MEMORANDUM

To: Garland Williams, Director of Planning and Scheduling
From: Randall Farwell, Principal
Date: January 14, 2016
Subject: Route Modification Recommendations for Richmond East End Communities of Fulton and Church Hill

SUMMARY FINDINGS AND RECOMMENDATIONS

The intent of this memorandum is to address specific mobility needs and services in the East Richmond communities of Fulton, Church Hill, and Church Hill North. The objectives are to define and recommend services to improve mobility, reduce travel times, and create more direct connections to the proposed BRT. This analysis revisits and augments recommendations previously provided in the Broad Street BRT Route Modifications Report, issued in July 2015. Once the service changes and funding for the East Richmond communities are approved by the City and GRTC, the July 2015 report will be updated to reflect these service changes and a series of adjustments made to the BRT plan in the intervening period.

The primary objectives for the July 2015 report were to:

- Define and implement a fully integrated multimodal transit system connecting BRT, the local bus network, and safe bicycle and pedestrian access to ensure multiple points of access to transit.
- Reduce total east – west travel times by transit.
- Enhance the connections between the BRT and routes with high ridership transfer volumes.
- Improve transit operations and transit reliability by managing and reducing bus volumes along Broad Street downtown.

For the East Richmond communities this memorandum examines three strategies to improve mobility and connectedness. These strategies are:

- Modifications to existing routes -7, 43, 44, and 52- to connect to the BRT and improve directness of travel reducing travel time to and from downtown.
- Introduction of community shuttles to provide direct service to the BRT.
- Introduction of community circulators to broaden mobility in and between Church Hill, Church Hill North, and Fulton neighborhoods.

Existing ridership and travel patterns were analyzed for six of the existing routes serving East Richmond; these routes include the 7, 43, 44, 45, 52, and 53. The examination of ridership data (boardings, alightings, and transfers) established a clear picture of travel origins, destinations, and travel patterns. Using this information and the objectives to improve mobility, access to
mobility, reduce travel times, and provide more direct connections to the BRT, a series of transit options were developed and evaluated.

While the findings and recommendations are described in greater detail later in this memorandum, the highlights of our finding and recommendations are presented as follows.

A series of strategies were examined. These include:

- Modifications to Routes 7, 43, and 44, to provide a direct connection to downtown via the Leigh Street Viaduct.
- Modification of Route 52 to serve Rocketts Landing.
- Examination of five (5) different transit shuttles to connect neighborhoods to BRT stations in East Richmond.
- Development of three circulators designed to expand service coverage and connect neighborhoods as well as connect to the East Richmond BRT stations.

The recommended solution for the East Richmond communities is a combination of modifications to the existing routes 7, 43, 44, 52, and the addition of two shuttle routes. Figure 1 presents the recommended combination of new services (two shuttles) and modifications to routes 7, 43, 44, and 52. This figure also reflects the alternative shuttles examined, the underlying transit network that will not be changed (in grey), the BRT alignment and stations, and existing ridership activity for existing services. The two recommended shuttles are Shuttle Option 2 Alternative (bright pink) and Shuttle Option 3 Modified (dark blue).

**Figure 1 – Recommended Service Improvements**
The recommended service improvements achieve the following objectives:

- More choice in transit options for local and crosstown travel.
- Shorter trip to/from downtown.
- Direct connection to BRT stations.
- Enhance service area coverage complementing the existing route network and BRT.

Shuttle Option 3 Modified (dark blue) connects the high ridership segments of the 43 and 44, connects to the 7, 41, 51, 52, and 53. It also covers the Mosby Street segment of the existing 43 and 44, and provides direct service to the Main Street BRT station. This shuttle introduces a significant amount of access and mobility choice to riders in East Richmond for local and crosstown travel.

Shuttle Option 2 Alternative (bright pink) provides direct connections to the 24th Street BRT station by serving 24th Street and high ridership areas of the 43, 44, 45, and 7 as well as connecting with the 41, 51, 52, and 53. This shuttle provides significant improvement in access and mobility choice for local and crosstown travel.

