design existed, the option that allowed preservation of the most on-street parking spaces was selected. At the second public meeting, the project team presented an estimate of 450 parking spaces to remain on Broad Street. This concept met a much better reception despite the reduction of travel-lane and median widths; however, concerns remained with the lack of left-turn access off Broad Street into the neighborhoods.

As the project has developed and the concept become more refined, the number of parking spaces proposed to remain has come into clearer focus. Public requests for additional exclusive left-turn lanes and a return to wider medians in the VCU Monroe Park area of the corridor have resulted in a reduction in parking spaces from the concept presented at the second public meeting. Preliminary traffic analyses were performed to provide a rough estimate of the left-turn storage lengths needed to accommodate vehicle queues. These storage lengths directly impact the number of parking spaces that can remain. The current design concept would accommodate 402 on-street parking spaces on Broad Street between Thompson Street and 14th Street.

A parking occupancy study was conducted over several representative time periods in October 2014. This occupancy study indicated that the 124 parking spaces on Broad Street between Thompson Street and Sheppard Street are very underused, with no more than nine spaces in use during any of the data collection periods. Parking between Sheppard Street and Lombardy Street also was underused, with a maximum of 118 of the 244 available parking spaces being used during any of the data collection periods. On-street parking from Lombardy Street to Foushee Street, in the vicinity of VCU, was very well utilized for all time periods studied. Observations show that VCU students and faculty seem to be responsible for a majority of the parking activities in this area. These users have access to hundreds of off-street parking spaces in the immediate area. The relatively small number of on-street parking spaces available on Broad Street between 4th Street and 14th Street were, on average, about 50 percent occupied on weekdays, with

higher levels of occupancy on weekends. Again, thousands of off-street parking spaces and side-street on-street parking spaces are available in this area.

A summary of the anticipated spaces preserved on Broad Street between Thompson Street and 14th Street is provided in **Table 5**. This information is presented in *draft* form, pending final roadway alignment.

TABLE 5: PARKING SPACES ALONG BROAD STREET BETWEEN THOMPSON AND 14TH STREET

Subarea	Existing Parking Spaces	Proposed Change in Number of Spaces	Preserved Parking Spaces
Thompson Street to Sheppard Street	124	-99	25
Sheppard Street to Lombardy Street	244	-94	150
Lombardy Street to Foushee Street	246	-85	161
Foushee Street to 4th Street	38	+28	66
4th Street to 14th Street	56	-56	0
TOTAL	**708**	**-306**	**402**

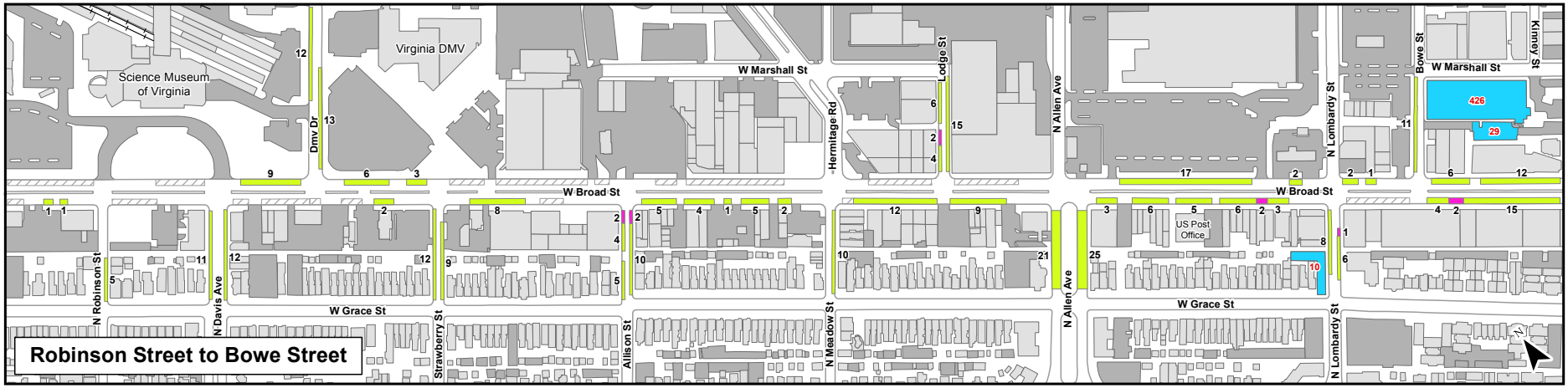
The results of the parking occupancy study are summarized performed in October 2014 are presented in **Table 6**.

TABLE 6: PARKING OCCUPANCY STUDY

Subarea	Maximum Utilization (%)			Peak Period(s)	Maximum Existing Spaces Used
	Daytime	Nighttime	Weekend		
Thompson Street to Sheppard Street	7%	3%	5%	12–1 PM Weekday	9
Sheppard Street to Lombardy Street	32%	30%	48%	10–11 PM Saturday	118
Lombardy Street to Foushee Street	71%	67%	89%	10–11 PM Saturday	218
Foushee Street to 4th Street	63%	47%	76%	1–2 PM Saturday 10–11 PM Saturday	29
4th Street to 14th Street	54%	29%	86%	1–2 PM Saturday	48
Corridor-wide Peak	**43%**	**39%**	**57%**	**10–11 PM Saturday**	**406**

A loading zone study was conducted in July 2015 to assess the need for loading zones on a block-by-block basis. Current utilization and land use were the two primary factors considered. Where loading zone occupancy was 0 percent, loading zones were typically eliminated unless future redevelopment is anticipated within that particular block. Where parking is proposed for removal but loading zones were shown by occupancy data and land use to be of vital importance, loading zones were shifted to the most appropriate adjacent block or side street. The parking occupancy data indicate that roughly 35 percent of loading zones are used regularly. The current BRT concept plan proposes to retain 33 of the 90 existing loading zones, with 21 remaining on Broad Street and 12 shifting to side streets. An additional 105 loading zones currently exist on side streets within one block of Broad Street.

A full description of the parking study can be found at **http://ridegrtc.com/brt/documents/**. Proposed parking along the corridor is depicted in **Figure 18** and **Figure 19**.



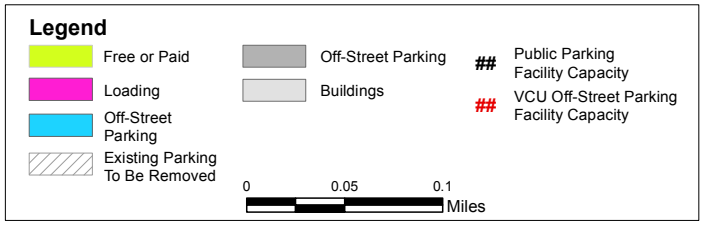
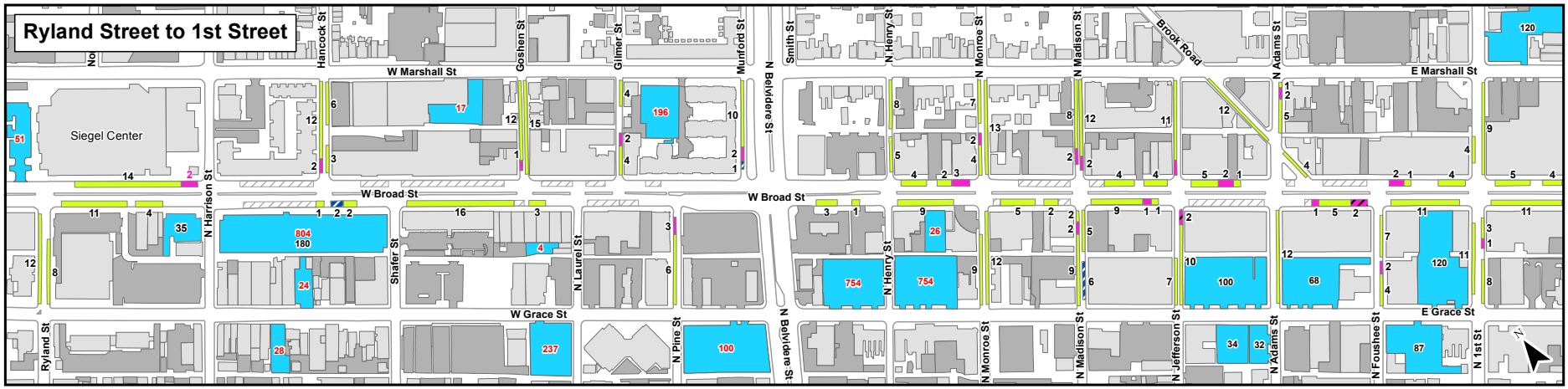
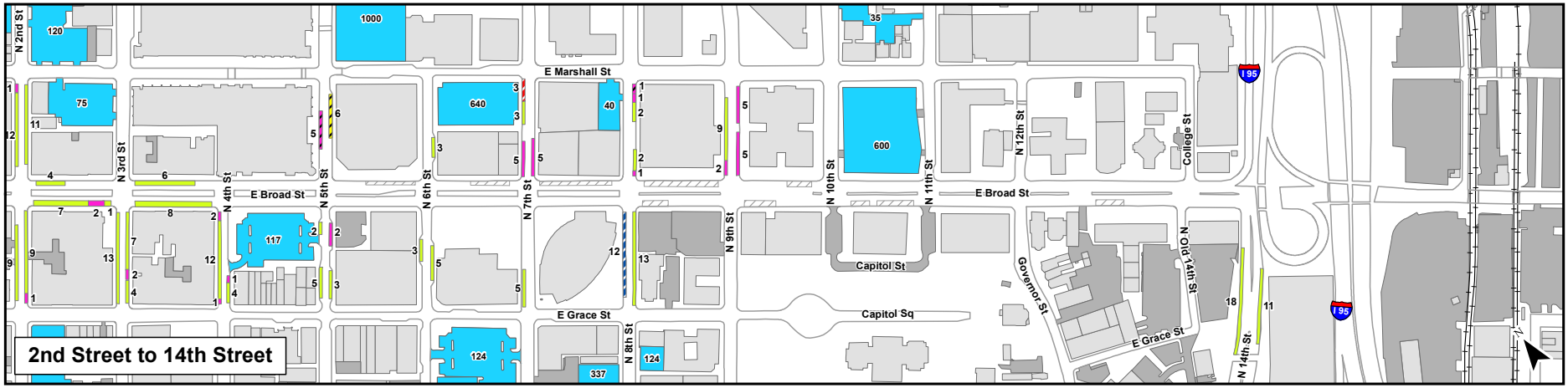


Figure 18: *Proposed Parking: I-195 to Bowe Street*





Legend

- Free or Paid
- Loading
- Off-Street Parking
- Existing Parking To Be Removed
- Cab Stand
- Passenger Loading
- Police Vehicle Only
- Fire Vehicle Only
- Off-Street Parking
- Buildings
- ## Public Parking Facility Capacity
- ## VCU Off-Street Parking Facility Capacity

0 0.05 0.1 Miles

Figure 19: *Proposed Parking – Ryland Street to 14th Street*

b. Traffic Recommendations

The GRTC BRT Project Team has worked closely with the City of Richmond, Henrico County, VCU, and DRPT to develop a plan that allows for a safe and efficient BRT system for the community. At the same time, the efficiency of the BRT system has been balanced with the need for traffic signals, left-turn access from Broad Street, north-south connectivity across Broad Street, and pedestrian and bicycle access.

TRAFFIC SIGNALS

For effective operation of BRT, it is suggested that any unwarranted traffic signals be removed to reduce delay; however, the public, City of Richmond, and VCU have expressed that maintaining vehicular, bicycle, and pedestrian access across Broad Street from the side streets outweighs potential BRT operational gains. Therefore, it has been determined that traffic signals shall remain at all existing locations. Additionally, new traffic signals are proposed at three locations to facilitate safe multimodal neighborhood access: Broad Street and Tilden Avenue, Broad Street and Monroe Street, and Main Street and Orleans Street.

LEFT TURNS AND NORTH-SOUTH CONNECTIVITY

For safety reasons, left-turn movements will occur only at signalized intersections operating with protected-only (green arrow) left-turn signal phasing. As the BRT vehicles will be running to the left of general purpose travel lanes, the BRT must be stopped to allow for vehicles to turn left across the exclusive median transit lanes. If the BRT vehicles are allowed to flow freely, left-turning vehicles and BRT vehicles may collide as the BRT vehicles are approaching from both directions within the median running section. It is very difficult for a driver to make a decision to turn left while processing head-on vehicular traffic, head-on BRT vehicles, and BRT vehicles approaching from behind.

Likewise, north-south vehicular movements across Broad Street will only occur at traffic signals. It is not safe for vehicles to cross Broad Street without signalization, as the temptation to store in the exclusive median transit lanes is strong.

