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Addressing Increased Ridership and Demand:  
GRTC – CARE Paratransit Service Sustainability for the City of Richmond

A thesis submitted in partial fulfillment of the requirements for the degree of Master of  
Urban and Regional Planning at Virginia Commonwealth University

By

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Virginia Commonwealth University, Richmond, Virginia, August 2012

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**Abstract:**

Addressing Increased Ridership and Demand:  
GRTC – CARE Paratransit Service Sustainability for the City of Richmond

Ashray Pande, Master of Urban and Regional Planning

A thesis submitted in partial fulfillment of the requirements for the degree of Master of  
Urban and Regional Planning at Virginia Commonwealth University

Virginia Commonwealth University, 2012

Director: Dr. Xueming (Jimmy) Chen, Associate Professor of Urban and Regional  
Studies/Planning

The objective of this thesis will be to evaluate and assess the current Care Service being offered by GRTC and recommend economic efficient, equitable and sustainable opportunities for a better Human Mobility Service transportation effectiveness and coordination. Transportation demand management strategies that generate revenue and contain costs are required to meet the demands and needs of future aging populations without compromising quality of service. With the baby boomer population set to retire and advancing health care improvements, the elderly population and disabled segment of the population is bound to rise, increasing the demand for human mobility services. This trend and age wave is being felt across the U.S. and has affected all states, including the City of Richmond. Although the GRTC Transit System in Richmond provides a Human Mobility Service called the Care-Service for Disabled Elderly, findings show that the agency is operating at a loss and has no dedicated plan for a Human Mobility Service.

## **Chapter 1: Introduction**

People in the United States are living longer and healthier lives than ever before with average life expectancy dramatically increasing as better health care systems and life styles have improved over the years (National Council on Disability, 2004). Population expansion in the elderly age group that is 65 and over will further increase with the retirement of the baby boomer generation in the coming decade. This will impact human mobility issues as this segment of the population will rise and create significant problems for older groups to maintain mobility. As seniors age, they lose the ability to drive due to decreases in their physical and cognitive capability. Aging populations that will be severely affected are disabled seniors who are unable to use normal public transportation services and rely on specialized transportation such as paratransit services. The Americans with Disabilities Act of 1990 (ADA) has also required transit agencies to meet mobility needs of disabled persons, putting serious pressure on existing human mobility services. With Federal and State funding shrinking, the Greater Richmond Transit Company (GRTC), the local transit agency for Richmond, requires a more sustainable approach to meet the increasing demand and costs of paratransit services for the rising numbers of disabled seniors who are unable to use normal public transit services.

This changing age demographic has altered the landscape for future transportation policy and planning. The current transportation infrastructure in the U.S. is not ready and prepared for aging drivers that will soon be incapable of safely driving on the road, requiring special transportation needs. Transit agencies across the country are already

adopting practices to improve accessibility to the emerging demand of specialized transport services for disabled elders. Reductions in spending at the federal level also mean greater financial efficiency and new funding sources for service providers. GRTC requires a more holistic approach to create a viable transit system that isn't just fiscally responsible but provides an equitable distribution of transportation services that are inclusionary. To add to the problem, global climate change and dwindling natural resources warrant further action by transit agencies to reduce energy use and encourage environment-friendly transportation mode choices.

A sustainable development-led approach is required if GRTC is to provide a safe and efficient public transportation network that is affordable, supports mobility access, and sustains a good quality of life for the people living in Richmond. Changes at the policy level and management style are essential to curb the increasing demand and costs of paratransit services. It is vital that safe mobility, which includes improving human mobility services like paratransit, be upgraded into the traditional road systems that make up the network. Sustainable practices that produce efficiency, equity and ones that protect the environment are paramount in tackling mobility and accessibility for the future. The path towards paratransit service and ultimately public transit sustainability is creating and implementing smart growth approaches like Transportation Demand Management (TDM) tools that will expand special needs transportation coverage for disabled seniors. The City of Richmond and its transit agency, GRTC, need to prepare for this coming change and create a suitable framework and plan for human mobility services for the safety and welfare of transit and non-transit users.

The thesis assesses GRTC's operational efficiency and provides recommendations for TDM practices to be effectively used in GRTC's CARE paratransit service.

The following four objectives are the proposed aim of the research:

- Illustrate rising costs of GRTC's CARE service and its impact on vulnerable persons;
- A Peer System Comparison will be conducted with Dayton OH, paratransit provider, GRDTA, as well as national transit averages based on service efficiency, cost effectiveness and service effectiveness;
- Assess service area of GRTC CARE service and management practices employed by transit agency to manage demand and costs; and
- Provide feedback and recommendations on transportation demand management practices so that GRTC can attain a sustainable paratransit service.

The assessment is based on ADA compliance service guidelines provided by the federal government regulations, peer and national average comparisons, and sustainable TDM practices. Similar to the concepts of smart growth, the greater use of TDM tools and practices that are targeted directly towards sustainable transportation strategies will help secure the future of GRTC's paratransit service.

The second chapter of the thesis provides a literature review of paratransit services after the implementation of the ADA and issues seen in the industry. This includes a background on the emerging demographic trends of disabled elderly as well as federal legislation and policies that have been developed to address the quality of service of paratransit use for public transit agencies. A brief overview of GRTC and its TDM

branch, Ride Finders, is part of the chapter. The next chapter, theoretical framework, of the research provides an overview of Smart Growth and TDM strategies that can be applied to GRTC's CARE service. Innovative approaches that are being successfully utilized by other transit providers to manage paratransit growth and escalating costs are explored. This is followed by the research and design methodology of the paper that is the basis of the thesis. The fifth chapter of the thesis contains the findings and provides recommendations based on TDM practices of GRTC. Finally, the final chapter contains a conclusion and summary of the report.

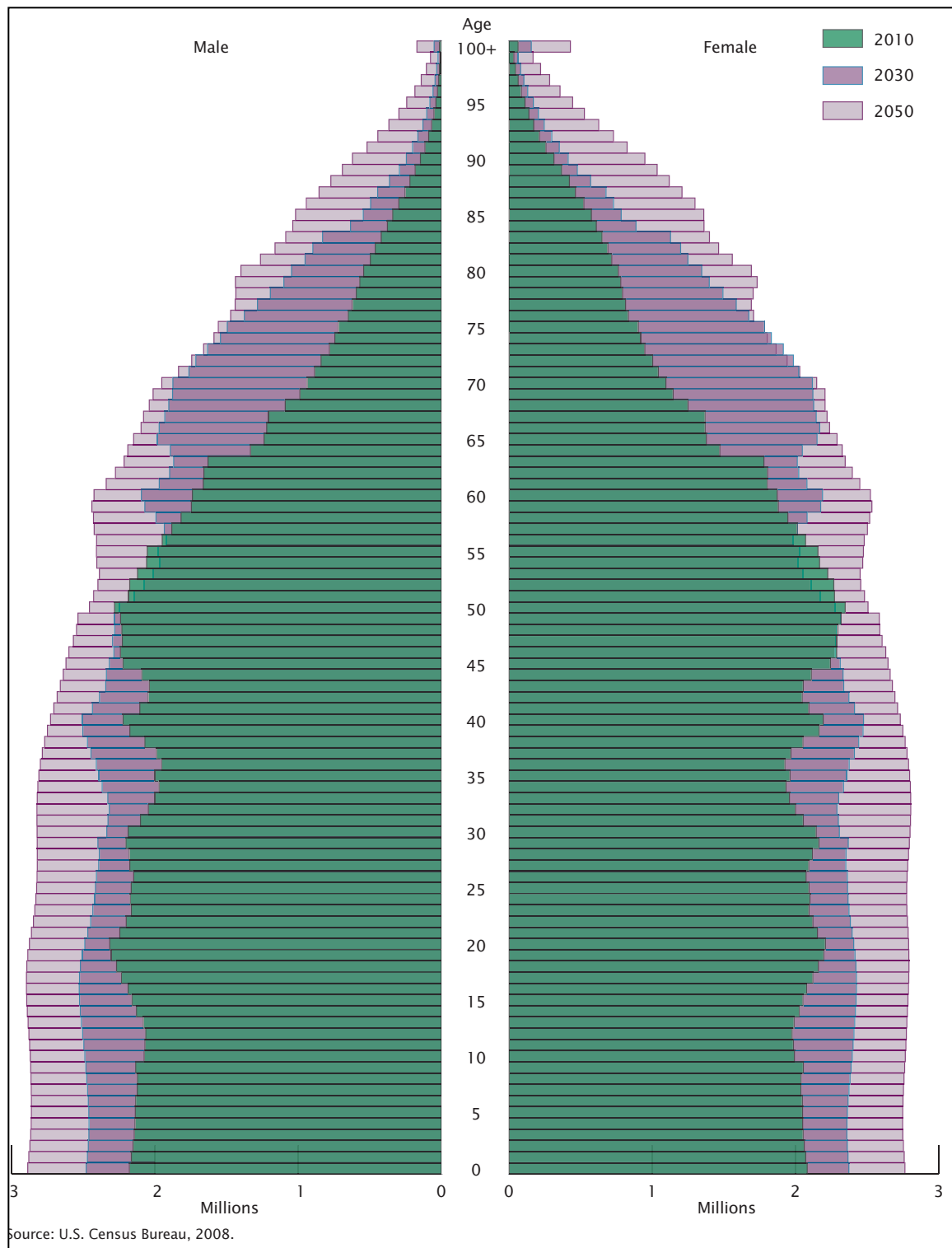
## **Chapter 2: Background**

### **2.1 Changing Demographic Structure**

#### ***2.1.1 Age***

The United States faces an eminent change in its demographic profile as aging populations are set to rise due to advances in technology and the retirement age arriving for the baby boomer generation. According to *State of Aging and Health in America 2007*, improved medical care and early prevention efforts have contributed to dramatic increases in life expectancy in the U.S. over the past century (CDC, 2007). These two factors, longer life spans and aging baby boomers, will have a serious impact on the age structure of the U.S.

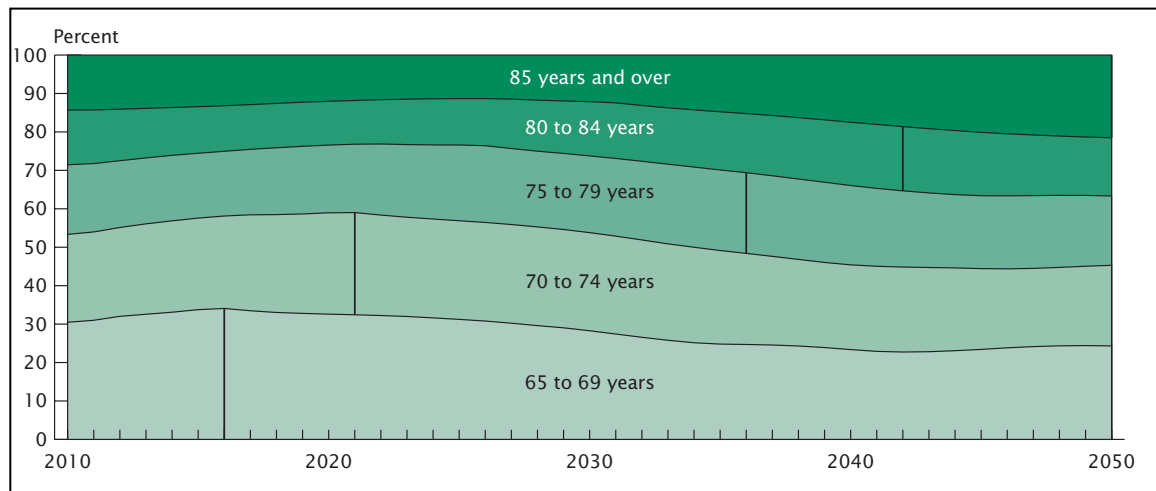
By the year 2050, the United States population structure and growth of its older population is set to increase swiftly. The number of Americans that are aged 65 + will double from 40.2 million in 2010 to 88.5 million by 2050 (He, Sengupta, Velkoff, & Debarros, 2005). This is reflected in Figure 1 where highest outward growth is exhibited by the elderly population groups compared to populations that are below 60 years of age. This significant surge in the growth of the elderly population in the country brings in a whole host of challenges that policy makers and programs need to adjust for in the coming years.



**Figure 1:** Age & Sex Structure of the Population for the United States: 2010. 2030. And 2050. Adapted from “Grayson, V. K., & Velkoff, V. A. (2010). *The Next Four Decades The Older Population in the United States: 2010-2050*. Retrieved Aug 1, 2012, from U.S. Census: <http://www.census.gov/prod/2010pubs/p25-1138.pdf>”



A large part of this change is being driven by the baby boomer generation that is set to retire in the very near future. According to the US Census Bureau, 60 % of the U.S. population of the working age group is currently in the age group of 20-64. This is set to change by 2030 when the baby boomer population retires and shifts into the older population segment group, decreasing the working age group by about 5 % (Grayson & Velkoff, 2010). This alteration in the population structure seen in Figure 2 below will change from the current 13 percent of the total population that the 65 and older group increases to 19 percent by 2030. Furthermore, the oldest age group, 85 + is also predicted to grow from 5.8 million in 2010 to 8.7 million in 2030 accounting for 2.3 percent in 2030 and 4.3 percent in the year 2050.



**Figure 2:** Distribution of the Projected Older Population by Age for the United States. Adapted from “Grayson, V. K., & Velkoff, V. A. (2010). *The Next Four Decades The Older Population in the United States: 2010-2050*. Retrieved Aug 1, 2012, from U.S. Census: <http://www.census.gov/prod/2010pubs/p25-1138.pdf>”

### 2.1.2 Disability

A strong relationship exists between age and disability, with longer life leading to decreased mobility as seniors become prone to substantial health issues that could lead to higher rates of disabilities. Based on the *Americans with disabilities 2010* report, there are approximately 56.7 million people living with some form of disability in the U.S, accounting for 18.7% of the total population. This number increased from 54.4 million in 2005 and added another 2.2 million in 2010 (Brault, 2012).

The *Disability – Status Report 2010*, reports rising prevalence of disability found in older adults in the U.S. Figure 3 below, reveals increasing disability rates as people age. The age group of 75 + has about 50% disability prevalence with ages 65 and 74 having about half that at 25%. Younger age groups have far less prevalence of disability compared to age groups that are 65 and over.

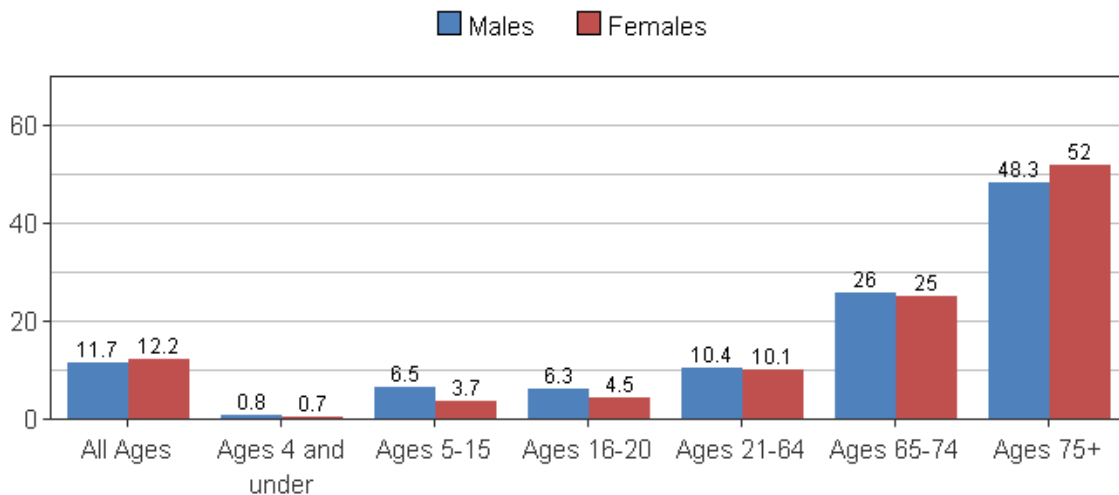


Figure 3: Prevalence of Disability among non-institutionalized people by gender and age group. Adapted from “Employment & Disability Institute of Cornell University. (2010). *2010 Disability Status Report*. Retrieved Sept 4, 2010, from Disability Statistics: [http://www.disabilitystatistics.org/StatusReports/2010-PDF/2010StatusReport\\_US.pdf?CFID=2557404&CFTOKEN=14513849&jsessionid=8430346bb224eb975f2753381e3d7f41235d](http://www.disabilitystatistics.org/StatusReports/2010-PDF/2010StatusReport_US.pdf?CFID=2557404&CFTOKEN=14513849&jsessionid=8430346bb224eb975f2753381e3d7f41235d)”

In terms of disability types, ambulatory disabilities were the most prevalent amongst elderly groups. Population groups that were between 65 and 74 had about 16.1% ambulatory disability with hearing at 8.9%. Even older group consisting of 75 + reported even higher disability rates with ambulatory disability at 33.3% and independent living at 26.2% (Employment & Disability Institute of Cornell University, 2010). Ambulatory and self-care disability persons would require significant assistance in moving and transporting themselves from one place to another.

The rapidly increasing number of disabled older Americans has far-reaching implications for transportation systems that they use daily. High disability prevalence amongst these elderly seniors as they age discussed above will also be a factor in affecting specialized transportation needs. This will place unprecedented demands on the provision of paratransit and other age-related services that they depend on.

## **2.2 Americans with Disability Act (ADA)**

Although the literature contains references to paratransit service development, there was very limited research directly focusing on this issue before the enactment of the Americans with Disability Act (ADA). This was the landmark legislation that paved way for mandatory paratransit services requirement for transit agencies across the country. To better understand paratransit services, background and service guidelines required by the ADA are needed.

Over the past two decades, the Federal government has realized the growing need of transportation services for groups that aren't able to use normal fixed route public transportation services like the elderly and disabled (Transit Cooperative Research Program, 1997). For this reason, the Americans with Disabilities Act (ADA) was enacted

to provide a framework and standard for better transportation choices and accessibility improvements for the disabled and elderly. Passed in 1990 by the U.S. Congress, the legislation was a national mandate against the discrimination against individuals with disabilities as well as ensuring the Federal government played a central role in establishing and enforcing standards (Koffman, Lewis, Chia, Burkhardt, & Bradley, 2007).

The enactment of the ADA has been an important factor in bringing about equality of opportunity for people with disabilities. It has increased architectural accessibility, particularly in newly constructed buildings and facilities, increased accessibility in fixed-route public transportation, and created provisions of auditory services for people who are deaf or have difficulty in hearing (American Association of People with Disabilities, n.d.). Due to these improvements, the elderly and disabled have greater access to goods and services from businesses, state and local governments, and their local communities.

The ADA's requirements have affected all forms of public transportation and infrastructure and brought about more accessibility and mobility to its users. Transit bus services have improved significantly under the ADA. Features that facilitate universal design access like low-floor buses with ramps, larger destination signs, floor markings, extra grab bars, stop announcements, and monitors that show upcoming stops have enhanced accessibility. ADA requires that all new fixed-route vehicles purchased be equipped with wheelchair lifts or ramps to provide full accessibility to persons with disabilities (National Council on Disability, 2007). As a result, most public transit

agencies have replaced older, non-accessible buses and use paratransit vehicles to supplement their 100% accessible fixed-route fleets.

People with mobility impairments have experienced substantial improvements in physical access to transportation, businesses and government agencies. The ADA has significantly increased overall transportation choices for people with disabilities, and more trips on more mode choices are being provided today than before the law was passed (National Council on Disability, 2007). Although rail service improvements were also part of the ADA's agenda, due to the nature of study of GRTC, rail services aren't discussed since the service isn't provided by the transit agency.

But the most significant achievement of the ADA was the mandatory requirement of all public transit agencies that operate fixed-route transportation services for the general public, to provide origin-to-destination paratransit service to eligible individuals (American Association of People with Disabilities, n.d.). For the purpose of this study in particular, Section 12143 of the ADA Act clearly states that,

“It shall be considered discrimination for purposes of section 12132 of this title and section 794 of title 29 for a public entity which operates a fixed route system (other than a system which provides solely commuter bus service) to fail to provide with respect to the operations of its fixed route system, in accordance with this section, paratransit and other special transportation services to individuals with disabilities, including individuals who use wheelchairs that are sufficient to provide to such individuals a level of service” (Americans with Disabilities Act, n.d.).

This laid out the foundation for the paratransit service or specialized transportation service that would compliment fixed route services operated by public agencies. It also created minimum service criteria in determining the level of services to be provided by the designated agency for a given area.

## **2.3 Paratransit**

Paratransit is known as demand response or dial-a-ride services and is comprised of passenger cars, vans or small buses. It operates in response to calls from passengers or their agents to the transit operator who then dispatches a vehicle to pick up the passengers and transport them to their destinations (Gerty, Procopio, Ellis, Ferris, & Knapp, 2011). Paratransit service vehicles do not operate over a fixed route or on a fixed schedule since they are used as an on-demand request service. Vehicles are dispatched to pick up several passengers at different pick-up points before taking them to their destinations (National Transit Database, 2005).

### ***2.3.1 ADA Paratransit: Service Criteria and Guidelines***

Public transit agencies operating fixed route transportation services for the general public are required by the U.S. DOT regulations that implement the ADA to provide ADA complementary paratransit service for individuals who are unable to use the fixed route system because of their disability (Federal Transit Administration, 2005). The FTA is responsible for ensuring compliance with the ADA and the U.S. DOT regulations (Federal Transit Administration, n.d.). According to the *Riders Guide to Public Transit*

for *People with Disabilities* report by the Transit Access Project the service criteria for ADA compliance are as follows:

**Table 1: ADA Compliance Guidelines**

<b>ADA Compliance Guidelines</b>	
<b>Service Area</b>	Provide next-day paratransit service to origins and destinations within a 3/4-mile of the fixed-route system.
<b>Response Time</b>	Provide reservation services during normal business hours for next- day services within a one-hour time span of the requested service.
<b>Fares</b>	Charge no more than twice the comparable fixed-route fare.
<b>Trip Purpose</b>	Prevent prioritization or restrictions of paratransit trips based on trip purpose.
<b>Hours and Days of Service</b>	Provide paratransit service during the same operating hours and days as the fixed-route service.
<b>Capacity</b>	Prevent transit agencies from limiting the availability of service by constraints such as trip limitations, waiting lists, or restrictive operating practices.