The extension of Route 52 to serve the Rocketts Landing BRT Station, adds minimal travel time to the route but not enough to change the operating hours. This modification is proposed to serve the 52 loop first collecting riders then serving Rocketts Landing to connect to the BRT, before continuing west on its regular routing downtown. In the afternoon the service will operate to Rocketts Landing first and then serve the 52 loop. It is important to note, that no change to Route 53 is proposed. The combination of these two services provide excellent circulation in Fulton as well as the choice of using the BRT for crosstown travel or riding the local route into downtown.

The net annual operating cost of these changes range between $668K and $1.4 million depending on the frequency of service operated. The shuttle frequency tested was every 10-minutes peak, 15-minutes off peak and every 20-minutes peak, 30-minutes off-peak. As shown in the table below, travel time savings from running the 7, 43, and 44 to/from downtown via the Leigh Street viaduct, saves riders travel time and saves GRTC operational hours. This partially offsets the cost of adding the shuttles.

<table>
<thead>
<tr>
<th>Annualized Costs of Preferred Recommendations:</th>
<th>Net Annual Hours</th>
<th>Net Annual Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modify routes 43, 44, 7 to run on Leigh St Viaduct bidirectional</td>
<td>(7,038)</td>
<td>$645,000</td>
</tr>
<tr>
<td>Add Shuttle 2A with headways:</td>
<td>at 10/15</td>
<td>7,812</td>
</tr>
<tr>
<td>Add Shuttle 3M with headways:</td>
<td>at 10/15</td>
<td>14,329</td>
</tr>
<tr>
<td>Modify route 52 to serve Rocketts Landing</td>
<td>-</td>
<td>$0</td>
</tr>
<tr>
<td>Net Total Impacts</td>
<td>15,104</td>
<td>$1,383,000</td>
</tr>
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Because the round trip running time (cycle time) of Shuttle 2A (bright pink) is 13 minutes, it can be run every 15 minutes without increasing the number of vehicles required and therefore will not increase annual service hours and costs above the 20/30 minute frequency assumption. So, the shuttle recommendation is to implement:

- Shuttle 2A (bright pink) is recommended to run every 15-minutes peak and off-peak.
- Shuttle 3M (dark blue) is recommended to run every 20-minutes peak and every 30-minutes off-peak.

The combined net annual operating cost for these service improvements is estimated to be $668,000. This is the estimated amount needed annually to add these augmented services.
As a result of these changes, the residents of communities in East Richmond will benefit from more mobility options, shorter travel times and more direct service. The BRT will operate every 10-minutes during the peak and every 15-minutes off-peak. Shuttle 2A will serve the BRT every 15-minutes peak and off-peak. Shuttle 3M will serve the BRT every 20-minutes peak and every 30-minutes off-peak. The modified 52 will provide connections to the BRT at Rocketts Landing every trip and the option stay on the 52. Estimated travel time comparisons between the existing and proposed improvements are presented in the recommendations section of this memorandum.

OVERVIEW OF ANALYSIS

The recommendations in this memorandum center on improving access to the proposed BRT in East Richmond. It also identifies recommendations to enhanced mobility, travel times, and mobility choice for the East Richmond communities of Fulton, Church Hill, and North Church Hill. This memorandum augments recommendations made originally in July 2015. Once approved by GRTC and the City of Richmond, the analysis, findings, and recommendations presented in this memorandum will be incorporated into a revised GRTC Route Modifications Report. At that time a series of changes that have been documented in BRT planning, most notably adjustments to BRT station locations and several local bus stops, will be combined with the East Richmond community recommendations into a revised final report.