Working with the City of Richmond and taking into consideration citizen input from four public meetings, the GRTC BRT Project Team increased the number of proposed left turns along Broad Street between Thompson Street and Foushee Street from nine to 17 as illustrated in **Figure 20**. To further promote north-south connectivity, two new traffic signals at Tilden Street and at Monroe Street will serve the Museum District and Jackson Ward.

PEDESTRIAN AND BICYCLE ACCESS

Pedestrian and bicycle access across Broad Street is equally as important as vehicle access. The GRTC Pulse will not restrict pedestrians from crossing Broad Street, 14th Street, or Main Street; however, pedestrians and cyclists will not be encouraged to cross the street at unsafe locations. To safely accommodate pedestrians and cyclists crossing Broad Street and Main Street, all existing and proposed traffic signals will be timed according to recent *Manual on Uniform Traffic Control Devices* (MUTCD) federal requirements to allow for safe passage. Additionally, six pedestrian crossings with warning signs and potentially flashing warning beacons are proposed at unsignalized intersections between Thompson Street and Foushee Street. These locations were carefully chosen based on pedestrian demand and distance between adjacent traffic signals as well as input from City and VCU staff.

Balancing the need for adequate vehicular travel lane width for BRT vehicles and general purpose vehicles with adequate median storage width has also been evaluated. After discussions with the City, VCU, and DRPT, it was determined that a 4-foot-wide median would be provided for the majority of the Broad Street corridor between Thompson Street and Foushee Street. In the vicinity of VCU's Monroe Park Campus, a 6-foot-wide median is proposed from Harrison Street to Pine Street due to the high volumes of pedestrian crossings. A full description of the traffic study can be found at **http://ridegrtc.com/brt/documents/**.

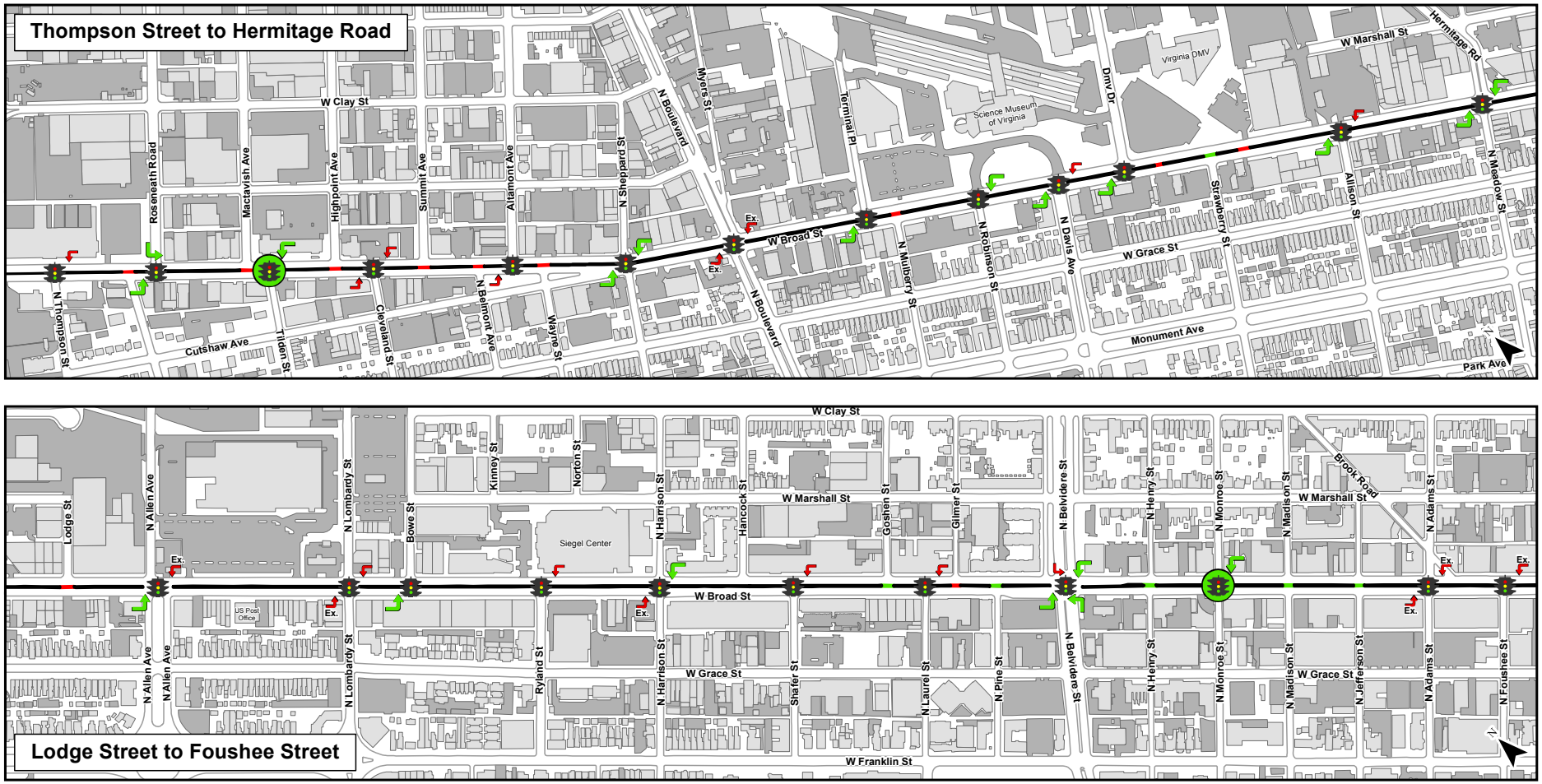


Figure 20: *Proposed Traffic Signal and Median Modifications*

7. Station Design

The GRTC Pulse system will have 14 stations along the Broad and Main Street Corridor that consist of 26 platforms. Each station will have an eastbound and westbound platform, except the west end station and the east end station. These end stations function as the beginning and end of the route, so it is not required to have separate east and west platforms. The BRT stations must be safe for pedestrians and bus patrons, secure, and completely functional for BRT operations. In addition, the stations will play an important role in establishing a unique identity for the GRTC Pulse system and should weave seamlessly into the surrounding architecture along the entire corridor.

The design of the stations began with the development of the stations program. This is a list of the design elements that must be incorporated into station design. These elements are set out for BRT stations by the national Institute of Transportation & Development Policy (ITDP) and were reviewed by GRTC, the design team, and project stakeholders for customizing the program for the GRTC BRT stations.

Once the stations program was established, the design team conducted a three-day design charrette for GRTC, the project stakeholders, and other parties interested in the BRT project design. The charrette included a visioning session, a tour of the BRT corridor, multiple design team conceptual sketches, feedback on the multiple conceptual sketches, and then a report back to GRTC of the charrette process results. Several conceptual design options were presented and reviewed and two design options were selected for further development. Conceptual drawings were prepared for two design options that were then presented to GRTC, project stakeholders, and the general public for input on a preferred design option. A single option then was selected for advancement into conceptual design. A full description of the station design process can be found in the GRTC "BRT Stations Basis of Design Report" found at **http://ridegrtc.com/brt/documents/**.

The conceptual design that emerged through this process recognizes that the BRT route travels through many historic areas within the City of Richmond and the stations themselves will be located within sight of many historic structures. In addition, GRTC aims for the stations to complement the historic architecture and integrate with the City fabric, while acknowledging the James River and the storied transit past of the city. The historic structures within the City offered many ideas for materials; however, based on the need for highly durable structures to meet FTA guidelines, the design team and GRTC focused on a few specific materials.

The first material selected was painted steel that can be seen in many bridges, train canopies, rail bridges, and ornamental details throughout the City. The second material selected for the canopy ceilings was cedar, chosen because of its durability and timelessness. This material can be found within the old train sheds at the science museum and provides a warm glow on a typically dark surface. The third material selected was masonry. Masonry can be seen throughout the City, but is highly recognizable at Main Street Station. There is potential to integrate stone either as a base or for seating that would reference stone from the James River. The brick is a stable and strong material that provides warmth and human scale.

The GRTC BRT station designs for the median stations, the curbside walk-through stations, the curbside walk-behind stations, and the steep slope curbside walk-behind station are shown in **Figure 21** to **Figure 24**. The locations of these stations are noted in the figures. Landscaping plans also are shown in **Figure 25** to **Figure 29** for each type of station.

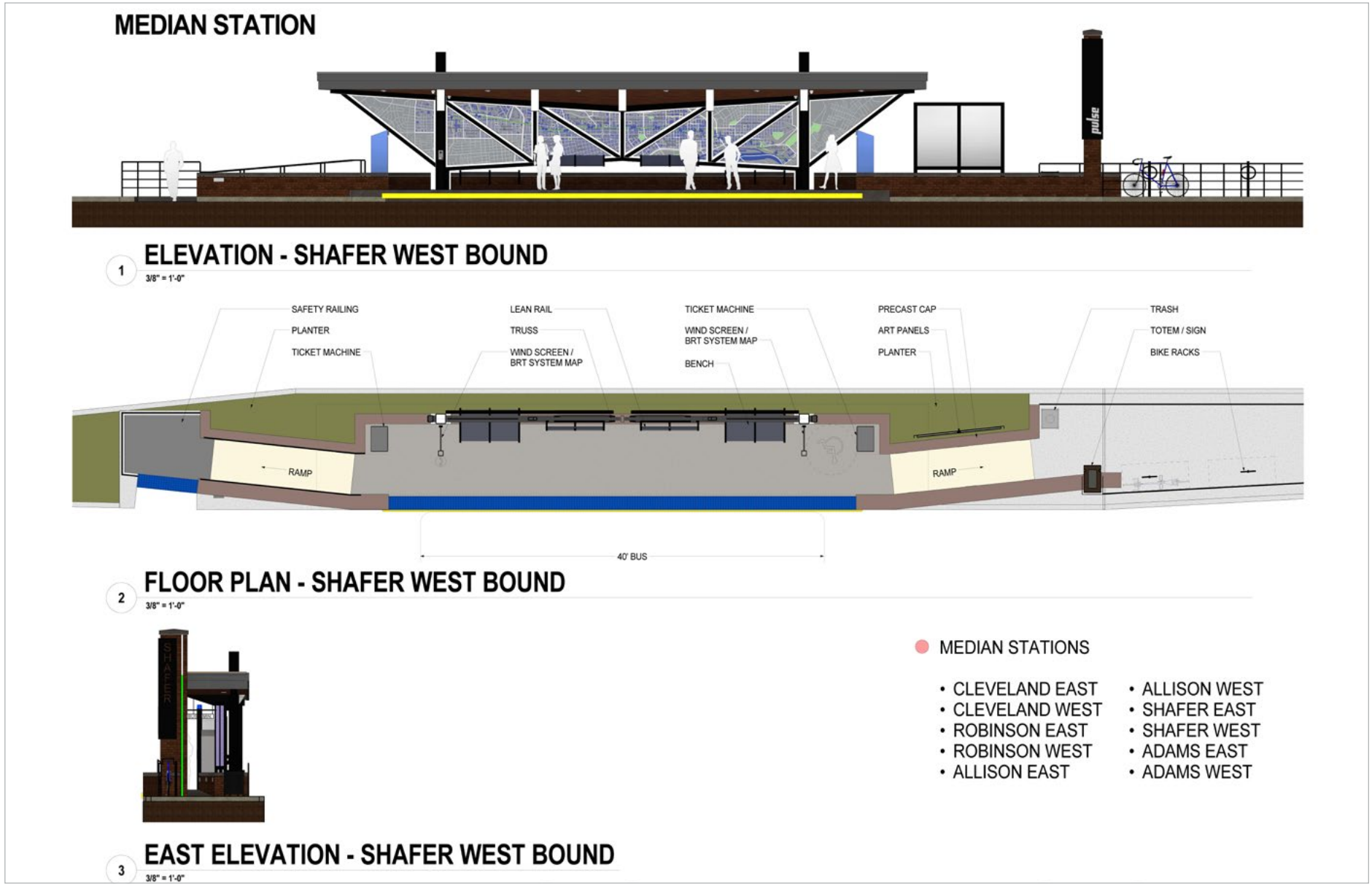
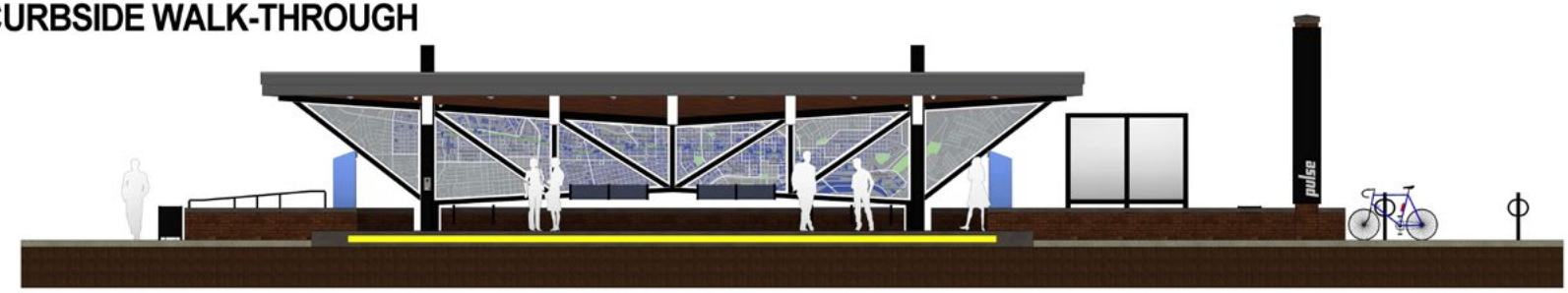