### **2.3.2 ADA Eligibility**

Paratransit services are for people with disabilities who are unable to use a fixed route system. Some people might be eligible for paratransit services on all trips they make while other people might be eligible only for certain trips due to certain circumstances. To be eligible, a person must fit into one of the ADA's three eligibility categories. According to the guide provided by GRTC's *CARE Personal Ride Guide* for ADA paratransit eligibility the three categories are;

- Persons who have specific impairment-related conditions which make it unreasonable to travel to or from the bus stop;
- Persons who need a wheel chair lift-equipped bus, but it is not available on the fixed-route when they need to travel;
- Persons who are unable to board, ride or exit from the regular buses even if they are able to get to a bus stop and the bus is equipped with a wheelchair lift.

The eligibility determination has to be made within 21 days of the application being submitted. If the determination isn't processed in the timeframe, the person is given conditional eligibility until the process is complete (National Transportation Library, 1993). ADA directs transit agencies to establish a process for determining complementary paratransit service eligibility. It places the responsibility on each transit agency to develop a process that limits eligibility to those who explicitly need paratransit services and cannot ride fixed-route buses (Koffman, Lewis, Chia, Burkhardt, & Bradley, 2007).

### ***2.3.3 Paratransit Ridership Demands***

The ADA compelled public transit authorities to review transportation services to aging populations and disabled individuals requiring curb-to-curb services with a fare scheme comparable to regular transit. This legislation allowed paratransit systems to improve mobility, employment opportunities, and access to services for individuals who were disabled and elderly. However, the last two decades have seen considerable increase in demand and ridership for this service.



Before the implementation of ADA requirements there were about 14 to 16 million paratransit trips provided annually nationwide. In the year 2000, the Federal Transit Administration (FTA) grantees reported 73 million demand-response rides, of which, almost 45 million were ADA-related (Ohio Developmental Disabilities Council, 2005). Furthermore, the average number of annual ADA paratransit trips that were provided by transit agencies increased 7 percent from 2007-2010 from 172,481 trips in 2007 to 184,856 trips in 2010 (U.S. Government Accountability Office, 2012). According to the National Transit agencies *2010 National Transit Summaries and Trends* demand response (paratransit services) combined with demand response taxis increased by nearly 14.4% from 2001-2010, illustrating the need and demand in providing special transit services for the elderly and disabled (National Transit Database Federal Transit Administration, 2010).

Government officials have stated that the growth in the elderly population is a reason why more people are living with disabilities and need ADA paratransit service. Other transit agency officials have said that ADA paratransit demand has also increased because of overall population growth with individuals with disabilities living independently. Improvements in ADA paratransit service have made the service more appealing to riders (U.S. Government Accountability Office, 2012). Although the ADA Act has resulted in transit operators significantly increasing the amount of paratransit ride since the legislation was passed, demand for this service has been rising faster than the services being provided.

### ***2.3.4 Rising Costs***

The increase in mobility and accessibility has been extremely beneficial to the elderly and disabled and the communities in which they travel. However, it has also had an impact on transit agency budgets. Capital costs for paratransit services rose by 163 percent while operating costs increased nearly 200 percent in the same time period. In 2003, transit agencies spent \$2.36 billion (representing 8.8 percent of their operating budgets) on paratransit services for 110.8 million riders (National Transit Database, 2005).

Other factors that increase operational costs for paratransit services compared normal fixed-routes is the hidden costs that include hiring operators and giving them specialized training assist disabled and elderly passengers. These operators then require special licenses, which further adds extra fees to the total cost. In addition, specialized vehicles are required to provide transportation that includes having lift-equipped vans and other requirements to ensure proper safety procedures are followed (Center of Urban Transport & Research, 2008).

Paratransit is an essential service that is being provided to the elderly and disabled, however these services are more expensive to sustain than fixed-route based mass transit systems due to their customized, on-demand service requirements. Research indicates that it is common that many paratransit systems in the United States experience cost overruns (Center of Urban Transport & Research, 2008). To cover these cost overruns for paratransit service providers, public transit authorities often subsidize the greater portions of paratransit services. But due to budget shortfalls, public transit

authorities are faced with the dilemma of controlling paratransit costs without deteriorating paratransit services (National Council on Disability, 2007).

### ***2.3.5 Land Use & Transportation Planning: Sprawl***

Transportation planning and land-use planning are intertwined and work side by side in the general planning process. Federal policy and funding here in the United States has shaped the development and direction of core planning theory, resulting in sprawl. The introduction of two federal programs and policies gave birth to the suburban boom that still affects the planning process today. As a consequence, private automobile dependence has soared, affecting all forms of public transportation services and limiting development in this sector.

The Federal guarantee of home mortgages and the construction of the interstate highway system inextricably set the landscape of planning after WWII (Levy, 2011). As result of the highway program, rural areas were connected into the national grid and homeowners flocked towards outer city limits that they were previously confined to before (Adams, 2012). To further propel sprawl towards the suburbs, the Federal Housing Authority (FHA) promoted homeownership in these areas with the addition of the Veterans Administration (VA) getting Congress to pass the home loan program that guaranteed special loan financing options (Kelly, 2010).

The FHA's new standards and regulation with a sudden private automobile ownership boom, directed planning towards residential only suburbs that subjected transportation policy to follow the commuter based transport infrastructure development with the enactment of the Highway system (Kelly, 2010). Due to the nature of land-use planning in the U.S., seniors will have difficulty in using numerous services ranging from

health to groceries that will make access to them difficult for elderly when they are no longer able to drive.

With increasing disability prevalence also to be found in this segment of the population, paratransit service area coverage will affect elderly disabled citizens who are out of  $\frac{3}{4}$  mile radius. Seniors living out of the coverage area will either have to be accommodated with paratransit services that go beyond the ADA mandate of complimentary paratransit services within  $\frac{3}{4}$  mile radius or be denied access. With most Americans choosing to drive private vehicles and public transportation not as extensive or affordable areas that they live in, losing their ability to drive to basic services will be disastrous.

## **2.4 Federal Initiative & Funding for Elderly and Disabled**

### ***2.4.1 Recent: Executive Order 13330 and 13217 and MAP-21***

Although, the Americans with Disabilities Act made the most significant contribution towards the improvement of transportation services and accessibility for the disabled and elderly, prior transportation legislation has been part of the change that resulted in paratransit services. Significant progress has been made in this regard in providing federal financial assistance to government and non-government programs throughout the country over the last decade.

More recent regulations from the federal government assistance towards human mobility services were President Bush's Executive Order 13330 Human Service Transportation Coordination and Executive Order 13217, the New Freedom Initiative (Federal Highway Administration, 2005). The implementation of both these orders have reflected the importance of human mobility and the federal governments commitment

towards the aging population's physical and mental health that improve greatly from these services (Community Transportation Association, 2010).

The human service transportation coordination order called for identification of restrictions and increased coordination between Federal Departments and agencies in improving federal support towards transportation services for people with no personal transport, persons with disabilities, persons with low-income, and the elderly that use community transportation systems (DPRT, 2006).

Part of this new coordination created the Interagency Transportation Coordinating Council on Access and Mobility (CCAM) consisting of secretaries from the Department of Transportation (DOT), Health and Human Services (HHS), Veterans Affairs, the Commissioner of the Social Security, Education, Interior, Housing and Urban Development (HUD), Agriculture (USDA), Social Security and the National Council on Disability (Department of Veteran Affairs, 2007; UWR, 2005). Under the direction of CCAM, these groups were then directed to work together in simplifying access to transportation on human mobility services.

The New Freedom Initiative created the New Freedom Program that was introduced in June 2001. Under this program, federal agencies were directed to support new public transportation services and public transportation alternatives for individuals with disabilities. The joint cooperation required by federal agencies for the Freedom Program, created the Interagency Council on Community Living under the Department of Health and Human Services (Federal Transit Administration, n.d.).

More recent initiative by the Federal Government has been the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21) signed by President Obama on July 2012.

Under the MAP 21 Act, highway and transit programs have been extended as well as the addition of the Transportation Mobility Program as a new core program. This new plan is a replacement of the existing surface transportation plan but allows more flexibility to state government's own priorities and projects (EPW, 2012). Although this addition calls for a mobility program, its focus on the previous surface transportation plans attention on federal-aid goes towards highways, bridges and tunnel project preservation and improvement with limited attention towards human mobility services for the elderly. The Map-21 Act is more geared towards increasing freight capacity and continuing the infrastructural repair and improvement of the existing highway networks and public transit terminals (Federal Highway Administration , n.d).

#### ***2.4.2 Department of Rail and Public Transportation (DPRT) The Elderly Persons and Persons with Disabilities Program***

The Federal Transit Administrations (FTA) section 5310 or also the Elderly and Persons with disabilities Program provides funding to special transportation needs like human mobility services for the elderly and disabled. The program first started in 1975 and offers financial support to both public and private entities that coordinate services for the elderly and disabled (Federal Highway Administration , n.d.).

Federal dollars are also given to state agencies so they can then disperse them to private non-profit agencies, assisting unmet demand and transportation service unavailability's in their region. About 80% of total capital costs for transportation services are provided with the remaining 20% of the financial burden to be shared with state and local agencies. Although exceptions can be made for 90% federal funding and

10% local matching funds if the costs are related vehicle-related equipment to meet requirements set for by Americans with Disabilities Act (Elderly and Persons with Disabilities Program, n.d.).

#### ***2.4.3 Freedom Program:***

The Freedom Program is the FTA's section 5317 grant program solely dedicated to transportation disadvantaged individuals whether low-income, disabled or elderly and that live in both urban, suburban and rural areas. The purpose of this funding is to encourage services and facility improvements to address the transportation needs of the disabled that go beyond ADA requirements (Community Transportation Association, 2010). The order states that "The United States is committed to community-based alternatives for individuals with disabilities and recognizes that such services advance the best interests of the United States" (Elderly and Persons with Disabilities Program, n.d.), and directs Federal agencies to assist in state and local areas in developing and funding human mobility services.

The New Freedom Projects that are eligible for funding are

- Expansion of paratransit service beyond • the minimum requirements of ADA
- Expansion of current hours for paratransit service

As seen in Table 2 below, the Federal share of eligible capital expenses may not exceed 80% of the net project costs. The Federal share of eligible operating expenses may not exceed 50% of the net operating costs.

**Table 2: Federal/Local Match Requirements**

<b>Match Requirements</b>	<b>Federal Share</b>	<b>Local Share</b>
Capital	80%	20%
Operating	50%	50%

**Source:** ((FTA) U. -F., Overview - New Freedom Program)

## **2.5 Richmond: Demographic and Socio Economic Characteristics**

### ***2.5.1 Disability Characteristics:***

The total population for Richmond City, VA is estimated to be 202,335 with 22,259 people making up the elderly population that is 65 years and older as seen in Table 3 below. Of the total elderly population, 35.20% of them are considered to be living with a disability, about 7,835. Disabilities are classified into six categories by the U.S. census, which include hearing difficulty, vision difficulty, cognitive difficulty, ambulatory difficulty, self-care difficulty and independent living difficulty.

Hearing Difficulty is classified as people who are either deaf or have serious difficulty hearing. This disability can make traveling problematic since people with hearing disabilities aren't able to hear bus announcements or hear vehicle warning signals when crossing intersections or streets. People with vision difficulty are individuals who are blind or have hard time seeing even when wearing glasses. Using public transit services is almost impossible without assistance from others for persons with severe vision impairment.

Cognitive difficulty disabled person have a hard time concentrating, remembering or making decisions (Ruiz & Houtenville, n.d.). These types of persons will not be able to travel by themselves, especially using normal public transit services like buses. For



people with ambulatory difficulties, walking and climbing stairs are very challenging and at times impossible, making travel to destinations extremely uncomfortable (Disability Statistics, 2012).

Self-care individuals are people who have trouble difficulty dressing or bathing, which immediately implies that traveling alone is out of the question. Finally, independent living difficulty is a physical, mental, or emotional condition (Ruiz & Houtenville, n.d.). People with this type of disability have extreme problems when it comes to doing anything alone, always requiring some form of aid to do simple things like traveling.

The most prevalent form of disability found in the elderly population in Richmond City is ambulatory difficulty at 25.70% shown below in table 3 below. This difficulty is a severe threat to the quality of life for this group, disbaring them from any form of physical activity. Ramp access to stairs and elevators are must for the select group of disabled persons with ambulatory difficulty. Independent living difficulty holds the second most widespread disability found amongst elderly persons with 3,842 people living with this condition, about 17.50%. Traveling alone is out of the question for independent living difficulty individuals who require constant support from a trusted family member or friend.

Cognitive difficulty is the third most prevalent disability found in the disabled elderly with 10.4% of the population. If the individual can't concentrate or remember, traveling could be a hazard and could be life threatening. Hearing disabled persons consists of about 8.30% of the total disabled elderly population. ADA's mandatory bus stop announcements are rendered useless for these individuals when they can't hear them.

Finally, vision difficulty is that least most prevalent disability, with 1,837 people living with this disability. Nonetheless, mobility is severely limited when individuals are blind or have very poor eyesight.

**Table 3: Disability Characteristics for Populations 65 and Over**

	<b>Total Population</b>	<b>With a disability</b>	<b>Percent with a disability</b>
	Estimate	Estimate	Estimate
<b>Total civilian non-institutionalized pop.</b>	202,335	29,315	14.50%
<b>Population 65 years and over</b>	22,259	7,835	35.20%
<b>With a hearing difficulty</b>	(X)	1,837	8.30%
<b>With a vision difficulty</b>	(X)	1,360	6.10%
<b>With a cognitive difficulty</b>	(X)	2,315	10.40%
<b>With an ambulatory difficulty</b>	(X)	5,716	25.70%
<b>With a self-care difficulty</b>	(X)	1,897	8.50%
<b>With an independent living difficulty</b>	(X)	3,842	17.30%

**Source: American Community Survey, 2010**

### ***2.5.2 Poverty Status:***

Poverty status for the elderly that are 65 and over is an important indicator of transportation needs and affordability. For the city of Richmond, a total of 50,286 people are below the poverty level, about 25.80%. From that total, 2,958 are seniors over the age of 65 living below the poverty line making up for about 13.30% of the total elderly population. Affordable transportation services are a vital concern for these elderly seniors and even more so for those that have disabilities and rely on paratransit services. Fare pricing for paratransit services needs to be comparable to the incomes of senior disabled populations that are eligible for these types of services.

**Table 4: 65 and over Poverty Status**

<b>Subject</b>			<b>Richmond city, Virginia</b>		
			<b>Total</b>	<b>Below poverty level</b>	<b>Percent below poverty level</b>
			<b>Estimate</b>	<b>Estimate</b>	<b>Estimate</b>
<b>Population for whom poverty status is determined</b>			194,962	50,286	25.80%
<b>AGE</b>					
<b>65 years and over</b>			22,259	2,958	13.30%

Source: American Community Survey, 2010

## **2.6 Background on GRTC:**

### **2.6.1 GRTC:**

The Greater Richmond Transit Company, originally called the Richmond Railway Company, was founded in 1860 and serves as the chief public transportation service provider for the City of Richmond. The company first started out as a railway power company, building the first effective streetcar system here in the U.S (Conneticut Department of Transportation, 2010). The company was acquired by the City of Richmond's transit branch, Greater Richmond Transit Company, in 1973 and began providing transit services for the Richmond Area.

Today the City of Richmond and Chesterfield County each own 50% of GRTC Transit system. Both groups have 3 representative members, totaling 6, at the board of directors for the company. Services that are provided today are Fixed-route services, Community Assistance Ride Enterprise (CARE) paratransit services, and the Central Virginia Assistance Network Van (C-VAN).

### **2.6.2 Ride Finders:**

Ride Finders is a branch of the GRTC Transit Company that handles the regional ride share and transportation demand management services for the agency. Its mission is to “move fewer people in fewer vehicles” (Connectics Transportation Group, 2012). It provides TDM related services to residents, employers, and employees, and its service area that includes commuter information, carpooling, emergency ride home, telework assistance, and information for bicyclists and pedestrians (Cambridge Systematics, Inc, Center for Urban Transportation Research, Southeastern Institute of Research).

## **Chapter 3: Literature Review**

### **3.1 Theoretical Framework:**

#### ***3.1.1 Communicative Rationality and Collaborative Planning:***

Generally, transportation planning falls under the theoretical paradigm of instrumental rationality, which is “a process of optimizing means (plans and programs) according to identified ends (goals)” (Wilson, 2001, p. 3). This process focuses more on the modeling and forecasting predictions of transportation and attempts to justify its reasoning through scientific and empirical research, with the central focus on increasing overall mobility (Stangl, 2008). This is a purely rational planning process where knowledge of all situations and outcomes of each action are predicted with certainty. But over the years, this modernist theory has been subject to criticism due to its disregard of other more important values like equity and now pressing concerns about the environment (Stangl, 2008).

The pure form of rational planning is never possible to achieve due to the limitations of the human mind and ability to foresee and solve all problems (Brooks, 2002). Communities have different needs and values and a particular solution may not necessarily be applicable to a specific problem. In a post-modernist world of thought, planners act with pragmatic rationality, where scientific and empirical approach based on real world observations and data provide the framework and justifications for planning and development. This post-modernistic thought “recognizes the complexity of our problems, the elusiveness of solutions to those problems, and the often chaotic nature of

the social, economic, and political environments in which these problems occur” (Brooks, 2002, p. 119). This is the challenge that transportation planners face when there are conflicting values and interests amongst stakeholders, making it difficult to reach a consensus with all parties. Thus a more coordinated and consensus-building approach is required to make sure that all parties are represented and that they come to a mutual understanding of the needs and requirements of all members of society; the young, the elderly and the disabled.

Communicative rationality and collaboratively planning in particular can provide the basis of consensus and understanding amongst all parties. Richard Willson’s *Assessing Communicative Rationality as a transportation-planning paradigm* provides a definition of this practice, which states, “communicative rationality is concerned with creating a rational basis for constructing ends and means in a democratic society – an approach that integrates scientific and interpretive/social learning approaches” (Willson, 2001).

This form of planning focuses rational communication, which combines both instrumental rationality and public discourse that allows consensual understanding (Stangl, 2008). The planner in this case acts as a mediator and the expert on the issue and provides feedback to the concerned parties who then will come to an agreement that is inclusionary and fair. Communicative rationality and collaborative planning is important in this research since transportation planning has both a technical and social element and its decisions affect a broad range of people.

### ***3.1.2 Sustainable Development Theory and Transportation Planning:***

The theory of sustainable development can provide a more holistic approach towards transportation planning, factoring in the scarcity of resources and the efficiency and equitable distribution of those resources while preserving the environment. According to the European Commission for the Environment, “Sustainable development stands for meeting the needs of the present without jeopardizing the ability of future generations to meet their own needs” (European Commission for the Environment, 2012). Another definition by the Victoria Transport Policy Institute states, “Sustainable development is progress toward the condition of sustainability” (Littman, 2011). In a world of finite resources, growing populations, rising consumption and demand are a direct threat to the long-term safety and viability of natural resources.

Transportation planning is directly linked to development and affects patterns of resource utilization, productivity, environmental quality, equity, and affordability (Littman, 2010). In transportation terms, “A sustainable transportation system is one that allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations ” (The Center for Sustainable Transportation, 2005, p. 5).

Improving equity amongst paratransit users relates to the concept of livability and improving the quality of life, achievable through sustainable transportation planning policy and practices. A livable community is one where people have access to multiple, convenient and safe transportation to reach destinations easily accessible to everyone (National Council on Disability, 2004). Regardless of the choice of the travel mode,

access to every destination must be accommodated in order to achieve transportation equity, independence, and improve community livability.

Vertical equity in regards to mobility and access should be prioritized in all forms of vehicular travel, especially public transit facilities. This type of equity in transportation requires basic level access to disadvantaged groups like the low-income, disabled and the elderly (Victoria Transport Policy Institute, 2012). Basic access for people with disabilities and support for specialized transit mobility services is emphasized when related to transportation service equity. Under the ADA Act, this is a civil right for individuals with disabilities and guarantees equal opportunity to access to public accommodations, especially transportation (National Council on Disability, 2007).

However, patterns of land use and sprawl have affected transportation planning and infrastructure development has been geared towards personal vehicular modes of travel. Furthermore, climate change and regulation from international organizations and Federal agencies within the U.S. have prompted transportation agencies to look into more sustainable and environmental friendly forms of travel. Transportation planning now is geared towards mitigation and adaptation to the infrastructure, natural and regulatory environment of today (Rodrigue, 2012).

### ***3.1.3 Just City***

Although sustainable development calls for efficiency, equity and environmentally friendly practices, these three interests are often at odds amongst one another. The Just City theory can provide the needed symmetry between growth and equity. Democratic and capitalist mentality of society does bring about the best of



economic development and those that are successful are highly rewarded. However, compromises are made to achieve growth and little interest is given to social reform.

Socially excluded segments of society like the elderly and disabled, rely on the government to represent them and make sure that they get a portion of the wealth. Although democratic principles endorse public participation and inclusiveness, policy makers find it difficult to encourage social reform when economic interests are in question (Fainstein, 2000). Finding the equilibrium between these three components of sustainability is key to implementing transportation plans that allocates equity evenly without comprising economic development and in the process keeps the environment intact.

