GCEDC

Multimodal Transit Corridor Alternatives Feasibility Study

FINAL REPORT

March 2010

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MULTIMODAL TRANSIT CORRIDOR ALTERNATIVES FEASIBILITY STUDY

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MARCH 2010

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1.0 Executive Summary

1.1 Study Background

On May 28, 1999, the Greenville County Economic Development Corporation (GCEDC) purchased approximately 13 miles of rail corridor located in Greenville County formerly owned by RailTex of San Antonio, Texas (now RailAmerica). This purchase was divided into two rail segments, a north rail segment which runs for about 9.8 miles between the City of Greenville northwest to the City of Travelers Rest on the former Greenville and Northern (G&N) Rail Line (known as the Swamp Rabbit Trail) and the southern segment, a section of approximately 3.42 miles in length. The GCEDC purchased the corridors to rehabilitate and preserve valuable public transportation links to provide passenger transit service and recreation opportunities and improve access to jobs while promoting economic growth.

The southern segment is the subject of this study. The GCEDC initiated this study to determine the feasibility of a high capacity transit (HCT) system between the cities of Greenville, Mauldin, Simpsonville and Fountain Inn (see Figure 2-1 Study Corridor Map). GCEDC owns the portion of the right-of-way from approximately Pleasantburg Drive on the north to Forrester Drive on the south. Northwest of the GCEDC owned right-of-way, the property is privately held. The tracks have been removed and the right-of-way remains vacant up until the point the railroad right-of-way nears the roadway intersection of Washington Street and Laurens Road in Greenville. At this point, the former railroad right-of-way has been built upon and it is assumed that transit service would not be restored in this section. Alternatives to get into downtown Greenville on street were developed as part of this study. South of Forrester Drive, the tracks are owned by RailAmerica, with operations by the Carolina Piedmont Division Railroad (CPDR).

The population for Greenville County has been steadily increasing over the decades and projections show that the population will increase by 43% from the year 2000 to the year 2030. Most of this growth is expected to occur in areas surrounding downtown Greenville and along the transit corridor, west of Interstate 385 in Mauldin and Simpsonville. This expected increase in population will continue to place pressure on area roadways to handle the expected growth in travel demand. Many of the study area roadways and highways are already approaching capacity or are at capacity. The visionaries of the County feel that transit is an integral component in helping to alleviate some of the negative impacts the expected population growth will have. Transit has many environmental and health benefits, including reducing the carbon footprint, helping to contain sprawl by encouraging more compact and walkable communities, and improving air and water quality.

1.2 Transit Oriented Economic Development

One of the great advantages of a dedicated transit corridor is its capacity to focus economic growth and development. A dedicated transit corridor spine can provide developers with a more predictable and diverse market for the development of Transit Villages. Transit Villages can stimulate economic growth by expanding the tax base with property development, by creating new jobs, and by providing quality lifestyle alternatives to attract progressive and innovative corporations to Greenville County. Transit villages offer an opportunity to create more traditional, compact communities or TNDs (Traditional Neighborhood Development), directing some of Greenville County's new growth into the existing development footprint, reducing environmental damage, improving quality of life, and protecting the natural beauty of the countryside.

Transit Village design can have a dramatic impact on the character and quality of each community along the transit corridor. Thoughtful Transit Station design can stimulate growth of neighboring homes and businesses. Development around the stations should provide a mix of uses, a comfortable pedestrian environment, and easy access to other modes including auto, taxi, bus bikeways, and trails. The design sidewalks, landscaping, and

pedestrian friendly streets should provide a comfortable and safe environment for residents and visitors. A mix of uses in the station areas will keep the areas active and safe.

1.3 Recommended Transit Alternative

Four types of transit modes that would be most appropriate given the characteristics of the study area were considered. These modes are:

- Commuter Rail (CR)
- Light Rail Transit (electrified and diesel powered- LRT/DLRT)
- Streetcar (STC)
- Bus Rapid Transit (BRT)

In addition, the use of the corridor as a multimodal corridor for bicycles and pedestrians was considered. Regional connections and interface with existing and proposed transit were also examined. This included the potential interface with the Amtrak station in downtown Greenville. The Norfolk Southern Railroad on which Amtrak operates is one of the alternative corridors being studied for South East High Speed Rail. Additionally the potential to connect with the Swamp Rabbit Trail's was examined.

Each of the alternatives was evaluated and ranked based on quantitative and a qualitative data. The criteria analyzed were:

- Capital cost
- Operating cost
- Ridership
- Travel time
- Frequency
- Convenience of trip
- Access to activity centers.

The results of the ranking system indicated that the alternatives that ranked the highest were the bus rapid transit (BRT) and the Light Rail Transit (electrified and diesel powered - LRT/DLRT) alternatives. The commuter rail alternative was not ranked as high due to the fact it would require a transfer onto a bus in order to continue the trip into downtown Greenville. This operating scenario would attract fewer riders, increase travel time and be inconvenient. The streetcar alternative would be as costly to implement as an LRT system but would not be expected to serve the same number of riders due to its lower operating speed. Also, streetcars are designed to operate typically over shorter distances than the length of the corridor, as they don't' have the same vehicle amenities as other rail vehicles. Of the highest ranked alternatives, the BRT alternatives are significantly less expensive than the LRT and DLRT alternatives.

It is recommended that the GCEDC proceed with the BRT - Main Street Alternative as the preferred alternative. The BRT – Main Street alternative is expected to attract more riders due to the fact that it serves the main business districts of each community and was designed with branch lines that would provide service closer to potential rider's homes. The capital cost estimate for this alternative for the bull build out is $45.2 million (2009 dollars). An initial start-up operation which would allow the alternative to provide service between Downtown Greenville and the limits of the GCEDC owned right-of-way would be approximately $3.6 million.

Integral to implementation, however, is the need to identify a dedicated funding source for operation of the BRT. There is no dedicated local funding source for transit in Greenville County presently. Before any major new transit investment can take place this issue needs to be resolved.

2.0 Project Background

2.1 Purpose of the Study

On May 28, 1999, the Greenville County Economic Development Corporation (GCEDC) purchased approximately 13 miles of rail corridor located in Greenville County formerly owned by RailTex of San Antonio, Texas (now RailAmerica). This purchase was divided into two rail segments, a north rail segment which runs for about 9.8 miles between the City of Greenville northwest to the City of Travelers Rest on the former Greenville and Northern (G&N) Rail Line and the southern segment, a section of approximately 3.42 miles in length. The GCEDC purchased the corridors to rehabilitate and preserve valuable public transportation links to provide passenger transit service and recreation opportunities and improve access to jobs while promoting economic growth.

The southern segment is the subject of this study. The GCEDC initiated this study to determine the feasibility of a high capacity transit (HCT) system between the cities of Greenville, Mauldin, Simpsonville and Fountain Inn. The balance of the corridor is on or near a freight railroad owned by RailAmerica, with operations by the Carolina Piedmont Division Railroad (CPDR).

Besides determining HCT along the corridor, this study also examines connectivity with other existing and planned transportation corridors, including the northern segment of the former G&N Rail Line, approximately 10 miles in length from the City of Greenville northwest to the City of Travelers Rest. This former railroad has been converted to the Swamp Rabbit Tram/Trail (SRTT) which is operated by the Greenville County Recreation District. It is currently used as a biking and walking multi-use path with the potential for a rubber-tired tram.

Regional connections that will be examined include the potential interface with existing Amtrak service and future high speed rail service. Amtrak operates the Crescent Route between New York-Washington-Atlanta-New Orleans with a stop in Greenville. The current Amtrak Station is located at 1120 W. Washington Street near downtown Greenville. The Norfolk Southern Railroad on which Amtrak operates is one of the alternative corridors being studied for South East High Speed Rail. Another corridor being studied is to connect Greenville southeast to Laurens and beyond to Columbia and Charleston.

2.2 Study Area

The study area extends from downtown Greenville on the north to the City of Fountain Inn on the south, a corridor approximately 18 miles in length. See Figure 2-1. The portion of the study area (3.42 miles) owned by the GCEDC extends from approximately Pleasantburg Drive on the north to near Forrester Drive on the south. The tracks are leased back to the CPDR for storage of empty rail cars. South of this section, the study area extends down to the City of Fountain Inn on railroad right-of-way upon which the CPDR operates freight service.

Northwest of Pleastantburg Drive the property is privately held. The tracks have been removed and the right-of-way remains vacant up until the point the railroad right-of-way nears the roadway intersection of Laurens Road/Washington Street. At this point, the former railroad right-of-way has been built upon and it is assumed that transit service would not be restored in this section of the former railroad right-of-way. Alternatives to get between this point in the corridor and downtown Greenville were developed as part of this study.

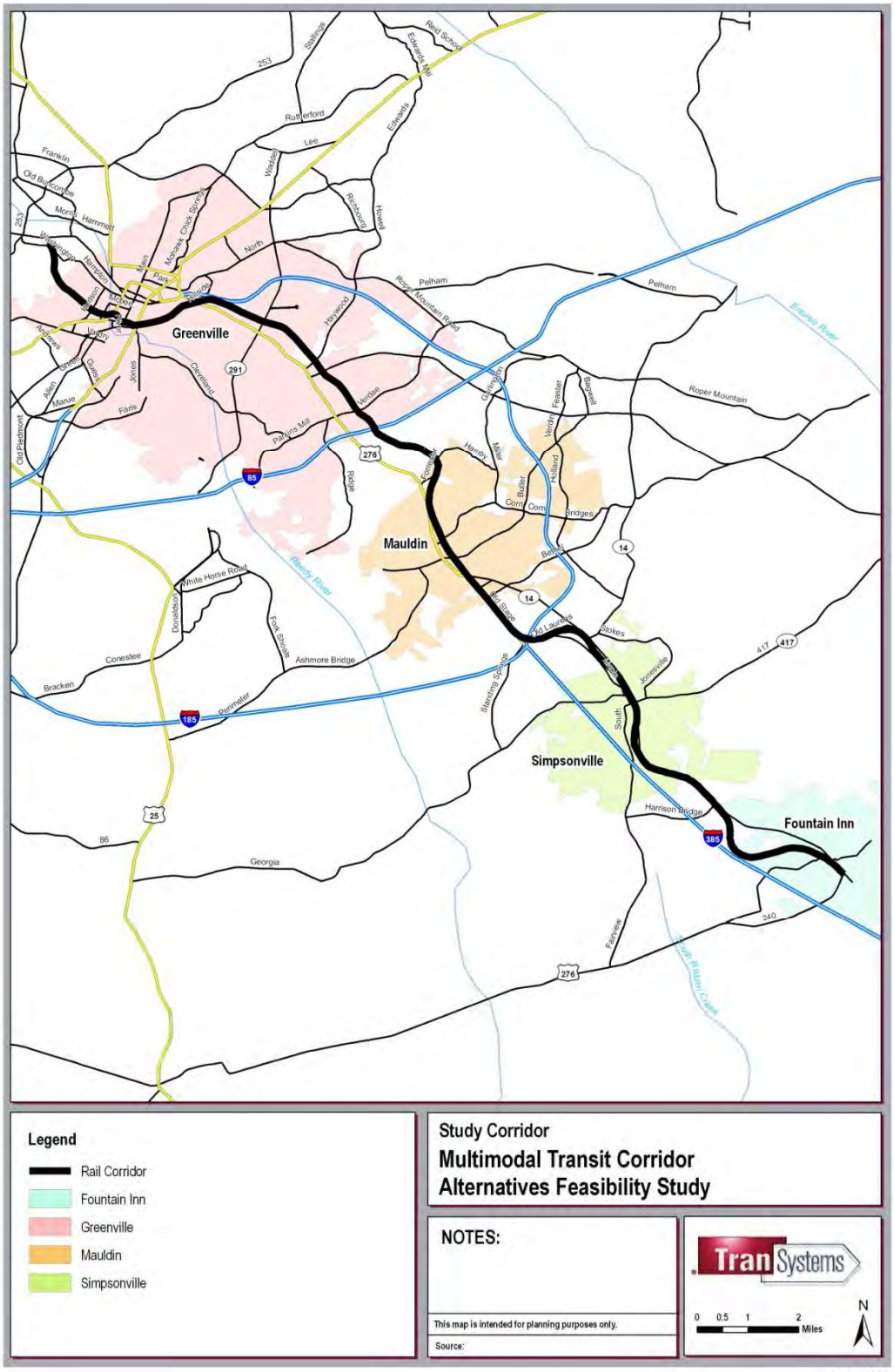
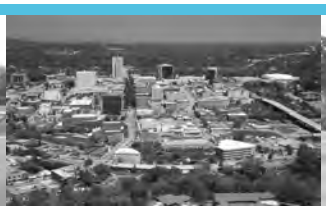
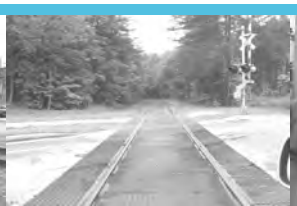
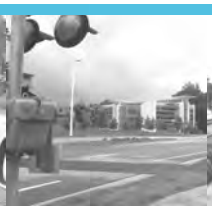


Figure 2-1: Study Corridor


2.3 Previous Reports, Studies and Community Initiatives

There are a variety of planning reports, studies, and community initiatives that support or address transit in Greenville County. These reports are briefly detailed within this section.

2.3.1 Imagine Greenville (2009)

Imagine Greenville is the county-wide Comprehensive Plan update process that the county is currently undertaking. Imagine Greenville is a year-long undertaking to develop a policy document to serve as a guide for future decisions on the growth of Greenville County. The plan inventories current conditions, identifies future needs, and includes recommendations and implementation strategies to address nine different elements of the county: population, economy, community facilities, housing, cultural resources, natural resources, transportation, land use, and priority investment areas. The Comprehensive Plan is intended to serve as a reference guide and as a decision-making tool for local government officials as well as private businesses and the public. The plan will help in decisions related to growth management, infrastructure improvements, development of new programs, and new investment areas.

The Comprehensive Plan contains the citizen and stakeholder created goals and objectives and activities for each of the nine elements, referenced above. Identified issues or facts that are most pertinent to this transit feasibility study are discussed below:

- Since1990, Greenville County's population has risen by 33 percent; at current rates, the county's population will rise to 451,398 by the year 2012 (2007 population is 428,2543)
- In 2006, 12% of the county's population was age 65 years or older (elderly people are more dependent on public transportation)
- In 2007, the median household income was $41,850, which was $6,000 less than the nation's median income (lower income persons are more dependent on public transportation)
- In 2006, 94% of all county residents in the work force relied on a private automobile to travel to work; of those people, 83% traveled alone
- In 2005, the average county driver traveled 30 miles per day, utilizing 1.5 gallons of gas per day or about $3.56 per day in gas; at this rate, drivers spend more than $1,040 per year on gas consumption
- It is currently expected that vehicle miles traveled in Greenville County will increase more than 16.7 percent by 2012 and minutes spent in congestion will rise 37% during the same time period
- Transportation and utilities are the major contributors to Greenville County's air pollution
- The Plan states that essential to the land use and transportation element is a need for significant changes in the methods and approaches to land use and transportation planning conducted by the County. The goal is to develop an integrated transportation system that ensures accessibility, safe and efficient movement, and connectivity through all parts of the county, and accommodate a range of transportation choices such as public, pedestrian, bicycle and vehicular. In addition, County development regulations should be revised to allow mixed use and high-density development, open space preservation, connectivity, green building, and low impact development practices.

2.3.2 Plan-It Greenville (2009)

Plan-It Greenville, the City of Greenville's comprehensive planning initiative, is a very intensive public involvement effort. As part of the planning process, "themed" committees were formed to create principles, desired outcomes and possible implementation strategies for their assigned theme. The Transportation Theme Committee developed the following principles:

- Provide a variety of transportation options for all incomes
- Provide linkages between all transportation options
- Encourage transit-oriented development in appropriate areas

Transportation strategies included the following objectives:

- Provide adequate public transportation so that individuals do not have to rely on vehicles.
- Pave the way for transit oriented developments

2.3.3 GPATS Long Range Transportation Plan (November 2007)

The Greenville-Pickens Area Transportation Study Metropolitan Planning Organization (GPATS MPO) adopted this plan on November 5, 2007. Federal regulations require the region's Long Range Transportation Plan (LRTP) be updated every 5 years to reflect changing needs and priorities. This updated plan addresses the area's transportation needs through 2030. The plan was developed with extensive public involvement and with input from numerous stakeholders, including the GPATS MPO, Cities of Easley, Fountain Inn, Greenville, Greer, Liberty, Mauldin, Pickens, Simpsonville, and Travelers Rest; Anderson, Greenville, Laurens, Pickens and Spartanburg Counties; and various local, regional, state and federal agencies including the Greenville Transit Authority (GTA), the South Carolina Department of Transportation (SCDOT), the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA).

The Visions and Objectives of the Plan included the following which are pertinent to this transit feasibility study:

- Develop a smarter, sustainable transportation system
- Provide viable transportation alternatives to decrease dependence on the automobile
- Recognize the effect growth patterns have on the transportation system and vice versa
- Minimize environmental impacts of the transportation system

Chapter 7, *Transit Element*, details the history of public transit in Greenville County, provides current service information provided by Greenville Transit Authority (GTA), and details the future vision for public transit in the county. A recurring theme from the public during the planning process was that there was a need for better regional transit connectivity. Participants expressed a desired for higher quality express transit service that could connect the municipalities and employers of the region and provide an alternative to automobile commuting. Two corridors were identified as the most promising based on existing development patterns and anticipated growth:

- The US Highway 123/Interstate 85 corridor running between Clemson University, Easely, Greenville, the emerging ICAR and Verdae developments and Greenville-Spartenberg Regional Airport
- The US 276 corridor, connecting Fountain Inn, Simpsonville, Mauldin, ICAR and Verdae, Greenville, Furman University and Travelers Rest

Three transit concept plans were developed as part of this plan. The first scenario is the Bus Rapid Transit (BRT) alternative. This scenario would invest in a dedicated bus rapid transit line between Greenville and Mauldin, fed by four regional on–road BRT corridors serving the rest of the region. The second alternative is a lower-cost regional express bus alternative. This alternative would still provide a dedicated BRT line at the center of the region, but would provide slightly less transit service overall. The third scenario is a rail transit option, a light rail transit (LRT) alternative, that would connect Travelers Rest to Fountain Inn.

Chapter 3, *Highway Element - Existing,* and Chapter 4, *Highway Element – Future*, discuss current and future roadway conditions within the county. Principal arterials within this study area are Laurens Road in Greenville and Main Street in Mauldin. Main Street is classified as a minor arterial as it travels through Simpsonville. Woodruff Road which bisects the transit corridor is also considered to be a minor arterial.

The worst congestion in the GPATS area occurs along the freeways and arterials in the Greenville area. The plan details projects that are planned or funded to help alleviate congestion on the roadways and highways. "Complete Streets" is one of the recommendations in the plan for improvements to the roadway network. Complete streets are community oriented streets that safely and conveniently accommodates all modes of travel. Such streets allow pedestrians, bicyclists, motorists, and transit users to use the street safely and conveniently. The plan also states that

areas targeted for high quality transit service must be supported through land use and zoning policies that sustain transit-oriented development and reflect the benefits of increased access to alternative modes of travel. Policy examples include appropriate densities and intensities for supporting transit use, parking rations that reflect reduced reliance on the automobile and setback and design guidelines that result in pedestrian supportive urban design.

2.3.4 Southeast High-Speed Rail Corridor Study Briefing Paper (June 2004) and Evolution of High-Speed Rail Options in the Macon-Atlanta-Greenville-Charlotte Rail Corridor, The Volpe Center (August 2008)

The Southeast High-Speed Rail Corridor (SEHSR) is one of eleven national high-speed corridors. Studies regarding this service have been ongoing since 1992. The June 2004 study examined the potential for upgrading 366 miles of Norfolk Southern freight lines between Charlotte, North Carolina to Macon, Georgia, including connections to Spartanburg, Greenville, and Atlanta, to operate 2 to 6 daily high speed passenger trains, connecting with trains to further points north. Track improvements needed include additional track space, upgraded track and signaling, improved at-grade road crossing protections, and refurbished stations and maintenance facilities. The study concluded that the SEHSR has a very good market potential for high-speed rail service and additional studies, including ridership forecasts and environmental studies, should be conducted.

In August 2008, the Volpe Center completed a feasibility study of the South East High Speed Rail corridor from Charlotte through Greenville/Spartanburg and Atlanta to Macon. The study validated the decisions of Congress and the US Department of Transportation to designate this corridor and established the justification for continued interest and progress toward developing high speed rail (HSR) along this route. One of the suggestions in the report is that the HSR could operate in the I-85 corridor, rather than on the Norfolk Southern Railroad as it approaches Greenville, allowing for the potential interface between HSR and this transit corridor at Millennium Boulevard. The study provides the foundation for at least three next step studies that are considered necessary at this point: a new travel/intercept study, ridership/revenue updates and a Tier I EIS.

2.3.5 Mauldin-Simpsonville Urban Area Transportation Development Plan (November 2005)

The Greenville County Planning Commission along with the Cities of Mauldin and Simpsonville, initiated a transit study in December 2004 to study the need and potential for providing public transportation services in the Mauldin-Simpsonville-Fountain Inn areas. The City of Greenville was also included in order to examine potential transit links between these areas. Findings of this Plan pertinent to the transit study are as follows:

- Approximately 13% of commuters living in the Mauldin-Simpsonville area work in downtown Greenville
- The two areas with the greatest "regional" attraction are the Woodruff Road area (near I-83 and I-385) and the Fairview/Harrison Bridge area (near I-385).
- For commuter trips, the strongest attractors are the downtown Greenville area, east Greenville areas around I-385 and SC Highway 146 corridor, and the Woodruff Road/SC Highway 146 corridor east of I-85.
- The study recommended five transit service alternatives. The alternatives ranged from express bus, demand response, hybrid service, extension of existing fixed routes, and rideshare. Two of the alternative options that are relevant to this study are: 1) express bus service for commuter peak periods connecting Simpsonville and Mauldin to downtown Greenville and 2) extension of Greenville Transit Authority (GTA) routes in the eastern Greenville area to provide a better connection between the north Mauldin area south of I-85 to the east Greenville area, encompassing Haywood Mall area and Woodruff Road corridor.

American Recovery and Reinvestment Act (ARRA) funding has been secured and Greenville Transit Authority is in the process of acquiring rolling stock to operate service along the I-85 corridor.

2.3.6 Rail Corridor Conversion Options (December 2005)

This study was conducted by graduate students at Clemson University. The study states that with the advent of the high speed rail, Greenville has the opportunity to be part of a dynamic connection with the rest of the region. Additionally, the upstate region of South Carolina should form a comprehensive multimodal system that affords efficient connections for both business and leisure travelers. The abandoned North and South lines acquired by

GCEDC offer the potential to link distance rail travel to a local/regional system. Integral to a complete transportation system could be the vital future development of several identified nodes as vibrant activity centers or rather, mixed use transit oriented development (TOD) hubs. TODs are high density developments around a transit station which promote the environmental sustainability by reducing a community's dependence on the automobile. The study reviewed various transit alternatives including bus rapid transit (BRT), commuter rail, and light rail (LRT). The study also reviewed the importance of bikeways on former railroad rights of way corridors.

2.3.7 GreenLink (2007)

The City of Greenville conducted a study of a bus rapid transit (BRT) between the Greenville Transit Authority (GTA) Transfer Center and the Clemson University ICAR (CU-ICAR) facility. The study details information on a proposed GreenLink, an 8 mile bus rapid transit (BRT) line connecting the three main business districts in Greenville, i.e. downtown Greenville, Pleasantburg Drive/Haywood Road, and CU-ICAR/Woodruff Road. The study concluded that each of these districts contains a concentration of offices, retail, high-density residential and other uses, and that there was a need to better connect these three districts and to fully utilize the transportation assets found within the districts. The proposed service would operate along a dedicated right-of-way, a portion of which will be derived from unused rail right-of-way. When the rail right-of-way is not available, GreenLink will run on public streets redesigned to include designated bus ways that can by-pass routine traffic. Proposed station locations for GreenLink are GTA Transfer Center, Laurens Road Station, Carolina First Center Station, Woodruff Road Station, Verdae Station, ICAR Station and Mauldin Station. The cost estimate for this BRT system is estimated at $20 million.

On May 18, 2009, the Federal Department of Transportation (DOT) began soliciting proposals for the discretionary grants program called the Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants Program. These grants are to be awarded on a competitive basis for capital investments in surface transportation projects that will have a significant impact on the nation, a metropolitan area, or a region.

Greenville County recently applied for a TIGER Grant for the implementation of a BRT system along this corridor, but was not an award recipient.

2.3.8 Upstate Forever

Upstate Forever promotes sensible growth and the protection of special places in the Upstate region of South Carolina. The membership-based, nonprofit organization covers ten counties (Abbeville, Anderson, Cherokee, Greenville, Greenwood, Laurens, Oconee, Pickens, Spartanburg, and Union), and they have three main programs: Land Trust, Sustainable Communities, and Clean Air and Water. The Land Trust program works with landowners to protect significant properties and resources in the region, primarily through land protection agreements. To date they have completed 57 such agreements, protecting nearly 10,391 acres of important land in the Upstate.

The Sustainable Communities program promotes economically, socially, and environmentally sound growth in the Upstate by supporting green development, parks and natural areas, active living initiatives, land use and infrastructure planning, and adaptive reuse and revitalization of existing communities.

The Clean Air and Water program works to promote low impact development; improve stormwater and erosion control measures; buffer floodplains, greenways, and lakeshores; protect pristine streams and wild rivers; improve air quality in the region; and raise awareness about climate change. Its water quality efforts are organized geographically, focused on mountain streams, urban rivers, rural waters, and statewide water resources.

2.3.9 Vision 2025 (2003) and Greenville Forward

In January 2003, the Greenville Chamber of Commerce launched a comprehensive visioning process, intended to update the 2005 vision process chaired in 1987 by former Mayor Max Heller. Nearly 1000 people participated in the Vision 2025 process. It is written from the perspective of someone in the year 2025 reflecting on the past 20 years of community progress. Among the major ideas is a multi-modal transportation system that includes roads, mass transit,

aviation, rail, bicycle and pedestrian ways needed for mobility in the rapidly growing Upstate South Carolina. It is expected that this multi-modal transportation system will serve as a catalyst to economic growth and prosperity. The regional multi-modal system would connect cities, airports, rails, public transit and loops to businesses, shopping centers, universities and other areas of interest. Bicycling facilities would be thoroughly integrated into the planning, design and construction of all new transportation facilities.

Greenville Forward was created January 2006 to help Greenville achieve Vision 2025. Greenville Forward seeks to enhance the quality of life for greater Greenville by engaging all citizens in continually updating, promoting and facilitating a community vision for 2025 and beyond. Greenville Vision 2025 establishes a variety of initiatives for greater Greenville. Specifically, Vision 2025 has established the following transportation vision statement:

> "A well-planned transportation system allows motorists within the Upstate to access jobs, shopping, entertainment events and allows businesses access to the employees, goods and services they need to flourish. A multi-modal transportation system provides an efficient, effective, safe and interrelated transportation system that includes roads, mass transit, aviation, rail, bicycle and pedestrian ways needed for mobility in the rapidly growing Upstate South Carolina. This multi-modal transportation system will serve as a catalyst to economic growth and prosperity."

2.3.10 Woodruff Road Corridor Study (July 2007)

The Woodruff Road Corridor Study was a collaborative process initiated by the City of Greenville and directed by a steering committee composed of representatives from local, regional and state agencies. The study's vision is to create a healthy and sustainable environment that protects the access and mobility of the Woodruff Road area while utilizing smart growth principles, encouraging sustainable development and protecting the community character.

Over the years Woodruff Road was converted from a rural roadway to a five lane thoroughfare serving as a major commercial hub. With this conversion, came a mix of independent developments that were not planned in an orderly fashion, resulting in significant traffic congestion. The Woodruff Road Corridor Study addresses these issues and makes recommendation on how to redesign and redevelop the corridor using smart growth principles. Suggestions include an investigation of alternate modes of transport, including transit and bicycle-pedestrian options to reduce the amount of vehicular traffic.

2.3.11 City of Mauldin Comprehensive Plan (2009)

The City of Mauldin's Comprehensive Plan establishes two guiding principles for transportation improvements 1) it is important to build complete streets with facilities for pedestrians and cyclists and 2) provide connections between and among compatible land uses.

No fixed route bus services are currently provided in the City of Mauldin. A feasibility study was completed in 2005, which recommended initial service connecting Simpsonville and Mauldin to the Haywood Mall area.

Funding has now been secured by the Greenville Transit Authority through the American Recovery and Reinvestment Act (ARRA) to begin a limited stop commuter transit route connecting Mauldin with Greenville and Simpsonville along the I-85 corridor. In addition to these ARRA funds, over $1.3 million has been reserved by the GTA for purchase of three transit buses and associated equipment for this service.

2.3.12 City of Simpsonville Comprehensive Plan 2030 (2009)

Simpsonville's Comprehensive Plan has identified objectives for transportation. Two of the objectives related to mass transit are as follows: 1) develop a multi-modal transportation system that encourages pedestrian and bicycle usage; and 2) develop a multi-modal transportation system that promotes an integrated mass transit system that addresses local and regional needs. The second objective is further clarified as follows: 1) Strategy T.3.1 "Ensure that any public mass transit services provided within the City of Simpsonville are at an acceptable economic cost to the City"

and 2) Strategy T.3.2.: "Promote transit use by encouraging appropriate densities at potential transit locations".

2.3.13 Fountain Inn Master Plan (October 2005)

The City of Fountain Inn completed a Master Plan in 2005 to guide future development and redevelopment in their community. The recommended implementation items that the City should focus on in the short term (5 year time frame) relate to Main Street improvements, building improvements, gateways and signage, new housing developments, new open space opportunities and strategies to encourage economic development initiatives.

2.3.14 GTA (Greenlink) Transit Vision Master Plan (2009)

The Greenville Transit Authority (GTA) (aka Greenlink) has recently initiated a Master Plan to identify future transit needs and a vision for future services. The study will help identify a dedicated funding source for transit services.

2.4 Data Collection

Data was collected from a variety of sources. Geographic Information Systems (GIS) mapping data was provided to the project team from Greenville County Transportation Planning Department and used for all of the maps produced in the report. Field visits were conducted to determine track and corridor conditions and to observe activity and development along the transit corridor and in the potential station areas. Information regarding existing transit services was received from the Greenville Transit Authority (GTA). No data was collected directly from the CPDR and there has been only limited coordination with railroad officials regarding this study to date.

