

# IMPACT OF THE GRTC 2018 REROUTE ON RICHMOND'S DISADVANTAGED POPULATION

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**VCU** Center for Urban and  
Regional Analysis

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## **ABOUT THE WILDER SCHOOL AND CENTER FOR PUBLIC POLICY**

The L. Douglas Wilder School of Government and Public Affairs at Virginia Commonwealth University informs public policy through cutting-edge research and community engagement while preparing students to be tomorrow's leaders. The Wilder School's Center for Public Policy conducts research, translates VCU faculty research into policy briefs for state and local leaders, and provides leadership development, education and training for state and local governments, nonprofit organizations and businesses across Virginia and beyond.

## **ABOUT THE CENTER FOR URBAN AND REGIONAL ANALYSIS (CURA)**

The Center for Urban and Regional Analysis (CURA) is the economic and policy research center of the L. Douglas Wilder School of Government & Public Affairs at Virginia Commonwealth University. The Center serves stakeholders and organizations at all levels of focus, providing information systems support, program impact analysis, public policy evaluation, targeted investment models, and strategic plans to state agencies, regional and metropolitan organizations, planning districts, cities, counties and towns, as well as businesses and non-profit organizations.

The Greater Richmond Transit Company (GRTC) recently redesigned the public transit bus network system in the City of Richmond and neighboring counties to improve service efficiency and accessibility to jobs, retail businesses, and other public services across the region. The redesign, also known as *The Great Richmond Reroute* coincides with the inauguration of the city's first Bus Rapid Transit System – the *Pulse*, and represents the first major transit network upgrade in over 80 years since city trolleys stopped running in the 1940's.

The *Pulse* and the *Reroute* have made significant changes to the city's transit network system. It is because of these changes CURA was interested in determining the accessibility of low-income communities to major job centers in Richmond City as well as in the surrounding counties of Henrico and Chesterfield. Neighborhoods within the City vary in relation to geography, demographics, and socioeconomic status as well as in the availability of affordable housing and moderate-wage jobs. Previous studies conducted by CURA have identified specific neighborhoods in the East End and the north side that are facing high levels of economic distress compared to the rest of the city; further analysis of these neighborhoods has revealed substantial jobs-housing imbalances. This study seeks to analyze the impact of the bus system redesign on the region's disadvantaged, primarily low-income neighborhoods, focused on the following objectives:

1. Improved accessibility of the region's population, especially those living in low-income neighborhoods.
2. Improved accessibility to jobs in the city and the surrounding counties.

This study uses spatial analysis methods to estimate the number of households located in the City of Richmond, Henrico County, and Chesterfield County within successive and mutually non-exclusive bands of walking distances (at quarter-mile and half-mile network buffer distances from bus stops). The purpose of the analysis is to compare levels of service and

accessibility from GRTC's original service area (prior to the 2018 reroute) to the new service area.

The scope of this study focuses on economically disadvantaged households within the original GRTC network to determine if any significant changes in accessibility occurred after the Reroute while also maintaining GRTC's goal of a high connectivity route design. The method for calculating connectivity for bus stops uses an index method adopted from Welch and Mishra (2013) which takes into account the average vehicle capacity, spatial coverage (the number of routes in the overall network), temporal coverage (frequency of routes), the average distance to destinations throughout the network, and the number of service hours during the day. Finally, CURA compares jobs accessibility between the two service systems.

