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Xueming Chen

Virginia Commonwealth University, xchen2@vcu.edu

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PUBLIC TRANSIT AGENCY'S MANAGEMENT STRATEGIES DURING THE COVID-19 PANDEMIC

Xueming (Jimmy) CHEN

*Urban and Regional Studies and Planning Program, L. Douglas Wilder School of
Government and Public Affairs, Virginia Commonwealth University, Richmond, VA, USA
xchen2@vcu.edu*

Abstract

Like the rest of the USA, the Greater Richmond, Virginia (RVA) region severely suffered from the COVID-19 pandemic impacts in multiple areas. The Greater Richmond Transit Company (GRTC) took big hits in its system transit ridership in fiscal years (FY) 2020 and 2021. In response to this emergency, GRTC immediately implemented bold management strategies to protect its operators and riders, serve essential trips, adjust operating schedules, offer free transit services, and broaden funding sources. As a result of implementing these emergency management strategies, GRTC successfully overcame the pandemic crises and embarked on the road to full recovery in its transit operation, especially in its local-fixed route operation. The successful lessons from GRTC can also be transferable to other similar regions in the USA and beyond.

Key Words: COVID-19 Pandemic; Greater Richmond Transit Company (GRTC); Transit Operation; Richmond, Virginia (RVA) Region; Full Recovery.

1. INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) was an acute infectious pneumonia with a human-to-human transmission that spread through droplets and physical contact. COVID-19 seriously threatened health problems and travel safety of people.

Public transport has the characteristics of serving a large number of people, gathering of passenger flow and having a complex enclosed environment, which provides an efficient way for virus transmission, thus making public transport a highly risky passenger transport mode. Due to this reason, COVID-19 had a great impact on the passenger transport system (Gössling et al., 2020; Parodi et al., 2020; Sannigrahi et al., 2020).

The prolonged COVID-19 pandemic from March 2020 to present dramatically affected the public transit operation throughout the world. The Greater Richmond, Virginia (RVA) Region is no exception.

This paper attempts to use the transit operation of the Greater Richmond Transit Company (GRTC) as an empirical case to probe into the following three questions: 1) the impacts of COVID-19 on the GRTC transit operation; 2) GRTC's management responses to COVID-19 and their effects. 3) the transferability of GRTC's successful experience to other similar regions. The research findings will be summarized based on this empirical study and several conclusions will be drawn accordingly.

2. GRTC AND COVID-19 IN RICHMOND: FACTS AT A GLANCE

2.1 GRTC

Founded in 1860, GRTC is a local government-owned public service company which operates urban-suburban bus lines based in the Greater Richmond, Virginia (RVA) region.

GRTC operates a fleet of 150 transit vehicles, which include both buses and cutaway vans, traveling over 40 routes within the City of Richmond, Henrico County, and beyond. Figure 1 shows the GRTC System Map and the RVA Region.