2.5 Socio-Economic Conditions

2.5.1 Population

The population for Greenville County has been steadily increasing over the decades. In 1980, the county's population was 287,943. In 2000, the population was 379,616, a 32% increase. Current population (2007) is 428,243. 2030 projections by the Greenville County Planning Commission estimate that 2030 population will be 543,822, a 43% increase from the year 2000. Most of this growth is expected to occur in the same areas where population is currently the greatest – in areas surrounding downtown Greenville, and along the transit corridor, particularly in areas west of Interstate 385 in Mauldin and Simpsonville. Refer to Figures A1 and A2 in the Appendix.

2.5.2 Race, Age, Income, and Vehicle Ownership

The county racial makeup is 76% Caucasian, 18% African American, and 6% Hispanic/Latino. Most minorities live in the neighborhoods surrounding downtown Greenville as show in Figure A3 in the Appendix.

The median household income for Greenville County (1999 data) is $41,850 which is about $4,000 greater than the State of South Carolina's median income. Per capita income in the county is $22,081 while the per capita income for the state is $18,795. In 2007, 10.8% of the families in the county were considered to be living in poverty. Along the transit corridor, household income is lowest in neighborhoods surrounding downtown Greenville, while household income is greatest in south Greenville, in Mauldin and in Simpsonville. Lower income families are more reliant on public transportation. Refer to Figure A4 in the Appendix.

Twelve percent of individuals in the county are age 65 or older. Many seniors are dependent on transit for their travel needs.

The lack of a personal vehicle will increase the dependency on public transit. Of the 47,585 renter occupied households in the county, approximately 16% do not have a vehicle available. This number is greatly reduced for the 101,971 owner occupied households; 3.6% do not have a vehicle available.

2.5.3 Employment

Existing and 2030 employment density data are shown in Figures A5 and A6 in the Appendix Most of the area slated for greater density by the year 2030 is primarily along the transit corridor, on the east side of Interstate 385, as well as surrounding downtown Greenville.

Figure A7 in the Appendix shows major employers, over 100 employees each, within and outside one mile from the study corridor. There are four significant employers with over 750 employees each located near the corridor: Space Services LLC, Greenville Technical College, Bi-Lo LLC and Kemet Corporation There are also numerous larger employers located in downtown Greenville and along Laurens Road. Other major employers are outside the one mile area.

2.6 Land Use

As shown in Figure A8 in the Appendix, the corridor varies in terms of land use. In downtown Greenville the land use is primarily commercial. Outside of the downtown to the northeast of Pleasantburg Drive the land use is primarily residential with some commercial. As the corridor proceeds to the south, the corridor varies between industrial land uses and undeveloped parcels. In the City of Mauldin, the corridor is primarily industrial or undeveloped parcels, surrounded by residential. In the Simpsonville area, there are large areas of residential and industrial parcels. Land use near Fountain Inn is primarily industrial or undeveloped.

Within the City of Greenville along the corridor, there are three primary developed areas that contain a mix of employment uses, higher density residential uses, and a variety of other uses. These areas are downtown Greenville, Pleasantburg Drive/Haywood Road, and Millennium Campus/Woodruff Road. In downtown Greenville, there are major employers as well as a mix of residential and commercial uses. The downtown retail shopping district has been successfully rejuvenated within the last ten years and is a gathering location for residents and visitors. Also within this area are the Bi-Lo Center, an indoor entertainment arena, and the Peace Center for the Performing Arts.

Near the Pleasantburg Drive /Haywood Road area, the land uses are primarily commercial and industrial; the area near the transit corridor has several older developments that are underutilized. The Carolina First Convention Center is located north of the transit corridor near I-385 and Pleasantburg Drive. The convention center features 280,000 square feet of exhibit space and 60,000 square feet of meeting and conference space. The Haywood Road area immediately near the transit corridor is a mix of lower density commercial uses. Within close proximity to the transit corridor near Pleasantburg Drive is the Greenville Downtown Airport the busiest general aviation airport in the state. The airport is home to more than 25 aviation-related businesses and 453 jobs.

The Millennium Campus area contains two developments of significant proportions, Verdae and Clemson University/ICAR Facility. The Verdae development, located within an area defined as I-85/Woodruff Road and Laurens Road, is currently under development. When fully built out, the development will contain a resort hotel, golf course, shopping, higher density residential units and a business office park. The business park will contain 160,000 square feet of Class A office space intended for high-tech tenants. The Marketplace Shopping Center, located on the corner of Woodruff Road and Laurens Road, will have close to 280,000 square feet of retail space. Additional features in the development will include hotels, a 20 acre park, a health and wellness facility, an amphitheater, and approximately 750 single family and 200 attached homes in a traditional walking neighborhood.

The Clemson University International Center for Automotive Research (CU-ICAR) is a 250 acre advanced technology research campus. The development is composed of five technology neighborhoods each designed for optimizing an innovative and collaborative environment. A few of the office buildings have been developed, with plans for additional buildings on the campus.

Figure A9 in the Appendix shows the Millennium Campus (also called the Upstate Link) Master Plan.

In addition to the developments mentioned above, there are numerous community facilities along the rail corridor including two hospitals, recreational uses, schools, several churches and other institutions. Refer to Figure A10 in the Appendix.

2.7 Environmental Conditions

There are several historical and archeological sites within 1/4th mile of the transit corridor in downtown Greenville. These sites are shown on Figure A11 in the Appendix.

Recorded wetlands are located near Verdae Boulevard in close proximity to the corridor. It is not known if there are other wetlands that have not been recorded as of yet in other areas of the corridor.

Threatened and endangered species in Greenville County are listed in Table A1 in Appendix A. It is not known if any of the plant species or animal habitats are located within close proximity to the corridor.

Two Superfund sites are located at the south end of the corridor shown in Figure A11 in the Appendix. A Superfund site is an uncontrolled or abandoned location where hazardous waste is located, possibly affecting local ecosystems or people. These sites are listed by the Environmental Protection Agency (EPA) and targeted for clean up.

Additional environmental investigation will need to be conducted during the design engineering phase.

2.8 Existing Transit[1]

Currently, the Greenville Transit Authority (GTA) provides the only fixed route public transit service in the GPATS region. GTA was established in 1975. Its service area is 148 square miles centered around the City of Greenville. The municipalities that surround Greenville, including the cities of Mauldin, Simpsonville, and Fountain Inn, do not have fixed route service. A study was conducted in 2005 to explore potential transit extensions to the cities of Mauldin and Simpsonville but the recommendations were not implemented due to a lack of local funding commitment from either municipality.

GTA operates a traditional “hub and spoke” service with the hub located at the GTA Transfer Center Station in downtown Greenville. GTA operates 12 spoke routes and 1 cross-town route. The cross-town route does not serve the Transfer Center Station. All routes operate on 60-minute headways except for Route 1 which operates on 30 minute headways. Service is generally provided between 5:30 a.m. and 7:30 p.m. with some routes operating on Saturdays and none on Sundays.

Figure 2-2 shows the existing GTA routes that operate within the transit corridor study area.

Intercity public transit services are provided to Greenville by Amtrak and Greyhound. Amtrak provides a stop in the City of Greenville along the Crescent Line operating between New Orleans and Washington D.C. One southbound train and one northbound train serve Greenville daily. The station is located at 1120 W. Washington Street on the west side of the downtown. Greyhound stops at the intermodal terminal on McBee Street in downtown Greenville ten times daily with service along the I-85 corridor.

[1] GPATS Long Range Transportation Plan, Kimley-Horn and Associates, November 2007

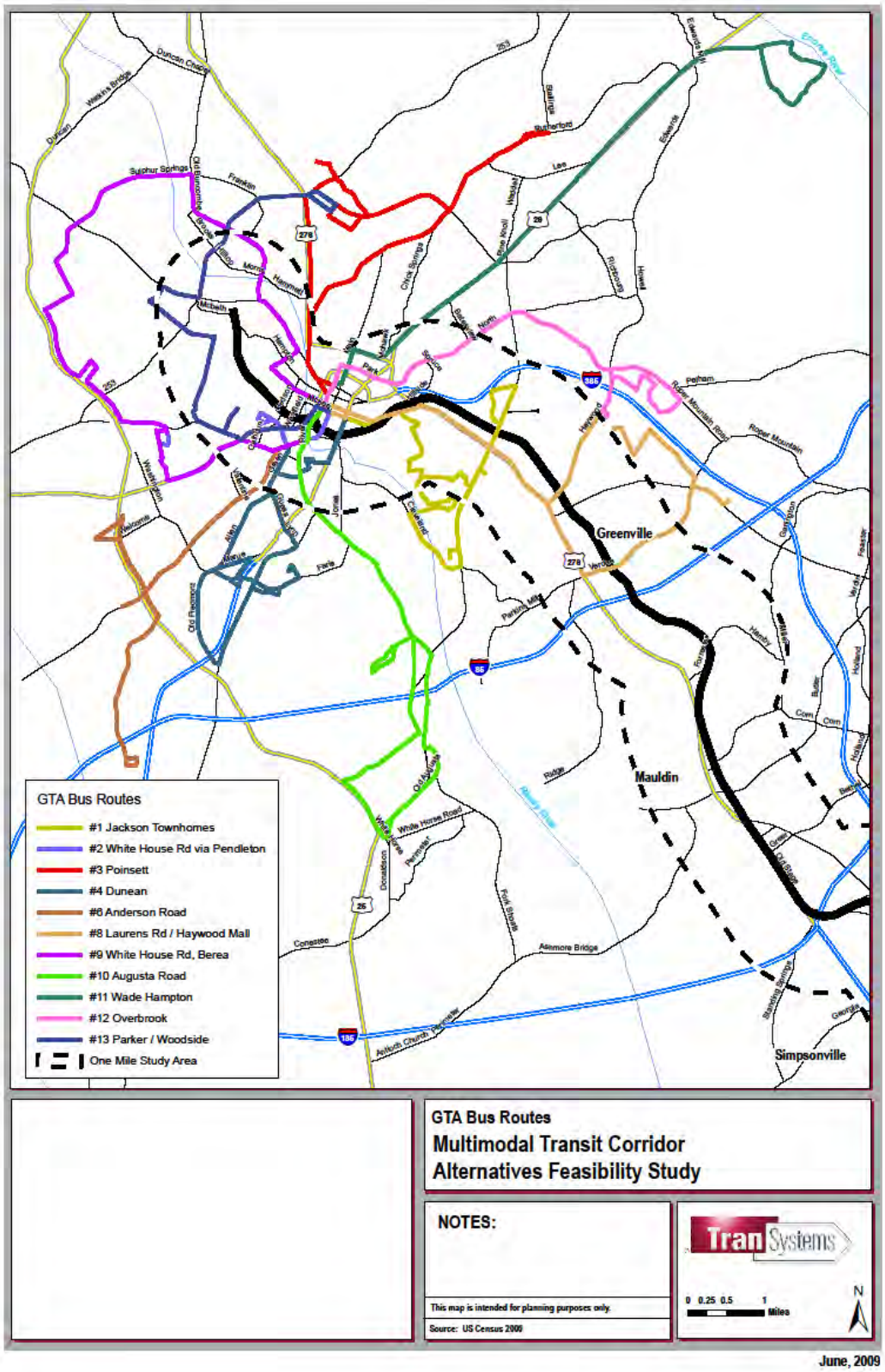


Figure 2-2: GTA Bus Routes

2.9 Existing Traffic Conditions

In the Greenville-Pickens Area Transportation Study (GPATS) Metropolitan Planning Organization area, the population is expected to grow 25% between 2000 and 2020 to a total population of 614,140. This expected increase in population will continue to place pressure on area roadways to handle the expected growth in travel demand. As stated in Section 2.3.3 of the GPATS Long Range Transportation Plan (November 2007), many of the study area roadways and highways are already approaching capacity or are at capacity. The worst congestion in the GPATS area occurs along the freeways and arterials in the Greenville area. Within the study area, the segment of I-385 that is "approaching capacity" is south of Bridges Road in Mauldin to Fountain Inn. However, this does not account for the recent widening of I-385 to six lanes from Harrison Bridge to US 276 in Simpsonville. The segment within the study area which is "at capacity" is Laurens Road, north of Bridges Road to the I-85 interchange. Route 185 is approaching capacity east of I-385. Other corridors approaching capacity within the study area are Woodruff Road - east of I-85, and north Main Street (US 276) - exiting Mauldin to the north as it nears I-85. Refer to Figure 2-3 (Figure 3-2A) for congested roadways within the study area.

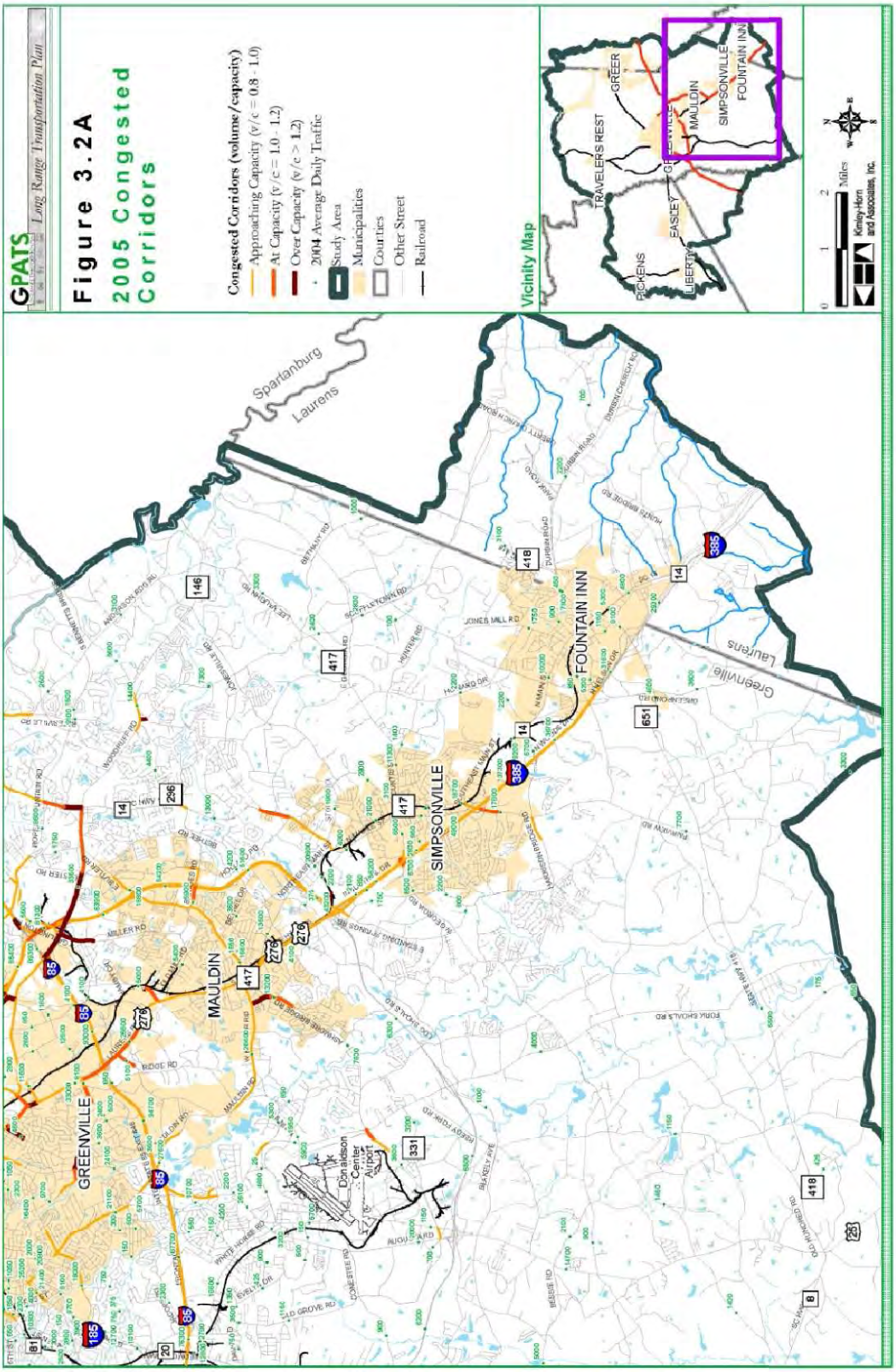


Figure 2-3: Congested Roadway Corridors

3.0 Public Involvement

Public involvement is integral to the entire study. As part of the study process there have been several stakeholder interviews and two public meetings to gather input and pertinent data for the study process. In addition, a comment card was available on the Greenville County Planning Department website that could be filled out and returned. The following details the results of these meetings.

3.1 Stakeholder Interviews

Several stakeholders were interviewed to gauge issues and opportunities and to collect data related to the transit study. The following describes the persons or groups who were interviewed and what information was collected.

City of Greenville – Discussions were held to gauge the City's interest in the transit corridor.

City of Greenville Economic Development Department- The city's Economic Development Department was contacted to collect information on relevant projects planned or underway and their perspective on the development of the corridor as a transit corridor.

The City of Greenville Planning Department –Information was collected regarding relevant master plan information, status of Haywood Road Plan, current and planned zoning implications including status of future TOD guidelines, and input and contact information for additional stakeholders.

The City of Greenville Community Development Department – The Community Development Department was contacted regarding relevant housing plans, role of public transportation in community development, process for integration of affordable housing into mixed use TOD design, and input and contact information for important stakeholders.

Greenville County Planning Department – Met with staff members to gather information regarding the transit corridor, including historic data and information on the GPATS transportation model.

City of Mauldin – Discussions were held with the City to gauge the City's interest in the transit corridor.

City of Simpsonville - Discussions were held with the City to gauge the City's interest in the transit corridor

City *of Fountain Inn* - Discussions were held with the City to gather information on their interest in the transit corridor. Information on new developments and plans for the downtown was collected.

Major Property Owners - Representatives from Verdae Properties, Clemson University ICAR (CUICAR) Research Facility, and two owners of property near the corridor by Pleasantburg Drive were interviewed. All representatives were supportive about transit in the corridor provided that the project could be quickly implemented. They feel that the quickest and most cost efficient mode of travel would be bus and bus rapid transit (BRT). They expressed concern that some resident groups will oppose the project as these groups don't feel transit brings any value to the county and that it would only serve the upper middle class.

Upstate Forever - Upstate Forever was interviewed to determine their support for transit. They support public transit for the many environmental benefits it brings, including reduction of the carbon footprint, reduction of sprawl and more compact communities, improved air and water quality, and healthier, walkable communities - in short, providing a vision for sensible growth in the Upstate.

3.2 Public Meetings

The first public meeting was held on Tuesday, July 7, 2009 from 6:00 to 8:00 p.m. at the Greenville County offices. The meeting was advertised through email contact with various interest groups and by a meeting notice posted on the County website. Public meeting notices were also sent to the local newspapers. The meeting was held in an Open House format. The meeting was used to educate the attendees on the scope of the project, existing conditions of the study area, proposed station locations, and potential transit alternatives. Attendees could come to the meeting any time within the two hour timeframe and view exhibits and ask questions. A comment form was also available at the meeting for attendees to fill out and return. Approximately 30 people attended the meeting.

A second public meeting was held on Thursday, November 19, 2009 from 6:00 to 8:00 p.m. at the Greenville County offices. Similar to the first public meeting, the meeting was advertised through email contact with various interest groups as well as a meeting notice posted on the County website. Public meeting notices were also sent to the local newspapers. Similar to the first meeting, the meeting was held in an Open House format. The meeting built off the information presented at the first public meeting in order to educate the attendees on the scope of the project, proposed station locations and potential transit alternatives, as well as presenting ridership estimates, cost estimates, and transit oriented development principles appropriate for the different station areas. Attendees could come to the meeting any time within the two hour timeframe and view exhibits and ask questions. A comment form was also available at the meeting for attendees to fill out and return. Approximately 25 people attended the meeting.

After both public meetings, exhibits were posted on the County's website for those people interested who did not attend the meeting. These exhibits are incorporated throughout this report.

3.3 Public Comments

A comment form was provided at both public meetings and was also available on the county's website for additional community input (see Appendix B). Fourteen people returned the form with comments. A brief synopsis of the comments follows:

1. **Do you think transit service would be beneficial to the corridor? Why or why not?**
   All respondents except one said yes. Most cited that there was a need for transit to encourage economic development, reduce congestion and improve air quality. The respondent that said no pointed to the presence of existing bus service that is underused and therefore, there was no need to invest in additional transit services.

2. **Would you envision using transit along this corridor to get to work?**
   Three said they would not use transit to get to work, one responded possibly, and the balance said yes.

3. **Would you envision using transit along this corridor for recreational or other types of trips?**
   Two said they would not use the transit service for recreational uses but the balance said yes they would.

4. **Would you utilize the bikeway that is proposed within the corridor?**
   Four respondents said no and the balance said yes they would use the bikeway proposed within the corridor.

5. **Do you have other thoughts on transit modes or alternatives that we might have missed:**
   Responses to this question included requests to look at expanded bus routes and to support bus rapid transit (BRT) both east-west and north-south.

6. **Please write down any additional comments that you might have regarding transit and a bikeway along this corridor:**
   Comments received included:
   - The corridor is the backbone for supplemental connecting linkages along established routes- Pleasantburg, I-85, I-185, Georgia Road/Route 417, etc. which further connects all parts of Greenville County.
   - Greenville has the potential to have a transit system of a European city
   - Just as the redevelopment of Greenville's downtown took visionary leadership, so too will the development of a public transit system
   - The transit should include links with bicycle/pedestrian networks and support the downtowns
   - The design should include multi-modal travel, i.e., bus/rail and pedestrian/bike
   - Include pedestrian amenities at appropriate points
   - Bikeway/greenway must accompany transit for TOD to succeed
   - Time is of the essence and timetables need to be set and met
   - Thanks for taking Greenville in a responsible, resident-friendly direction; this is great
   - Mauldin has voted unanimously to explore Bus Rapid Transit to connect with Greenlink
   - Who is funding?
   - Bike paths would be great; this should be incorporated for health/recreational potential for all citizens
   - It will serve as a critical transportation, recreation, and economic development corridor
   - Bikeway would be great for recreation
   - Installing rail service on existing abandoned lines that don't even reach all the way downtown would be a massive waste of resources
   - I would like a bike/walking path added to the proposed rapid transit system

3.4 Steering Committee and Greenville County Department of Planning

A Steering Committee consisting of members of the GCEDC provided direction and guidance during the course of the study. The GCEDC meets on a regular basis and were updated as to the status of the project, provided information on the public input process, and received copies of the draft reports for review and comment. Participants on the Steering Committee are listed in Appendix B.

In addition, the staff of the Greenville County Department of Planning provided invaluable support, technical guidance and data to the study.

4.0 Existing Rail Corridor Conditions and Constraints

4.1 Rail Corridor Limits and Segments

The transit corridor under evaluation is an approximately 18 mile rail corridor. The Greenville County Economic Development Corporation (GCEDC) owns 3.42 miles, and the balance is owned by RailAmerica (formerly Railtex) on which the Carolina Piedmont Railroad (CPDR), a division of the South Carolina Central Railroad Company, Incorporated operates freight service. It is a single track operation for the entire length of the study corridor. See Existing Conditions Maps (Figure A12) in the Appendix.

The GCEDC property extends from a point near Pleasantburg Drive (SC-291) on the north to the General Electric (GE) spur track turnout (immediately north of Forrester Drive) on the south. As a result of purchasing negotiations between RailTex and the GCEDC, the Carolina Piedmont Railroad leased back the GCEDC owned track in order to store empty rail cars.

North of Pleasantburg Drive, the tracks have been removed and the corridor is owned by a variety of property owners. The former corridor remains vacant between Pleasantburg Drive and to the point it is near the intersection of Laurens Road (Highway 276) and Washington Street. West of this point, the former right-of-way has been built upon and a large trestle bridge which once carried the tracks over Richland Way within Cleveland Park has been removed.

South of the GE spur track, the study corridor is an active freight corridor operated by the CPDR. For purposes of this study, the corridor extends along the CPDR right-of-way until the grade crossing at Hunts Bridge Road in the City of Fountain Inn. The City of Fountain Inn is considered to be the terminus of this study. The CPDR continues south of Fountain Inn.

For purposes of right-of-way analysis, the corridor study area was divided into five segments:

Segment A: Downtown Greenville to Pleasantburg Drive
Segment B: Pleasantburg Drive to Knollwood Drive/Forrester Drive
Segment C: Forrester Drive to I-385/I-185 Interchange
Segment D: I-185/I-385 Interchange to 0.5 miles north of Harrison Bridge Road
Segment E: 0.5 miles north of Harrison Bridge Road to Hunts Bridge Road

With the exception of Segment A, all of these segments follow the existing rail tracks. Alternatives for Segment A are discussed in Chapter 7.

A display of these segments is shown in Figure 4-1.

4.2 Right-of-Way

The available right-of-way (R.O.W.) in the transit corridor varies considerably throughout the study area. GIS and parcel data was used to determine right-of-way widths along the corridor. This information was recorded so that as alternatives are developed, it could be determined what type of right-of-way issues existed. It was found that some segments maintain a 200 foot wide R.O.W., other segments maintain a 40 foot, and some have indeterminate widths. In order to properly determine available right-of-way however, a property record search would need to be conducted during the design phase. Appendix C shows the right-of-way restrictions within the corridor. They are described below.

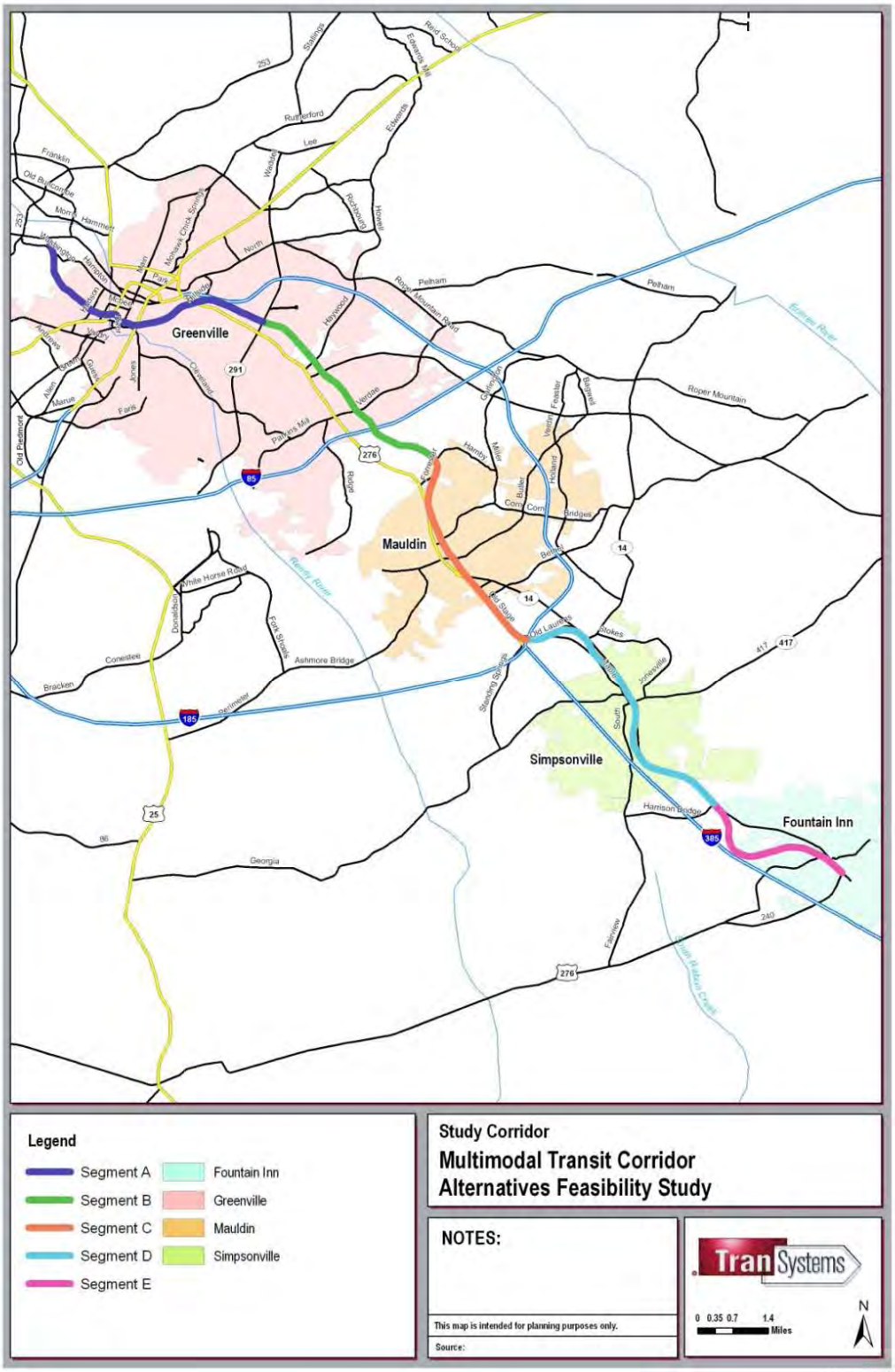
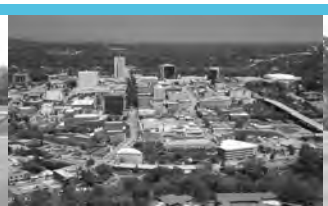
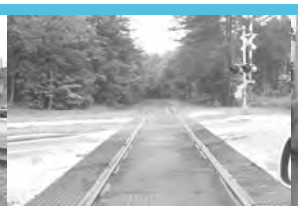
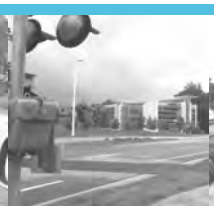


Figure 4-1: Rail Corridor Segments


Typical crossections have also been prepared for the different transit alternatives being discussed in this study and are also presented in Appendix C.

4.2.1 Segment A

Segment A is the segment from downtown Greenville to Pleasantburg Drive. The former railroad R.O.W. has been sold off to various property owners. A portion of the R.O.W., from a point near the Washington Street/Laurens Road to Pleasantburg Drive is vacant and could possibly be purchased and restored to transit use. The portion of the former railroad between downtown Greenville and Washington Street/Laurens Road has been built on and cannot be restored for transit use. Alternatives for this porition of the study corridor are presented in Chapter 7.

4.2.2 Segment B

Between N. Pleasantburg Drive and Airport Road, there are a number of restrictions within the R.O.W. which reduce the effective R.O.W. to between approximately 130' to about 65'. Between Airport Road and Haywood Road, the R.O.W. ranges from approximately 108' then widens to about 165' and then narrows again to 143' and again to about 75' just before Haywood Road. After Haywood Road, the R.O.W. widens to 200' to Millennium Avenue. There is a slight restriction down to 114' but then it widens out again to 200' at Forrester Drive. There are some building encroachments into the R.O.W. near Woodruff Road (see Figure 4-2). Legal descriptions of the properties are available and encroachment issues would need to be dealt with in the future.