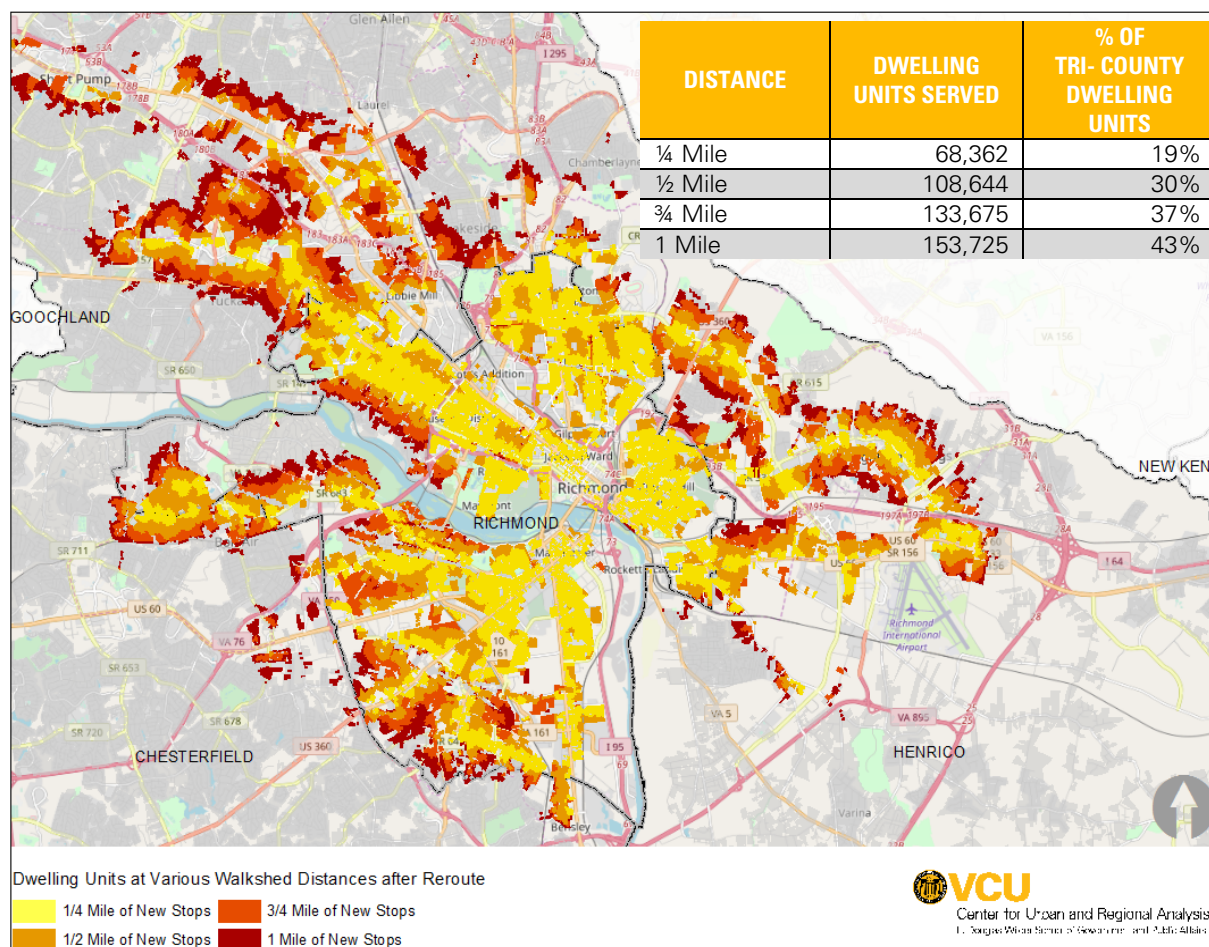
This study is unique compared to the existing research on public transit accessibility; most studies measure accessibility based on physical distances (i.e. proximity) to transit stops. This study, however, is true to CURA's work which is focused on equitable planning and development. In the sense of this paper, equity refers to equal access to public transit and the services it offers to all members of society, including lower income households. Socioeconomic status and demographics are a primary focus of the research; for the purposes of this paper, accessibility is measured for low-income households in the Richmond region (i.e. individuals living below the poverty level). CURA's broader research focus on equitable development measures transit access equity across four criteria: individuals below the poverty level, people of color (non-white), individuals with limited English proficiency, and individuals who are transit dependent (people below the poverty level, have no vehicular access, and are elderly). These four criteria were chosen because this portion of the population is considered highly disadvantaged, and measuring transit access equity for this portion will provide a big picture look at equity across the city and region. This paper measures accessibility primarily for individuals in poverty, and it is in CURA's pipeline to continue measuring transit access equity with the additional criteria just mentioned.

