CORE
COASTAL REGION MPO

Urban Circulator Feasibility Study
Final Report

February, 2015

DRAFT

RS&H

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1 Introduction

In the early twentieth century, the population of urban areas had steadily increased, resulting in the growth of urban mass transit. These transit systems were primarily streetcar systems, the majority of which were operated by electric utility companies. In 1917, there were over 1,000 private streetcar companies operating in the United States. By the 1920s, with the increasing use of automobiles, the transit systems began to transition to the use of motor coach vehicles.

Over the past decade, the streetcar has re-emerged as a mode of urban transportation with the renewed focus on city centers and the economic development potential associated with streetcar implementation. This reemergence has included the implementation of new systems, as well as the expansion of existing systems that were not abandoned (i.e. New Orleans, Louisiana).
The City of Savannah, like many of its sister cities, explored streetcars through a number of previous streetcar related efforts, which included:

2003 Streetcar Report

In December, 2003 the *Feasibility Report on Streetcar Transit Service as a Downtown Circulator for the Savannah Downtown Historic District and Other Locations* was completed by TEAM, Inc. and presented to the Chatham Area Transit (CAT) Board. As part of this study, research on streetcar systems, surveys and individual stakeholder meetings were completed and formed the basis of the study implementation recommendations. The proposed system, which proposed the use of an historic streetcar vehicle, included 4.5 miles of track with costs ranging from $17.9 million to $29.7 million. The recommendations from this study were not implemented.

River Street Streetcar Service

In 2009, the streetcar service along River Street began operation as a demonstration project. This demonstration project goal included the use of alternate power sources to overhead catenaries with the use of a bio-diesel powered, self-propelled vehicle. The goal was also for the demonstration project to form the first phase of a streetcar system extending into the downtown area. To implement the system, 2.3 miles of right-of-way was purchased along River Street and an historic Melbourne streetcar vehicle (1925) was restored for use. The line is funded and operated by the City of Savannah's Department of Mobility Services and the Savannah Mobility Management Board, which is an independent, non-profit entity.

2010 Streetcar Report

In June, 2010, *Reinvesting in Savannah's Urban Core – The Savannah Streetcar Network* – a Decision Document for Savannah City Council was presented. This document, developed by Chatham Area Transit, contained research, demographic and land use analysis and potential funding mechanisms regarding the expansion of the River Street streetcar line. This document contained only background information and data, and did not make any recommendations regarding system expansion.

2010 TIGER II Streetcar Grant Application

A TIGER II grant application for federal funds was completed and submitted in partnership between the Coastal Region MPO (CORE MPO) and the City of Savannah and the Mobility Management Board. This application met the broadly defined goals for the DOT/HUD/EPA livability and sustainability grants. These goals included the provision of more transportation choices, affordable and equitable housing options, economic competitiveness, and the support of existing communities and neighborhoods.

The work plan portion of the application also described the specific steps in completing a federal New Starts/Small Starts Alternative Analysis under the previous federal transportation legislation, *the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU). The steps discussed were necessary under the previous transportation bill in order to receive federal funding for the planning of the system expansion, as well as the design, construction, operation and maintenance of the system.

2011 Streetcar Report Technical Memorandum

As part of the recently completed *Transit Vision Plan*, this technical memorandum provides the details on streetcar systems currently operating in cities across the country. The research also includes recommended next steps for moving forward with the expansion of the River Street line. These recommended steps include the identification of a project sponsor and the completion of an Alternatives Analysis that met FTA requirements under SAFETEA-LU. In the memo, it was stated that the Alternatives Analysis should include elements that should support the subsequent environmental documents.

Transit Mobility Vision Plan

The Transit Mobility Vision Plan, completed in 2013 by the CORE MPO, is a high-level assessment of transit modes and their feasibility on a regional scale. The effort covered the five Georgia Counties of Chatham, Bryan, Effingham, Liberty and Bulloch, and Beaufort and Jasper Counties in South Carolina. The assessment identified feasibility of each mode, potential locations, and implementation. While not specifically focused on streetcar or enhanced bus at the local level, the plan does provide a regional framework and context for future transit services.

While each of these studies provided valuable insight and information, none clearly addressed one of the major drawbacks associated with the implementation of streetcar: the significant capital investment needed for implementation and the continuing need for operational funding. With the number of streetcar studies currently underway, the competition for limited federal funding is strong and sound supporting data is critical for success.

The Urban Circulator Feasibility Study

Based on the previous studies and the outcomes of recent TIGER grant applications, the Coastal Region MPO (CORE MPO) recognized the need for a data-driven, mode neutral technical study to determine the feasibility of an urban circulator in Savannah.

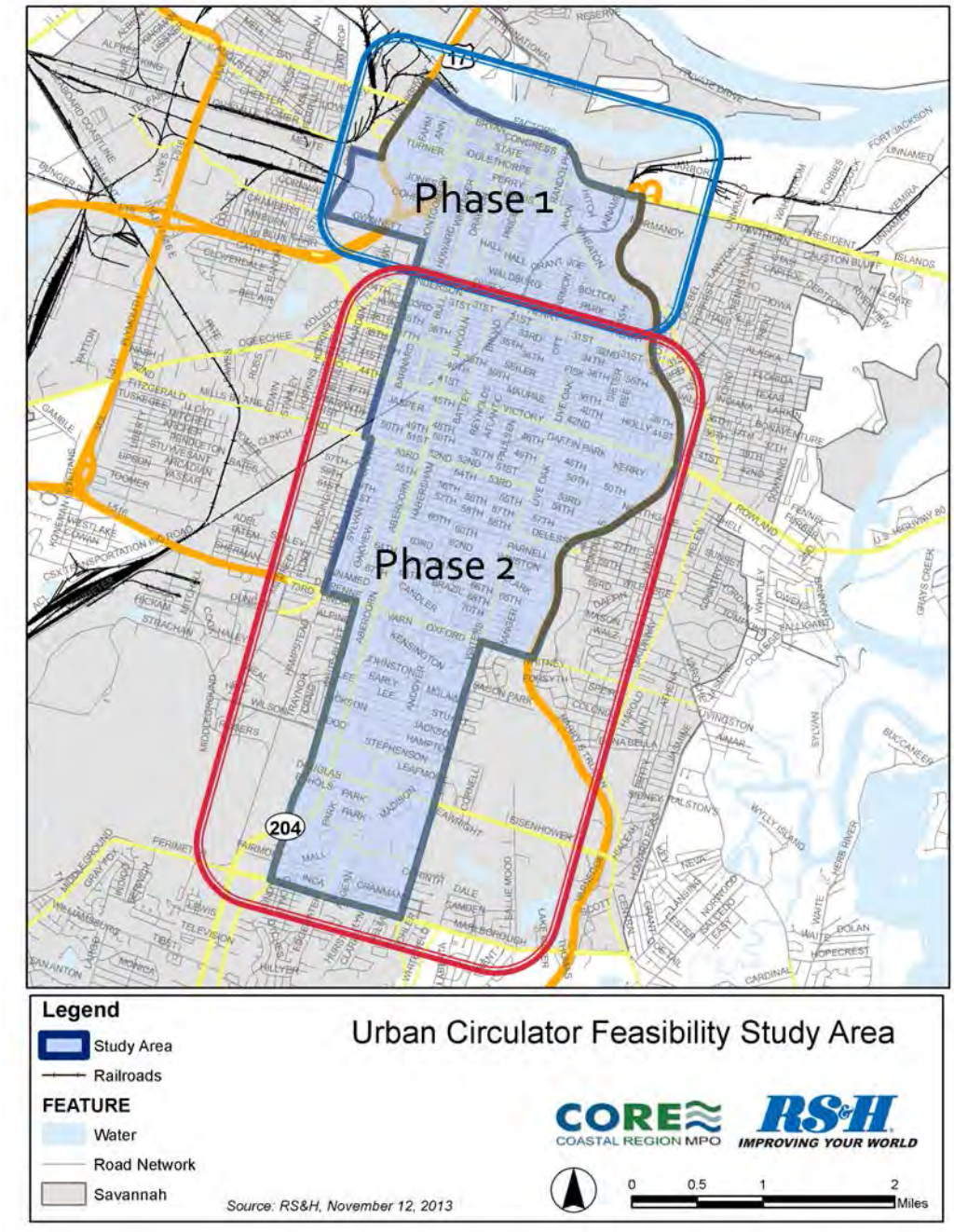
The overall goals of the study are to provide the City of Savannah and CAT with the information needed to make a sound business decision regarding the implementation of an urban circulator, and to begin to establish the justification for future federal funding should such a system be deemed feasible. The specific goals identified for the study included the following:

- Completion of a data driven, mode neutral technical analysis
- Determination of the feasibility of an urban circulator system
- Establishment of the foundation for future federal funding
- Provision of the basis for the need and justification for the investment

In consultation with City of Savannah, and Chatham Area Transit staff, the study area was defined as shown in Figure 1 to include downtown Savannah and neighborhoods to the south. The study area is

bounded by River Street on the north, the Oglethorpe Mall area/Montgomery Crossroads on the south, Harry S. Truman Parkway on the east and generally by Martin Luther King Boulevard/Bull Street on the west. The study area also includes the proposed arena site west of Martin Luther King Blvd, which is a significant component of the City's vision for the Canal District and the western expansion of the downtown area. A detailed assessment was completed for the downtown portion of the study area, shown in the figure as Phase 1, with a higher level assessment completed for the southern portion of the study area shown as Phase 2.

Figure 1. Study Area



The specific technical tasks incorporated in the effort included:

- Review of available technology including vehicle types and propulsion systems
- Data collection and mapping
- Analysis of existing conditions
- Identification of feasible route alternatives
- Assessment of ridership and economic impact

2 Coordination

The Technical Working Group

In order to ensure this coordination was accomplished on an ongoing basis, a Technical Working Group was established. This group, which met regularly, provided guidance and input on all elements of the study. This Technical Working Group included the following:

- CORE MPO staff
- Georgia Department of Transportation (GDOT), Intermodal Division staff, Office of Planning Staff
- Federal Transit Administration (FTA) staff
- Chatham Area Transit Authority staff
- City of Savannah staff:
    - Traffic engineering
    - Public works
    - Zoning
    - Management services
    - Parking

A project kick-off meeting was held in November, 2013. The working group agreed to meet regularly to review project information and data; initially the meetings were scheduled monthly, however the consensus was that these meetings would occur when there was new information to review. The group subsequently met and provided input at 7 meetings, which were held as follows:

- December 11, 2013
- January 22, 2014
- February 11, 2014
- March 12, 2014
- May 14, 2014
- August 22, 2014
- September 11, 2014

Individual Coordination Meetings

Individual coordination meetings were held with key stakeholders to ensure the study was completed with all of the necessary input and information.

City of Savannah

Utilities are often overlooked in these types of studies and it is a critical element, particularly with regard to streetcar. With the identification of the potentially feasible corridors, the study team met with the City of Savannah Public Works and Water Resources Bureau Chief and the Assistant City Manager for Utilities, Development and Construction Services to review the corridors and to identify any known issues with underground infrastructure. The study team subsequently met twice more with the departments to review the refined feasible corridors and to obtain any needed information or comment.

The City has also purchased property west off of Stiles Avenue for the proposed arena. This facility will serve as the anchor for the City's vision for this area, known as the Canal District. Although in preliminary stages, the City vision is for the area to become an extension of the downtown historic district and an urban circulator service would play an important role in providing the needed connectivity. The study team met with the Assistant City Manager for Administration and Community Services to obtain additional insight into the City's vision for the future arena site to ensure the study was compatible.
Two additional separate meetings were held with Mobility Services and Parking to further review information presented at the Technical Working Group. These meetings were to review the study elements in more depth, determine any issues with future plans or projects, and to ensure full coordination with the City's mobility goals and efforts to reach those goals.

Study team members and staff of the CORE MPO also met individually with the City of Savannah City Manager. This meeting was held to provide an in-depth review of the study, its methodology and analysis, and study results.

Chatham Area Transit Authority
The Chatham Area Transit Authority (CAT) partnered with the CORE MPO for this study. As a planning partner, the study team met separately with CAT five times over the course of the study. These meetings were to identify the Technical Working Group members, provide in-depth study updates and to coordinate this study with other CAT efforts. The study area boundaries were adjusted at the request of CAT, as well as the phased approach focusing the more in-depth analysis on the core downtown area with a higher level focus in the southern portion of the study area.

Savannah Tree Foundation
In addition to these planning partners, the study team also met separately with representatives of the Savannah Tree Foundation. With its significant tree canopy on many of its roadways, careful consideration of the trees is required to ensure no adverse effects on the canopy resulted from the implementation of an urban circulator system.

MPO Briefings
With the CORE MPO conducting the study, project updates were provided to the MPO and advisory committees at key project milestones including project kick-off and preliminary study findings. These presentations were made to the Technical Coordinating Committee, the Citizens Advisory Committee the Advisory Committee on Accessible Transportation and to the MPO Board on the following dates:

- December 12, 2013 CORE TCC
- December 12, 2013 CORE CAC
- December 18, 2013 CORE Board
- February 19, 2015 CORE TCC
- February 19, 2015 CORE CAC
- February 25, 2015 CORE Board

3 Technology Review

There are a variety of urban circulator technologies, propulsion systems and vehicle types that are currently available. As part of the study, each of these technologies were reviewed to identify needed supporting infrastructure and equipment and operating costs. The review also identified any advantages, issues or disadvantages associated with each technology. The following criteria were utilized while screening propulsion systems and modes:

- Ability to meet Buy America standards [1]
- Propulsion systems capabilities including speed and travel distance
- Operational dependability
- Procurement cost

Based on the results of the research and review, the most appropriate and compatible vehicle type and propulsion system was identified.

3.1 Technologies

The various technologies reviewed for streetcar are shown on the following page. The technologies reviewed for enhanced bus include:

- Bio-diesel Engine
- Hybrid Electric Engine
- Standard Diesel Engine

[1] Buy America provisions ensure that transportation infrastructure projects are built with American-made products. That means that Department of Transportation investments are able to support an entire supply chain of American companies and their employees. Source: www.dot.gov/buyamerica

STREETCAR - FIXED RAIL TECHNOLOGY

Technology	Energy Storage System (ESS) Source: APTA	Power Source Locations	Sample Systems				Description	Comments
On-board Fuel System		Onboard					Hydrogen fuel cells, hydrogen internal combustion engines, and clean diesel-electric generator sets were investigated. The hydrogen based systems have not been advanced to a point where they can be applied to a transit vehicle for commercial application however this has been tested in areas outside of the United States.	May not meet Federal Buy America procurement standards
Fuel Cell Technology		Onboard w/ fueling stations					Fuel cell technology continues to be developed along with the infrastructure required for hydrogen fuel cells including storage tanks and pumping equipment for refueling the vehicles. Diesel-electric generator sets have been used in various applications in the United States and abroad.	The industry is moving away from fossil fuel based systems.
Battery and/or Capacitor		Onboard, without external power; capacitor system utilizes generator (GEN)	Savannah, GA	Los Angeles, CA	---	---	Onboard energy storage systems that deliver power to the vehicle. Once the battery or capacitor is depleted, it must be recharged from a power source such as OCS, regenerative braking, other wayside power supply or any combination thereof.	
Overhead Contact System, OCS		AC, DC, and multi-system traction units; overhead infrastructure	Charlotte, NC	Little Rock, AR	New Orleans, LA	Portland, OR	The electric transmission system for modern electric rail systems consists of an upper weight carrying wire (known as a catenary) from which is suspended a contact wire. The pantograph is spring loaded and pushes a contact shoe up against the contact wire to draw the electricity needed to run the train. The steel rails on the tracks act as the electrical return.	Application of this propulsion system will be limited in some corridors due to mature tree canopy. Most widely utilized system.
Third Rail		Inductive & physical contact; embeded in track	San Francisco, CA	Boston, MA	Clevland, Ohio	---	Both inductive and physical contact, uses an embedded rail between the running rails for transfer of energy. The third rail is energized only when the vehicle passes over that segment of rail. Energy is then transferred by either a physical contact with the rail or by means of induction. When the vehicle is not present, then that rail segment is not energized.	
Fourth Rail		Inductive & physical contact; embeded in track	London, England	Paris, France			Collects power by sliding over the top surface of the conductor rail. The additional rail carries the electrical return that, on third rail and overhead networks, is provided by the running rails.	Generally utilized in underground or elevated systems due to pedestrian safety risks
GTL - Guided Light Transit		Onboard w/ fueling stations and rail or Pantograph overhead infrastructure	Belgian Ardennes Test Track				Purpose built vehicles merge the tram with the flexibilty of the bus. In guided bus mode tractive effort is via the rubber tyres, with guidance coming from double-flanged rollers which follow a central rail located flush in the roadway. This allows for sharing roadspace with the other traffic. Other guided mode possibilities include multiple-unit operation, electric collection via a pantograph (return is via the guide rail), elevated / underground tunnel operation and the 'rear' end can be fitted with tram-type driving controls for reversibility. In bus mode the GLT will behave like any other road vehicle, driven from the front and able to roam freely as required. An onboard fossil fuel engine powers the electric drive system, although 100% electric two-wire trolleybus operation is also a design possibility.	Concerns of derailing and this new technology limits you to single source manufacturer.