Figure 4-2: Building encroaching into R.O.W. south of Woodruff Road

4.2.3 Segment C

The right-of-way varies between Forrester Drive and Butler Road from 40' to 200'. It then varies from 60" to 145' between Forrester Drive to I-185.

4.2.4 Segment D

Segment D appears to have the most restrictions in right-of-way with the right-of-way being reduced to just the track width at Curtis Road. It is widest on the north end of Curtis Road (175') but then narrows down and varies between 0' and 130' at Pride Road.

4.2.5 Segment E

Segment E ranges in right-of-way between 10' and 200'. The 200' right-of-way is located between Wham Road and Route 418 in Fountain Inn.

Table 1 below indicates the variable R.O.W. widths within each segment of the rail corridor.

Table 1- R.O.W. for Each Segment

SEGMENT	FROM	TO	WIDTH OF R.O.W.*
B	Pleasantburg Drive	Airport Road	65' to 130'
	Airport Road	Haywood Road	75' to 200'
	Haywood Road	Verdae Boulevard	200'
	Verdae Boulevard	Millennium Avenue	200'
	Millennium Avenue	Forrester Drive	114' to 200'
C	Forrester Drive	Butler Road	40' to 200'
	Butler Road	I-185	60' to 145'
D	I-185	Curtis Street	50' to 175'
	Curtis Street	Pride Road	0'to 130'
E	Pride Road	Wham Road	100'
	Wham Road	Route 418	100' to 200"

*Note that there are building encroachments within the right-of-way in various parts of the corridor restricting the stated width

4.2.6 Encroachments

In addition to variable R.O.W. width, an additional issue is associated with structures built inside the rail R.O.W. as noted above. As can be seen below in Figure 4-3, several buildings cross parcel lines bringing the buildings significantly close to the tracks. This location is in the City of Fountain Inn. Buildings built on what appears to be railroad R.O.W. occurs in various sections along the study corridor.

Figure 4-3: Structures built within the parcel lines near Georgia Street in Fountain Inn

Numerous sites in the rail corridor also have buildings in close proximity to the tracks, although just outside the parcel lines. In these sites, the R.O.W. indicated by the parcel lines varies, but is typically considerably less than 200 feet. Photos of buildings shown in close proximity to the tracks at Haywood Road in Greenville are shown in Figure 4-4. The R.O.W. north of Haywood Road is approximately 75 wide with structures built only a short distance outside of that R.O.W.

Figure 4-4: Haywood Road in Greenville

These inconsistencies in R.O.W. width and encroachments into the R.O.W. create the need to consider various options when planning the transit corridor. Right-of-way might need to be purchased and certain building encroachments into the R.O.W. would need to be resolved depending on what transit alternative is selected

4.3 Horizontal Curves

Numerous horizontal curves exist in the track which could restrict speeds for any of the rail transit alternatives. Calculations were generated to determine the approximate maximum allowable passenger train speeds for each curve. These horizontal curves can be seen in the Existing Conditions Maps (Figure A12 in the Appendix) and a sample photo is provided in Figure 4-5.

As stated in Section 3.1, the corridor was divided into segments for analysis purposes. No tracks exist in Segment A. Segment B, Pleasantburg Drive to Knollwood Drive, contains horizontal curves that would restrict speeds to as low as 35 mph, while the remaining segments have horizontal curves that would restrict passenger operations to 40 or 45 mph.

Flattening (re-alignment) of these curves to allow for faster speeds may potentially require land acquisition, construction of new track and earthwork, residential and commercial relocation, relocation of highway grade crossings, environmental assessment and permitting, and drainage relocation and development in some areas of the corridor. Potential impacts will need to be determined during the design engineering phase.

Figure 4-5: A horizontal curve near Craig Street in Fountain Inn

4.4 Track Conditions

Track conditions vary significantly throughout the rail corridor. In general, track conditions are better in the southern portion of the alignment, and worse in the northern portion of the alignment with the main exception being the track in the vicinity of Woodruff Road where a new bridge has recently been installed. A general summary of track conditions is shown in Table A2 in the Appendix. Photos of track conditions at various sites can be found on the Existing Conditions Maps and two sample photos of track conditions are provided below in Figures 4-6 and 4-7.

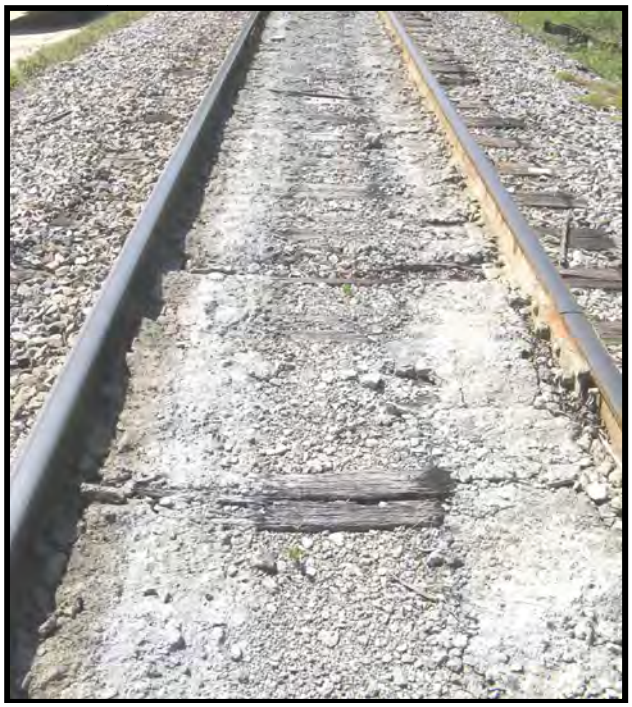


Figure 4-6: Poor track conditions at Pelham Road in Simpsonville

Figure 4-7: Track conditions at Woodruff Road in Greenville (excellent ballast and ties, rusty rail)

4.5 Grade Crossings

There are approximately 45 to 50 at-grade roadway / rail crossings in the corridor. These vary from small single industry access roads to large four-lane highways. The majority of these crossings have no gates, no bells, and no flashing lights. This is the case for nearly all small access roadways and even for the majority of the two-lane collector roadways. Figure 4-8 shows a typical at-grade crossing found throughout the rail corridor.

Should passenger service commence on this track in the future, most of these crossings would need to be upgraded to include full crossing protection, some could be closed, and some could be grade separated. These infrastructure improvements would constitute a significant capital investment.

Figure 4-8: Richardson Street, Simpsonville, grade crossing with no protection

4.6 Track on Embankment

In several locations throughout the corridor the single track is partially elevated on an earthen embankment. In some sites the adjacent land falls away from the elevation of the top of rail by as much as ten to fifteen feet. If the selected transit alternative requires a second track or a pathway next to the existing track, significant quantities of earthen fill would be needed along additional drainage structures. Figure 4-9 shows the track on earthen embankment near Industrial Drive in Simpsonville. Adjacent to the tracks is a large ditch filled with vegetation.

Figure 4-9: Tracks on earthen embankment near Industrial Drive, Simpsonville

4.7 Signaling

No portions of the existing rail corridor are signalized for rail traffic. Should any future rail based passenger service be initiated on this track the entire length of the corridor would need to be signalized.

4.8 Structures

The existing track runs over a few major structures, passing over and above:

- I-385
- A small creek southeast of Millennium Drive
- A small creek west of the Verdae Greens Golf Course
- Woodruff Road (See Figure 4 -10)

The rail R.O.W. is limited by the width of each of these structures which vary from 11 feet to 24 feet wide. In order to implement any the rail transit alternatives, it may require capital investment in either the alteration of existing structures or the addition of new ones.

Figure 4-10: Woodruff Road structure

4.9 Freight Traffic and Industrial Clients

The CPDR currently operates freight traffic at all hours of the day and has no set schedule. Between Fountain Inn and the GE turnout, a few large industrial clients have active spurs leading from their facilities to the tracks. Data is not available to determine average number of freight trains per day but based on field observations, it does not appear to be substantial.

Figure 4-11 below shows freight cars being stored on an adjacent siding track for the adjacent Cryovac industrial plant in Simpsonville.

Figure 4-11: Siding track for the Cryovac industrial plant in Simpsonville

On the GCEDC right-of-way, north of the GE turnout, the tracks are used only for storage. Empty CPDR freight cars sit on the tracks for a few months at a time and are moved in and out of the area every so often for use.

5.0 Transit Mode Technology

The following reviews the different transit modes that were considered for the proposed transit corridor.

5.1 Commuter Rail (CR)

Commuter Rail is intended to carry large volumes of passengers with stations spaced in the 3-5 mile range. It is oriented to the peak period and typically serves suburban residents commuting to downtown employment centers. Usually, trains consist of one locomotive and several passengers cars which accommodate approximately 140 riders per car. Commuter rail is typically diesel powered and can operate on tracks shared with freight traffic. Figure 5-1 below shows an example of commuter rail in Nashville, Tennessee.

Figure 5-1: Nashville Music City Star Commuter Rail

5.2 Heavy Rail Transit (HRT)

HRT, also called Metro, typically operates grade separated and is electrically powered. It can operate on the same type of tracks as commuter rail or freight trains. HRT typically carries extensive volumes of passengers in heavily urbanized metropolitan areas with high frequencies. Stations are spaced 1-2 miles apart. Trains usually operate with several passenger cars which accommodate 65 plus riders per car. Due to the required grade separation, heavy passenger loads, and electrification associated with this mode, it is not thought that this mode is a viable alternative for the GCEDC corridor and has been removed from further consideration.

Figure 5-2: A MARTA HRT train in Atlanta, GA

5.3 Light Rail Transit (LRT) /Diesel Light Rail Transit (DLRT)

Light rail transit (LRT) is an electrically powered rail passenger system used for urban transportation, typically used on shorter routes than those covered by commuter rail. LRT typically operates at grade within a dedicated right-of-way. It can also operate in mixed traffic on street. LRT is capable of high speed (55 mph) when in an exclusive right-of-way. Stations are generally spaced at minimum of half mile intervals. LRT typically operates with at least two car consists, each car can accommodate approximately 64 riders. LRT systems operate with overhead catenary wires and poles required for electrification. If the system is diesel powered, the mode is referred to as diesel light rail transit (DLRT). DLRT has similar characteristics as LRT. Both options could operate on the existing tracks and within the street in mixed traffic on new tracks. Figure 5-3 shows an LRT train in Charlotte with overhead catenary wires and poles required for electrification. Figure 5-4 shows a DLRT system in New Jersey operating in the street.

Figure 5-3: Charlotte LRT

Figure 5-4: NJ Transit's RiverLINE DLRT

5.4 Streetcars (STC)

Streetcars are electrically or diesel powered vehicles designed to travel in urban cores and serve a wide variety of trip types over shorter distances. The cars are “light weight” and maneuverable. They have fast acceleration and can travel quickly between shorter spaced stations, typically within mixed traffic in the street. They accommodate a lower ridership because each train only has one car and each car accommodates approximately 50 riders. The vehicles can be modern or historic replicas as shown below.

Figure 5-5: New Orleans historic replica streetcar

Figure 5-6: Portland, OR modern streetcar

5.5 Bus Rapid Transit (BRT)

A bus rapid transit (BRT) system is a bus operating strategy that uses reserved transitways or lanes, express operations, special vehicles, enhanced passengers facilities, and other means for buses to emulate the reliability and convenience of rail transit. Transitways can be designed for conventionally steered buses (Figure 5 -7) or for Curb Guided Bus (CGB) operation (Figure 5 -8). This latter option allows buses to operate at high speed in a right-of-way barely wider than the bus itself. BRT vehicles can also operate on street within mixed traffic as a standard bus would do. BRT buses are usually more highly styled than standard buses. Vehicles accommodate 40 to 60 riders. Typical station spacing is 1-2 miles apart. Buses operate on shorter headways (or frequencies); 5 to 10 minutes apart ideally.

Figure 5 -7: Eugene, OR BRT

Figure 5-8 Cambridge, England guided bus

6.0 Case Studies

The following case studies were selected as background information to this study. They reflect transit systems that were recently initiated in corridors or areas of the country that reflected similar characteristics to Greenville, South Carolina.

6.1 Charlotte, North Carolina LYNX (LRT)[2]

6.1.1 Background

Similar to many cities in the southern United States, Charlotte has experienced a rapid increase in population since the mid-1970's, largely fueled by the region's significant financial and banking sector. Its establishment as a central city in the 1880s was due to its railroads; it was an active railroad hub with three major railroads coming together in the middle of the city. The prominence of railroading driving Charlotte's economy gradually declined in the twentieth century and the banking and financial industries took over, bringing with it new residents. With the rapid influx of new population, the region's roadway system quickly got inundated with traffic. The Charlotte Area Transit System (CATS) struggled to meet the demand for transit service through an expanded bus network, with the thought that the existing railroads could provide a foundation for future transit service.

Figure 6-1: Charlotte Lynx

The original Charlotte & Columbia Rail Line, which was purchased by Norfolk & Southern Railroad, was the first to be developed into a transit corridor. The line originates in downtown Charlotte, then heads south to the town of Pineville and the South Carolina border. It parallels the heavily-congested Interstate 77, the region's main north-south arterial about a half mile to the west. After many years of negotiations with the Norfolk & Southern, the City initiated streetcar service in 1996 on a 1.8 mile section of the track. Due to the initial success of the streetcar, more track and infrastructure was renovated to allow the streetcar, or Charlotte Trolley, to operate two miles along the Norfolk Southern Line. The renovations included a new bridge, replaced rail bed, tracks, signals and electrification. The work, completed on June 28, 2004, was designed to be compatible with the eventual introduction of light rail trains on the route. It signaled a new found synthesis between rail transit and economic development in the region. The City Council created the Historic South End Municipal Service District in 2001; along the two-mile corridor, property values have increased by nearly 90% and $600 million of development has occurred on 800,000 square feet of land.

On February 26, 2005, ground was broken for the South Corridor Light Rail Line, a 9.6 mile extension of the Charlotte Trolley line. Due to the city's professional teams- the NFL Panthers and the NBA Bobcats, as well as the planning agency called CATS, the new light rail would bear a similar moniker—LYNX –also a nod to the improved connectivity and mobility presented by the service. Project leaders selected a sleek new vehicle to deploy on the route, the Siemens' Avanto light rail cars. On November 24, 2007, only two years after construction began, LYNX operated for service.

[2] *"Charlotte Lynx: A Rail History Lesson",* Rail, Spring 2009

Initial projections pegged ridership at 9,100 for the first year climbing to 18,100 by the year 2025. However, in the first year, LYNX actually doubled the ridership estimate. Expansion of LYNX to five different transit corridors emanating from the downtown, are in various stages of planning. There are also plans to expand the original line, now known as the Blue Line, 11 miles to reach the University of North Carolina at Charlotte.

6.1.2 Cost

The initial two mile trolley segment cost $16.7 million and was financed by the City of Charlotte. Investment from federal sources was matched with the local sales tax revenues to generate the $462 million expanded (9.6 mile) South Corridor Light Rail line. In 1998, the Mecklenburg County voters approved a one-half cent sales tax to support a multi-year transit plan.

6.1.3 Lessons Learned

In 1998, regional leaders first went to the voters for simultaneous construction of nine rail lines totaling 77 miles that would total $467 million. Citing the substantial scope and onerous price tag, voters soundly rejected the plan. Stung from the defeat of the proposal, CATS withdrew its rail transit plans and focused its attention on acquiring rights-of-way as they became available for purchase or easement. Due to the lessons learned, public officials instead took smaller and more practical steps with future transit implementations, starting first with a 2 mile trolley system and then expanding it to a more complete light rail system. In addition, LYNX, at its opening, was perfectly positioned to capture substantial changes to the region's commuting trends. In the following spring and summer of 2008, gas prices soared to levels not seen in nearly 30 years. The clean, quick and frequent LYNX service proved an enticing option for an increasing number of Charlotte commuters.

6.2 Nashville Music City Star – Commuter Rail

6.2.1 Background

The Music City Star commuter rail line extends from downtown Nashville to Lebanon, 32 miles to the east. It operates entirely on an existing single track railroad which is owned by the Nashville & Eastern Railroad Authority, a public agency.

Figure 6-2: Music City Star Route Map

Construction started in November 2004 with service starting in September 2006. This is the first rail transit service in the Nashville area and is envisioned to be part of a network eventually serving up to six other corridors. This corridor was selected as Nashville's first primarily because of the low cost made possible by its use of the track of a lightly utilized short line.

6.2.2 Cost

Implementation cost $41M million (about $1,285,000/mile), the lowest cost of any commuter rail startup in recent times. Locomotives and coach cars which had been retired by Amtrak and Metra (the Chicago commuter rail operator) were acquired at very low cost and refurbished. Principal costs were for upgrading track and grade crossing protection and construction of modest stations. One new passing siding was constructed. The "no frills" approach has carried over to operations, which require only two trainsets (each consisting of a locomotive and two cars); each of these operate with a two person crew (an engineer and a conductor). Annual operating costs for the service are

about $4 million not including the cost of dedicated connecting buses used for distribution on the Nashville end. Three trips are operated in the morning peak and afternoon peak periods, Monday through Friday; the last morning trip and first afternoon trip do not operate over the entire route enabling the trainset to go back and make a second trip. The service operates at speeds up to 59 mph. It is hoped that this low-budget starter line spurs public support to encourage more local funding for expansion of the envisioned commuter rail system.

The Federal government funded 80% of the capital costs of the project, the state 10%, and local government, the remaining 10%. Federal funds for the commuter rail were pursued through the New Starts funding program. Public funding for operations is shared between the state, the two counties and the municipalities served.

To date, the Music City Star has not been successful in attracting ridership as forecasted. Daily ridership was projected at about 1400 trips per day after one year. Actual ridership peaked at about 900 during the period of high fuel prices in late 2008. It has now fallen to about 610 daily. Responsibility for operation of the service has recently been shifted from the regional planning agency to the Metropolitan Transit Authority- the local bus operator- with the expectation of more efficient operation.

It is thought that several reasons have combined to suppress ridership:

- The service terminates on the edge of downtown; most passengers must transfer to buses to reach their place of employment
- Distance based fares range from $1.65 to $5.00, a fare that some commuters find high
- A very expensive widening of parallel I-40, which significantly reduced congestion, was completed just about the time that the rail service started
- Operation is relatively slow, averaging less than 39 mph in some locations, due to the numerous curves and grade crossings on the line, and the lack of a signal system
- Uncertainty regarding the future of the service (as a result of its low ridership) has made it more difficult to develop higher density Transit Oriented Development (TOD) projects at stations

6.2.3 Lessons Learned

Several lessons can be taken from these results:

- The route must be capable of supported auto competitive travel times (it helps if parallel roadways are congested)
- A requirement for most riders to transfer to a local bus will reduce ridership
- Economy of implementation (such as not straightening out portions of the track to increase speed) could impact speed of travel which impacts ridership

For more Information: http://www.musiccitystar.com

6.3 Austin MetroRail – DLRT

6.3.1 Background

Austin MetroRail is a diesel light rail transit (DLRT) system, not yet implemented, connecting the northwest communities of Austin with downtown Austin operated by Capital Metro. The system is 100% constructed but not in operation. As of June 2009, the system has been delayed due to recurring safety violations and technical problems. It is expected that service will start up in March 2010.

The route is a 32 mile long system operating in a mix of exclusive, shared, and street running in portions of downtown Austin. The system will run on standard (4' – 8.5") rail gauge with maximum operating speed in the 60-75 mph range. The line will operate with seven inbound trains in the morning rush and seven outbound trains in the evening. The reverse commute will have three trains outbound in the morning, and three inbound in the evening.

This first line is has a total of nine stations with a projected per day ridership of 2,000 people.

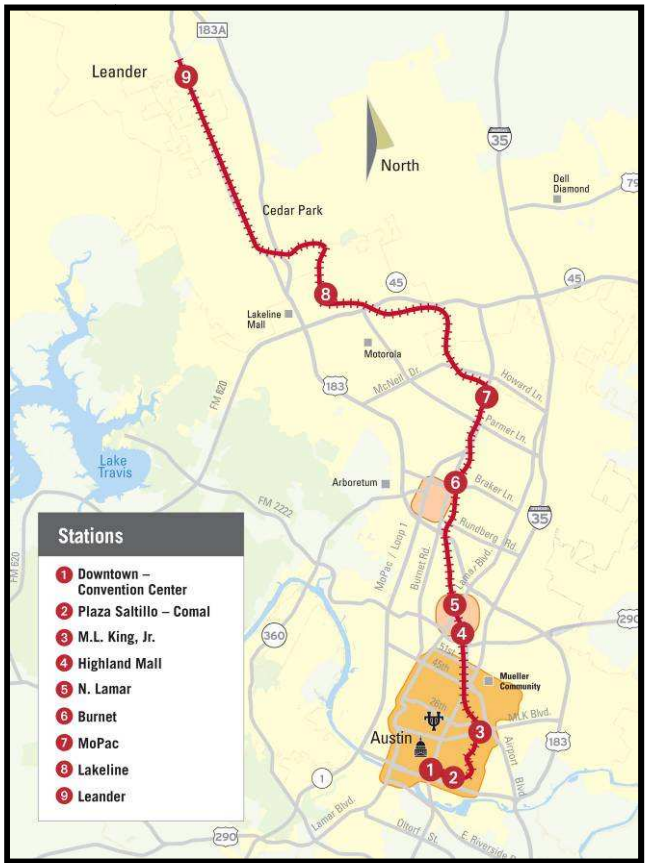


Figure 6-3: Austin MetroRail Route Map

In 2005, Stadler Rail won the bid to build six Stadler GTW diesel powered LRT cars for the system. The vehicles have a capacity of 200 passengers (108 seated, 92 standing). Cars will be ADA compliant and will have a low-floor section and seating typically intended for commuter rail operation and with limited conference table seating.

Figure 6-4: Austin MetroRail during test run

Figure 6-5: Interior of Austin MetroRail DLRT vehicle

6.3.2 Lessons Learned

Due to incidents in February 2009 where two engineers operating MetroRail trains entered a section of track without prior authorization during system testing, the service start date was postponed with operation expected to start in March 2010. The Federal Railroad Administration (FRA) cited Capital Metro and its private contractor with twenty-two violations during its March 2009 inspections.

6.4 San Diego Sprinter – DLRT

6.4.1 Background

The SPRINTER is a diesel light rail transit (DLRT) system connecting Oceanside and Escondido in Southern California. Planning for the service goes back to the 1970's when the North County Transit District suggested plans for a commuter rail line utilizing existing freight tracks between the two cities. The district operates the Coaster commuter rail service between Oceanside and San Diego. After many plan revisions in the 1980's and 1990's, the FTA approved $152M funding in 2003 for construction. At the time, the project cost was estimated at $351M. After delays due to various factors, revenue service began in March of 2008. With higher than expected inflation, the final capital cost of the system came to $485M ($22M/mile).

6.4.2 Construction

Establishing the route for the SPRINTER required converting the 120 year old single track alignment used only for freight service since 1946 when the Santa Fe Railroad discontinued passenger service on the line. Tracks are still owned by the successor company, BNSF Railway. Preparing the alignment entailed extensive rebuilding of the roadbed, including all new track with concrete ties for the entire alignment. The passenger route is 22 miles long. A 1.7 mile dedicated segment (not owned by BNSF) was constructed to serve the San Marcos campus of California State University. There are also 8 miles (in 3 segments of approximately 2.5 miles each) of double track to allow for passing trains.

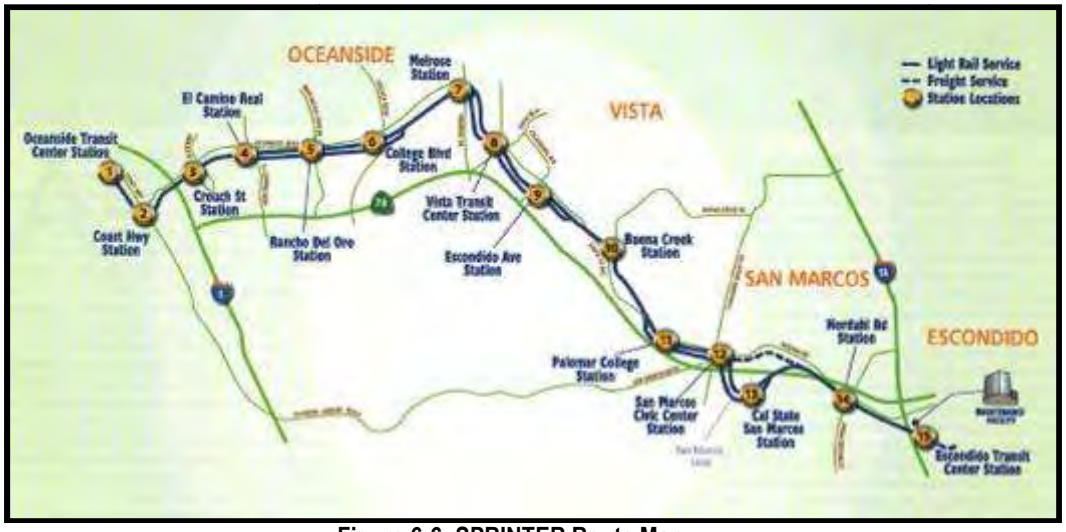


Figure 6-6: SPRINTER Route Map

6.4.3 Operation

Since the Siemens DLRT vehicles are not Federal Railroad Administration (FRA) compliant, temporal separation is used. This means that during the operating hours of the SPRINTER service (4:00 am-9:00 pm), no freight traffic is allowed. Freight trains use the line two or three nights a week after passenger service finishes for the evening. Passenger service runs seven days per week with weekday service operating at 30-minute headways, and weekend service running at 60-minute headways. The system has 15 station stops and makes rail connections to the San Diego Coaster, Los Angeles Metrolink, and Amtrak's San Diego to Los Angeles service at the Oceanside Transit Center. A journey over the entire 22 mile route takes 53 minutes (an average of 25 mph). With maximum running speeds of 55 mph, SPRINTER offers a viable alternative to the automobile, despite the parallel Route 78 freeway. It is estimated that the new light rail line reduces road journeys in the region by 5,000 trips a day.

All stations are well equipped with parking, shelters, seating, and ticket machines. As with all new light rail and commuter systems built in the US, a proof-of-payment (POP) fare system is in use, based on random checks and heavy penalty fares charged for passengers found without POP.

6.4.4 Rolling Stock and Ridership

The SPRINTER system uses 12 Siemens VT642 diesel multiple units (DMU), operated in either single or two-car trains, purchased for $52M ($4.4M each). Large low-floor sections and wide aisles make the cars accessible for disabled passengers and operators encourage cyclists and families to ride as there is ample storage for bicycles and strollers.

Figure 6-7: SPRINTER in service

Although the initial projections of 11,000 passengers per day may have been ambitious, there is no doubt that with well over two million patrons in its first year, SPRINTER is successfully reducing car use along the route. Averaging out at more than 7,300 daily passenger trips each weekday – four times the figure of its express bus service predecessor – the reduced congestion and linked environmental benefits are self-evident.

6.4.5 Lessons Learned

Because the Siemens DMU vehicles were brand new to the US market, a few issues were encountered during testing. For one, the signaling system initially did not always recognize the relatively light vehicles. This was also an issue at grade crossings because the warning systems did not activate consistently. Secondly, the California Public Utilities Commission did not certify the rail line until March of 2008 because of retractable platform gangways at one station not lining up correctly with the train doors. The problem was found during testing and it was decided that the station would be bypassed until corrections could be made. The station finally opened seven months after revenue service began. There have been no issues with the shared use of tracks owned by a freight railroad.

6.5 Eugene EmX – BRT

6.5.1 Background

In January 2007, Lane Transit District (LTD), headquartered in Eugene, Oregon, initiated a Bus Rapid Transit (BRT) service called the Emerald Express (EmX). The service operates over a four-mile route between downtown Springfield and downtown Eugene. The two cities, which have a combined population of just 200,000, are located about 60 miles from the Oregon coast, and 110 miles from Portland, in rural Lane County.

The line serves two downtown districts, the University of Oregon, and a major hospital. The EmX replaced one of LTD's most popular bus routes, which served about 2,700 riders daily. Since the EmX opened, corridor ridership has jumped by almost 50%, with daily boardings averaging around 4,700. The service is part of a multiple route BRT plan. The second corridor is a 7.8 mile route that is set to open in 2010.

Figure 6-8: EmX Route Map

The EmX is a full featured BRT line that uses dedicated transitways, exclusive bus lanes, transit signal priority, high-capacity vehicles, high quality widely-spaced stations with near-level boarding platforms, and relatively frequent service. Sixty percent of the route operates in an exclusive bus lane. In most segments buses operate lanes are a single lane that uses block signaling (like trains) to run two way service. The remainder of the route operates in dedicated curbside bus lanes with signal priority and queue jump lanes. Concrete roadway is used to visually designate the bus lane from the mixed traffic roadway.

Until late in the engineering phase of the project it was anticipated that the dedicated right-of-way portions route would be constructed as a curb guided bus guideway (with buses equipped with guide wheels), as operated in about a dozen other systems, all overseas. This idea was dropped however.

The EmX had 1.5 million boardings in the first year. The EmX is currently fare-free, making it possible for passengers to board rapidly, at all doors. Lane Transit District feels that most users of the service connect from other routes and pay on another part of their trip. With the planned extension to the second corridor, it is planned to convert to Proof of Payment (POP) fare collection.

6.5.2 Cost

Construction of the EmX line cost approximately $25 million, or $6.25 million per mile. LTD secured $13 million in New Starts funding, making it one of the first agencies to build a BRT project through New Starts. Additional funding came from the Federal Transit Administration Section 5307 and 5309 funds. Federal funds covered about 80% of projects cost.

Figure 6-9: Level Boarding Platform

Figure 6-10: EmX Station

Local funds pay for 67% of the operating costs. Much of it comes from a payroll tax in Eugene of $6.20 per $1,000 of salary. Other communities in the District pay through property taxes. Operating cost is very similar to the cost of regular LTD bus routes as shown in Figure 6-11 below. The EmX service costs $1.15 per boarding.