## THE NEW GRTC SERVICE AREA

The GRTC route redesign, also known as *The Great Richmond Reroute*, went into effect June 2018. The Reroute included transitioning from a network with 1,834 stops and 44 routes to 1,608 stops and 42 routes including 7.6 miles of bus rapid transit running east and west from Willow Lawn to Rocketts Landing. This decision was made by GRTC and the greater community out of preference to a route model with higher frequency over a model with higher coverage. While the 12 percent reduction in the number of stops is expected to decrease transit time for many patrons, reducing the number of stops means longer walking distances, which indicated reduced accessibility. On the other hand, the Reroute extends west along the Broad Street corridor to Short Pump Town Center – a major regional job hub – which improves access to jobs

within the region's service area. Figure 1 represents a map of residential units (single family units including townhouses, duplexes, and multi-family units) in the new GRTC service areas at successive bands of walking distances (1/4 mile, 1/2 mile, 3/4 mile, and 1 mile buffer distances). The new service network provides transit access to about 68,362 households at the quarter mile and about 108,644 at the half-mile distances. In general, about 19 percent of the households in the region are located within quarter mile of GRTC network, and about 30 percent at the half-mile catchment area. The coverage increases to 37 percent and 43 percent of households respectively at 3/4 mile and 1 mile distance bands. The rest of this paper uses quarter-mile and half-mile walking distances as the primary measure of accessibility.