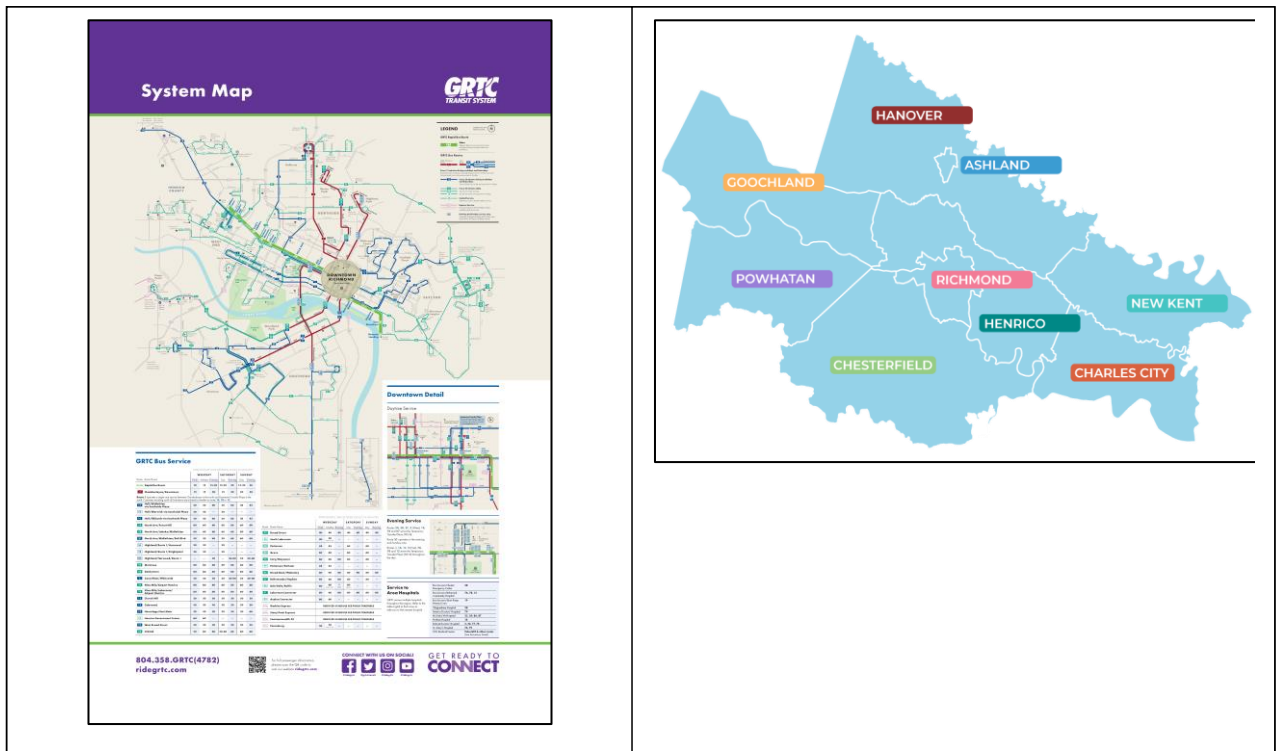


FIGURE 1 - GRTC SYSTEM MAP (LEFT) AND RVA REGION (RIGHT)
(Sources: <http://ridegrtc.com/planning-your-trip/system-map>; <https://planrva.org/>)

In addition to local and express bus services, which are the agency's main services, GRTC also provides specialized transportation services called CARE (Community Assisted Ride Enterprise) as well with the following variations:

- CARE: CARE provides the next day origin-to-destination service under the guidelines of the Americans with Disabilities Act (ADA) for the eligible citizens of the Richmond Region who live within the $\frac{3}{4}$ mile of the GRTC fixed local routes. Fare is \$0 currently (pre-pandemic was \$3.00) for City of Richmond, Henrico County, & Chesterfield County residents;
- CARE Plus: This is the paratransit services for eligible citizens who live beyond the $\frac{3}{4}$ mile of the GRTC local routes. Fare is \$0 currently (pre-pandemic was \$6.00) for City of Richmond and Chesterfield County residents. Depending on the location and time, some Henrico County trips are \$6;

- CARE on-Demand: "CARE On-Demand" offers CARE customers the option to utilize a same-day, direct, non-stop trip. CARE On-Demand is an optional program open to CARE customers; CARE customers are not required to use CARE On-Demand. However, you must first qualify for CARE to be eligible to utilize CARE On-Demand.

2.2 COVID-19 in Richmond

Like in the rest of the country, COVID-19 swept across the Richmond Region in March 2020. Here are some important dates in the early stage of the COVID-19 pandemic in Richmond:

- March 16, 2020: Schools were closed;
 - March 30, 2020: Stay at home order was issued;
 - May 15, 2020: Phase one reopening began;
 - May 29, 2020: First night of protests happened;
 - July 1, 2020: Phase Three reopening began;
 - January, 2021: COVID-19 cases increased;
 - April 4, 2021: Easter Sunday was observed;
 - June 21, 2021: 70% of Virginia's adults were vaccinated at least one dose.
- (Source: <https://planrva.org/transportation/covid-19-pandemic/>)

Unexpectedly, the COVID-19 pandemic has been lasting for three years in the Richmond region, during which the transit operation of the Greater Richmond Transit Company (known as GRTC Transit System) was dramatically impacted in multiple ways. The sections below will describe these impacts at length from different perspectives.

3. IMPACTS OF COVID-19 ON GRTC TRANSIT OPERATION

3.1. Annual View of GRTC's System Ridership Changes

Figure 2 clearly indicates that the GRTC annual system ridership began to slide from 8,586,386 in FY 2019 (pre-pandemic) to 8,397,838 in FY 2020 (the early stage of the Pandemic), and further fell to the all-time low of 7,457,551 in FY 2021. After that, the GRTC system ridership began to bounce back and increased to 8,182,225 in FY 2022, but never reached the pre-pandemic level. The overall trajectory exhibits the asymmetric U-shaped curve.

Figure 2 illustrates that the GRTC annual system ridership took the biggest hit in FY 2021.