In July 2015, the Broad Street BRT Route Modifications Report was issued to GRTC. The July 2015 report was written to examine near term modifications to the bus network to better facilitate connections between the proposed Broad Street Bus Rapid Transit (BRT) and the existing route network, with an emphasis on enhancing connections between high ridership transfer volume routes to/from the existing Route 6, the proposed BRT. In addition, the July 2015 recommendations addressed strategies to improve bus reliability and reduce bus travel times along the BRT corridor. A key strategy for doing this included reducing the volume of bus traffic in the proposed curb-running bus lanes downtown; recommending BRT and bus stop consolidations; and adjusting bus stop spacing to eliminate stops too closely spaced in the corridor (less than 1/3 of a mile). The recommendations considered the location of proposed BRT stations relative to the transit network as well as improvements to pedestrian accessibility to and from transit stops; this includes in particular, the BRT stations. Improvements to pedestrian access included pedestrian crossing accommodations. Finally, the July report recommended changes in bus bay assignments at the transfer center so that the routes with the highest volume transfers to the Route 6 (proposed BRT) are closest to the BRT station at 9th and Broad Street.

From the July 2015 report, several key findings are repeated below. The highest ridership transfer volumes to/from the Route 6 are shown below.

<table>
<thead>
<tr>
<th>Route</th>
<th>Ridership</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>62-63</td>
<td>3,666</td>
<td>1</td>
</tr>
<tr>
<td>37</td>
<td>2,279</td>
<td>2</td>
</tr>
<tr>
<td>32</td>
<td>2,083</td>
<td>3</td>
</tr>
<tr>
<td>43-44</td>
<td>2,013</td>
<td>4</td>
</tr>
<tr>
<td>70-71</td>
<td>1,669</td>
<td>5</td>
</tr>
<tr>
<td>34</td>
<td>1,449</td>
<td>6</td>
</tr>
<tr>
<td>72-73</td>
<td>1,315</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>1,214</td>
<td>8</td>
</tr>
<tr>
<td>52-53</td>
<td>1,033</td>
<td>9</td>
</tr>
<tr>
<td>45</td>
<td>975</td>
<td>10</td>
</tr>
<tr>
<td>74</td>
<td>909</td>
<td>11</td>
</tr>
</tbody>
</table>
These routes and their relationship to the Route 6 are reflected in the Figure 3. This map reflects the thickness of each route based on the volume of transfers to/from the Route 6.

**Figure 3 – Daily Peak Ridership by Stop with Transfer Volumes to/from Route 6**

Bus volumes along the BRT Broad Street / Main Street alignment were examined in the July 2015 report and recommendations were proposed to reduce volumes to improve operational reliability and reduce travel times for local as well as BRT vehicles. The volume of bus traffic is particularly critical downtown eastbound between 9th Street and 14th Street.

Figure 4 presents existing plus BRT bus volumes along the corridor. Figure 5 presents the impacts of the proposed route changes from the July 2015 recommendations. The recommendations reduce bus volumes in the segment of 9th Street to 10th, and 11th to 14th Streets from 1.6 and 0.3 minutes between eastbound buses respectively to volumes of a bus every 2.3 and 1.6 minutes respectively. These changes add significant improvements to bus volumes and thus provide operational stability.
## Figure 4 – Existing Bus Plus BRT Bus Volumes

<table>
<thead>
<tr>
<th>Order</th>
<th>BRT Station</th>
<th>Average Minutes Between Buses + BRT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>East</td>
</tr>
<tr>
<td>1</td>
<td>Willow Lawn</td>
<td>4.4</td>
</tr>
<tr>
<td>2</td>
<td>Staples Mill</td>
<td>4.8</td>
</tr>
<tr>
<td>3</td>
<td>Cleveland</td>
<td>5.2</td>
</tr>
<tr>
<td>4</td>
<td>Robinson</td>
<td>3.8</td>
</tr>
<tr>
<td>5</td>
<td>N Allison</td>
<td>3.8</td>
</tr>
<tr>
<td>6</td>
<td>Shafer</td>
<td>2.7</td>
</tr>
<tr>
<td>7</td>
<td>Adams</td>
<td>2.7</td>
</tr>
<tr>
<td>8</td>
<td>5th</td>
<td>3.3</td>
</tr>
<tr>
<td>9</td>
<td>9th</td>
<td>1.6</td>
</tr>
<tr>
<td>10</td>
<td>11th/14th</td>
<td>.3</td>
</tr>
<tr>
<td>11</td>
<td>Main St. Station</td>
<td>6.8</td>
</tr>
<tr>
<td>12</td>
<td>24th</td>
<td>6.8</td>
</tr>
<tr>
<td>13</td>
<td>Route 5</td>
<td>10.0</td>
</tr>
<tr>
<td>14</td>
<td>Rockett's Landing</td>
<td>10.0</td>
</tr>
</tbody>
</table>