Table 1 shows the technologies for streetcar and enhanced bus, as well as the modes for each.

Table 1. Technologies and Vehicles

Technologies – Streetcar and Enhanced Bus
On Board Fuel System
Fuel Cell Technology
Battery and/or Capacitor
Overhead Contact System
Overhead Catenary
Vehicles
Replica Streetcar • High Floor (i.e., New Orleans)
Modern Streetcar • Low Floor (i.e., Atlanta)
Enhanced Bus • BRT Light – Low Floor

Based on the research and review, the most appropriate technologies and modes were identified. These technologies for streetcar include a combination of battery and/or capacitor systems with the overhead contact system. The streetcar operation would primarily utilize the overhead contact system except when avoiding the tree canopy. At those locations, the vehicle would switch to the battery/capacitor system.

The modes and vehicles identified as most appropriate include the high floor replica streetcar, which would fit in with the character of the historic district. The streetcar would operate in the historic district, connecting to the southern portion of the study area with enhanced bus, which is a "BRT Light" vehicle with low floor.

4 Route Identification

4.1 Case Studies

A review of other urban circulator systems already in operation can provide valuable information and lessons learned for studying, planning and implementing new systems. A case study of systems across the country was undertaken with ten existing, or soon to be operational, urban circulator systems reviewed prior to the development of the route, service, and rolling stock recommendations for Savannah. The case study review included the streetcar systems now in operation in the following cities shown in Table 2.

Table 2. Systems and Vehicle Types

System	Vehicle Type
Portland, Oregon	Modern cars
Little Rock, Arkansas	Replica cars
San Francisco, California	Historic cars
Tampa, Florida	Replica cars
Lowell, Massachusetts	Replica cars
Memphis, Tennessee	Historic cars
New Orleans, Louisiana	Historic and replica cars
Charlotte, North Carolina	Replica cars
Kenosha, Wisconsin	Historic cars
Seattle, Washington (South Lake Union)	Modern cars

These systems are primarily modern systems built or expanded within the last 20 years. Best practices were identified in terms of routing, track placement in streets, rolling stock, markets served, and stop placement. These case studies include a variety of urban area sizes, vehicles, and services and provide sound information and lessons learned for assessing and determining potential system recommendations for Savannah.

As reference, the following website links provide consolidated resources on these systems, with additional links to city-specific sites:

- APTA Streetcar Subcommittee: www.heritagetrolley.org/
- U.S. Streetcars website: www.railwaypreservation.com

In addition, the periodical, *Tramways & Urban Transit*, www.tramnews.net, published in the United Kingdom by the Light Rail Transit Association was referenced for further information.

4.2 Methodology

The methodology for determining the feasibility of an urban circulator incorporated several different components. These components incorporated an assessment of the extensive background data collected, as well as information from the case studies. The methodology steps included the following:

- Market assessment
- Vehicle and operational characteristics

- Identification of feasible corridors
- Route development and implementation staging
- Future system buildout

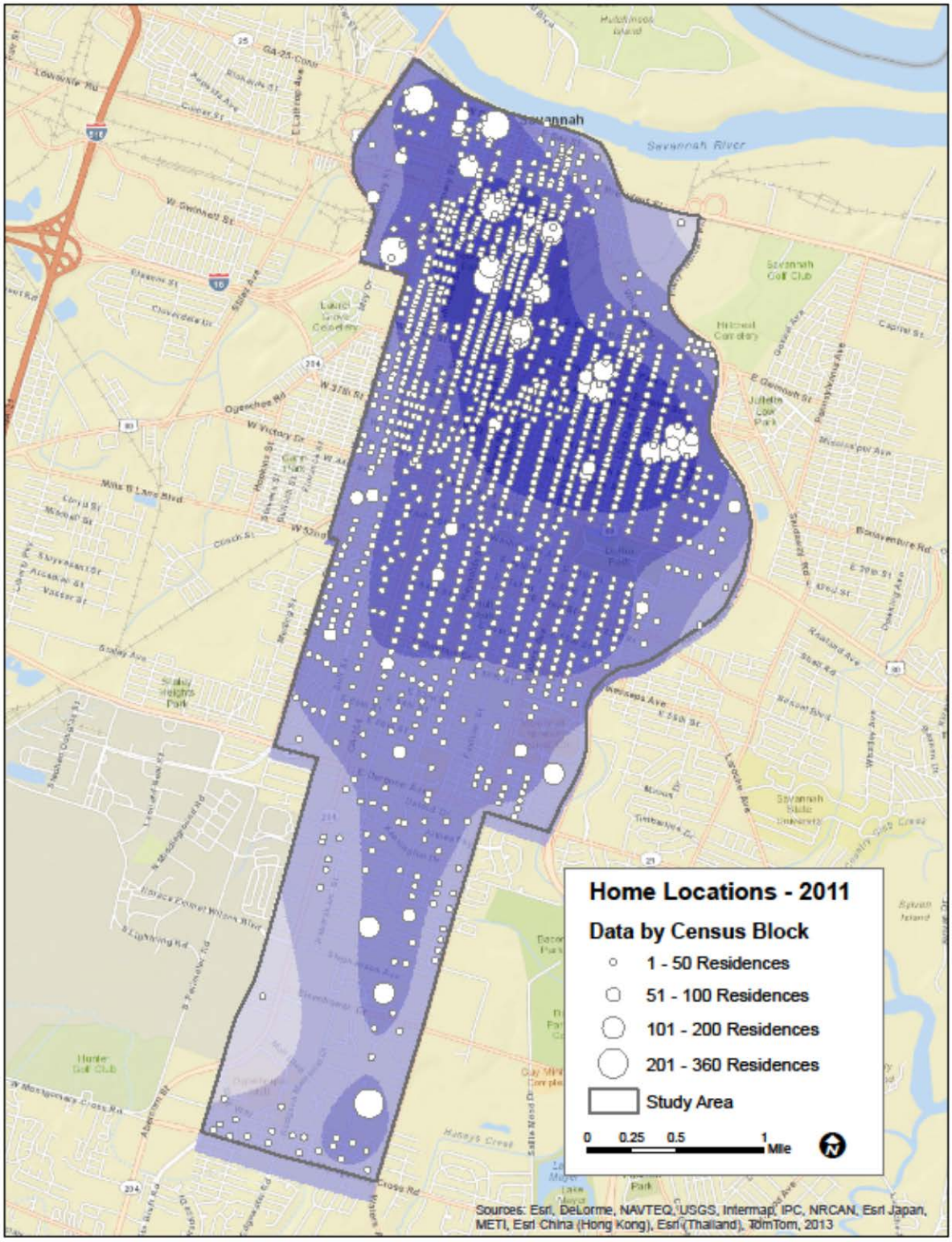
4.2.1 Market Assessment

Successful transit service is based on a variety of factors including population and employment densities, land use mix and density, and the presence of both choice and dependent riders. Data regarding these characteristics, as well as background information on CAT ridership, historic streetcar routes, previous streetcar proposals, and roadway and infrastructure features were collected at the beginning of the study to identify the potential ridership markets.

4.2.1.1 Home Locations

Data for home locations were obtained from the US Census (2011) and mapped at the census block level in Geographic Information System (GIS) for the study area. The results are presented in Figure 2. As shown by the graduated circles, the largest concentrations of residences in the study area are located in areas primarily north of 37th Street. Larger clusters are located just west of Martin Luther King Boulevard at Gwinnett Street, east and west of Montgomery Street on Bay Street, on Drayton Street between Park Street and President Street, and along East Broad Street, between Park Street and President Street. There are also a few clusters to the east and south of East Broad and Park Street, and a few clusters in the southern portion of the study area; however, the southern portion of the study area is primarily commercial.

Figure 2. Home Locations



Source: US Census Bureau

4.2.1.2 Work Locations

Work locations, as with the home locations, were also obtained from the US Census (2011) and mapped at the census block level using GIS. The results of this mapping exercise are shown in Figure 3. The largest cluster of jobs is located in the northernmost section of the study area, i.e. the historic district. As shown, there are many clusters of job nodes, with the circles representing anywhere from over 100 jobs to over 5,000 jobs. Other jobs clusters are concentrated just east of Forsyth Park, at the St. Joseph/Candler Medical Center, and near Oglethorpe Mall at the south end of the study area.

4.2.1.3 Hotel and Tourist Destinations

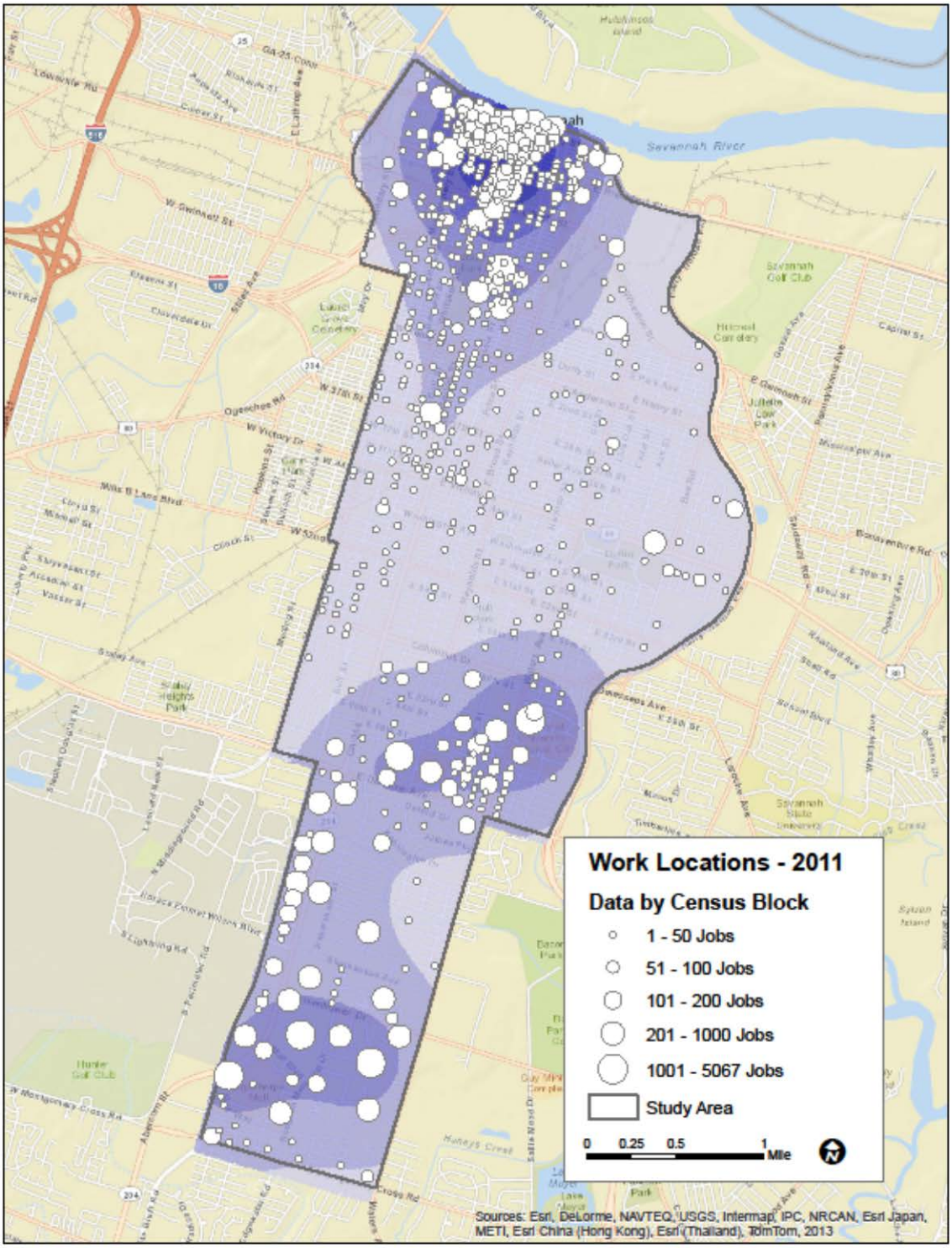
The City of Savannah, and in particular the National Landmark Historic District, has become one of the most popular tourist destinations in the country and is increasingly attracting international visitors. In 2012, the City hosted 12 million visitors, of which 7 million were overnight visitors. Currently, three tourist trolleys operate in the historic district with "on-off" capability. The ridership information from these three trolley tours, Oglethorpe Tours, Old Savannah Tours, and Old Town Trolley, were used to provide insights into the tourist market.