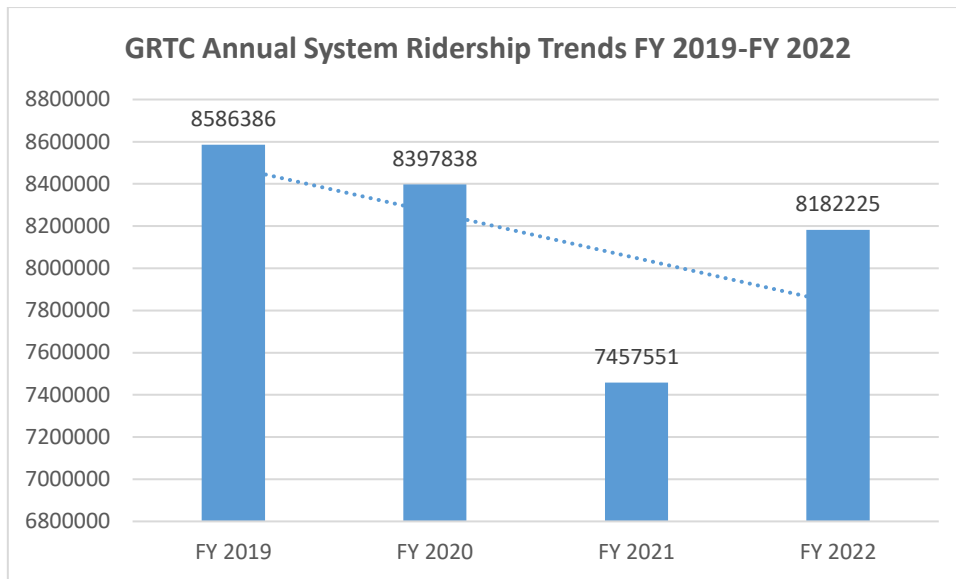


FIGURE 2 - GRTC ANNUAL SYSTEM RIDERSHIP TRENDS FY 2019-FY 2022
 (Source: GRTC, Ridership Reports, <http://ridegrtc.com/statistics-reports/ridership-reports/>);

3.2. Monthly View of GRTC’s System Ridership Changes

Table 1 and Figure 3 show GRTC system ridership changes between FY 2019 and 2022 by months.

TABLE 1 - GRTC SYSTEM RIDERSHIP CHANGES BETWEEN FY 2019 AND 2022 BY MONTHS

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
FY 2019	641421	718693	666351	784569	708693	652369	706619	688236	736536	772979	772737	737183	8586386
FY 2020	761439	808405	813867	852523	720258	703223	740996	721958	655558	525962	525383	568266	8397838
FY 2021	622768	623164	677614	701227	635362	558975	548118	511057	659364	640941	631713	647248	7457551
FY 2022	686645	698532	720673	753072	700705	674493	567584	596694	679353	667310	685662	751502	8182225

Source: GRTC, Ridership Reports, <http://ridegrtc.com/statistics-reports/ridership-reports/>.

In FY 2019 (pre-pandemic), the monthly system ridership remained relatively stable, fluctuating around 700,000/month.

In FY 2020 (early pandemic), however, the monthly system ridership steadily declined after October 2019, reached the lowest points in April and May 2020.

In FY 2021, the monthly system ridership was at the lowest level until February 2021. After that, it gradually recovered.

In FY 2022, the monthly system ridership remained relatively stable, and began to climb after January 2022, signaling the weakening of the pandemic and gradual recovery of ridership (June 2022 ridership exceeded the pre-pandemic June 2019 ridership).

