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To: Planning Commission  
From: Urban Design Committee  
Date: November 16, 2015  
RE: **Final Location, Character and Extent Review of the Greater Richmond Transit Company plans for a Bus Rapid Transit system along Broad Street, N. 14th Street and E. Main Street from the intersection of W. Broad Street and Staples Mill Road on the west to the intersection of E. Main Street and Orleans Street on the east**

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**I. APPLICANT**

Douglas C. Dunlap, Interim Director, Dept. of Economic and Community Development  
Sid Pawar, Virginia Department of Transportation (VDOT), Richmond District

**II. LOCATION**

City of Richmond right-of-way along Broad Street, N. 14<sup>th</sup> Street and E. Main Street from the intersection of W. Broad Street and Staples Mill Road on the west to the intersection of E. Main Street and Orleans Street on the east.

**Property Owner:**  
City of Richmond

**III. PURPOSE**

The application is for Final Location, Character and Extent Review of the GRTC plans for a Bus Rapid Transit (BRT) system.

**IV. SUMMARY & RECOMMENDATION**

The GRTC BRT project is a regional collaboration among GRTC, the Virginia Department of Rail and Public Transportation (DRPT), the City of Richmond, and Henrico County. The goal of BRT is to 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 proposed 7.6 mile BRT route runs along Broad Street from the western terminus at Willow Lawn Drive (in Henrico County), along N. 14<sup>th</sup> Street and then along E. Main Street to the eastern terminus at Orleans Street.

Since the conceptual review, the project's funding partners decided that the project would be delivered via a Design-Build method as opposed to a traditional Design-Bid-Build method. In the Design-Build method the contractor and the designer work concurrently as one team to deliver the project in a shorter timeframe. VDOT will be managing the delivery of the Design-Build project on behalf of GRTC, the City of Richmond, and Henrico County.

Two sections of the route will allow the BRT buses to operate in dedicated lanes: a median-running section between N. Thompson and N. Foushee Streets and a curbside-running section between N. 4<sup>th</sup> and N. 14<sup>th</sup> Streets. In all other sections of the route the BRT buses will operate in mixed-traffic conditions with other vehicles. The dedicated median and curbside sections of the route are the ones that will impact the existing right-of-way the most. In these sections the plans call for converting one general purpose

travel lane to an exclusive BRT lane. A limited number of on-street parking and loading spaces will be removed in certain areas to accommodate the bus route, and there will be restrictions on left-turn movements.

The City's Downtown Plan recommends a median-running BRT (see image on page 14 of this report) as a precursor to the lanes being transitioned into streetcar tracks when federal streetcar funding becomes available, which is also advocated for in the Plan. One of the recommendations made during conceptual review was for the applicant to investigate a median-running operation from N. Foushee Street to N. 9<sup>th</sup> Street and what potential impacts not doing so would have on plans for a future light-rail system. The applicant's report addresses the impacts to the BRT and local service as well as the budget, but also notes that any improvements constructed for median-running BRT would not meet the needs for a future light-rail system without major reconstruction. The Urban Design Committee is satisfied that a curb-running operation for this section of Broad Street will not negatively impact the future possibility of light rail.

Another recommendation made during conceptual review was for the BRT planning team to investigate utilizing Governor Street as opposed to N. 14<sup>th</sup> Street to make the connection to E. Main Street. It appears as though there would be several operational advantages to having the BRT traverse that route, including releasing the BRT from the heavy congestion associated with N. 14<sup>th</sup> Street at rush hour, though that would necessitate the relocation of the eastbound N. 12<sup>th</sup> Street platform to the west of the intersection. The applicant has spoken with the Virginia Department of General Services, which does not support the proposal for security reasons. The Commonwealth has also requested the closing of the Governor Street right-of-way.

The BRT planning team was asked to provide a plan showing how the existing bus stops along the BRT route will be impacted and how they connect into the BRT stations and also to investigate providing better connectivity and service to communities in the east end. The team has responded by providing information on four consolidated stops along the BRT route that will integrate and connect the BRT to the existing local bus routes. Those consolidated stops are located at Willow Lawn, 9<sup>th</sup> Street, 12<sup>th</sup> Street and 24<sup>th</sup> Street, and will provide connections to routes that service Park and Ride facilities in the West End/Henrico County, downtown and, in the case of the east end, local routes 41 and 51 at 12<sup>th</sup> Street and local routes 52 and 53 at 24<sup>th</sup> Street, serving Church Hill, Fulton and Montrose Heights. In addition, the City and GRTC will conduct a Comprehensive Operations Analysis (COA) that will evaluate the entire GRTC system. The COA will provide system-wide recommendations that will more fully address the questions and concerns regarding local route connectivity to the BRT system.