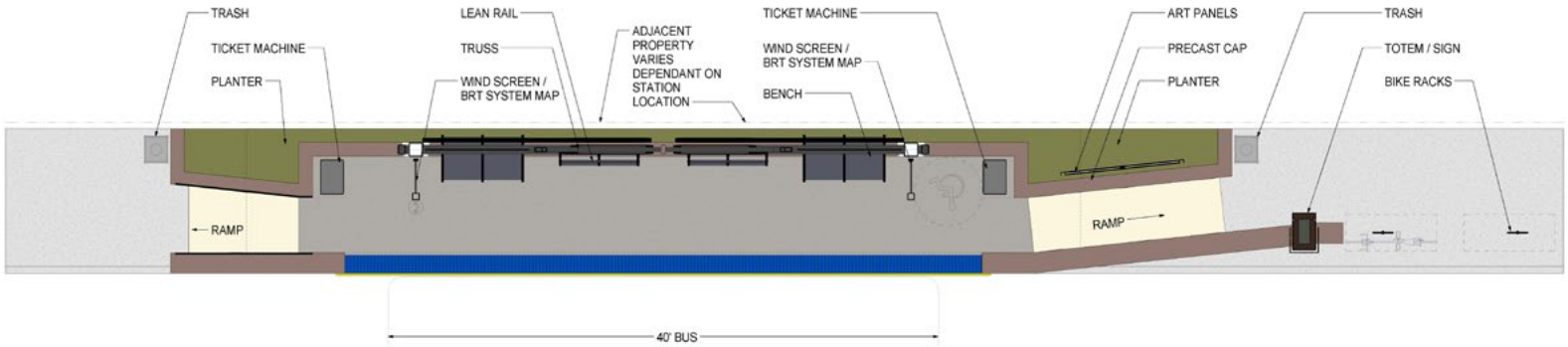
Figure 21: *Median Station*

CURBSIDE WALK-THROUGH



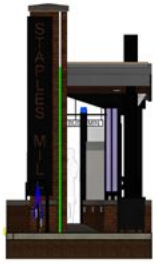
1 ELEVATION - STAPLES MILL WEST BOUND

3/8" = 1'-0"



2 FLOOR PLAN - STAPLES MILL WEST BOUND

3/8" = 1'-0"



CURBSIDE WALK-THROUGH STATIONS

- WILLOW LAWN
- STAPLES MILL EAST
- STAPLES MILL WEST
- MAIN STREET EAST
- 24TH STREET EAST
- 24TH STREET WEST
- RT 5 EAST
- RT 5 WEST
- ROCKETT'S LANDING

3 EAST ELEVATION - STAPLES MILL WEST BOUND

3/8" = 1'-0"

Figure 22: *Curbside Walk-through*

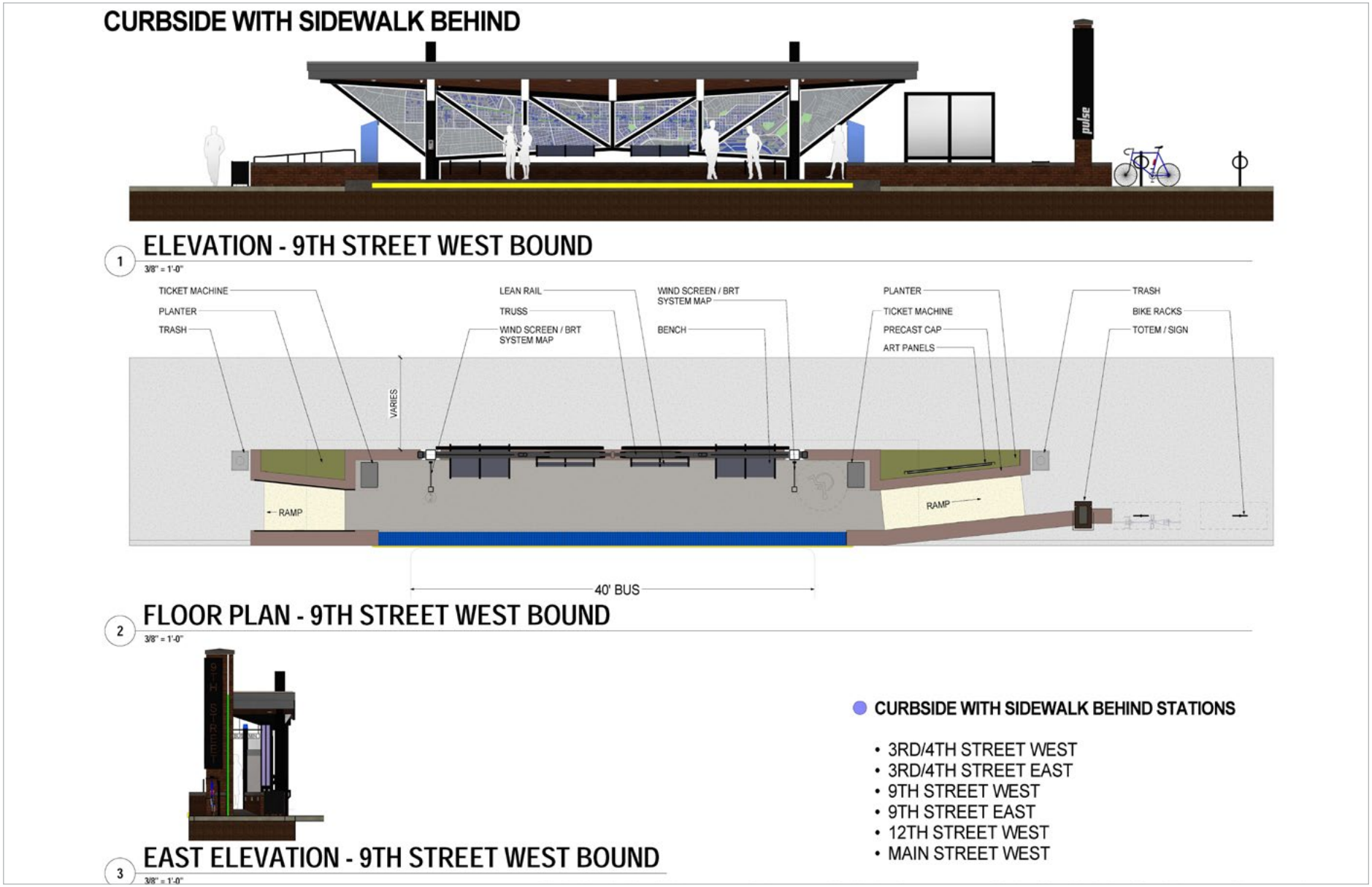


Figure 23: *Curbside with Sidewalk Behind*

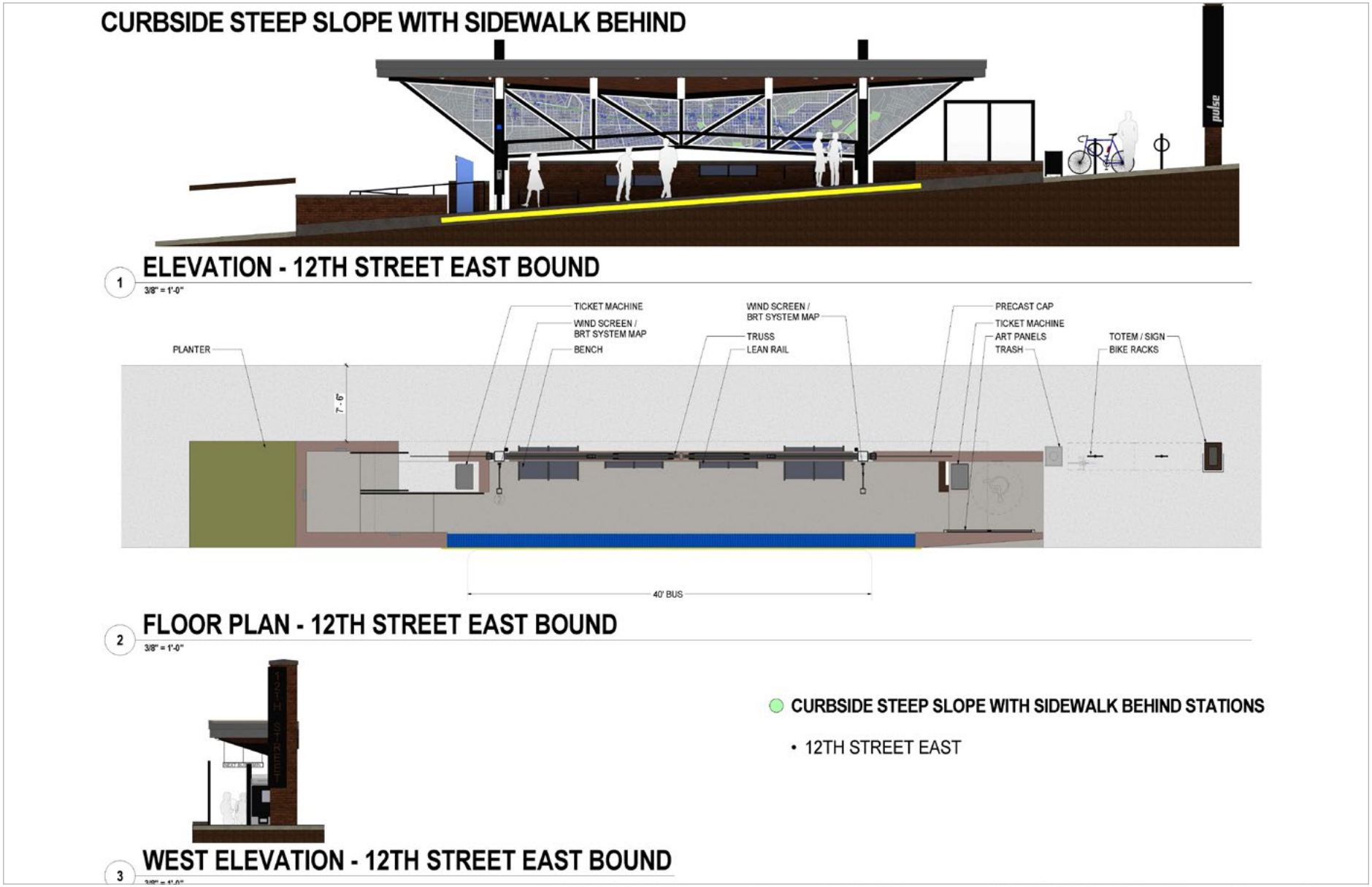
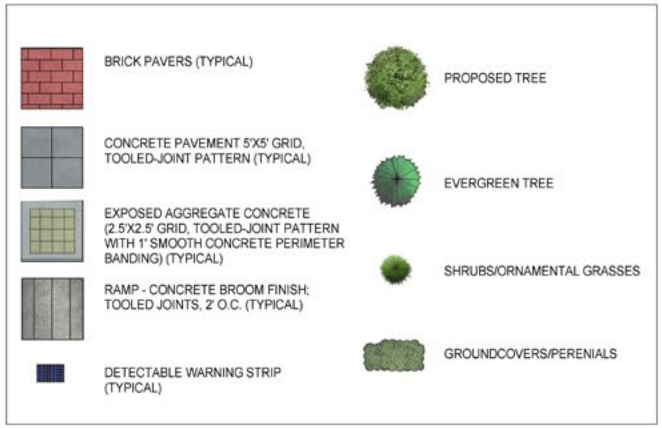