With the implementation of an urban circulator, visitors comprise a significant component of the market. It is anticipated that overnight visitors in particular would utilize the tourist trolleys on the first day and on subsequent days while visiting, would shift to an urban circulator system if it existed. Tourism statistics were obtained from several sources; reports reviewed to gain a better understanding of this market segment included the following:

- *Savannah 2012 Visitor Final Report* (Longwoods Travel USA, May 2013),
- *Visit Savannah* tourism statistics
- Savannah Convention and Visitors Bureau

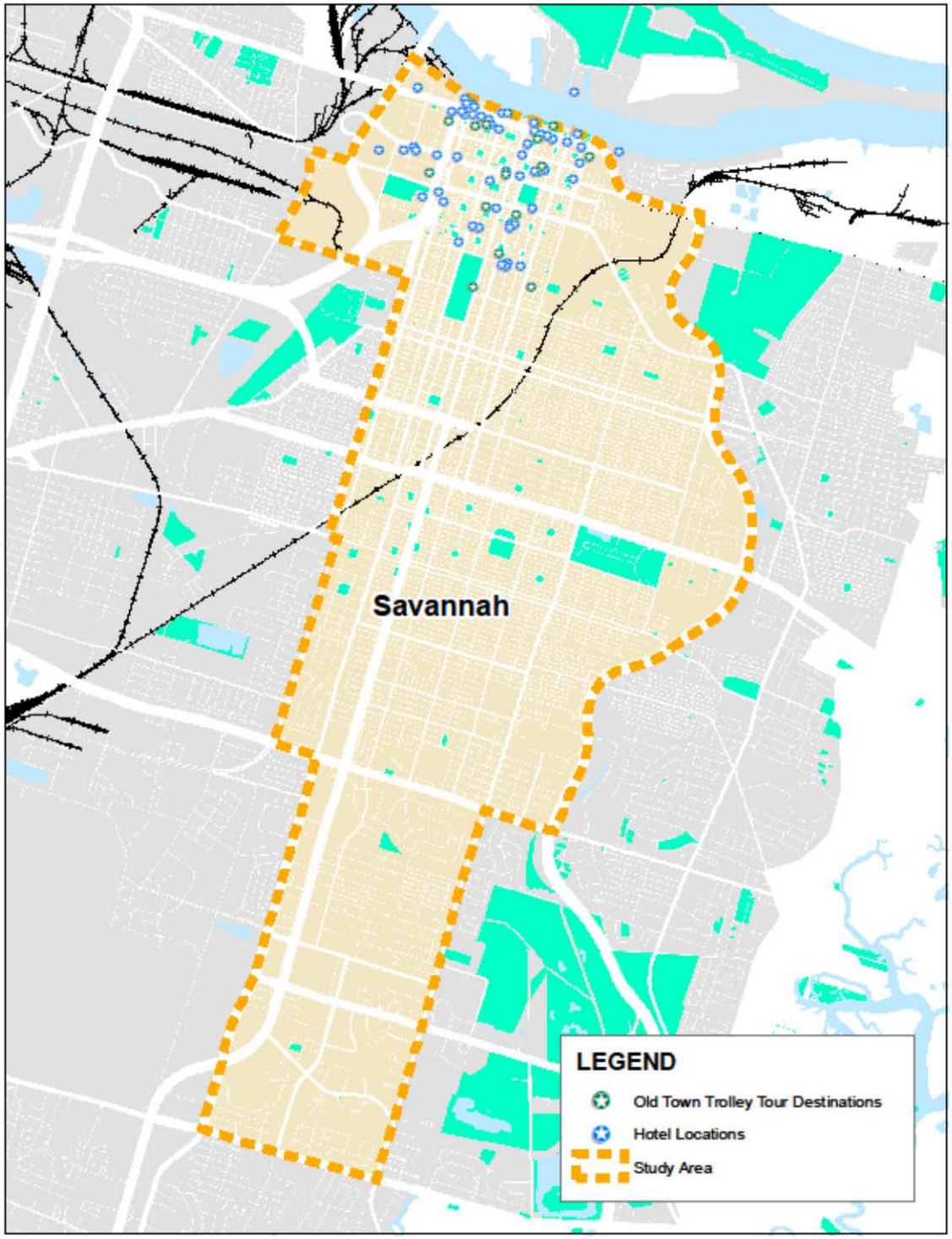
Tourist and hotel destinations located in the historic district north of Gwinnett Street and west of East Broad Street were identified from these sources and mapped. These destinations are shown Figure 4.

Figure 3. Work Locations



Source: US Census Bureau

Figure 4. Tourist and Hotel Destinations



Source: http:// www.visit-historic-savannah.com/savannah-visitor-center

4.2.1.4 Savannah College of Art and Design (SCAD) Facilities

The Savannah College of Art and Design was founded in 1978 as a specialized professional art college. SCAD is a private, nonprofit institution, conferring Bachelor of Arts, Bachelor of Fine Arts, Master of Architecture, Master of Arts, Master of Fine Arts and Master of Urban Design degrees, as well as undergraduate and graduate certificates. Approximately 11,000 students are in attendance.

SCAD has numerous facilities within the study area, with the majority located in the historic district north of Gwinnett Street. Several of their facilities are located in the southern portion of the study area, including SCAD related facilities that are not specifically associated with the college, such as residential complexes. SCAD currently operates its own transit system called the Bee Line. The Bee Line bus service provides transportation to and from SCAD facilities during scheduled class times, as well as after class hours to provide late-night transportation for students. While the transit service is fare free to students, faculty and staff, a portion of student fees are dedicated to the service. The Bee Line routes are shown in Figure 5.

SCAD service routes, level of service, and estimated ridership were used as background information for identifying the feasibility of an urban circulator service as SCAD students, faculty and employees are considered as a target market for any future system.

4.2.1.5 Chatham Area Transit (CAT) Services

CAT operates system wide fixed route bus service which operates service in Savannah and portions of Chatham County, connecting the historic district with bus service to the greater Savannah area. Fares cost $1.50 one way for buses; day passes are $3.00.

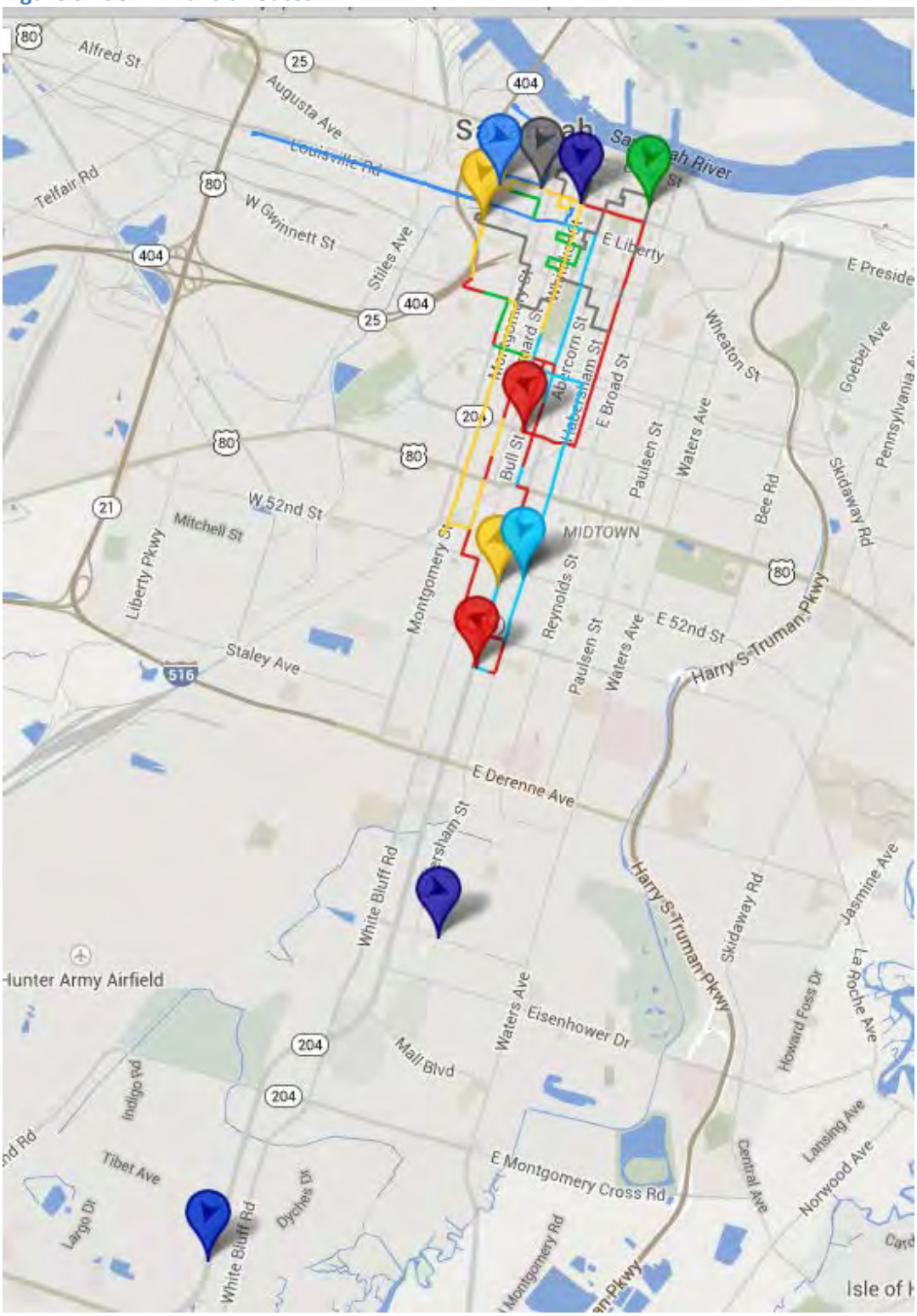
The Savannah Mobility Management Inc. is a partnership whose purpose is to implement Mobility Management Plan, which is focused on meeting the needs of the area's hospitality industry. The governing Board for this group includes representatives of the City, CAT, convention and visitor bureaus and members from the hospitality industry. The group oversees the *dot* Express Shuttle service as well as the Savannah Belles Ferry, and *Dottie*, the River Street Streetcar, all of which are operated by CAT. This downtown fare free system is funded by a per occupied hotel room fee for all hotels of 25 or more rooms located in the historic district.

The *dot* Express Shuttle, a free circulator system in the historic district, operates two buses daily, 10 hours per day, providing 20-25 minute frequency to each of 11 stops. It stops at cultural destinations, tourist destinations, public parking garages, public facilities, and at the Visitor Centers. *Dottie*, the River Street Streetcar started operation in February 2009. It is a hybrid streetcar with on board generators for power. *Dottie's* electric propulsion system is fueled by biodiesel produced with recycled cooking oil collected from local restaurants. It operates up and down River Street, Thursday through Sunday from 12:00 noon to 9:00 PM serving the tourist market.

The Liberty Shuttle Service provides a free service operating on a looping route between four City parking garages and the heart of the downtown area. It operates during weekday rush hours, as well on Friday and Saturday nights between 9:30 PM and 2:00 AM. The City of Savannah contracted with CAT to provide the shuttle service for people working in the downtown area who use municipal parking garages.

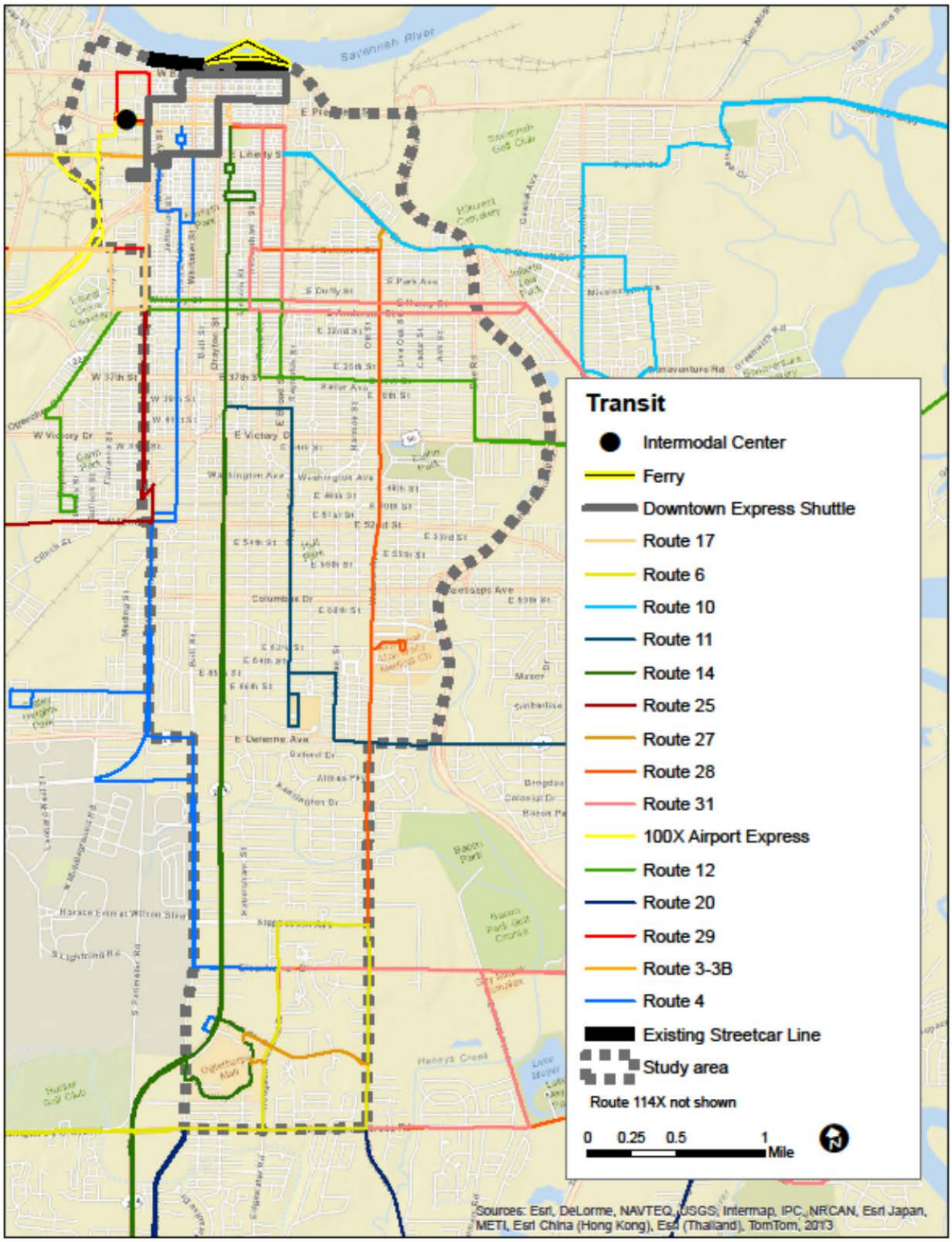
Figure 6 shows the CAT fixed route buses and the other services they operate in the study area. Information on routes, bus stops, and ridership for all services was assessed in order to identify which markets might be served by the urban circulator or coordinated with for transfers. Ridership data on the Chatham Area Transit (CAT) services was available from CAT staff, notably from a Comprehensive Operating Analysis report. Ridership data on the CAT routes indicate that there is little use made of CAT routes for trips entirely within the historic district; most riders are travelling to/from the historic district to/from destinations that are further out. Ridership data on the *dot* shuttle and Liberty shuttles was not available, but assumptions on ridership were made by observation and discussion with CAT staff.

Figure 5. SCAD Transit Routes



Source: http://www.scad.edu

Figure 6. CAT Services



Source: CAT System Map

4.2.2 Market Data Conclusion

Based on the results of the market data collected, the decision was made through the Technical Working Group early in the study process to focus initial efforts on establishing circulation service in the most densely packed part of the study area. This area, shown as Phase 1 in Figure 1, corresponds to the historic district and area north of Forsyth Park. The Technical Working Group determined that with the existing market demand, particularly the tourism market, this focused approach would have the most opportunity for a feasible urban circulator system.

Based on this direction and focus, the potential ridership market segments were identified as:

- Employment based:
  - Passengers traveling to work either from residences in the service area or transferring to/from CAT buses to/from other parts of Savannah,
- Tourism based:
  - The large numbers of visitors to the historic district and its many tourist attractions and the existing tourist-oriented transportation services
- SCAD students:
  - The large number of SCAD facilities located throughout the historic district and the number of SCAD students, faculty and staff accessing these facilities
- Induced demand:
  - Demand generated by new economic development spurred by the urban circulator system

4.2.3 Comparison with Previous Streetcar Proposals and Historic Streetcar Routes

Prior to identifying potential corridors and routes, it was important to understand suggested routings proposed in previous streetcar studies and in the Transportation Investment Generating Economic Recovery (TIGER) grant applications previously submitted by CAT.

Several previous studies examining the feasibility of streetcar service in Savannah have been completed. These studies, summarized in the Introduction of this report, include:

- 2003 Streetcar Feasibility Report
- River Street Streetcar Service
- 2010 Streetcar Report
- 2010 TIGER II Streetcar Grant Application
- 2013 TIGER V Streetcar Grant Application
- 2011 Streetcar Report Technical Memorandum
- Transit Mobility Vision Plan

Each of these previous work efforts were reviewed to understand the potential corridors and services identified.

In addition to the previous work efforts, historic streetcar routes were also reviewed as part of the data collection effort. This information was obtained from the book, *Streetcars of Chatham County, Photographs from the Collection of the Georgia Historical Society* by Mary Beth D'Alonzo. Routes where streetcars originally operated were reviewed to determine if the routes were relevant to today's markets.