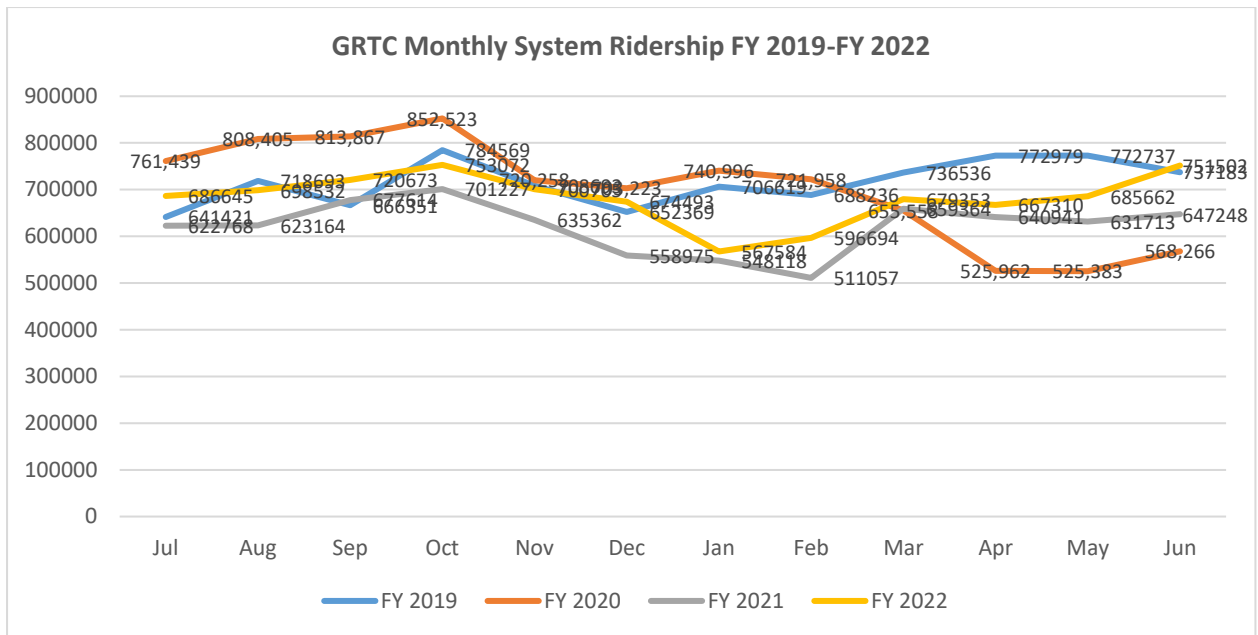


FIGURE 3 - GRTC SYSTEM RIDERSHIP CHANGES BETWEEN FY 2019 AND 2022 BY MONTHS

(Source: Ridership Reports, <http://ridegrtc.com/statistics-reports/ridership-reports/>)

3.3. Modal Variations of Transit Ridership

The overall decline in system ridership during the pandemic years masked the variation among different transit modes.

From Figure 4 through Figure 8, it can be seen that the percentage changes of different transit modes' ridership between FY 2021 and FY 2020 were as follows: 1) Local Routes: -1%; 2) Bus Rapid Transit or BRT (Pulse): -32%; 3) Vanpool: -61%; 4) Express: -73%; 5) CARE: -10%; 6) CARE On-Demand: -4%.

As shown in Figure 4, GRTC's local-fixed route ridership initially declined from 503,029 in December 2019 to 444,298 in December 2020. From December 2020 to December 2022, however, local-fixed route ridership level went up and gradually exceeded its pre-pandemic level. The ridership in December 2022 reached 554,052, which was more than 10% higher than that in December 2019.

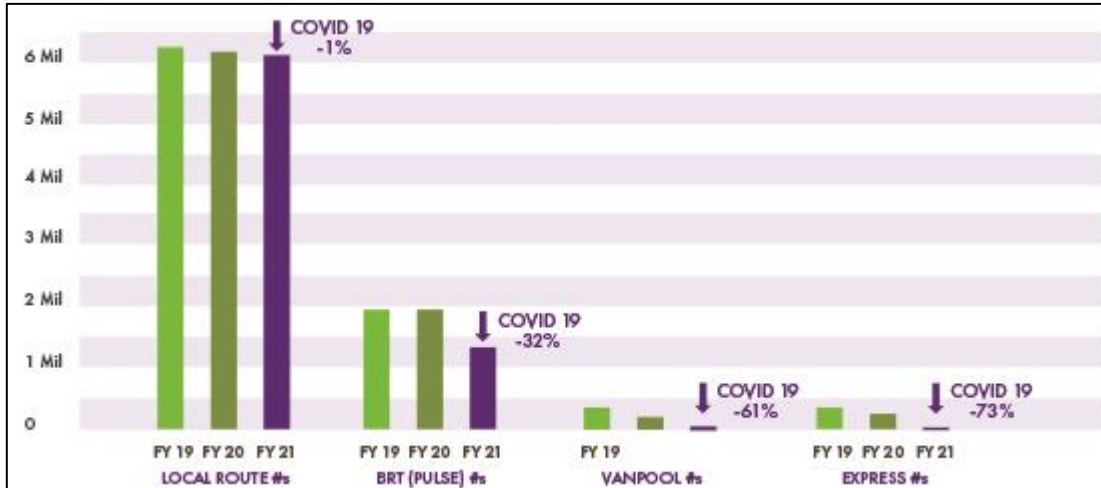


FIGURE 4 - VARIATIONS OF MODAL RIDERSHIP
(GRTC: Annual Report 2022, <http://ridegrtc.com/annual-report-2021>)