Figure 24: *Curbside Steep Slope with Sidewalk Behind*

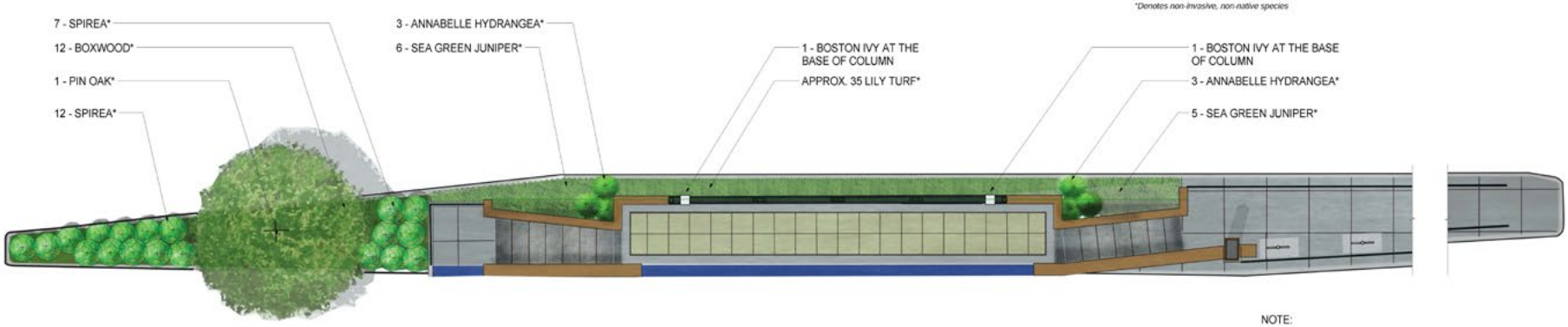


TYPICAL PLANT LIST *(Acceptable Options)*

Key	Botanical Name	Common Name	Size and specifications
TREES			
AA	*Amelanchier arborea*	Downy Serviceberry	Clump form, 7'-8' Ht
AC	*Amelanchier canadensis 'Autumn Brilliance' **	Autumn Brilliance Serviceberry	Clump form, 7'-8' Ht
AL	*Amelanchier laevis*	Allegheny Serviceberry	Clump form, 7'-8' Ht
AR	*Acer rubrum*	Red Maple	2.5 - 3" B&B, cultivars acceptable if approved by project LA
BN	*Betula nigra*	River Birch	Clump form, 8' - 10' B&B
CC	*Capinus caroliniа*	American Hornbeam	2.5" - 3" B&B
CE	*Cercis Canadensis*	Eastern Redbud	2.5" - 3" B&B
CF	*Cornus florida*	Flowering Dogwood	2.5" - 3" B&B
CH	*Chioanthus virginicus*	Fringetree	Clump form, 5' - 6' B&B
CJ	*Cercidiphyllum japonicum**	Katsuratree	2.5" - 3" B&B
CO	*Carya ovata*	Shagbark Hickory	2.5" - 3" B&B
CR	*Crageagus sp*	Hawthorne	2.5" - 3" B&B
CV	*Crataegus viridis*	Winter King Hawthorne	2.5" - 3" B&B
GB	*Ginkgo biloba**	Ginkgo Maidenhair Tree	Male variety only, 2.5" - 3" B&B
LI	*Lagerstroemia indica**	Crapemyrtle	Clump form, 5' - 6' B&B
LT	*Liriodendron tulipifera*	Tuliptree	2.5" - 3" B&B
LS	*Liquidambar styraciflua*	American Sweetgum	2.5" - 3" B&B
MV	*Magnolia virginiana*	Sweetbay Magnolia	2.5" - 3" B&B
NS	*Nyssa sylvatica*	Black gum	2.5" - 3" B&B
PA	*Platanus acerifolia**	London Planetree	2.5" - 3" B&B
PY	*Pyrus calleryana 'Respire'**	Redspire Pear	2.5" - 3" B&B
QA	*Quercus alba*	White Oak	2.5" - 3" B&B
QC	*Quercus coccinia **	Scarlet Oak	2.5" - 3" B&B
QP	*Quercus palustris*	Pin Oak	2.5" - 3" B&B
QU	*Quercus prinus*	Chestnut Oak	2.5" - 3" B&B
QUP	*Quercus phellos*	Willow Oak	2.5" - 3" B&B
QR	*Quercus rubra*	Northern Red Oak	2.5" - 3" B&B
TA	*Tilia americana*	Basswood	2.5" - 3" B&B
UA	*Ulmus americana 'Triumph' **	Triumph American Elm	2.5" - 3" B&B
EVERGREENS			
AC	*Abies fraseri*	Fraser Fir	Utilize for screening, 8' - 10' Ht. Min. B&B
JV	*Juniperus virginiana spp.*	Eastern Red Cedar	Utilize for screening, 6' - 7' Ht., Min., B&B
JU	*Juniperus sp**	Juniper	Varies, 6' - 7' Ht., Min., B&B
PS	*Pinus strobus*	Eastern White Pine	Utilize for screening, 8' - 10' Ht. Min. B&B
TO	*Thuja occidentalis*	Eastern Arborvitae	Utilize for screening, 6' - 7' Ht., Min., B&B

Key	Botanical Name	Common Name	Size and specifications
SHRUBS			
BS	*Buxus sempervirens 'Green Velvet'**	Green Velvet Boxwood	15" - 18", min. 2 gallon container
CA	*Clethra alnifolia*	Summersweet	30" - 36", B&B or 3 gallon container
CK	*Cornus sericea*	Red Twig Dogwood	30" - 36", B&B or 3 gallon container
HAA	*Hydragea arborscens 'Annabelle'*	Annabelle Hydrangea	3 gallon container
HPL	*Hydrangea paniculata 'Limelight'*	Limelight Hydrangea	30" - 36", B&B or 3 gallon container
HQ	*Hydrangea quercifolia 'Pee Wee'*	Pee Wee Hydrangea	18" - 24", 3 gallon container
IG	*Ilex glabra 'Shamrock'*	Shamrock Inkberry	30" - 36", B&B or 3 gallon container
IO	*Ilex opaca*	American Holly	4' - 5' B&B or large container
IV	*Ilex verticillata 'Red Sprite'*	Winterberry Holly	4' - 5' B&B or large container
Ivo	*Ilex vomitoria*	Yaupon Holly	3 gallon container
IT	*Itea virginica 'Little Henry'*	Dwarf Virginia Sweetspire	30" - 36", B&B or 3 gallon container
JU	*Juniperus**	Juniper	30" - 36", B&B or 3 gallon container
KL	*Kalmia latifolia*	Mountain Laurel	30" - 36", B&B or 3 gallon container
RM	*Rhododendron maximum*	Rosebay Rhododendron	30" - 36", B&B or 3 gallon container
RR	*Rosa rugosa**	Rugosa Rose	30" - 36", B&B or 3 gallon container
RK	*Rosa 'Knock-out' varieties*	Knock-out Rose	Assorted varieties, 3 gallon container
SJ	*Spirea japonica or equal*	Spirea varieties	Assorted hardy varieties, 3 gallon container
TxD	*Taxus x media 'Densiformus'*	Dense Yew	18" - 24", B&B or 3 gallon container
TxH	*Taxus x media 'Hicksi'*	Hick's Yew	30" - 36", B&B or 3 gallon container
VD	*Viburnum dentatum*	Arrowwood Viburnum	30" - 36", B&B or 3 gallon container
VL	*Viburnum lentago*	Nannyberry	30" - 36", B&B or 3 gallon container
GRASSES, PERENNIALS and GROUNDCOVERS			
AR	*Ajuga reptans**	Bugleweed	flats/rooted cuttings, 4" on center
AP	*Perennials*	Assorted Perennials	Species/varieties to be determined based on station location
CX	*Carex varieties**	Sedge varieties	3 gallon container, 18" on center
EP	*Echinacea Purpurea*	Purple Coneflower	2 gallon container, 18" on center
EF	*Euonymus fortunei**	Wintercreeper Euonymus	flats/rooted cuttings, 6" on center
HE	*Hemerocallis**	Daylilly	Assorted varieties, 50" Stella D'Oro varieties, 2 gallon, 18" o.c.
HF	*Hibiscus*	Rose Mallow	3 gallon container, 18" on center
HO	*Hosta*	Hosta	Assorted varieties, 2 gallon containers
HC	*Hypericum calycinum**	St. Johnswort	3 gallon container, 18" on center
JH	*Juniperus horizontalis**	Creeping Juniper	3 gallon container, 18" on center
LM	*Liriope muscari or spicata**	Lilyturf	2 gallon container, 12" on center
MV	*Miscanthus varieties*	Maiden Grass varieties	3 gallon
MS	*Miscanthus sinensis 'Morning Light'*	Morning Light Maiden Grass	3 gallon
PA	*Pennisetum alopecuroides spp.*	Fountain Grass	3 gallon, generally 24" on center
RB	*Rudbeckia fulgida or equal*	Black-eyed Susan	2 gallon, 18" on center

**Denotes non-invasive, non-native species*



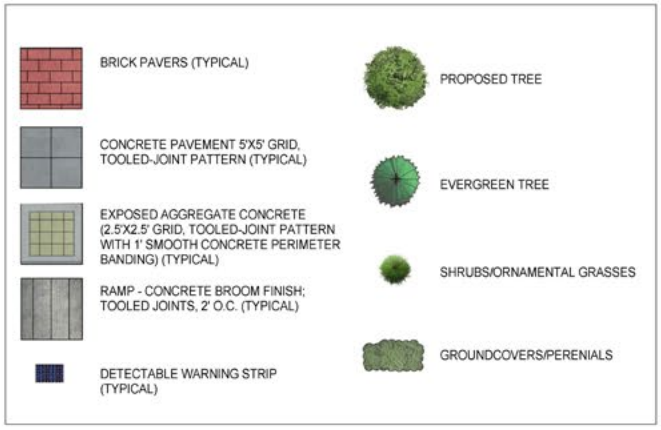
NOTE:

* - PLANT SELECTION CAN VARY FROM STATION TO STATION BASED ON LOCATION, SURROUNDING CONDITIONS, AND THE ORIENTATION OF THE STATION. OTHER POTENTIAL HARDY PLANT OPTIONS ARE SHOWN ON THE TYPICAL PLANT LIST.

1 **LANDSCAPING FLOOR PLAN - SHAFER WEST BOUND**

1/4" = 1'-0"

Figure 25: *Landscaping Floor Plan - Shafer Westbound*



TYPICAL PLANT LIST *(Acceptable Options)*

Key	Botanical Name	Common Name	Size and specifications
TREES			
AA	*Amelanchier arborea*	Downy Serviceberry	Clump form, 7'-8' Ht
AC	*Amelanchier canadensis 'Autumn Brilliance' **	Autumn Brilliance Serviceberry	Clump form, 7'-8' Ht
AL	*Amelanchier laevis*	Allegheny Serviceberry	Clump form, 7'-8' Ht
AR	*Acer rubrum*	Red Maple	2.5 - 3" B&B, cultivars acceptable if approved by project LA
BN	*Betula nigra*	River Birch	Clump form, 8' - 10' B&B
CC	*Capinus caroliniia*	American Hornbeam	2.5" - 3" B&B
CE	*Cercis Canadensis*	Eastern Redbud	2.5" - 3" B&B
CF	*Cornus florida*	Flowering Dogwood	2.5" - 3" B&B
CH	*Chioanthus virginicus*	Fringetree	Clump form, 5' - 6' B&B
CJ	*Cercidiphyllum japonicum**	Katsuratree	2.5" - 3" B&B
CO	*Carya ovata*	Shagbark Hickory	2.5" - 3" B&B
CR	*Crageagus sp*	Hawthorne	2.5" - 3" B&B
CV	*Crataegus viridis*	Winter King Hawthorne	2.5" - 3" B&B
GB	*Ginkgo biloba**	Ginkgo Maidenhair Tree	Male variety only, 2.5" - 3" B&B
LI	*Lagerstroemia indica**	Crapemyrtle	Clump form, 5' - 6' B&B
LT	*Liriodendron tulipifera*	Tuliptree	2.5" - 3" B&B
LS	*Liquidambar styraciflua*	American Sweetgum	2.5" - 3" B&B
MV	*Magnolia virginiana*	Sweetbay Magnolia	2.5" - 3" B&B
NS	*Nyssa sylvatica*	Black gum	2.5" - 3" B&B
PA	*Platanus acerifolia**	London Planetree	2.5" - 3" B&B
PY	*Pyrus calleryana 'Respire'**	Redspire Pear	2.5" - 3" B&B
QA	*Quercus alba*	White Oak	2.5" - 3" B&B
QC	*Quercus coccinia **	Scarlet Oak	2.5" - 3" B&B
QP	*Quercus palustris*	Pin Oak	2.5" - 3" B&B
QU	*Quercus primus*	Chestnut Oak	2.5" - 3" B&B
QUP	*Quercus phellos*	Willow Oak	2.5" - 3" B&B
QR	*Quercus rubra*	Northern Red Oak	2.5" - 3" B&B
TA	*Tilia americana*	Basswood	2.5" - 3" B&B
UA	*Ulmus americana 'Triumph' **	Triumph American Elm	2.5" - 3" B&B
EVERGREENS			
AC	*Abies fraseri*	Fraser Fir	Utilize for screening, 8' - 10' Ht. Min. B&B
JV	*Juniperus virginiana spp.*	Eastern Red Cedar	Utilize for screening, 6' - 7' Ht., Min., B&B
JU	*Juniperus sp**	Juniper	Varies, 6' - 7' Ht., Min., B&B
PS	*Pinus strobus*	Eastern White Pine	Utilize for screening, 8' - 10' Ht. Min. B&B
TO	*Thuja occidentalis*	Eastern Arborvitae	Utilize for screening, 6' - 7' Ht., Min., B&B