The BRT planning team was also asked to study opportunities to provide additional left turn movements from Broad Street, particularly at Summit Avenue, N. Boulevard and N. Lombardy Street. It was found that a left turn movement to southbound Boulevard was feasible during off-peak hours, but the other movements were not able to be accommodated.

There are real impacts to the pedestrian and outdoor dining experience in areas where on-street parking is removed and replaced with a transit lane. The Urban Design Guidelines note that on-street parking provides for some of the parking needs of adjacent uses, defines the character of a corridor or neighborhood and provides a buffer between those pedestrians and moving traffic. One way to encourage pedestrian activity in light of removing on-street parking is to create a new buffer by providing streetscape

amenities such as street trees, lights, furniture and planters. With this understanding, the BRT planning team and applicable City agencies were asked to develop a plan to provide a buffer (planters/street trees/bike racks, etc.) in areas along the corridor where on-street parking will be removed in order to enhance the streetscape for pedestrians. That plan will be studied as part of the Broad and E. Main Street Corridor Study and will be submitted as a separate project under the City's CIP program once the study is complete.

The Committee is appreciative of the amount of information provided by the BRT planning team to address concerns voiced during conceptual review. The Committee acknowledges that the conceptual plans were at a much more developed and detailed level than typical, and is comfortable with the level of information being presented for final review, along with the statement in the applicant's report that the UDC/PC requirements will be included in the RFP so that the Design-Build contractor has the necessary information to construct the BRT project in accordance with any final requirements, and with the understanding that the Design-Build team plans to update the project stakeholders throughout the delivery of the project. As stated in the applicant's report, in the event that any major changes are made to the station architecture and urban design components of the project, the Design-Build team will be required to submit a final plan for UDC/PC approval. If there are no significant changes to the station and urban design plans, project construction will commence with the approved UDC/PC approval conditions.

Nonetheless, there are certain outstanding plan elements that to the Committee do not appear to be critical to construction commencement, and for which there is still an opportunity to come back to the UDC/PC for final consideration. Among those elements are the tree survey, tree replacement plan and landscaping plan for the stations as well as the streetscape plan to alleviate issues associated with the removal of on-street parking. Notwithstanding these elements, the Committee finds the proposal to be consistent with the recommendations of the Citywide Master Plan, the Downtown Plan, and the Strategic Multimodal Transportation Plan. The Committee also finds the proposal to be consistent with the recommendations made during conceptual review. The Committee notes that the planning of the BRT has set into motion a transit-oriented development plan that will provide recommendations for private development along the BRT corridor, and provide guidance on land use and urban design. Therefore, the Urban Design Committee recommends that the Planning Commission grant final approval, with the following conditions:

- That applicable City agencies develop, and return for UDC and PC approval, a plan to provide a buffer (planters/street trees/bike racks, etc.) in areas along the corridor where on-street parking will be removed in order to enhance the streetscape for pedestrians. This plan should also show areas where curb cuts could be closed or reduced in width to allow for additional on-street parking, following an examination by the City Department of Public Works, coordinated with GRTC.
- That the BRT planning team and the City Department of Public Works Urban Forestry Division produce a tree survey, showing the location, size and species of all trees that will be removed along the project corridor as a result of this project.
- That the BRT planning team and the City Department of Public Works Urban Forestry Division develop, and return for UDC and PC approval, a plan to provide deciduous, shade-producing street trees in areas adjacent to those where existing trees will be removed, or, if space is not available in the vicinity, in other areas along the BRT corridor.

- That the BRT planning team develop, and return for UDC and PC approval, a final landscape plan for the stations, and that the plant palette is composed of drought tolerant and native species.

**Staff Contact:**

Jeff Eastman, (804) 646-6348

**V. FINDINGS OF FACT**

**a. Site Description and Surrounding Context**

The proposed 7.6 mile route for the BRT system runs along Broad Street from the western terminus at Willow Lawn Drive (in Henrico County), along N. 14<sup>th</sup> Street and then along E. Main Street to the eastern terminus at Orleans Street. As expected with a route of this length, the adjacent land uses vary greatly and includes suburban office complexes, drive-through fast food restaurants, car dealerships, office buildings, museums, college campuses and residence halls, multi-family housing, retail shops, the convention center, government offices, a train station, and a brewery, just to name a few. Accordingly, there are many zoning designations represented along the corridor, with the adjacent properties zoned B-3 (General Business), B-4 and B-5 (Central Business), UB-PO4 (Urban Business with a Parking Overlay), M-1 (Light Industrial), M-2 (Heavy Industrial), RF1 and RF2 (Riverfront). The BRT route moves through the Broad Street City Old & Historic District and is adjacent to the Shockoe Slip, Old Stone House, St. John's Church, and Woodward House—Rocketts City Old & Historic Districts.

**b. Scope of Review**

The project is subject to location, character, and extent review under Section 17.07 of the Richmond City Charter as a “widening, extension, narrowing, enlargement, vacation or change of use of streets.”