**FIGURE 1. RESIDENTIAL UNITS IN THE GRTC SERVICE AREA**

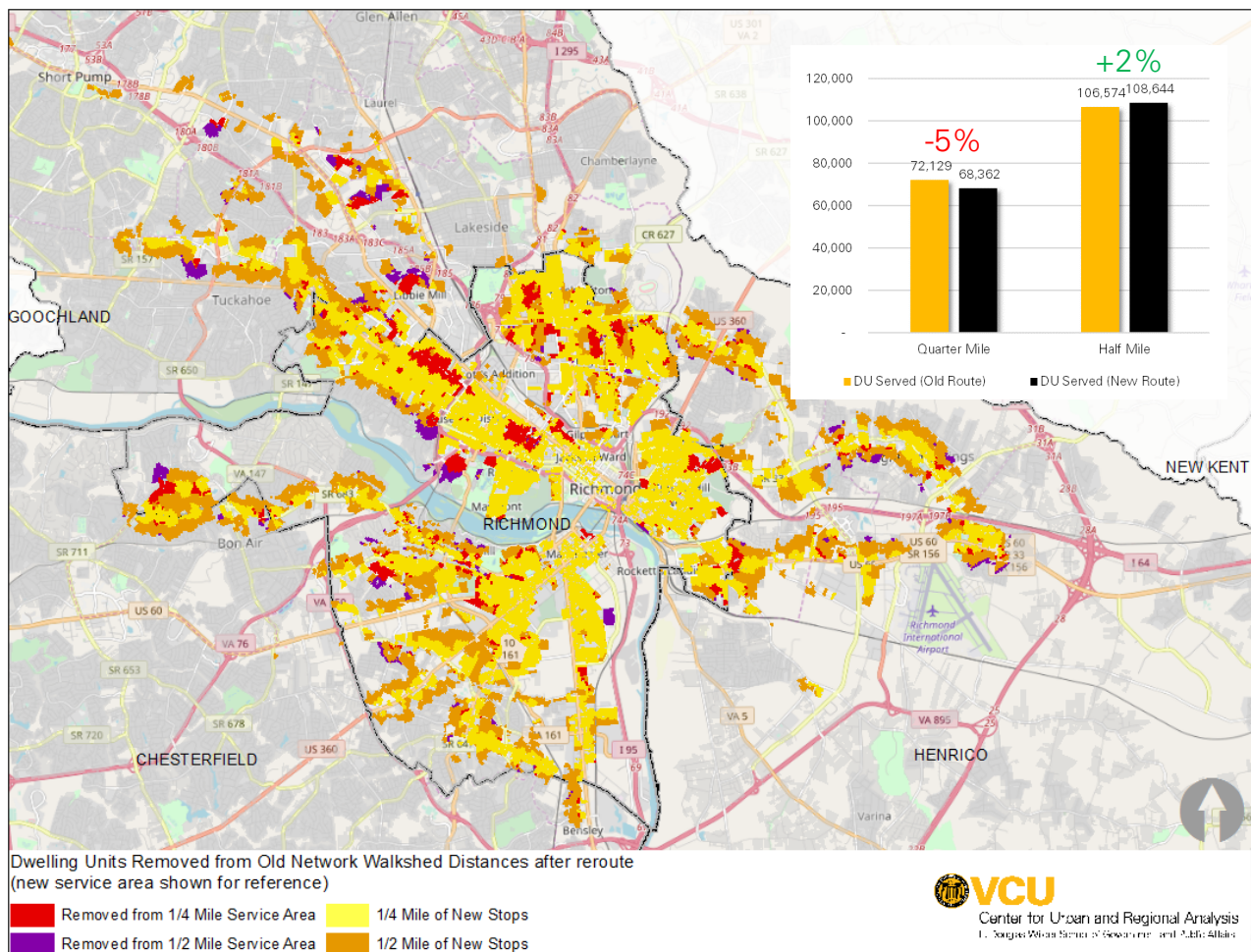


## IMPACT ON RESIDENTIAL DWELLING UNITS

Reroutes impact transit patrons including frequency of buses arriving at their neighborhood stops, number of interchanges they need to make to get to their destinations, travel duration, available service hours, and accessibility both at the origin and at the destination. This study primarily focuses on the first-(half) mile accessibility problem where patrons have to walk longer distances to get to the first bus stop. Figure 2 represents a map of residential properties that are within the ¼ mile and ½ mile service area of the rerouted GRTC network. Highlighted parcels indicated properties removed from the original coverage area at the corresponding distance bands after the Reroute.

A total of 3,767 residential dwelling units (highlighted in red on the map) were removed from the ¼ mile service area. This accounts for approximately 5 percent of the residential units at quarter-mile walking distances to original bus stops (prior to the Reroute). On the other hand, there has been an additional 2,070 dwelling units served in the ½ mile service area after Reroute. A majority of the dwelling units that were within the ¼ mile walkshed before the Reroute are now located within the ½ mile walkshed. However, after the redesign, the number of dwelling units added to the half-mile band are fewer than the ones lost from the quarter-mile band suggesting that about 1,697 dwelling units are now outside the half-mile walkshed of the new bus stops. Overall, there are more residential units being served within a ½ mile walkshed compared to the number of units served from the original route.