The Just City theory offers such a practical arrangement between all three concepts of sustainable development. It “incorporates an entrepreneurial state that not only provides welfare but also generates wealth” (Fainstein, 2000, p. 468). The socialist element of empowering the masses is a positive direction in reaching equality; however, this approach dismisses the importance of the economic growth (Fainstein, 2000). The Just City combines the economic efficiency with fundamental foundations of equity and democracy needed to direct policies towards an equitable dispersal of resources. Government programs and social services that cater to the disadvantaged rely on revenue that is brought on by economic growth and without it are limited. Without financial progress and incentive, society cannot move forward.

Hence, services like paratransit are directly linked to the growth and success of market economies. Fast growing economies mean more revenue for governments, which in turn means more funding and resources for services that can be delivered to the

transportation disadvantage portions of the population. Fiscal sustainability and efficiency is vital as long as the equitable distribution of resources is being practiced. Improving overall quality of life is the overarching goal that all communities strive for, and that means making sure that all members are included and taken care for.

### **3.2 Improve Fixed-route Transit Accessibility:**

An important component of a paratransit service is to facilitate and improve the accessibility and overall functionality of the basic fixed route transit infrastructure. One of the most cost-effective ways to manage paratransit costs is to transition paratransit passengers who are able to utilize the fixed-route system (Project East Action, 2012). Elderly and disabled persons avoid using fixed route service due to usability of sidewalks, a lack of curb cuts on sidewalks to stations and stops, inaccurate or no announcements on buses, misleading or missing signs at bus stops and transit stations (MDOT, 2012). These barriers force people who want to use the fixed route services to rely instead on more costly paratransit services. Issues such as working elevators and bus ramps can be addressed by the transit agencies. Infrastructure and architectural improvements can be limited to public transit agencies, by working with state agencies and local area governments and identifying these barriers can help improve accessibility (Center of Urban Transport & Research, 2008).

Under the ADA mandate, transit agencies are already required to make sure that their vehicles are designed to be disability friendly with lift access and stop announcements for the disabled and elderly customers. Low-floor buses with ramps have become an accessibility option widely preferred by both riders with disabilities and transit agencies (National Council on Disability, 2005). Building upon this success can

allow increased capabilities for fixed-route transportation to offset demand on paratransit services. This can then increase capacity for paratransit services and leave room for more elderly disabled passengers. Making normal fixed-route services as attractive and usable as possible for seniors and people with special needs will promote them as the preferred mobility option (Connecticut Department of Transportation, 2010; Connecticut Transportation Group, 2012). This can be achieved through the use of comprehensive plans that stimulate transit-oriented development, integrating existing transport networks into the system and providing environmentally friendly choices of travel that cater to all types of passengers, disabled and able bodied persons.

### ***3.1.1 Comprehensive Transportation Planning & TOD:***

Comprehensive plans represent the future needs of a community and include long-term goals that portray the vision for community. The main purpose of these types of detailed plans is to “develop mechanisms that will inform near-term and future-land use decisions made to support the city’s development goals and preserve its character” (Kelly, 2010, p. 48). The use of comprehensive plans that have integrated transportation planning is becoming a standard practice for local, state and federal planning organizations. Transportation planning affects a host of issues like land use; housing, environment and economic development just to name a few (Cambridge Systematics, Inc & Deakin, 2004). Comprehensive plans can be very beneficial by assisting transportation systems to meet the needs of the community (Littman & Steele, Comprehensive Transport Planning Framework, 2012).

Although transit agencies have limited authority over land-use policy, the new federal mandate for increased coordination with government and non-profit agencies

under the SAFETEA-LU Act, does allow them to provide their expertise and knowledge to influence growth and development patterns (Seggerman & Hendricks, 2005). Coordinated and collaborative planning structures can provide a more comprehensive approach towards transportation sustainability and rising transit demand including paratransit services. Integration with transportation agencies, Metropolitan Planning Organizations (MPO), Long Range Transportation Plans (LRTP) and regional statewide planning collaboration and coordination is required for sustainable transportation planning (Littman & Steele, 2012). For transit agencies like GRTC, this can be achieved through smart growth policies like transit-oriented development that promote livability and universal access (Victoria Transport Policy Institute, 2012).

Encouraging TOD can allow transit agencies to increase ridership and reduce automobile dependency, protecting the environment by reducing pollution and creating opportunities for transport that is multi-modal and accessible to all people (Victoria Transport Policy Institute, 2011). These forms of initiatives are mainly expanding existing transportation infrastructure and increasing accessibility to these facilities (Reconnecting America & The Center for TOD development, 2010). Moreover, TOD acts like a driver for transit agencies to offset demand for paratransit services. Transit oriented development can prioritize transportation planning that favors basic mobility and accessibility. This form of transportation activity is recognized as having higher social value and actively supports specialized mobility services and universal design (Victoria Transport Policy Institute, 2012).

### ***3.1.2 Green Fleet:***

With the cost of fuel increasing as much as the need to reduce the environmental

impact of transit vehicles operations, environmental friendly vehicles can be very beneficial to a transit company. Purchasing and changing fossil fuel based vehicles to cleaner vehicles can lower operating costs from fuel savings (Federation of Canadian Municipalities, 2010). Global warming and climate change has spurred transit agencies to convert to alternative fuels, improving operational fleet standards and improving local air quality (Environmental Defense Fund, 2010). Eliminating older and inefficient vehicles can have a big impact on costs and technology improvements. This can also serve as platform for transit companies to show leadership on environmental issues in the local community (Federation of Canadian Municipalities, 2010).

### **3.2 Strategies for Paratransit Services:**

TDM strategies and tools can mitigate the rising costs and demand of paratransit services. According to the Victoria Transport Policy Institute (VTPI), “Transportation Demand Management or TDM refers to various strategies that change travel behavior (how, when, and where people travel) in order to increase transport system efficiency and improved mobility for non-drivers, energy conservation and pollution emission reductions”. It organizes urban transport systems to maximize the efficiency by discouraging private vehicle use and promoting more effective, healthy and environmental-friendly modes of transport (Seggerman & Hendricks, 2005).

TDM strategies include improving the transportation options available to consumers, while others provide an incentive to change travel mode, time or destination (Sound Transit, 2010, p. 2). These strategies can be further broken down into two types, one that generates revenue and the other that reduces costs for the paratransit agency provider. Revenue generating strategies include charging premiums for ADA services

that fall outside the  $\frac{3}{4}$  mile service area like distance based fares and income based fares. Cost containment tools that can be implemented on paratransit services are economic incentives, partnerships, travel training programs, and managing and diversifying mobility options in regards to the disabled elderly (Center of Urban Transport & Research , 2008).

### ***3.2.1 Revenue Generation:***

Revenue generation is vital for transit agencies to be operationally viable and sustainable. They function no differently compared to other private agencies that rely on capital to provide daily services to their clients. Securing sufficient funds to operate is one of the biggest challenges for transit agencies especially with Federal mandates like the ADA complimentary paratransit service (Center for Urban Transportation Research, 1997). While increasing fares overall can achieve balanced budgets, restrictions by federal regulations on fare costs can severely limit the options for paratransit service revenue. However, there are revenue-generating opportunities that can be used by paratransit services but at the same time meet ADA criteria of fare costs. Two of these alternative fare-pricing models are discussed below, distance and income based fare.

#### ***3.2.1.1 Distance Based Fare:***

Distance based fare requires existing fare policies and structures to be changed to charge fares based on the length of the trip. In the distance based fare structure, trips with fewer miles would be charged less while longer trips would be charged higher (Tindale-Oliver & Associates, Inc., 2012). Charging a flat rate for any trip affects the fiscal sustainability for any transit company that provides paratransit services, especially when demand and costs are rising. A distance based-fee can increase revenue and improve

overall financial stability for paratransit services. While the ADA mandate does enforce the regulation of not charging more than double the fixed route fare, transit agencies can charge a premium for services that fall outside the radius of the fixed route service. Transit agencies aren't required to provide paratransit services beyond the  $\frac{3}{4}$  mile buffer, which will enable them to charge a higher fare for services that go beyond the ADA service area.

#### ***3.2.1.2 Income Based Fare:***

Income based fare policies would require transit agencies to price fares based on the person's annual income and status (Tindale-Oliver & Associates, Inc., 2012). Higher income persons using paratransit services would be required to pay a larger fee while low-income persons would be required to pay less. A two-tier fare based system would be needed to effectively evaluate a passenger's income and his ability to pay. Once again, ADA regulation requires fares to be no more than double the fixed route fare but this doesn't apply to services that fall outside the  $\frac{3}{4}$  mile buffer. This fare structure would definitely be an equitable way of supporting low-income and transportation disadvantaged persons to accessible and affordable paratransit services. In addition to improving equity and fairness, this fare structure would also generate revenue and increase service efficiency and cost effectiveness.

#### ***3.2.2 Cost Containment***

Cost containment strategies is considered a more effective tool to meet rising demand and costs for transit agencies, especially paratransit services. Customer service is an important emphasis for service industries that provide transportation. For transit agencies facing budgetary constraints, raising fares and reducing services should be the

least preferred option since it harms the best interests of passengers (Center for Urban Transportation Research, 1997). The more equitable and efficient approach would be to improve productivity and reduce costs. For paratransit operations this can be achieved through better management of resources, incentives, partnerships and overall increased coordination between government as well as private actors (Center for Urban Transportation Research, 1997).

#### ***3.2.2.1 Economic incentives:***

Pricing incentives could be used to reduce demand and encourage the use of alternative modes for the disabled elderly. To encourage fixed-route ridership, other transit agencies are using fare strategies as disincentives to ride the more costly paratransit service (Community Transportation Association of America, 2003). Fare incentives are a great way of attracting paratransit users to fixed route ridership. Taking it a step further, some transit agencies are even providing fixed-route services for free for all eligible paratransit passengers and seniors (Pace - Connecting Communities, 2012). Free services are even better monetary incentives to increase interest in traveling by regular fixed-route services. Reduced fare programs can be monetary incentive to transition paratransit users capable of using fixed-route services (Project East Action, 2012).

#### ***3.2.2.2 Public-Private Partnerships (PPP): Contracting***

Partnership development that includes public and private transit providers is critical to successful expansion of paratransit services. More service providers are looking for partnerships with private transportation providers (United We Ride, 2010). It is an important alternative that should be considered to increase access for the disabled



elderly. Taxi services can be more flexible and reliable than relying on public transportation systems, especially when public transit is either unavailable or inaccessible (American Association of People with Disabilities, n.d.).

Moreover, taxis can provide a cost-effective alternative to paratransit service (Burkhardt, 2010). Pressing issues in the disability community is the shortage of accessible taxis but they are an important mode of transportation for the disabled elderly who can't drive (United We Ride, 2010). Furthermore, health care-related travel could be provided more cheaply and effectively by accessible taxis than public paratransit systems. This can be a great tool for public paratransit providers to decrease costs significantly and create more funding opportunities to expand existing services.

But before contracting paratransit services to private providers, transit agencies need to develop a framework that will layout a detailed plan involving details of coordination and how it will be implemented and monitored (Community Transportation Association of America, 2003). This includes an open and transparent public bidding process determine and select the most suitable transport provide to partner with or contract services to. Performance standards, training requirements, rates, and other measures should be included in the language of the contract to allow for monitoring and ensuring service quality amongst contract providers (Simon, 1998).

A centralized approach using a single operator system to service management should be adopted by the transit agency. The operator system would receive requests; match the travel request with the appropriate contracted or public paratransit carrier based on proximity and service area, scheduling the trip requested by the paratransit passenger

(Simon, 1998). Transit agencies can either participate as a service provider or allow only the contracted agencies to be paratransit providers. These systems are very effective and improve quality control because they help to eliminate duplication of services through the efficient use of equipment and employees (Community Transportation Association of America, 2003).

### ***3.2.2.3 Volunteer Driving Programs***

Volunteer driving programs are an important element of senior transportation and can be a supplement to public transportation services. Volunteer programs often provide transportation for the frail elderly (Center of Urban Transport & Research, 2008). Most transportation volunteers are drivers and friends, but volunteers programs can also be found in social service and faith-based organizations (Community Transportation Association of America, 2003). These organizations are already providing support and transportation resources for the elderly and disabled and are strong advocates for the transportation needs of older adults.

Many elderly and disabled persons transportation means are rides with informal volunteers like friends and neighbors for medical appointments, and other social activities. Volunteers offer an untapped resource to offset some of the paratransit system operating expenses (Center of Urban Transport & Research, 2008). While there may be limitations in the actual delivery of service, volunteers from social service and faith-based organizations can often meet that need (TranSystems Corp; RLS & Associates, Inc.; Gunn Communications, Inc., 2008). Identifying potential volunteer pools is vital for transit agencies so that it can provide services that it couldn't otherwise afford to offer (Community Transportation Association of America, 2003). Coordination between these

organizations and paratransit agencies is required for collaboration and sharing of vehicles and resources, in this case volunteer driver pools.

However, the use of volunteers has its own share of complications that includes the primary concern of sufficient insurance coverage that protects the driver and passengers on board the paratransit service (TranSystems Corp; RLS & Associates, Inc.; Gunn Communications, Inc., 2008). Not enough studies or development of these programs have been found in the literature and this option can only be considered generally.

#### ***3.2.2.4 Travel Training & Promotion:***

Many transit agencies have also developed travel-training programs as a tool in helping senior and disabled persons to be able to ride accessible fixed-route services (Ride Connection, 2009). This strategy is for transit agencies to proactively identify senior and disabled citizens, who are unfamiliar with riding public transit and are paratransit clients. A comprehensive travel-training program includes trip planning, boarding and exiting, using wheelchair lifts, crossing streets, and reading bus schedules ( Wolf-Branigin & Wolf-Branigin, 2008). A more focused travel-training program can be expanded to target future paratransit clients. This can be especially effective for transitioning functionally capable disabled or elderly persons to the fixed-route system. Targeted travel training programs are critical to provide public transit education to future senior populations who are automobile dependent (Ride Connection, 2009). Many elderly citizens are not familiar with how to ride public transit and need to be taught how to ride fixed-route buses.

#### ***3.2.2.5 Eligibility Determination Process & Public Outreach:***

A more accurate and efficient determination of applicant eligibility can be accomplished through in-person interviews, functional assessments and public outreach programs. A growing number of paratransit systems have implemented eligibility determination processes that involve in-person interviews combined with functional assessments (Innovative Practices in Paratransit Services, 2012). This allows paratransit agencies to have a better assessment of the individual's capabilities and disability needs. If the individual can be provided travel training to use normal fixed-route services, then paratransit capacity can be increased for more serious passengers. Transit agencies can also promote information through outreach programs that instruct potential passengers about ADA paratransit eligibility (National Council on Disability, 2004). Information about ADA paratransit eligibility written in simple understandable language is an effective means to educate the community and maximize resources.

#### ***3.2.2.6 Subscription-Trip Management (Grouping Rides):***

According to Florida Department of Transportation Research Center's report on *Creative Ways to Manage Paratransit Costs*, no more than 50% of a transit agency's daily paratransit capacity may be reserved for subscription services (Center of Urban Transport & Research, 2008). Subscription service trips are trips that a customer makes multiple times per month or week, and are of a specific origin and destination that does not change (Transit Access Project, n.d.). Most often, these types of trips are for employment, medical, and/or educational purposes. This service is used by public transit agencies to provide routine trips to a customer to the same destination on a recurring basis. Subscription services can reduce scheduling time for routine trips and be beneficial

in managing demand for paratransit services (Project East Action, 2012). Grouping rides for medical appointments, groceries, and other essential activities for the elderly and disabled can improve efficiency and reduce costs. Confirmed subscriptions and coordinated group rides can allow paratransit services to create fixed paratransit routes for passengers who confirm interest to special trips.

#### ***3.2.2.7 Coordination with Aging Agencies:***

Many agencies are unaware that they are providing identical or parallel services to clients within the same geographic service area (Lave & Mathias, 2012). Human service agencies operate and provide transportation services for the elderly and disabled, in particular local area aging agencies like senior centers. These centers provide transportation for their clients through contract arrangements with private transit providers or by operating their own vehicles (Community Transportation Association of America, 2003).

Coordinating program resources with these type of local aging agencies for transportation services can lead to increased service availability and more cost-effective human services transportation services (Mid-America Regional Council, 2008). The benefits of coordinating transportation services include increased service levels, mobility, quality of service, cost effectiveness, accountability, equitable cost sharing between participating agencies and safer transportation services (Lave & Mathias, 2012).

#### ***3.2.2.8 Technology: ITS & Smart Cards***

Intelligent Transportation System (ITS) technologies have been applied to transit systems, providing better manageability and service. ITS technology can provide

computer dispatching, automated billing, and tracking programs for record keeping and reimbursement (Murray, Koffman, Chambers, & Webb, 1997). These systems improve the operational performance of the transportation network and enhance driver mobility, boosting productivity and growth (Ezell, 2010). ITS technologies include mobile data terminals (MDT), computers, vehicle locator devices, geographic information systems, and smart card technologies that can be used by services to increase efficiency and lowering costs.

The uses of smart electronic card and readers provide automated fare collection and reduce the need for fare collection and identification (Route Match Software, 2011). Instead of using paper based ticketing systems, this electronic card can contain ticket information, rider history and store data for future paratransit planning. This improves the driver's flexibility and fare collection duties as well as enhancing customer service for the passenger (Ezell, 2010). The primary goal of these applications is to improve the efficiency and the safety of the transportation system.

### **5.3 Summary:**

Paratransit service providers face pressure in using their resources more efficiently while continuing to provide the service required by the ADA. Rising costs and increasing demand seen in Paratransit services across the nation has strained budgets and capacity, and public transit agencies are obligated to look for more innovative and efficient policies and tools to ease this burden. Smart growth policies and TDM encourages better management of existing transportation infrastructure, services and resources. This is an effective way to build capacity in a community's transportation system by expanding and improving existing infrastructure.

Demand management strategies provide a cost effective method in bringing a higher quality of service and support to paratransit users. Emphasis on better coordination, partnerships and the use of technology will increase capacity and service supply overall. Although it can be used on more general transit services, TDM strategies are very flexible and can be used for paratransit service providers. Focusing on simple strategies and tools, allows for a more sustainable and capable paratransit service to operate within its means. GRTC CARE paratransit services can be significantly improved through the use of TDM strategies and smart growth initiatives like comprehensive planning and transit oriented development.

## **Chapter 4: Research Methodology & Design:**

The purpose of this study is to examine GRTC's CARE Paratransit Services operations. The conclusion emerging from the literature review about the increasing elderly population and high disability prevalence found in aging populations will result in increased demand. This will ultimately put pressure on existing CARE service capacity to serve its passengers. The study attempts to provide insight into the field of TDM best practices that are being practiced by other transit agencies providing paratransit services. These strategies should assist to cope with higher operating costs and demand for transit agencies.

The City of Richmond was chosen as the primary study area since GRTC operates its local fixed-route service within the city boundary. The ADA requirement calls for complimentary paratransit services to be provided within a  $\frac{3}{4}$  mile buffer of fixed-route services.

The following four objectives are the proposed aim of the research:

- 1) Illustrate rising costs and demand of GRTC's CARE service.
  - a. Examine spatial distribution of demographic, socio-economic characteristics of the elderly in Richmond City that impact paratransit ridership demand.
  - b. Evaluate Ridership history trends and operational costs for GRTC provided by GRTC Specialized Transportation division.



c. Examine ADA compliance and regulatory guidelines followed by GRTC.

2) Conduct Peer System Comparison with similar paratransit provider, as well as national transit averages based on service efficiency, cost effectiveness and service effectiveness. These measures were obtained from the Operational Assessment of the Albany Transit Company:

a. Service Efficiency

Cost per Revenue Mile – annual O&M costs /annual revenue miles of service operated

Cost per Revenue Hour - annual O&M costs /annual revenue hours of service operated

b. Cost Effectiveness

Cost Per Passenger Mile – annual O&M costs / annual passenger-miles of service operated

Cost Per Passenger Trip – annual O&M costs / annual unlinked passenger boarding

c. Service Effectiveness

Passenger Trips Per Revenue Mile–annual unlinked passenger boarding/annual revenue miles of service operated

Passenger Trips Per Revenue Hour–annual unlinked passenger boarding/annual revenue hours of service operated.

3) Assess GRTC CARE service management practices employed by transit agency to manage demand and costs.

4) Provide feedback and recommendations on transportation demand management practices so that GRTC can attain a sustainable paratransit service.

The main hypothesis addressed in this thesis is that TDM strategies need to be adopted by GRTC CARE Service in order to mitigate costs and rising demand trends seen across the paratransit industry. Although TDM strategies and measures being adopted by other paratransit agencies are general transit practices, these tools are effective in reducing demand and reducing operating costs on providers.

As described in Chapter 3, TDM approaches being adopted by paratransit providers include:

- Improving Fixed-Transit
- Green Fleets
- Economic Incentives
- Public-Private Partnerships
- Travel Training
- Eligibility Determination Process & Public Outreach:
- Subscription-Grouping Rides
- Coordination with Area Aging Agencies
- Technology

#### **4.1 Data Collection & Analysis:**

Data collection for this study relies on mixed methods approach that will consist of both quantitative and qualitative techniques. For the purposes of this study, transportation disadvantaged person include only the elderly 65 + population who are disabled.

#### ***4.1.1 Demographic, Socio-economic Characteristics:***

The census definition for disability refers to persons with long last physical, mental, or emotional condition that makes it difficult for a person to perform activities such as walking, climbing stairs, dressing, bathing, learning and remembering. This condition can also impede a person from being able to go outside home alone (Disability Statistics, 2012).