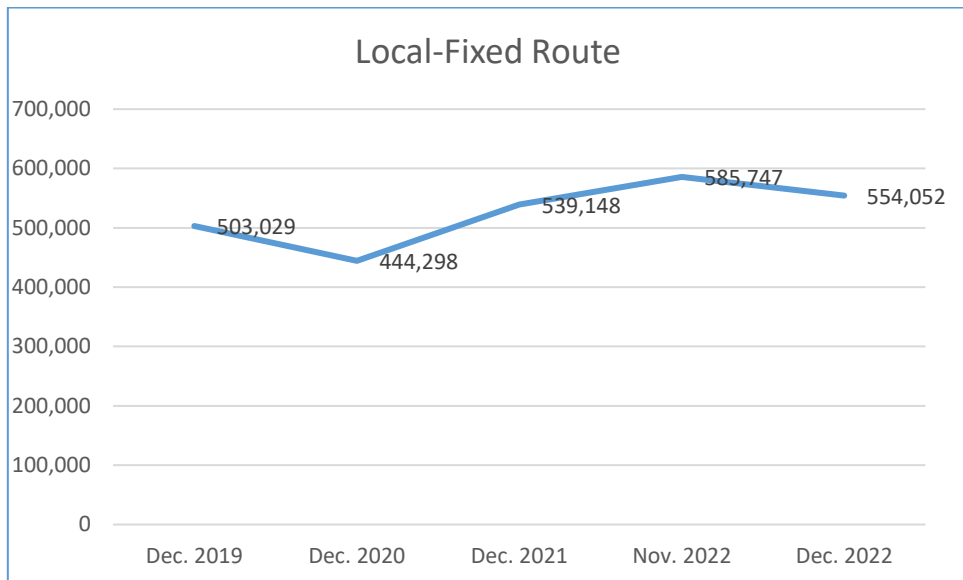


FIGURE 5 - MONTHLY RIDERSHIP OF GRTC LOCAL-FIXED ROUTES
(Source: GRTC Board Meeting Packet, Page 44, January 17, 2023, <http://ridegrtc.com/media/main/GRTC Board Packet 1-17-2023.pdf>)

However, express and Pulse (Bus Rapid Transit) ridership remain depressed with continued virtual school and remote work options. See Figures 6 and 7 for details. Look on the bright side. GRTC express route and local-Pulse ridership reached higher levels starting in fall 2021 and afterward primarily because of Virginia Commonwealth University resuming most on-campus activities.

Although vanpool ridership remains lower while employers continue liberal telework policies, vanpools do have capacity to grow in the future for customers shifting from traditional daily express routes to targeted in-office commuting days.

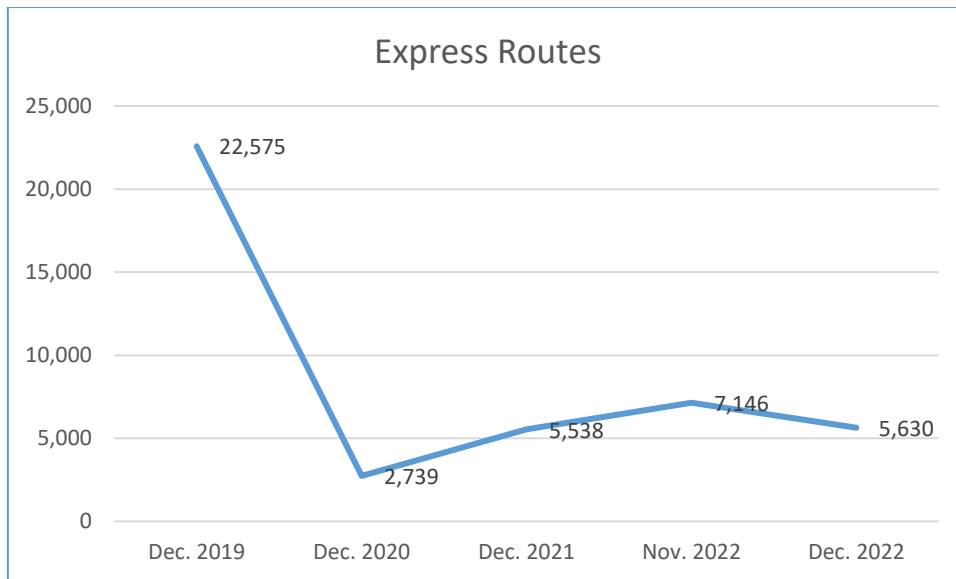


FIGURE 6 - MONTHLY RIDERSHIP OF GRTC EXPRESS ROUTES
 (Source: GRTC Board Meeting Packet, Page 44, January 17, 2023,
http://ridegrtc.com/media/main/GRTC_Board_Packet_1-17-2023.pdf)