**c. UDC Review History**

The UDC reviewed and the Planning Commission approved, in August and September of this year, respectively, the conceptual plans for the BRT system, with the following conditions:

- (1) That the BRT planning team investigates utilizing a median-running operation from N. Foushee Street to N. 9th Street and what potential impacts not doing so would have on plans for a future light-rail system, fully recognizing the need for two general purpose lanes and the addition of left turn lanes and local transit stops as needed.
- (2) That the BRT planning team investigates utilizing Governor Street as opposed to N. 14th Street to make the connection to E. Main Street.
- (3) That the BRT planning team continues to study opportunities to provide additional left turn movements from Broad Street, particularly at N. Boulevard and N. Lombardy Street, fully recognizing the impact to parking totals and the important role that parking provides as a buffer for pedestrians from moving travel lanes.
- (4) That the final plans include details for each station showing the dimensions, materials and finishes of all structural components and amenities.
- (5) That the final plans show the location of each station and the businesses/buildings adjacent to them to determine the impact of the station on the adjacent private properties.
- (6) That the BRT planning team and applicable City agencies develop a plan to provide a buffer (planters/street trees/bike racks, etc.) in areas along the

corridor where on-street parking will be removed in order to enhance the streetscape for pedestrians.

(7) That the City Department of Public Works coordinates with GRTC to examine areas where curb cuts could be closed or reduced in width to allow for additional on-street parking.

(8) That the final plans include a tree survey, showing the location, size and species of all trees that will be removed along the project corridor as a result of this project.

(9) That the City Department of Public Works Urban Forestry Division coordinates with GRTC to provide deciduous, shade-producing street trees in areas adjacent to those where existing trees will be removed, or, if space is not available in the vicinity, in other areas along the BRT corridor.

(10) That the final plans include a signage package, to include signs placed upon or adjacent to the roadway as well as station identifying signage. This package should include materials, finishes and dimensions of the signs.

(11) That the final plans include a lighting plan for the stations, to include make, model and finish of any light fixture; light source and light color temperature. LED lights with a color temperature of 3000k are recommended. The lighting plan should also include a representative photometric diagram for at least one of the stations.

(12) That the BRT planning team provide a plan showing how the existing bus stops along the BRT route will be impacted and how they connect into the BRT stations.

(13) That the plant palette is adjusted to include more drought tolerant and native species.

(14) That the BRT planning team considers an alternate design for the walk-through stations that would provide better pedestrian flow.

(15) That the BRT planning team ensure that the totem design does not block views.

(16) That the BRT planning team considers more options to uplight the BRT stations.

(17) That the BRT planning team seeks to reduce the mass of the station roof form, particularly for the three downtown curb-running locations.

(18) That the BRT planning team considers providing higher capacity bike racks at stations.

(19) That the BRT planning team and the City considers locating bike share stations near the BRT stations.

(20) That the BRT planning team investigate providing better connectivity and service to communities in the east end.

(21) That a 10' vehicular lane width is maintained except for bus lanes.

(22) That the BRT planning team investigate using adaptive technology for left turn movements.

(23) That a review at the 60% design stage include connectivity to the neighborhoods, access to the Scott's Addition particularly at Summit Avenue, and the median running design of the system.

#### **d. Project Description**

The GRTC BRT project is a regional collaboration among GRTC, the Virginia Department of Rail and Public Transportation (DRPT), the City of Richmond, and Henrico County. The goal of BRT is to 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 proposed 7.6 mile BRT route runs along Broad Street from the western terminus at Willow Lawn Drive (in Henrico County), along N. 14th Street and then along E. Main Street to the eastern terminus at Orleans Street.

As noted in the conceptual applicant's report, the BRT project was first 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 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 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.

Since the conceptual review, the project's funding partners decided that the project would be delivered via a Design-Build method as opposed to a traditional Design-Bid-Build method. In the Design-Build method the contractor and the designer work concurrently as one team to deliver the project in a shorter timeframe. VDOT will be managing the delivery of the Design-Build project on behalf of GRTC, the City of Richmond, and Henrico County.

### **General Operating Information and Typical Sections**

The BRT hours of operation will be from 5:30 a.m. to 11:30 p.m. on weekdays and 6:00 a.m. to 11:30 p.m. on weekends. The peak hours of operation are from 6-8 a.m. and from 4-6 p.m. During those times, the BRT buses will operate on a 10 minute interval. At all other times they will operate on a 15 minute interval.

From the western terminus to N. Thompson Street, the BRT buses will operate in mixed-traffic on W. Broad Street, meaning that the BRT bus will not travel in a dedicated lane and will instead mix with other vehicles. This does not require modifications to roadway configuration or on-street parking.