Spatial analysis on the demographic and socioeconomic characteristics about the disabled elderly population will be conducted through comparisons of a series of maps displaying population density and median income for populations over the age of 65 living in Richmond City. Data will be collected from the American Community Survey (ACS) 2010 for the population of Richmond City. A spatial analysis will also be conducted on the disability density for the populations over 65. However, disability data for age groups 65 and over for Census tract 2010 data wasn't available and 2000 census data was used from the American Community Survey instead. This isn't an accurate representation for the current disability statistics but will have to be used for the purpose of the study. Lastly, median incomes for Chesterfield and Henrico will also be compared with the City of Richmond to evaluate fare changes to CARE service.

#### ***4.1.2 GRTC Operational Assessment:***

Ridership history and operating costs were obtained through GRTC in addition to Fixed-Route and CARE operational expenses/fare revenue. This data was then used to examine CARE services annual passenger trips from 2003 to 2012 including percent changes of ridership each year. Fixed route and CARE services were then compared

based on the cost per trip and percent of total budget from 2003 to 2012 to demonstrate the huge differences in costs between the two services. Furthermore, five year CARE operating expenses and fare revenue were looked at to illustrate rising costs. This data was obtained from the National Transit Database and included the years 2007 to 2012. The eligibility verification process will also be evaluated against ADA guidelines based on GRTC's contracted paratransit applicant evaluator, ADARIDE and their practices found in their website, [www.adaride.com](http://www.adaride.com).

#### ***4.1.3 Peer Comparison:***

Comparing peers with similar service area population densities will help GRTC to assess its own circumstances and develop strategies to be more efficient. The national peer was selected based on the similarity to the GRTC service area. Population density was used as metric for selecting comparable transit operations because it is the density of demand that has the most impact on the productivity of service (CHA Companies, JACOBS Huntley Partners, 2011). National transit averages were also chosen as another indicator based on Urbanized Areas Zones (UAZ) with populations above 200,000.

Dayton Regional Transit Authority (GDRTA) was chosen as the national peer for comparison to GRTC since it closely resembled Richmond City in population size, density and land area square miles. GRDTA also resembled the CARE service by paratransit fleet size and services, relying on one form of demand response service for paratransit.

Data for peer comparisons were acquired from the National Transit Database between GRTC, Peer Transit Company and National Paratransit group averages. GRTC CARE service operations were examined relative to a national peer based on NTD data

for 2007-2011 as well as national transit averages of demand-responsive (paratransit) services. Performance measures were divided into three categories; service efficiency, cost effectiveness and service efficiency. The measures that were compared included; Operating Expense per Vehicle Revenue mile, Operating Expense per Vehicle Revenue Hour, Operating Expense per Passenger Mile, Operating Expense per unlinked Passenger Trip, Passenger Trips per Vehicle Revenue Mile and Passenger trips per Vehicle revenue hour.

**Table 5: Peer Comparison**

2010 Urbanized Area Name	2010 Population	2010 Land Area Square Miles	2010 Density Persons per Square Mile	Vehicles Operated in Maximum Service (2011)	Vehicles Available for Maximum Service (2011)
Dayton, OH	724,091	351.44	2,060.4	72	95
Richmond, VA	953,556	492.17	1,937.5	67	71

**Source: American Public Transportation Association, 2010 & National Transit Database, 2011**

#### ***4.1.4 GRTC CARE Service Management and Best Practices:***

The next portion of the assessment was qualitative based research that examined management practices adopted by CARE paratransit services. Practices were compared to TDM best practices being adopted by other paratransit agencies to manage costs and demand found in the literature that was discussed earlier. The Comprehensive planning efforts and strategies were obtained through the *Transit Development Plan Fiscal Years 2012-2017* and the *Comprehensive Operations Analysis Final Report* for GRTC. The *Ride Finders Five year TDM Plan* was reviewed for TDM practices and strategies for paratransit services as well as services provided on their website.

Federal, State and local coordination assessments were based on GRTC's participation in regional, statewide and local area plans. These plans include regional level Richmond Regional Planning District Commission Metropolitan Planning Organization's (RRPDC) *Long Range Transportation Plan 2035* and Virginia's state transportation plan *VTRAN 2035*, Virginia's Long-Range Multimodal Transportation Plan. Local level plans include the *Richmond/Petersburg Metropolitan Planning Areas Coordinated Human Service Mobility Plan*.

To get detailed information on coordination between GRTC and area aging agencies, a site visit was conducted to the City of Richmond's area aging agency, Senior Connections. An informal meeting was arranged to acquire information on Senior Connections transportation program for the elderly with a site visit to one their program locations. Senior Connections *Fiscal Year 2012 Area Plan* was also examined to get a more detailed look at their elderly assistance transportation plan and partner entities.

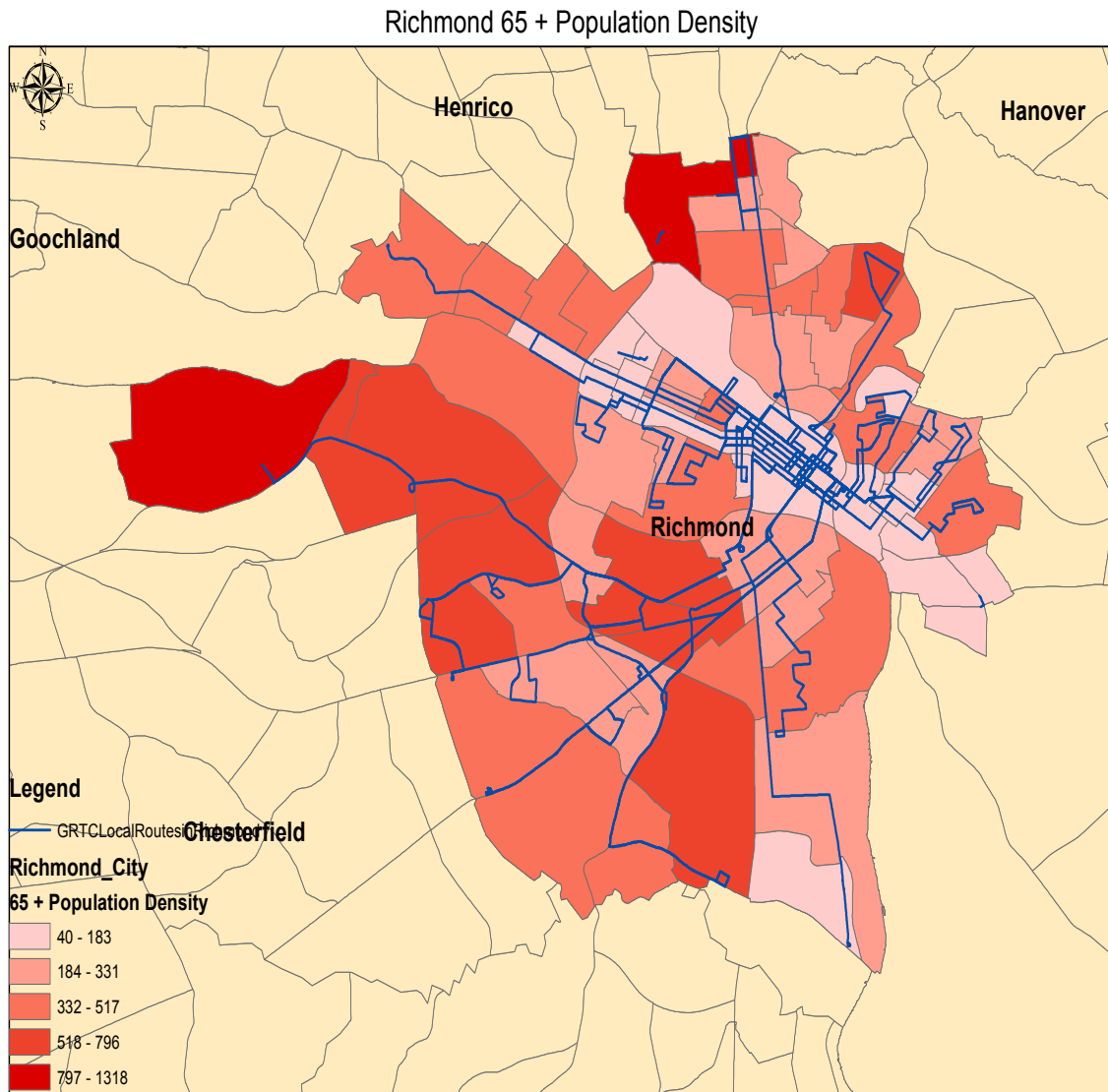
To get information on faith-based organizations in Richmond, VA, the first Baptist church was chosen for their transportation program for the elderly. A site visit was also conducted to the First Baptist church, to assess their transportation program for elderly services. Informal observations were made and the Church staff members provided background on the services, facilities and coordination with GRTC.

## **Chapter 5: Findings**

In order to formalize recommendations for TDM best practices for paratransit services this study focuses solely on the City of Richmond, Virginia. The first part of the findings will consist of a spatial analysis of the demographic and socio-economic characteristics of the aging disabled population in the city. A  $\frac{3}{4}$  mile buffer is placed on GRTC's local fixed-route across the city to assess service penetration and gaps. The overall assessment of GRTC's CARE service operations is evaluated followed by review of GRTC's ADA compliance procedures. The next section involves a peer review, based on the selection criteria and national averages of paratransit services in the U.S. Finally, GRTC's TDM practices for paratransit services are assessed and recommendations are made.

GRTC's complimentary ADA paratransit service is called the CARE service and has been providing curb-to-curb services for the disabled and elderly who aren't able to use regular fixed-route services (GRTC, 2012). In addition to providing services for the City of Richmond, paratransit services are also offered to residents of Chesterfield and Henrico County. CARE service has a total of 73 vehicles that make up its special transportation vehicle fleet with a service life of about 4 to 5 years (Connectics Transportation Group, 2012).

## 5.1 Spatial analysis: Demographics and Socio-economic Characteristics

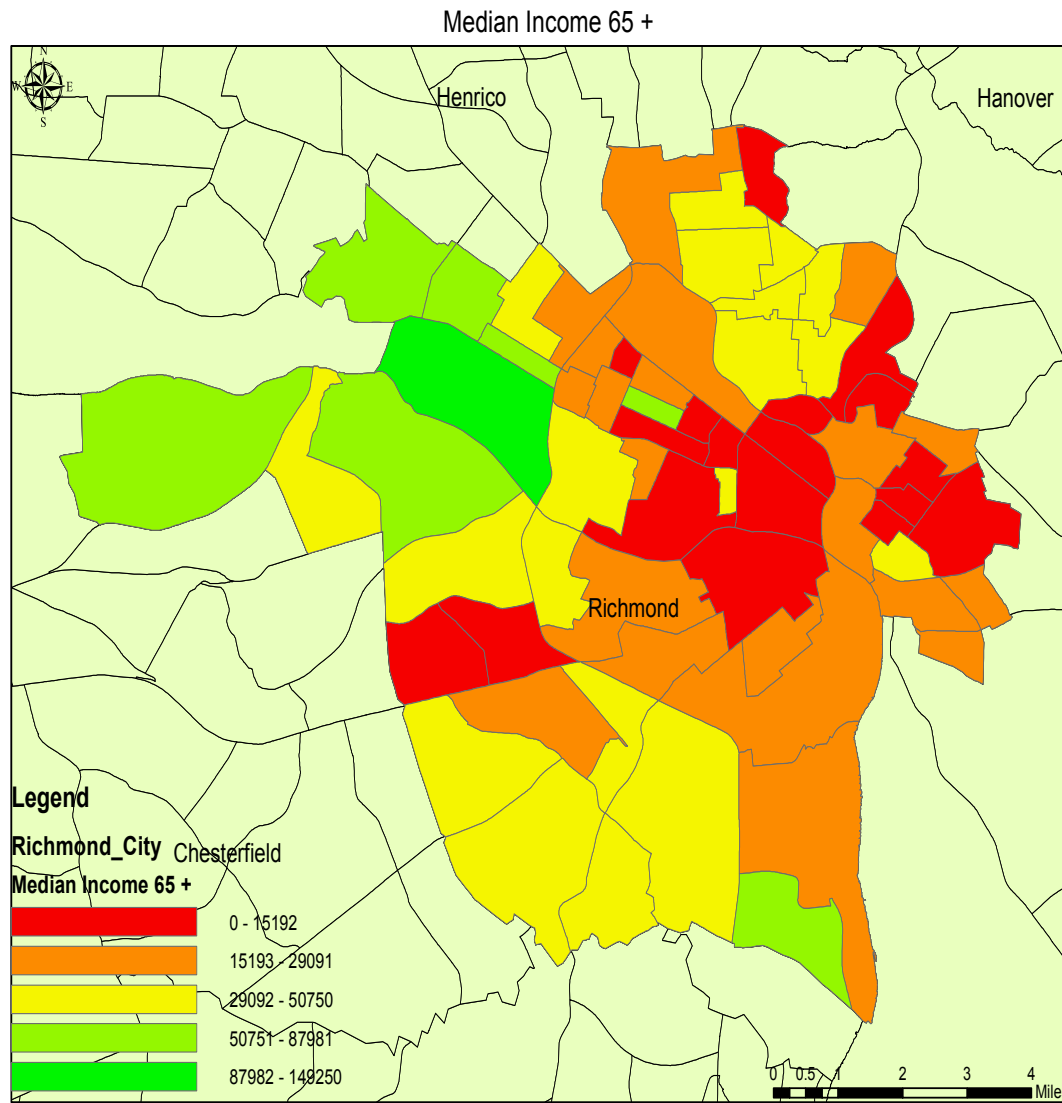


**Figure 5: Elderly Population 65 & Over Density**  
Source: American Community Survey, U.S. Census 2010.

Figure 5 is a map describing Richmond's population density for seniors that are over 65 years old. Large concentrations of seniors can be found in the northern part of Richmond city as well as the far western portion with densities ranging from 797 to 1318. The center of Richmond city also has higher densities of elderly living in the area. These



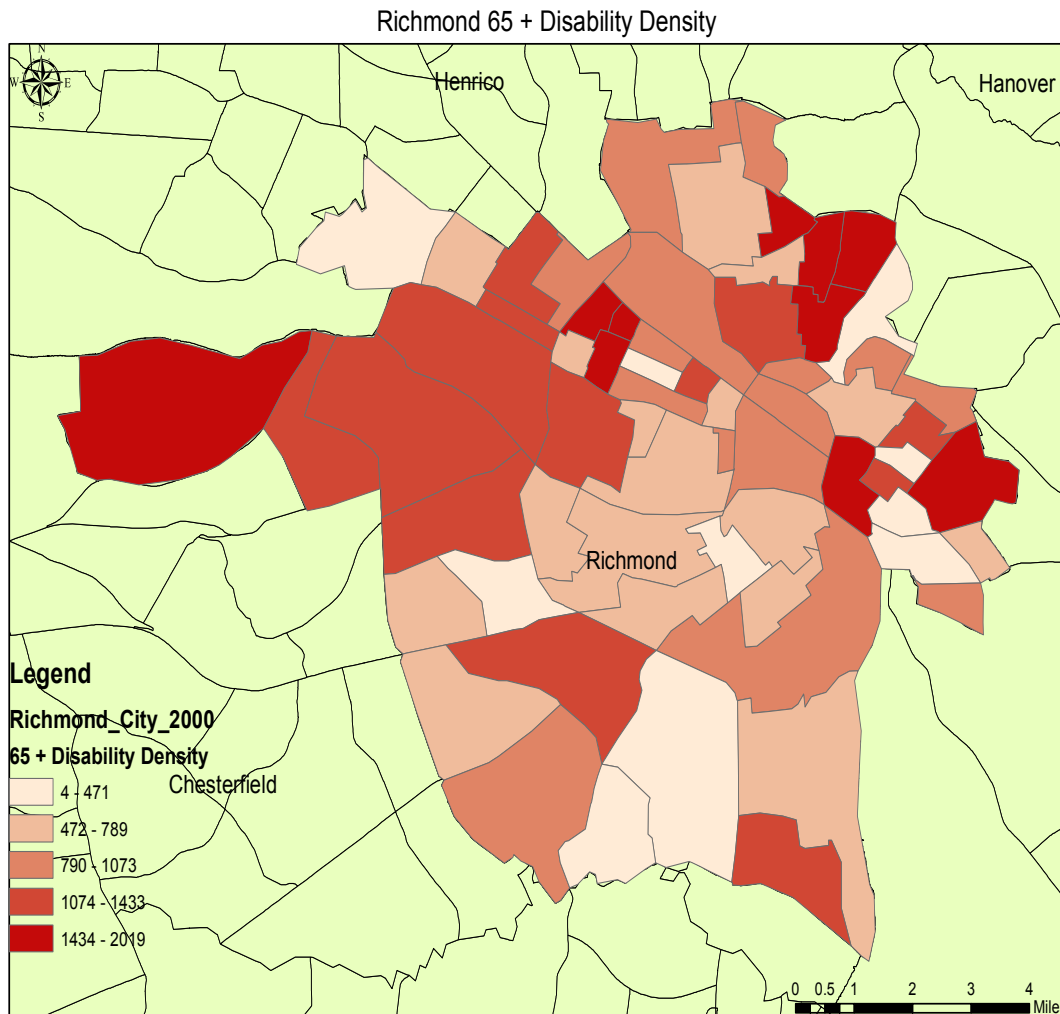
seniors can be using paratransit services due to higher disability prevalence found in older aging populations.



**Figure 6: Median Income for Population 65 & Over**  
**Source: American Community Survey, U.S. Census 2010.**

Figure 6 above depicts the median income distribution of populations that are 65 and older. The map uncovers the low-income senior populations living in core and surround areas of Richmond City. Median income levels in the central part of town are significantly lower and can be considered to be below the poverty line with the highest

income being about \$15,192. Most of the southeastern portions of the city are relatively poor excluding one portion that is located at the tip of Richmond, which surprisingly has a higher median income range of \$50,751 to \$57,981. This higher income range can be attributed to the proximity of Chesterfield County, whose residents are relatively better off compared to Richmond city. The southern end of Richmond city is better off compared to the central core areas. Higher densities of elderly populations living in the western part of Richmond city, discussed earlier, also have higher median incomes that range from \$87,982 to \$149,250. This can again be attributed to the proximity of this part of town that is near Henrico and Chesterfield County.



**Figure 7: Disability Density for Populations 65 & Over**  
**Source: American Community Survey, Census 2000.**

Figure 7 above, depicts large concentrations of disabled elderly populations to be found more to the mid-western portion of Richmond city, in particular areas of Midlothian that border Chesterfield. This could be a result of suburbanization where populations are moving further away from urbanized city centers to more rural areas. Other areas with high concentrations of seniors include the eastern portion of the city, near Highland Springs and Mechanicsville.

## **5.2 ADA Paratransit Regulation Compliance:**

### ***5.2.1 ADA Compliance:***

GRTC's CARE service provides curb-to-curb paratransit service for persons with disabilities who aren't able to use regular fixed-route transit service. It is only available to ADA- eligible riders in the City of Richmond, Henrico County, and portions of Chesterfield County. Operating hours for the residents of Richmond City is provided daily from 4:30-12:30 am. In compliance with ADA regulation, CARE vehicles are all equipped with wheelchair lifts and operators are required to assist passengers while boarding and exiting (Connectics Transportation Group, 2012). Vehicles are custom designed to meet the needs of the elderly and disabled with accommodations that include guide dogs, scooters, and crutches (GRTC, n.d.).

Fixed Route services - 5:00 am – 1:00 am.

CARE – 4:30 am – 12:30 am

Although CARE services end at 12:30 am, services start half an hour earlier than fixed-route services. Service hours are at different times, however, both CARE and Fixed Route services provide 20 hours of service each day.

Fares for CARE's paratransit services are \$2.50 for a one-way trip, regardless of the length of the destination. Tickets are also sold in books, with 6 costing \$15.00 and 10 costing \$25.00 dollars. In compliance with ADA regulation, regular fixed-route services are \$1.50 for local routes while express route costs range from \$2-\$3 dollars. CARE costs are a \$1.00 more expensive compared to fixed –route services (GRTC, 2012). Although

fares may be following ADA regulation of not charging more than double the amount, CARE services are relatively more expensive compared to fixed route costs due to higher operating costs for GRTC.

Reservations are required to be made at least in a day in advance but no more than 7 days ahead and can be requested through phone or fax. Subscription services are available for paratransit riders who use CARE services at least four times a week (Connectics Transportation Group, 2012). CARE services are provided along the 3/4-mile radius of the fixed-route system required by federal law.

On time performance measures of GRTC are exceptional and exceed the 1-hour response time frame of the service requested by the ADA. CARE vehicles are within 15 minutes, early or late, of the scheduled pick up time of the passenger (Connectics Transportation Group, 2012). Figure 20 from GRTC's *Transit Development Fiscal Plan Years 2012-2017* reveals that most CARE services are about 90% on time from July-2009 to June 2010. This is a remarkable achievement since paratransit services can take up extra time boarding and exiting passengers, resulting in delays of service.