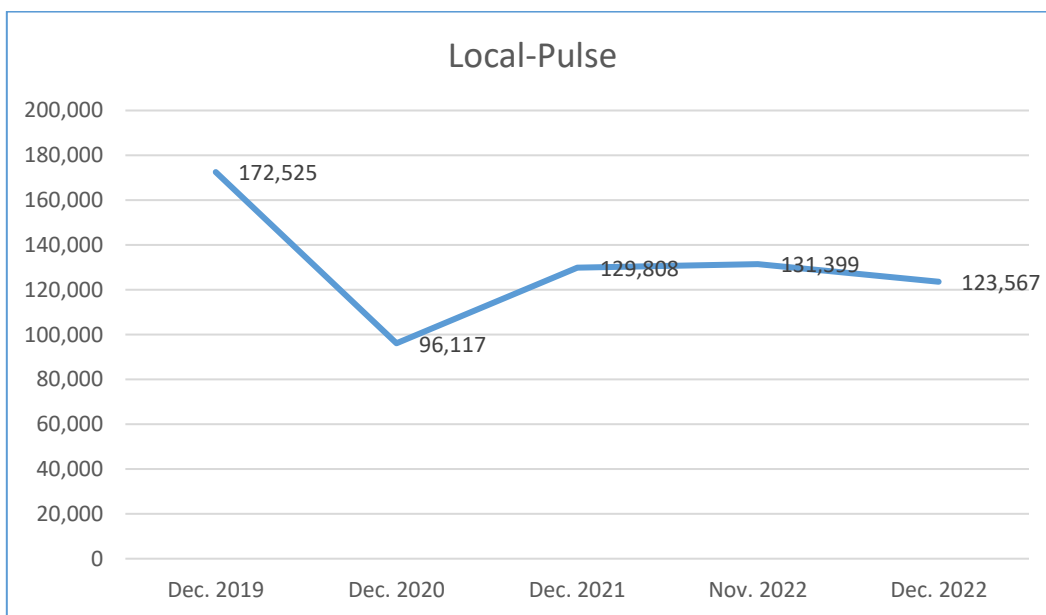


FIGURE 7 - MONTHLY RIDERSHIP OF GRTC LOCAL-PULSE
 (Source: GRTC Board Meeting Packet, Page 44, January 17, 2023,
http://ridegrtc.com/media/main/GRTC_Board_Packet_1-17-2023.pdf)

CARE passengers rode less often during the pandemic, but their return to riding is slower than on buses. This delayed recovery may be a combination of factors related to the pandemic, including ongoing personal precautions to limit public exposure and medical appointment delays from shut-down backlog demand. See Figure 8 for CARE’s ridership changes over the years.

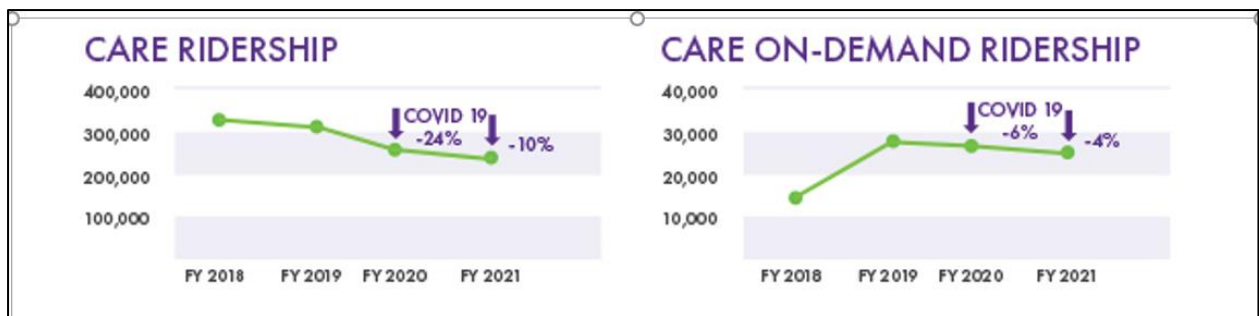


FIGURE 8 - CHANGES OF CARE RIDERSHIP DURING THE PANDEMIC
(GRTC: Annual Report 2022, <http://ridegrtc.com/annual-report-2021>)

In a nutshell, of all GRTC transit modes, local route ridership returned to the pre-pandemic level at the earliest time. Other transit modes lagged behind in ridership recovery. The reasons accounting for this discrepancy might be that:

- Local buses serve more diverse trip purposes than other transit modes do. Home-work commuting trips had relatively less impacts on local routes than on express routes and vanpools;
- GRTC adjusted service levels throughout FY 2020 to prioritize vehicle and manpower resources onto core local bus routes where demand remained high.

4. GRTC'S MANAGEMENT STRATEGIES TAKEN DURING THE COVID-19 PANDEMIC

4.1 GRTC's Emergency Response Guiding Principles

Seeing the tragic loss of life experienced in the Metropolitan Transportation Authority (MTA) of New York City Transit and projecting the likely impact on the Richmond, Virginia (RVA) region, GRTC immediately reacted to the pandemic by quickly establishing and closely following Emergency Response Guiding Principles. These principles were used to define the agency's first, second, and third orders of priority to guide and implement daily and sometimes hourly actions to protect staff, riders, and RVA community.

- Health and safety of GRTC Staff and Family: Job Protection for GRTC and Riders;
- Maintenance of Essential Service for Community: Redistribution of service to essential lines;
- Survive Regional Economic Recovery: Budget for Long-Term Recovery of Service and Community.

In mid-March 2020, with funding support from The Virginia Department of Rail and Public Transportation, GRTC suspended all fare collection to mitigate the risk of virus transmission to Operators and other riders of the farebox and requested that riders only use transit for essential trips.