4.2.4 Bicycle and Pedestrian Data

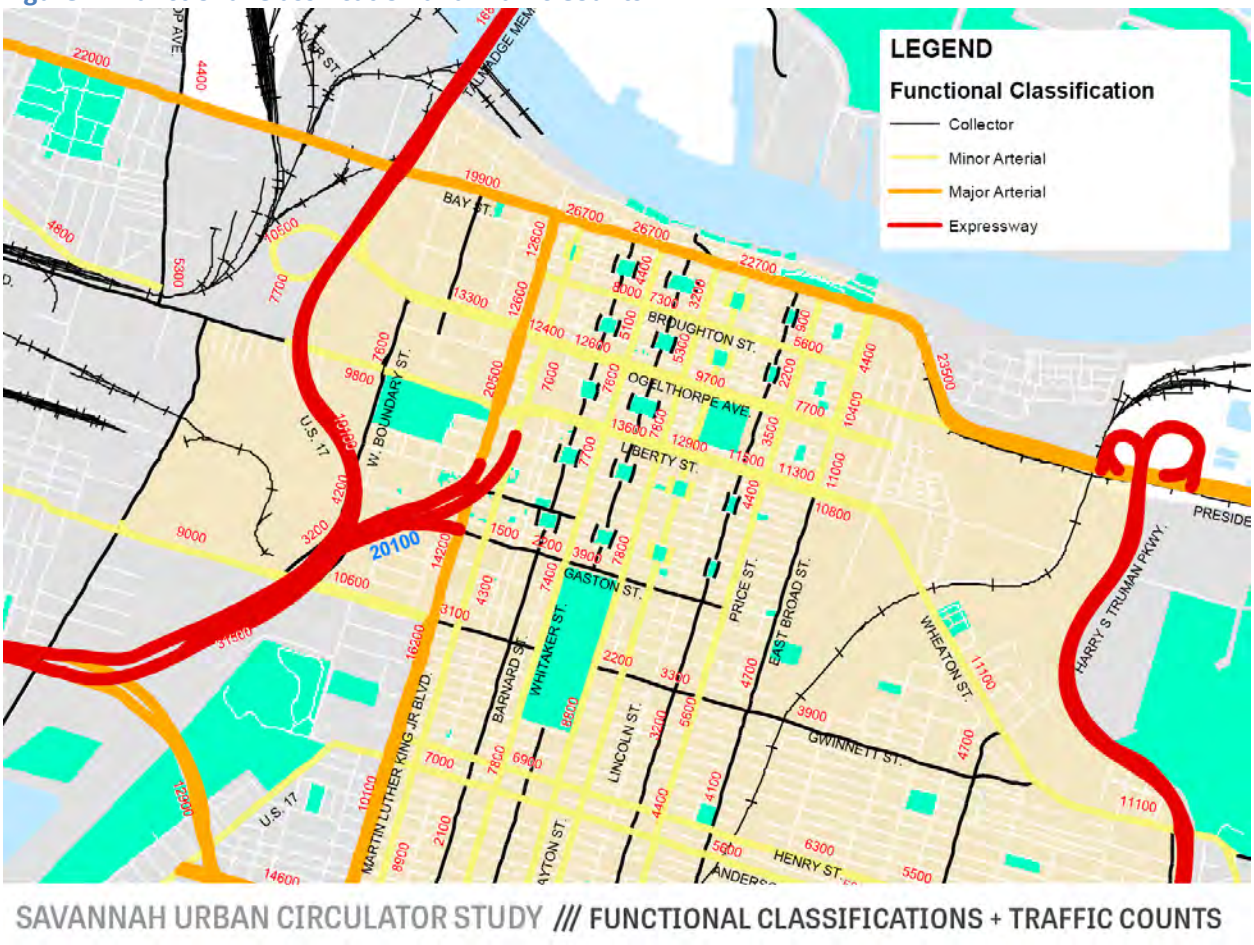
Bicycle and pedestrian count data provided by the CORE MPO, collected as part of the National Documentation Project 2012-MPO/City/SBC Bicycle and Pedestrian Count, was reviewed to identify appropriate bicycle and pedestrian connections to the urban circulator system. Accessibility and connectivity to pedestrian and bicycle networks and facilities are critical elements of appropriately siting stations and/or stops.

4.2.5 Roadway and Parking Data

Information on roadway infrastructure conditions and right-of-way was obtained through GIS parcel data, by observations during field visits, by viewing aerial maps and through input obtained from the Technical Working Group. Traffic data for each of the streets in the historic district was obtained from the City and shown in Figure 7. This information provided valuable information in identifying which streets are most appropriate for an urban circulator system.

Data on parking garages and on street parking was provided by the City of Savannah. The potential impact on on-street parking was also important in the identification of potential routes. Parking garage locations were analyzed as indicators of destinations.

Figure 7. Functional Classification and Traffic Counts



4.2.6 Existing Land Use and Future Development Proposals

Existing land use and proposed developments were included in the analysis. Areas with diverse and relatively high density produce more transit trips, and the identification of these areas is important in understanding and assessing the potential of a new transit service. The following describes the development proposals that were reviewed as part of this process:

Broughton Street Redevelopment: In February 2014, developer Ben Carter announced plans for the redevelopment of Broughton Street between Jefferson and Drayton Streets, including streetscape improvements. The plan calls for the redevelopment of 24 properties with a mix of retail, dining and residential uses.[2]

Savannah River Landing: The 54 acre Savannah River Landing site is located immediately east of River Street on the eastern edge of the Historic district. Previous development plans included a mix of commercial and residential uses and serve to extend the core downtown to the east. Plans by the current property owner have not yet been finalized, although the City is committed to ensuring the

[2] Curl, Eric and Ritchey, Julia. *Ben Carter Unveils $75 million Broughton Street Development Plan, (February 6, 2014),* Savannah Morning News, page1

development has a mix of uses and retains a pattern or interconnected streets and squares. The site would connect to the existing riverwalk and serve as a gateway to the historic district. [3]

East Savannah Gateway: The East Savannah Gateway project encompasses the demolished Robert Hitch Village and Fred Wessels Homes public housing sites and surrounding area. Plans call for the redevelopment of the site as a mixed-income, mixed used community that will include 600 new homes. The project area is located on the eastern side of the historic district, east of East Broad Street and south of Bay Street.[4]

City of Savannah Arena: The City intends to build a new arena in west Savannah, proposed for a site north of West Gwinnett Street along the Springfield Canal. The project is being funded by sales tax approved through a sales tax referendum in 2006. Programming for the arena or other development details is not yet available.[5]

Canal District Vision: In October 2013, the City of Savannah announced a vision for the site of the proposed new arena and the surrounding area. This area, the Canal District, is located to the west of West Boundary Street. The vision calls for the creation of a regional mixed used entertainment district with multi-modal transportation network serving pedestrians, cyclists, automobiles and rail transit.[6]

4.3 Vehicle Operation

Before any corridors could be identified it was important to first develop corridor and station stop criteria that applied to either a streetcar or an enhanced bus. In common with most cities with streetcars or bus-based urban circulator service, most Savannah streets are not wide enough to provide dedicated lanes for transit and still retain sufficient lanes for traffic and parking. Additionally, it would be very difficult to get support to reduce lanes of traffic or remove parking in order to operate a transit service in the historic district. Therefore, transit options that could operate in mixed traffic were pursued as directed and supported by the Technical Working Group.

4.3.1 Corridor and Station Stop Criteria

The following criteria for corridors and stations/stops were developed based on the best practices identified through research, as well as the review of operations in the cities previously-identified. Based on the information and input from the Technical Working Group, the infrastructure criteria identified for potential corridors focused on the transit vehicle operating in mixed traffic and autos having the capability of passing the transit vehicle that is stopped to allow passengers to board or alight.

Based on these two criteria, recommended routes focused on two-way streets with a minimum of four travel lanes, or on one-way streets with two travel lanes. Exceptions to these criteria could be made for streets with light traffic volumes. In addition, operation on private right-of-way (off-street) could be considered in certain areas and circumstances. Station and/or stops are to be spaced approximately ¼ mile apart.

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[3] Dawers, Bill. *The Oglethorpe Plan and Savannah River Landing (August 11, 2014),* Savannah Morning News, page 1

[4] http://www.eastsavannahgateway.com/the-east-savannah-gateway

[5] Curl, Eric. Savannah City Council Oks new arena site (September 5, 2013) Savannah Morning News, page 1.

[6] http://www.connectsavannah.com/NewsFeed/archives/2013/10/17/city-unveils-canal-district-plan-for-westside

Streetcars are unable to pull up to the curb at stops; where streetcars are proposed for operation with on-street parking, sidewalk bump-outs would be provided for passenger boarding and alighting to address this constraint. Stops could include amenities such as shelters, benches, real time vehicle/service information and fare media purchasing. In addition, it is possible to incorporate a system for passengers to pay on-board to utilize a proof of payment system.

Figure 8 shows an image of a bump out for passenger boarding and alighting for the Little Rock, Arkansas system. Figure 9 provides an image of off-street operation for the New Orleans, Louisiana system. This type of operation could occur enroute to the proposed Arena site or within a median of a wider street.

Figure 8. Sidewalk Bump-out for Boarding/Alighting; Little Rock, Arkansas

Source www.gomacotrolley.com

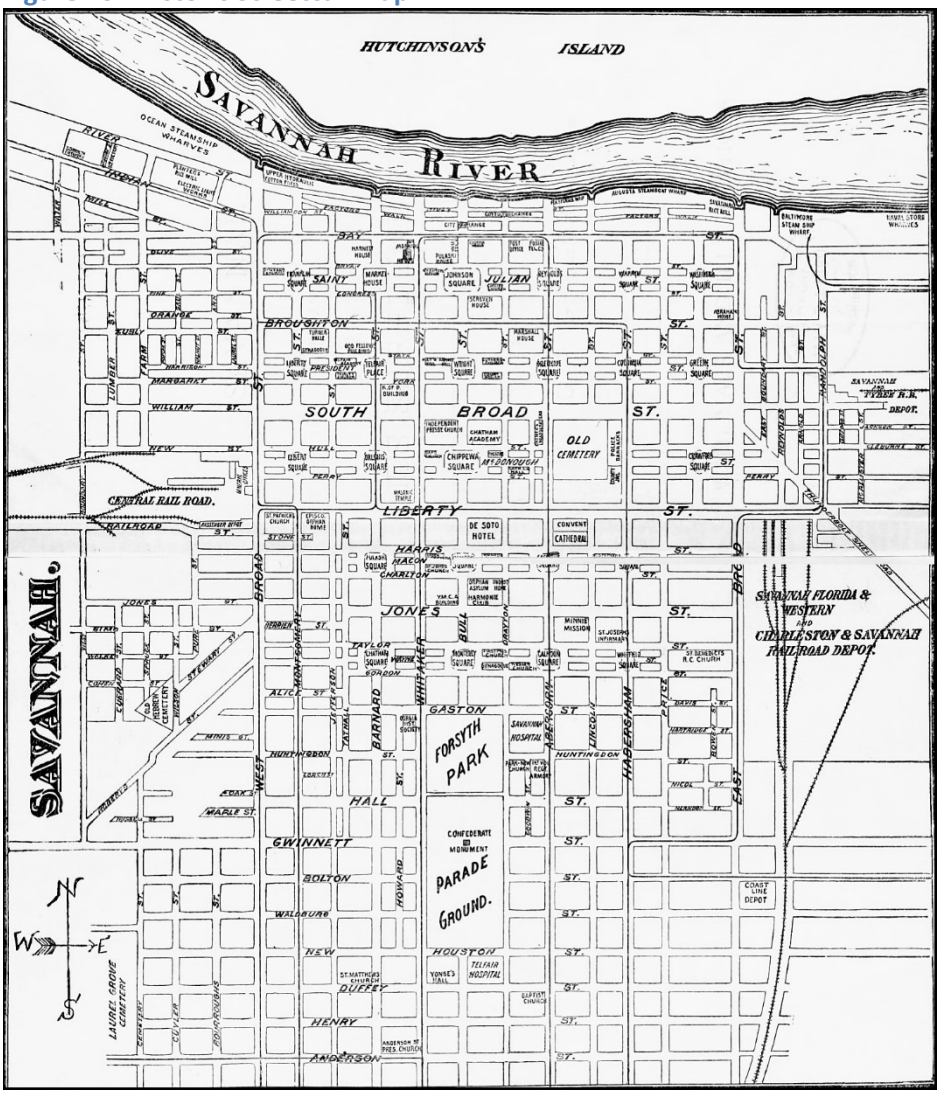
Figure 9. Off Street Operation; New Orleans, Louisiana

Source: TranSystems

4.3.2 Other Considerations

The famous squares of the Savannah historic district are located along some of the major north-south streets. As shown in the historic street car map found in Figure 10, streetcar routes formerly went straight across and through the squares, which is not an acceptable concept for a system today. With the constraints posed by the squares for circulator vehicles, for purposes of this study, these streets were not considered as potential corridors.

Figure 10. Historic Streetcar Map



The low hanging tree canopy on many of the streets is another constraint and may have an impact on overhead contact wire if the streetcar mode is chosen. Propulsion systems for streetcars will need to include an option for operation without adverse impact on the tree canopy where necessary.

Information on the specific location of underground utilities was not available for all streets; therefore, the study assumed that all streets have some underground utilities in greater or lesser amounts. Utility relocation would need to be accomplished for any corridor where streetcars are installed to permit maintenance or connections without having to shut down service. Typical costs for utility relocation are incorporated in the capital cost estimate.

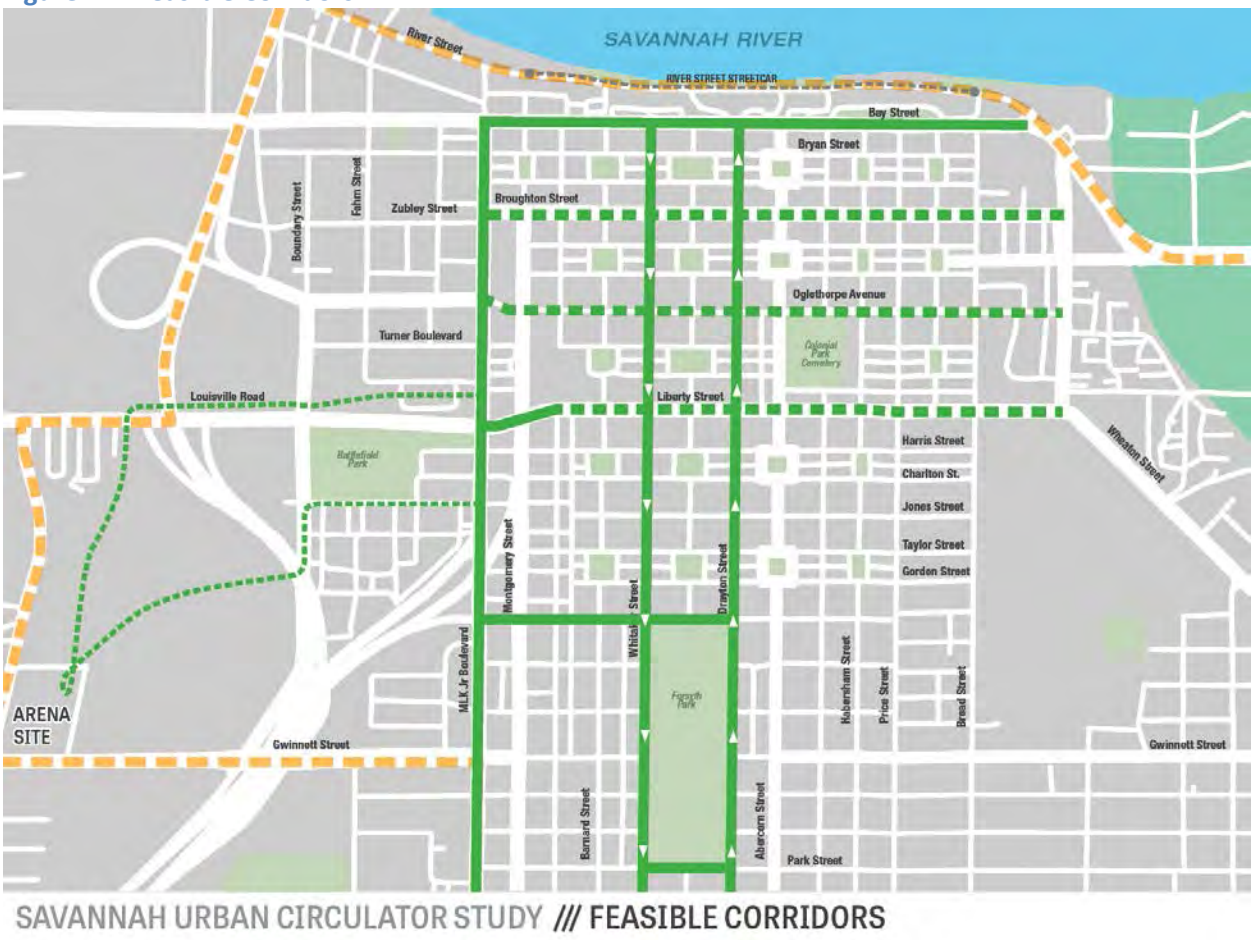
Other issues discussed by the study team and the Technical Working Group were streets that flood frequently, causing the road to be impassable due to standing water. In the event of a heavy rain, it is assumed that a temporary suspension of service on the route would need to occur until the water on the street recedes.