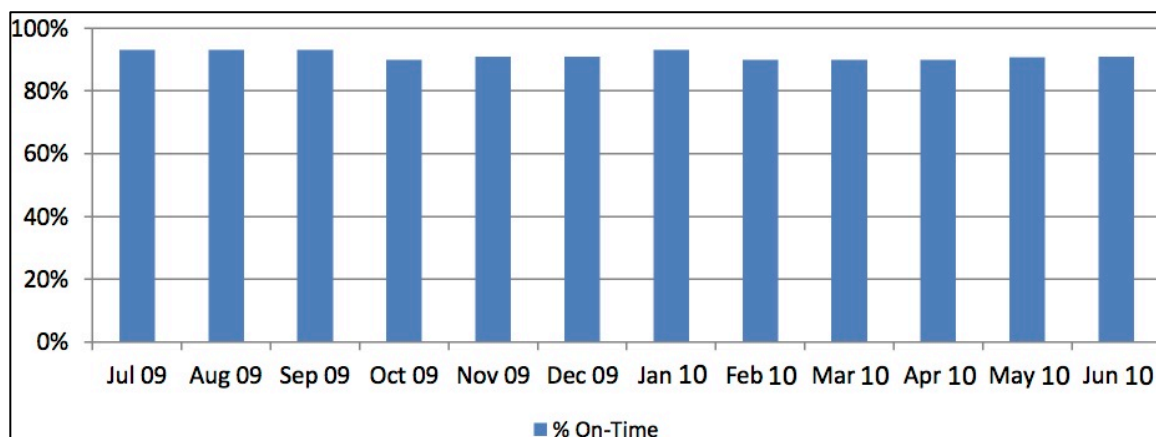
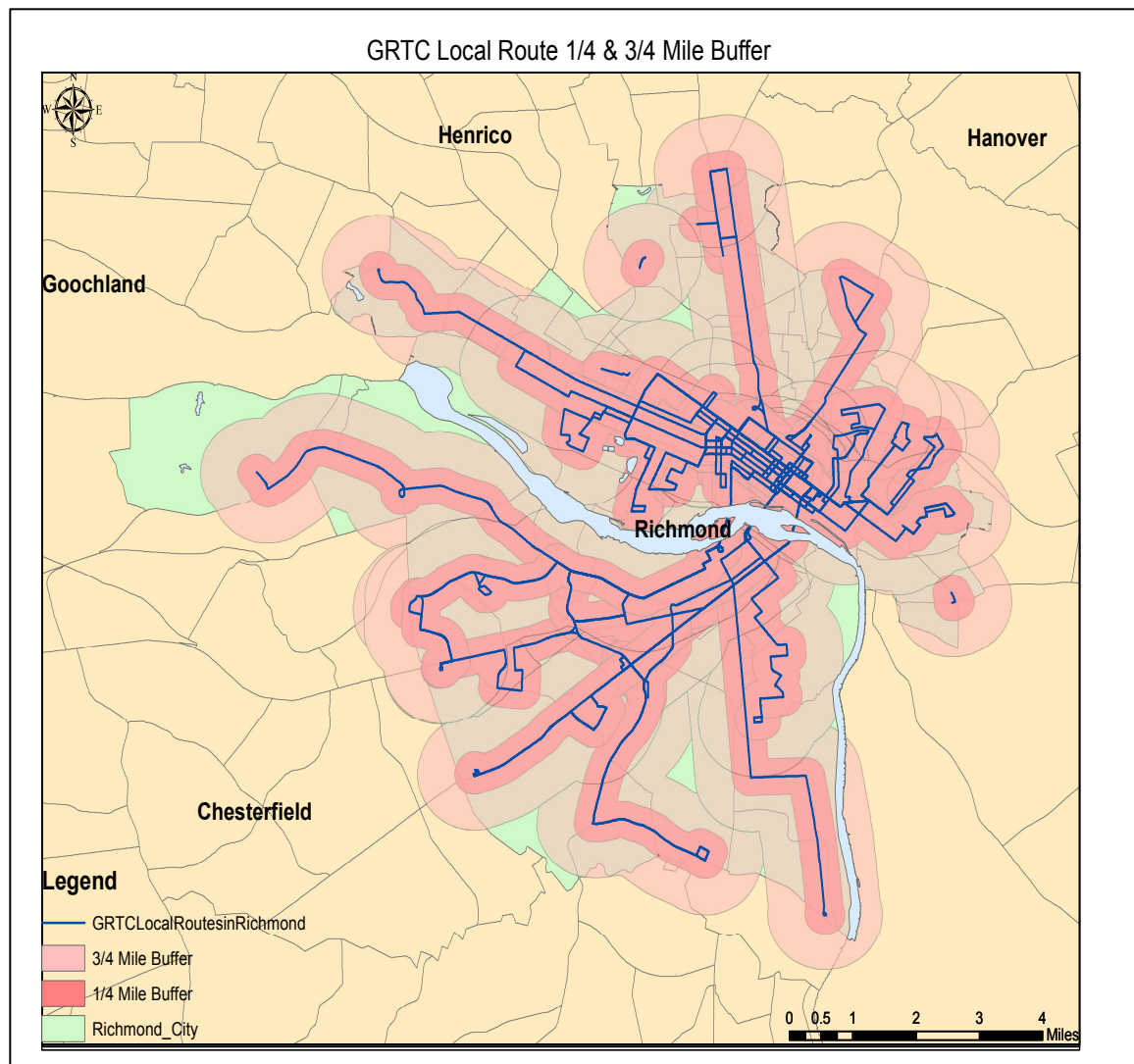


Figure 21: CARE on Time Performance (FY2010). Adapted from Connectics Transportation Group. (2012). *Transit Development Plan Fiscal Years 2012 – 2017. Final Report*, GRTC

**Table 5: GRTC ADA Compliance**

<b>ADA Compliance Guidelines</b>	<b>ADA Mandate</b>	<b>GRTC</b>
<b>Service Area</b>	Provide next-day paratransit service to origins and destinations within a 3/4-mile of the fixed-route system	Complimentary 3/4 mile paratransit curb to curb service of Fixed Route as well serving Henrico and Chesterfield patrons
<b>Response Time</b>	Provide reservation services during normal business hours for next- day services within a one-hour time span of the requested service	Reservations are made 1 day in advance, service response within 15 minutes, early or after
<b>Fares</b>	Charge no more than twice the comparable fixed-route fare	Fixed: \$1.50 CARE: \$2.50
<b>Trip Purpose</b>	Prevent prioritization or restrictions of paratransit trips based on trip purpose	No Restrictions
<b>Hours and Days of Service</b>	Provide paratransit service during the same operating hours and days as the fixed-route service	Fixed: 5:00 am-1:00 am CARE: 4:30 am-12:30 pm
<b>Capacity</b>	Prevent transit agencies from limiting the availability of service by constraints such as trip limitations, waiting lists, or restrictive operating practices	No limitations of service by constraints on trip limitations or waiting lists



**Figure 8: GRTC - Local Route  $\frac{1}{4}$  &  $\frac{3}{4}$  Mile Buffer Service Area for ADA Complimentary Paratransit Service.**

Source: GRTC

The last map of Richmond City, Figure 8, shows GRTC's fixed-route access route spread across the city. A  $\frac{3}{4}$  mile buffer was added to the layer to assess the overall service coverage being provided that is required by ADA mandate for complimentary paratransit services. Overall, GRTC's fixed-route  $\frac{3}{4}$  mile buffer covers most routes that require the transit agency to provide paratransit services. The western portion of the city falls short of the  $\frac{3}{4}$  mile buffer of the fixed-route that would qualify them paratransit

services. Furthermore, high densities of disabled seniors are to be found in this area, as indicated earlier in the 65 and over disabled density map.

Door-door services aren't provided by CARE and isn't a requirement under ADA guidelines. This can be problematic for certain passengers who aren't able to go outside and board the paratransit vehicle. However, GRTC goes above the ADA mandate and provides services for disabled and elderly passengers outside the  $\frac{3}{4}$  mile buffer. As discussed earlier, the missing coverage of Fixed-route services found in figure 8, doesn't affect paratransit users. But unavailability of fixed-route services will require GRTC to provide paratransit services to passengers who have no access to the regular route, exerting additional burden on existing CARE services.

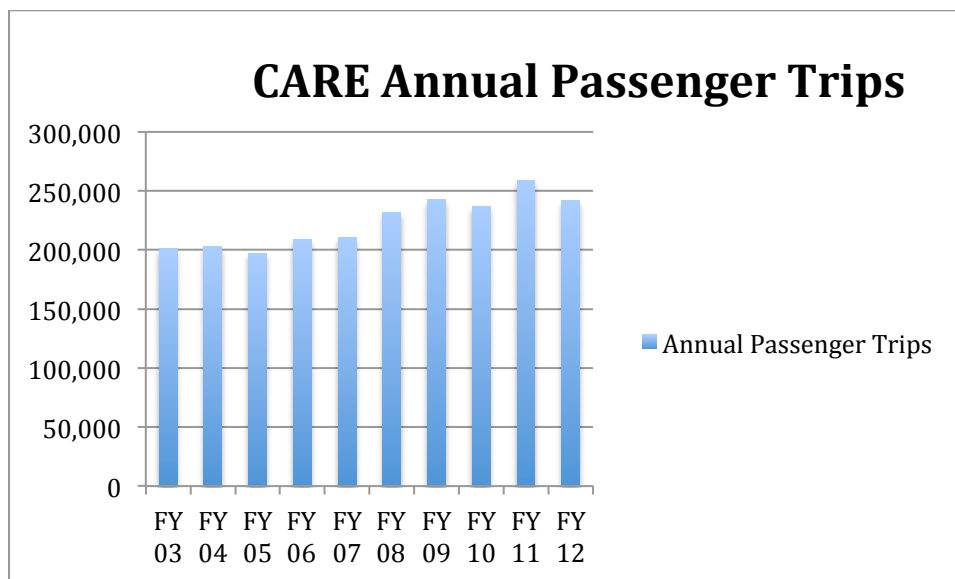
### ***5.2.2 Eligibility Process:***

GRTC outsources its ADA eligibility process and relies on ADARIDE, an ADA eligibility process company based in Los Angeles, CA. Applicants can either mail in application forms or use the online application process with verification within 3 days. The application process is free for paratransit applicants while transit agencies get charged an average of \$70.00 per application coming from their area (ADARIDE, 2012). In person assessments aren't required unless an applicant is rejected. Evaluators based in Los Angeles, assess the application of the person based on the descriptions of the person's home and environment. Weather, terrain, bus accessibility are all taken into consideration when evaluating applications (ADARIDE, 2012). This eligibility process appears to be a feasible alternative compared to in-house eligibility determination for CARE services, meeting ADA eligibility determination procedure requirements.



### 5.3 GRTC Overall System Assessment:

An overall system assessment is invaluable to gain insight and operational functionality of GRTC's CARE paratransit service. Available data sources for GRTC's CARE paratransit operation and the National Transit Database reports from reporting years 2007 through 2012 were used to assess CARE paratransit operations. Annual passenger trips, seen in Figure 9, are displayed from the year 2003 to 2012 for CARE Services. Ridership for GRTC's paratransit service has been steadily increasing from 200,000 rides to 258,738 rides in 2011. The 2012 rides till date are at 241,509 and will go up by the year's end. The year 2008 and 2011 saw the biggest percent changes in ridership with 10.1% for the former and 9.14% for the latter, indicating rising demand of ridership of paratransit services (Table 6).



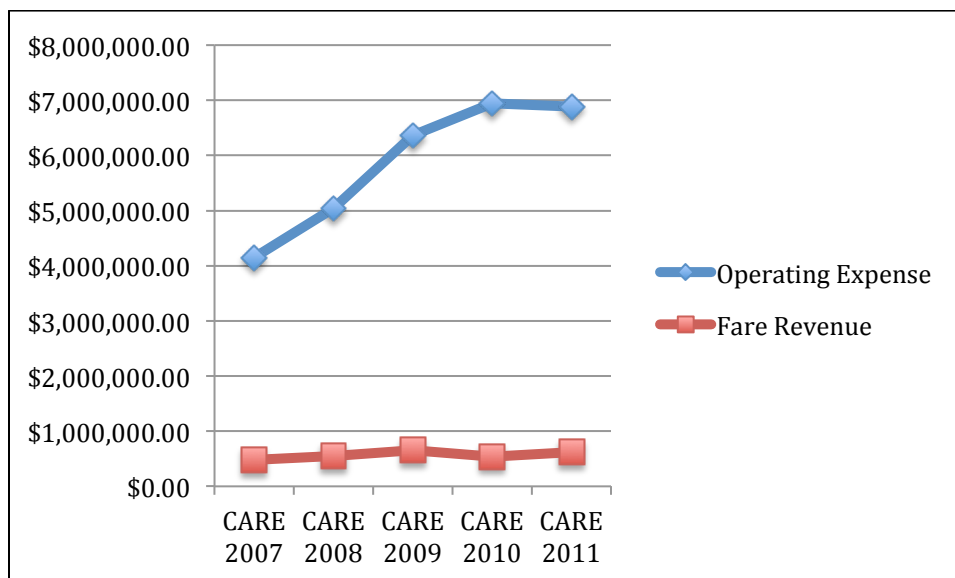
**Figure 9: Care Annual Passenger trips**  
**Source: GRTC**

**Table 6: GRTC CARE Annual Passenger Trips**

Care Annual Trips	Annual Passenger Trips	%Change
FY 03	200,887	
FY 04	202,548	0.83%
FY 05	197,140	-2.67%
FY 06	208,783	5.91%
FY 07	210,616	0.88%
FY 08	232,074	10.19%
FY 09	242,560	4.52%
FY 10	237,065	-2.27%
FY 11	258,738	9.14%
FY 12	241,509	-6.66%

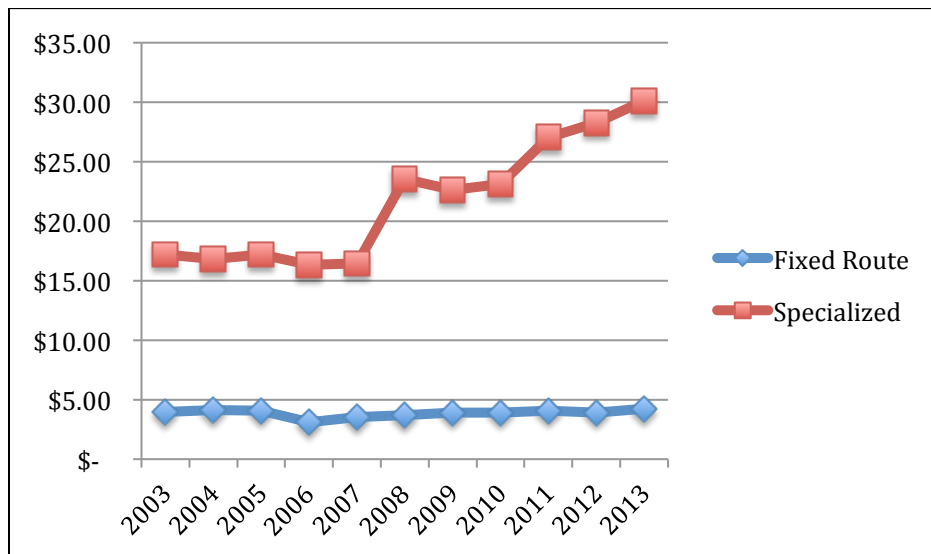
**Source: GRTC**

Figure 10 below represents annual paratransit costs from the year 2007-2011 obtained from the National Transit Database. Operating expense for CARE paratransit service has been increasing at an alarming rate from \$4 million in 2007 and reaching \$7 Million in 2011. Fare revenue on the other hand has been slow, with a rise in 2009 to \$656,000 and dropping to \$624,000 in 2011. This is a huge shortfall on revenue being collected to meet paratransit expenses and is a serious concern for GRTC if funding opportunities are limited.



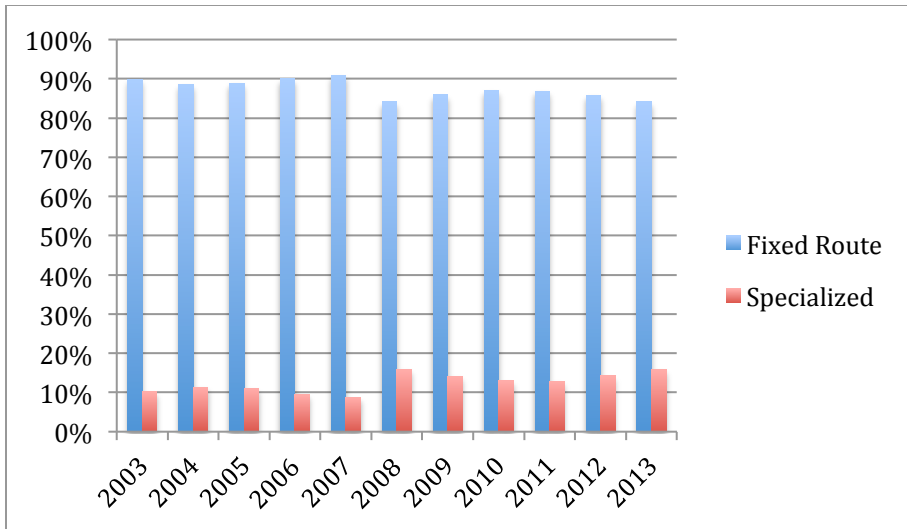
**Figure 10: GRTC CARE Operating Costs and Fare Revenue**  
**Source: National Transit Database 2007-2011**

The cost per trip shown in Figure 11 below is for fixed-route services and specialized paratransit services. Specialized transportation services were fairly stable from 2003 to 2007 with cost per trip being about \$17. This cost skyrocketed at the end of 2011, reaching \$28.00 and is projected to reach \$30.00 dollars by 2013. Fixed route cost per trips on the other hand have been steady, hardly changing between 2003 to 2012 and costs averaging about \$4.00 per trip for GRTC's regular bus service.

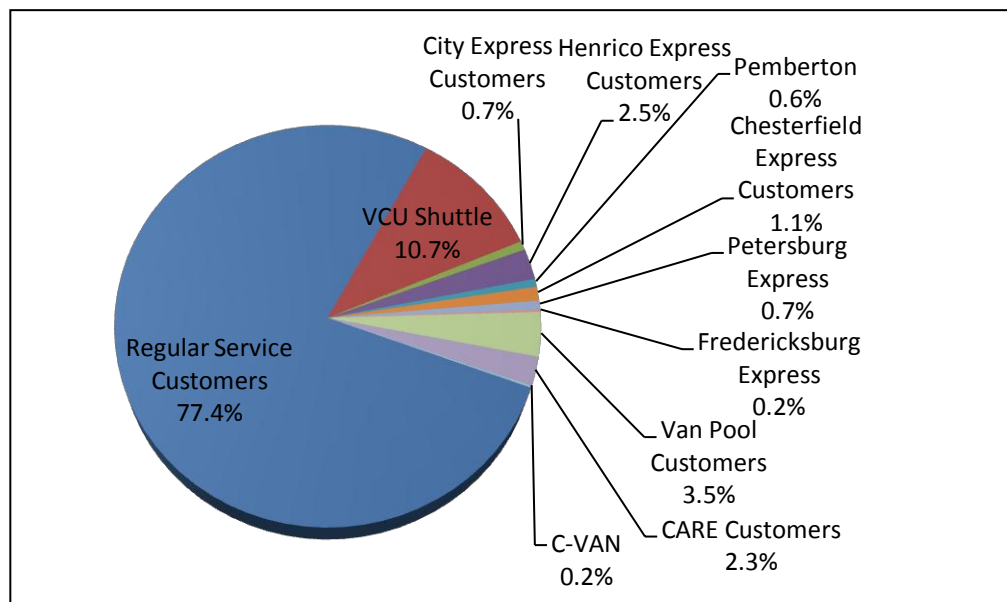


**Figure 11: Cost per Trip for Fixed-Route and Specialized Transport**  
**Source: GRTC**

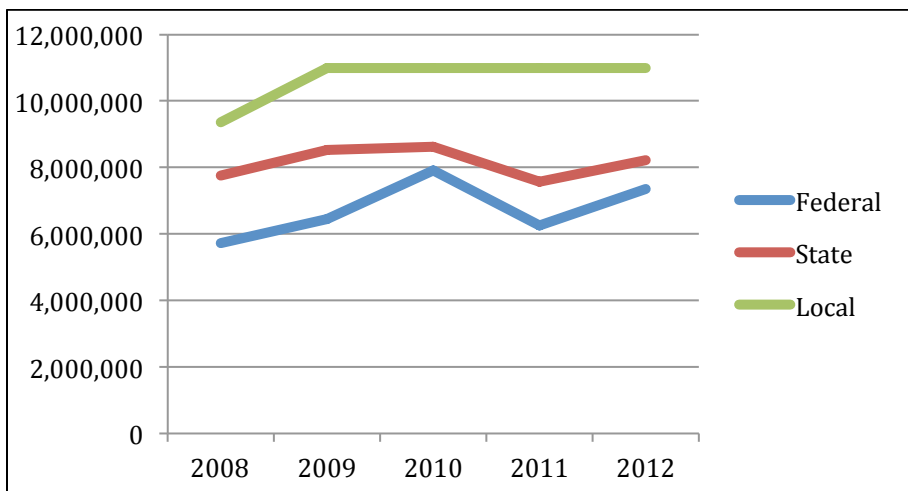
Figure 12 represents the percentage of total budget that CARE services have been taking from 2003 to 2011, with 2013 projected percentages. According to the Figure 12 below, 14% of GRTC's operating budget is providing service to CARE passengers who represent 2% of the total ridership that GRTC serves for the year 2012, seen in Figure 13 ridership distribution for 2012.



**Figure 12: Percentage of Total Budget**  
**Source: GRTC**



**Figure 13: Ridership Distribution in GRTC Service. Adapted from Connecticut Transportation Group. (2012). *Transit Development Plan Fiscal Years 2012 – 2017*. Final Report, GRTC Transit System, GRTC Transit System, Richmond p.3-15.**



**Figure 14: Operating Contributions 2008-2012**

**Source: GRTC**

As seen in Figure 14 above, all three budgets provided by federal, state and local governments have leveled off since 2008 and in some cases gone down. For local operating contributions, funding increased between 2008 and 2009 from \$9.3 million to \$11.0 million, remaining constant for the past four years. This is a worrying concern since costs per trip have dramatically increased after 2008 as seen in Figure 11. Both Federal and State operating contributions to GRTC went down in 2010, with Federal funding seeing the largest drop from \$7.9 million to \$6.25 million in 2011. State funding has seen the smallest percent change over 5 years with 6.03% shown in Table 7 below while costs have more than doubled. Government funding overall hasn't been equivalent or even enough to match rising costs associated with paratransit services experienced by GRTC.