Continuing on W. Broad Street east of N. Thompson Street, the buses will operate in dedicated lanes in the median of the roadway, a condition that will continue up to the intersection with N. Foushee Street. The applicant's report notes that running the BRT in the center of the roadway helps to minimize conflicts with vehicles turning to/from side streets and private entrances and also allows parallel parking along the curb. In addition, having the two bus lanes located in the center of the roadway helps to enhance the look and feel of a

dedicated transitway. The existing roadway width is approximately 76' measured from curb face to curb face from N. Thompson Street to Sheppard Street and approximately 82' from Sheppard Street to N. Foushee Street. The overall section of roadway from N. Thompson to N. Foushee includes three 10' wide through lanes in each direction, with parking on both sides, and a raised concrete median that varies between 4' and 6' in width.

The proposed typical section for the median-running BRT operation seeks to balance the needs of all uses to the maximum extent possible. These different uses include the number of general purpose travel lanes, BRT lane, median, on-street parking or loading zones, left-turn lanes (where applicable), and BRT station platforms. One of general purpose travel lanes in each direction will be converted to a dedicated median-running BRT lane. From N. Thompson Street to Sheppard Street, where the curb-face to curb-face dimension is 76', 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 N. Foushee Street, where the curb-face to curb face dimension is 82', 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 the VCU Monroe Park Campus is an exception. From Harrison Street to Pine Street, parking will be eliminated in order to provide a 6' 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.

From N. Foushee and 4<sup>th</sup> streets, the buses will operate in mixed traffic again as they transition between median- and curb-running.

Between 4<sup>th</sup> and N. 14<sup>th</sup> streets the buses will operate in dedicated curbside lanes. The existing roadway width of this section is approximately 82' measured from curb face to curb face. There are several different existing sections for this roadway as it transitions between 4 and 6 travel lanes with on-street parking and dedicated left turn lanes. This segment will be modified to provide appropriate travel lane widths (achieved with pavement markings) and necessary median modifications for dedicated left turns. Median modifications will be necessary along some blocks to provide minimum lane widths from 4<sup>th</sup> Street to 9<sup>th</sup> Street. The existing median from 9<sup>th</sup> Street to 11<sup>th</sup> Street will be reconstructed to provide the required minimum lane widths and necessary turn lanes. The remaining curb running transitway segment from 11<sup>th</sup> Street to Old N. 14<sup>th</sup>/College Street will require existing raised median modifications and lane restriping to provide the minimum recommended lane widths.

All existing left-turn and right-turn movements allowed along E. Broad Street between N. 4<sup>th</sup> Street and N. 14<sup>th</sup> Street will be maintained. Where the BRT is curb running, other vehicles can use the BRT lane to make right turns. Signing and special pavement markings will indicate to drivers that right turns are allowed.

The route turns south on N. 14<sup>th</sup> Street and then travels on E. Main Street to the eastern terminus, all in mixed traffic. Minor roadway widening is required on the south side of E. Main Street just west of N. 17<sup>th</sup> Street to accommodate the eastbound Main Street Station platform. The existing curb lane is too narrow for a

bus to stop at the proposed BRT station without encroaching upon the adjacent travel lane.

### **Left Turns, North-South Connectivity and Traffic Signals**

*More comprehensive information on left turns, connectivity and traffic signals can be found in the document titled "Broad Street Roadway Concept" available at <http://ridegrtc.com/brt/documents/>*

From N. Thompson Street to N. Foushee Street, where the BRT runs in the median, left-turn movements will occur only at signalized intersections operating with protected-only (green arrow) left-turn traffic signal phasing. Since 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. Similarly, north-south vehicular movements across Broad Street will only occur at traffic signals. This removes the temptation of drivers crossing Broad Street at non-signalized intersections to attempt to store in median transit lanes. No existing traffic signals will be removed, which will allow for continued vehicular, bicycle, and pedestrian access at those intersections. Exclusive left turn lanes will be provided as an improvement to the shared left-through lane configuration currently present today

Following is a summary of existing left turn movements into neighborhoods adjacent to the median-running portion of the BRT. It is important to note that all of the existing protected (that is, in its own lane) left turn movements at signalized intersections will remain. Only unprotected left turn movements are proposed to be restricted.

Of seven existing left turn movements into the West of the Boulevard neighborhood, five are proposed to be restricted (N. Thompson Street, Roseneath Road, N. Cleveland Street, N. Belmont Avenue and Wayne Street) and two will remain (Tilden and N. Sheppard Streets). Of six existing left turn movements into the Scott's Addition neighborhood, four are proposed to be restricted (MacTavish, High Point, Summit and Altamont Avenues) and two will remain (Roseneath Road and N. Sheppard Street). Of ten existing left turn movements into the Fan neighborhood, eight are proposed to be restricted (N. Mulberry Street, N. Davis Avenue, Strawberry Street, N. Allison Street, N. Lombardy Street, Ryland Street, Shafer Street and N. Laurel Street) and two will remain (N. Robinson and N. Harrison Streets). Of four existing left turn movements into the Carver/Newtown neighborhoods, one is proposed to be restricted (Goshen Street) and three will remain (N. Meadow Street/Hermitage Road, N. Allen Avenue, and Bove Street). All three of the existing left turn movements into Jackson Ward (N. Henry, N. Madison and N. Adams Streets) will be restricted. Of three existing left turn movements into Monroe Ward, two will be restricted (N. Jefferson and N. Foushee Streets) and one will remain at Monroe Street.