Cost per Boarding: EmX vs. Remainder of System
FY 2008-09

Service	Annual Boardings	Annual Schedule Hrs.	Annual Service Cost	Cost per Boarding
EmX	1,592,122	17,583	$1,834,951	$1.15
All Other Routes	9,814,194	297,292	$30,430,619	$3.10
TOTAL	11,406,316	314,875	$32,265,570	$2.83

FY 2007-08 Operating Cost	$32,265,570	From Adopted Budget
FY 2007-08 Schedule Hours	314,875	From June 2008 Perf. Report
Cost per hr EmX	$104.36	
Cost per hour - remainder	$102.36	

Figure 6-11: EmX Operating Cost and Ridership

6.5.3 Lessons Learned

The low population of the region (113 persons/square mile) made a LRT or a streetcar not a viable option for federal funding due to the high costs that would be involved. LTD started with a small BRT system to prove that it was viable in Eugene and gain buy-in from decision makers and transit advocates. The “green” aspect of the Emerald Express was tailored to enhance the attractiveness of the system to the population of Eugene who are strong advocates of the environment.

The combination of a short initial line and a high percentage of local operating funding made the EmX a prime candidate for the initial federal funding for a full featured BRT line. This helped to shorten the timeframe from planning to construction.

Some problems have resulted from the late change away from curb guidance, most notably in providing precision docking, required to provide minimum horizontal gaps at the near level station platforms.

The project has been considered a success and LTD’s second BRT route is scheduled for opening in 2010.

7.0 Transit Corridor Alternatives

7.1 Introduction

Four types of transit modes that would be most appropriate given the characteristics of the study area were considered. These modes are:

- Commuter Rail
- Light Rail Transit (electrified and diesel powered)
- Streetcar
- Bus Rapid Transit (BRT)

The following describes the mode and route alternative. Based on the mode choice, there were some variations on the route alternatives within the study area. The rail options interface with active freight tracks and suggest service on the CPDR right-of-way (R.O.W.) and/or tracks. The BRT alternatives would need to utilize a portion of the CPDR R.O.W. before they operate on street. To date however, there has been limited coordination with the Carolina Piedmont Railroad. Before any of the transit alternatives can be implemented, further coordination will need to take place with the CPDR.

Note that for all of the alternatives, it is assumed that the former railroad right–of-way that is currently owned by private land owners between Pleasantburg Drive and the point the corridor is near the Laurens Road/Washington Street intersection can be purchased and restored for transit purposes. However, none of the alternatives continue on the former railroad right-of-way north or west of the point near the Laurens Road/Washington Street intersection. Due to topographic conditions and the fact that the former rail right-of-way has been built on, it is not expected that this part of the corridor can be restored for transit use. Therefore, all alternatives at this point need to continue on-street in order to provide service into downtown Greenville. In order to provide a connection between the end of the potentially buildable former right-of-way where it terminates near Laurens Road/Washington Street and the actual street, about 500 feet of land acquisition would be required.

7.2 Commuter Rail (CR)

The commuter rail service alternative would use the existing rail tracks owned by the Carolina Piedmont Railroad (CPDR) from Fountain Inn to eastern Greenville at Forrester Road. Service would then continue on the rail corridor owned by the GCEDC into Greenville. The CR alternative assumes that the track could be restored and right-of-way acquired between Pleasantburg Drive and Laurens Road/Washington Street. From Laurens Road/Washington Street, passengers would need to transfer onto a shuttle bus to travel into downtown Greenville via East Washington Street and East McBee Avenue. See Figures 7-1 and 7-2.

Advantages:

- Higher average speed along route
- Large ridership capacity

Disadvantages:

- Typically has wider station spacing (2-5 miles)
- Not capable of operating into downtown Greenville; requires a transfer to a shuttle bus
- Longer headways (30-60 minutes)
- Would need substantial infrastructure upgrades (track, signaling, grade crossings)
- Fixed guideway (less flexible than BRT alternatives)

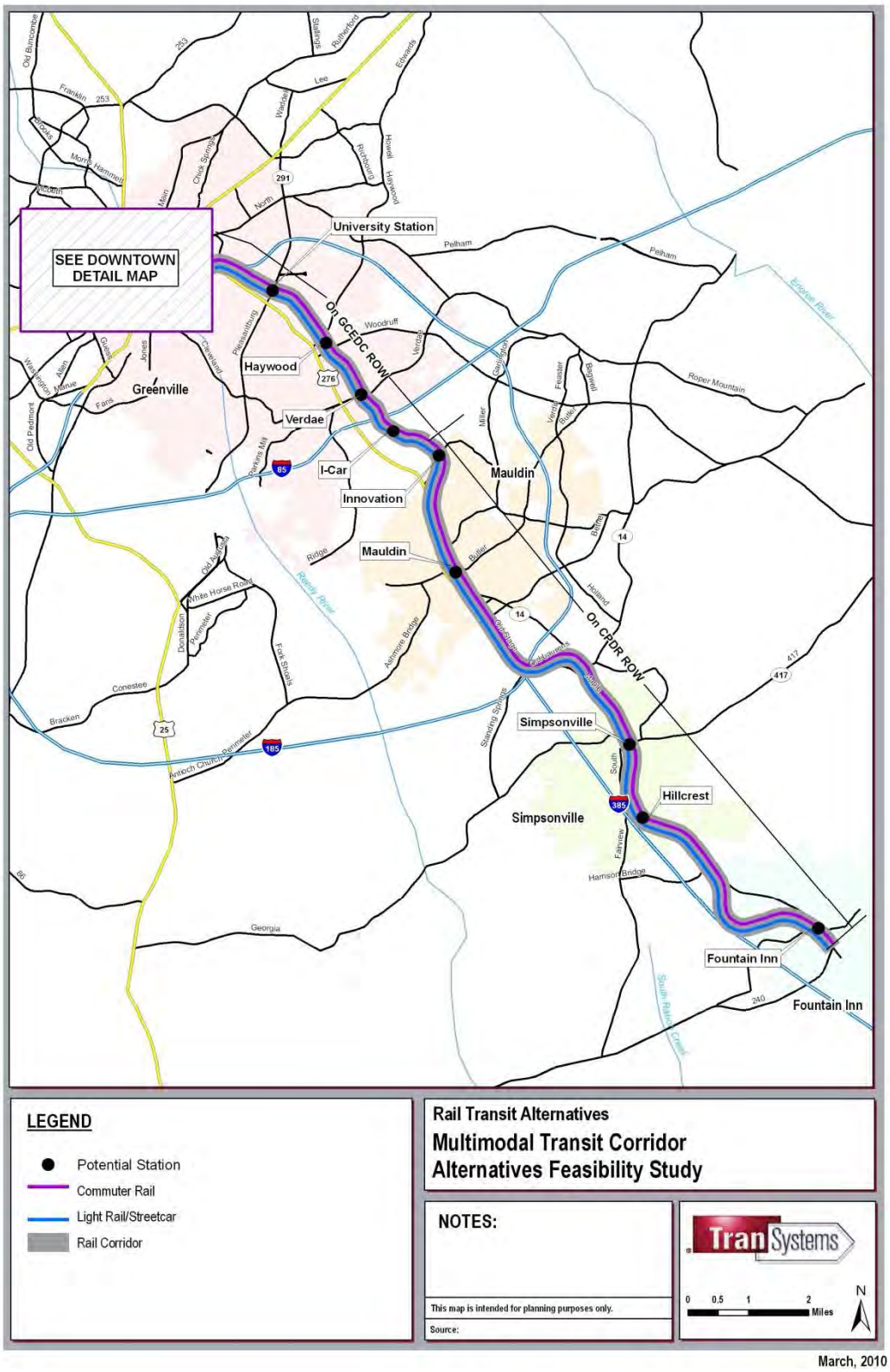


Figure 7-1: Rail Transit Alternatives

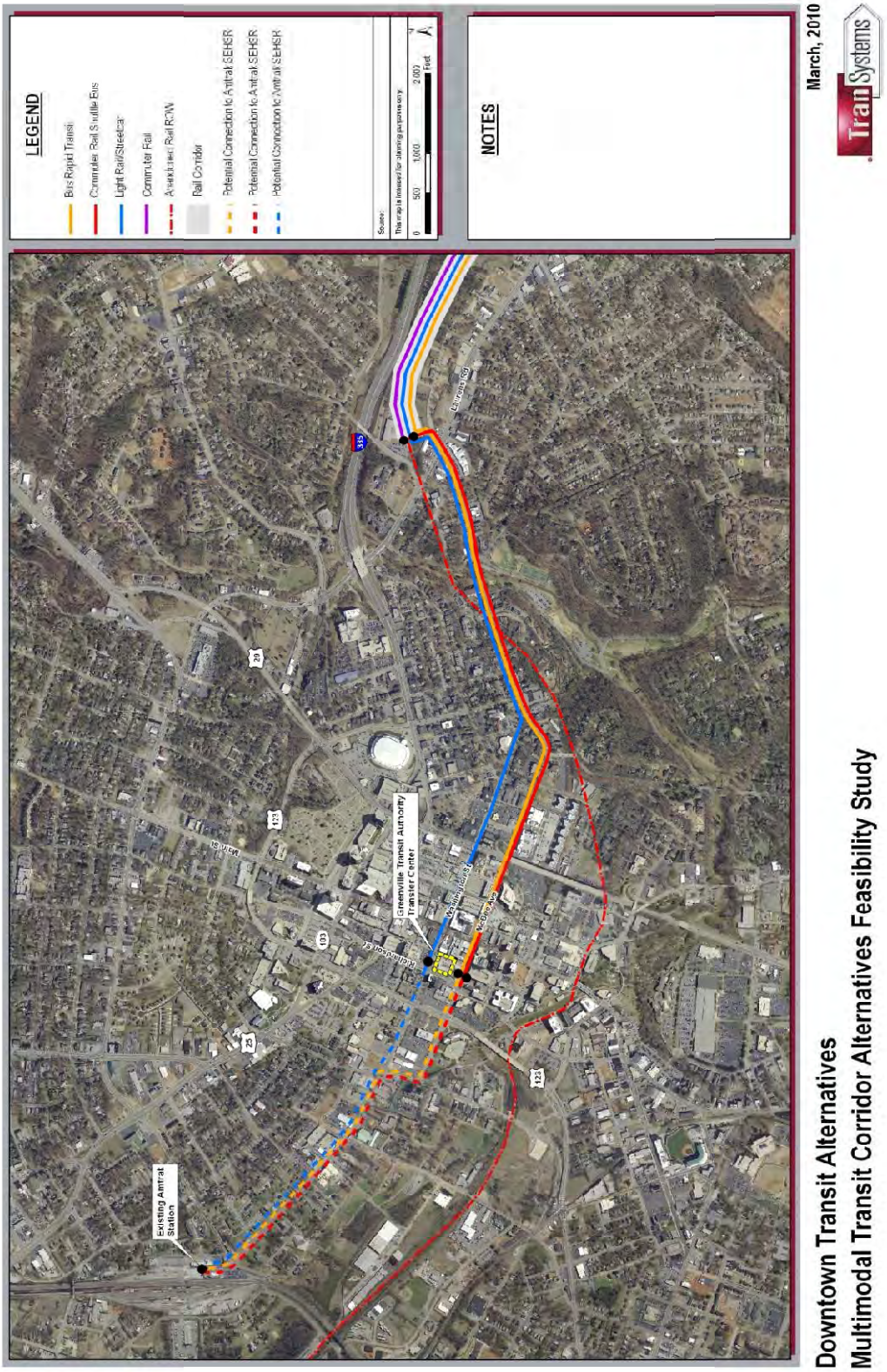


Figure 7-2: Downtown Transit Alternatives

7.3 Light Rail (LRT)/Diesel Light Rail (DLRT)

The potential light rail service would use the existing rail tracks owned by the Carolina Piedmont Railroad (CPDR) from Fountain Inn to eastern Greenville at Forrester Road. Service would then continue on the rail corridor owned by the GCEDC into Greenville. See Figures 7-1 and 7-2. The LRT alternative assumes that the track could be restored and right-of-way acquired between Pleasantburg Drive and Laurens Road/Washington Street. From Laurens Road/Washington Street, new tracks would be constructed on street, so the LRT vehicles would operate via East Washington Street on street in mixed traffic into downtown Greenville.

Note that this mode can be either powered by electricity or by diesel. LRT that is powered by electricity is more costly than diesel light rail transit (DLRT) due to the significant expense of the electrification infrastructure. Diesel powered LRT (DLRT) is considered a viable technology that could be implemented in the rail corridor at a lower cost. Diesel propulsion would avoid the capital expenditure of installing overhead electrification, while the equipment would be suitable for running in street traffic in downtown Greenville once leaving the exclusive rail corridor. Additionally, to keep capital expenditures at a minimum, a few passing tracks in lieu of a second main track could be built to allow for bi-directional rush hour operation. DLRT vehicles do emit emissions and acceleration and deceleration rates tend to be somewhat slower than LRT vehicles, however. As the DLRT equipment reaches its useful life, analysis could be undertaken to revaluate the feasibility of electrifying the corridor. DLRT is also an applicable technology that has the flexibility to run with minimal capacity of only one unit upon initiation of the service, but can be coupled with other units should future demand become substantial.

LRT and DLRT equipment would be non-FRA compliant[3] on the portion of the R.O.W. where CPDR is operating freight service. A "temporal separation program" could be instituted which allows passenger operation during the day, with freight operations running at night.

Advantages:

- Frequent stations serving more community areas
- Medium ridership capacity
- Single seat ride into downtown Greenville
- Suited for street operation
- Short headways (10-20 minutes), with the addition of more passing sidings

Disadvantages:

- Slower average speed along route than commuter rail (due to more frequent station stops)
- Infrastructure upgrades (track, signaling)
- Fixed guideway (less flexible)

7.4 Streetcar (STC)

The streetcar alignment would follow the same alignment as the LRT mode alternative considered in Section 6.3. See Figures 7-1 and 7-2. Typically, however, streetcars operate on shorter segments of corridors in dense urban areas, so it is recommended that if a streetcar was initiated it would only operate on a very small portion of the transit corridor. The potential ridership of a streetcar system is limited by the smaller vehicles yet the cost to electrify the corridor would be as costly as a LRT system. This alternative could be considered as a start up operation with the intention of evolving into a light rail system which could serve many more riders. Like LRT vehicles, streetcar vehicles are considered to be non-FRA compliant and therefore, would need to operate separately from the CPDR freight cars.

[3] Non-FRA compliant means that the equipment does not meet the Federal Railroad Administrations (FRA) crashworthiness regulations for rolling stock and needs to be operated separately from FRA compliant vehicles.

Streetcars derive their traction power from overhead electrical wires (in this case a trolley wire, as opposed to catenary for light rail vehicles). The cost to install an electrical system of this type runs roughly $2.5 million per mile. If it was decided to upgrade to a faster, higher capacity Light Rail Transit (LRT) mode in the future, it is possible that the supporting infrastructure (poles) for the electrical system could remain. However, the overhead wires and substations would need to be replaced for the higher speeds and power requirements.

Because the nature of the streetcar is to run on embedded rails in mixed street traffic, they are not designed to travel more than 30 mph. Given that transit is often in direct competition with the automobile, it is crucial for ridership that the average speeds from point to point be competitive. Factoring the top speed of a streetcar with the associated station stops, the average speed of a streetcar is about 15 mph. In order to lure riders from their cars, the average transit speed should be around 40-50 mph. Additionally, in much the same way that buses collect fares from the rider at the fare box (adjacent to the bus operator) streetcars also collect fares at the fare box, increasing travel time and lowering the average transit speed.

Streetcars are typically standalone vehicles able to seat about 45-50 riders (similar to a standard bus). This capacity is suited for busy urban areas where most rides are short, and passengers can tolerate standing during the trip. For a transit ride more than 4 or 5 miles, riders will expect to be seated because of the long transit time. For example, a streetcar traveling from Mauldin to Greenville will take about 30 minutes. If a rider has to stand for that duration, they will be motivated to return to their automobile to get to their destination.

Other than the cost of equipment, the capital investment requirements of streetcar and LRT are similar, and typically more expensive than the DLRT option due to the costs of electrification for the streetcar and LRT.

Advantages:

- Potential as a start up operation
- Serves shorter length trips within the corridor
- Frequent stations serving more community areas
- Single ride into downtown Greenville
- Suited for street operation
- Short headways (10-20 minutes), with the addition of more passing sidings

Disadvantages:

- Slower average speed than any of the other alternatives due to technology
- Minimum capacity for ridership with a significant infrastructure cost
- Fixed guideway (less flexible)
- More appropriate for shorter, denser corridors

7.5 Bus Rapid Transit (BRT)

Two bus rapid transit (BRT) alternatives are considered. Both would assume construction of a dedicated busway or transitway (assumed to allow bi-directional travel) on the GCEDC-owned R.O.W. The busway would be constructed adjacent to the tracks so that the tracks would remain in place. In the event that there is insufficient right-of-way (e.g. across the Woodruff Road bridge and some other limited locations where the right-of-way is restricted), it could be possible to construct the busway on top of the tracks. Due to legal and property right issues, it is important to retain the tracks, so none of the alternatives are suggesting that the tracks be removed.

On the north end of the corridor, both alternatives would travel into downtown Greenville in the same manner. Similar to the other alternatives above, it is assumed that right-of-way can be acquired between Pleasantburg Drive and Laurens Road/Washington Street which would allow the busway to be constructed in this area. At Laurens

Road/Washington Street, the BRT vehicles would get off the busway and travel in mixed traffic via Washington Street to McBee Street into the downtown where the vehicles would turn around at the existing Greenville Transit Authority (GTA) Transit Transfer Center and continue back along the corridor.

On the south end, at the point the GCEDC corridor meets the CPDR right-of-way, two alternatives with variations are suggested:

7.5.1 BRT I-385 Alternative

This alternative is considered the freeway based alternative where the BRT vehicles would operate on I-385 in order to travel between Greenville and Fountain Inn. See Figure 7-3. The vehicles could operate with traffic initially, but ideally in order to make it a true BRT operation, the construction of a reversible BRT/HOV lane with operation in off-peak periods and in the reverse peak direction in general traffic lanes is recommended on I-385. New stations could be created in the I-385 right-of-way, which would allow them to be served by buses without having to leave the highway as is done, for example, with stations on the Harbor Freeway in Los Angeles, California.

As part of this alternative, there are two options for the BRT to get between the GCEDC corridor and I-385, shown on Figure 7-3. For Option A, the vehicles would leave the GCEDC corridor near Innovation Drive and travel a short distance to Laurens Road. Right-of-way acquisition would be required for this short distance. Space is very limited and the busway could only be one lane wide, allowing peak direction service to bypass congestion on Laurens Road. The other direction would continue to operate on Laurens Road. Laurens Road then becomes I-385. Option B requires a dedicated busway to be constructed on the CPDR right-of-way until the CPDR right-of-way intersects with I-385. The vehicles would then transfer onto I-385 at the point at which US 276 and SR 417/Main Street diverge. This would avoid a congested section of Laurens Road/Main Street. A bi-directional busway would probably be difficult to fit in much of this segment, so it might have to be limited to operation in one direction, with non-peak direction service remaining in mixed traffic.

At the point the BRT is in the City of Mauldin, two routes are proposed to branch off of the busway to directly serve relatively densely populated portions of Mauldin. These are shown on Figure 7-3. Additionally, there is another route shown on the map branching off near Pleasantburg Drive that would serve nearby commercial/industrial areas.

It is recommended that traffic signal priority be installed along the corridor where the bus will be travelling on-street. Additionally, stations should be located at the far side of key intersections at wide intervals. Park and ride lots could be constructed at key locations along the corridor.

7.5.2 BRT Main Street Alternative

For this alternative as shown in Figure 7-4, vehicles would operate on a separate busway on the GCEDC corridor. Once they reach the CPDR right-of-way, the vehicles would utilize Main Street (SR 14) to travel through the corridor between Greenville and Fountain Inn., traveling through the downtowns. Between the SR 14/US 276 junction and the beginning of the GCEDC R.O.W., the two route options, Option A and Option B, as described above could be used.

As stated above, at the point the BRT is in the City of Mauldin, two routes are proposed to branch off of the busway to directly serve relatively densely populated portions of Mauldin. These are shown on Figure 7-4. Additionally, there is another route shown on the map branching off near Pleasantburg Drive that would serve nearby commercial/industrial areas.

Similar to the I-385 alternative, it is recommended that traffic signal priority be installed along the route. Additionally, stations should be located at the far side of key intersections at wide intervals. Park and ride lots could be constructed at key locations along the corridor.

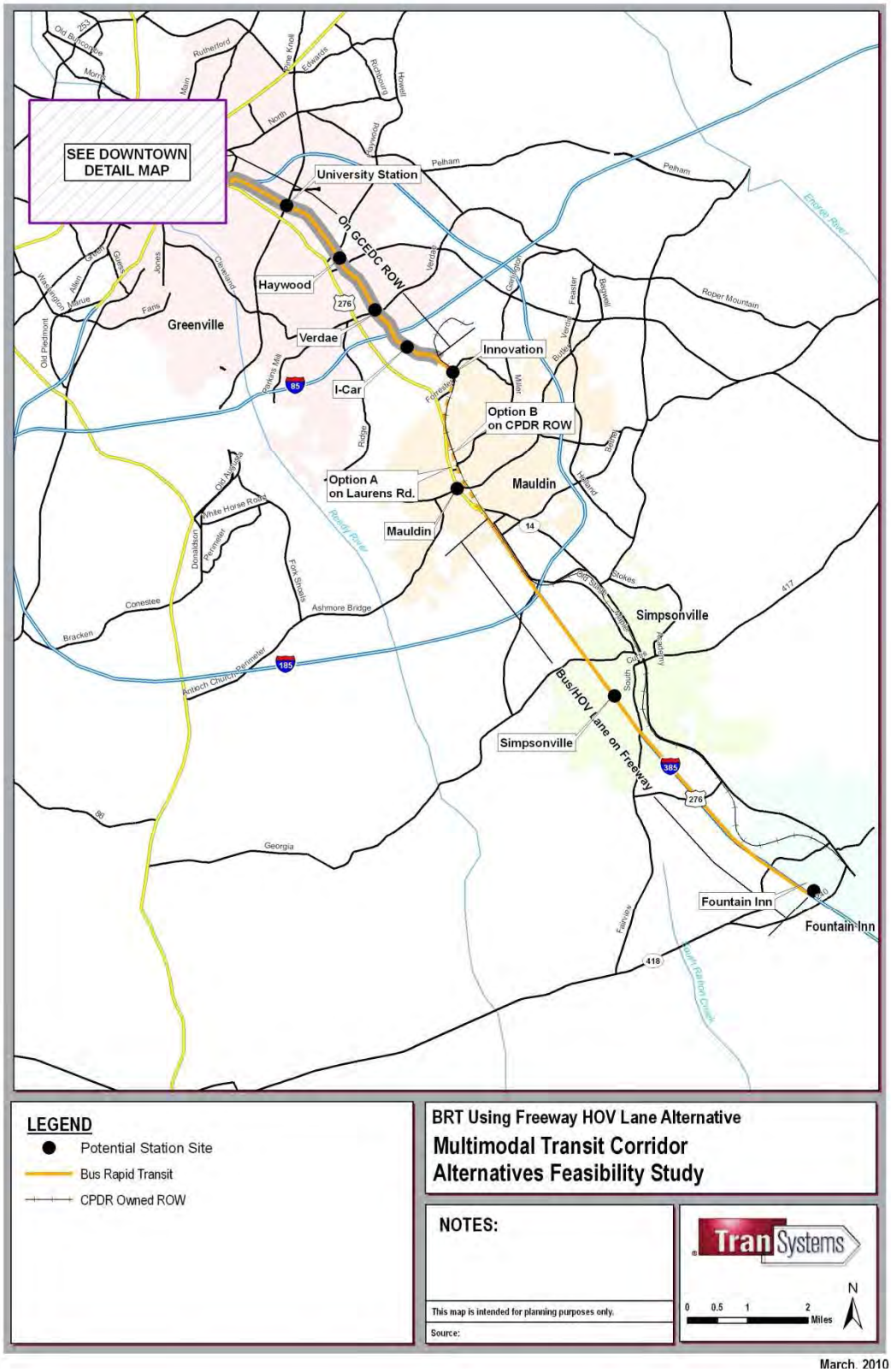


Figure 7-3: BRT on I-385

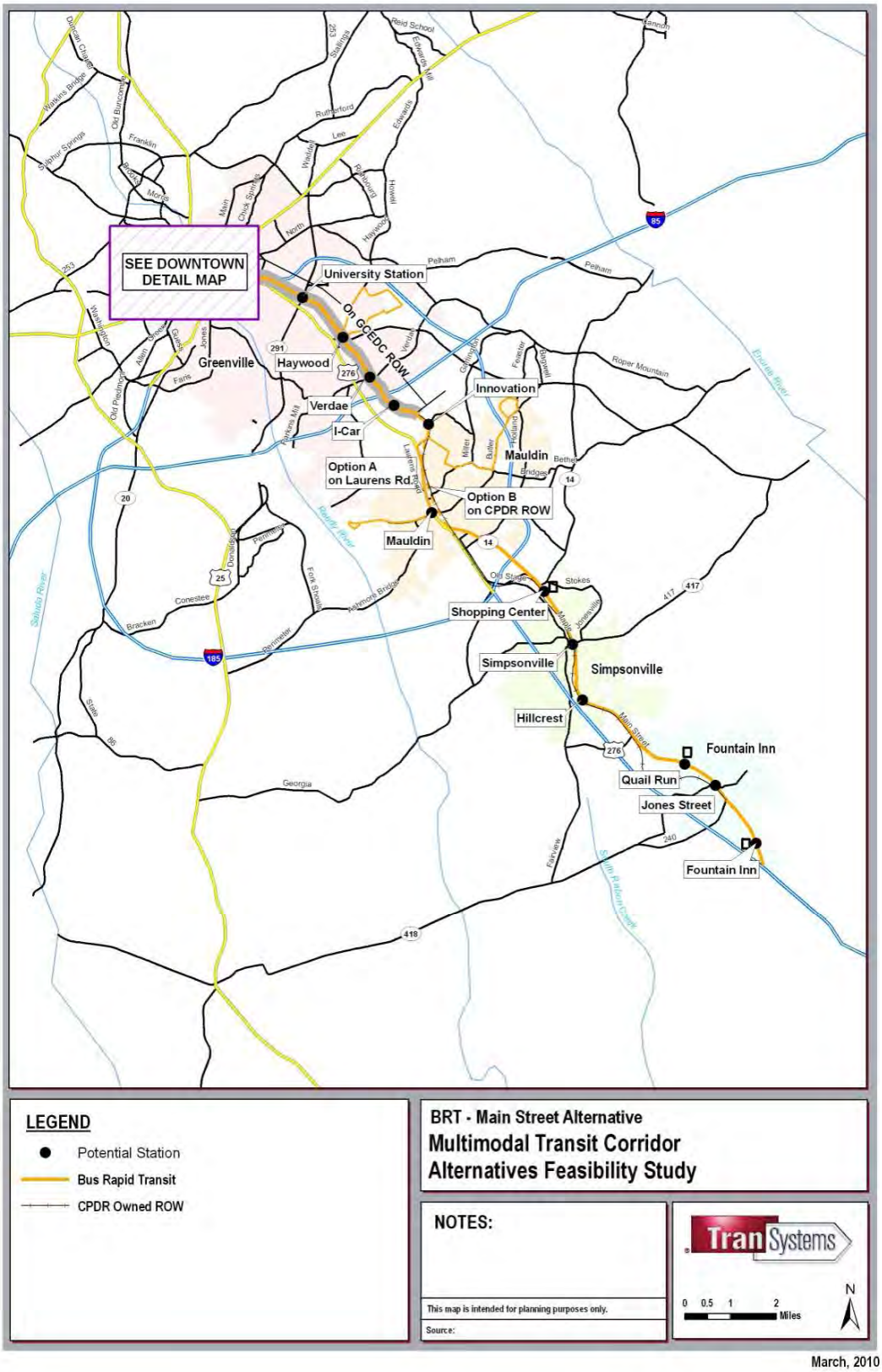


Figure 7-4: BRT on Main Street

The decision to utilize "curb guided bus" (CGB) operation, would depend on the narrowness of the right-of-way of the selected alternative. This option allows buses to operate at high speed in a right-of-way barely wider than the bus itself, an important feature where right-of-way width is limited. This technology has not been deployed in North America although it is used on most other continents.

The advantages and disadvantages of the BRT option are as follows:

Advantages:

- Single seat ride into downtown Greenville
- Potential for more frequent stations serving more community areas
- Suited for street operation (not tied to rails in case of maintenance or other disruption)
- Lower cost for infrastructure upgrades
- Vehicle is more highly styled as compared to standard bus
- Potential for headways as short as necessary (less than one minute)
- Construction costs for a BRT system are lower than a LRT system, particularly due to the lack of overhead power supply. Also, a big advantage compared to LRT is the ability for buses to continue off the dedicated alignment on regular roadways.

Disadvantages:

- BRT-based alternatives have not generally demonstrated the ability to attract as much development among station areas as rail based alternatives
- BRT systems are thought of as slower than rail based alternatives

7.6 Pleasantburg Drive to Laurens Road/ Washington Street Alternatives

As stated previously, the GCEDC property rights end at approximately Pleasantburg Drive. Track has been removed from the portion west of Pleasantburg Drive and the former railroad right-of-way has been reverted back to various property owners. The portion of railroad right-of-way between Pleasantburg Drive and near the intersection of Laurens Road/Washington Street remains vacant. It is hoped that this R.O.W. can be reacquired for transit use. (West of that location, the former right-of-way has been built upon and is not considered a viable option for a transit corridor.)

In the event the former railroad right-of way cannot be acquired quickly to restore a transit corridor between Pleasantburg and Laurens Road/Washington Street, there are a few alternatives that have been suggested. These alternative on-street routings have been identified for interim use to connect the main portion of the transit corridor to downtown Greenville. These should be considered interim solutions until right-of-way can be acquired to allow completion of the remaining 1.3 mile portion of the transitway (see Table 2 and Figure 7-5).

Table 2- Pleasantburg Drive to Laurens Road/Washington Street Alternatives

Alternative	Routing	Issues	Distance to Downtown Greenville
Laurens Road	Via Airport Road to Laurens Road, re-joining the originally-planned route at Washington Street Depending on success of property acquisition, options include traveling along the transit corridor until Eastland or Darwin Roads with connections to Laurens Road	This would subject the BRT or LRT vehicles to a 1.1 mile long portion of Laurens Road which is quite congested, including five signalized intersections.	2.9 miles
I-385	Via Keith-Pleasantburg- I-385- North Street, accessing the GTA Transfer Center via Richardson and McBee	This is the most circuitous route, and would introduce a completely different route for accessing downtown Greenville.	4.3 miles
Woodlark Street	Via Keith-Woodlark-Hillside to Laurens Road, re-joining the originally-planned route at Washington Street	Portions of this routing are residential streets. The Hillside-Laurens-Washington movement could be very difficult, with no signal protection at Hillside/Laurens and a very sharp turning movement at Laurens/Washington.	3.1 miles

7.7 Bikeway

The GCEDC and members of the public are very interested in converting the corridor into a multi-modal corridor allowing both transit use and bicycle and pedestrian use. It is assumed in this study however, that the use of the corridor for transit would take precedence over the use of the corridor for a bikeway. Figure 7-6 indicates the areas of the corridor where the right-of-way is restricted and would not be able to accommodate a bikeway. In these instances, it would be appropriate to either continue the bikeway onto the street or as necessary, acquire right-of-way so that the bikeway can continue off street on a designated path. Future bikeway planning studies would be able to determine which option would be most feasible. Costs or details regarding this alternative were not developed as part of this transit study.