Key	Botanical Name	Common Name	Size and specifications
SHRUBS			
BS	*Buxus sempervirens 'Green Velvet'**	Green Velvet Boxwood	15" - 18", min. 2 gallon container
CA	*Clethra alnifolia*	Summersweet	30" - 36", B&B or 3 gallon container
CK	*Cornus sericea*	Red Twig Dogwood	30" - 36", B&B or 3 gallon container
HAA	*Hydragea arborscens 'Annabelle'*	Annabelle Hydrangea	3 gallon container
HPL	*Hydrangea paniculata 'Limelight'*	Limelight Hydrangea	30" - 36", B&B or 3 gallon container
HQ	*Hydrangea quercifolia 'Pee Wee'*	Pee Wee Hydrangea	18" - 24", 3 gallon container
IG	*Ilex glabra 'Shamrock'*	Shamrock Inkberry	30" - 36", B&B or 3 gallon container
IO	*Ilex opaca*	American Holly	4' - 5' B&B or large container
IV	*Ilex verticillata 'Red Sprite'*	Winterberry Holly	4' - 5' B&B or large container
Ivo	*Ilex vomitoria*	Yaupon Holly	3 gallon container
IT	*Itea virginica 'Little Henry'*	Dwarf Virginia Sweetspire	30" - 36", B&B or 3 gallon container
JU	*Juniperus**	Juniper	30" - 36", B&B or 3 gallon container
KL	*Kalmia latifolia*	Mountain Laurel	30" - 36", B&B or 3 gallon container
RM	*Rhododendron maximum*	Rosebay Rhododendron	30" - 36", B&B or 3 gallon container
RR	*Rosa rugosa**	Rugosa Rose	30" - 36", B&B or 3 gallon container
RK	*Rosa 'Knock-out' varieties*	Knock-out Rose	Assorted varieties, 3 gallon container
SJ	*Spirea japonica or equal*	Spirea varieties	Assorted hardy varieties, 3 gallon container
TxD	*Taxus x media 'Densiformus'*	Dense Yew	18" - 24", B&B or 3 gallon container
TxH	*Taxus x media 'Hicksii'*	Hick's Yew	30" - 36", B&B or 3 gallon container
VD	*Viburnum dentatum*	Arrowwood Viburnum	30" - 36", B&B or 3 gallon container
VL	*Viburnum lentago*	Nannyberry	30" - 36", B&B or 3 gallon container
GRASSES, PERENNIALS and GROUNDCOVERS			
AR	*Ajuga reptans**	Bugleweed	flats/rooted cuttings, 4" on center
AP	*Perennials*	Assorted Perennials	Species/varieties to be determined based on station location
CX	*Carex varieties**	Sedge varieties	3 gallon container, 18" on center
EP	*Echinacea Purpurea*	Purple Coneflower	2 gallon container, 18" on center
EF	*Euonymus fortunei**	Wintercreeper Euonymus	flats/rooted cuttings, 6" on center
HE	*Hemerocallis**	Daylilly	Assorted varieties, 50" Stella D'Oro varieties, 2 gallon, 18" o.c.
HF	*Hibiscus*	Rose Mallow	3 gallon container, 18" on center
HO	*Hosta*	Hosta	Assorted varieties, 2 gallon containers
HC	*Hypericum calycinum**	St. Johnswort	3 gallon container, 18" on center
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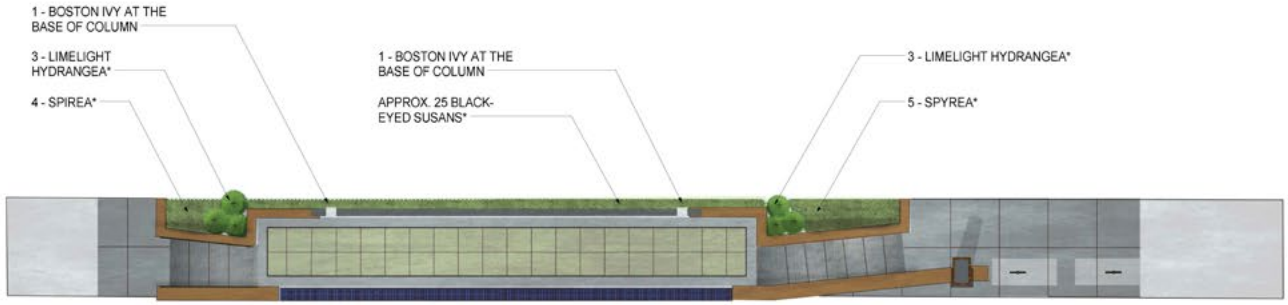

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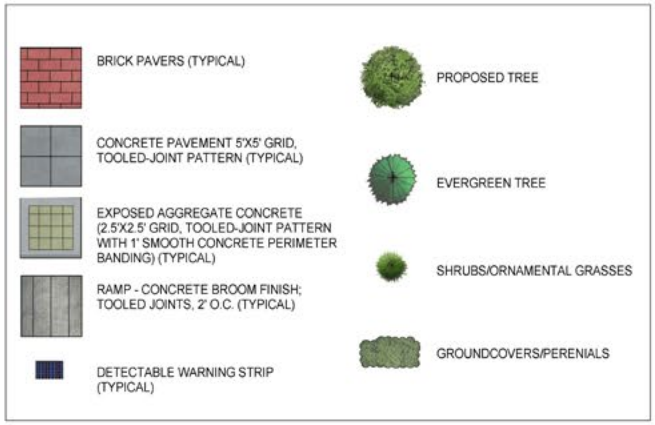
1 LANDSCAPING FLOOR PLAN - STAPLES MILL WEST BOUND

1/4" = 1'-0"

Figure 26: *Landscaping Floor Plan - Staples Mill Westbound*



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UA	*Ulmus americana 'Triumph' '*	Triumph American Elm	2.5" - 3" B&B
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JV	*Juniperus virginiana spp.*	Eastern Red Cedar	Utilize for screening, 6' - 7' Ht., Min., B&B
JU	*Juniperus sp**	Juniper	Varies, 6' - 7' Ht., Min., B&B
PS	*Pinus strobus*	Eastern White Pine	Utilize for screening, 8' - 10' Ht. Min. B&B
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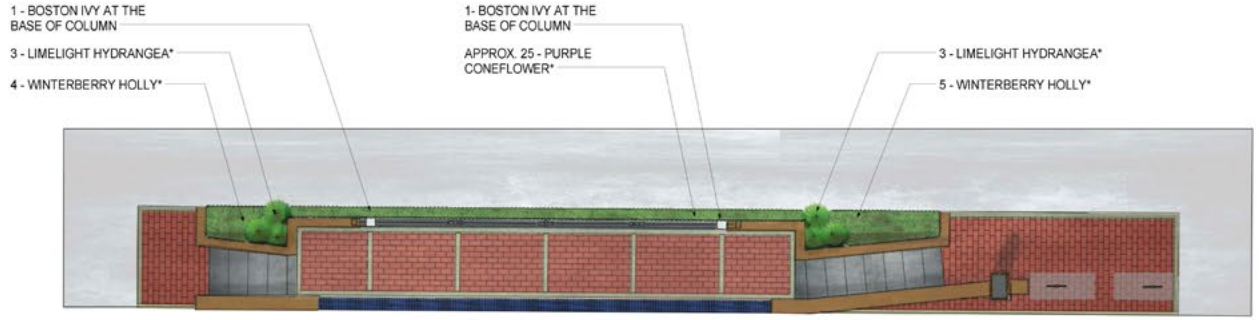
HO	*Hosta*	Hosta	Assorted varieties, 2 gallon containers
HC	*Hypericum calycinum**	St. Johnswort	3 gallon container, 18" on center
JH	*Juniperus horizontalis**	Creeping Juniper	3 gallon container, 18" on center
LM	*Liriope muscari or spicata**	Lilyturf	2 gallon container, 12" on center
MV	*Miscanthus varieties*	Maiden Grass varieties	3 gallon
MS	*Miscanthus sinensis 'Morning Light'*	Morning Light Maiden Grass	3 gallon
PA	*Pennisetum alopecuroides spp.*	Fountain Grass	3 gallon, generally 24" on center
RB	*Rudbeckia fulgida or equal*	Black-eyed Susan	2 gallon, 18" on center

*Denotes non-invasive, non-native species



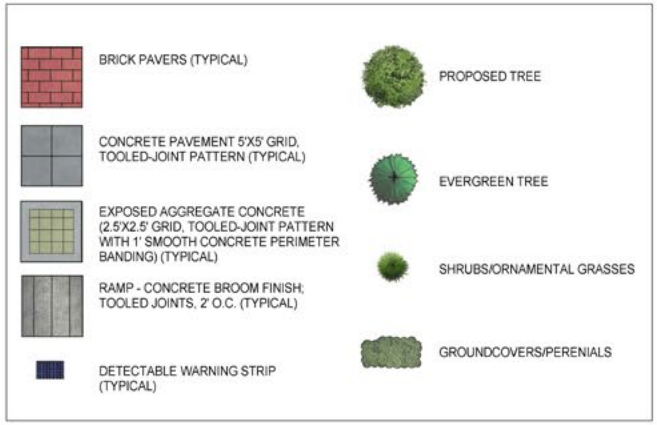
NOTE:

* - PLANT SELECTION CAN VARY FROM STATION TO STATION BASED ON LOCATION, SURROUNDING CONDITIONS, AND THE ORIENTATION OF THE STATION. OTHER POTENTIAL HARDY PLANT OPTIONS ARE SHOWN ON THE TYPICAL PLANT LIST.

1 **LANDSCAPING FLOOR PLAN - 24TH STREET WEST BOUND**

1/4" = 1'-0"

Figure 27: *Landscaping Floor Plan - 24th Street Westbound*



TYPICAL PLANT LIST *(Acceptable Options)*

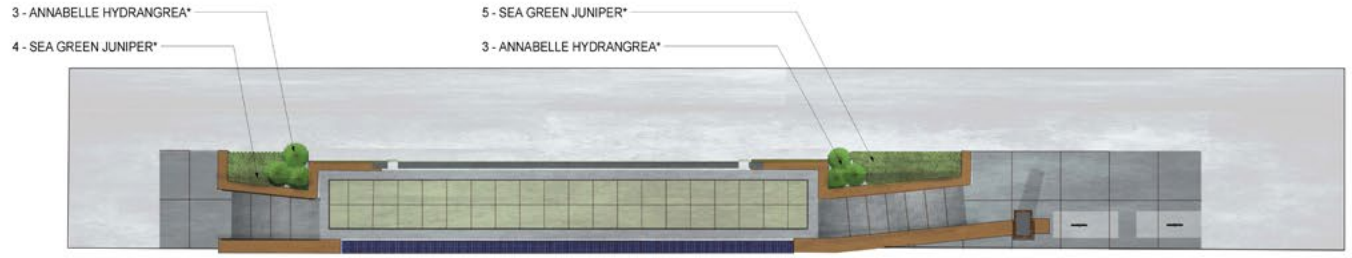
Key	Botanical Name	Common Name	Size and specifications
TREES			
AA	*Amelanchier arborea*	Downy Serviceberry	Clump form, 7'-8' Ht
AC	*Amelanchier canadensis 'Autumn Brilliance' **	Autumn Brilliance Serviceberry	Clump form, 7'-8' Ht
AL	*Amelanchior laevis*	Allegheny Serviceberry	Clump form, 7'-8' Ht
AR	*Acer rubrum*	Red Maple	2.5 - 3" B&B, cultivars acceptable if approved by project LA
BN	*Betula nigra*	River Birch	Clump form, 8' - 10' B&B
CC	*Capinus caroliniа*	American Hornbeam	2.5" - 3" B&B
CE	*Cercis Canadensis*	Eastern Redbud	2.5" - 3" B&B
CF	*Cornus florida*	Flowering Dogwood	2.5" - 3" B&B
CH	*Chioanthus virginicus*	Fringetree	Clump form, 5' - 6' B&B
CJ	*Cercidiphyllum japonicum**	Katsuratree	2.5" - 3" B&B
CO	*Carya ovata*	Shagbark Hickory	2.5" - 3" B&B
CR	*Crageagus sp*	Hawthorne	2.5" - 3" B&B
CV	*Crataegus viridis*	Winter King Hawthorne	2.5" - 3" B&B
GB	*Ginkgo biloba**	Ginkgo Maidenhair Tree	Male variety only, 2.5" - 3" B&B
LI	*Lagerstroemia indica**	Crapemyrtle	Clump form, 5' - 6' B&B
LT	*Liriodendron tulipifera*	Tuliptree	2.5" - 3" B&B
LS	*Liquidambar styraciflua*	American Sweetgum	2.5" - 3" B&B
MV	*Magnolia virginiana*	Sweetbay Magnolia	2.5" - 3" B&B
NS	*Nyssa sylvatica*	Black gum	2.5" - 3" B&B
PA	*Platanus acerifolia**	London Planetree	2.5" - 3" B&B
PY	*Pyrus calleryana 'Respire'**	Redspire Pear	2.5" - 3" B&B
QA	*Quercus alba*	White Oak	2.5" - 3" B&B
QC	*Quercus coccinia **	Scarlet Oak	2.5" - 3" B&B
QP	*Quercus palustris*	Pin Oak	2.5" - 3" B&B
QU	*Quercus prinus*	Chestnut Oak	2.5" - 3" B&B
QUP	*Quercus phellos*	Willow Oak	2.5" - 3" B&B
QR	*Quercus rubra*	Northern Red Oak	2.5" - 3" B&B
TA	*Tilia americana*	Basswood	2.5" - 3" B&B
UA	*Ulmus americana 'Triumph' **	Triumph American Elm	2.5" - 3" B&B
EVERGREENS			
AC	*Abies fraseri*	Fraser Fir	Utilize for screening, 8' - 10' Ht. Min. B&B
JV	*Juniperus virginiana spp.*	Eastern Red Cedar	Utilize for screening, 6' - 7' Ht., Min., B&B
JU	*Juniperus sp**	Juniper	Varies, 6' - 7' Ht., Min., B&B
PS	*Pinus strobus*	Eastern White Pine	Utilize for screening, 8' - 10' Ht. Min. B&B
TO	*Thuja occidentalis*	Eastern Arborvitae	Utilize for screening, 6' - 7' Ht., Min., B&B