To mitigate the loss of left turns into the Museum District and Jackson Ward, new traffic signals are proposed at Tilden Street and at N. Monroe Street, respectively. A third new signal is proposed for the intersection of E. Main Street and Orleans Street. Since conceptual review, the applicant has further researched providing left turn movements to southbound Boulevard, Summit Avenue and Lombardy Street, and has agreed to add the left turn movement to



southbound Boulevard. Doing so reduces the proposed on-street parking by 6 spaces in order to achieve the proper lane widths and transitions within the existing roadway cross section. Left turn movements at Lombardy Street and Summit Avenue were not recommended.

In addition, the plans call for the establishment of six pedestrian-only crossings at the intersections of Strawberry, Goshen, N. Pine, N. Henry, N. Madison, and N. Jefferson Streets.

### **Impact on On-Street Parking**

*More comprehensive information on parking can be found in the document titled "BRT Parking Analysis Report and Appendix" available at <http://ridegrtc.com/brt/documents/>*

There are currently 708 on-street parking spaces (free, paid and loading zone) on Broad Street, between N. Thompson and N. 14th Streets. West of N. Thompson Street there is no on-street parking allowed and on N. 14th and E. Main Streets the BRT will only impact parking where a station is located. The earlier iterations of the BRT plans called for the removal of all 708 spaces, however, the current design concept would accommodate 401 on-street parking spaces on Broad Street between N. Thompson Street and N. 14th Street. The proposal reflects an understanding that the BRT is operating in an urban environment and a desire to balance the needs of on-street parking in the existing curb-face to curb-face dimension with the presence of BRT stations, left turn movements, median width necessary to protect pedestrians and curb-running BRT operations.

Broken into segments, 26 spaces are preserved between N. Thompson and Sheppard Streets (of 124 existing spaces, a loss of 98 spaces), 149 spaces are preserved between Sheppard and Lombardy Streets (of 244 existing spaces, a loss of 95 spaces), 160 spaces are preserved between Lombardy and N. Foushee Streets (of 246 existing spaces, a loss of 86 spaces), 66 spaces are provided between N. Foushee and 4<sup>th</sup> Streets (there are 38 existing spaces, and 28 spaces are gained) and no spaces are preserved between 4<sup>th</sup> and N. 14th Streets (a loss of 56 existing spaces). 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.

There are currently 284 on-street parking spaces (free, paid and loading zone) on N. 14<sup>th</sup> Street, E. Main Street, Old Main Street and Orleans Street. Of that total, 30 spaces total are lost under the current plans: 20 on E. Main Street from N. 14<sup>th</sup> Street to Williamsburg Avenue, and 10 on Orleans Street from Old Main Street to E. Main Street.

Since conceptual review, the project team has identified several areas where curb cuts could be closed or narrowed. Doing so could add valuable on-street parking to the corridor. More thorough vetting of the closing of the curb cuts will be undertaken by City staff.

### **Stations**

The BRT system will have 14 stations along the Broad and E. Main Street corridors with a total of 26 platforms. Each station will have an eastbound and

westbound platform, except the western and eastern termini. Ten of the station platforms will be located in the Broad Street median, nine station platforms will be curbside walk-through (where the platform occupies all of the usable sidewalk space), and seven station platforms will be curbside but will have sufficient sidewalk depth for pedestrians to use the sidewalk to the rear of the platform. All but one of the platforms, the western terminus being the exception, are located within City limits.

### **Station Design**

*More comprehensive information on station design can be found in the document titled "BRT Stations Basis of Design Report" available at <http://ridegrtc.com/brt/documents/>*

The station designs seek to take their cues from the architecture and materials used around the city. Importantly, the designers note that several of the stations are located in City Old & Historic Districts, and attempts were made to integrate the stations into the historic fabric of the city. The stations designs are all consistent to make them easily recognizable as transit stops, however, there are also maintenance benefits that result as well. The structural supports of the stations are composed of steel, supporting a low-angle canopy composed of a standing seam metal roof painted gray. The underside of the canopy is to be composed of cedar planks, similar to the train sheds behind the Science Museum of Virginia (formerly Broad Street Station). The low walls of the platforms will have a brick base topped with a granite cap. The back wall of the platform is a wind screen composed of a transparent glass or polycarbonate (not yet finalized) containing an image of the BRT system map. A separate screen wall is provided at each station as a placeholder for public art.