7.8 Regional Connections

There is the potential for any of the transit alternatives to interface with existing and proposed regional transit services. Any of the alternatives selected could continue on Washington Street to serve the Amtrak Station near downtown Greenville. This station could potentially also serve the proposed South East High Speed Rail service. Vehicles could continue to the Amtrak Station once they served the GTA Transfer Center Station. A link to the Swamp Rabbit Trail proposed trolley service could also be made at the GTA Transfer Center Station. The Swamp Rabbit Trail is discussed in Chapter 2.

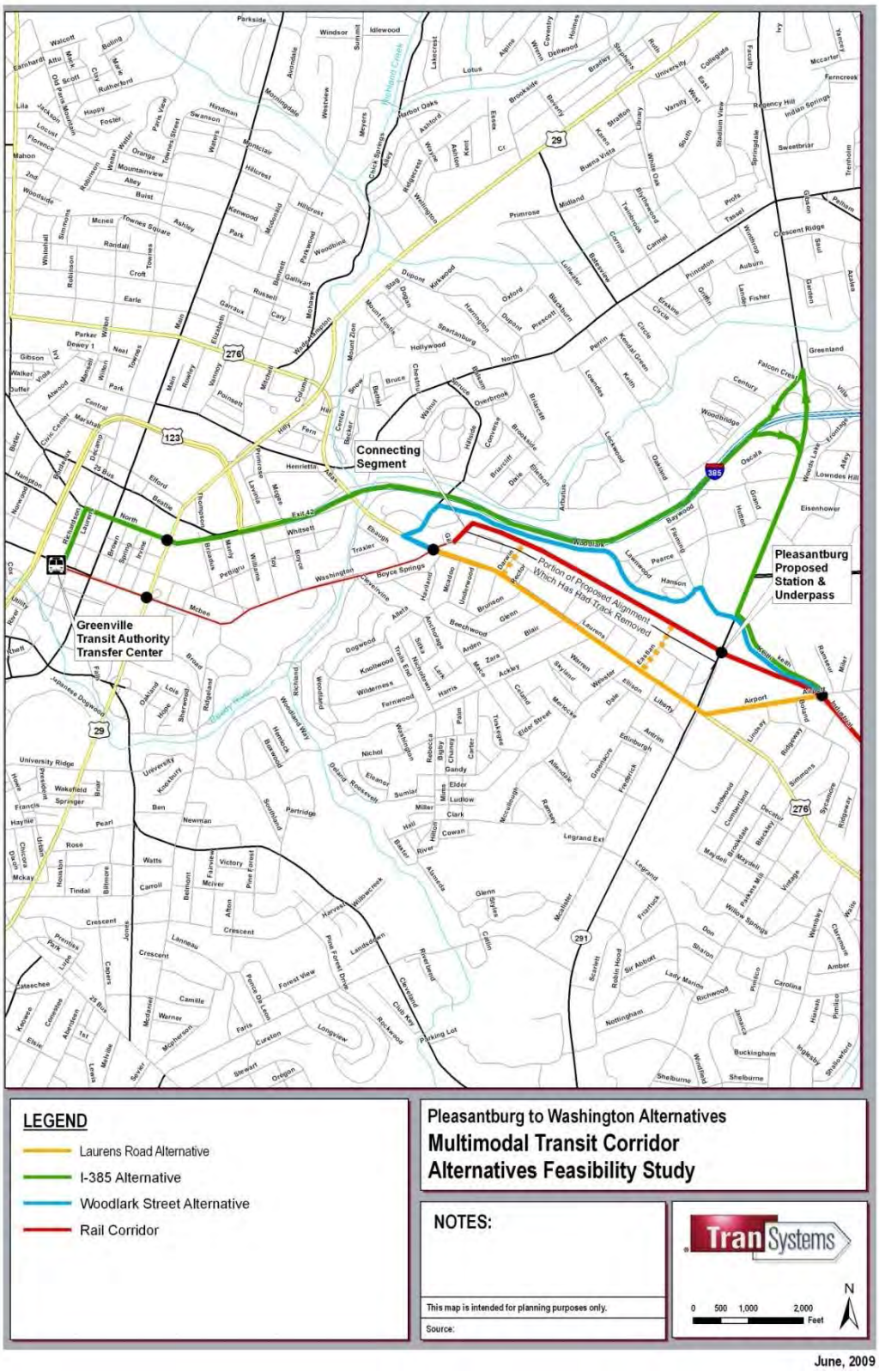


Figure 7-5: Pleasantburg to Washington Street Alternatives

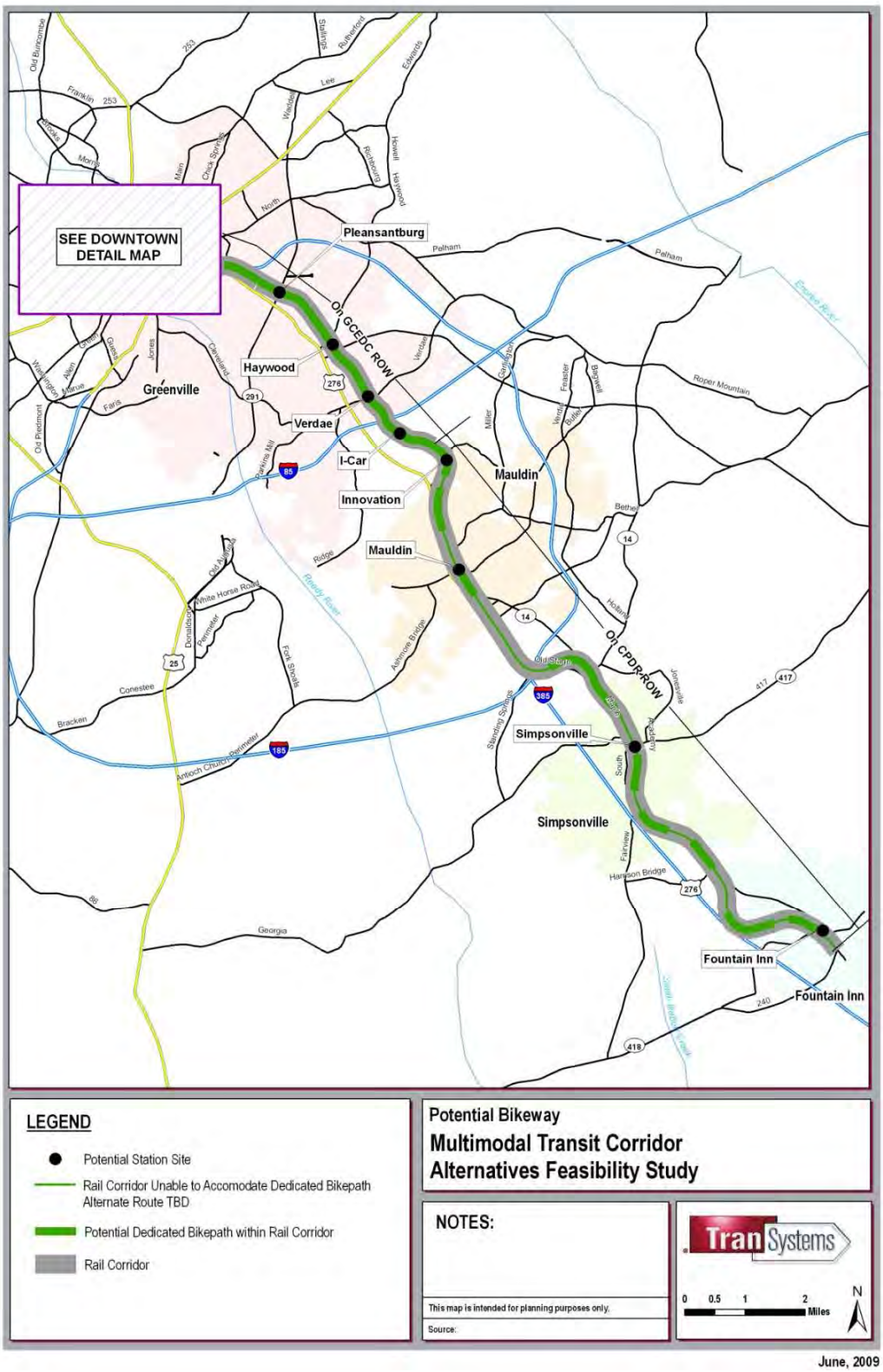


Figure 7-6: Bikeway Alternative

8.0 Cost Estimate

8.1 Capital Cost Estimate

The capital cost estimates for the proposed alternatives are based on field inspection, concept plans, and station area assumptions. Capital costs were categorized into:

- Trackwork
- Electrification
- Structures
- Sitework and demolition
- Station sites
- At-grade roadway crossings
- Wayside signaling
- Passing sidings
- Maintenance facilities
- Drainage Work
- Utility Relocation
- Vehicles

Professional services and contingencies were added to the capital costs. Land acquisition was not included. Land acquisition analysis would be conducted during the design engineering phase.

A summary of the potential transit modes and their respective capital cost estimates are shown in Table 3.
It is notable to mention that this is a conceptual study, and cost estimates are based on field inspection and "best guess" on what improvements would need to be made to operate transit along the corridor. These capital cost estimates are intended to serve as order of magnitude estimates and do not include or tabulate right-of-way acquisition and railroad settlements, negotiations and agreements. It was deemed appropriate to provide the standard practice contingency of 30% assigned to tabulated costs due to the high-level nature of this study. More definitive costing would occur during design engineering.

8.2 Assumptions

The following assumptions were made when estimating capital costs. All capital cost estimates are for the year 2009.

8.2.1 Bus Rapid Transit (BRT)

The BRT vehicles would be modern vehicles able to accommodate 35 seated riders. They would offer onboard amenities such as comfortable head rest seats and Wi-Fi. Stations would contain a raised platform for easy boarding, off vehicle pay stations, and passenger amenities such as benches, lighting, and shelters. Infrastructure costs would include an asphalt paved transitway for the portion on the GCEDC right-of-way, on-street improvements including traffic signal preemption systems for the portion outside the GCEDC right-of-way, and widening of existing bridge structures that would need to accommodate the transit way.

8.2.2 Streetcar (STC)

The capital costs include the required overhead electrification and modern streetcar vehicles. On board proof-of-payment (POP) would be expected whereby riders would pay at a fare box onboard the vehicle. These ticket

Table 3- Cost Estimate

Greenville HCT Transit Study
Fountain Inn to Downtown Greenville
Conceptual Order of Magnitude Costs for All Alternatives (2009 dollars)

ITEM DESCRIPTION	UNITS	QUANTITY	BRT COST- I-385	BRT COST- Main St.	CR COST	DLRT COST	STC COST	LRT COST
Trackwork	*LSUM*	*1*	*$ -*	*$ -*	*$ 27,857,750*	*$ 37,063,230*	*$ 37,063,230*	*$ 37,063,230*
Electrification	*LSUM*	*1*	*$ -*	*$ -*	*$ -*	*$ -*	*$ 25,674,230*	*$ 25,674,230*
Structures	*LSUM*	*1*	*$ 864,500*	*$ 864,500*	*$ 579,800*	*$ 579,800*	*$ 579,800*	*$ 579,800*
Sitework & Demolition	*LSUM*	*1*	*$ 9,026,564*	*$ 9,026,564*	*$ 3,766*	*$ 5,165*	*$ 5,165*	*$ 5,165*
Stations	*LSUM*	*1*	*$ 9,960,000*	*$ 8,460,000*	*$ 8,164,500*	*$ 9,574,800*	*$ 8,040,000*	*$ 9,574,800*
At-Grade Roadway Crossings	*LSUM*	*1*	*$ 1,040,000*	*$ 1,040,000*	*$ 7,061,400*	*$ 7,061,400*	*$ 7,061,400*	*$ 7,061,400*
Wayside Signaling	*LSUM*	*1*	*$ -*	*$ -*	*$ 16,222,400*	*$ 24,587,500*	*$ 24,587,500*	*$ 24,587,500*
Passing Sidings	*LSUM*	*1*	*$ -*	*$ -*	*$ 5,738,200*	*$ 2,278,600*	*$ 2,577,200*	*$ 2,278,600*
Maintenance Facilities	*LSUM*	*1*	*$ 2,000,000*	*$ 2,000,000*	*$ 10,000,000*	*$ 6,000,000*	*$ 5,000,000*	*$ 7,000,000*
Drainage Work	*LSUM*	*5%*	*$ 1,144,553*	*$ 1,069,553*	*$ 3,781,391*	*$ 4,357,525*	*$ 5,529,426*	*$ 5,691,236*
Utility Relocation	*LSUM*	*5%*	*$ 1,144,553*	*$ 1,069,553*	*$ 3,781,391*	*$ 4,357,525*	*$ 5,529,426*	*$ 5,691,236*
SUBTOTAL - CONSTRUCTION COSTS			*$ 25,180,170*	*$ 23,530,170*	*$ 83,190,598*	*$ 95,865,544*	*$ 121,647,377*	*$ 125,207,197*
Real Estate/ROW	*LSUM*	*1*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*
Vehicles	*LSUM*	*1*	*$ 7,200,000*	*$ 7,200,000*	*$ 11,985,000*	*$ 21,420,000*	*$ 22,290,000*	*$ 26,005,000*
Professional Services	*LSUM*	*1*	*$ 4,280,629*	*$ 4,000,129*	*$ 14,142,402*	*$ 16,297,142*	*$ 20,680,054*	*$ 21,285,223*
Contingencies		*30%*	*$ 10,998,240*	*$ 10,419,090*	*$ 32,795,400*	*$ 40,074,806*	*$ 49,385,229*	*$ 51,749,226*
TOTAL CAPITAL COST ESTIMATE			*$ 47,700,000*	*$ 45,200,000*	*$ 142,200,000*	*$ 173,700,000*	*$ 214,100,000*	*$ 224,300,000*
TOTAL ROUTE MILEAGE			*18.70*	*18.70*	*18.70*	*18.70*	*18.70*	*18.70*
COST PER ROUTE MILE			*$ 2,551,000*	*$ 2,418,000*	*$ 7,605,000*	*$ 9,289,000*	*$ 11,450,000*	*$ 11,995,000*

vending machines were assumed to be part of the vehicle costs and not estimated separately. Costs also include stations that allow for some pedestrian amenities including a shelter and benches.

8.2.3 Light Rail Transit (LRT)

LRT operations would require more substantial station sites, ticket vending machines in the stations and larger and more expensive vehicles as compared to the streetcar. The cost of overhead electrification is also included in the cost estimate.

8.2.4 Diesel Light Rail Transit (DLRT)

DLRT vehicles would not require overhead electrification. Stations and passenger amenities would be the similar to LRT, however. DLRT vehicles are less costly than LRT vehicles due to the lack of electrification equipment in the vehicle. Also, the maintenance facility would be less expensive than a LRT facility because the facility does not need to contain catenary wires.

8.2.5 Commuter Rail (CR)

The commuter rail capital cost evaluated two fewer stations than the LRT/DLRT concepts and would also not require overhead electrification. The trackwork costs are lower than the LRT/DLRT option because tracks would not be constructed beyond the Laurens/Washington Street station. Note that the capital costs also include the required bus rolling stock needed for the shuttle bus to downtown Greenville.

8.2.6 Maintenance Facility

No matter what mode is selected, a maintenance facility will be required. The capital cost estimate included an order of magnitude cost associated with a standard sized facility that would match services of similar scale and corresponding vehicle technology utilized.

A maintenance facility would ideally be located at the far southern end of the alignment in or near Fountain Inn. Two potential sites may include:

- Off the existing railroad tracks near Valley View Road
- Off the existing railroad tracks south of McCarter Road between Main Street and Nash Street

Any future maintenance facility should be placed in a site requiring minimal earthwork and having adequate land available for future growth, while being sensitive to nearby social receptors.

8.2.7 Security

Transit systems require special security provisions in order to deter crime and vandalism, as well as to meet the Federal Transit Administration's (FTA) goals for all transit agencies to plan for, mange, and recover from emergencies and disasters.

The following security measures would be recommended for any of on the proposed transit alternatives. The capital costs associated with these improvements are assumed in the cost estimates.

- Stations would be designed with security-awareness; the design of the station would be open with no places to hide and vandal-resistant finishes would be used
- Video cameras would be installed at stations, with images brought back to a transit and/or police dispatch office
- The station facilities and parking lots would be well lit and not constructed in secluded areas; surveillance would be provided by onsite personnel or local police stations
- Multiple cameras would be installed onboard vehicles; a digital video recorder would record activity in solid state memory

- Vehicle operators would be provided with a covert alarm button which alerts the dispatch office to an incident; GPS-based location information would be transmitted (allowing an immediate call for police assistance), a live audio channel is opened, and the video would be marked for retention for assistance in criminal investigation as appropriate
- On board fare collectors or fare inspectors would play an important role in providing a visible security presence
- Fencing would be installed to prevent pedestrians from crossing at locations other than designated crossings and to prevent interference with active freight traffic and adjacent use of the R.O.W. including the proposed bikeway

8.3 Operating Cost Estimate

Estimates of operating costs were developed for each mode. An operations cost per hour factor for each transit mode was calculated based on operating costs from similar transit operations at peer cities. The operating cost per hour for each mode took into consideration average speed, the length of the alignment, layover time, frequencies (headways), and days and hours of operation. That hourly cost was then annualized to reflect an annual operating cost by mode. The operating cost takes into the following inputs:

- Crew costs
- Electrical consumption (fuel for DLRT)
- Basic infrastructure and track maintenance
- Vehicle maintenance
- Station maintenance
- Fare inspectors[4]

Table 4 summarizes these costs.

Table 4: Total Estimated Operating and Maintenance Costs by Mode

Total O&M Cost Per Year	
Streetcar	$1,413,750
LRT	$1,554,500
DLRT	$1,694,750
Commuter Rail	$754,000
BRT- I-385	$975,650
BRT- Main Street	$1,145,225

[4] Sporadic fare inspection is needed for systems that have proof of payment (POP) systems. The estimate require fare inspection about 20% of the time the system was operating to keep fare evasion at an acceptable low level.

9.0 Ridership

9.1 Introduction

The ridership potential of any new transit service depends on multiple factors. These factors can generally be grouped into three categories. First, ridership depends on the existing travel patterns as well as those that are expected to develop in the future. Secondly, ridership depends on the characteristics of the existing modes of travel, including issues such as congestion, tolls and parking charges. Finally, it depends on the characteristics of the transit service in question, the convenience of the stops/station, the need for transfers, travel time, fares, reliability, and comfort.

The following sections describe the factors that go into estimating ridership. Section 9.2 discusses travel patterns. Section 9.3 discusses issues that affect a person's choice of mode for travel. Section 9.4 discusses the characteristics of the transit service in question. Once this information was assessed, ridership estimates were generated for each transit mode under consideration and are presented in Section 9.5. A simple ridership model using journey to work data and the region's patterns of travel characteristics as a baseline was used to generate the ridership estimates.

9.2 Regional Travel Patterns

Journey to work data from the Census 2000 was used as the baseline in determining regional travel patterns. Journey to work data is developed from questions on the Census about where a person lives and where they work. All census tracts along the proposed transit corridor between downtown Greenville and the City of Fountain Inn were assessed to determine work travel patterns. It was assumed that the journey to work trips made between adjacent census tracts most likely would not be made on transit due to the short distance that would be traveled, and were no longer considered in the ridership model. The journey to work trips that were made between non adjacent census tracts along the corridor were considered as a potential for future transit trips and included in the ridership model.

The census tracts from which potential riders would originate were then examined from a geographical standpoint to determine how close they were to a proposed station; i.e. what percentage was within one half mile of the station and what percentage was beyond one half mile to the station. The one half mile distance is used as a gauge to determine walkability to a station. Typically, transit users living within one half mile of a station walk. Those who live beyond one half mile typically drive to the station or get dropped off. These percentages were then applied to divide the journey to work trips into walking trips to the station versus driving trips to the station. It is important to examine the journey to work trips in this way because those people who need to drive to the station are not as "captive" of an audience for transit as those who can walk to a station. Those people who live beyond one half mile from the station and need to drive can continue driving on to work rather than use transit.

Table 5 indicates the number of journey to work trips (one way trips) along the corridor that were pulled from the census data.

Table 5
Number of Journey to Work Trips Served by the Proposed Transit (All Modes)

Type of Access	Number of Trips
Walk Access	1,901
Drive Access	3,958

Note that work trips generally account for about half of all transit trips; the other half is trips for shopping, medical trips, trips to education facilities, and recreational trips. In order to get a true picture of all trips that potentially could be served by transit, the journey to work numbers, which are one way trips, need to be multiplied by four to get an accurate count of trips –i.e. one roundtrip to work and one round trip for non-work purposes - a total of four trips.

It should also be noted that population and employment in the Greenville region has grown substantially since 2000, especially in the corridor under analysis. Overall, the county population grew from 379,616 in 2000 to 428,243 in 2007 and is expected to grow to 451,398 by 2012. Under the assumption that travel in the corridor has increased, and will increase in proportion to county population growth, the numbers in the above table also need to be increased by 13% for 2007 estimates and 19% for 2012 estimates.

9.3 Automobile Travel Related Issues

A key factor in the demand for transit alternatives, especially those on dedicated rights-of-way, is the cost and quality of automobile travel in the corridor. This is especially true in Greenville where in 2006, 94% of all county residents rely on a private automobile to get to work, and 85% of those people travel alone. While overall congestion in the region is better than average in the United States, 26 annual hours of congestion in Greenville compared with 38 annual hours nationwide (2005 data), time spent in congestion was expected to increase by 37% by 2012, compared with a 17% increase in vehicle miles traveled. Travel delays in Greenville are also expected to increase, with the difference in travel time between rush hour trips and on-rush hour trips increasing from the current 5% to an expected 12% in 2030.[5] The majority of this congestion occurs in a few limited corridors, with I-385 in Greenville (between SC-417 and I-85) being the 20th most congested section of roadway in the state of South Carolina. The relatively high level of congestion in the corridor supports an argument that transit that is competitive in travel times to the auto would have a strong competitive position in terms of obtaining riders.

Parking is plentiful in Greenville, with city lots and garages charging $6.00 per day and between $40 and $70 per month for parking. This is higher than Greenville Transit's current fares and this would also support transit's competitive position if these fares were continued for the proposed service.

9.4 Transit Mode Specific Issues

Potential limitations or benefits of the modes and alternatives studied that could have an impact on ridership are described below:

- Commuter Rail (CR): The need to transfer onto a shuttle bus to travel to downtown Greenville would reduce the potential ridership due to the inconvenience of having to switch modes, and the associated time delays
- Light Rail (LRT)/Diesel Light Rail (DLRT): This mode would serve the main business districts of each community along the way and provide a one seat ride on a dedicated track.
- Streetcar (STC): Streetcars are not designed to operate at higher speeds so the length of time it would take to travel the entire corridor would be slower than the LRT/DLRT option. Also, streetcars are limited in the number of riders they can accommodate as they operate as single cars.
- Bus Rapid Transit (BRT) I-85: This alternative would operate ideally in a dedicated HOV lane at a relatively high speed which would be attractive to many riders. However, the fact that the highway corridor is segregated from the residential and business areas and the stations are mainly accessible by vehicles and not walkable will somewhat reduce potential ridership.

[5] *Future Mobility in South Carolina: Meeting the State's Need for Safe and Efficient Mobility*, TRIP, May 2008

- Bus Rapid Transit (BRT) Main Street: This alternative, given the proposed branch lines, will be most proximate to the rider's home and be most convenient of all of the options. Also, the alternative serves the main business districts of each of the communities.

9.5 Ridership Estimates

The basic question in estimating the ridership of the proposed transit services is what share of existing travelers in the corridor will be attracted to a new transit service. This can be estimated by first examining how willing Greenville area residents are to use existing transit services. By reviewing the 2000 Census journey to work data which provides information on the number of sampled individuals using each mode of travel for work trips between any two census tracts in the Greenville area an estimate can be made. Thirty-six of these pairs currently have transit mode shares of 10% or higher (i.e. 10% use transit), with the maximum mode share of 83%. Another 16 census tract pairs had mode splits of between 2% and 9%. Overall, the transit mode share between census tracts where there were any transit riders identified was 12%. While there is a high degree of potential error in some of these results (since they are based on a sample of 1 in 6 census respondents and between 14 and 386 respondents per census pair), this does show that where a reasonable transit alternative is available, many individuals will choose to use it. Talking the information from both sets of sample pairs, a reasonable base estimate for the transit mode split of a transit system that has hourly service would be 10%-12% (i.e. 10% to12% of the journey to work trips would utilize transit). The best estimate for a model split of a 30 minute service would be 13% - 17% [6] (i..e.13% to 17% of the journey to work trips would use transit).

For the commuter rail alternative, trips will include a transfer. For work trips, having to make a transfer has been found to have an equivalent impact to increasing the in-vehicle travel time by 12-15 minutes, while for non-work trips the impact is equivalent of an increase in in-vehicle travel times of 17-27 minutes or more. Since the average trip length is estimated at 12 – 15 minutes, the impact of the required transfer in the commuter rail alternative will be roughly the same as cutting the travel speed in half, resulting in a decrease in the number of trips that would be made on transit. [7] The mode split for commuter rail service would therefore be expected to be instead about 6%-9% for hourly service. For the streetcar mode, the slower operating speed would have an impact on its potential to attract riders. The mode split for streetcar is therefore expected to be between 8%-12% for 30 minute service.

As detailed in Section 9.2, it was important to determine which percentage of the census tracts along the corridor were within one-half mile of the station area (i.e. walkable) and what percentage was outside the walkable limits. This determination was important because individuals who need to drive to a station are not as attracted to transit as individuals who can walk to a station—the number of trips that need to utilize park and ride at stations is generally 25% or less as compared to individuals in walking distance. This is a result of the need to make a transfer from auto to transit versus a single seat trip in a car and a corresponding need to allow extra time for the transfer to compensate for potential delays while driving; often times, the vehicle driver feels it is easier to just continue his/her drive to work rather than transfer to a transit mode. The resulting mode splits are set forth in Table 6.

[6] For infrequent service, the average elasticity of transit ridership with respect to headway changes in the United States is approximately 0.60 to 0.80, i.e., cutting the headway from 60 minutes to 30 minutes would increase ridership approx. 30% - 40%.
[7] The elasticity of ridership with respect to travel time is approximately -0.60 to -0.80. In other words, doubling the travel time of a transit service results in reducing its ridership by 30% to 40%.

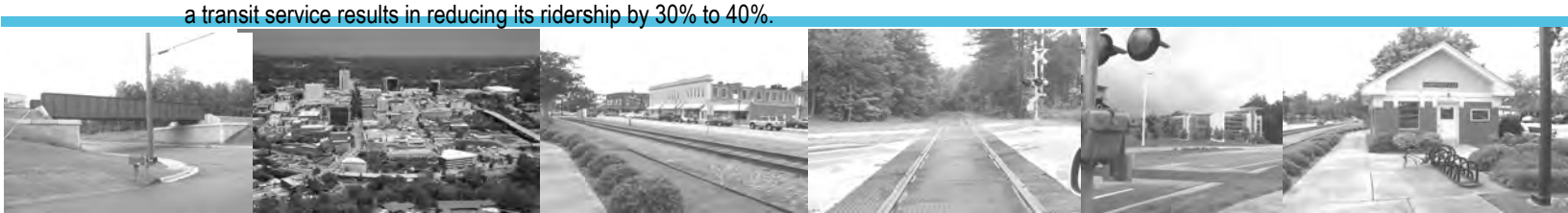


Table 6
Percentage of Journey to Work Trips Expected to Be Attracted to Transit
(By Mode and Access Characteristics)

Mode	Walk	Park & Ride
LRT/DLRT and BRT - 30 minute headway	13%-17%	3%-4%
Commuter Rail - 60 minute headway	6%-9%	1%-2%
Streetcar - 30 minute headway	8%-12%	2%-3%

Table 7 takes the information generated from Table 5 and Table 6 and reflects low and high ridership estimates for each of the modal alternatives. The following provides an example of the quantitative process used to generate the low ridership estimate for the LRT/DLRT option.

1. 1901 (walk access from Table 5) x 4 trips x 13% (walk - Table 6) + 3,958 (drive access number from Table 5) x 4 trips x 3% (park & ride - Table 6) = 1463
2. 1463 x 13% (population increase 2000-2007) = 1654 (low estimate – Table 7)

Table 7- Daily Ridership Estimates

Mode	Low Estimate	High Estimate
Commuter Rail	694	1,131
LRT / DLRT	1,654	2,176
Streetcar	1,217	1,568
BRT Main Street	2,108	2,771
BRT I-385	1,654	2,176

10.0 Evaluation of Alternatives

10.1 Introduction

A summary of the alternatives characteristics is presented in detail in Figure 10-1.

Each of the alternatives was evaluated according to the following criteria. These criteria were established because they are pertinent factors in evaluating the successful operation of a transit system.

- Capital cost
- Operating cost
- Ridership
- Travel time
- Frequency
- Convenience of trip
- Access to activity centers.

For each criteria, the alternatives were compared against each other to determine how they were comparatively ranked. A “Harvey ball” with a point value was used for the ranking system. A full ball (3 points) indicates that the alternative fully addressed the measure or is “best” relative to the consideration. A half ball (2 points) indicates that the alternative somewhat or partially addresses the measure or is the “second best”. The empty ball (1 point) indicates that the alternative failed to address the measure or is the lowest ranked criteria in comparison to the other alternatives. A summary matrix is presented in Figure 10-2.

The results of the ranking system indicate that the most feasible alternatives to be examined in closer detail are the BRT and LRT/DLRT alternatives. It is not thought that the commuter rail option or the streetcar option should be developed further at this time due to the projected lower ridership. The commuter rail option cannot operate into downtown Greenville and would require a transfer onto a bus, an operating scenario that most likely would not attract many riders due to the length of time it would take to make the trip. The streetcar alternative would be as costly to implement as an LRT system but would not be able to serve the same number of riders. Also, streetcars are designed for slower operating speeds, so the projected ridership is lower due to that reason.