Key	Botanical Name	Common Name	Size and specifications
SHRUBS			
BS	*Buxus sempervirens 'Green Velvet'**	Green Velvet Boxwood	15" - 18", min. 2 gallon container
CA	*Clethra alnifolia*	Summersweet	30" - 36", B&B or 3 gallon container
CK	*Cornus sericea*	Red Twig Dogwood	30" - 36", B&B or 3 gallon container
HAA	*Hydrangea arborsciens 'Annabelle'*	Annabelle Hydrangea	3 gallon container
HPL	*Hydrangea paniculata 'Limelight'*	Limelight Hydrangea	30" - 36", B&B or 3 gallon container
HQ	*Hydrangea quercifolia 'Pee Wee'*	Pee Wee Hydrangea	18" - 24", 3 gallon container
IG	*Ilex glabra 'Shamrock'*	Shamrock Inkberry	30" - 36", B&B or 3 gallon container
IO	*Ilex opaca*	American Holly	4' - 5' B&B or large container
IV	*Ilex verticillata 'Red Sprite'*	Winterberry Holly	4' - 5' B&B or large container
Ivo	*Ilex vomitoria*	Yaupon Holly	3 gallon container
IT	*Ilea virginica 'Little Henry'*	Dwarf Virginia Sweetspire	30" - 36", B&B or 3 gallon container
JU	*Juniperus**	Juniper	30" - 36", B&B or 3 gallon container
KL	*Kalmia latifolia*	Mountain Laurel	30" - 36", B&B or 3 gallon container
RM	*Rhododendron maximum*	Rosebay Rhododendron	30" - 36", B&B or 3 gallon container
RR	*Rosa rugosa**	Rugosa Rose	30" - 36", B&B or 3 gallon container
RK	*Rosa 'Knock-out' varieties*	Knock-out Rose	Assorted varieties, 3 gallon container
SJ	*Spirea japonica or equal*	Spirea varieties	Assorted hardy varieties, 3 gallon container
TxD	*Taxus x media 'Densiformus'*	Dense Yew	18" - 24", B&B or 3 gallon container
TxH	*Taxus x media 'Hicksi'*	Hick's Yew	30" - 36", B&B or 3 gallon container
VD	*Viburnum dentatum*	Arrowwood Viburnum	30" - 36", B&B or 3 gallon container
VL	*Viburnum lentago*	Nannyberry	30" - 36", B&B or 3 gallon container
GRASSES, PERENNIALS and GROUNDCOVERS			
AR	*Ajuga reptans**	Bugleweed	flats/rooted cuttings, 4" on center
AP	*Perennials*	Assorted Perennials	Species/varieties to be determined based on station location
CX	*Carex varieties**	Sedge varieties	3 gallon container, 18" on center
EP	*Echinacea Purpurea*	Purple Coneflower	2 gallon container, 18" on center
EF	*Euonymus fortunei**	Wintercreeper Euonymus	flats/rooted cuttings, 6" on center
HE	*Hemerocallis**	Daylilly	Assorted varieties, 50" Stella D'Oro varieties, 2 gallon, 18" o.c.
HF	*Hibiscus*	Rose Mallow	3 gallon container, 18" on center
HO	*Hosta*	Hosta	Assorted varieties, 2 gallon containers
HC	*Hypericum calycinum**	St. Johnswort	3 gallon container, 18" on center
JH	*Juniperus horizontalis**	Creeping Juniper	3 gallon container, 18" on center
LM	*Liriope muscari or spicata**	Lilyturf	2 gallon container, 12" on center
MV	*Miscanthus varieties*	Maiden Grass varieties	3 gallon
MS	*Miscanthus sinensis 'Morning Light'*	Morning Light Maiden Grass	3 gallon
PA	*Pennisetum alopecuroides spp.*	Fountain Grass	3 gallon, generally 24" on center
RB	*Rudbeckia fulgida or equal*	Black-eyed Susan	2 gallon, 18" on center

**Denotes non-invasive, non-native species*

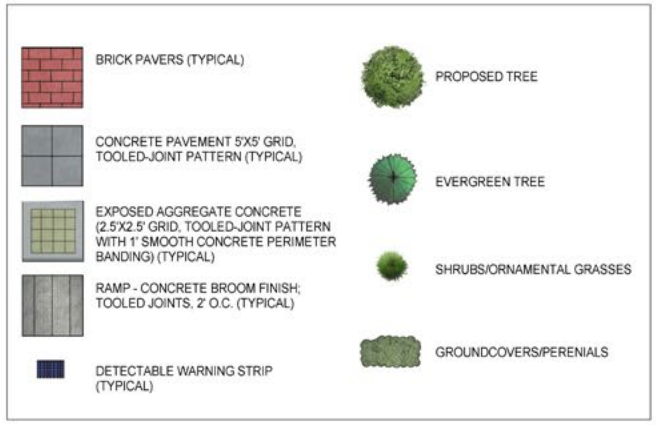
NOTE:

* - PLANT SELECTION CAN VARY FROM STATION TO STATION BASED ON LOCATION, SURROUNDING CONDITIONS, AND THE ORIENTATION OF THE STATION. OTHER POTENTIAL HARDY PLANT OPTIONS ARE SHOWN ON THE TYPICAL PLANT LIST.



1 LANDSCAPING FLOOR PLAN - 9TH STREET WEST BOUND
1/4" = 1'-0"

Figure 28: *Landscaping Floor Plan - 9th Street Westbound*



TYPICAL PLANT LIST *(Acceptable Options)*

Key	Botanical Name	Common Name	Size and specifications
TREES			
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BN	*Betula nigra*	River Birch	Clump form, 8' - 10' B&B
CC	*Capinus caroliniia*	American Hornbeam	2.5" - 3" B&B
CE	*Cercis Canadensis*	Eastern Redbud	2.5" - 3" B&B
CF	*Cornus florida*	Flowering Dogwood	2.5" - 3" B&B
CH	*Chionanthus virginicus*	Fringetree	Clump form, 5' - 6' B&B
CJ	*Cercidiphyllum japonicum**	Katsuratree	2.5" - 3" B&B
CO	*Carya ovata*	Shagbark Hickory	2.5" - 3" B&B
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GB	*Ginkgo biloba**	Ginkgo Maidenhair Tree	Male variety only. 2.5" - 3" B&B
LI	*Lagerstroemia indica**	Crapemyrtle	Clump form, 5' - 6' B&B
LT	*Liriodendron tulipifera*	Tuliptree	2.5" - 3" B&B
LS	*Liquidambar styraciflua*	American Sweetgum	2.5" - 3" B&B
MV	*Magnolia virginiana*	Sweetbay Magnolia	2.5" - 3" B&B
NS	*Nyssa sylvatica*	Black gum	2.5" - 3" B&B
PA	*Platanus acerifolia**	London Planetree	2.5" - 3" B&B
PY	*Pyrus calleryana 'Respire'**	Redspare Pear	2.5" - 3" B&B
QA	*Quercus alba*	White Oak	2.5" - 3" B&B
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JU	*Juniperus sp**	Juniper	Varies, 6' - 7' Ht., Min., B&B
PS	*Pinus strobus*	Eastern White Pine	Utilize for screening, 8' - 10' Ht. Min. B&B
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HPL	*Hydrangea paniculata 'Limelight'*	Limelight Hydrangea	30" - 36", B&B or 3 gallon container
HQ	*Hydrangea quercifolia 'Pee Wee'*	Pee Wee Hydrangea	18" - 24", 3 gallon container
IG	*Ilex glabra 'Shamrock'*	Shamrock Inkberry	30" - 36", B&B or 3 gallon container
IO	*Ilex opaca*	American Holly	4' - 5' B&B or large container
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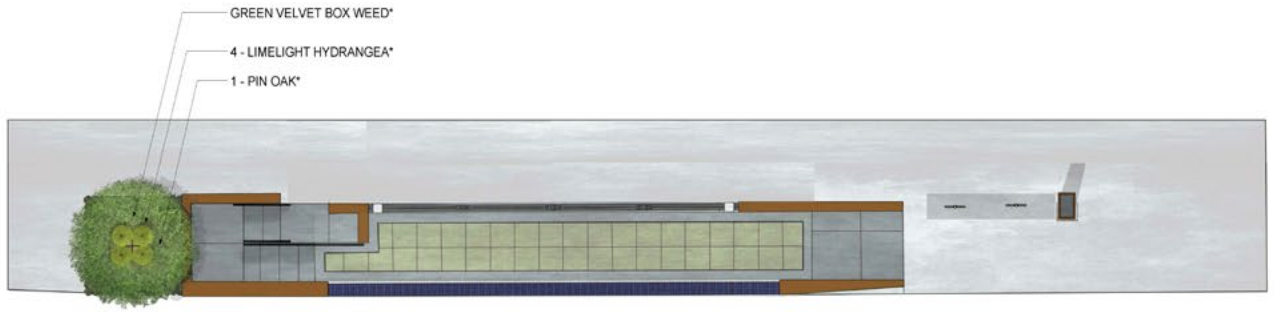


1 **LANDSCAPING FLOOR PLAN - 12TH STREET EAST**
1/4" = 1'-0"

Figure 29: *Landscaping Floor Plan - 12th Street East*

Architectural renderings of each platform shown in context with its surroundings are provided in the Appendix to this report. A daytime view as well as a nighttime view of each platform is shown in the renderings.

Plan sheets for each station can be viewed at **http://ridegrtc.com/brt/documents/**

The consistent appearance of each station throughout the corridor will maintain the BRT identity and allow for GRTC and the city of Richmond to more easily maintain the stations. However, it is also important to ensure that each station helps represent the area in which it is located. The station design presents an opportunity to achieve this through public art. There is an opportunity to incorporate commissioned artwork into each station that is highly visible and will be integral to establishing a neighborhood identity. While there is no budget for public art in the project, the design team will work with the Public Art Commission to explore the opportunities for incorporating public art into the stations. The station design includes a free standing panel as you enter the station that may serve as the opportunity for public art.