During conceptual review, it was recommended that the mass of the station roof be reduced to minimize the impact of the station on the adjacent properties. The design team notes that the cantilevered roof as designed requires significant structural depth that governs the thickness of the roof. However, they feel that a 4" depth reduction would be possible, bringing the roof thickness from 1'-10" to 1'-6" (~ 20% reduction). This will apply to every station.

The platform is 10' 6" deep and 43'-45' long. For comparison, the existing GRTC passenger shelters are 8 <sup>3</sup>/<sub>4</sub>' deep and 17' long. When the ramps are added on to the BRT platforms, the overall station length is about 80'. The platforms ramp up to be at grade with the bus doors (about 17" above street level) so that the bus does not need to kneel down or unfold an accessible ramp. The sidewalk materials at each of the stations will match those on the adjacent sidewalks, either brick or concrete. The distance from the platform floor to the top of the canopy is 11', and the station identification totem is 17' in height. Following a recommendation made during conceptual review, the applicants have modified the sidewalk width through the platform so that 5'2" is the minimum width, a gain of 14" from the previous design. The stations are being designed to accommodate the 40' BRT bus, but can also expanded at a future date to accommodate a 60' articulated bus. Access to and from the stations will consist of visible and designated crosswalks with potential safety strobe lights at non-signalized intersections and bollards where necessary.

Amenities at the stations will include benches, a leaning rail and trash cans. Bike racks will be provided from the group of approved, City-standard racks, and could

vary in capacity by location as space permits. The City will also seek to locate bike share stations near the BRT stations as that initiative progresses. The platforms will all have a ticket vending machine that allows riders to purchase a pass before boarding, saving time during passenger loading. Each platform will be outfitted with centrally-monitored security cameras. Light fixtures will direct lighting towards the station and will typically be in the 10-20 foot-candle range. The designers are exploring using motion sensors in the station to allow the light levels to be reduced by 50% when motion is not detected. In addition, the surrounding illumination levels from the existing street lights will also be considered to prevent over-illumination. The color temperature of the lights will be 3000k.

### **Station Locations**

*More comprehensive information on station location can be found in the document titled "BRT Final Station Location Report" available at <http://ridegrtc.com/brt/documents/>*

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.

#### Willow Lawn (Henrico County)

A single curbside platform on W. Broad Street just west of its intersection with Willow Lawn Drive. This is the western terminus of the BRT.

#### Staples Mill

Two curbside platforms – the westbound platform located on the northwest side of the intersection of W. Broad and Chantilly Streets; the eastbound platform located at the southeast side of the intersection.

#### Hamilton/I-195

Two median platforms located between Cleveland Street and N. Belmont Avenue.

#### N. Robinson

Two median platforms located between Terminal Place and N. Robinson Street.

#### N. Allison

Two median platforms located between Strawberry and N. Allison Streets.

#### Shafer

Two median platforms located between N. Harrison and Shafer Streets.

#### N. Adams

Two median platforms located to either side of the intersection of W. Broad and N. Adams Streets.

#### N. 3<sup>rd</sup>/N. 4<sup>th</sup> Street

Two median platforms – the westbound platform located to the northwest side of the intersection of E. Broad and N. 3<sup>rd</sup> Streets; the eastbound platform located to the southeast side of the intersection of E. Broad and N. 4<sup>th</sup> Streets.

#### N. 9<sup>th</sup> Street

Two curbside platforms – the westbound platform located on the northeast side of the intersection of E. Broad and N. 9<sup>th</sup> Streets; the eastbound platform located at the southwest side of the intersection.

#### N. 12<sup>th</sup> Street

Two curbside platforms – the westbound platform located on the northwest side of the intersection of E. Broad and N. 12<sup>th</sup> Streets; the eastbound platform located at the southeast side of the intersection.

#### Main Street Station

Two curbside platforms – the westbound platform located on the northeast side of the intersection of E. Main and N. 15<sup>th</sup> Streets; the eastbound platform located at the southwest side of the intersection of E. Main and S. 17<sup>th</sup> Streets.

#### N. 25<sup>th</sup> Street

Two curbside platforms – the westbound platform located on the northwest side of the intersection of E. Main and N. 25<sup>th</sup> Streets; the eastbound platform located at the southwest side of the intersection.

#### Route 5

Two curbside platforms – the westbound platform located on the north side of the road to the west of the intersection of E. Main and Nicholson Streets; the eastbound platform located on the opposite side of the street.

#### Rocketts Landing

A single curbside platform on Orleans Street just east of its intersection with Old Main Street. This is the eastern terminus of the BRT.

### **Station Landscaping**

All stations will be landscaped, but to varying extents depending on the location. Primarily, landscaping will feature groundcovers, grasses, perennials and shrubs, but there are also some opportunities for trees to be planted. Due to the locations of the stations, plants have been selected for their hardiness and ease of maintenance. Stormwater from the platform canopies will be diverted into the station landscaping, with any excess being diverted to the City sewer system. A full list of suggested plants was presented in the conceptual plan package.