**FIGURE 2. GRTC COVERAGE UP TO ½ MILE SERVICE AFTER REROUTE**

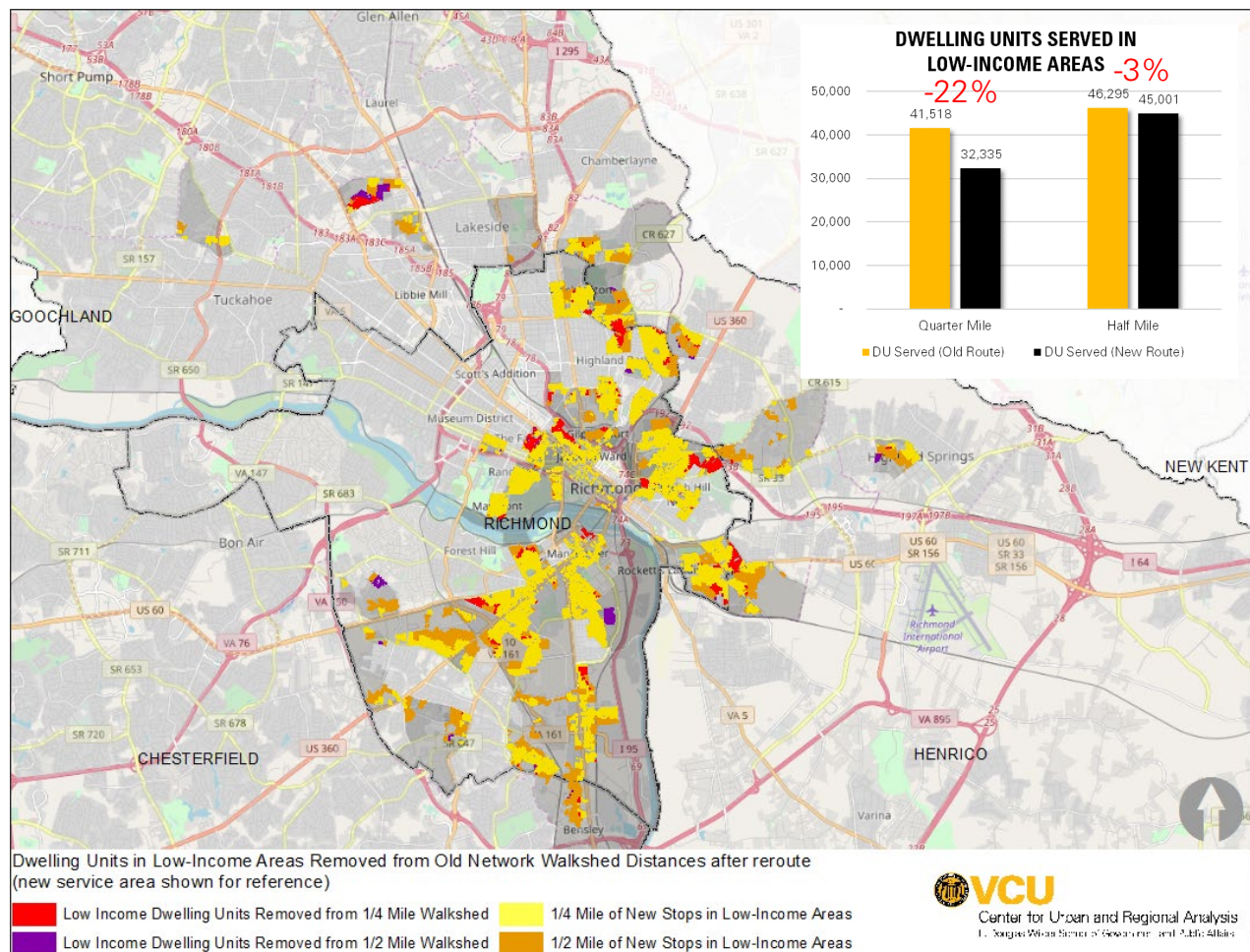


## IMPACT ON DWELLING UNITS IN LOW-INCOME AREAS

A network-wide comparison of the original service route to the Reroute design is not sufficient to assess the impact of the transit reroute on low-income neighborhoods. Aggregated comparison shows service area shrinkage at one section of the network gets mathematically compensated by service areas extension in another section. Additionally, an economically weaker segment of the population has higher dependency on public transit services than more affluent areas. This has been consistently supported by data published by the US Census Bureau where the majority of the population who rely on public transit are identified as being under the federal poverty threshold. Census Block Groups with more than a quarter of

the population under 100 percent poverty threshold, location of public housing, subsidized rental, and LIHTC properties are among the variables used to identify low-income areas in the region. Therefore, the impacts from reduced accessibility are experienced at greater capacities by the city's low-income population compared to other areas of the city. The following section compares the impact on transit accessibility within the sub-region of the GRTC service area with a comparatively higher proportion of low-income residents. Figure 3 represents a map showing impacts of the Reroute on transit accessibility in low-income and economically disadvantaged areas within the GRTC network.