Other operational changes included primarily rear-door boarding/alighting, requiring face masks/covering at all times, maintaining on-board hand sanitizer stations, enhancing cleaning schedules and staffing to support daily complete-fleet disinfection, redistributing vehicle resources to the routes with greatest ridership needs, and encouraging social distance as much

as feasible on-board and in GRTC facilities. Schedules were reduced on express routes and lower-ridership local routes, while increasing the Operator extra board to ensure coverage when operators were pulled off duty to be quarantined and tested from possible COVID exposure. GRTC's liberal leave and paid quarantine policies protected jobs and encouraged employees to voluntarily report potential exposure to mitigate possible spread among the workforce. On-site free testing events detected asymptomatic and pre-symptomatic cases to proactively catch any workplace exposure.

4.2 GRTC's Responsive Measures by Categories

GRTC took numerous bold measures to mitigate the negative impacts of COVID-19 pandemic. These measures fall under the following categories:

- Bus Interior Seat Redesign, New Boarding Process, and Daily Sanitizing;
- Bus Operation and Scheduling Modification;
- Bus Fare Policy;
- Bus Passenger Requirements; and
- On-Demand Service for Essential Trips.

Each category is described below.

4.2.1 Bus Interior Seat Redesign, New Boarding Process, and Daily Sanitizing

GRTC provided more space on-board for passengers at the bus Operator's discretion. The barrier cord was placed behind priority seating area (its placement during the majority of the pandemic), forward, or entirely removed, which allowed for more standing room as ridership continued to increase on many local routes.

GRTC's top priority was the safety of its bus operators because healthy staff ensured reliable service for customers. GRTC allowed rear door boarding for most passengers to protect operators at the front. The front seats were reserved for disabled persons.

Furthermore, daily disinfecting of the entire fleet continued, and on-board hand sanitizer stations were made available for the use and protection of passengers.

Moreover, for ventilation purpose, the bus windows remained open while the buses were in motion.

4.2.2 Bus Operation and Scheduling Modification

GRTC substantially modified the bus operating schedules during the pandemic, which were made available online and in area displays. The categories of service update and their examples of measures are briefly summarized in Table 2.

TABLE 2 - SUMMARY OF THE GRTC SERVICE UPDATES

Service Update Category	Examples
Schedule change	<ul style="list-style-type: none"> • Added more buses (including the Pulse BRT buses) on the busiest routes to keep social distancing while meeting higher demand, e.g., continued providing express bus services. • Decreased or cancelled buses due to lower demand. e.g., 23x <i>Glenside/Parham Express</i>, 26x <i>Parham Express</i>, 27x <i>Glenside Express</i>, 28x <i>White Oak Village</i> services were canceled until further notice because of very low ridership. 102x <i>Kings Dominion</i> service was also suspended until further notice by Kings Dominion. • Some express bus services were reduced, such as 29x <i>Gaskins Express</i>, 64x <i>Stony Point Express</i>, 82x <i>Commonwealth 20</i>. • While reduced services continued on most express routes, local route updates improved Sunday service, reliability, and destination connectivity.
Route change	<ul style="list-style-type: none"> • Services were consolidated into “trunk” routes, e.g. <i>Route 1 Chamberlayne & Wilmer to Southside Plaza</i>. • Redeployed express resources to local routes to balance the demand. • Rerouted passengers to take alternate routes. • Route extension. • Route elimination. • Route interlining
Vehicle change	<ul style="list-style-type: none"> • On some express routes with lower ridership, passengers were transported in GRTC Vans instead of buses.
Bus bay location change	<ul style="list-style-type: none"> • Bus bay reassignment was implemented to better meet the changing demand of picking up and dropping off the passengers.

Source: GRTC, <http://ridegrtc.com/news-initiatives/news-updates/grtc-and-covid-19-coronavirus>.

4.2.3 Bus Fare Policy

Prior to the COVID-19 pandemic, the zero-fare approach arose as a way to improve the quality of life of public transit users. Those initial motivations remained instrumental, but in the COVID-19 context, zero-fare also allowed agencies to ensure safety and security for operators and riders.

GRTC remained Zero Fare on bus and CARE services (excluded CARE On-Demand) at least through June 30, 2022. In December of 2022, the GRTC Board voted to continue fare-free operations through June 2024. A press release about this decision may be found at <http://ridegrtc.com/news-initiatives/press-releases/grtc-to-continue-free-bus-rides-through-june-2024>.

The benefits of zero-fare included: reducing mobility inequities, increasing ridership, improving boarding procedures, decreasing the potential of fare related conflicts, and eliminating many costs and staffing burdens associated with fare collection.

4.2.4 Bus Passenger Requirements

Because of the increase in community transmission resulting from the COVID-19, GRTC continued rear door boarding for most passengers to protect Operators at the front. Front door boarding remained open only for passengers needing assistance, the ramp, or ADA seating at the front. With the return to in-person school, unaccompanied minors were permitted to ride. The Federal Mask Order remained in effect through January 18, 2022, which meant that all passengers were required to properly wear face masks throughout their trips with GRTC, regardless of vaccination status. However, GRTC planned to continue a mask mandate for passengers and staff beyond this date.