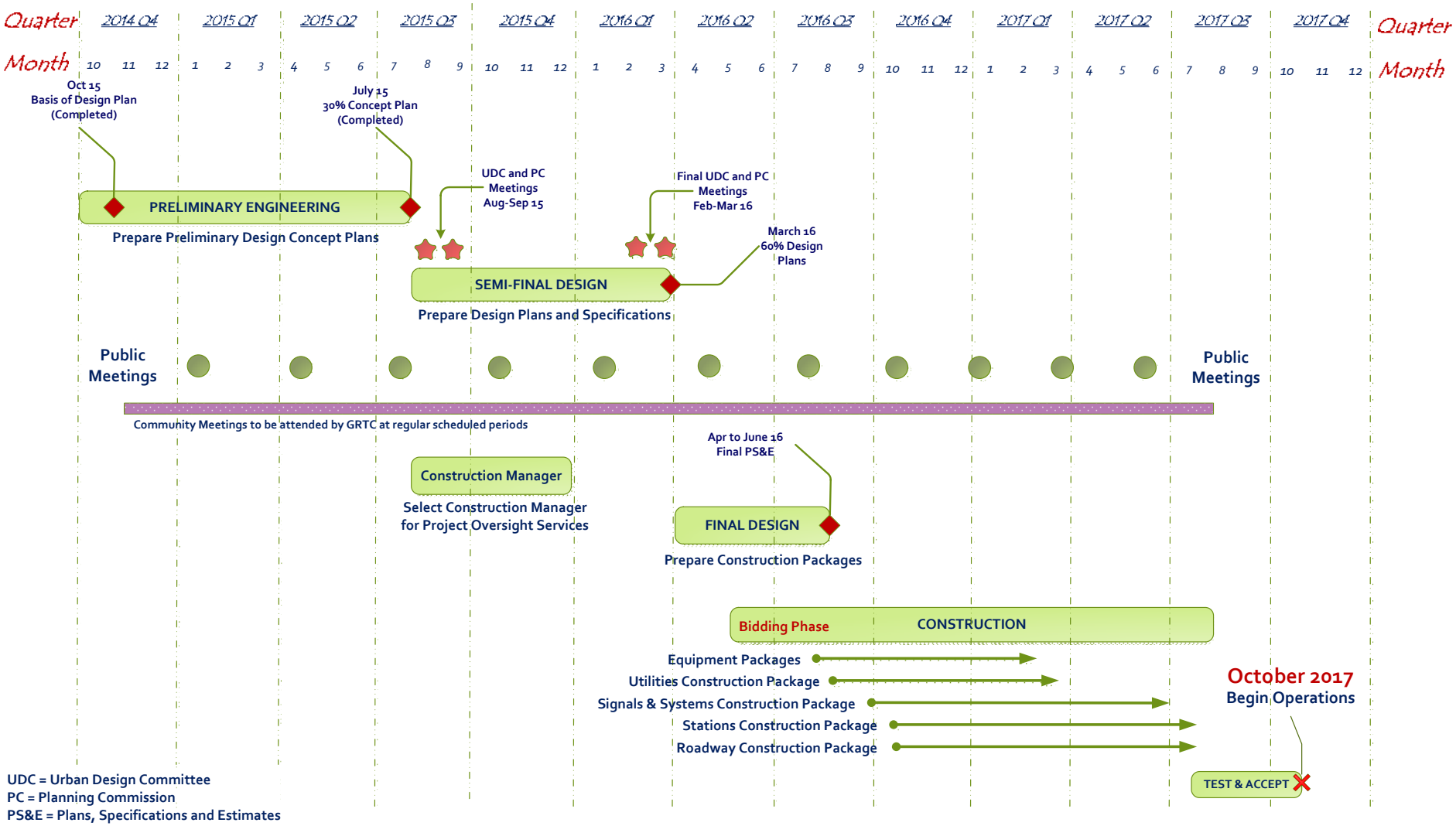
As part of the design process for the GRTC Pulse, urban design treatments and landscape elements are addressed in station and station area design, median areas, and curb-running segments of the project. In addition to the importance of the "station" designs and architectural style, typically it is the overall urban design treatment that is most visible and functional for BRT users. These design elements consist of:

- **Hardscape/pavement treatments.** The standard hardscape elements, which include the raised station platforms, connecting sidewalks and walkways, walls and steps, bus pads, and other pavement or "hardscape" areas for each station, shall be appropriately and sensitively integrated to complement the design of the station canopies. These station area hardscapes shall provide convenient, safe, and easy access connections for BRT users or commuters and pedestrians in general in accordance with local codes and requirements in terms of dimensions and materials. Given space limitations at some of the proposed station sites, the station areas and raised platforms will consume most of the existing sidewalk area and thus require all pedestrians to pass directly through the station platforms rather than bypassing them. In other areas, there is ample room to allow for a separate sidewalk outside of the platform area. All hardscape conditions will meet the requirements set forth in the Americans with Disabilities Act (ADA). This includes all surface treatments, ramps, railings and step conditions.
- **Shelter area layout and design scheme.** As shown in **Figure 21** through **Figure 24.**
- **Urban landscape (softscape) treatments.** Softscapes typically refer to the elements of the site that comprise of landscape elements, such as trees, shrubs, groundcovers, and other plantings. These landscape features make a significant contribution to any urban space by providing both environmental and aesthetic benefits. Beautiful, well-maintained landscape treatments are often a source of great civic pride; however, some landscape treatments may need to have an additional provision for maintenance and watering for each station that is not afforded under the funding allotment on this project, and potentially through adjacent private business interests of independent garden clubs or such. To clarify, no formal irrigation systems are being proposed, but at a minimum any plantings shall be native and hardy to the Richmond area and able to withstand periods of drought if proper care is limited. The softscape/landscaping areas for the station design are shown in **Figure 25** through **Figure 29**. Trees shall be planted in accordance with the City of Richmond Ordinance #92-231-227, Municipal Tree Policy, adopted June 23, 1998, which concerns the planting, maintenance, and removal of trees on City-owned properties. All plantings should also be carefully located to avoid utility lines and easements wherever deemed necessary and the locations of all plantings will be coordinated with the City Arborist.
- **Site furnishings and station amenities.** These include benches, bike racks, trash receptacles, seat walls/raised planters, lighting/illumination, ticket vending machines, way-finding and bus arrival signs, and similar.
- **Art in public spaces.** As mentioned previously.
- **"Green"/sustainable design initiatives.**

A full report that documents the applicable standards, design criteria, and other urban design and landscaping requirements that were used in the preparation of the plans and specifications entitled GRTC Bus Rapid Transit Urban Design and Landscaping Basis of Design Report can be found at **http://ridegrtc.com/brt/documents/**.