### **Funding and Schedule**

The total estimated cost of the BRT system is \$53.8 million, which includes \$4 million for preliminary engineering. The capital and construction budget for the project is \$49.8 million, which includes funding from the following sources: FTA TIGER grant (\$24.9 million), Virginia DRPT (\$16.9 million), City of Richmond (\$7.6 million), Henrico County (\$400,000).

The timeline presented in the application package indicates that the anticipated contract award date is mid-March 2016, and the estimated project completion date is mid-August 2017.

**e. Master Plan**

The City's Master Plan (2000) designates Broad Street as a Principal Arterial in the road hierarchy, defined as "major routes carrying high traffic volumes originating in areas not conveniently served by interstates or freeways" (page 40). Generally, these roadways have four to six moving lanes, sometimes with a median, but not limited access. Parking is generally prohibited at peak times with signalization and other controls and transit provisions being major design features. Main Street is designated as a Minor Arterial, defined as "routes designed to support and supplement principal arterial roadways" (page 40).

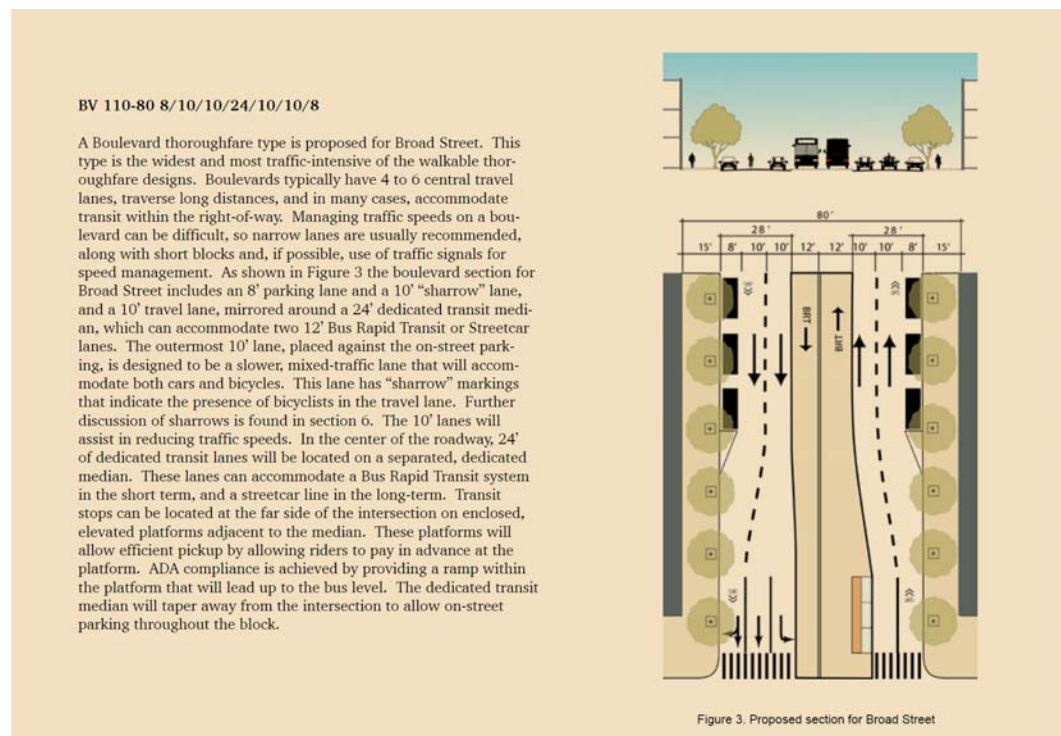
While there is no language in the City's Master Plan specific to BRT systems, the Plan does advocate for a light rail system "connecting key stops within the City and metropolitan area along major transportation corridors" (page 36). One element of the envisioned light rail system is a route along Broad Street from Main Street Station west. The Plan recognizes that light rail is costly and more of a long-term solution, noting that in the interim a "range of bus systems on existing rights-of-way should be used" and that "consideration should be given to providing dedicated lanes for such vehicles" (page 36). In a section discussing ways to improve air quality in the City, the Plan notes that one strategy is to support land use and development that reduces reliance on private automobiles, and promotes greater use of public transportation systems (page 67).

The Master Plan provides general guidance appropriate to the BRT project, acknowledging that the existing grid system in many of the City's older neighborhoods provides a variety of travel opportunities that evenly distributes traffic and that "alteration of this system through selective street closings or other techniques has the potential to seriously impact other streets and neighborhoods" (page 52). Another important consideration put forth by the Master Plan is that in order to develop a successful multi-modal transportation system, the specific needs of bicyclists and pedestrians must be accommodated (page 38).