4.4 Feasible Corridors

Figure 11 shows feasible corridors that were identified as suitable for an urban circulator operation in the first phase of the study area based on the established criteria described in section 4.3.1. Each of the streets selected as a potentially feasible corridor was selected because it includes the physical ability to accommodate an urban circulator system from an infrastructure and right-of-way perspective. In addition to meeting the infrastructure criteria, these corridors also provide strong connections to tourist destinations, population and employment centers; and provides connections to existing and proposed developments. Prior to identifying the final feasible corridors, various alternatives were suggested. These alternatives were vetted by the Technical Working Group and the final feasible corridors were identified.

River Street, which is the street where the existing River Street streetcar operates, was not integrated into the routing suggestions. While the existence of the former freight spur track made it easier to implement a streetcar demonstration project along River Street, it was determined that River Street is not well-located to serve the purposes of the urban circulator system given that it is on the far edge of development, rather than centrally-located, and does not serve any of the identified market segments in a meaningful way. However, with the close location to the identified feasible corridors, passengers can easily transfer between the two systems on foot as necessary.

Figure 11. Feasible Corridors



4.5 Stages of System Development and Route Identification

With the identification of the feasible corridors, several alternative route networks serving the most urban area of focus (primarily, north of Forsyth Park, and in the western part of the historic district) were developed.

In order to develop the routes, the study area was divided into four zones as shown in Figure 12. The purpose of the zones was to divide the historic district into smaller service areas so that routes could be introduced and implemented incrementally. The zones focus on specific areas, with alternative routings developed in each:

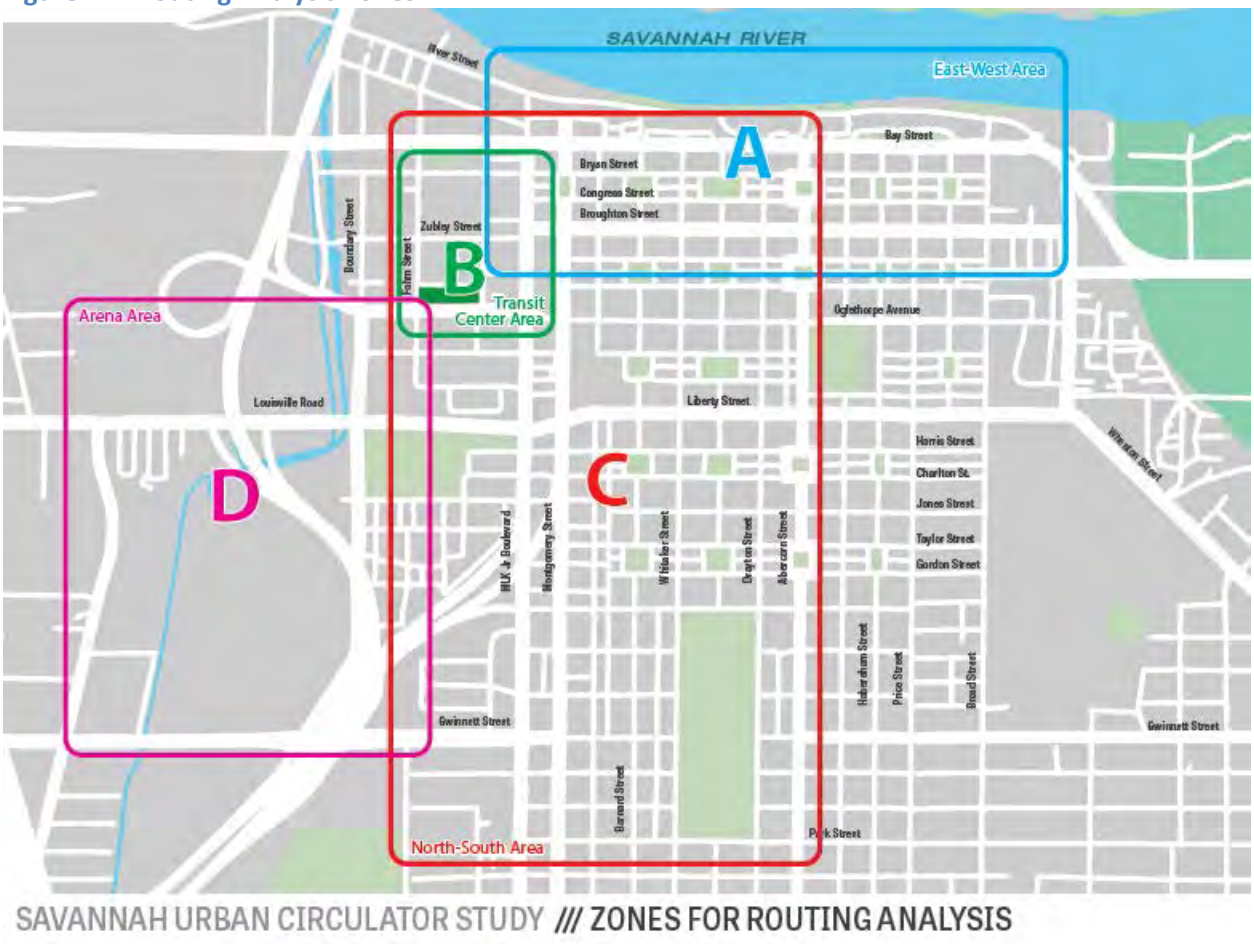
- Zone A: East-West Zone
- Zone B: Transit Center Zone
- Zone C: North- South Zone
- Zone D: Arena Area Zone

Choices in each zone could be combined with choices for routings within other zones to create a multitude of overall systems.

When developing the routes, the following considerations were made:

- Routes stayed on feasible streets
- Routes minimized circuitous trips for riders (avoiding broad loops)
- Routes avoided unnecessary jogs and difficult turns

Figure 12. Routing Analysis Zones



After selection of preferred routes within each zone by the Technical Working Group, a system network of four urban circulator routes that could be operated either with streetcars or buses was developed. These routes were color coded as red, green, blue and purple.

Subsequently, a plan was developed for deploying this system incrementally, in up to nine "stages", with the system more complete and fully usable after construction of each stage. In many cases, these stages could be implemented in varying sequences based on a variety of factors including ridership potential of each stage, capital and operating costs of each stage, economic development opportunities, and more comprehensive analysis of the feasibility of each segment. For the purpose of this study, the sequence of the phased construction was intended to provide service first to the most viable and most dense markets. Figures 13 through 21 illustrate this sequence of phased construction. Figures 22 26 show the full system map with each of the market layers overlaid onto the proposed routes.

Figure 13. Stage 1 Red Route - Initial Operating Segment
Connects Visitor Center and Transit Center to Heart of Downtown

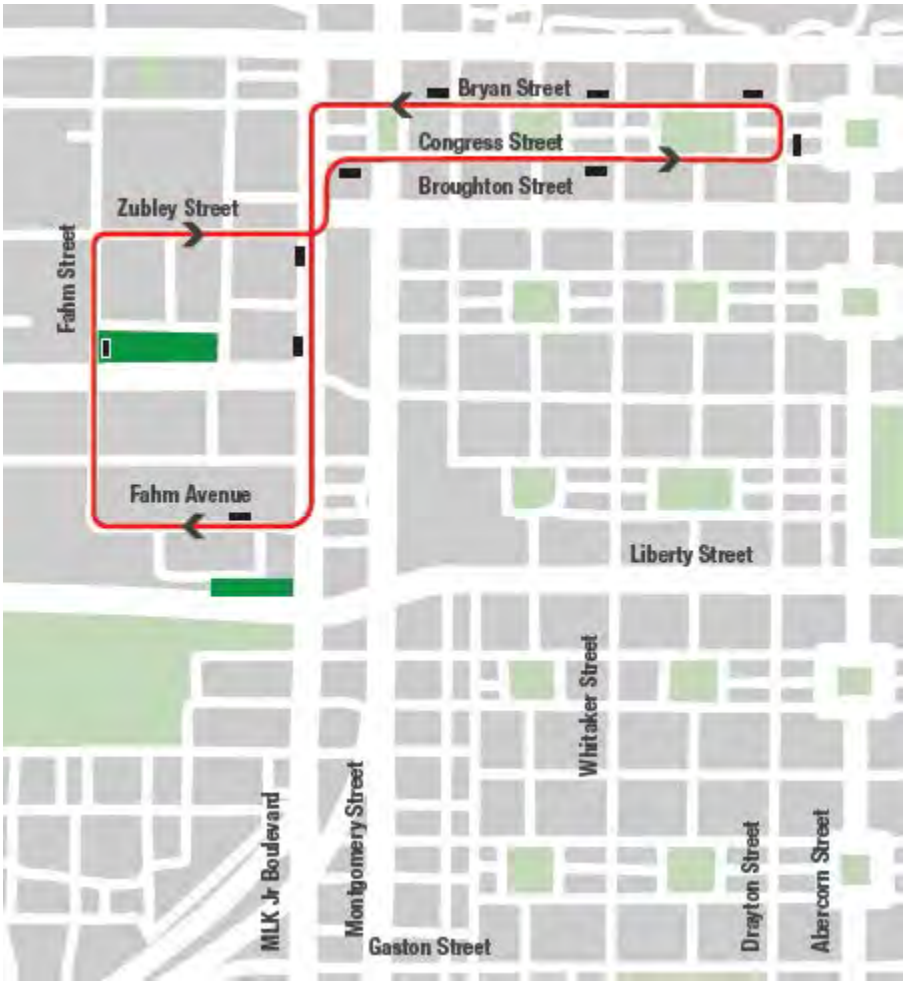


Figure 14: Stage 2 Red Route- Construct Track for Future Green Route
Operated Initially as Part of Red Route; Adds Service to Forsyth Park

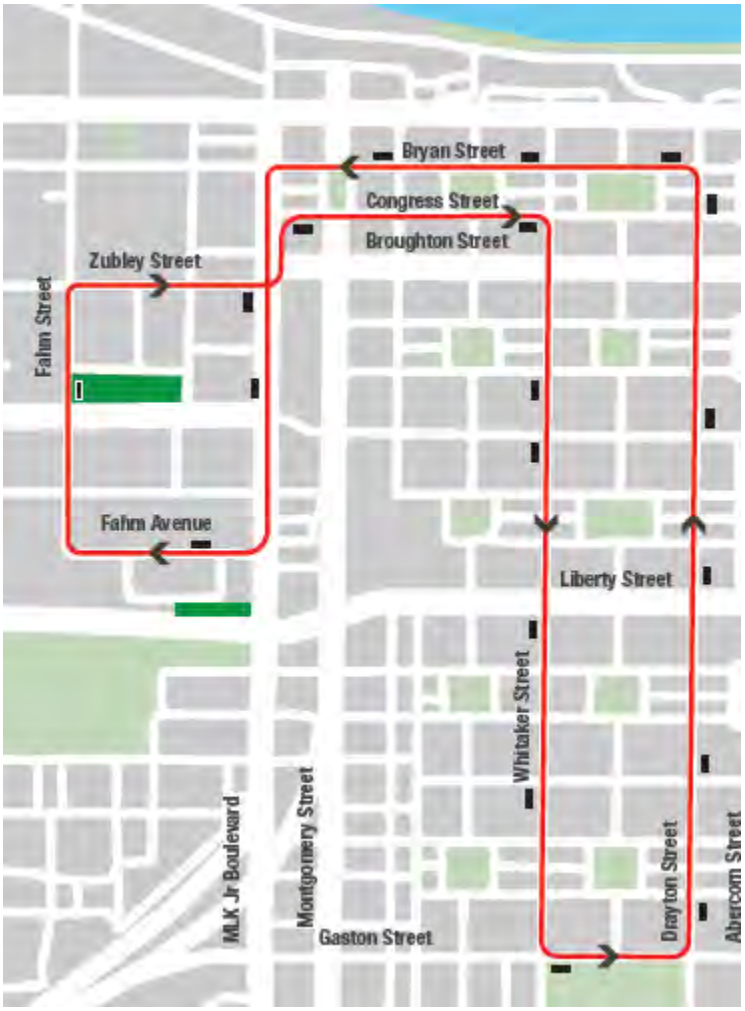


Figure 15: Stage 3- Red/Green Route

Adds service to East Side of historic district; Initiates Operation of Green Route

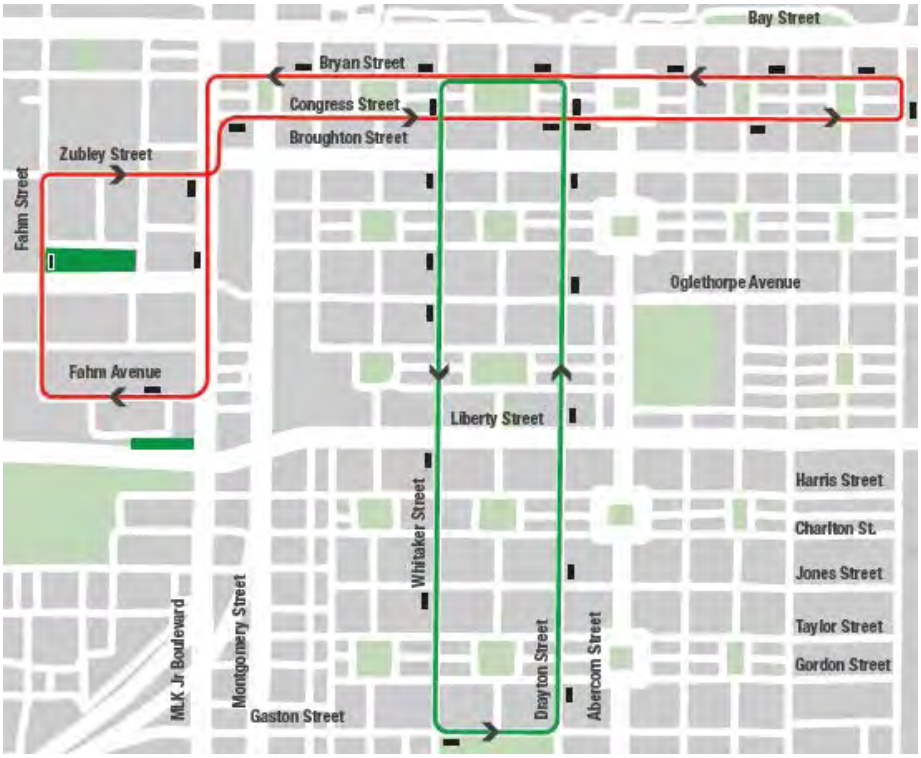


Figure 16: Stage 4 Purple Route
Adds service to East Broad Street and Hitch Village