As of 8/23/2022, however, masks were no longer required, and mask wearing became optional on GRTC buses or in GRTC facilities.

4.2.5 On-Demand Service for Essential Trips

In addition to the normal services, GRTC also offered on-demand service for essential trips. Early morning and late-night riders could request one ride per day from one GRTC bus stop to another. The on-demand service window was: Monday-Friday, 5AM-6AM and 11PM-2AM. GRTC worked with multiple partners (Uber, UZURV, etc.) to provide this service under Zero Fare operations.

Passengers could request a ride over the phone with Uber, UZURV (a local Transportation Network Company similar to Uber), or a GRTC small vehicle. Trips needed to be requested approximately 30 minutes before the ride. Wheelchair accessible vehicles (WAVs) were available upon request.

4.3 GRTC Funding during the Pandemic

In the past, GRTC received funds from riders in the form of fares. Due to the COVID-19 pandemic, GRTC implemented a zero fare policy. This fare revenue loss was replaced by the funding from the Coronavirus Aid, Relief, and Economic Security Act, also known as the CARES Act. In FY 2022, fare replacement – CARES Act was 5.8 million.

The eight other important funding sources are as follows.

First, the Central Virginia Transportation Authority (CVTA) is now the primary source of funds for GRTC with about \$20 million in the fiscal year 2022 (FY2022). The authority was established in 2020 by the General Assembly to help fund transportation, and it derives its revenue from an additional regional 0.7 percent sales and use tax (revenue collection began October 2020) and a wholesale gas tax of 7.6 cents per gallon of gasoline and 7.7 cents per gallon of diesel fuel (revenue collection began July 2020).

Second, the Virginia Department of Rail and Public Transportation (VDRPT) aims to improve mobility in Virginia through transit and provided \$13.3 million to GRTC for FY2022.

Third, the Federal Government (Federal Transit Administration, FTA) provided about \$5.4 million for FY2022, and the City of Richmond contributed \$8.1 million.

Fourth, other local agencies. Henrico County and VCU provided \$4.3 million and \$1.7 million, respectively. Chesterfield County provided \$1.2 million, and the City of Petersburg contributed \$200,000. There was 0.7 million from other sources.

So, the total FY 2022 GRTC revenue (revised baseline) exceeded \$60 million.

TABLE 3 - FUNDING SOURCES FOR GRTC

Entity	Funding
CVTA	20 Million
VDRPT	13.3 Million
Federal Transit Administration	5.4 Million
City of Richmond	8.1 Million
Fare replacement – CARES Act	5.8 million
County of Henrico	4.3 Million
County of Chesterfield	1.2 Million
City of Petersburg	0.2 Million
VCU	1.7 Million
Other Sources	0.7 Million
Total	60.7 Million

Source: GRTC, FY 2022 Proposed Budget,
http://ridegrtc.com/media/annual_reports/FY2022_Proposed_Budget.pdf.

5. DISCUSSIONS AND CONCLUSIONS

The sudden outbreak of COVID-19 in March 2020 dramatically impacted the GRTC transit operation. Its system ridership took the largest hit (11.2%) in FY 2021 compared to FY 2020.

Fortunately, due to the combined effects of COVID-19 testing and vaccination, as well as GRTC’s priority to serving essential trips and concomitant bold measures, GRTC’s system ridership rapidly bounced back in FY 2022 and onward.

At present, GRTC’s local-fixed route ridership has restored the pre-pandemic levels, whereas other transit modes still lag behind in their ridership recovery primarily due to their predominant services of home-work commuting trips which were drastically reduced as a result of tele-work options offered by riders’ employers.

During the past three years, GRTC implemented numerous innovative measures to protect the safety of bus operators and passengers while meeting the demand of passenger transportation and serving the essential trips. In spite of the overall transit trip reduction, GRTC maintained much of its local service routes because the riders of these routes were considered essential workers and had to access their jobs - they weren't able to work remotely.

The successful lessons learned from GRTC's transit operation during the pandemic can be summarized below:

- Putting people's safety first: this included the protection of both bus operators and passengers through taking different preventive measures (e.g., face masks, social distancing, hand sanitizing, vehicle disinfecting, rear-door boarding, etc.);
- Taking priority to serving the essential trips: GRTC adjusted bus routes and schedules to make sure that the busiest local routes had more frequent services and deployed vehicles while canceling or reducing low-demand routes.
- Using dynamic scheduling approach to meeting constantly changing travel demand. GRTC regularly updated its operating schedules and issued service update notices.
- Broadening its funding sources to cover increasing operating costs. GRTC aggressively outreached and obtained more funding supports from various sources so it could provide most transit services for free to benefit the riders and foster social equity.

All of the above successful experience and lessons can be transferable to other similar regions.

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