**Table 7: Operating Contributions – 5 yr. % Change**

	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>5 yr. % Chg.</b>
<b>Federal</b>	5,725,290	6,448,858	7,914,255	6,253,765	7,350,146	28.38%
<b>State</b>	7,755,215	8,530,082	8,633,310	7,571,931	8,223,029	6.03%
<b>Local</b>	9,360,000	11,000,000	11,000,000	11,000,000	11,000,000	17.52%

**Source: GRTC**

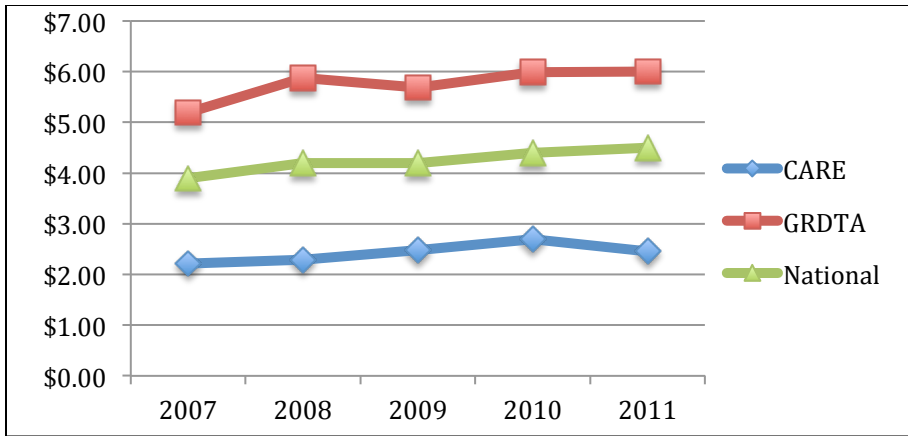
#### **5.4 Peer Comparison:**

GRTC CARE paratransit operations was examined relative to Dayton, OH's GRDTA paratransit service and national peer averages based on National Transit data for reporting years 2007 through 2011, the years for which data are available at the time of this analysis.

##### **5.4.1 Service Efficiency:**

###### **Cost per Revenue Mile:**

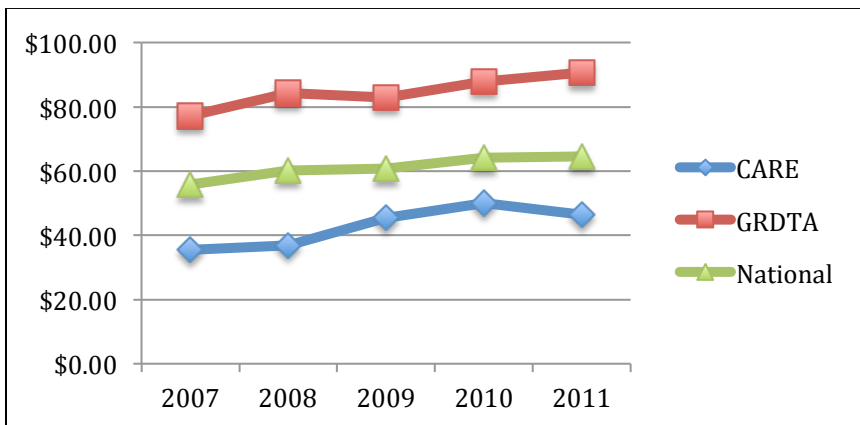
The operating cost per revenue mile is far less for GRTC CARE service, which is about \$2.45 for the year 2011. There was a rise in operating costs per mile during 2009-2010, reaching at \$2.70 but this later came back down. National averages for operating costs per revenue mile are at \$4.50 while GRDTA has the highest cost at about \$6.00. Services that cover more miles per hour and per unit of operating cost are averaging higher speeds than systems with slower speeds, improving efficiency of services. GRTC has significantly lower operating costs per revenue mile indicating better services.



**Figure 15: Service Efficiency – Cost Per Revenue Mile**  
**Source: National Transit Database (NTD) 2007-2011**

### Cost per Revenue Hour:

The next measure of service efficiency is cost per revenue hour. This is the cost to operate each vehicle hour of service. Once again CARE service for Richmond City is considerably lower at about \$46 compared to national averages of \$60. The cost per revenue hour increased to \$50 dollars in 2010 but came back down in 2011. This is comparatively better than GRDTA's service, which averages about \$90 per revenue hour.

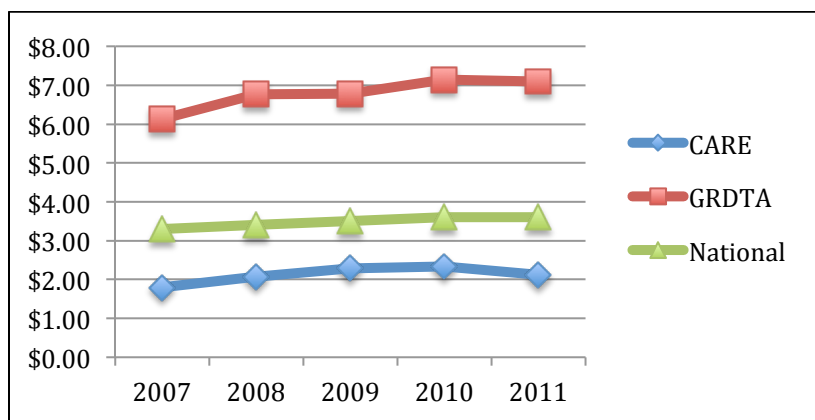


**Figure 16: Service Efficiency Cost per Revenue Hour**  
**Source: National Transit Database (NTD) 2007-2011**

### 5.4.2 Cost Effectiveness:

#### Cost Per Passenger Mile:

Figure 16 below, represents cost per passenger mile. It is the average cost to operate service for a passenger over one mile. GRTC fares better than both peers with relatively lower operating costs per passenger mile, averaging \$2.00 from 2007-2011. Both National averages and GRDTA had considerably higher operating costs per passenger at about \$3.60 and \$7.09. This indicates that CARE service costs have been lowered due to higher ridership, resulting in lower costs per passenger mile.

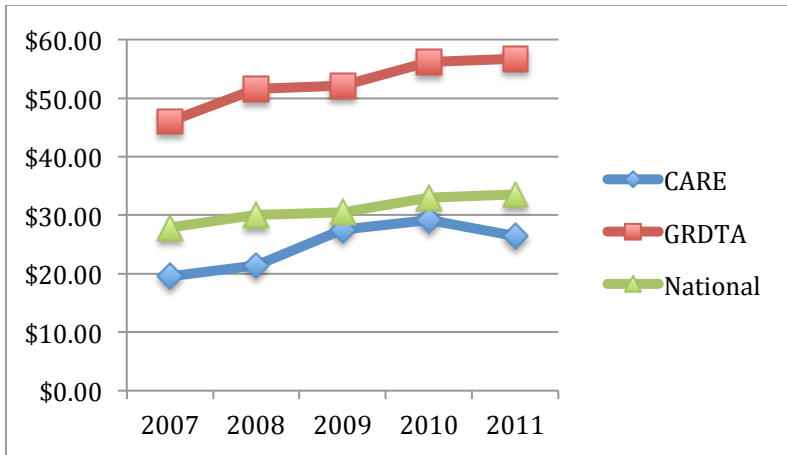


**Figure 17: Cost Effectiveness - Cost per Passenger Mile**  
**Source: National Transit Database (NTD) 2007-2011**

#### Cost Per Passenger Trip:

Cost per passenger trips is cost on average to provide service to each passenger's trip. Both CARE service and national averages having similar patterns in cost increases from 2007-2011. However, CARE is about \$7 more cost effective at \$26 with national averaging \$33 per passenger trip. GDRTA has experienced much higher costs per passenger trip at about \$56 for the year 2011, double the amount for CARE services.



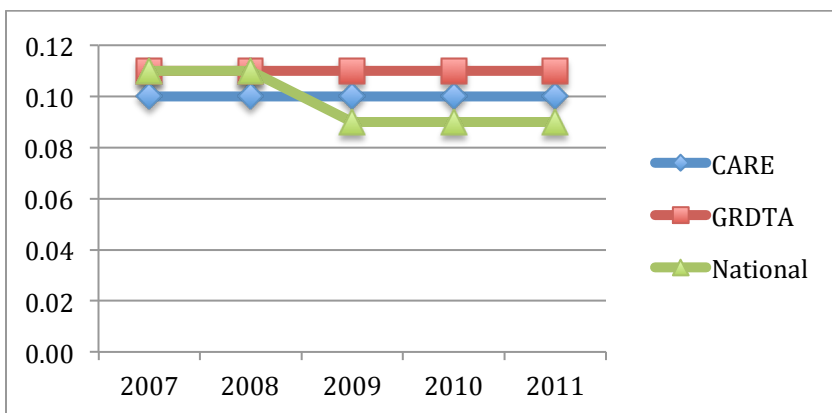


**Figure 18: Cost per Passenger Trip**  
**Source: National Transit Database (NTD) 2007-2011**

### 5.4.3 Service Effectiveness

#### Passenger Trips Per Revenue Mile:

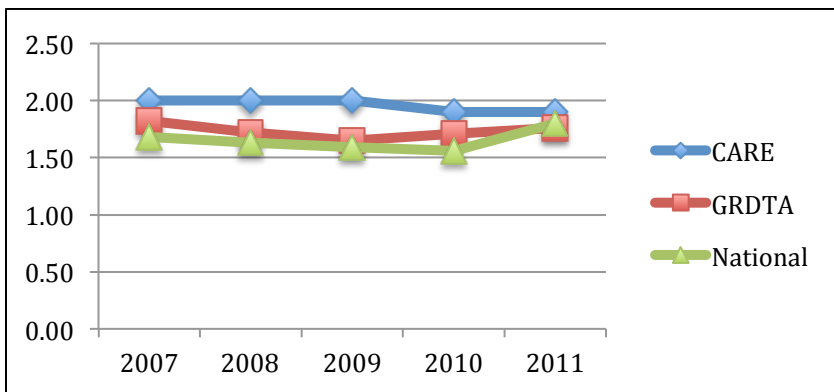
Figure 18 shows that CARE services have been picking up 0.11 passengers per mile with GRDTA services picking about the same, averaging .10 passengers per mile. With relatively the same population density, having similar pickups per passenger miles is acceptable. National averages are lower at .09 passengers per revenue mile.



**Figure 19: Passenger Trips Per Revenue Mile**  
**Source: National Transit Database (NTD) 2007-2011**

### Passenger Trips Per Revenue Hour:

In terms of passenger trips per revenue hour in Figure 19 below, all three groups have similar declining trends in productivity, although CARE services averaged 1.90 passenger trips per revenue hour for the year 2011. This indicator reveals that CARE paratransit services have been higher ridership and service effectiveness compared to GRDTA and national demand response averages for passenger trip per revenue hour. The 2009-2010 decreases are a result of the decreased ridership exhibited by CARE Service during those years.



**Figure 20: Passenger Trips Per Revenue Hour**  
**Source: National Transit Database (NTD) 2007-2011**

#### 5.4.4 Key Findings:

GRTC's annual ridership has been increasing at an alarming rate with operating costs almost doubling in a time span of 5 years. Fare revenue has increased indicating increased ridership but this still doesn't meet the operating costs to reduce the budget shortfall. Furthermore, the City of Richmond's annual budget to GRTC has been the same for the last three years at \$11 Million with Federal and State following similar

patterns (Appendix A, Operating Results). Funding being provided to GRTC's CARE service also doesn't match the cost increases being experienced especially from 2008 onwards.

Nonetheless, in comparison to its peer GRDTA and national averages, CARE services are consistently better off in regards to service efficiency. Cost per mile and revenue hour are both lower in contrast to the peer group reflecting better management and efficiency in services.

As discussed earlier the revenue being collected isn't enough to match rising operating costs for GRTC's CARE service. GRTC is totally dependent on federal, state and local funds to meet the budget shortfall. If these funds were to disappear, GRTC's paratransit service would find it difficult to operate under those circumstances (Appendix C –Operating Results).

## **5.5 Improving Fixed-Transit: Findings**

GRTC has been working towards promoting TOD practices that result in improvements in fixed-route services, reducing driving and congestion. Examples include the study for a Bus Rapid Transport system (BRT) along Broad Street to provide quicker services to the general public (Richmond Area Metropolitan Planning Organization (RAMPO, 2012). These systems can improve transportation systems notably by providing faster and more efficient service to regular fixed –route services.

In addition to transit improvements and services, GRTC's fixed-route bus fleets are all equipped with wheelchair lifts as well as low floor designed buses that are easier to board and exit. Audio announcements and monitors displaying stops have also been successfully upgraded into existing bus fleets (Connectics Transportation Group, 2012).

These improvements are very helpful to disabled passengers, especially if they have visual, hearing and cognitive difficulties. Bus operators are also required to assist elderly and disabled customers who need extra assistance on fixed-route services.

#### ***5.5.1 Comprehensive Planning & TOD:***

Both GRTC and Ride Finders have engaged in strategic comprehensive planning processes. Strategic comprehensive planning has been used by private corporations and public entities to establish frameworks to assess issues and trends impacting operations, develop a vision, establish goals and objectives, determine performance measures, guide the development of financial and business plans, and set spending priorities. Several documents guide or represent the strategic direction of GRTC including the *Transit Development Plan Fiscal Years 2012 – 2017*; *Comprehensive Operations Analysis for the Year 2008* and the *Richmond/Petersburg Metropolitan Planning Area Coordinated Human Mobility Plan*. All three documents provide long-term direction and guidance on where the needs of the community are required.

Furthermore, GRTC's Richmond/Petersburg plan specifically targets the elderly and disabled populations who are considered to be transport disadvantaged. It calls for a unified and coordinated plan to establish a comprehensive strategy for transportation services that promotes community mobility for seniors (GRTC; DPRT; Cambridge Systematics Inc., 2008). This initiative identifies that the elderly and disabled populations need to be given equal access to public facilities and services. Establishing input from all stakeholders is vital in the process of developing a plan and will require engaging the elderly community. Assessment of available transportation services and resources, an unmet needs and gaps, and funding opportunities are addressed by study for a

coordinated human mobility service improvement.

Ride Finders long-range transportation plan; “*Ride Finders Long Range TDM Plan*” is another good example of comprehensive planning that has a goal setting element and a roadmap for the community to follow. This plan was in collaboration with Department of Rail and Public Transportation (DPRT) and other private research institutes (Cambridge Systematics, Inc, Center for Urban Transportation Research, Southeastern Institute of Research, n.d). Goals are also aligned at a regional level with the Richmond Regional Planning District Commission’s (RRPDC) plans of a balanced transportation system with multi-modal options (Cambridge Systematics, Inc, Center for Urban Transportation Research, Southeastern Institute of Research, n.d.). Ride Finders also represents GRTC at the Interagency Consultation Group that was created by the Freedom Program initiative. Coordination and collaboration at the state level and with the private sector increases overall productivity and brings in new expertise that the transit agency might be lacking.

Other long-range plans have also provided policy guidance and helped shape the strategic direction of GRTC including long-range transportation plans (LRTP) of Richmond Area Metropolitan Planning organization (MPOs) (Richmond Regional Planning District Commission (RRPDC)). Integration at a regional level also is reflected by Ride Finders adoption of the statewide transportation strategic goals, VTRAN 2035, that sets mobility, connectivity, accessibility, environmental stewardship, economic vitality and program delivery as top priorities for the future (Cambridge Systematics, Inc, Center for Urban Transportation Research, Southeastern Institute of Research, n.d.).

### **5.5.2 Green Fleets**

GRTC has a vehicle replacement program that is continuously being upgraded every year with older vehicle being phased out for more advanced, accessible, and fuel-efficient. The agency is in the process of converting its entire fleet, both fixed-route and paratransit, to Compressed Natural Gas (CNG) fuel based vehicles. As of now however, the fleet is diesel based and plans for replacing them are in place. Due to funding limitations GRTC, hasn't be able to completely convert all vehicles that are schedule for replacement. The capital cost of this program is being provided by the City of Richmond (Connectics Transportation Group, 2012). This would result in not only fuel savings but also a general reduction in emissions that the current diesel based fleet is emitting.

## **5.6 TDM Strategies: Findings**

### **Ride Finders:**

TDM management and programs are already being practiced in GRTC, with the integration of Ride Finders. Having a branch of the agency working on improving transit management is an asset for GRTC. Rider Finders is a “one-stop resource mobility center for inclusive and innovative TDM initiatives” (Cambridge Systematics, Inc, Center for Urban Transportation Research, Southeastern Institute of Research, p. 8). Services include Vanpooling, Employer Support, Ride matching, Commuter Store, and Emergency Ride Home (Ride Finders, 2009). Most of these programs cater to only to existing regular route passengers, with no management practices or programs directed towards the elderly and disabled. Ride Finders commuter store provides ticketing information and store pickup for CARE passengers (Ride Finders, 2009).

### ***5.6.1 Revenue Generation:***

The only revenue-generating source for GRTC's paratransit service is the service fare being collected. The standard flat fare fee of \$2.50 being charged on passengers is regardless of destination length or the person's ability to pay for the service.

#### ***5.6.1.1 Distance Based Fare & Income Bases Fare:***

The fare structure for GRTC's CARE service is based on a flat service fee of \$2.50 regardless of trip length or income. Passengers bear no extra cost for the distance they travel or their socio-economic status for that matter. While this standard flat fee being charged by GRTC is in compliance with ADA regulations, this fare structure isn't efficient and cost effective. As mentioned earlier, fares need to be no more than double the fixed route service fare. However, this rule isn't applicable to services outside the  $\frac{3}{4}$  mile radius of the fixed route service.

### ***5.6.2 Cost Containment:***

#### ***5.6.2.1 Economic Incentives***

GRTC has adopted price incentives to lure elderly and disabled passengers aboard fixed route services. This includes a reduced fare program that allows paratransit passengers that hold CARE Identification Cards to ride fixed route services for \$ 0.75. In addition, transfers for CARE Riders are free on fixed-route services compared to \$ 0.25 for regular passengers (Connecticut Department of Transportation, 2010). Paratransit rides are also a dollar more expensive compared to regular fixed route ticket costs of \$1.50.

#### ***5.6.2.2 Public-Private Partnerships: Taxi Service***

GRTC currently has no public-private partnership with transportation providers or contracts to provide transportation services in the Richmond City Area. CARE services were originally outsourced and contracted to the Laidlaw company, but was purchased by GRTC in 2007 (Connectics Transportation Group, 2012). Interest in privately contracted paratransit service providers has been reflected in the GRTC's *Richmond-Petersburg Coordinated Human Mobility Services Plan* (GRTC; DPRT; Cambridge Systems Inc., 2008).

#### ***5.6.2.3 Volunteer Driving Programs***

GRTC currently has no volunteer driving program in place. However, interaction between the First Baptist Church, a faith based organization in Richmond, VA and GRTC was discovered based on the second site visit. GRTC has donated two retired CARE fleet vehicles to the Church, but there is no other coordination or collaboration between the two. The First Baptist Church does have a volunteer program, but the elderly transportation service is already constrained due to limited volunteer drivers (Appendix C- Site Visit). No other driver training, funding and other resource sharing can be found between GRTC and the First Baptist Church.

#### ***5.6.2.4 Travel Training***

Currently, GRTC has no travel-training program for the elderly and disabled populations living in Richmond City. Travel training provides a promising approach for moving persons from paratransit to fixed-route transportation services. CARE services have seen high increases in paratransit ridership over the last few years and this can be a great tool in managing demand.



#### ***5.6.2.5 Eligibility Determination Process & Public Outreach:***

As discussed earlier in the eligibility process section, GRTC relies on ADARIDE to handle paratransit eligibility applications. This can ease the responsibility and costs for the transit agencies, but solely relying on an agency outside of the state of Virginia can create service inefficiencies. Public outreach and interaction is limited when determining eligibility between the applicants and GRTC. The agency provides the approval after receiving verification from ADARIDE with no contact with the applicant during this process (GRTC, 2012). This is a very poor method of getting to know the applicant has his disability conditions that limit his mobility.

#### ***5.6.2.6 Subscription-Grouping Rides***

GRTC has a subscription-based service for CARE passengers who use the service at least four times a week (GRTC, n.d.). These types of service are prescheduled and can let the agency plan ahead, allowing other trip requests to be based on around confirmed requests. This can also have major impact in reducing trip requests and calls to the paratransit operator improving general productivity and efficiency (Center of Urban Transport & Research, 2008). Trip management, also known as grouping rides are not a service being provided by GRTC to CARE passengers.

#### ***5.6.2.7 Technology:***

Utilizing technology to operate more efficiently and enhance customer satisfaction is a goal listed under the improvement of paratransit operations for GRTC's strategic *Transit Oriented Development Plan for Fiscal Years 2012-2017*. Investments have been made to improve the operational efficiency of CARE paratransit services. GRTC has acquired and implemented its Advanced Communication Project, which

includes Computer Aided Dispatch/Automatic Vehicle Locators (CAD/AVL), advanced vehicle monitoring (AVM), Passenger Counters, (APC), Voice Annunciation, Internet Visual Signs, and stop level bus arrival signs (Connectics Transportation Group, 2012). This will allow GRTC to increase its operational efficiency and effectiveness through improved trip scheduling and routing. Technology advancements have made considerable progress in assisting paratransit providers manage day-to-day operations.

These investments are a major progress in achieving efficiency and lower operating costs for GRTC. Although infrastructure improvements have been made, the study found that CARE passengers still have to buy standard tickets to be able to board paratransit vehicles. GRTC's normal Go Card that can be used on regular fixed route services and cash aren't accepted on CARE Rides (GRTC, 2012).