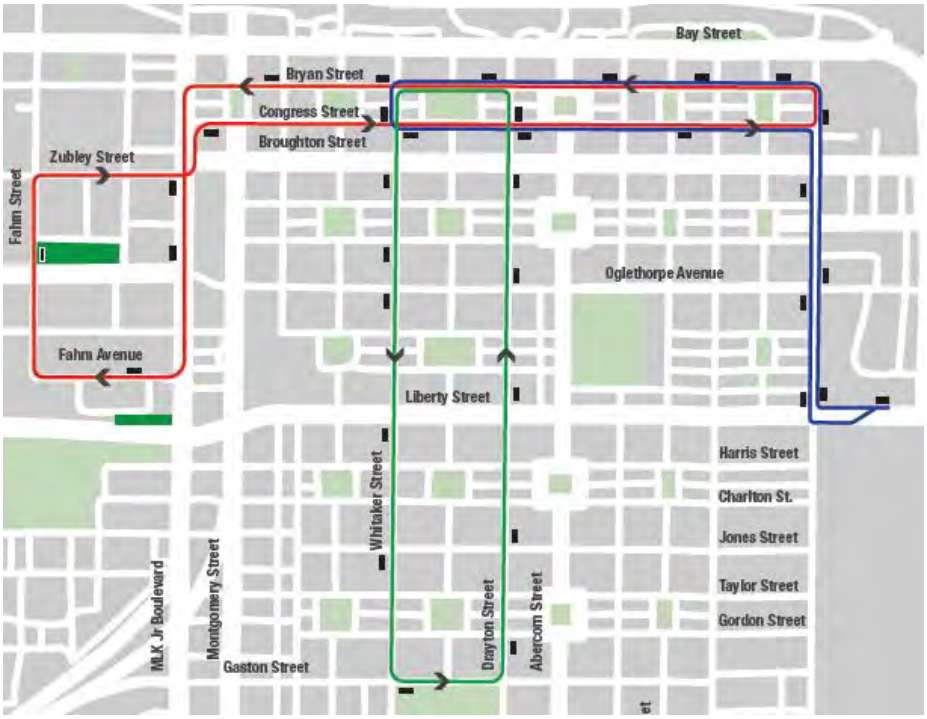


Figure 17: Stage 5 Blue Route
Create Loop Circulating through Historic District

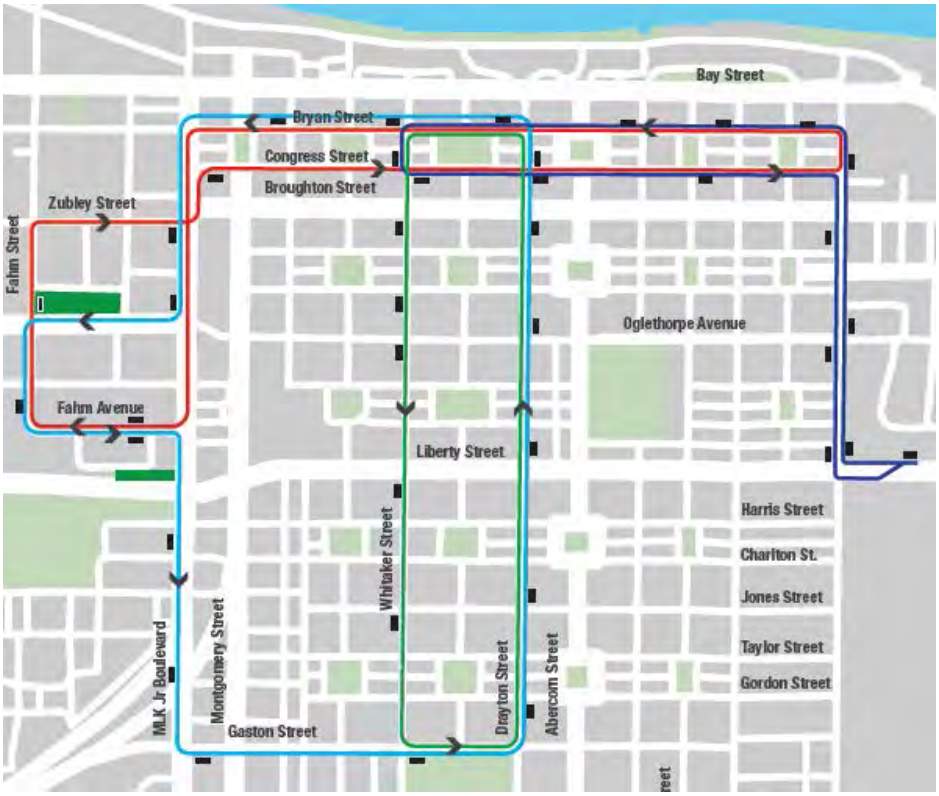


Figure 18: Stage 6 Red Route

Extend to Proposed Arena through Visitor Center Lot and Over Viaduct

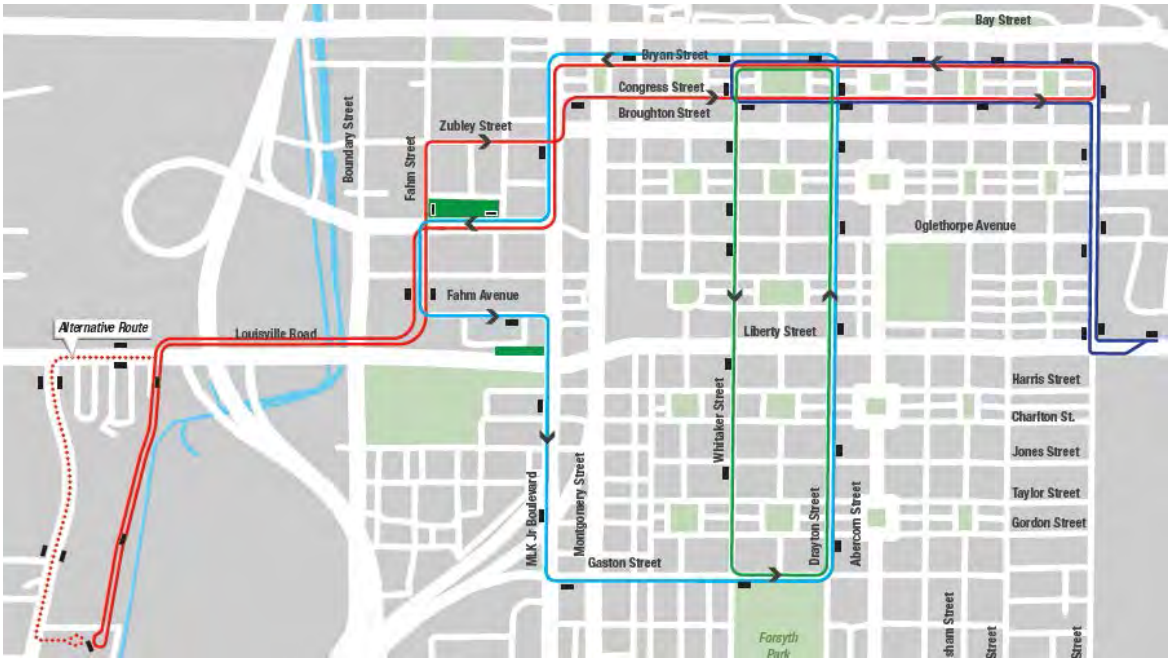


Figure 19: Stage 7 Green Route

Create Bi-Directional Loop Circulating Through Historic District

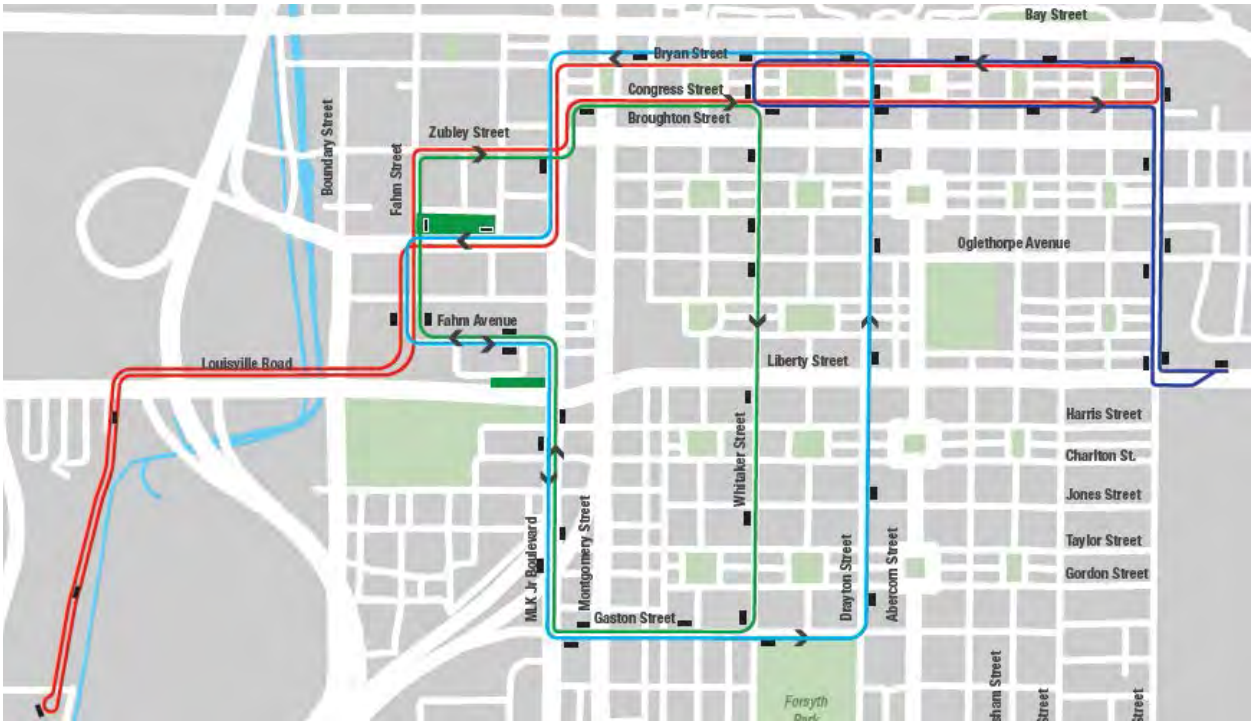


Figure 20: Stage 8 Green Route
Extend to South End of Forsyth Park