## Figure 5 – Proposed Bus Volumes

<table>
<thead>
<tr>
<th>Order</th>
<th>BRT Station</th>
<th>Average Minutes Between Buses + BRT</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
<td>7</td>
<td>Adams</td>
<td>2.7</td>
</tr>
<tr>
<td>8</td>
<td>5th</td>
<td>4.1</td>
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<tr>
<td>9</td>
<td>9th</td>
<td>2.3</td>
</tr>
<tr>
<td>10</td>
<td>11th/14th</td>
<td>1.6</td>
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<td>Main St. Station</td>
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<td>12</td>
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<tr>
<td>14</td>
<td>Rockett's Landing</td>
<td>10.0</td>
</tr>
</tbody>
</table>
Except for the segment of curb-running bus lanes between 9th and 14th streets downtown, the expected bus volumes in the corridor are clearly operationally manageable. Fixing the choke point of eastbound travel from 9th to 14th Streets is critical. The recommendation to reroute the Routes 7, 43, and 44 via the Leigh Street Viaduct from the transfer center was initially considered in the July 2015 report. Further analysis and discussion revealed additional savings in time and cost with bi-directional travel on the Leigh Street Viaduct. An emphasized benefit is the shorter travel time for riders of Routes 7, 43, and 44 between East Richmond and downtown.

EAST END ANALYSIS AND FINDINGS

Existing services

The East Richmond communities are currently served by GRTC routes 6, 7, 11, 41, 43, 44, 45, 51, 52, 53 and 56. All of these routes provide service to downtown. Figure 6 shows a map of existing services and the proposed BRT alignment.

Figure 6 – Existing Routes Servicing East Richmond
To better differentiate the existing routes serving the East Richmond communities, Figure 7 presents a map of existing routes with colored and off-set route alignments. Figure 7 helps define where they overlap and how the routes function together to cover the neighborhoods. This map also clearly shows the duplication of service along Broad Street into downtown for routes 7, 41, 43, 44, 45, and 51. Routes 11, 52, and 53 duplicate into downtown via Main Street and Cary Street.

**Figure 7 – Existing East End Connections**

**Existing ridership activity**

Figures 8 and 9 provide maps of the existing route network with average daily boardings (ons) and average daily alightings (offs) by bus stop along each route. It is important to note the distribution of high ridership stops on these maps compared to where the proposed improvements are located.

In particular the following are high ridership volume locations (see Figure 7):

- Fairfield Way at Mechanicsville Turnpike and at 27th Street - routes 43 and 45 - over 500 daily boardings
- Whitcomb Court along Whitcomb Street – route 43 – over 200 daily boardings
- Fairfield Way along Cool Lane, 21st Street , Fairfield Way, Rosetta Street – route 44 – over 200 daily boardings
- Creighton Road – route 45 – over 200 daily boardings
- Oakwood Avenue – route 41 – over 200 daily boardings.
Similar patterns exist for ridership alightings on these routes. See Figure 8.

**Figure 7 – Existing Average Daily Boardings**
Changes to existing routes

In an attempt to reduce rider travel times and reduce bus volumes on Broad Street, we have proposed rerouting the 7, 43, and 44 to/from downtown via the Leigh Street Viaduct. This proposal pivots off the fact that the majority of ridership on these routes are going between downtown and East Richmond. Using the Leigh Street Viaduct in both directions (inbound and outbound) saves the rider travel time. The existing ridership activity supports this service change. Highest ridership activity is in downtown or towards the end of the routes in East Richmond. These changes to routes 7, 43, and 44 will save an estimated $645,000 annually.