8. Project Schedule

GRTC BUS RAPID TRANSIT PROJECT
OVERALL PROJECT SCHEDULE



APPENDIX – STATION RENDERINGS

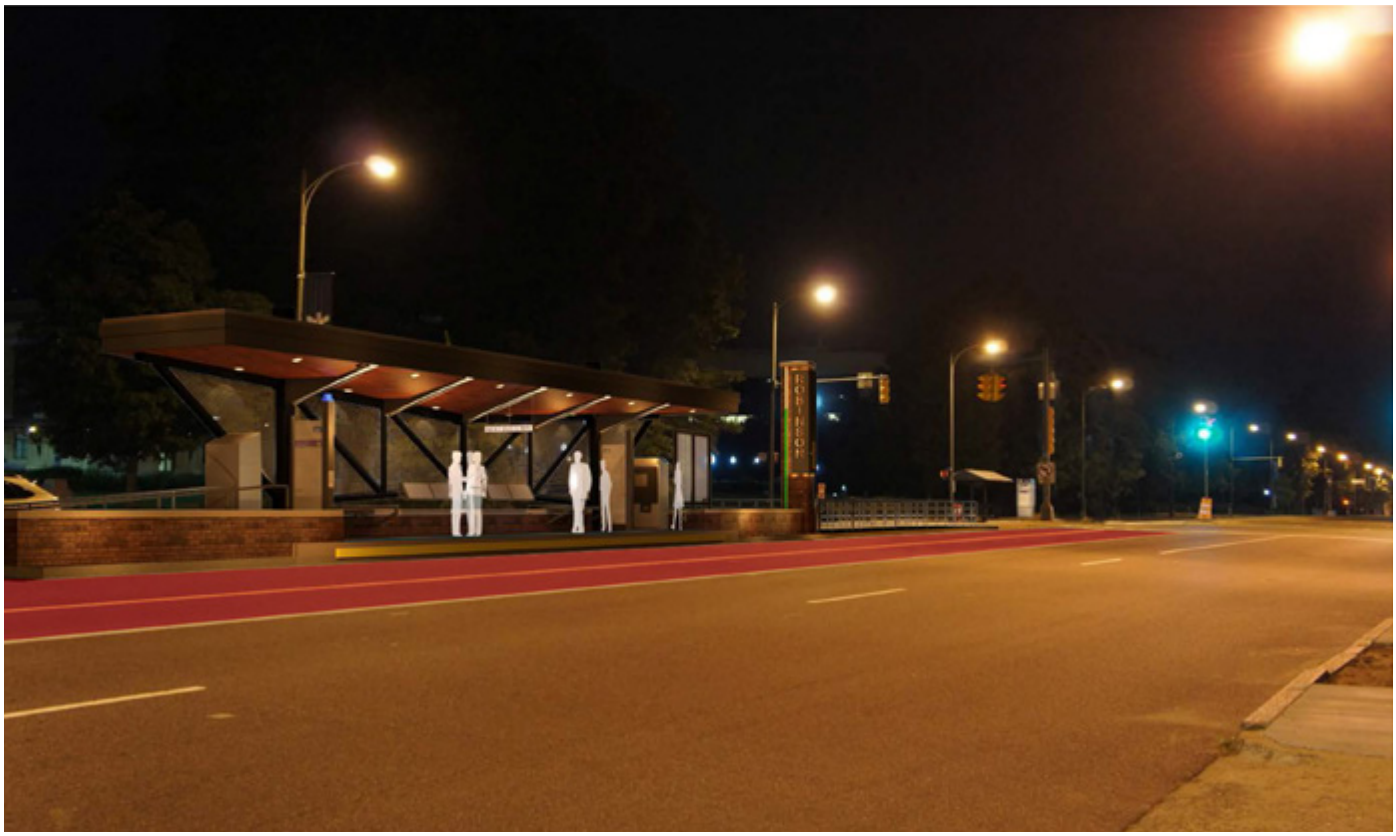
Willow Lawn

Staples Mill East Bound

Staples Mill Westbound

Cleveland Eastbound

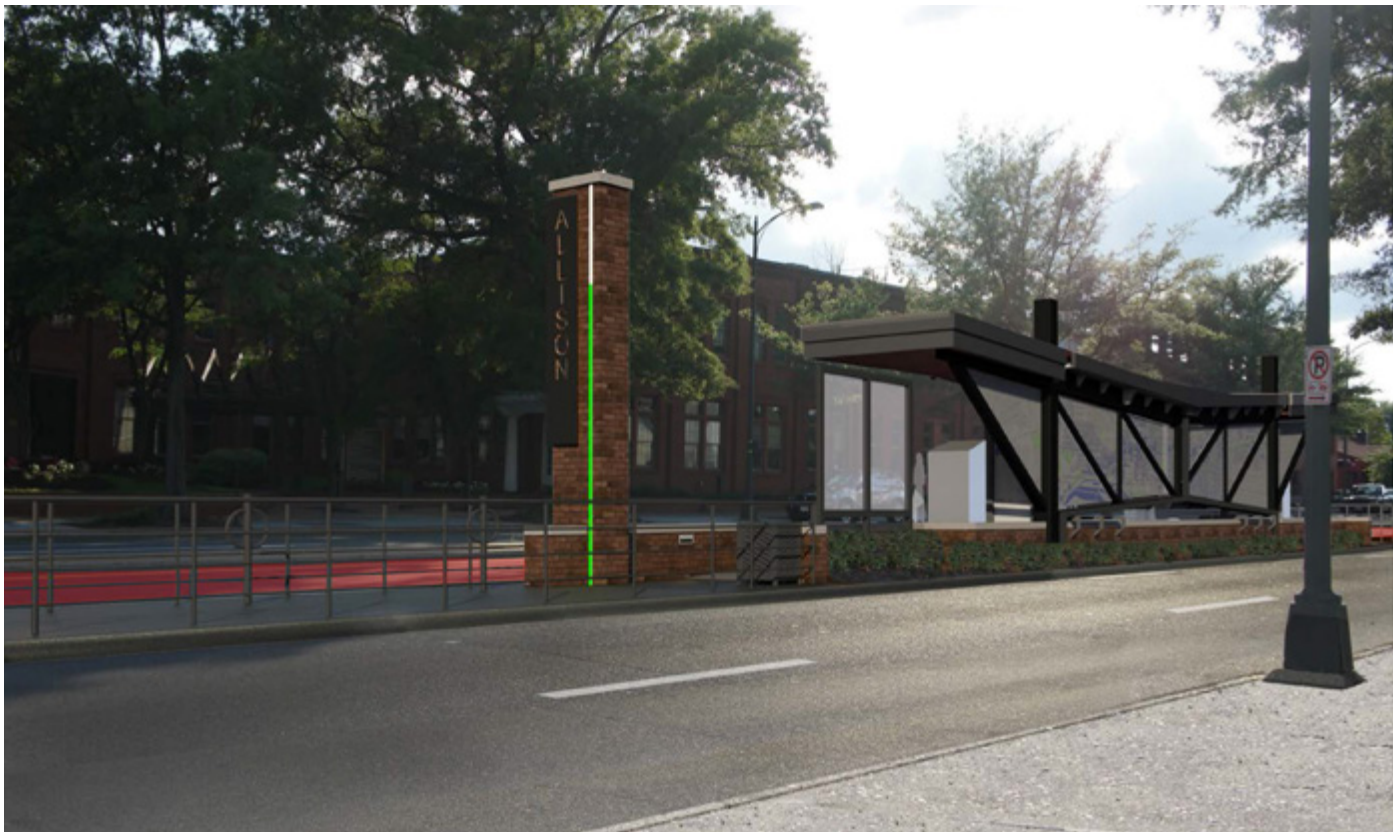
Cleveland Westbound



Robinson Westbound

Robinson Eastbound

Allison Eastbound



Allison Westbound

Shafer Eastbound

Shafer Westbound

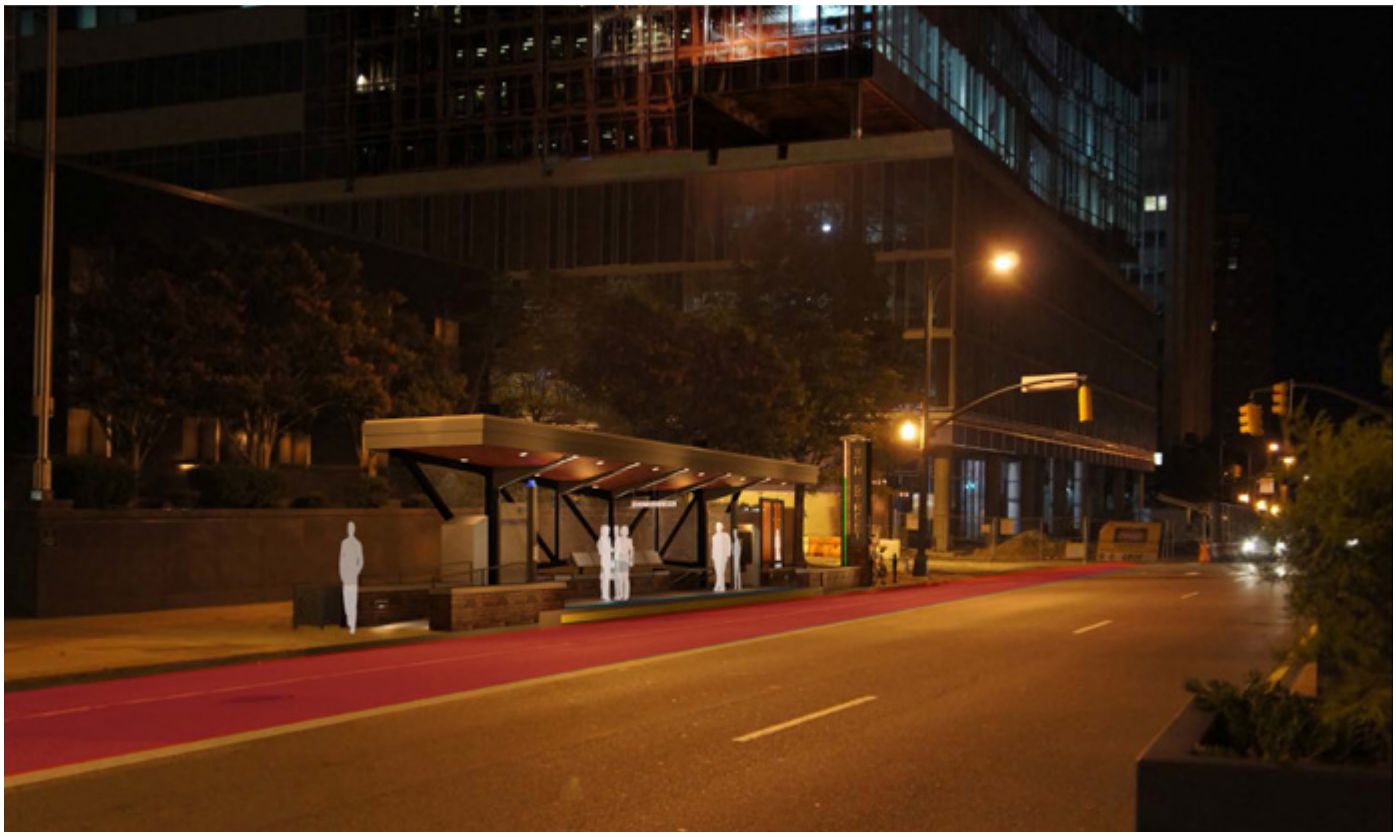
Adams Eastbound

Adams Westbound

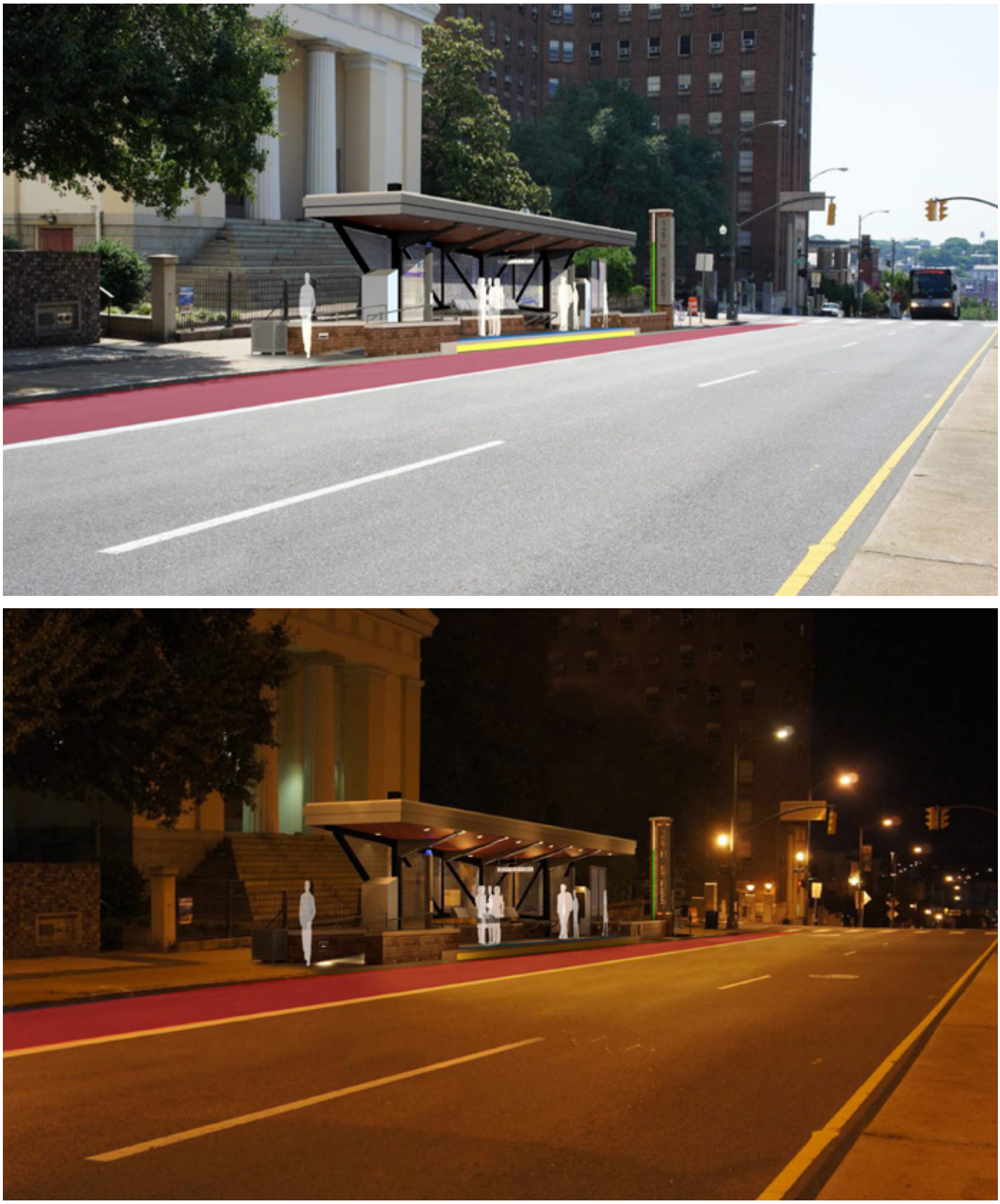
3rd/4th Street Westbound

3rd/4th Street Eastbound

9th Street Eastbound



9th Street Westbound



12th Street Westbound

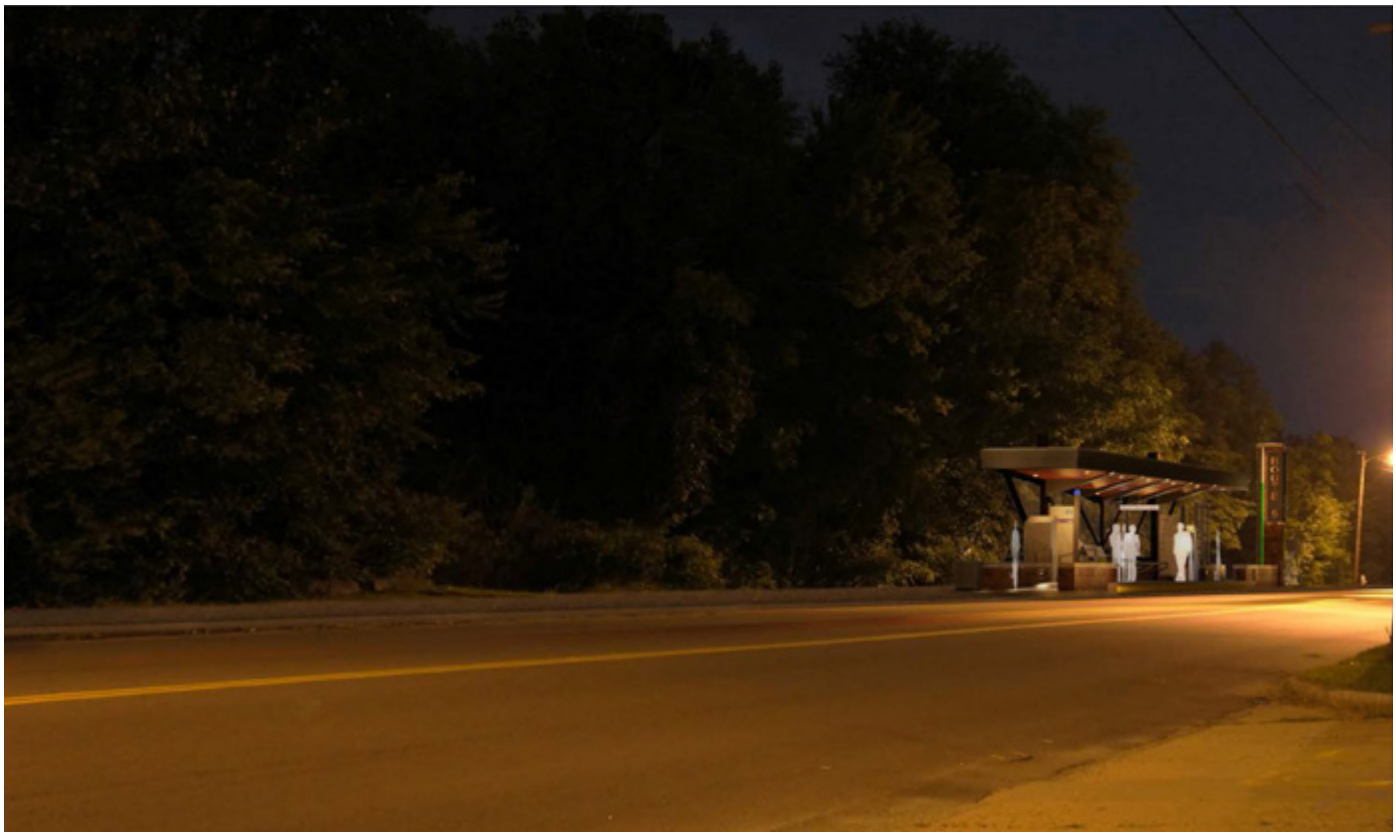
12th Street Eastbound

Main Street Westbound

Main Street Eastbound

24th Street Westbound

24th Street Eastbound



Route 5 Westbound

Route 5 Eastbound

Rockett's Landing

Station Identity OPT.1

Station Identity OPT.2