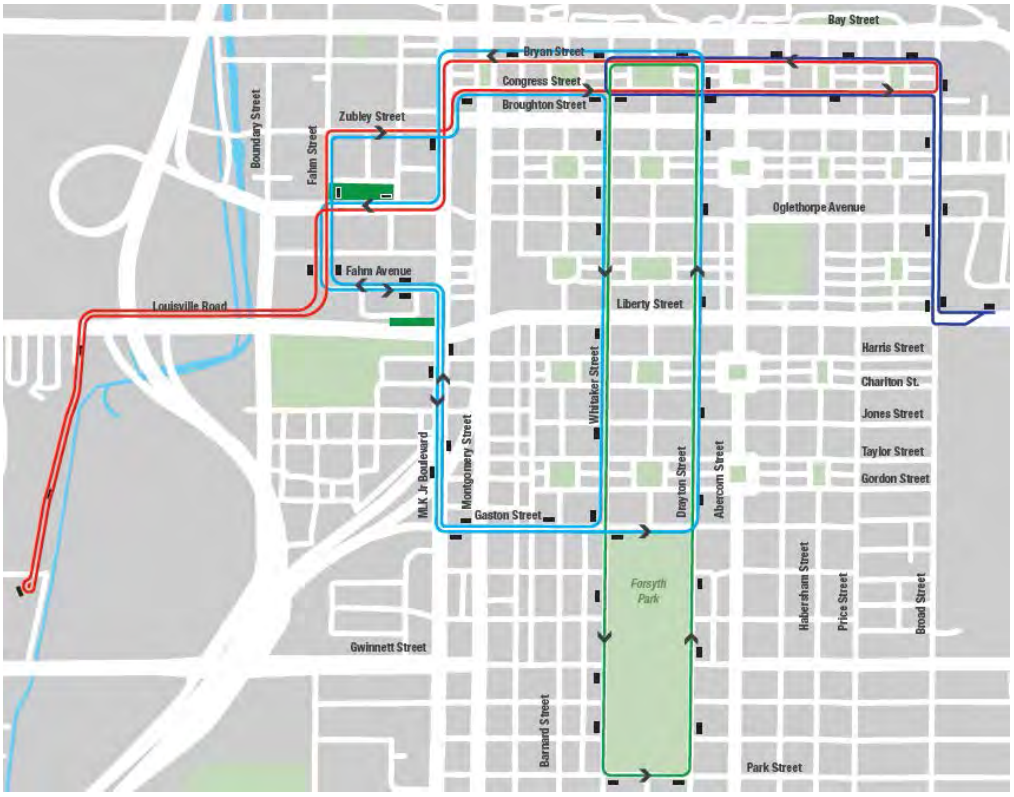


Figure 21: Stage 9 Red Route
Extend to River Landing Site

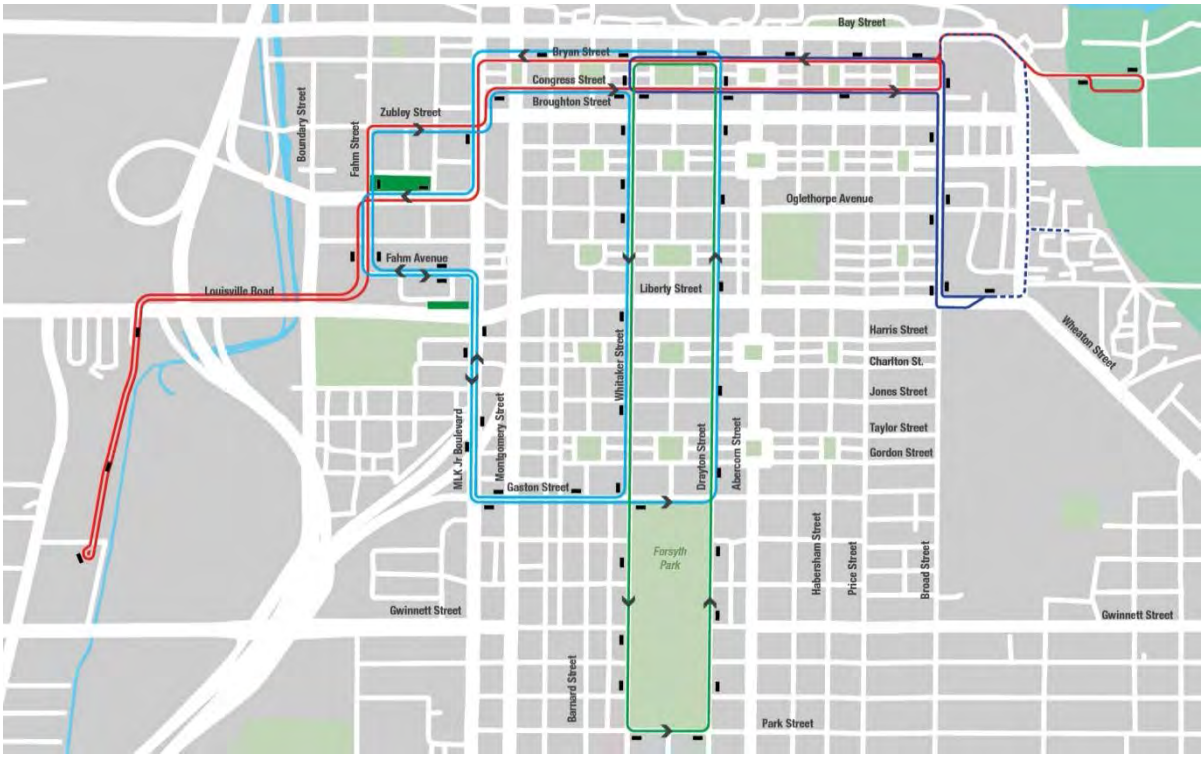


Figure 22. Full System with Future Land Use

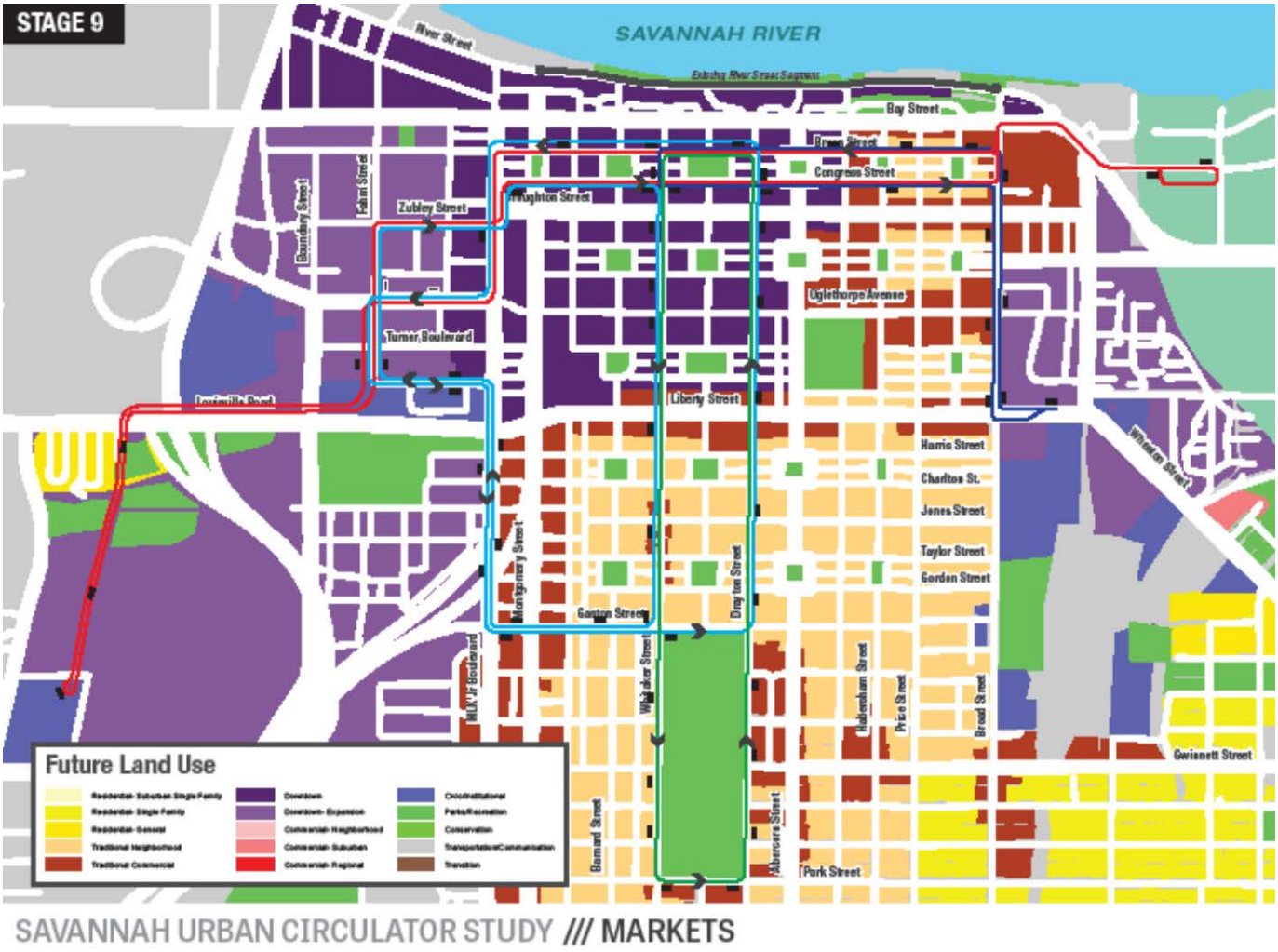


Figure 23. Full System with Home Locations

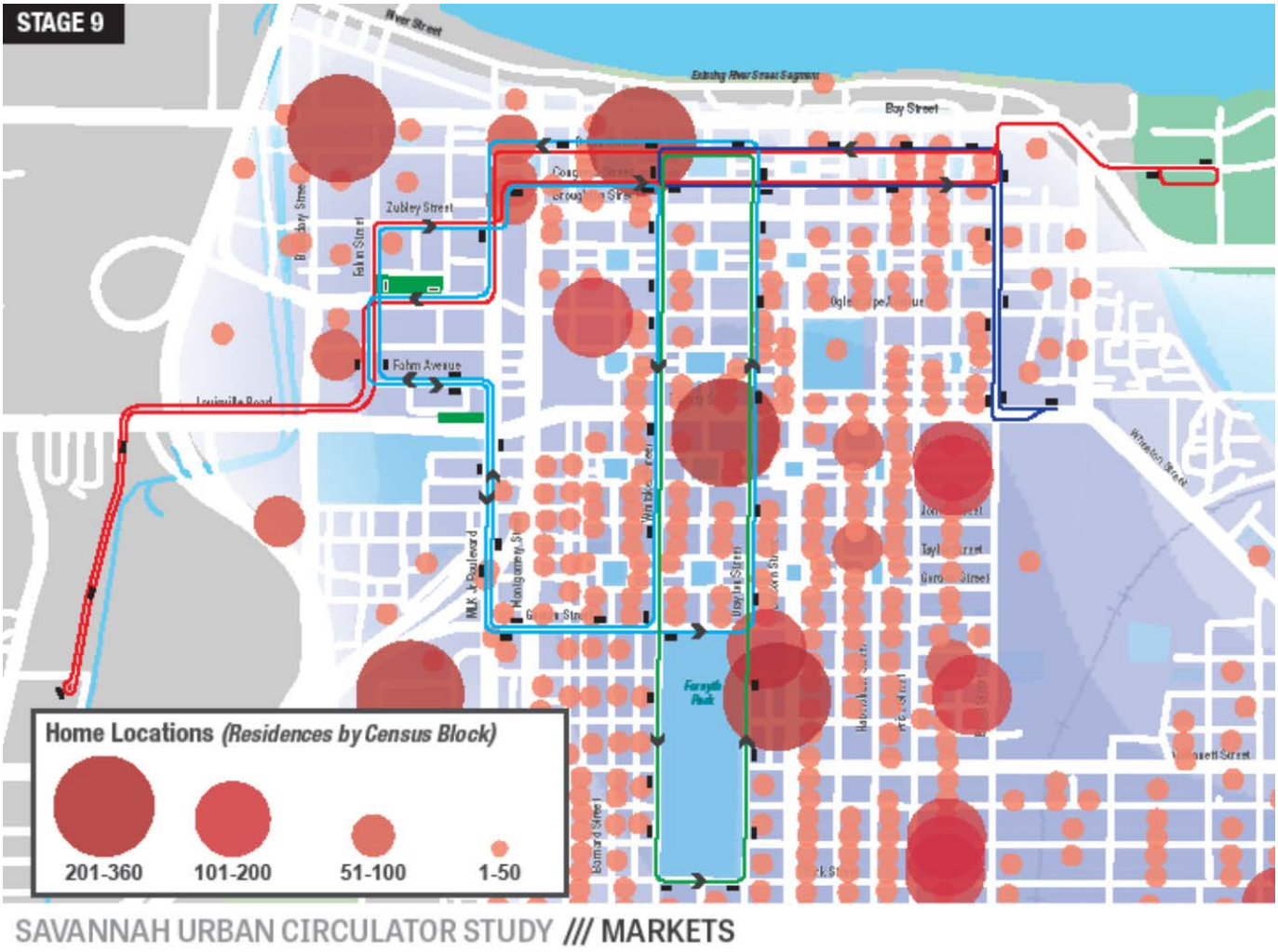


Figure 24. Full System with Work Locations

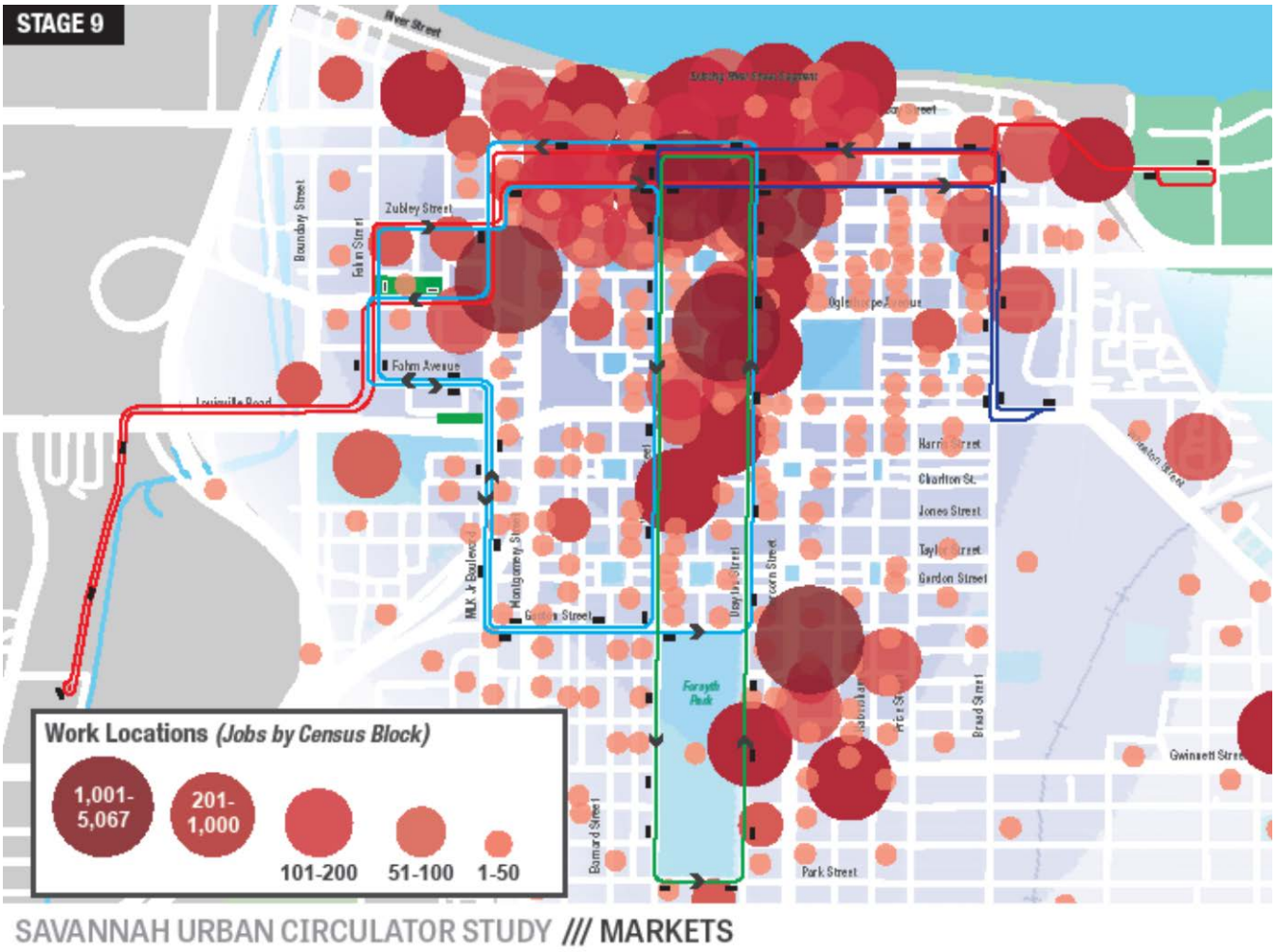


Figure 25. Full System with SCAD Facilities

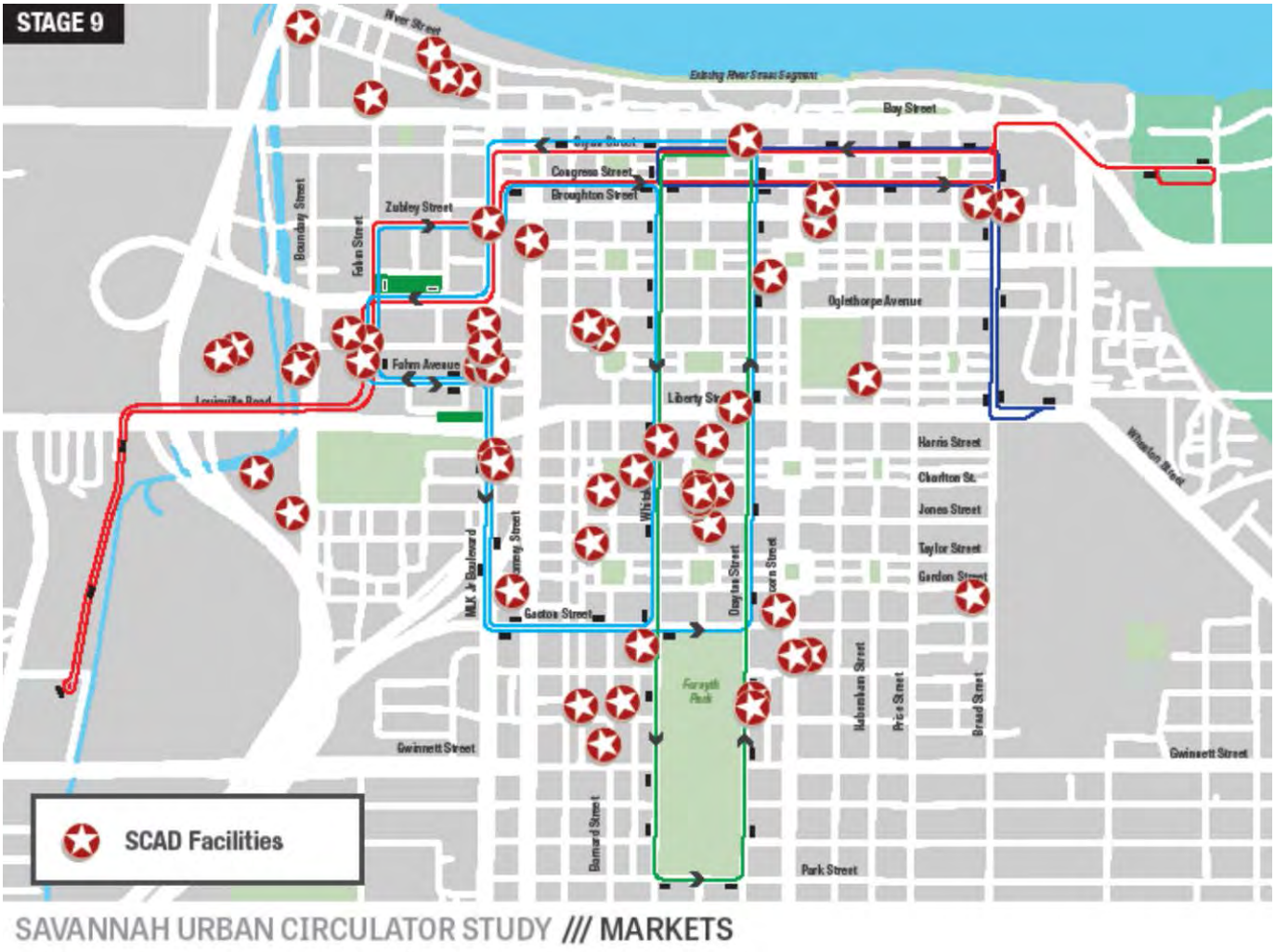
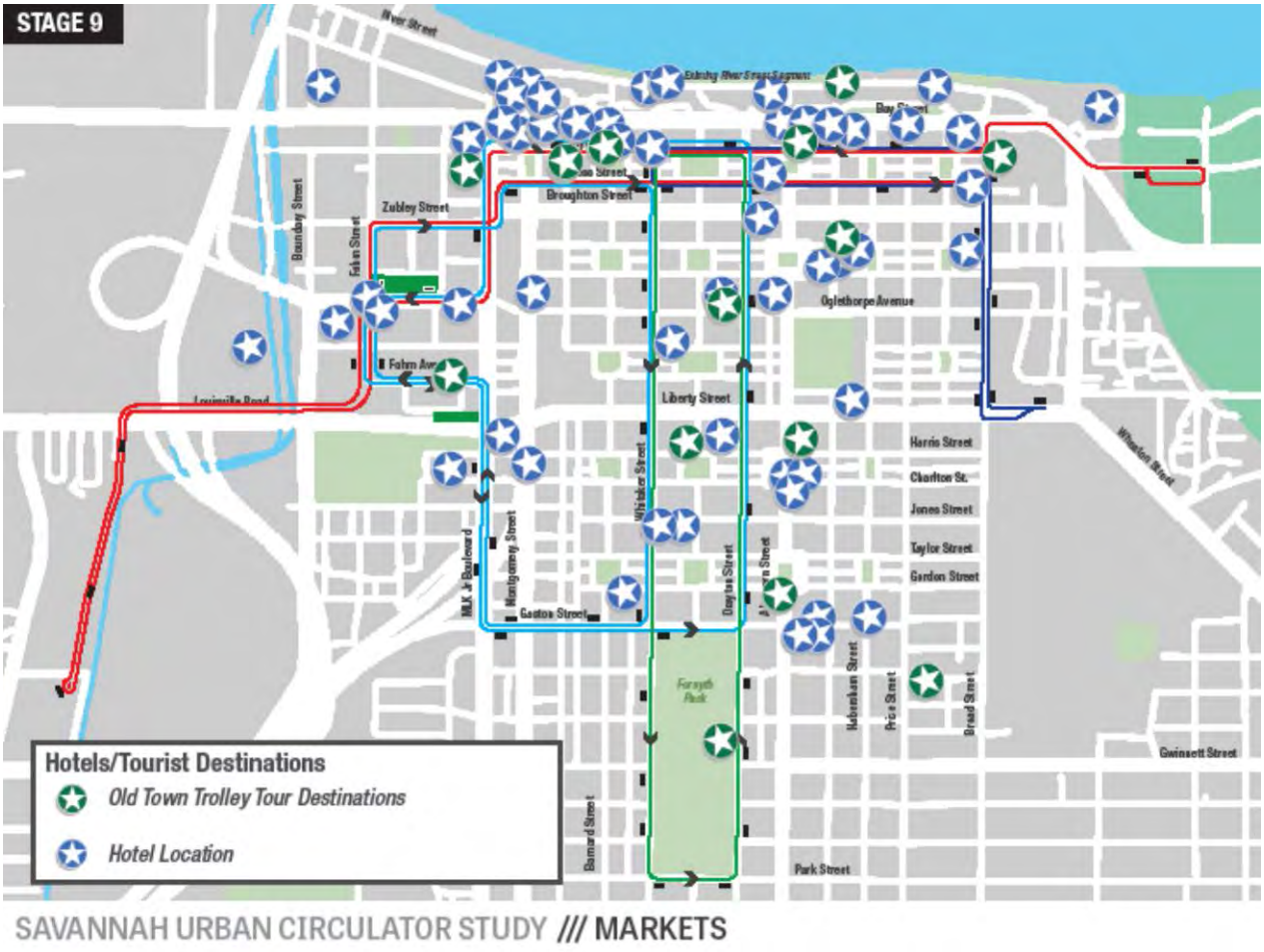