Figure 9 presents a map of the proposed service improvements along with ridership activity by stop and the existing bus network that would remain. In particular routes 41, 45, and 51 would continue to operate east-west along Broad Street between downtown and East Richmond.

In addition, the introduction of Shuttle 3M (dark blue) would serve the stretch of Mosby Street/Mechanicsville Turnpike from north of Fairfield Avenue south to Broad Street and then to Main Street and the Main Street BRT station. The combination of these service improvements will provide travel options for riders in Church Hill North and Church Hill. These improvements will also provide a shorter travel time to/from downtown and provide a direct connection to the...
Main Street BRT station. The addition of shuttle 3M at 20-minute peak and 30-minute off-peak frequencies, will add an estimated annual operating cost of $716,000.

Figure 9 – Modifications to Routes 7, 43, 44 and Shuttle 3M

In addition to the changes discussed above, the route 52 is proposed to change to serve the BRT station at Rocketts Landing. Figure 10 presents the proposed change in routing. The route 52 operates in conjunction with the 53 and operates a one-way loop at its east end. The extension of service to the BRT station at Rocketts Landing would include running the 52 loop north of Government Road and down Williamsburg Road prior to serving the BRT. This effectively creates a shuttle service to the BRT in the morning. In the evenings, the outbound (returning) 52 would stop first at the BRT station and then run the loop. This creates a shuttle service from the BRT station in the evenings. No change is proposed to the route 53.

While the addition of the Rocketts Landing/Orleans Street segment to the route 52 will add two (2) minutes to the running time, the overall impact to the route 52 cycle will not increase the need for another vehicle and will not cause an increase in operating costs.
Shuttles

In addition to the shuttle 3M described above as a complementary service to the improvements to routes 7, 43, 44, and four other shuttles were examined. The purpose of the shuttles is to provide additional choice of service for residents in East Richmond, provide a direct connection to the BRT, and provide greater connections to existing services.

Figure 11 shows the shuttles that were developed and evaluated along with the base bus network and proposed change to the route 52. These include:

- Shuttle Option 1 – designed to serve Fulton and connect to the BRT at Rocketts Landing
- Shuttle Option 1 Alternative – designed to serve Fulton and connect to BRT at Rocketts Landing
- Shuttle Option 2 – designed to serve the 25th Street Corridor and connect to BRT at 25th Street
- Shuttle Option 2 Alternative – designed to serve the 25th Street Corridor and connect to BRT at 25th Street
- Shuttle Option 3 – designed to serve Mechanicsville Turnpike and Mosby Street Corridor, and connect to the Main Street BRT station
- Shuttle Option 3 Alternative – designed to serve Mechanicsville Turnpike and Mosby Street Corridor, Fairfield Avenue, and connect to the Main Street BRT station
Examining the shuttles relative to the existing services, ridership activity, and operating costs, several decisions were clear. First, shuttle options 1 and 1A were too duplicative of the existing routes 52, and 53. With the extension of the 52 to serve the BRT at Rocketts Landing, the need for a separate shuttle was eliminated. In addition, the daily additional cost of shuttle 1 ranged between $2,100 and $3,700 depending on frequency. The daily cost of shuttle 1A ranged between $1,700 and $3,300 depending on frequencies. Our recommendation is to extend the 52 to serve the BRT at Rocketts Landing and not implement shuttle options 1 or 1A.

Examination of shuttle options 2 and 2A, provided a compelling case for a direct service along 25th street and connecting to the 25th Street BRT station. Although shuttle option 2A is more expensive than option 2, it provides greater potential to connect with existing high ridership areas and connects easily to routes 7, 44, and 45 as well as the 41, 51, 52, 53.

The daily costs for shuttles 2 and 2A are the same. The costs range between $1,700 and $2,100 per day. Our recommendation is to implement shuttle option 2A because it provides direct service to the BRT, serves the high ridership 25th Street corridor and connects many of the East Richmond routes. This provides residents with much improved access, mobility options, and the shuttle can run every 15 minutes all day long without exceeding the 20/30 minute headway costs (because shuttle cycle time is 13 minutes).