**FIGURE 3. IMPACT ON DWELLING UNITS IN LOW-INCOME NEIGHBORHOODS**

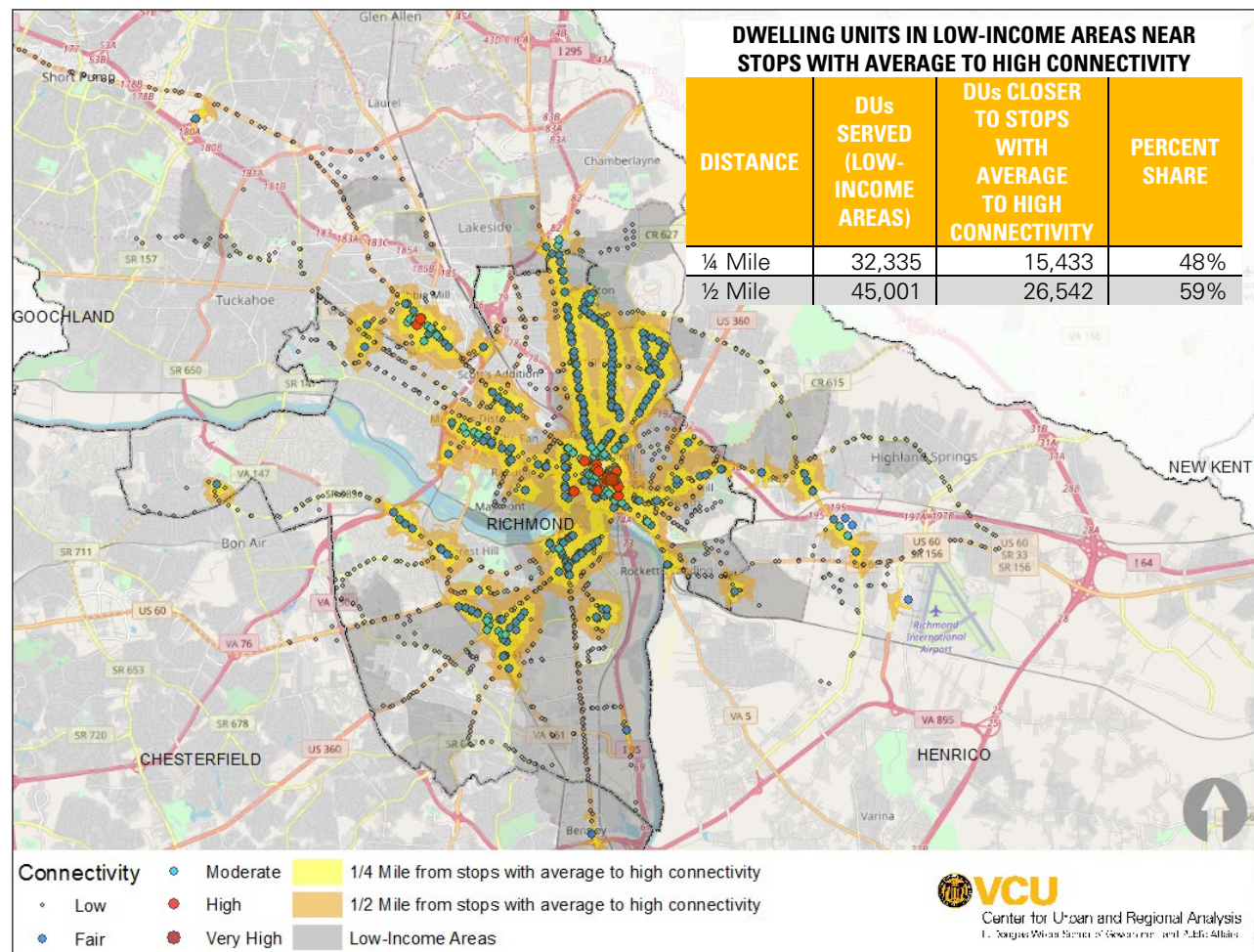


An estimated 41,518 residential units in the city's low-income neighborhoods were less than one quarter mile away from the original GRTC network. After the Reroute, the number of dwelling units served within the same distance band (1/4 mile) is 32,335. This accounts for about 9,183 or roughly 22 percent, of the previously served dwelling units who experienced reduced accessibility to transit stops. Similarly, an estimated 1,294 dwelling units lost accessibility to the network at the half-mile walkshed. In aggregate, about ten thousand households have been required to walk longer distances or use other means of travel to access bus stops. This is a significant reduction compared to the network-wide impact discussed in the previous section.

Additionally, not all residents living within the network-wide service area have the same level of

access to transit services. Accessibility also depends upon other factors such as the number of routes available at the closest stop, frequency of buses, average distance to the destination (in this case to the nearest interchanges), how many interchanges are needed to get to the destination, and how long do the buses operate on that route during the day. These factors are summed up to calculate the connectivity index for each bus stop. Within the coverage of the network, residents closer to the stops with higher connectivity index have better access to transit services than others. Figure 4 shows the classification of bus stops along the redesigned routes based on their connectivity indices and their service areas.