As to parking, the Master Plan recognizes that the ability to provide parking in an urban area can put the City at a disadvantage with suburban sites, and that effective solutions to this issue should include increased support for; and expansion of, public transportation. The Plan notes that "expanding transit service to offset increased parking demands for private automobiles should be a central feature in revitalizing Downtown Richmond" (pages 59-60). Nonetheless, one parking policy described in the Plan is to "maintain on-street parking for short-term visitors in business areas, particularly Downtown" (page 60).

Much of the BRT route traverses downtown, and the City's Downtown Master Plan (2008) recognizes that GRTC is pursuing Bus Rapid Transit as a pro-active first step towards bringing the streetcar back to Downtown. The Plan states that "Bus Rapid Transit is an efficient, reliable, and low-cost strategy to begin regular transit service through Downtown, and it can be funded through an attainable federal grant from the Federal Transit Authority (FTA). After a 12-18 month operating period, GRTC will present BRT ridership levels to the FTA as grounds

for funding a Downtown Streetcar system. Evidence of strong ridership levels will help Richmond to compete for limited Federal Streetcar funding. The BRT system is proposed to run in dedicated lanes in the center of Broad Street, where the existing median is located. These dedicated lanes can be transitioned into streetcar tracks when federal streetcar funding becomes available” (page 5.22). The Implementation section of the Plan recommended the conversion of Broad Street for BRT Operation as a project that could be phased within five years of the Plan’s adoption (page 5.32). The diagram below depicts how the Downtown Plan envisions the BRT to operate within the right-of-way.



The Downtown Plan notes that much of the historic street grid has been maintained downtown, but also that street widening, intersection modification and converting two-way streets to one-way have all encouraged high vehicular speeds, complicated local travel patterns, and reduced the walkability of the area. The vision for Downtown Richmond, as described by the community, is a return to the walkable city structure of the early 1900s. Downtown residences, places to shop and find entertainment, and workplaces are all components found in a walkable downtown. The return to a walkable downtown requires managing traffic speeds to pedestrian-friendly levels and ensuring connectivity of the street system. To accomplish this vision, a number of priorities were put forward, two of which are to “prioritize pedestrian needs on Downtown streets” and to “provide efficient, reliable transit Downtown” (page 5.3).

One of the strategies to improving transportation as noted in the City’s Strategic Multimodal Transportation Plan, completed in July 2013, is to implement the Broad Street BRT (page 52). The Executive Summary for the plans notes that it would “improve transit operations along Broad Street and provide faster public transportation service along the Broad Street corridor” (page 41). In the “prioritization” table on page 55 of the Plan, BRT is listed as a high priority.

**f. Urban Design Guidelines**

The Urban Design Guidelines contain several recommendations regarding street design, including that “on-street, curb parking should be retained wherever possible (page 4). The Guidelines are very supportive of on-street parking, noting that it is “important for not only providing for some of the parking needs of adjacent uses, but also as a means of defining the character of a corridor or neighborhood. On-street parking creates pedestrian activity and provides a buffer between those pedestrians and moving traffic” (page 6). As to intersections, the Guidelines advocate for them to be designed to serve pedestrians, bicyclists and motorists in a safe manner” and that “pedestrian crossings should be clearly marked and refuge islands should be provided where the crossing distance is 60 feet or greater” (page 7).

The Guidelines impart that streetscape elements, such as street trees and street lighting, should be used to encourage pedestrian activity and that striped crosswalks, pedestrian crosswalk signals, and other improvements that enhance safety should be installed as a standard amenity at all signalized intersections (page 6).

The Guidelines contain several recommendations applicable to the proposed stations, noting that “a comfortable, safe, and quality environment should be created at transit stops (page 6). As to signage (intended for buildings but apt for station signage as well), the Guidelines recommend that signs should fit the architecture of the building but not overwhelm it. The Guidelines also recommend that the signs not obstruct defining architectural elements of the building and that their placement is sensitive to the signs of adjacent businesses. The sign’s message should be easy to read, direct and should not contain too much information (page 23). “Generally”, the Guidelines continue “sign lettering should be 4 to 14 inches high and should be in proportion to the area in which it will be displayed” (page 24). The Guidelines state that “internally illuminated signs should have light lettering and dark, opaque backgrounds for improved readability and minimal glare” and that “all lighting and electrical parts should be concealed from view” (page 24).

The Guidelines note that “site furnishings, such as benches and trash receptacles, should be appropriately styled and scaled to complement building architecture” and that “decorative streetscape planters are not recommended, unless they will have plantings in them year-round and be well maintained” (page 24). The Guidelines also note that “site furnishings should be durable, both in construction and finish, and be easy to maintain and to install” (page 25).

**VII. ATTACHMENTS**

- a. Vicinity Map**
- b. Application**
- c. Plans**