**Circulators**

Three circulator routes intended to increase connectedness within and between the East Richmond neighborhoods and connections to the proposed BRT stations were defined and
evaluated. The circulators were developed to serve Church Hill North, Church Hill, and Fulton. The circulators involve loop routes that can be operated in one direction or bi-directionally. Figure 12 presents the three circulators evaluated.

**Figure 12 – Circulator Concepts**

The problems with the circulator concept are that they consist of large loops which mean that while they cover significant areas of the East Richmond communities, they also take the rider on a long and circuitous ride. The circulators overlap most of the existing service coverage provided by routes 6, 7, 43, 44, 45, 52, and 53.

In addition, because the circulator routes are long, the time on-board the vehicle for the rider is long and the **daily** operating costs are high. **Daily** operating costs range from $10.8k with a 10-minute/15-minute frequency to $20.4k with a 20-minute /30-minute frequency. Further, the circulators, if operating in one direction, means riders will likely choose to walk or to ride much of the way around the loop to reach their return destination. While this problem is eliminated by running the circulators in bi-directional loops, doing so would double the **daily** operating costs to between $21.6k and $40.8k depending on frequency (every 10/15 minutes or every 20/30 minutes peak/off-peak).

The calculated running time for Circulator Option 1 is 40 minutes end to end. The calculated running time for Circulator Option 2 is 1 hour end to end. The calculated running time for Circulator Option 3 is also 1 hour end to end.

Our recommendation is to eliminate the circulator concept due to extensive overlap with existing services, indirect travel, long on-board travel times, and high operating costs.
EAST END COMMUNITY RECOMMENDATIONS

Objectives

The objectives for examining transit service, service needs in the East Richmond communities were as stated, to create:

- More transit options for local and cross-town travel.
- Shorter trips to/from downtown.
- Direct connection to BRT stations.
- Enhanced service area coverage complementing the existing route network and BRT.

These objectives will be fully realized through the proposed service improvements for East Richmond.

The recommended service improvements, described in the next section, focus service improvements in the areas of Church Hill North, Church Hill, and Fulton where existing ridership activity is greatest. The improvements provide increased choice in local mobility and crosstown travel and both penetrate new service areas and better connect services and neighborhoods in East Richmond. The improvements provide a meaningful reduction in travel times over existing travel times. Finally, the proposed service improvements take advantage of the existing transit network and savings from modifications, to make these improvements in the East Richmond communities affordable, particularly given the improvements in service levels and travel times.

Recommendations

The proposed modifications to existing routes and the introduction and consideration of a range of circulators and shuttles were evaluated. The recommended service improvements include:

- Rerouting the 7, 43, and 44 to operate via the Leigh Street Viaduct to provide reduced travel times and more direct service between East Richmond and downtown.
- Adding a shuttle service along Mechanicsville Turnpike/Mosby Street to Broad Street, Main Street and the Main Street BRT station to provide connectivity, mobility choice, and direct service to the BRT.
- Adding a shuttle to operate along 24th Street between Nine Mile Road and the 24th Street BRT station on Main Street to provide connectivity and highly frequent direct service to the BRT.
- Modifying the route 52 to serve the Rocketts Landing BRT station as well as the option to ride the 52 as a local service between Fulton and downtown.

Figure 13 presents a map of the recommended service improvements over top of the remaining unchanged transit network plus the proposed BRT alignment.
The above map highlights that high ridership areas are well served and residents have a significant choice in travel locally as well as cross-town. In addition, the combined route network serving East Richmond is easier to understand and connections between neighborhoods and to downtown and points west via the BRT are easier to make. Finally, this map shows that no areas previously served by the routes 7, 43, and 44 are without service.

**Travel Time Comparisons**

This memorandum presents significant discussion about new services, service modifications, costs, and travel time savings. The next set of figures were prepared to provide a simple comparison of existing and proposed travel times for routes that have been recommended as part of this service improvement package.