#### ***5.6.2.8 Coordination with Area Aging Agencies***

##### **Finding:**

The study found a clear lack of coordination and collaboration between GRTC and other non-profit aging related service agencies. The main agency providing aging related transportation services is Senior Connections the Capital Area Agency on Aging (SCAAA). The organization receives funding and supports from another social service agency, United Way of Greater Richmond & Petersburg. GRTC is a corporate partner with United Way but its involvement with service agency has been limited (United Way of Greater Richmond & Petersburg, 2012). United Way, although doesn't physically provide services provides support to other agencies like the SCAAA. In addition, United Way has published reports on the aging and disabled populations in the Richmond area. Notable publications include *Greater Richmond Regional Plan for Age Wave Readiness*

and the *Public Transportation for the Elderly, Disabled and Low-income; Needs Assessment Report*.

### **Senior Connections:**

Senior Connections, the Capital Area Aging Agency (SCCAAA), is a private non-profit organization that has been helping the elderly citizen population of the greater Richmond area to live an improved and healthier lifestyle. The organization provides additional assistance to seniors who are aged 55 and older, and persons with disabilities to residents of the City of Richmond, Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent and Powhatan Counties (SCCAAA, 2010).

SCCAAA further acts as a community resource to promote and create awareness on the issues that are being faced by the elderly and future aging in its service regions listed above. The Federal government under the Older Americans Act and state funds given by the Virginia Department of Aging provides funding for the organization as well as accepting donations and volunteer services (SCCAAA, 2010). Although Senior Connections provides numerous other services, the transportation service is of importance in this study. Senior Connections has contracting agreements with taxicab companies and SODEXHO to provide transportation services for its clients (SCCAAA, 2010).

## **5.7 Summary**

GRTC's CARE service needs to find ways to control the soaring costs of paratransit. The operational assessment does already illustrate rising costs and demands affecting CARE paratransit services. Although GRTC's paratransit service fares better than other peers and national averages, proactive action is required to meet future

challenges and needs. On a positive note, GRTC's Ride Finders branch already practices TDM strategies on improving transportation needs of the residents of Richmond City. Economic incentives like the reduced fare program and use of technology to improve efficiency and effectiveness is already an important step in easing pressure on paratransit services. However, these measures and tools need to be applied on a dedicated level towards CARE services as well and improve overall functionality of the service.

TDM strategies and approaches are vital in mitigating the demands and costs of the future. GRTC needs to concentrate on removing barriers to fixed transit (for instance, adding curb cuts to make streets more accessible); making fixed-route service more ADA compliant; implementing fare incentive programs on fixed-route transit; ensuring more accurate eligibility determinations; and adding disincentives such as charging premium fares for special services that fall out of ADA service areas. All these tools are effective in refining paratransit services to better serve the needs of disabled and elderly passengers and creating a sustainable paratransit service.

## **Chapter 6: Recommendations & Conclusion:**

It is evident that a strong foundation for strategic planning exists in GRTC's CARE paratransit service for the City of Richmond. Yet the findings in this thesis illustrates that national paratransit trends of rising demand and costs are being experienced in the CARE paratransit service over the last five years. Costs per passenger trips have risen steeply while revenues and budgets have been relatively flat. This trend is unsustainable in the long run if both demand and costs are projected to rise even further due to increases in aging and disabled populations. GRTC's policy decision to have service delivery practices that exceed the federal ADA mandate to provide service beyond the 3/4 mile to Henrico and Chesterfield residents has also proven to be costly. The CARE service is already encountering exponential cost increases associated with paratransit operations and populations with increasingly elderly demographic characteristics. GRTC faces a potential threat to its overall fiscal health and operability as it seeks to fund future paratransit service. Recommendations for overall improvement and TDM strategies for revenue generation and cost containment for GRTC's care service are discussed below.

### **6.1 Recommendations: Improving Fixed-Transit**

Improving fixed-route transit is a vital component in integrating disability accessibility in regular modes of transport. The success of these programs will result in a drop in demand for paratransit services that are being stretched thin due to high demand. However, GRTC needs to work with local and state agencies in improving access to bus stations. Bus stops and sidewalks need to be disability friendly with adequate lighting and

benches to support elderly disabled passengers (Center of Urban Transport & Research, 2008). Without these amenities, there is no point in having vehicles equipped with disability access.

#### ***6.1.1 Comprehensive Planning & TOD:***

Although GRTC has been clearly working on improving transit access and TOD, mobility in regards to the general public appears to be their main priority. Both GRTC and Ride Finders have shown some concern for elderly disabled senior citizens, but no concrete approaches were defined to address the aging population that is set to increase as baby boomers retire. Goals were established by GRTC's *Transit Development Plan for 2012-2017* to improve paratransit operations but were limited to technology upgrades (Connectics Transportation Group, 2012). Viable programs to integrate or diversify paratransit services were not part of the agenda and are a necessity if GRTC wants to have universal accessibility to all its transportation services. Goal setting can be an admirable quality, however, a clear action plan outlining objectives and outcomes are needed for goals to become a reality. This was found to be lacking in GRTC's long-range plans and local level coordinated plans for CARE improvements. However, the main objective is to continue creating opportunities in promoting comprehensive planning and transit-oriented development.

#### ***6.1.2 Green Fleets***

Vehicle replacement programs are great way in reducing operating costs and provide savings in the long run. Quicker conversion of diesel based systems for paratransit systems may bring some relief to operating costs as well in the case of GRTC. Another approach to safer environmental driving would be operator training on how to

drive vehicles more economically (Environmental Defense Fund, 2010, p. 5). Decreasing fuel consumption and more efficient driving behaviors can result in fuel efficiency.

## **6.2 Recommendation for TDM Strategies:**

TDM practices followed by Ride Finders improve overall efficiency of GRTC's transit system. Nonetheless, strategies for improving CARE paratransit services aren't part of TDM programs being provided currently. Ride Finders and GRTC, both need to work on identifying potential opportunities and programs to better manage paratransit services. Rising costs for CARE services should serve as an indicator that TDM tools need to be applied to manage demand. Ridesharing and Van pooling programs that are already in operation can be integrated CARE services. A more balanced approach in implementing TDM strategies is required by Ride finders that would result in a more equitable distribution of resources and programs for CARE passengers.

### ***6.2.1 Distance Based Fare & Income Bases Fare:***

GRTC's CARE service goes beyond the ADA mandate by providing services to Chesterfield and Henrico county residents who are eligible for paratransit services. Since fixed route services aren't provided to these counties, the service area is out of the  $\frac{3}{4}$  mile radius. Due to this reason, ADA mandates for fare cost limitations do not apply, allowing GRTC to charge a premium service fee for passengers that are out of the paratransit service area.

In the case of distance-based fares, GRTC is allowed to charge a premium service fee for passengers that travel out of the Richmond City area. Fixed route services aren't provided beyond the City, so residents that are eligible for paratransit services can be

expected to pay a higher fee. All services inside the coverage area can be charged the regular \$2.50 or subsidized further since distance being traveled within the city is less.

For the implementation of income-based fares, the reasoning behind the proposed fare hike for passengers can be applied to Henrico and Chesterfield county residents. As seen in table 8 below, Richmond's elderly population takes up a larger percentage of its total population, as well as having a significantly lower median income compared to Chesterfield and Henrico residents. Charging a higher fee to residents outside of Richmond can be justified and acceptable since median income in these counties is higher. Compared to Richmond's median income of \$28,317 for 65 and over populations, both Henrico and Chesterfield have a median income that lies above \$40,000 (Appendix D, Median Income). In addition to lower median income, Richmond has higher percentages of 65 and over elderly populations living below the poverty line. Both Henrico and Chesterfield County have considerably lower percentages of poverty levels at 4.70%. Richmond City has more than double the percentage of the elderly population living below poverty at 13.30% (Appendix D, Poverty Status).

However, a more comprehensive fare structure needs to be developed by GRTC based on incomes of CARE passengers in these areas. This form of income based fare structure is a more equitable approach that favors low-income riders. It also serves as a strategy for GRTC to generate more revenue to be operational viable.

### ***6.2.2 Cost Containment:***

A more effective approach towards maintaining a sustainable paratransit service, are through cost containment strategies that do not harm the passengers for CARE's paratransit service. Fare revenue is an important tool, but this approach is a vertical



equitable approach in meeting demands and costs for this service. The tools and strategies listed below are prioritized according to ease of implementation and applicability to GRTC's Care network.

#### ***6.2.2.1 Travel Training***

Travel Training programs can either be conducted by GRTC or through other public, non-profit agencies that assist in transportation related services ( Wolf-Branigin & Wolf-Branigin, 2008). Working within elderly communities and educating public transit use will not only reduce demand on paratransit ridership, but also integrates and engages them back into society. Limited mobility options and lack of fear or knowledge of traveling on regular bus routes can be overcome through travel training (Center of Urban Transport & Research, 2008). This is an important element in transportation equity as well as improving the livability factor in communities. The undertaking of this program will require extensive stakeholder input from the elderly and disabled communities to identify the barriers that limit them from traveling on fixed route services. Possible program models could include a buddy system or a transit staff member that would travel with the passenger until he/she feels comfortable traveling alone (Project East Action, 2012)

#### ***6.2.2.2 Public-Private Partnerships: Taxi Service***

As discussed earlier, private partnerships can be very helpful in countering ridership demand for CARE paratransit service. Taxi services that are accessible to disabled and elderly passengers could offset demand for paratransit services. This can either be done through a public entity or encourage private enterprise to meet the needs of the disabled elderly (Center of Urban Transport & Research, 2008). The

The Freedom program provided by the federal government covers improvement of ADA

services and can be source of funds to kick-start the program (Community Transportation Association, 2010). Since private contractors providing paratransit services won't be under ADA guidelines, GRTC will have to develop minimum standards and regulations to ensure quality of service (Project East Action, 2012). If contracting services are adopted by GTRC for paratransit services, it is essential that adequate service provider reviews are incorporated into the contract. This should include service delivery monitoring, customer satisfaction feedback, vehicle inspections, review of safety and accident records, review of driver files, and similar quality control measures (Community Transportation Association of America, 2003). These policies will ensure that the services being provided by private contractors are comparable to ADA compliance laws and standards. A study and assessment of current accessible taxi services needs to be conducted by GRTC to identify potential partners.

#### ***6.2.2.3 Technology:***

Paratransit passengers have to present their tickets as well as their CARE ID's while boarding to the operator. This system is extremely inefficient and can affect overall system efficiency and effectiveness. Smart Cards and readers are widely used by transit agencies on fixed routes and are also being used by paratransit providers (Route Match Software, 2011). The use of paper ticketing in the age of technology is extremely inefficient for GRTC's paratransit service. The use of smart cards can allow for better data collection opportunities, enhanced customer service, and overall operator efficiency. GRTC CARE passengers are already given ID cards and this can be an ideal opportunity for smart card use and integration. CARE ID cards can have a dual purpose for both GRTC and the CARE passenger. CARE ID's can serve as identification for passengers

but also be able to hold ticketing information (Route Match Software, 2011). Passengers can reload trip tickets online or through the use of operators, no longer requiring carrying both a ticket and ID along with them.

For GRTC, smart cards can enable them to collect rider history and trip patterns that can be used later to create grouped rides and manage trip scheduling more efficiently (Route Match Software, 2011). Card Readers can be installed on CARE vehicles to integrate them into the system. The driver of the CARE vehicle is also free to assist the passenger and perform his duties with relative ease.

#### ***6.2.2.4 Eligibility Determination Process & Public Outreach:***

In person assessments conducted by GRTC staff members would allow for a better understanding of the applicants disability and capabilities. This would allow CARE services to determine if travel training is an option. It would also allow the agency to evaluate the available services and infrastructure improvements in the immediate vicinity that would make transitioning to the fixed route services easier not only for the applicant but other elderly disabled passengers that live nearby. Having the responsibility of evaluating an applicant's paratransit service request may be an expense, but long-term benefits result in opening up more capacity for paratransit services. Public outreach is significantly improved since staff members are getting to know and observe the individual on a one to one basis. A in person assessment can therefore be very effective approach in determining the alternative solutions for GRTC as well as being beneficial to the applicant who will be catered on a more personal basis.

#### ***6.2.2.5 Subscription-Grouping Rides***

Limited mobility and accessibility options prohibit the elderly and disabled from conducting daily business routines that include medical appointments, recreational activities and buying groceries. Developing specific ride destinations such as supermarkets and malls can allow transit operators to reduce ridership during other hours of operation (Center of Urban Transport & Research, 2008). Fixed reservations and destinations allow for better and more effective route scheduling and management opportunities for GRTC. Ride Finders Ridesharing program is the ideal program to integrate group rides for paratransit passengers. Stakeholder input and destinations with high frequency rates need to be identified before implementing this program.

#### ***6.2.2.6 Coordination with Area Aging Agencies***

Coordination among aging services and transit that provide transportation alternatives offers the potential to increase transportation availability and access. This not only enhances the quality of services but also eliminates any duplication of services being provided in the area (Community Transportation Association of America, 2003). The Freedom program specifically calls for a more coordinated locally developed transportation plan for human mobility services (GRTC; DPRT; Cambridge Systematics Inc., 2008). Sharing resources and information can be extremely beneficial for GRTC and Senior Connections and the opportunities for cooperation are endless.

The SCAAA is already a resource center for Aging and Disabled populations for Richmond City and can act as a partner of a possible travel-training program with GRTC. In this manner, some of the responsibility is taken off GRTC service staff as well increasing resource capability of both partners. This is just an addition into the aging

agencies resource services and can be implemented right away. Furthermore, the taxicab transportation program can serve as a study and pilot program into private enterprise providing paratransit services. As of now, the current contracting taxicab provider, VIP & Associates, don't have accessible cab services (Senior Connections Area Aging Agency, 2012). However, cooperation and coordination between GRTC, SCAAA and VIP & Associates could result in receiving funding opportunities from the Freedom program. This way, costs are decreased and shared amongst transportation providers. Entering into a formal agreement would increase productivity and efficiency for all three potential partners.

#### ***6.2.2.7 Economic Incentives***

Reduced fare programs provided by GRTC are a great example that can result in reduced ridership on paratransit services. But CARE passenger ridership is growing substantially which could mean that this service isn't as effective in incentivizing riders to regular public transit systems. Providing free services could be an even greater incentive for the elderly and disabled to ride fixed-route services as well as receiving considerable savings on travel. Paratransit services are already far more expensive on per passenger by trip basis compared to fixed-route services. Fixed route services operating costs are \$2.31 where as for demand response services are \$19.50 (Connectics Transportation Group, 2012). Even with, increased ridership on fixed routes, GRTC would still receive a significant amount of savings. However, for this to occur training programs and public outreach is required to educate elderly and disabled passengers on traveling on GRTC's regular bus services.

#### ***6.2.2.8 Volunteer Driving Programs***

GRTC's vehicle donation program to faith based organizations like the First Baptist Church is an important step in allowing other community organizations to help in aiding elderly and disabled transportation needs. The volunteer driving program being implemented by First Baptist Church can serve as a model and resource driver pool for a potential driver program. Continuing to donate retired vehicles is innovative approach in relieving demand off CARE services, however, coordination between the two organizations is lacking. Sharing volunteer driving pools and resources can allow for reduced costs and improve capacity. GRTC needs to work with the First Baptist Church and find other potential volunteer based driving programs that serve the elderly and disabled. Nevertheless, as mentioned earlier, no concrete studies and evaluations have been made into this field so implementation of this program can only be theoretical in nature.

### **6.3 Conclusion**

Sustainable transportation is a system that preserves the environment, is durable and takes into account the materials we use. It's a system that manages and operates using policies and strategies that meet society's present needs without compromising the ability of future generations to meet their own needs. This is the foundation and principle that GRTC's CARE service needs to abide if it wishes to continue its current standards of service and quality. Increasing elderly populations and rising disability prevalence amongst this group needs to be met in a manner that will make GRTC operational viable but at the same time promote the three E's of the sustainability principle; efficiency, equity and preserving the environment.

Providing services to this segment of the population is extremely important, but the current dependency on government aid and budget shortfalls could spell disaster for GRTC in the future if reductions in government spending were to happen. Due to this reason, the Just City's approach that promotes the equitable distribution of resources through a manner that is entrepreneurially and financially feasible needs to be applied. Without financial viability, providing services to the elderly and disabled will be even more challenging.

The general strategy to cope with rising costs and demands, GRTC and CARE paratransit services need to implement smart growth policies and programs as goals and objectives to improve overall fixed route accessibility to the disabled and elderly. According to the American Planning Association's *Policy Guidebook on Smart Growth*, "Smart Growth is largely about retrofitting communities to offer more choices both in terms of housing types and prices but also in terms of transportation options" (American Planning Association, 2012). Smart growth in general planning terms means incorporating land use and transportation decisions together that promotes mixed and compact development, decreasing private vehicle use. It is an effective strategy that is essential for the implementation of plan that is equitable and cost effective (Kelly, 2010). If growth and development are unchecked, it can result in congestion, pollution, sprawl and auto dependent lifestyles that are being seen in cities across the world today.

In transportation planning the use of smart growth policies means promoting accessibility and increasing the overall quality of life, the livability factor in communities (Victoria Transport Policy Institute, 2012). Smart Growth measures for transportation agencies as discussed earlier are though comprehensive transportation planning that

promotes Transit-Oriented Development (TOD) and create incentives for people to use public forms of transportation and drive less (Littman & Steele, Comprehensive Transport Planning Framework, 2012). Sustainable smart growth policies for transit agencies also include upgrading fleet standards to better fuel-efficient and environment friendly (Environmental Defense Fund, 2010).

Rising energy costs and transit vehicles that consume tremendous amounts of fuel can be costly for transportation providers. Growth and development require management, and for transit agencies this requires TDM strategies that maximize efficiency of transportation resources. TDM practices that increase revenue without harming paratransit ridership and service quality as well as cost containment strategies need to be implemented by GRTC to ensure an operationally viable paratransit system.

GRTC needs to also collaborate both internally, among state agencies, Chesterfield and Henrico county governments, and stakeholders to identify interrelated issues and challenges. A comprehensive, integrated strategic planning process is needed to cooperatively address mutual issues and to ensure that strategic planning efforts are consistent and interconnected. Collaboration between local aging agencies and faith-based services are required to share costs to avoid funding shortfalls.

The right policy can turn the direction and attention towards the aging population of drivers and provide sufficient mobility. Excessive Automobile ownership has made planners and policy makers to identify the consequences; urban sprawl, air pollution, high death and injury rates, energy dependence and now an aging population of drivers. Although the over reliance on an aging and expensive transportation network of



highways and roads has left little choice, barriers can be turned into opportunities. Coordination from the Federal level all the way down to the local level should be made on public mass transportation systems with a focus on human mobility services that cater to the elderly adults and those with disabilities that are inherent as population's age.

To meet the current mobility needs of the aging population; a policy of sustainability must be integrated into transportation systems like GRTC. Limited supplies of oil and rising prices and the large influx of baby boomers that are nearing their retirement age will also need to be adjusted into the transportation network. All of these factors need to be integrated into providing a safe and sustainable form of transportation planning that will provide mobility and independence to seniors.