RIDERSHIP AND COST SUMMARY

ALTERNATIVE	BUS RAPID TRANSIT- MAIN STREET	BUS RAPID TRANSIT- I - 385	DIESEL LIGHT RAIL TRANSIT	LIGHT RAIL TRANSIT	COMMUTER RAIL	STREETCAR
CAPITAL COST	$45.2 million	$47.7 million	$173.7 million	$224.3 million	$142.2 million	$214.1 million
COST PER MILE+	$2.4 million	$2.6 million	$9.3 million	$12.0 million	$7.6 million	$11.5 million
OPERATING COST/YEAR	$1.2 million	$975,600	$1.7 million	$1.6 million	$754,000	$1.4 million
DAILY RIDERSHIP^	2,100 to 2,770	1,650 to 2,175	1,650 to 2,175	1,650 to 2,175	700 to 1,125	1,200 to 1,575
ONE WAY TRAVEL TIME#	38 minutes	29 minutes	30 minutes	30 minutes	38 minutes	57 minutes
* Assumes on street operations south of GCEDC right-of-way						
+18.7 mile corridor, downtown Greenville to Fountain Inn						
^ Shows the low and high ridership estimate potential						
# Fountain Inn to downtown Greenville						
~ Includes travel time on shuttle bus						

Figure 10-1: Summary Information

Summary Matrix

CRITERIA	BUS RAPID TRANSIT MAIN STREET ALTERNATIVE	BUS RAPID TRANSIT I-385 ALTERNATIVE	DIESEL LIGHT RAIL TRANSIT	LIGHT RAIL TRANSIT	COMMUTER RAIL	STREETCAR
Capital Cost	●	●	◒	○	◒	○
Operating Cost	◒	●	○	○	●	◒
Ridership	●	◒	◒	◒	○	○
Travel Time	◒	●	●	●	◒	○
Frequency	●	●	●	●	◒	●
Convenience of Trip	●	◒	●	●	○	●
Access to Activity Centers	●	◒	●	●	●	●
SUMMARY (No. of Points)	19	18	17	16	14	14

● This symbol indicates an alternative fully addresses the measure or is the "best" relative to the consideration (3 points)

◒ This symbol indicates an alternative somewhat or partially addresses the measure, or is "second best."(2 points)

○ This symbol indicates an alternative fails to address the measure, or is the lowest ranked criteria in comparison to the other alternatives (1 point)

Figure 10-2: Ranking Matrix

10.2 BRT Alternatives

10.2.1 Operational Concept

The operational concept for both BRT alternatives assumes construction of a bi-directional busway, generally 25 feet wide, along the rail alignment as far south as Forrester. There may be a couple of short segments, including at bridge locations, where the right-of-way becomes too narrow to construct the busway; in these locations, it may require paving over the track and locating the busway on top of the tracks or narrowing the busway allowing only one-directional operation. The Main Street alternative would continue in mixed traffic along Laurens Road/Main Street until it reaches Fountain Inn. The I-385 alternative would leave the busway at Laurens Road and go express on a dedicated HOV lane on I-385 to Fountain Inn.

For either alternative, two branch lines are proposed to branch off the busway to directly serve relatively densely populated portions of Mauldin. These routes are assumed to operate only during peak periods. There is also another route shown on the map as branching off at Pleasantburg Drive that would serve nearby commercial/industrial areas. That route is assumed to potentially replace some existing GTA service. Its operating costs/ridership is not figured into the BRT calculations.

No signaling along the busway is proposed; operation would be "on sight", like a highway. Traffic signals would be used to protect at-grade roadway crossings (possibly supplemented with crossing gates at crossings where sight lines are obstructed). Longer segments with no stations might be operated at up to 60 mph. It is assumed that a Transit Signal Priority (TSP) system would be installed with new sensors at the signalized intersections along on-street portions of the routes. Traffic signals in the corridor are equipped with relatively modern controllers that can be upgraded with software to accommodate TSP. Such a system provides a few seconds of early green or extended green to expedite transit service. Operating time from Fountain Inn to Greenville for the I-385 alternative is approximately 29 minutes and for the Main Street alternative is approximately 38 minutes.

It is assumed that the BRT vehicles will be 40 feet long non-articulated vehicles with about 35 seats, equipped with two doors for rapid boarding/alighting, with comfortable headrest-equipped seats in recognition of the long route length. Ridership growth in the corridor can be accommodated with added service, accomplished by acquiring additional buses (operating more frequent service), or longer articulated buses.

Implementation of Proof of Payment (POP) fare collection would reduce dwell times at stations. This requires that most passengers have prepaid tickets or that stations be equipped with ticket vending machines. It allows passengers with tickets to enter at all doors and not file past the bus farebox.

Park and ride lots would be provided at all stations except in central Greenville. It has been assumed that each would have an average of about 75 spaces.

10.2.2 Conceptual Service Levels

Service is proposed to operate on weekdays only, with service operating from 6:00 a.m. to 7:00 p.m. Weekend or evening service could be provided for special events such as major sporting functions or other events at downtown venues. Frequencies of every 30 minutes during morning and evening rush periods and hourly service during the midday are proposed for the mainline to Fountain Inn. The Mauldin branches are proposed to operate during peak periods only, with 30 minute headways on each. Table 8 displays the BRT conceptual service levels.

Table 8: BRT Conceptual Service Levels

Route	Frequency		Hours of Operation	Days
	AM/PM Rush	Midday		
Greenville-Fountain Inn (mainline)	30 min	60 min	6:00a.m. – 7:00p.m.	Mon.-Fri (except holidays)
Mauldin branches	30 min	--	6:00a.m.-9:00a.m.; 3:00p.m.-7:00p.m.	

10.3 DLRT/LRT Alternatives

10.3.1 Operational Concept

The operational concept assumes a Light Rail Transit system that is either diesel powered (DLRT) or the more traditional LRT systems that are electrically powered with overhead catenary system.

With properly spaced stations, LRT (either electric or diesel) would maintain an approximate average speed of 40-45 mph, enabling it to be competitive with the personal automobile during congested rush hour periods along parallel interstate highways. Both have the flexibility to run both on an exclusive right-of-way and in mixed street traffic. DLRT has a major advantage for lower density startup operations, such as under study in Greenville, because it minimizes capital expenditure by avoiding an initial investment in costly overhead electrification throughout the corridor. DLRT systems have been implemented in San Diego, and New Jersey.

Because LRT vehicles do not comply with Federal Railroad Administration (FRA) regulations for operations in mixed service, they would not be permitted to operate on the existing freight tracks during the same hours of operation as freight trains. A "temporal separation" could be arranged, as has been done on passenger transit and commuter lines throughout the country. This temporal separation would require an agreement between the transit operator and the freight railroad (or owner of the tracks) to determine when the transit service can operate separately from the freight service.

LRT is also an applicable technology for the corridor as it has the flexibility to run with minimal capacity of only one unit upon initiation of the service, but can be coupled with other units should future demand become substantial. This could save the potential transit operator significant upfront capital which would have been used to purchase rolling stock or build maintenance facilities and yards too large and unnecessary for initial service needs. The ridership forecast anticipates ridership would be high enough to justify two - car train operation at the start of operation on proposed 30 minute headways. This has been included in the capital and operating cost estimates. The 30 minute headways are based on two factors: level of ridership and the fact that it is a single track operation. Operating time from Fountain Inn to Greenville is approximately 30 minutes, allowing one car to be operating in one direction at any given time.

10.3.2 Conceptual Service Levels

It is possible that a transit line operating in this corridor could obtain service frequencies of every thirty minutes during morning and evening rush periods and hourly service during the mid-day operations. Operations could run from 6:00 a.m. (first train leaving Fountain Inn) to 7:00 p.m. (last train leaving Greenville) and would likely not operate on weekends nor during holidays, however special train runs could possibly be organized for major sporting events or the like at downtown venues. Table 9 displays the DLRT/LRT conceptual service levels.

Table 9: DLRT/LRT Conceptual Service Levels

Frequency		Hours of Operation	Days
AM / PM Rush	Mid Day		
30 min	60 min	6:00a.m. - 7:00p.m.	Mon.-Fri (except holidays)

10.4 Recommendation of Preferred Alternative

Of the highest ranked alternatives, the BRT alternatives are significantly less expensive than the LRT and DLRT alternatives. The BRT – Main Street alternative is expected to attract more riders due to the fact that it serves the main business districts of each community and was designed with branch lines that would provide service closer to potential rider's homes. Subsequently, it is recommended that the GCEDC proceed with the BRT - Main Street alternative into the implementation stage.

10.4.1 Phased Implementation and Forecast Costs

Figure 10.1 shows an estimated cost for the full build out of the BRT-Main Street corridor, Greenville to Fountain Inn, as $45.2 million. As a start up operation, it may make sense to operate the BRT from downtown Greenville to the limits of the GCEDC right-of-way at Forrester Drive. A park and ride lot would be located near the limits of the property. Service could then be expanded incrementally to Fountain Inn as ridership grows. The cost estimate for this first phase of implementation is approximately $36.6 million.

The capital cost estimates are shown in 2009 dollars. Since it is not know when implementation of the service will occur, the cost estimate for the initial start up operation (i.e. $36.6 million) was projected over the next 40 years to the year 2050. The approximate cost estimate per decade is as follows: [8]

2020: $45.2 million
2030: $57.7 million
2040: $73.6 million
2050: $93.9 million

[8] Capital planning of transit systems requires the estimation of capital costs for a broad variety of project components and the projection of these costs into those future years during which construction will take place. The most uncertain factor in these projects is identifying an appropriate estimate of the rate at which these costs will increase in the future. For example, during 2008 the Producer Price Index for Other Construction, a measure of the rate at which construction costs are increasing, varied between 1% and 16%. However, there is general consensus that the costs of construction have in the past and will in the future rise faster than the inflation rate for the economy as a whole, i.e., the change in the Consumer Price Index or CPI. However, soft costs, such as project design, engineering and management costs, are expected to increase at closer to the rate of inflation. The Federal Office of Management & Budget forecasts an inflation rate of 1.3% in 2010 and 1.7% in 2011, rising to 2.1% in 2020. The Congressional Budget Office forecasts a slightly lower rate of inflation both for the next two years and as a long-term estimate. For this estimate, it has been assumed that the average rate of inflation for the next 10 years will be the average of the estimated inflation rate for the next two years and the long-term inflation rate. It has also been assumed that construction costs will increase at a rate 0.5% per year higher than the overall CPI. The estimate for contingencies has been kept at 30% of the total of the other line items.

11.0 Revenue Estimate

Integral to implementation is the need to identify funding for operation of the preferred alternative, the BRT-Main Street alternative. Fare revenue will be one element of that funding, but is not expected to be sufficient. However, an estimate of potential fare revenue is an important element in estimating the amount of funding that would be necessary from other sources that are proposed in Chapter 13. The following presents a discussion of possible fare structures and levels for the BRT service and an estimate of the resulting revenues.

11.1 Conceptual Fare Structure Options

A *fare structure* consists of three basic elements: *fare strategy*, *payment options*, and *pricing levels.* Fare strategy refers to the general type of fare collection/payment approach (i.e., flat vs. differentiated fares) and to the transfer pricing/policy; differentiated fares include zonal charges, peak/off-peak differentials, and express or rail surcharges. Payment options include cash, period pass, single or multi-ride tickets/tokens, and stored-value/ride farecards. The final piece of the fare structure is the actual pricing levels of each payment option, including percentage discounts (if any) for prepaid options. Each of these areas is reviewed below.

11.1.1 Fare Levels

Transit service in Greenville is currently provided by the GTA's Greenlink with 11 fixed bus routes serving the County. Greenlink also provides a complimentary ADA paratransit service named GAP. The current base fare for adults on Greenlink is $1.25, with discounts for students, senior citizens, individuals with disabilities, and children.

11.1.2 Fare Strategy

Basic fare strategies fall into two general categories: flat and differentiated. In a flat fare structure, riders are charged the same fare, regardless of the length of the trip, time of day, speed or quality of service. Alternatively, fares can be differentiated by one or more of those parameters, resulting in *distance-based* or *zonal fares*, *time-based* (e.g., peak/off-peak) *differential*, and/or *service-based differential* (e.g., express surcharge or bus-rail differential). Each of these approaches has certain advantages and disadvantages, mainly related to relative ease of use and administration vs. ridership/revenue impacts.

The principal arguments in favor of differentiation have focused on issues related to efficiency and equity. In particular, it has been argued that a higher fare should be charged to cover the higher operating costs associated with serving longer trips, operating peak period service and providing "premium" service such as express bus or rail; otherwise, the users of the higher-cost services are effectively cross-subsidized by the users of shorter-distance, off-peak or local bus services. Differentiated fares are also seen as able to generate greater revenues as lower flat fares, since the users of the higher-cost services (e.g., longer distance) have often been found to be less price-sensitive than those using the lower-cost services.

All differentials also have significant disadvantages. These disadvantages generally fall into two categories, ease of administration and ease of use. Ease of administration focuses on the agency and includes the cost of additional fare cards, the cost of providing information on the fare differentials, the additional accounting and administration costs, and the additional difficulty for the operators of administering the differentials. Ease of use focuses on the customer's experience and includes the ease of understanding the fare system, and the likelihood of fare-related conflicts between the customer and the operator. Ease of understanding is important as studies have shown that potential riders are less likely to use transit if they are unable to accurately estimate the fare in advance. The disadvantages of time-based differentials are generally considered to be greatest since it creates the possibility of conflicts between operators and customers based on differences in how watches are set and adds the greatest difficulty to estimating the fare (especially when the precise time of travel is unknown). This is reflected in the fact

that by far the fewest agencies use time-based fare differentials. Service-based differentials are generally considered to have the least disadvantages, where the agency provides distinctly different services, especially where the higher fare can actually be part of the package of elements that distinguish a service as being special and more valuable.

For the purpose of this estimate, the revenue impact of implementing a service-based differential and a distance-based differential (a zone system) for the proposed BRT was examined.

11.2 Methodology

Revenue estimates were generated based on the ridership estimates included in Chapter 9, on the current fare revenue and unlinked ridership of Greenlink's bus service, and on national experience regarding fare increases and fare differentials.

11.2.1 Baseline Revenue Estimate

The low and high estimates of ridership for the BRT Main Street alternative are shown in Table 10.

Table 10- Daily Ridership Estimates

Mode	Low Estimate	High Estimate
BRT Main Street Alternative	2,108	2,771

The daily ridership estimates were annualized and appear in Table 11. Weekday only service is proposed.

Table 11- Annual Ridership Estimates

Mode	Low Estimate	High Estimate
BRT Main Street Alternative	548,080	720,460

Greenlink's fare revenue and unlinked ridership were used to generate an average revenue per boarding with the existing fare structure which takes into account the discount offered by Greenlink's multi-ride ticket and the share of riders currently using that ticket, as well as the impact of transfers. For year 2008[9], Greenlink had fare revenues of $649,600 and unlinked ridership (on the buses) of 751,700. This is equivalent of a revenue per boarding of $0.864. This is assumed to be the average revenue per boarding on the proposed BRT service. Applying this average revenue to the annual ridership gives the baseline annual revenue provided in Table 12.

Table 12- Baseline Annual Revenue Estimates

Mode	Low Estimate	High Estimate
BRT Main Street Alternative	$ 473,500	$ 622,500

[9] Source: National Transportation Data, 2008

11.2.2 Service-Based Fare Differential

Implementing a service-based differential for the BRT service is certainly possible, as it will be a significantly different service from Greenlink's existing service. It will operate at a higher rate of speed, a significant portion of the route will be on an exclusive right-of-way, and it will mostly serve longer trips. Nationwide, service-based surcharges range from $0.25 to about $4.00.

Use of transit drops significantly when the route-trip cost of transit exceeds parking costs, so it is important that the fare on the BRT service be lower than or comparable to the cost of parking. Currently, the maximum daily rate at the majority of the Greenville parking garages and lots reviewed was $6.00, while the maximum monthly rate was $69.70. This should be the maximum cost of riding the BRT service. Therefore, the maximum one-way fare for BRT would be $3.00 (one-half of the $6.00 daily charge). This would be a surcharge of $1.75 (or 140%) compared with the current fare of $1.25. Currently, the cheapest way to use transit for an entire month is to purchase two 20-trip tickets at a cost of $22.50 each, for a total cost of $45. If the monthly cost of the BRT service were increased to approximately $69.70 (the monthly maximum parking rate), each 20-ride ticket would cost $34.85. This would be a surcharge for BRT service of $12.35 per 20-ride ticket (55%). If the same percent surcharge were applied to both one-way tickets and 20-ride tickets, it would have to be the lower increase – 55%. Rounded to the nearest quarter, this equals a surcharge of $0.75, or a fare of $2.00 for the BRT and $1.25 for regular transit service.

In estimating the impact of a fare surcharge, it is important to recognize that higher fares result in reduced ridership. This impact is calculated using an elasticity, or a measure of how ridership changes with fares. Nationwide, a reasonable estimate for the elasticity of ridership with respect to fares for small cities is -0.40, meaning that for a 10% increase in fares, there is approximately a 4% decrease in ridership. Using that elasticity and the range of surcharges discussed above, results in the estimates of ridership and revenue shown in Table 13.

Table 13 - Service-Based Surcharge
Ridership and Revenue Estimates

Mode	Surcharge		Low Estimate	High Estimate
BRT Main Street Option	$0.25	Ridership	504,200	662.800
BRT Main Street Option	$0.25	Revenue	$ 522,800	$ 687,200
BRT Main Street Option	$0.75	Ridership	416,500	547,500
BRT Main Street Option	$0.75	Revenue	$ 575,800	$ 756,900

11.2.3 Distance-Based Fare Differential

Implementing a distance-based differential for the BRT service is also possible, since it will operate for a much greater distance than current service. Since operating costs are related to travel time and distance, longer trips cost more to provide and reasonably should pay a higher price so that they are not subsidized by the shorter trips. Distance-based surcharges are also used when a service operates into suburban jurisdictions which do provide as much funding for transit as the central city. Nationwide, distance-based surcharges generally range from $0.25 to about $3.00, although some agencies have distance surcharges as low as $0.05 and on (New Jersey Transit) has a maximum surcharge of over $25.00. For this service, the maximum surcharge would again be limited by the maximum daily and monthly parking rate in Greenville. As discussed above, the maximum one-way fare for the longest trips on the BRT would be $2.00, a surcharge of $0.75. The minimum reasonable surcharge is generally $0.25, as surcharges below that level provide little revenue, but provide the same disadvantages as a higher level of service. This once again gives us a range of potential surcharges from $0.25 (total one-way fare of $1.50) to $0.75 (total one-way fare of $2.00).

The additional factor in distance-based surcharges is determining to which trips the surcharge is applied. Distance-based for bus services are generally based on zones, with trips within a single zone paying the base fare and trips that cross the zone line paying an additional fare for each zone line that they cross. Zone lines generally are either

based on the distance from the city center or are based on political boundaries, especially if the jurisdictions provide different levels of funding for the transit operator. For purposes of this estimate, we have assumed that a zone boundary is created between ICAR Station and Mauldin Station, roughly matching the border between Greenville and the other jurisdictions. This makes the inner zone roughly match the current service area provided by Greenlink, while the outer zone represents the expanded service area.

In estimating the impact of this fare surcharge, we have used the same value of elasticity as used for service-based surcharges, -0.40. Of course, only the riders actually crossing the zone line experience the fare increase, so the revenue and ridership impact of this surcharge is lower than the impact of a service-based surcharge. We estimated that with the above described boundary, only about 40% of riders would be subject to the surcharge. Using that elasticity and the range of surcharges discussed above, results in the estimates of ridership and revenue shown in Table 14.

Table 14- Distance-Based Surcharge
Ridership and Revenue Estimates

Mode	Surcharge		Low Estimate	High Estimate
BRT Main Street Option	$0.25	Ridership	530,500	697,400
BRT Main Street Option	$0.25	Revenue	$ 493,200	$ 648,400
BRT Main Street Option	$0.75	Ridership	495.500	651.300
BRT Main Street Option	$0.75	Revenue	$ 514.500	$ 676,300

11.2.4 Conclusions

Comparing the revenue generated by fares that have a service based surcharge to fares that have a distance based surcharge, it appears that the revenue estimates are similar. The decision to adopt either surcharge or to implement a flat fare comparable to existing GTA services, will be a policy decision that will need to be made as part of the implementation process.

12.0 Transit Oriented Economic Development and Station Locations

12.1 History[10]

Railroad transport came to South Carolina during the two decades preceding the Civil War, stimulating economic development and the growth of Greenville County towns. During this period, goods sold in Greenville County increased in value by 45 per cent, spurred to some extent, by increased distribution capabilities.

Mauldin (originally known as Butler's Crossroads), Simpsonville, and Fountain Inn were established along a stage coach road from Greenville to Laurens, South Carolina prior to the Civil War. After the war, Greenville County saw another flurry of railroad expansion. When the Greenville and Laurens Railroad began operations in 1886, nearby landowners in these towns divided their property into lots for homes and business endeavors. The Fountain Inn and Simpsonville Cotton Mills were established and the postwar economy grew.

A planned railroad expansion from Greenville to Asheville, South Carolina, was never realized. However, by 1892, a preliminary branch reached from downtown Greenville to Marietta, South Carolina, later extending to Pott's Cove (now River Falls). This short spur was nicknamed *The Swamp Rabbit*. Today, *The Swamp Rabbit* is being converted from rails to trails, with plans for a future tram. It runs through historic Traveler's Rest, Furman University, past historic textile mill villages, and into downtown Greenville. Any plans for a transit corridor being planned under this study should consider integration with this valuable county amenity.

The Swamp Rabbit Corridor, along with Laurens Road and the historic Greenville and Laurens Railroad Corridor offer an exciting opportunity for new transit oriented economic growth in the twenty first century.

12.2 Transit Oriented Growth

One of the great advantages of a dedicated transit corridor is its capacity to focus economic growth and development. Traditional bus lines in Greenville County follow growth, connecting meandering neighborhood routes and destinations to a central hub. Such routes are thought of by developers as temporary, providing neither the predictability nor the diverse markets necessary for stimulating economic development.

A dedicated transit corridor spine, however, can provide an efficient alternative, offering developers a more predictable and diverse market for the development of Transit Villages. Figure 11-1 shows the transit corridor under study, with linkages to the Swamp Rabbit Trail referred to above. Proposed station stops which can be developed into transit villages are highlighted.

[10] All historic data from *Greenville: The History of the City and County in the South Carolina Piedmont*, by Archie Vernon Huff, Jr., University of South Carolina Press, 1995.

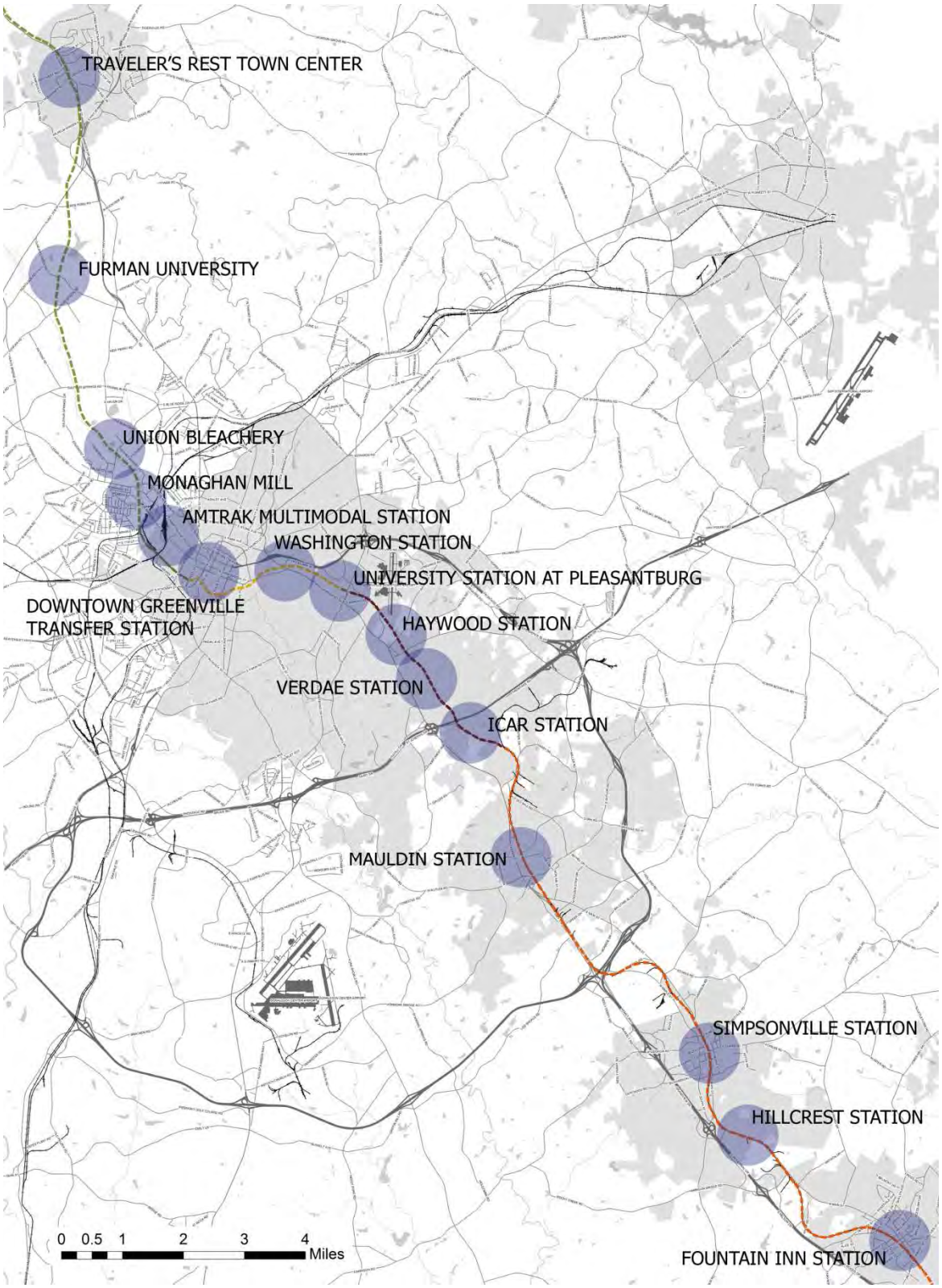


Figure 11-1: Route of the Historic Rail Corridors Traveler's Rest to Fountain Inn, with Proposed Transit Villages

12.3 The Transit Village

Public transit extends the range of the pedestrian, offering greater independence to those whose mobility is limited by age, economics, or physical ability, while providing an alternative to those searching for a more environmentally sensitive way of life. A ten minute walk from the Transit Station at the center creates a 500 acre Transit Village. A five minute bike ride from the station extends the boundary to include another 630 acres.

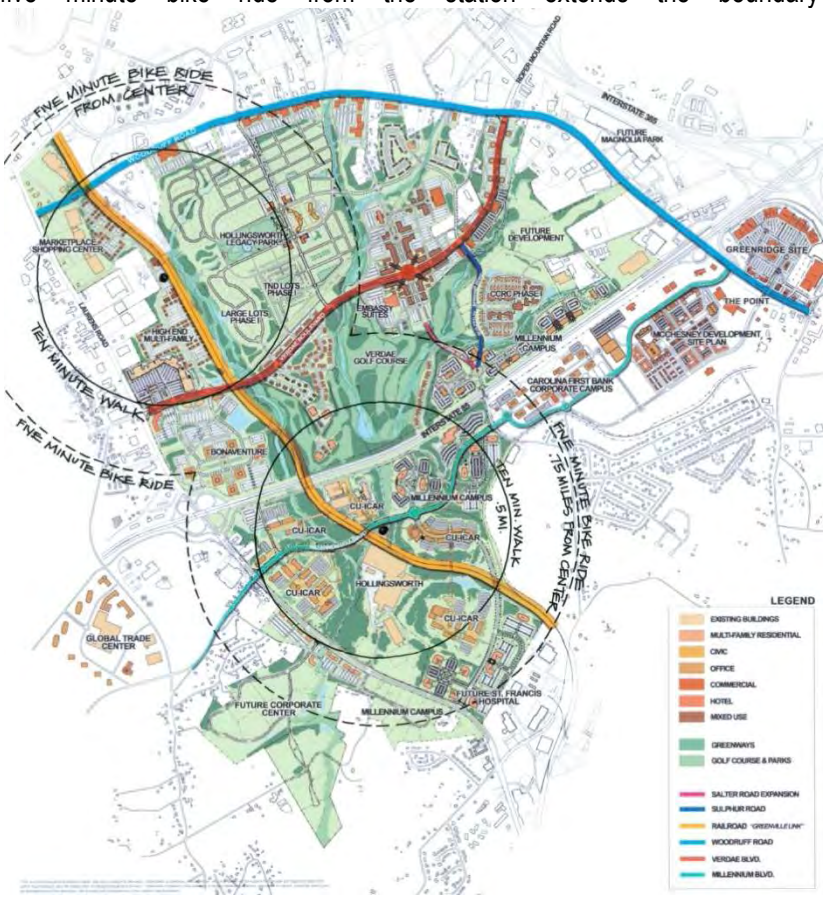


Figure 11-2: Ten Minute Walk (one half mile radius) and Five Minute Bike Ride (three quarter mile radius) from station centers at Verdae and ICAR Transit Villages (Map courtesy of Verdae Development)

Careful village design will ensure a quality of life and sense of community now missing from commercial strip corridors. Village streets should respect the safety and comfort of pedestrians and cyclists. The community should offer a variety of shops, offices, and homes, as well as civic and recreational opportunities. All of these amenities should be within an easy walk from the neighborhood edge. A Transit Corridor Magnet School could become the heart of each Transit Village. As these walkable villages grow, each one will develop its own character, offering a special sense of community, reducing reliance on the automobile, and increasing ridership for the transit system.

12.4 Station Location Criteria

Station locations have been chosen to offer convenient transit access to existing neighborhoods, employment centers, entertainment destinations, and commercial nodes. Potential for economic development and community revitalization is often a determining factor. All station locations are thoughtfully integrated with multi-modal options, including:

- *Pedestrian and Bicycle Connections:* All stations should provide a pedestrian friendly environment and easy access to bikeways and greenway systems.
- *Integration with Bus System:* All stations in the City of Greenville should have easy access to traditional bus service. All other stations should be designed to accommodate future bus services.
- *Access to Airports and Passenger Rail:* The Rapid Transit Corridor should provide access to the Downtown Airport, the Greenville-Spartanburg Airport, and AMTRAK.
- *Kiss and Ride:* All stations should offer easy drop off zones for autos and taxis.
- *Park and Ride:* Select stations should provide Park and Ride garages for suburban users.
- *Zip Cars and Bicycles:* Short term rental of bikes and cars could provide a business opportunity at select locations.
- *Employer Shuttles:* Major employers in Greenville County should consider providing a shuttle service from a convenient stop along the Transit Corridor as a benefit to employees.
- *Destination Shuttles:* Easy access to public venues such as the BiLo Center, the Carolina First Center, the Heritage Amphitheater and the Drive Stadium should also be considered.