The travel times are presented in a stick diagram fashion, similar to how one sees travel time options displayed on Google Transit. The travel time comparisons, between existing and proposed scenarios, are presented for peak and off-peak travel for routes 7, 43, 44, and 52. In addition, the proposed travel times are presented for Shuttle 2A and Shuttle 3A. The travel times include transfers and wait times. The travel times are provided to the end of line to downtown and downtown to the end of line for each route. In addition, travel times are provided for travel to Willow Lawn and from Willow Lawn. As seen from the comparisons, significant travel time savings accrue from the recommendations.
Route 7 Existing (Peak)

35 minutes
Seven Pines
Rt 7
Downtown
Rt 7
Seven Pines
35 min. on Rt. 7
Marshall & 7th
9 min. wait
36 min on Rt. 6
Willow Lawn
25 min. on Rt. 6

Route 7 Proposed (Peak)

29 minutes
Seven Pines
Rt 7
Downtown
Rt 7
Seven Pines
29 min. on Rt. 7
9th St BRT Station
5 min. wait
18 min. on BRT
Willow Lawn
21 min. on BRT

44 minutes
Downtown
Seven Pines
Willow Lawn

52 minutes
Seven Pines
Willow Lawn

70 minutes
Willow Lawn
Seven Pines
Route 7 Existing (Off-Peak)

- 35 minutes: Seven Pines, Downtown, Seven Pines
- 50 minutes: Downtown, Seven Pines
- 80 minutes: Seven Pines, Willow Lawn
- 90 minutes: Willow Lawn, Seven Pines

Route 7 Proposed (Off-Peak)

- 29 minutes: Seven Pines, Downtown, Seven Pines
- 44 minutes: Downtown, Seven Pines
- 52 minutes: Seven Pines, Willow Lawn
- 70 minutes: Willow Lawn, Seven Pines
Route 43 Existing (Peak)

26 minutes
- Whitcomb
- Downtown

26 minutes
- Whitcomb
- Downtown

63 minutes
- Whitcomb
- Transfer Plaza
- Willow Lawn
- 26 min on Rt. 43
- 37 min. on Rt. 6
- 30 min on Rt. 6
- Broad & 12th
- 10 min. wait
- 21 min. on Rt. 6

61 minutes
- Willow Lawn
- Whitcomb

Route 43 Proposed (Peak)

19 minutes
- Whitcomb
- Downtown

19 minutes
- Whitcomb
- Downtown

40 minutes
- Whitcomb
- Willow Lawn
- 18 min. on Rt. 43
- 5 min. wait
- 18 min. on BRT
- 17 min. on Rt. 43

43 minutes
- Willow Lawn
- Whitcomb

GRTC
Nelson\Nygaard Consulting Associates Inc. | 19
Route 43 Existing (Off-Peak)

25 minutes
Whitcomb

Rt 43

Downtown

Rt 43

25 minutes
Whitcomb

Transfer Plaza
5 min. wait

35 min. on Rt. 6

33 min on Rt. 6

Willow Lawn

Rt 6

75 minutes
Whitcomb

Route 43 Proposed (Off-Peak)

18 minutes
Whitcomb

Rt 43

Downtown

Rt 43

18 minutes
Whitcomb

9th St BRT Station
5 min. wait

18 min. on BRT

17 min. on Rt. 43

Willow Lawn

9th St BRT Station

40 minutes
Whitcomb

Willow Lawn

43 minutes
Whitcomb

21 min. on BRT
Route 44 Existing (Peak)

27 minutes
Fairfield
Rt 44
Downtown

23 minutes
Fairfield
Transfer Plaza 12 min. wait
Downtown

73 minutes
Fairfield
Rt 44
Willow Lawn

57 minutes
Willow Lawn
Broad & 12th 10 min. wait
Fairfield

37 min. on Rt. 6

Route 44 Proposed (Peak)

21 minutes
Fairfield
Rt 44
Downtown

18 minutes
Downtown
Rt 44
Fairfield

47 minutes
Fairfield
9th St BRT Station 5 min. wait
Willow Lawn

44 minutes
Willow Lawn
9th St BRT Station 5 min. wait
Fairfield

21 min. on Rt. 44
18 min. on BRT
Route 44 Existing (Off-Peak)