**FIGURE 4. DWELLING UNITS IN LOW-INCOME AREAS RELATED TO HIGH CONNECTIVITY**

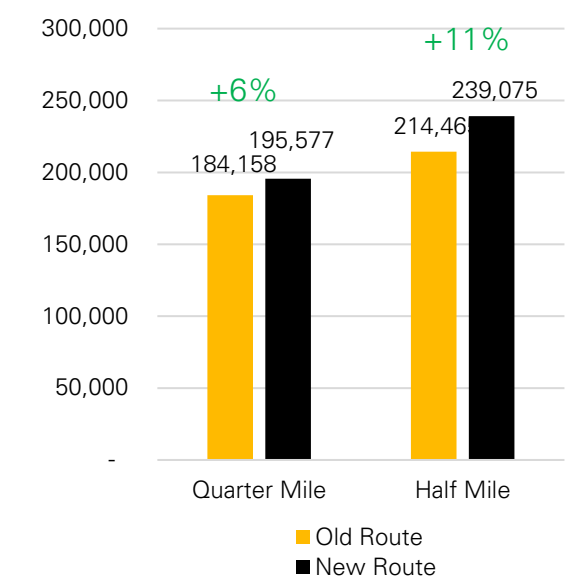


The downtown commercial center has the highest density of bus stops with high connectivity indices due to confluence of multiple routes and increased frequency of buses. Similarly, the Willow Lawn retail center in the West End is well connected to the rest of the network. On the Northside, routes connecting the downtown area to the Azalea shopping center including neighborhoods such as Washington Park, Ginter Park, Barton Heights, Bellevue, Laburnum Park, Virginia Union have fair to moderate connectivity. South Richmond neighborhoods of Manchester, Swansboro, Blackwell, Woodland Heights, Forest Hill, and areas surrounding McGuire Veterans Hospital also have fair to moderate connectivity. Similarly, neighborhoods in the East End such as Church Hill and Windsor Place have fair to moderate connectivity to transit services. Low-income neighborhoods in the East End such as Mosby, Whitcomb, Brauers, Peter Paul, and Fulton, and South side neighborhoods along Jefferson Davis Highway, Hull Street, and Midlothian Turnpike outside the Belt Boulevard have the lowest connectivity to public transit services. In aggregate, out of an estimated 32,335 dwelling units served at a quarter-mile walkshed from the redesigned network, only 15,433 (or about 48 percent) have access to bus stops with fair to high connectivity. Similarly, about 60 percent of dwelling units in low-income areas are within a half-mile walking distance of bus stops with fair to high connectivity. Almost half of the low-income residents are outside the high-connectivity walkshed.

## ACCESS TO JOBS

The new GRTC network shows some improvement in access to jobs in the region. Compared to 184,158 jobs accessible at the quarter-mile walkshed from the original network, the redesigned routes have improved access to an additional 11,400 jobs suggesting an increase by about 6 percent. Similarly, the new route has added 24,600 new jobs to the half-mile walkshed - an improvement by 11 percent compared to the original GRTC bus network. Route extension into Western Henrico and other jobs hubs is primarily responsible for the increase.

**FIGURE 5. COMPARISON OF JOB ACCESSIBILITY**



## CONCLUSION

Public transportation plays a vital role in the Richmond region's economy, especially in providing access to jobs. Accessible public transit is particularly important to recruit businesses and a skilled workforce by improving lifestyle amenities and creating connections between communities. On an individual level, public transportation provides choices and enables people to seek economic opportunities throughout the region. The latter is particularly true for economically disadvantaged residents.

The Richmond region has recently experienced a new focus on public transportation, thanks in part to an improved collaboration among the region's different jurisdictions. GRTC took the opportunity to design a Reroute with the hopes of improving efficiency and better serve the entire region. Some of the positive changes resulting from the Reroute include the route extension to Short Pump in Western Henrico – a major regional jobs hub – and the Pulse BRT – an expanded, more time-efficient route coverage.

CURA's research interest was to understand how these benefits are distributed across the region and, from an equitable development perspective, how the Reroute has affected the low-income households living in high-poverty neighborhoods.

This analysis shows network-wide accessibility improvements, as well as an increased

connection to major job centers - about 6 percent for jobs within ¼ mile, and 11 percent for those within ½ mile. However, the results show also how the absolute number of residential dwelling units served within ¼ mile of transit stops decreased by about 22 percent after the Reroute, and by 3 percent for dwelling units located within ½ mile. In relation to connectivity of transit stops, low-income neighborhoods have access to transit stops with the lowest connectivity power and are typically not served by high connectivity nodes. To put it simply, jobs accessibility across the region improved, but transit accessibility for low-income households remained the same or decreased.

Findings from this analysis and other recent transit accessibility studies can be used to inform the region of its current public transit accessibility. While GRTC has taken a forward-thinking approach to improving jobs accessibility, there is still room for improvement related to improving transit access to affordable housing and increasing high connectivity nodes near low-income neighborhoods. While the city is pursuing a path of further economic development and growth, it is our collective responsibility – and, in particular, of policy and decision makers – to ensure the entire community reaps the benefits of this growth. This is especially important for the region's marginalized and disadvantaged communities who have felt, and rightfully so, left behind in past developments.