12.5 Station Locations

The municipalities along the corridor are already are making infrastructure improvements near the proposed stations that are conducive to transit-oriented development. For example, the City of Fountain Inn has developed a Downtown Framework Plan which integrates mixed use developments, higher density residential, and pedestrian friendly infrastructure to support proposed transit. Hollingsworth Park in the Verdae area in Greenville, is a large neighborhood under development and very close to the rail corridor. It is being developed in a traditional design, that is conducive to transit oriented development. Other plans are being developed to support additional station locations.

12.5.1 The North Corridor

Figure 11- 3 shows proposed station locations along the GCEDC Corridor from University Station at Pleasantburg Drive to ICAR and along the street corridors west of University Station. Each circle indicates the inner boundary of a Transit Village, a ten minute walk radius (one half mile) from a station at the center. Although the Swamp Rabbit at Monaghan Mill is beyond the scope of this study, it is included to emphasize the potential for walkable villages along the Swamp Rabbit Trail, as well as its proximity to the Rapid Transit Corridor. Stations include:

- **AMTRAK Hub** within walking distance of the Southernside neighborhood
- **Transfer Station** in the heart of downtown Greenville
- **Washington Station** adjacent to Nicholtown Neighborhood
- **University Station at Pleasantburg** on the rail corridor facing Eastlan Neighborhood and Pleasantburg Shopping district
- **Haywood Station** on the corridor
- **Verdae Station** on the corridor facing the Verdae Town center, and
- **ICAR Station** in the center of the ICAR Research Park: ICAR Station offers easy shuttle access to GSP International Airport, as shown

It is expected that the University Station at Pleasantburg Drive would serve as an intermodal transfer center due to the existing activity centers near the station as well as the station's potential to be the center of transit oriented economic development (TOED). Existing activity centers include Greenville Technical College, the Carolina First Convention Center, the Greenville Downtown Airport as well as existing neighborhoods and places of employment. The station could provide an easy transfer point to GTA buses, airport shuttles, and other modes of transit for those

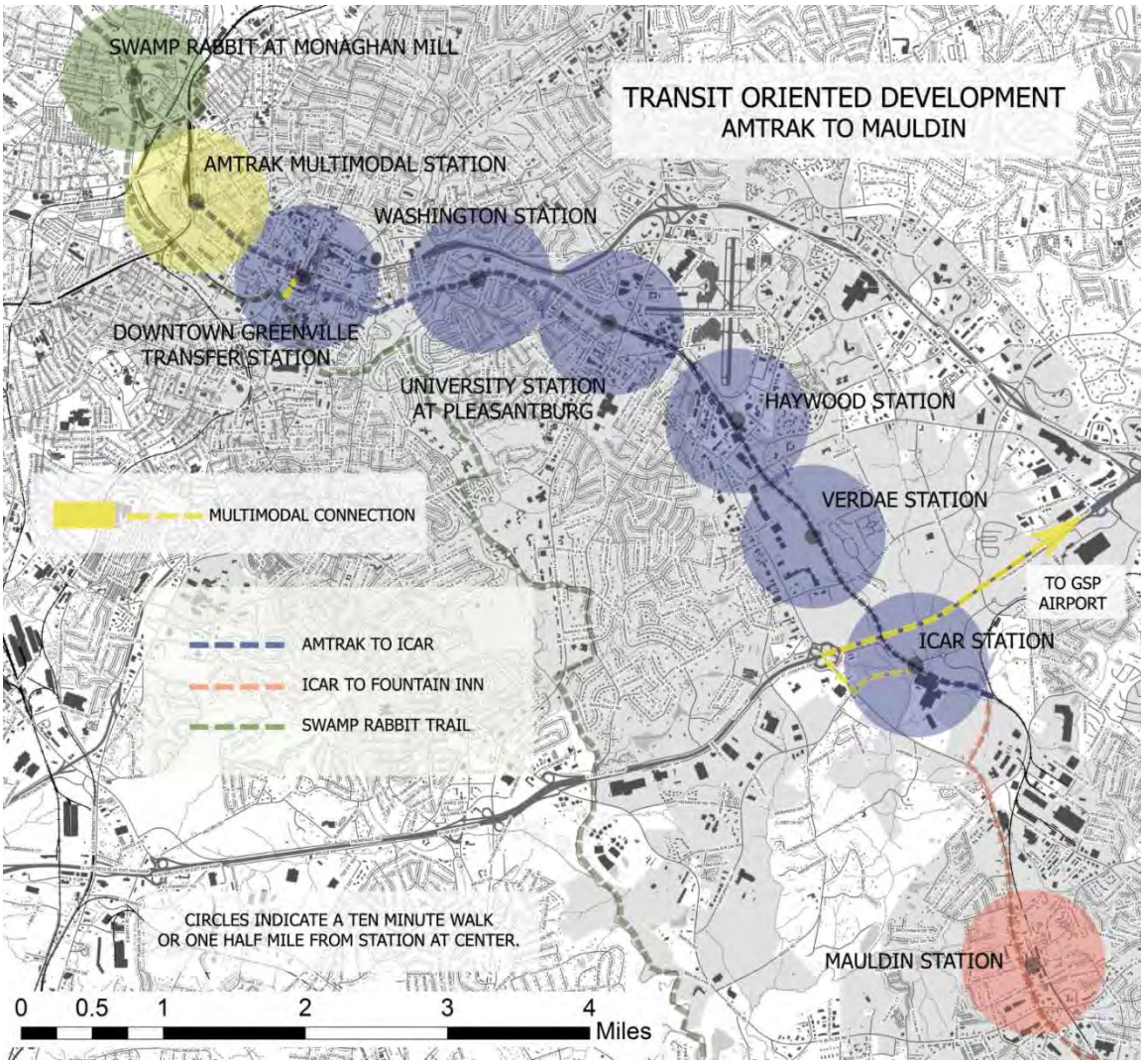


Figure 11-3: Transit Station Locations along the North Transit Corridor

riders who have destinations near this station. An additional park and ride location is prposed at Innovatin Drive, south of ICAR if the BRT-Main Street Alternative terminates at the GCEDC limits as the first phase in implementation.

12.5.2 The South Corridor

The transit corridor is proposed to run along Laurens Road/Main Street from ICAR to Fountain Inn, as shown in Figure 11-4. Laurens Road/Main Street parallels the rail line, creating the opportunity to revitalize the historic town centers, while offering a smooth transition to possible future light rail along the rail corridor. Stations include:

- **Fountain Inn**
- **Hillcrest**
- **Simpsonville**
- **Mauldin**

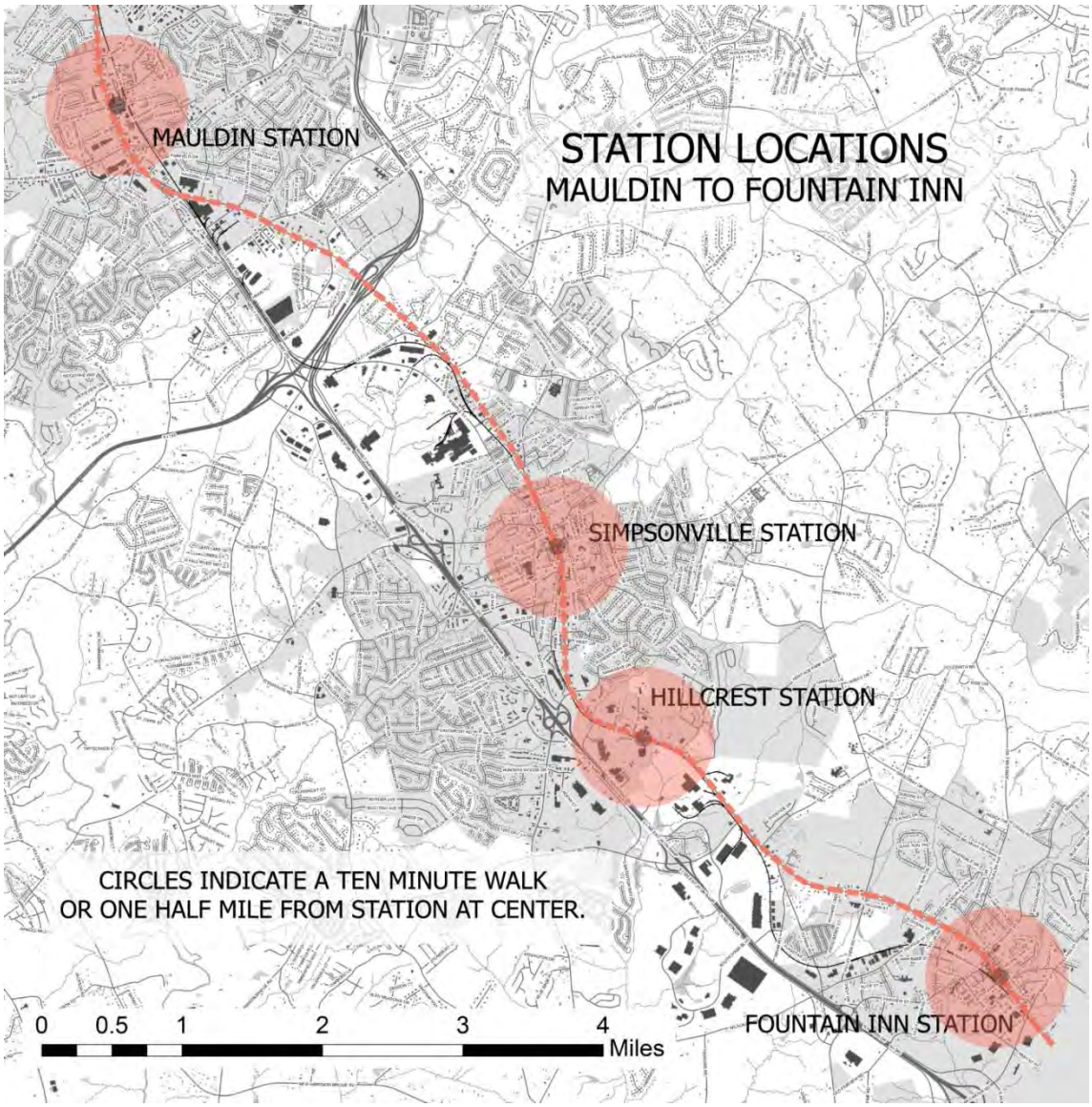


Figure 11-4: Transit Station Locations along the South Transit Corridor

Stations are located in historic downtown Simpsonville and historic downtown Fountain Inn. Mauldin Station is located on City of Mauldin property in an area planned as a town center with easy access to Mauldin's Civic and Cultural centers. Hillcrest Station was added because of its close proximity to Hillcrest Hospital, Bryson Middle and Hiillcrest High Schools, and the Heritage Park and Amphitheater. All four Transit Villages include residential neighborhoods and a mix of uses, with generous opportunity for further economic development. Additional station stops and park and ride lots are proposed for the BRT-Main Street Alternative at a shopping center at Route 14 in Simpsonville, and at Quail Run Circle and Jones Street in Fountain Inn as necessary. These stops are shown on Figure 7-4.

The City of Fountain Inn has prepared a Downtown Framework Plan (January 2006) that reflects appropriate transit oriented economic development including mixed use development, new higher density development, a downtown plaza, and pedestrian friendly enhancements to Main Street. In addition, the City has begun construction in the downtown on a new museum building, known as the Fountain Inn Historical Center that could also serve as a transit

stop once the transit service is initiated. Figure 11-5 shows a conceptual drawing of the station building.

Figure 11-5: Conceptual Drawing of Fountain Inn Transit Station and Museum

12.5.3 Community Impact

Economic Transit Villages can stimulate economic growth by expanding the tax base with property development, by creating new jobs, and by providing quality lifestyle alternatives to attract progressive and innovative corporations to Greenville County.

The University Station Transit Village, shown in Figure 11-6, illustrates the property development potential as the Pleasantburg and Laurens commercial strips evolve into a Transit Village. This City of Greenville Pleasantburg Corridor Master Plan (A) shows the potential for 64 townhomes, 1705 multifamily homes, 193,000sf new office space, 83,000sf new retail and restaurants, 127,000 new hotel, 28,000 new University Center space. The twenty acres adjacent to the station (B) could produce an additional 176 multifamily homes, 134,000sf commercial, a 67,000sf Research Center, and 8 acres of park and gardens. Revitalization of this aging suburb will expand the tax base while making use of existing infrastructure like roads, sewer, water, and electricity, saving taxpayer dollars by limiting expansion into the countryside.

Figure 11-6: Economic Development: University Station Transit Village (Background map courtesy of City of Greenville)

Environment The Strom Thurmond Institute at Clemson University studied current growth patterns in the South Carolina Upstate and predicted that, if current trends continue, development will increase to over 1.5 million acres by 2030, an increase of 82 acres per day. This development rate is outpacing the area's population growth rate by a factor of 5, threatening air and water pollution, loss of farms and forests, and massive sprawl with accompanying traffic congestion.

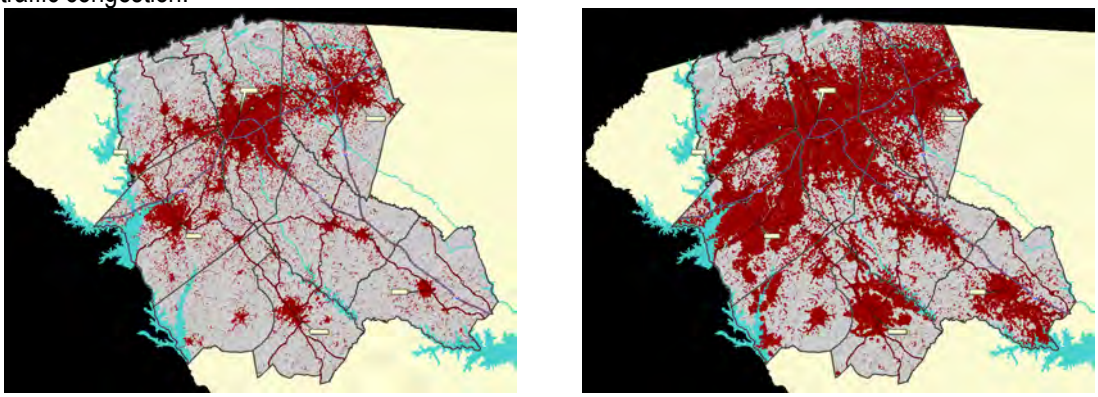


Figure 11-7: 2007 Growth Limits and 2030 Growth Projection (Maps courtesy of Upstate Forever)

The study also found that from 1940 to 1990 the development rate in the Upstate was half the population growth rate, offering hope for an attractive, viable alternative. Transit villages offer an opportunity to create more traditional, compact communities or TNDs (Traditional Neighborhood Development), directing some of Greenville County's new growth into the existing development footprint, reducing environmental damage, improving quality of life, and protecting the natural beauty of the countryside.

Health Transit Villages help reduce risk of obesity, heart disease, and related illness by offering a walkable environment, encouraging a more active lifestyle. Public transit can reduce auto usage and emissions, decreasing the risk of asthma due to poor air quality. In addition, the increased social networking, civic interaction, fresh air and exercise offered by Transit Villages can have a positive impact on mental health and well being.

Neighborhoods A rapid transit corridor could serve as a backbone to existing and new bus, shuttle, and trolley routes, expanding service now offered to Greenville's Special Emphasis Neighborhoods. Many of these neighborhood residents depend on public transportation as their sole method of mobility. Figure 11-8 shows proximity of station locations to a significant number of Special Emphasis Neighborhoods. The transit corridor could act as a catalyst for further revitalization in these communities.

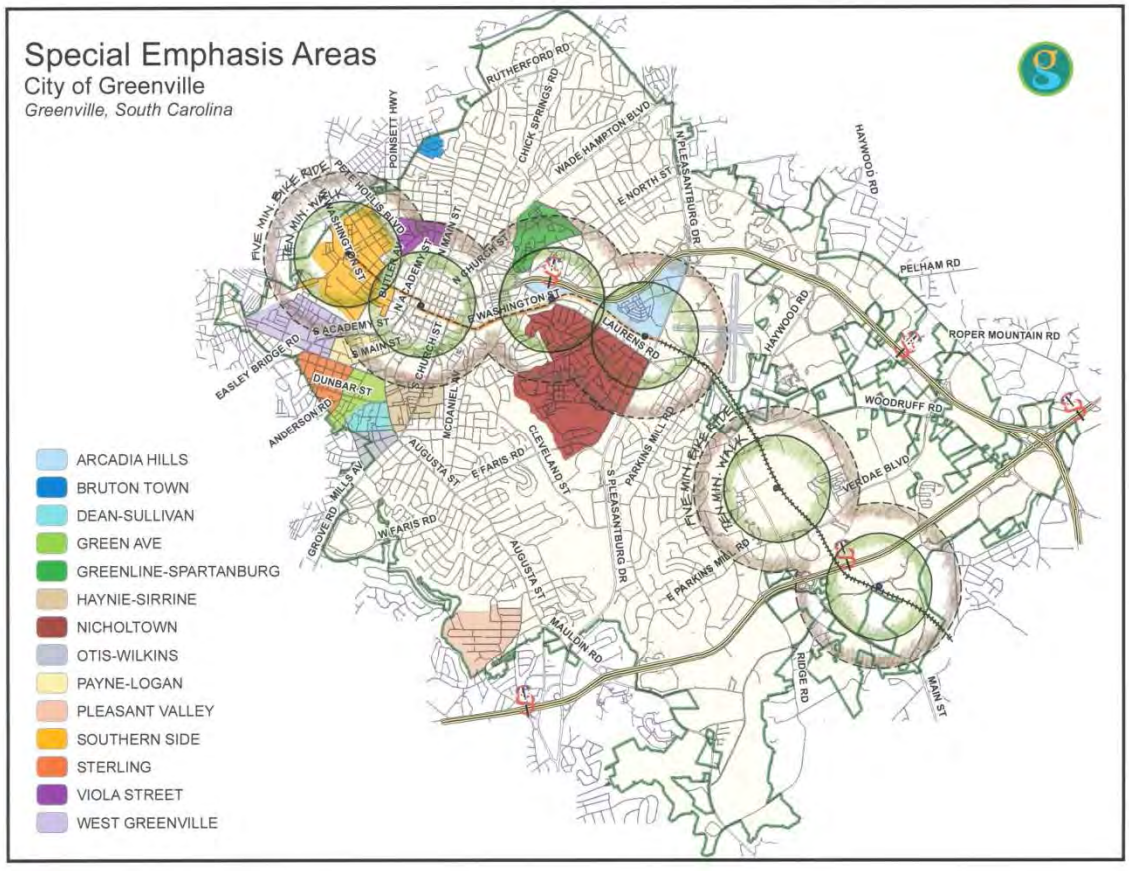


Figure 11-8: Transit Villages located in close proximity to Greenville's Special Emphasis Neighborhoods. (Background map courtesy of the City of Greenville)

Design

Transit Village design will have a dramatic impact on the character and quality of each community along the transit corridor. Sidewalks, landscaping, and pedestrian friendly streets should provide a comfortable and safe environment for residents and visitors. A mix of uses in the village center will keep the neighborhood active and safe by providing eyes on the street twenty four hours a day. Building facades should form an inviting "outdoor room" for community

interaction. Parks and plazas provide welcome public space.

Homes should range from town center lofts near the station to single family homes at the village edge. A diversity of types, sizes, and price points should be offered.

On street parking can provide a safety buffer and can calm traffic. Surface parking should be placed to the rear of buildings in order to offer active street fronts throughout the village. Parking garages should be used whenever possible to free land for more compact development. These garages should be lined on major streets with mixed use buildings for aesthetic effect and to draw the pedestrian through the neighborhood.

Station Design Thoughtful Transit Station design can stimulate growth of neighboring homes and businesses. Development around the station should provide a mix of uses, a comfortable pedestrian environment, and easy access to other modes including auto, taxi, bus bikeways, and trails. The character of the station design will vary from one station to another.

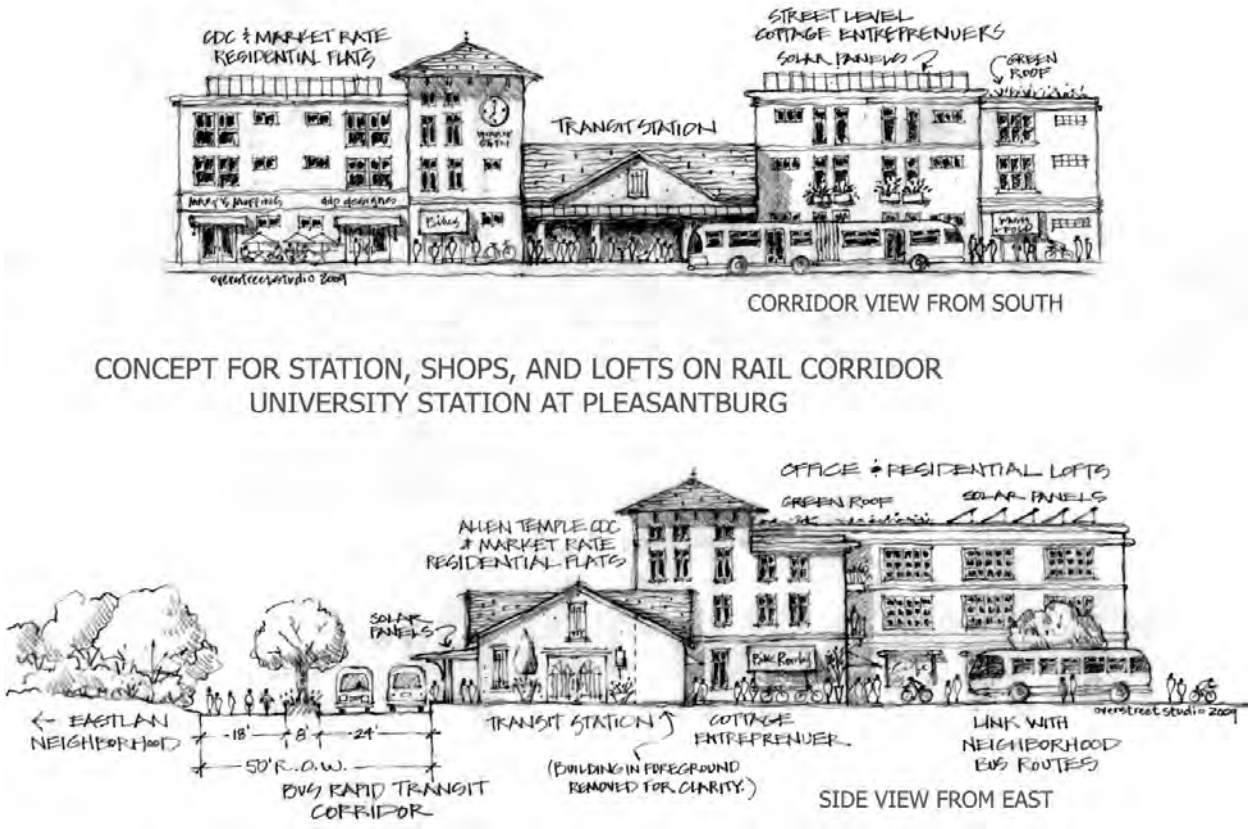


Figure 11- 9: Typical Transit Station and adjacent block

Figure11-9 illustrates a typical station block that could be situated on the corridor just to the west of Pleasantburg Drive as it passes over the rail corridor. The station, associated shops, and residential lofts could be a catalyst for further development on this 20 acre property. The initial phase could integrate affordable and market rate lofts and offer an opportunity for cottage entrepreneurs to serve transit riders with bike rental, convenience shop, and sidewalk café. Perhaps the public library could provide a Library Satellite here, where riders could use the internet, and borrow library books, music and videos. This station site allows easy integration with bus routes and bike trails. As this property develops towards Pleasantburg Drive, the new transit village concept could transform the perception of Pleasantburg Drive from a car oriented aging suburban strip to a thriving village. Green technology could complete the process for transforming this neighborhood into a model for the future.

Transit Village Typology Each Transit Village will develop its own quality and character. There are five typical scenarios for transit oriented development.

Revitalized Suburban Village Transit Village design can soften the character of our automobile oriented commercial strips. Figure11-10 shows how mixed use buildings, landscaping, and pedestrian friendly sidewalks can frame the street, transforming a sterile highway into an attractive parkway.

Figure 11-10: Pleasantburg Drive looking north at Keith Drive

Stations at Pleasantburg, Haywood and Washington could spur revitalization of these aging suburban neighborhoods.

Old Town Simpsonville and Fountain Inn could enjoy further revitalization with transit stations located in the heart of their historic downtowns.

New Town Verdae and ICAR offer an opportunity to create new walkable villages providing homes, shopping, and entertainment along with employment and destination centers at St. Francis Hospital and ICAR Research Park. Mauldin could develop a town center around a transit stop within walking distance of its cultural center. Mauldin's New Town could provide a model for revitalizing Laurens Road.

Urban Village Downtown Greenville provides a Transit Village model and a hub, encompassing the BiLo Center, Peace Center, Falls Park, neighborhoods, lofts, offices, shops, theatres, hotels, and restaurants. This urban setting offers a diverse and attractive model for the compact development necessary to support a rapid transit system.

Destination Village Hillcrest Station in Simpsonville provides access to Hillcrest Hospital and Heritage Park and Amphitheater. This station also offers the opportunity for Transit Magnet Schools with its close proximity to Hillcrest High and Bryson Middle Schools. A mixed use village with a diversity of homes could evolve to serve these destinations. The Multi Modal Station at AMTRAK is another destination hub, providing an opportunity for revitalization in an urban neighborhood.

Sustainable Development Model Transit Villages along the corridor could easily meet LEED-Neighborhood Design standards. LEED-ND is a program developed by the US Green Building Council to establish standards for Leadership in Energy and Environmental Design for neighborhood development. Transit Village criteria closely parallel these environmental standards. Greenville County's Transit Oriented Developments could serve as a national model if LEED-ND standards were incorporated into Transit Village Design Guidelines.

Community Support

Public participation in Imagine Greenville County, Greenville County's Comprehensive Planning Process documented enthusiastic support for sustainable, green, affordable, vibrant and planned communities. The citizen Transportation Committee proposed multimodal connections integrated with public transit, along with an education program to help the public understand the economic, environmental, and quality of life advantages to investment in transit. GPATS (Greenville Pickens Area Transportation Study), Greenville 2025, and comprehensive plans from local municipalities all support public transit and walkable village design.

Figure 11-11: Comprehensive Plan Survey Results

During the Greenville County Comprehensive Planning Process, citizens were asked for five words to describe their vision for the future of Greenville County. Figure 11-11 is a graphic representation of the results of that survey. Font sizes indicate percentage of each citizen request. This survey reflects overwhelming public support for sustainable, green, affordable, vibrant and planned communities.

13.0 Implementation and Funding

13.1 Overview

Implementing new transit service along the GCEDC and CPDR corridor will require a concerted and unified regional effort. The transit corridor is entirely within Greenville County but passes through four communities: Greenville, Mauldin, Simpsonville and Fountain Inn. Any type of implementation will require coordination and cooperation between all four local units of government, as well as with the County. Additionally, there is presently no local dedicated funding source for transit within Greenville County. There is an immediate need to identify a local dedicated funding source before this transit alternative or any other major transit investment can occur in Greenville County.

13.2 Governance

The Greenville Transit Authority (GTA) provides public transportation services within Greenville County. The Greenville Transit Authority was created in 1974 by Ordinances of the City of Greenville and Greenville County, pursuant to the Regional Transportation Authority Law, originally adopted in 1973 and later amended. The Greenville Transit Authority is governed by a seven member Board. Two members are appointed by Greenville City Council, two members by Greenville County Council, and three members are appointed by the Greenville County Legislative Delegation.

During fiscal year 2008 and effective March 31, 2008, the GTA entered into an agreement with the City of Greenville to manage operations of this entity. This arrangement was intended to provide a reduction in transit operational costs through economies of scale by merging transit administration, support services and operations with other City services. Under GTA's contract with the City of Greenville, the GTA Board retains all duties, powers, and responsibilities defined in State law. A few of these responsibilities most pertinent to this study are:

- Contract for public transportation services
- Plan in concert with any appropriate local planning operation for public transportation services
- Establish public transportation routes and approve the alteration or addition of routes based primarily on a detailed analysis or proposed use and comprehensive cost analysis
- Accept gifts, grants or loans of money or other property from and enter into contracts, leases, or other transactions with and accept funds from Federal, State or local governments, public or semipublic agencies or private individuals or corporations and expend the funds and carry out cooperative undertakings and contracts
- Provide transportation services for residents of the service area to destinations outside the service area

The GTA would be able to operate any new transit service within Greenville County. However, prior to implementing new service to Fountain Inn, agreements from each of the communities within the corridor would need to be made with the GTA.

13.3 Overview of Potential Funding Sources

Virtually all regional and municipal transit systems In the United States are funded by a combination of revenue sources for both operating and capital costs, including:

- Fare and other operating revenues
- Federal funding, including formula funding, grant program funding, "earmarked" funds, and loan guarantees

- State funding, including annual appropriations for capital program support, project funding, and operating subsidies from both "dedicated" funding and annual appropriations
- Local funding, usually related to a specific service or facility, particularly in municipal and county owned systems
- Regional funding, usually sales taxes or millage
- General obligation bonding authority, or revenue bonding authority
- Pooling of state transportation funds
- Private sector funding (provided by developers, corporations or foundations)
- Non-transportation revenues, such as advertising, lease and rental income, and interest income

The GTA is dependent on yearly general revenue appropriations from the City of Greenville and Greenville County for operations. There is no dedicated local funding source for transit. In addition to this source of funding, passenger funds support a portion (approximately 17% in 2008) of the operating costs. Non-operating revenues come from federal grants, state grants and local contribution; in 2008 these percentages were approximately 66%, 12% and 22% respectively.

13.3.1 Federal Sources

On August 10, 2005, President George W. Bush signed the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). SAFETEA-LU authorizes the federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009. There are currently discussions on the federal level to extend this bill until a new bill can be passed.

The Federal Transit Administration (FTA) provides financial assistance (typically up to 80% of the cost of the project) primarily through capital grants and loans under a variety of programs. The following programs are most applicable to this project. A description of each of these programs follows.