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## Appendices:

### Appendix A: GRTC

CARE-Cost Per Trip	Fixed Route	Specialized
2003	\$3.98	\$17.22
2004	\$4.11	\$16.83
2005	\$4.06	\$17.22
2006	\$3.08	\$16.33
2007	\$3.55	\$16.44
2008	\$3.71	\$23.54
2009	\$3.90	\$22.66
2010	\$3.92	\$23.10
2011	\$4.05	\$27.03
2012	\$3.93	\$28.31
2013	\$4.23	\$30.12

Source: GRTC

Percentage of Total Budget	Fixed Route	Specialized
2003	90%	10%
2004	89%	11%
2005	89%	11%
2006	90%	10%
2007	91%	9%
2008	84%	16%
2009	86%	14%
2010	87%	13%
2011	87%	13%
2012	86%	14%
2013	84%	16%

Source: GRTC

GRTC	Percentage of Actual Total Cost	
	Fixed Route	Specialized
2003	88%	12%
2004	89%	11%
2005	89%	11%
2006	90%	10%
2007	91%	9%
2008	85%	15%
2009	87%	13%
2010	86%	14%
2011	85%	15%
2012	84%	16%

**Source: GRTC**



## Appendix B: Operating Results

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
<b>Operating Revenue</b>					
Customer Revenue - Fixed Route	8,505,370	8,408,652	8,202,272	9,068,655	9,390,839
Customer Revenue - CARE	529,758	497,957	540,695	624,115	645,404
Charter Revenue	124,777	124,537	148,023	133,217	125,000
Advertising Revenue	584,633	404,059	461,972	347,197	390,000
Other Operating Revenue	694	19,530	(2,149)	16,122	12,000
VCU Shuttle Revenue	2,030,545	2,253,561	1,992,717	2,171,491	1,675,880
VCU Pass Program	116,997	224,505	269,439	307,696	325,000
City Contribution - Senior Fare	200,000	200,000	175,000	175,000	175,000
Taxi Program	20,000	20,000	19,000	7,613	0
<b>Total Operating Revenue</b>	<b>12,112,774</b>	<b>12,152,801</b>	<b>11,806,969</b>	<b>12,851,106</b>	<b>12,739,123</b>
<b>Operating Expenses</b>					
Equipment & Maintenance	5,972,219	6,467,721	6,565,994	6,804,490	6,699,573
Transportation	18,831,467	21,380,124	21,403,381	20,951,003	22,649,277
Schedules & Marketing	1,052,906	992,708	961,219	804,177	742,822
Insurance & Safety	2,468,502	2,379,945	3,446,436	2,714,462	2,823,555
General & Administration	8,712,716	10,038,287	11,090,924	10,189,102	10,413,280
Purchase of Service - Vanpool, Fredericksburg	4,406,102	1,235,409	638,207	687,049	422,400
Operating Expenses Before Taxes	41,443,912	42,494,194	44,106,161	42,150,283	43,750,907
Operating Taxes & Licenses	1,519,115	1,636,835	1,760,703	1,663,287	1,758,882
<b>Total Operating Expenses</b>	<b>42,963,027</b>	<b>44,131,029</b>	<b>45,866,864</b>	<b>43,813,570</b>	<b>45,509,789</b>
<b>Net Operating Loss</b>	<b>(30,850,253)</b>	<b>(31,978,228)</b>	<b>(34,059,895)</b>	<b>(30,962,464)</b>	<b>(32,770,666)</b>
<b>Other Income</b>					
Purchase of Service - Henrico Co.	3,389,135	3,885,010	3,044,744	3,482,156	3,272,190
Purchase of Service - Petersburg	150,000	150,000	150,000	150,000	150,000
Purchase of Service - Henrico Co. CARE	1,479,453	1,773,754	1,967,207	1,604,105	1,727,810
Purchase of Service - CVAN	0	418,958	234,665	271,925	500,022
RideFinders - Leased Personnel-Fredericksburg	578,638	551,922	567,183	463,029	422,470
Interest/Non Transportation Income	701,692	211,328	52,039	17,457	125,000
<b>Total Other Income</b>	<b>6,298,918</b>	<b>6,990,972</b>	<b>6,015,838</b>	<b>5,988,672</b>	<b>6,197,491</b>
<b>Net Loss Before Operating Contributions</b>	<b>(24,551,335)</b>	<b>(24,987,256)</b>	<b>(28,044,057)</b>	<b>(24,973,792)</b>	<b>(26,573,175)</b>
<b>Operating Contributions:</b>					
Federal Funds	5,725,290	6,488,858	7,914,255	6,253,765	7,350,146
State Funds	7,755,215	8,530,082	8,633,310	7,571,931	8,223,029
City of Richmond Funds	9,360,000	11,000,000	11,000,000	11,000,000	11,000,000
Welfare to Work	924,100	0	0	0	0
<b>Total Operating Contributions</b>	<b>23,764,605</b>	<b>26,018,940</b>	<b>27,547,565</b>	<b>24,825,696</b>	<b>26,573,175</b>
<b>Over(under) Funding</b>	<b>(786,730)</b>	<b>1,031,684</b>	<b>(496,492)</b>	<b>(148,096)</b>	<b>(0)</b>
<b>Miles - Fixed Route</b>	<b>5,366,602</b>	<b>5,513,132</b>	<b>5,698,299</b>	<b>5,307,455</b>	<b>5,244,226</b>
<b>Passengers - Fixed Route</b>	<b>8,775,418</b>	<b>8,824,861</b>	<b>9,579,788</b>	<b>9,887,800</b>	<b>9,591,166</b>

Source: GRTC

## **Appendix C: Site Visit**

### **Site Visit: First Baptist Church**



**Address:** 1127 N. 28th Street, Richmond, VA 23223

**No. Patrons:** 25-30

**Hours of Operation:** 10 am – 2:00 pm (Weekdays)

**Facility:** First Baptist Church

**Staff:** 10 Employees

**Years in Service:** 1965 – Present

**Vehicles:** 2 Vans & 1 Bus

Vans (2) – 15 Seats

Bus (1) – 12 Seats (includes disability services)

**Drivers:** 6 (All Volunteers) –Alternate between weekdays

#### **Senior Connections Support:**

The Senior Connections office provides a \$ 100.00 for Gas every month and a hot meal for all the patrons' every weekday valued at \$ 5.00 a meal. A manager for the friendship café, usually a patron, is the coordinator of the program and is paid by the SCAAA as well.

#### **First Baptist Church:**

The Church owns the facility that the Friendship café is hosted in as well as owning the 3 vehicle; 2 vans and 1 bus. The 2 vans were donated by the GRTC Care service two years ago and are in relatively good condition. Gas, insurance, and maintenance of all vehicles costs are borne by the Church's ministry with the additional \$ 100.00 per month provided

by Senior Connections. The Church also allows the Friendship Café program to use its Kitchen to store meals.

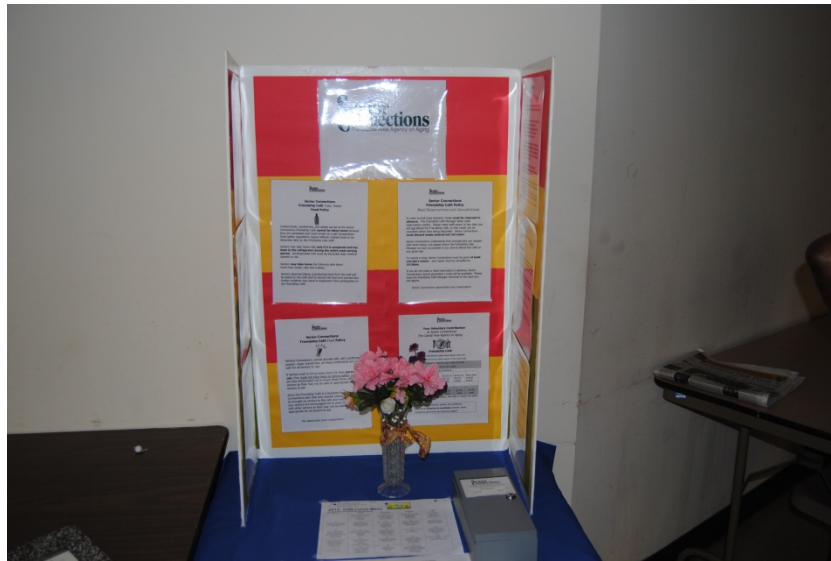


**Friendship Café 0015:**

The Friendship Café 0015 has about 25-30 patrons who are mostly African American of descent. The café uses the kitchen provided by the First Baptist Church to store and heat meals provided by Senior Connections for lunch. The meal is considered healthy by a nutritionist and is served at around 11:30 pm. Patrons have access to board games and a television for entertainment as well as a gym facility located in the church for exercise. The participants are also taken to Fairfield Mall every Wednesday to shop and walk around the area.



All patrons capable of donating any amount can drop off funds into the Senior Connections donation box.



**ISSUES:**

- Additional Financial Support would be helpful
- GRTC Care van drivers that drive senior citizens to the café are unreliable
- Some Patrons live very far away, eg: Hamilton & Borough.



## **Site Visit: Senior Connections Friendship Program**



**Address:** 6501 Jahnke Rd, Richmond, VA 23225

**No. Patrons:** 23

**Hours of Operation:** 10 am – 2:00 pm (Tuesdays & Thursdays)

**Facility:** Monarch Woods Senior Home

**Staff:** 2 Employees (Senior Connections)  
- Social Worker (Tuesdays & Thursdays)

**Years in Service:** 2006 – Present

**Eligibility:** 60 +

**Vehicles:** 1 Van (Owned and operated by Sodexho)  
Vans (1) – 13 Seats

**Drivers:** None (Outsourced to Sodexho)

### **Senior Connections Support:**

Senior Connections office provides full funding for the transportation and daily meals for the participants of friendship café 0032. The transportation is outsourced and contracted to Sodexho who handles both the transportation and food delivery services to the site. Currently, there are two managers who coordinate and manage the friendship café and are employees of Senior Connections.



### **Monarch Woods Support:**

The Monarch Woods Senior Home provides the facility in which the Friendship café is operated on. The center is part of a federally funded program where residents have to pay 30% of their income on rent.

A game room and a kitchen is part of the area in which the participants meet and congregate with one another. Although use of the facility is free, Senior Connections must have at least 50% of participants who live in Monarch Woods Senior Home and the rest from outside as part of the agreement. A social worker as well as nurse comes in for weekly visits on the premises to check on the mental and physical health of the participants.



### **Friendship Café 0032:**

Friendship Café 0032 has 23 patrons as its participants of which half come from Monarch Woods Senior Home itself. The patrons are made up of a mix of races consisting of whites, African Americans and Asian immigrants. Two managers employed by senior connections operate the friendship café and Sodexo provides a

hot meal. Once a month, the St. Michaels Church provides groceries to all the patrons of the friendship café. Most patrons arrive by the van provided by senior connections with two patrons who drive to the site. There is one exception where only one patron takes public transportation and arrives to the café by bus. The Forest hill GRTC bus stop is conveniently located near the Monarch woods Senior Home.



For Activities, patrons are allowed to play board games and walk outside in the garden as exercise. Patrons are also taken to special events several times a year for picnics in the park and other extra-curricular activities. Once a month patrons are also taken to a restaurant for meals and a private van is rented for the residents who live in Monarch woods while the Sodexho van takes the other patrons. Shopping is also an option but only if both coordinators are present at the café since one of remains while the other takes the patrons.



All patrons capable of donating any amount can drop off funds into the Senior Connections donation box.

**ISSUES:**

- Capacity is major issue with maximum 30 patrons allowed to participate in the program here in Monarch Woods. There is a waiting list for seniors who would like to join the program.
- Additional Financial Support
- Medical transportation is an issue
- Van being provided is not disability friendly



## Appendix D: American Community Survey (2010)

**Table 8: Median Income for 65 +**

Median Income for 65+		
	Total Estimate	Median Income
Chesterfield	16.50%	\$46,560
Henrico	18.30%	\$43,493
Richmond	19.30%	\$28,317

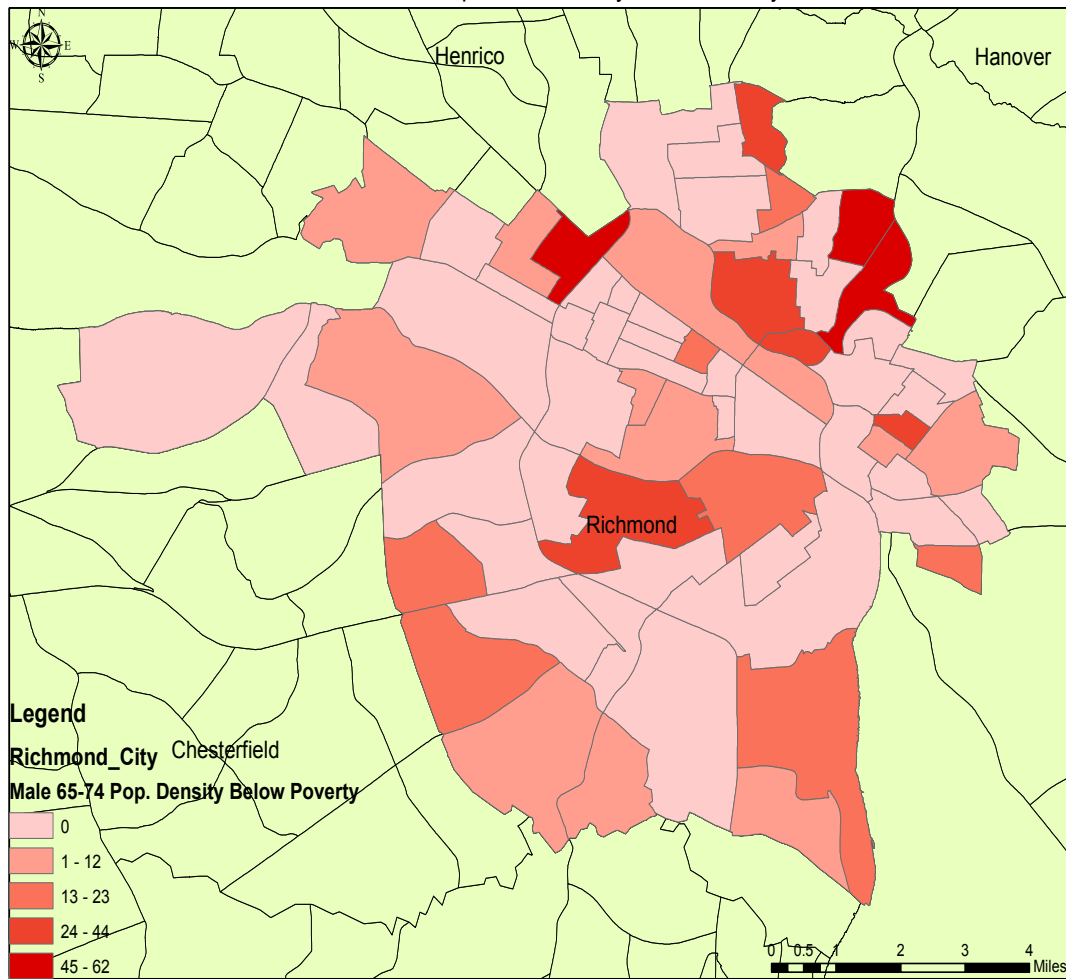
Source: American Community Survey 2010

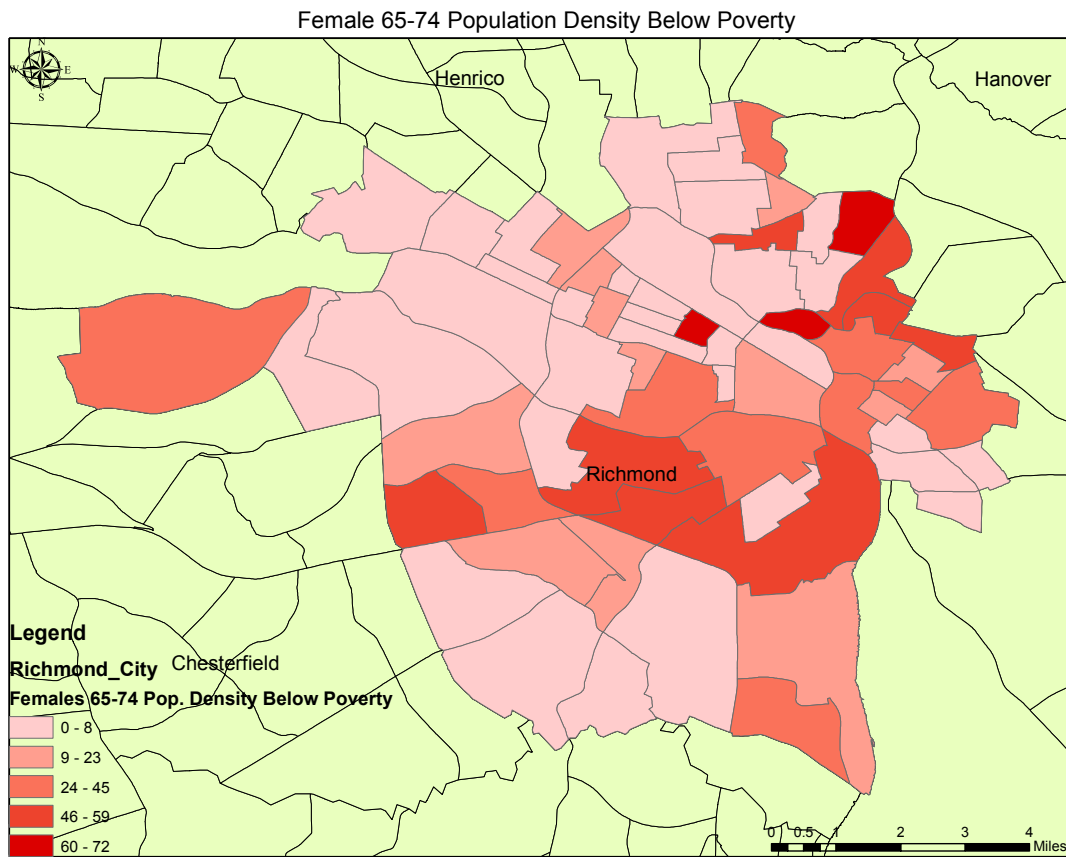
**Table 9: Population Below Poverty**

	Chesterfield County, Virginia		Henrico County, Virginia		Richmond city, Virginia	
	Total	Percent Below Poverty	Total	Percent Below Poverty	Total	Percent Below Poverty
	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
<b>Population in Poverty</b>	311261	6.40%	304021	10.20%	194962	25.80%
<b>65 and over</b>	32143	4.70%	36811	4.70%	22259	13.30%

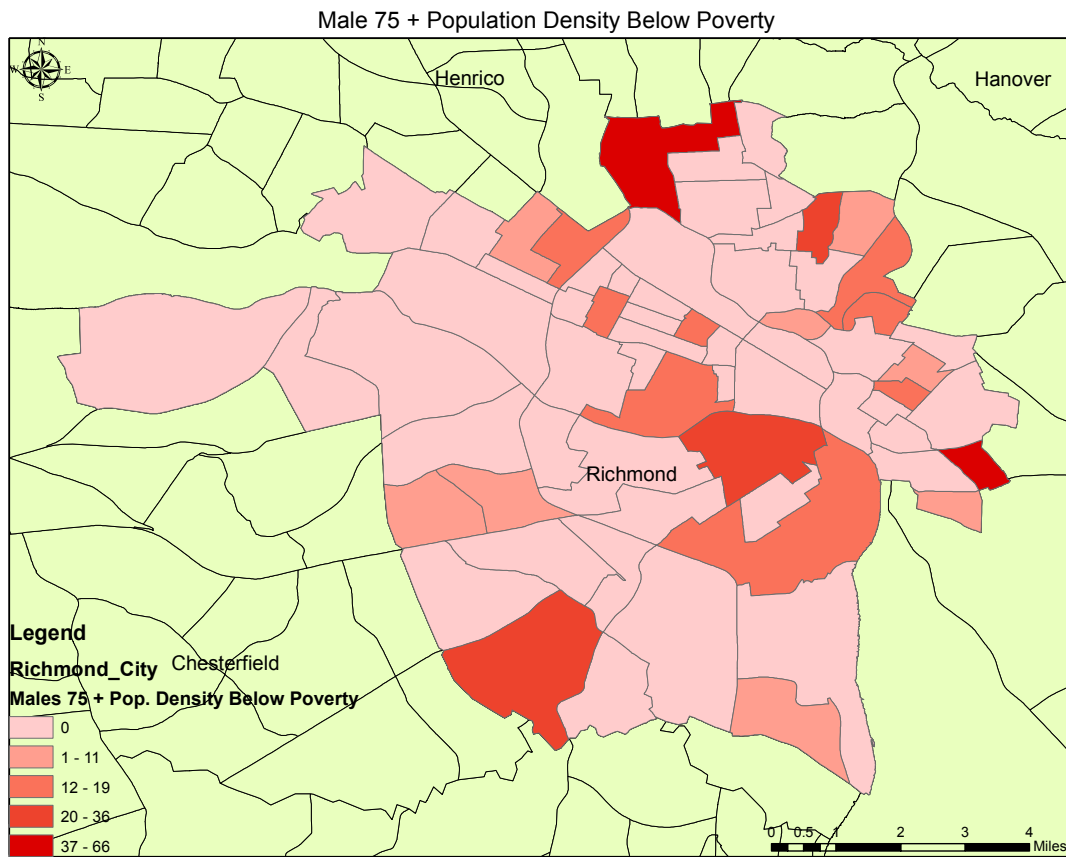
Source: American Community Survey 2010

Male 65-74 Population Density Below Poverty

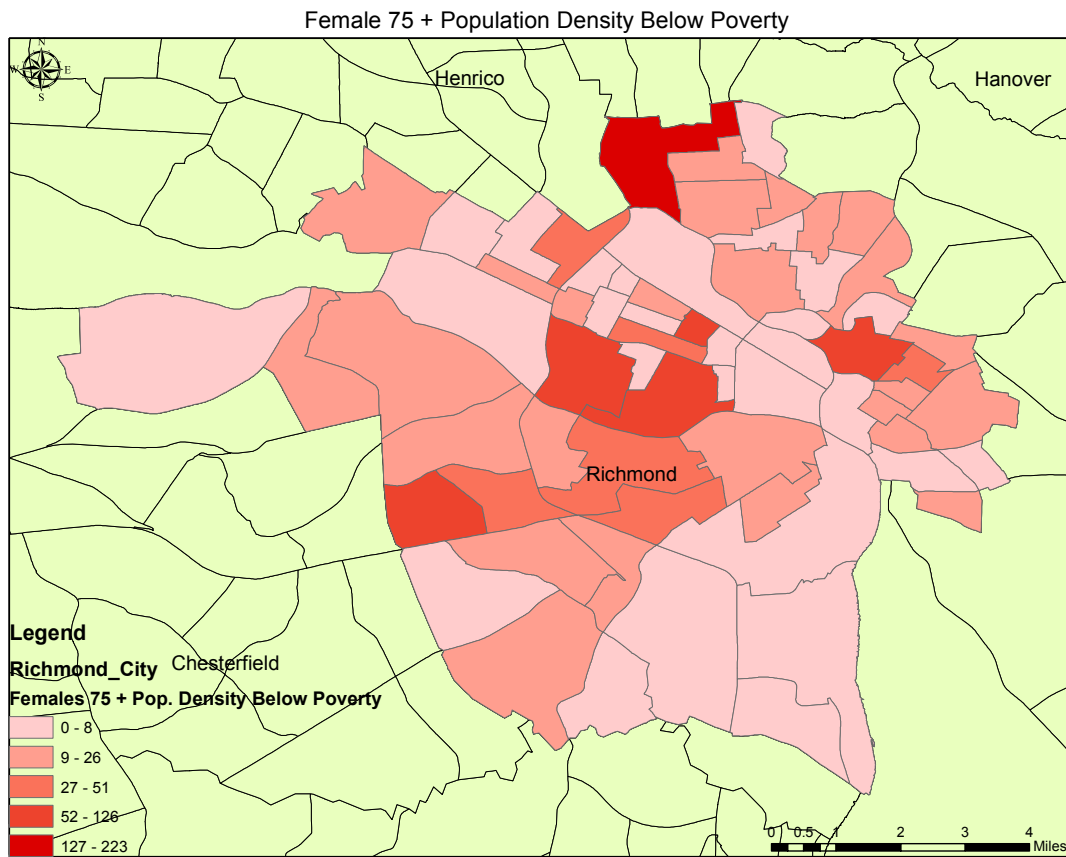




**Source: American Community Survey 2010**



**Source: American Community Survey 2010**



**Source: American Community Survey 2010**