- 27 minutes: Fairfield to Downtown (Rt 44)
- 23 minutes: Downtown to Fairfield (Rt 44)
- 67 minutes: Fairfield to Willow Lawn
  - 28 min. on Rt. 44
  - 3 min. walk
  - 36 min. on Rt. 6
- 61 minutes: Willow Lawn to Fairfield
  - 33 min. on Rt. 6
  - 10 min. wait
  - 18 min. on Rt. 44

Route 44 Proposed (Off-Peak)

- 21 minutes: Fairfield to Downtown (Rt 44)
- 18 minutes: Downtown to Fairfield (Rt 44)
- 47 minutes: Fairfield to Willow Lawn
  - 21 min. on Rt. 44
  - 5 min. wait
  - 18 min. on BRT
- 44 minutes: Willow Lawn to Fairfield
  - 21 min. on BRT
  - 5 min. wait
Route 52 Existing (Peak)

**Route 52 Proposed (Peak)**
Route 52 Existing (Off-Peak)

- 25 minutes
  - Montrose Heights
  - Downtown
  - Rt 52

- 23 minutes
  - Montrose Heights
  - Downtown
  - Rt 52

- 19 minutes
  - Downtown
  - Williamsburg & Orleans
  - 6 min. walk

- 82 minutes
  - Montrose Heights
  - Willow Lawn
  - Main & 11th
  - 13 min. on Rt 52

- 68 minutes
  - Willow Lawn
  - Montrose Heights
  - Main & 13th
  - 37 min. on Rt. 6

Route 52 Proposed (Off-Peak)

- 25 minutes
  - Montrose Heights
  - Downtown
  - Rt 52

- 25 minutes
  - Montrose Heights
  - Downtown
  - Rt 52

- 17 minutes
  - Downtown
  - Rocketts Landing
  - 5 min. walk

- 42 minutes
  - Montrose Heights
  - Willow Lawn
  - Rocketts Landing
  - 9 min. on Rt 52
  - 28 min. on BRT

- 45 minutes
  - Willow Lawn
  - Montrose Heights
  - Rocketts Landing
  - 31 min. on BRT
  - 9 min. on Rt 52
Shuttle 2A Proposed

17 minutes
Church Hill North
7 min. on Shuttle 2A
24th St BRT Station
5 min. wait
5 min. on BRT
Downtown

37 minutes
Church Hill North
7 min. on Shuttle 2A
24th St BRT Station
5 min. wait
25 min. on BRT
Willow Lawn

Shuttle 3A Proposed

23 minutes
Fairfield
15 min. on Shuttle 3A
Main St BRT Station
5 min. wait
3 min. on BRT
Downtown

41 minutes
Fairfield
15 min. on Shuttle 3A
Main St BRT Station
5 min. wait
21 min. on BRT
Willow Lawn
Cost Comparisons

The table below provides the operating service hours and cost comparisons. The modifications to routes 7, 43, and 44 save service hours and operating costs which largely off-set the additional service hours and operating costs for Shuttles 2A and 3A. The table also shows the variation in hours and costs based on service frequency.

The recommendation is to modify routes 7, 43, 44, and 52. These impacts save an estimated $645,000 annually. Our recommendation is to add Shuttle 3A operating at 20-minute peak frequency and 30-minute off-peak frequency, and add Shuttle 2A operating at a frequency of 15-minute peak and off-peak. The net added cost of service improvements is estimated to be $668,000 annually.

NEXT STEPS

The next steps in finalizing changes to the GRTC transit network include securing an agreement between the City and GRTC on these recommended service improvements. Once there is an agreement on the service improvements, the Broad Street BRT Route Modifications Report issued in July 2015 will be revised to reflect the service improvements for East Richmond as well as a series of relatively minor changes to the BRT plan that have occurred since July 2015. The changes to the BRT plan primarily reflect minor shifts in a few BRT stations and local bus stop locations. Once the Broad Street BRT Route Modifications Report is revised, it will be submitted to GRTC and the City of Richmond.