- Urbanized Aid Formula (Section 5307)
- Congestion Mitigation and Air Quality
- New Starts and Small Starts (Section 5309)
- Clean Fuels Program (Section 5308)
- Bus and Bus Facilities (Section 5309, Section 5318)

While most of these programs are nominally "discretionary" or allocated to states by formula, an increasing percentage of the funds appropriated for these discretionary programs are "earmarked" by Congress to specific projects when the annual authorizing legislation is passed. Each Federal budget contains "earmarked" transit projects that are sponsored by state Congressional delegations and are mandated by statute in the FTA budget. The costs of the earmarks are taken from the appropriations for the discretionary grant programs, and thereby reduce the amount of funds available for discretionary grants.

1. Urbanized Aid Formula Funds (49 U.S.C 5307)- FTA

Section 5307 formula funds are appropriated annually by Congress to transit agencies based upon population served and the amount of transit services provided. Section 5307 is a formula grant program for urbanized areas providing capital, operating, and planning assistance for mass transportation. This program was initiated by the Surface Transportation Act of 1982 and became FTA's primary transit assistance program in FY 1984. Funds are apportioned to urbanized areas utilizing a formula based on population, population density, and other factors associated with transit service and ridership. Section 5307 is funded from both General Revenues and Trust Funds.

2. Congestion Mitigation and Air Quality Program

The CMAQ program, jointly administered by the FHWA and the FTA, was reauthorized in 2005 under SAFETEA-LU. The CMAQ program provides over $8.6 billion dollars in funds to State DOTs, MPOs, and transit agencies in non-

attainment areas to invest in projects that reduce criteria air pollutants regulated from transportation-related sources.

Prior to 2008, Upstate South Carolina (and Greenville) was considered to be in a nonattainment area. In January, 2008, the EPA designated Upstate South Carolina as an attainment area for ground level ozone and in December 2008 for PM2.5. However, in March 2008, EPA strengthened the ozone standard to 0.075 ppm. Most recently, EPA announced that it will review the 2008 decision from the previous Administration. It is expected that the new ozone standards will fall between 0.060 and 0.070 which will put the Upstate back in nonattainment in the near future.

3. New Starts and Small Starts 49 U.S.C. 5309

New Starts funds are discretionary funds authorized through SAFETEA-LU and administered through the FTA. The New Starts program is the federal government's primary financial resource for supporting locally-planned, implemented, and operated transit "guideway" capital investments. The FTA's New Starts program has helped to make possible hundreds of new or extended transit fixed guideway systems across the country, including heavy rail, light rail, commuter rail and bus rapid transit.

The first part of the New Starts process is an Alternatives Analysis (AA). As part of the AA process a range of alternatives is studied. The range of alternatives includes a no-build alternative; one or more fixed guideway options such as light rail, heavy rail or busway; and a transportation system management (TSM) alternative. The AA process can be divided into four major steps: study initiation; development and refinement of alternatives and technical methodologies; analysis and evaluation; and selection of a locally preferred alternative. The FTA has established guidelines on how each of these steps should be approached and briefly described below:

- **Study initiation** –The detailed work plan is developed, public involvement process is initiated and goals, objectives, and evaluation measures are decided.
- **Development and refinement of alternatives and technical methodologies** – A general agreement of the alternatives and analytical methodologies is developed and those alternatives that show the least amount of promise are screened out.
- **Analysis and evaluation** - Each of the alternatives is assessed for transportation, environmental and financial impacts. Included in this step are travel demand forecasting, estimation of capital and operating costs, analysis of social, economic and environmental impacts, and financial analysis.
- **Selection of a locally preferred alternative** – Once the analysis is completed, a locally preferred alternative (LPA) will be selected and the final alternatives analysis study report will be completed. A cost effectiveness index (CEI) will be developed for the preferred LPA; the CEI is one of the factors that the FTA uses to determine if the project can compete on a national level against other New Starts projects for the limited New Starts funding. If so, the candidate project proceeds to the second step of the New Starts process – preliminary engineering.

At the conclusion of the AA, it will be determined from the "cost effectiveness index" if the FTA allows the project to advance into the next phase of the process, the Preliminary Engineering phase, and then finally the Final Design phase.

The New Starts process is very lengthy and can take fifteen or twenty years between initiation of the process and start-up. Projects are evaluated and rated by FTA and submitted to Congress for appropriations annually. Projects proposed for New Starts funding need to be justified based on a comprehensive review of the following criteria:

- Mobility Improvements;
- Environmental Benefits;
- Operating Efficiencies[11];

[11] FTA considers operating efficiencies to be evaluated as part of the cost effectiveness measure and so it does not receive a separate rating.

- Cost Effectiveness; and
- Transit Supportive Land Use Policies and Future Patterns

Projects need to consider match sources from the state and local levels to advance under this program; typically, the FTA has contributed between 50% and 80% of the federal share (most recently 50%), with the local match funding the balance.

Similar in structure to the New Starts program, the FTA Small Starts is appropriate for projects with capital costs under $250 million.

Proposed Change in New Starts Guidelines
It has recently been announced that there is a proposed change in the New Starts guidelines. U.S. Transportation Secretary Ray LaHood has proposed that new guidelines for major transit projects be based on livability issues such as economic development opportunities and environmental benefits, in addition to cost and time saved, which are currently the primary criteria. As part of this initiative, the FTA will immediately rescind budget restrictions issued by the Bush Administration in March of 2005 that focused primarily on how much a project shortened commute times in comparison to its cost.

The change will apply to how the Federal Transit Administration evaluates major transit projects going forward. In making funding decisions, the FTA will now evaluate the environmental, community and economic development benefits provided by transit projects, as well as the congestion relief benefits from such projects.

FTA will soon initiate a separate rulemaking process, inviting public comment on ways to appropriately measure all the benefits that result from such investments.

4. Clean Fuels 49 U.S.C. 5308
The program was developed to assist nonattainment and maintenance areas in achieving or maintaining the National Ambient Air Quality Standards for ozone and carbon monoxide (CO). The program supports emerging clean fuel and advanced propulsion technologies for transit buses and markets for those technologies. The program provides an opportunity to accelerate the introduction of advanced bus propulsion technologies into the mainstream of the nation's transit fleets. Eligible projects include the purchasing or leasing of clean fuel buses and facilities, and the improvement of existing facilities to accommodate clean fuel buses. Available funds are allocated among the eligible grant applications using a formula based on an area's nonattainment rating, number of buses, and bus passenger-miles.

5. Bus and Bus Facilities 49 U.S.C. 5309, 5318
The Bus and Bus Facilities program provides capital assistance for new and replacement buses and related equipment and facilities. Eligible capital projects include the purchase of buses for fleet and service expansion, bus maintenance and administrative facilities, transfer facilities, bus malls, transportation centers, intermodal terminals, park-and-ride stations, acquisition of replacement vehicles, bus rebuilds, bus preventive maintenance, passenger amenities such as passenger shelters and bus stop signs, accessory and miscellaneous equipment such as mobile radio units, supervisory vehicles, fare boxes, computers and shop and garage equipment.

13.3.2 ARRA Funding
The American Recovery and Reinvestment Act (ARRA) of 2009 is an economic stimulus package enacted by Congress in February 2009. The purpose of the act is to 1) preserve and create jobs and promote economic recovery; 2) assist those most impacted by the recession; 3) provide investments needed to increase economic efficiency by spurring technological advances in science and health, and 4) to invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits.

Fifty-one billion, two hundred million dollars ($51.2 billion) has been set aside for "Core Investments" – i.e. roads, bridges, railways, sewers, and other transportation. Title XII of the American Reinvestment and Recovery Act (ARRA) provides funding thru what are called "Supplementary Discretionary Grants for a National Transportation System". This program allows local and state governments to apply for $1.5 billion in discretionary funding for transit projects.

On May 18, 2009, the Federal Department of Transportation (DOT) began soliciting proposals for the discretionary grants program called the Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants Program. These grants are to be awarded on a competitive basis for capital investments in surface transportation projects that will have a significant impact on the nation, a metropolitan area, or a region.

GTA applied for a TIGER Grant for the implementation of a BRT system along this corridor but was not among the award recipients.

13.3.3 Flexible Funding

The U. S. Department of Transportation (USDOT) supports urban transit projects primarily through the Federal Transit Administration. To a lesser extent, USDOT can help pay for transit projects through "transfers" of federal highway funds that are allocated to states but which states and local governments agree to use for transit projects instead of highways. Usually the forfeited or delayed highway projects are in the same urban area as the preferred transit project.

The Federal Highway Administration funds a variety of categories of highway construction funds, with Congress appropriating program monies to the states through various formulas. The Federal budget allocates these funds to states by categories of highway programs. Certain of these funds may be used for either transit or highways, if the regional officials in an urban area choose to do so.

The decisions to forgo highway projects for in favor of transit projects do not increase the amount of Federal assistance. In some cases it reduces or increases the total funding, depending on the percentage of federal share that govern the federal program from which the highway project funds are transferred. The amount that is transferred does not change, but the local matching percentage can change, since the FTA funding ratio is generally 80/20, while Federal highway funding shares range from 50% to 90%.

These 'flexible funding" decisions follow the same process as other major metropolitan transportation investment decisions in an urban area:

- "Transfer" decisions transit are made by state and local officials, as a part of the metropolitan planning process
- Some projects to be funded by "transfers" must meet eligibility criteria for some non-transit programs
- Projects may be administered by FHWA or the FTA, whose procedures are not the same
- "Transferring" generally means that some non-transit project will be cancelled or postponed
- Funds generally come from Federally legislated programs that have set budgetary allocations to the state that are not increased by the transfer

Among the Federal funding sources that can be "transferred" to transit are:

- CMAQ funds, limited to projects in urban areas that are non-attainment air quality regions (described above)
- STP (surface transportation program) for many kinds of transit projects
- National Highway System (NHS) funds, for highway related transit projects in NHS corridors, such as park and ride facilities, car and van pool projects, and bus terminals

13.3.4 State and Local Funding

Local funding, provided by the state, regional or local governments is necessary to meet the capital and operating needs of a transit system. At a minimum, locally generated funds are needed to match Federal capital dollars or to bond projects/match and to provide on-going operating funds for the system. The sources of the funds must be a dedicated permanent source in order for an agency to make the commitment for long term capital improvements.

The Greenville Transit Authority's five-year *Transit Development Plan* has identified the need for a local dedicated funding source to be secured in order to provide stability and predicable funding for public transit. The Plan states that the current system of depending on annual revenue appropriations from the City of Greenville and Greenville County inhibits the ability to develop and implement long-range plans. Consideration of regional transit services makes the funding question more critical, since several units of government would have to collaborate to fund a multi-jurisdictional service. A dedicated funding source will be essential to enable expansion of local transit services and development of the regional transit services presented here.

Options for potential local funding sources for transit projects in Greenville County were described in GTA's *Transit Development Plan* as follows:

a. Local-Option Sales Tax

Local sales tax could be approved by referendum in the municipalities or counties receiving transit service. Three recent examples of this tax exist in South Carolina. In November 2004, 60 percent of Charleston County voters approved a half-cent sales tax dedicated to mass transit, road improvements, and greenways. Sixty-two percent of Horry County voters approved a one-cent sales tax in November 2006 to fund road improvements, while simultaneously approving a one-cent sales tax for schools. In November 2003, almost three-quarters of York County voters approved a renewal of a one-cent sales tax targeted at highway safety improvements. In North Carolina, Mecklenburg County is using the proceeds of a half-cent sales tax to fund bus system expansion, two light rail lines, two bus rapid transit lines, and a commuter rail line.

b. Vehicle Registration Fee

Vehicle registration fees are currently collected in Greenville and Pickens Counties, with the proceeds directed to road maintenance. Currently, Greenville assesses a $15 annual fee, and Pickens assesses a $20 fee per vehicle annually.

c. Property Tax

Many transit systems are funded through a dedicated portion of property taxes. While the property tax often is an unpopular tax, it is a major source of funding for transit in the GPATS region currently.

d. Motor Fuel Tax

However, one quarter cent of the state motor fuel tax is dedicated to mass transit. A portion of any increase in state-level motor fuels taxes could be dedicated to transit, and redistributed to local jurisdictions to fund transit services. Each penny of motor fuel tax in South Carolina generates about $25 million annually. Local motor fuel taxes are unlikely, however. State law does not currently enable local governments to impose motor fuel taxes.

e. Summary of Operating Funding Sources

Table 10 lists a variety of non-federal funding sources used to fund transit services throughout the United States.

TABLE 10 - INVENTORY OF NON-FEDERAL FUNDING SOURCES - U. S. TRANSIT SYSTEMS

General revenues	Joint development fees	Parking fees
Sales taxes	Value capture	Employer and payroll taxes
Property taxes	Beneficiary charges	Car rental fees
Purchase of service revenues	Special assessment districts	Vehicle lease fees
Motor fuel taxes	Impact fees	Parking fees
Vehicle fees	Access fees	Right-of-way leases
Advertising	Tax increment financing	Airport passenger facility charge
Leases	Community facility districts	Tolls
Lottery revenues/Casino taxes	Oil company franchise taxes	Congestion pricing fees
Corporate franchise taxes	Corporate franchise taxes	HOT-lane pricing
Mortgage recording taxes	Long Line taxes	Emissions fees
Realty transfer fees	Hotel occupancy taxes	Parking fees
General obligation bonds	Business licenses	Revenue anticipation notes
Grant anticipation notes	Utility fees	Certificates of participation
Private activity bonds	Income taxes	Tax credit bonds
Revenue bonds	Donations	State infrastructure bonds
Cigarette taxes	New Market Tax Credits	

One of the tools listed in Table 10 that the City has utilized is Tax increment financing (TIF). TIF is a tool to use future gains in taxes to finance current improvements (which theoretically will create the conditions for those future gains). When a public project such as a road, school, or hazardous waste cleanup is carried out, there is often an increase in the value of surrounding real estate, and perhaps new investment (new or rehabilitated buildings, for example). This increased site value and investment sometimes generates increased tax revenues. The increased tax revenues are the "tax increment." Tax Increment Financing dedicates tax increments within a certain defined district to finance debt issued to pay for the project. TIF is designed to channel funding toward improvements in distressed or underdeveloped areas where development might not otherwise occur. TIF creates funding for "public" projects that may otherwise be unaffordable to localities, by borrowing against future property tax revenues.

Another financing tool that could potentially be used for redevelopment (i.e. transit oriented economic development) in certain proposed station areas are New Markets Tax Credits. Instituted as part of the Community Renewal Tax Relief Act of 2000, the New Markets Tax Credit Program is expected to spur approximately $15 billion in investments into privately managed investment institutions. In turn, these privately managed investment institutions, or Community Development Entities (CDEs), make loans and capital investments in businesses in underserved areas. By making an investment in a CDE, an individual or corporate investor can receive a tax credit worth 39 percent (30 percent net present value) of the initial investment, distributed over 7 years, along with any anticipated return on their investment in the CDE. The NMTC program was designed to make investment capital available to businesses in qualifying low-income communities, to create jobs and spur additional economic development. The City of Greenville has experience in the New Markets Tax Credit Program. In 2009, the creation of The NEXT Innovation Center in downtown Greenville was made possible by utilizing this financing program. The Center was created by the Greenville Chamber, the City of Greenville, the Hughes Development Corporation and NEXT. NEXT is the Upstate's resource collaborative of organizations, which provides services to high impact technology companies throughout the Upstate.

Figure 12-1 shows a synopsis of all transit operating funds across the country; over one third of the funds used by these agencies to support operations come from dedicated sources. Figure 12-2 looks in depth at the composition of the dedicated sources 'slice' of Figure 12-1. It shows that the predominant funding mechanism used for providing regional transit systems with a "guaranteed" source of funding is a regional sales tax (nearly 60%), created either by legislation or by referendum. Gasoline and property taxes follow at 7% and 5% respectively with many other miscellaneous taxes comprising over 20%.

In some cases these taxing powers are created by referendum in the context of proposed regional transit improvement program. In other cases, these referenda results are counted for the region as a whole, and in some cases on a county-by-county basis. In the latter case, if the referendum fails to pass in one county but is approved by other county, the sales tax is not imposed in that county where the referendum failed, and the county is not represented on the agency Board, and service is not provided in that county.

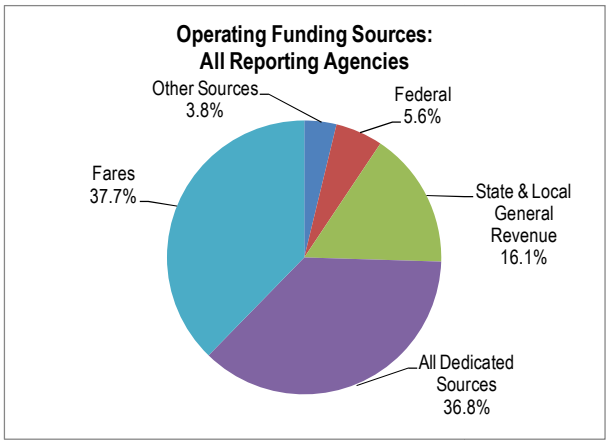


Figure 12-1: Operating Funding Sources

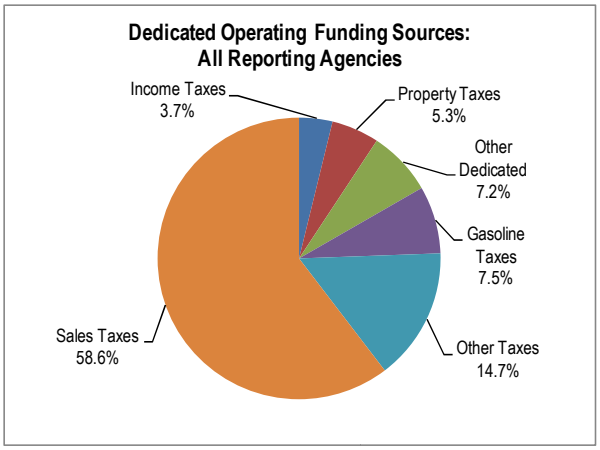


Figure 12-2: Dedicated Transit Funding Sources

13.3.5 Innovative Funding

In the past, a major capital investment program could be at least partially supported by an "innovative" funding arrangement that takes advantage of some unique local opportunity for a land swap, use of toll revenues to support revenue bonds, or from some other financial target of opportunity. This option has only been used in rare circumstances in which the interests of the transit project happen to coincide with those of some second party. Most of the projects which the FTA reports as "innovative" have to do with combining traditional funding mechanisms in some "innovative" manner, such as using multiple Federal sources to support various elements of a single project. Currently the FTA supports the use of Private Public Partnerships (P3) as a method for funding corridor development and operations. The FTA is currently working on a Private Public Partnership Pilot Project with three Regional Transit Authorities to develop models for future P3 programs. P3 programs are intended to provide a method of sharing risk and accelerating the speed of project funding approvals.

Public private partnerships arrangements with high potential include:

- **Contract Services-Operation and Maintenance:** A public partner contracts with a private partner to operate and/or maintain a specific service. The public partner retains ownership and overall management of the public facility or system (Note: nearly all new US commuter rail operations implemented in the last 20 years use contract operators).

- **Design/Build:** A design firm and contractor construct the project combining performance based specifications and limited design drawings prepared by the owner and their engineer/architect with contractor preparation of final design drawings concurrent with construction.
- **Design/Build/Maintain/Operate (DBOM):** A single contract is awarded for the design, construction, operation and maintenance of a capital improvement. Title to the facility typically remains with the public sector. Usually the DBOM system involves one contract for design with an architect and/or engineer, followed by a different contract with a builder for project construction, followed by the owner's taking over the project and operating and maintaining it.
- **Sale/Leaseback**: This is a financial arrangement in which the owner of the facility sells it to another entity and subsequently leases it back from the new owner. Both public and private entities may enter into sale/leaseback arrangements for a variety of reasons. An innovative application of the sale/leaseback technique is the sale of a public facility to a public or private holding company for the purposes of limiting governmental liability under certain statutes.

Two projects that are usually cited as "innovative" are the use of some Washington D.C. Dulles Airport Highway toll revenues to support the costs of the Metro Rail expansion to Dulles, and a "land swap" in which the value of donated land was used to help support light rail expansion in Portland.

Innovative funding is a useful means of extending the financial resources of a transit agency on a project specific basis, but has not proven to be a major source of funding on a system-wide basis. It can be useful as a part of station area development through partnering with a private developer, or with a local government which may have a redevelopment project in the station area.

13.3.6 Types of Financing

The two traditional means of borrowing and financing in transit are general obligation bonds and revenue bonds. General obligation bonds may be issued by the transit agency, or by a state or municipality that has a stake in the project. There is often a "full faith and credit" provision that helps to reduce borrowing costs.

Revenue bonds are less extensively used by transit agencies because of the lack of a source of revenue adequate to support debt service. Some agencies that have access to other revenues, such as tolls or highway fees, have been able to float revenue bonds using these sources to qualify for and retire the debt.

Bonding creates the need to pay debt service over a specified period, usually ranging from 10 to 30 years, depending on the useful life of the facility being constructed. The total payments in current dollars will exceed the original amount being borrowed by more than 100%. In addition, some bonding requires the establishment of a "cover" account which reduces the availability of this amount for other purposes.

13.3.7 Example of a Local Funding Scenario for Start Up Service

The scenario is predicated on a locally financed arrangement that allows a fast tracked implementation. The case study of the New Mexico Rail Runner Express is described below.

Rail Runner Express Commuter Rail Service, New Mexico

On July 14, 2006 at 5:10 a.m. the first regularly scheduled New Mexico Rail Runner Express commuter train left the downtown Albuquerque station for the Sandoval/U.S. 550 station in Bernalillo. This trip represented the start of service for a project that began in earnest in January of 2004, two and half years prior to the first day of service. On June 17, 2008 the Rail Runner carried its millionth rider which translates into approximately 23 million passenger miles since opening day. The service was further extended to Santa Fe at the end of December 2008.

The implementation of commuter rail service in this corridor started in August of 2003 when Governor Bill Richardson

announced that his administration was going to pursue the implementation of commuter rail between the cities of Belen and Santa Fe. To kick off this effort, the Governor provided the New Mexico Department of Transportation (NMDOT) and the Mid Region Council of Governments (MRCOG) with grants of $1 million to begin the implementation. In September of that same year, the New Mexico State Legislature convened in special session and passed House Bill 15, now referred to as Governor Richardson's Investment Partnership (GRIP), a $1.6 billion transportation improvement package. One of the projects in this bill, Section 27, A (2) was the implementation of commuter rail between Belen and Santa Fe.

Responding to this legislative and executive initiative, the MRCOG and the NMDOT developed a strategy for implementing commuter rail in this corridor. The project was divided into two phases. Phase I included the portion of the corridor between the cities of Belen and Bernalillo. Phase II covered the remaining portion between the cities of Bernalillo and Santa Fe. Capital costs for Phase I were estimated to be $85 million.

To cover the capital costs of Phase I, the NMDOT programmed $75 million from the GRIP program. This action was incorporated into the MRCOG Transportation Improvement Program by the MRCOG Metropolitan Transportation Board in June of 2004 and approved in the Statewide Transportation Improvement Program by the New Mexico Transportation Commission in July of 2004. In November of 2005, the NMDOT programmed an additional $60 million in GRIP funds to cover the purchase of the tracks and rights of way from Belen to Bernalillo.

In order to continue funding beyond the first three years, enabling legislation for the formation of Regional Transit Districts (RTDs)[12] was passed by the New Mexico state legislature and signed into law by Governor Bill Richardson in the spring of 2003. In the regular 2004 session, the legislature voted to give local governments new gross receipts tax authority (up to ½ percent) to fund regional transit districts (RTDs). Revenue from that local-option tax can be used to fund passenger rail and other local transit services provided by RTDs. The MRCOG spearheaded the effort to create an RTD for this region, and after many months of effort the Mid Region RTD was officially constituted at the March 2005 meeting of the New Mexico Transportation Commission.

In addition, in December of 2005, the Sandoval County Commission approved $10 million for the commuter rail project to assist in the acquisition of rolling stock, track and signal improvements in Sandoval County and to provide additional resources for station development. The Sandoval County Commission also approved an additional $6 million to provide for connecting transit services in Sandoval County.

With regard to operating expenses, the 2007/2008 fiscal year operating budget included about $10.5 million in expenses. Major categories of expenses in this budget included train operations and maintenance, maintenance of the rights of way, insurance, agency staff costs and marketing. Operational costs were expected to rise from $10 million for the first phase to $20 million after completion of the second phase.

Operating revenues were estimated to be in the range of $3.0 million for the 2008 fiscal year, mainly from fare box revenue and maintenance payments from the BNSF, the railroad upon which the new commuter rail service was operating. To cover the Phase I operating cost shortfall, NMDOT and the MRCOG evaluated several potential sources. Congestion Mitigation Air Quality (CMAQ) funds, which are distributed by formula from the Federal Highway Administration to the NMDOT, and a portion further distributed to the MRCOG, were identified as the most viable near term revenue source. The NMDOT programmed $32 million in CMAQ funds to cover the operating expenses for

[12] The New Mexico state legislature created Regional Transit Districts to provide a framework for local governments to cooperate on regional transit projects. Two or more municipalities, counties, pueblos, tribes, or other local governments can agree to form a RTD and work together to develop a transit network that meets the needs of the area. RTD's are governed by the communities they serve and plan, finance, and operate transit services that serve an entire region.

the first three years. The funds were approved by the MRCOG Metropolitan Transportation Board in April 2005 and approved by the New Mexico Transportation Commission in June 2005.

Federal funding for the Rail Runner was expected to stop in 2009. To prevent a funding shortfall, local and state governments began looking into possible taxes in the counties the Rail Runner serves. Two separate gross receipts taxes[13] for regional transit were approved by voters in central and north-central New Mexico in November 2008 and will cover a large portion of the operational funds of the Rail Runner. Additional funds will also come from bond revenue and money appropriated by the New Mexico State Legislature.

13.4 Implementation

There are several action items associated with implementing the preferred alternative, BRT-Main Street. An implementation matrix has been developed to assist the GCEDC in determining the next steps to the process of implementing transit service along the corridor. Action items have been outlined, initiators and participants have been identified and time frames suggested. Refer to Table 11.

At the conclusion of this study, it is important that an Implementation Task Force be established to begin the implementation process. The Task Force can be charged with the following tasks:

- **Governance:** As discussed above, the proposed transit service passes through four communities: Greenville, Mauldin, Simpsonville and Fountain Inn. Any type of implementation will require coordination and cooperation between all four local units of government.
- **Funding:** There is no local dedicated funding source for transit in Greenville County. The Implementation Task Force must start evaluating the most feasible and politically acceptable approach to this issue. Additionally, sources of capital funding must be identified. Exploration of private public partnerships for some aspects of the project and/or participation by local municipalities for infrastructure improvements such as station buildings, parking lots and access roads should also be explored.
- **Coordination with the Railroads:** The selected BRT alternative has an option to traverse on a small part of the right-of-way of the CPDR. Additionally, when the alternative is implemented, the CPDR will no longer have the option to store rail cars on the GCEDC owned right-of-way. The railroad must be approached to discuss these issues.
- **Coordination with Municipalities:** Although there have been initial discussions with municipalities regarding station locations, and inclusion of known station plans into this report, more definitive discussions with the municipalities need to be discussed. A more permanent agreement could put them into the motion of zoning and land use planning needed for each station area. This is an important factor in the FTA criteria for New Starts; i.e. readiness with regard to transit supportive land uses and policies.
- **Public Involvement Process:** Continued public involvement should be throughout all phases of the project to allow for necessary input and representation.
- **Initiating the NEPA EIS/EA Process:** With the acceptance of any federal funds, the NEPA process must be followed. Typically, an Environmental Impact Statement (EIS) is completed for larger scale projects which have the potential for environmental impacts. The initial step in the EIS process is the scoping process which consists of one or more meetings with concerned citizens and affected agencies to define the key parameters and techniques to be used in the EIS effort. A "Purpose and Need" needs to be defined, the evaluation criteria for each of the alternatives are developed, and the existing and affected conditions are described in the EIS. An EIS is a lengthy process which takes into consideration the various alternatives and supports the alternative that has the least impact to the environment. For projects of a lesser scale with the potential for fewer impacts, an Environmental Assessment (EA) is completed instead.

[13] A gross receipts tax, sometimes referred to as a gross excise tax, is a tax on the total gross revenues of a company, regardless of their source. A gross receipts tax is similar to a sales tax but it is levied on the seller of goods or services rather than the consumer.

Table 11- Implementation Matrix

Action Items	Initiators/Participants	Time Frame	Comments
Organize an Implementation Task Force	GCEDC Greenville County GPATS GTA Greenville Mauldin Simpsonville Fountain Inn	Short Term	Should meet on a regular basis to set policy, provide direction, secure funding, initiate agreements, etc.
Explore capital funding resources	Implementation Task Force FTA South Carolina DOT Private parties	Short Term	Determine what federal funding resources are most appropriate for this project Identify public/private partnerships
Actively seek a dedicated local source of funding for transit	Implementation Task Force State and Local Political Officials Business Community Citizens/Voters Civic Organizations	Short Term	Need to explore various funding options that are politically acceptable to the voters, business community, other residents, etc. Determine the need for a referendum
Initiate Discussions with CPDR	Implementation Task Force CPDR	Short Term	Begin discussions on feasibility of operating on a small portion of CPDR right-of-way and future unavailability of rail car storage on GCEDC owned tracks
Acquire necessary right-of-way	Implementation Task Force Private property owners	Short to Mid Term	Identify property that needs to be acquired; determine property owners' willingness to sell; begin appraisal process
Seek a "champion" to advocate for transit interests	Highly regarded political official/community or business leader	Short to Mid Term	Identify an advocate who can rally local citizens to support the new transit initiative
Identify and preserve potential station sites	Private property owners Greenville County GPATS Greenville Mauldin Simpsonville	Short Term to Mid Term	Purchase land in station areas to preserve for future stations and prevent from further development
Determine fare structure/revenue policy	Implementation Task Force	Mid Term	Determine fare structure of new service
Adopt land use ordinances and policies encouraging transit supportive development	Greenville County GPATS Greenville Mauldin Simpsonville Fountain Inn	Mid Term	Confirm station locations, identify current zoning and land use policies and identify and implement appropriate changes to support transit supportive development land uses
Proceed to next phase of design	GCEDC GPATS	Mid Term	Retain a design consultant to proceed with next phases of project. Initiate an Alternatives Analysis if funding source is expected to be New Starts
Initiate the NEPA EIS Process	GCEDC GPATS	Mid Term	Proceed with an Environmental Impact Statement (EIS) to identify potential for environmental impacts.
Public participation	Implementation Task Force	Mid Term	Continue public input during all phases of project