Figure 26. Full System with Hotels and Tourist Destinations



Typical Cross Sections

The corridors identified for the streetcar system have varied cross sections. In order to ensure the compatible incorporation of the vehicles and infrastructure within the existing rights of way, typical cross sections were developed.

The typical cross sections were developed for the following streets: Martin Luther King Boulevard, Congress Street, Drayton Street and Fahm Street in order to exhibit the best operating practice for various types of street conditions. Martin Luther King Boulevard has two travel lanes in each direction with a wide median, which can accommodate the proposed urban circulator. Congress Street, a one way street with lower traffic volumes, has one travel lane and one parking lane and the urban circulator would operate in mixed traffic in the travel lane. Drayton Street is a one way street with two travel lanes and no parking lanes and the urban circulator would operate in the right hand (i.e. curb) lane. Fahm Street has two travel lanes in each direction and no parking and the so the urban circulator would operate in the right hand (i.e. curb) lane. These typical sections are shown in Figure 27 through Figure 30.

Figure 27. Typical Section – Martin Luther King, Jr. Boulevard

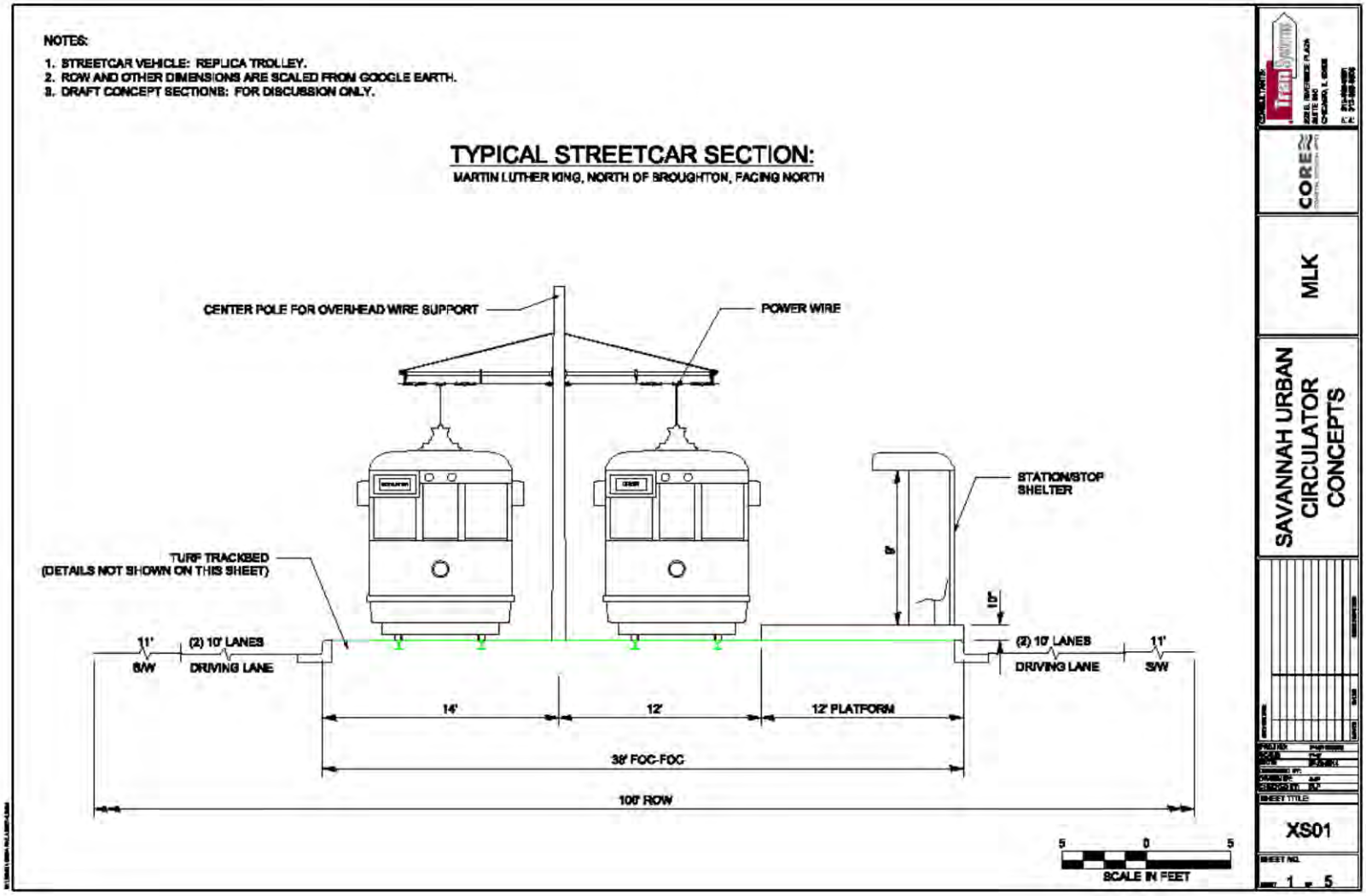


Figure 28. Typical Section – Congress Street

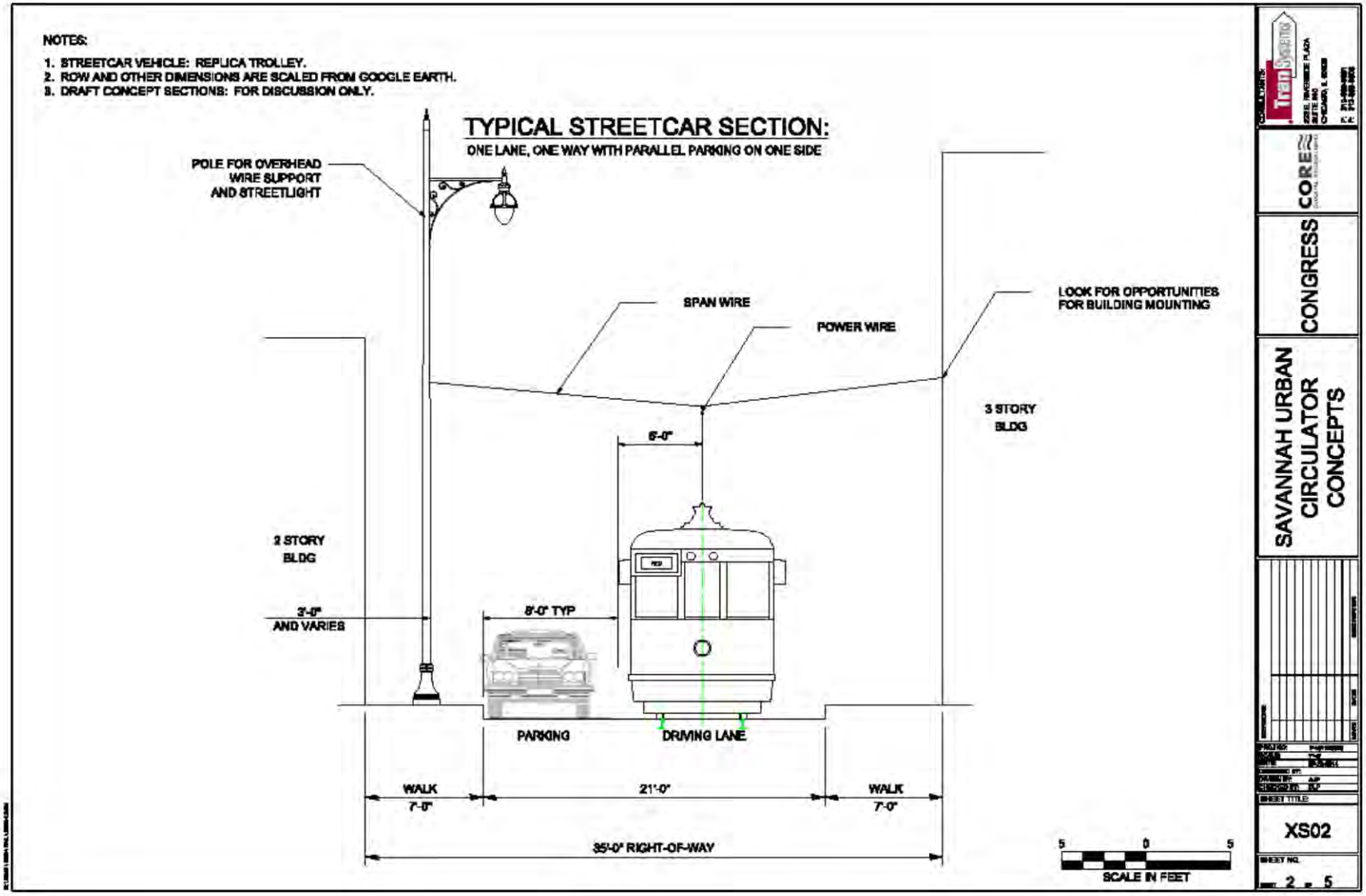


Figure 29. Typical Section – Drayton Street

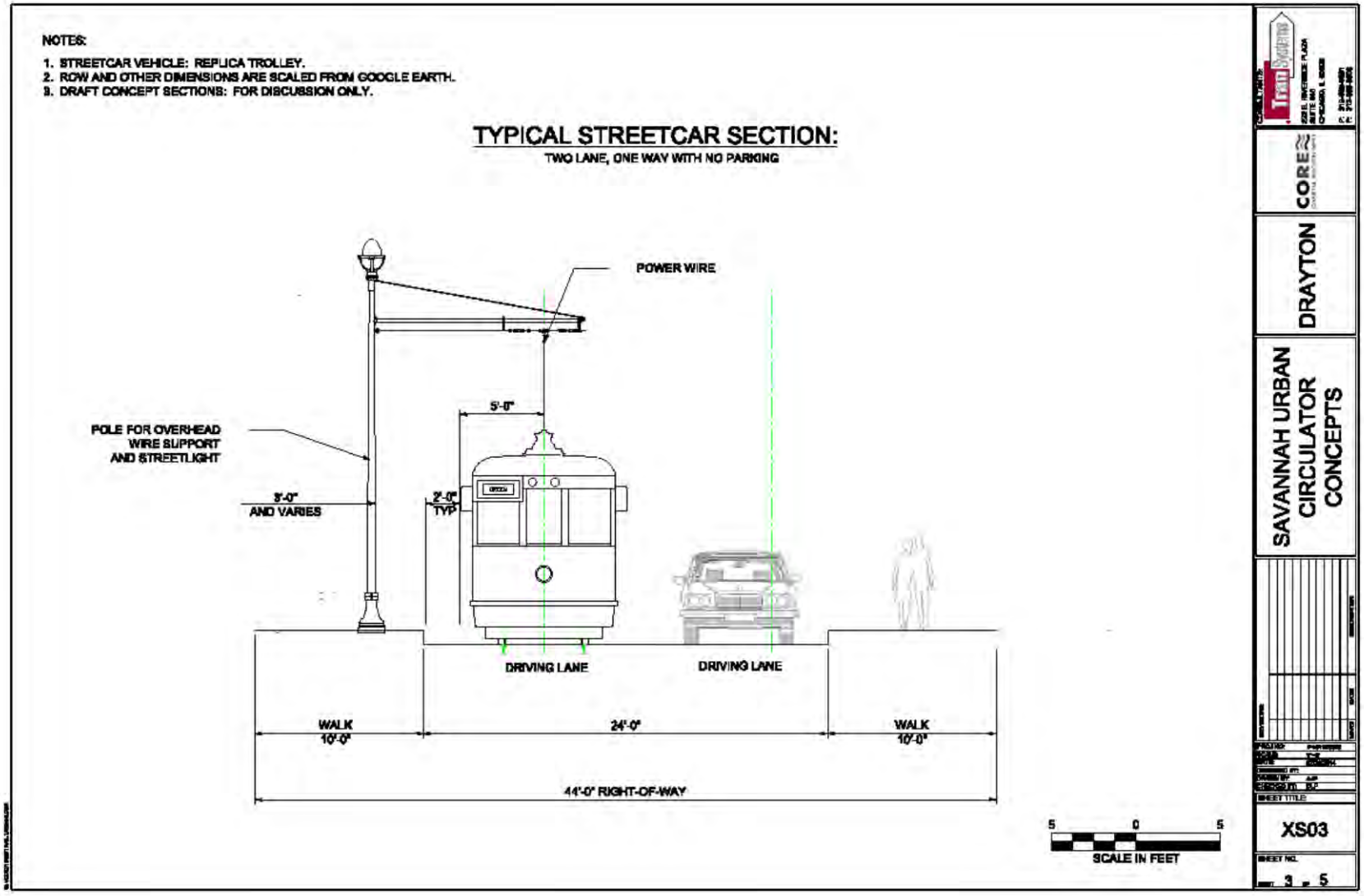
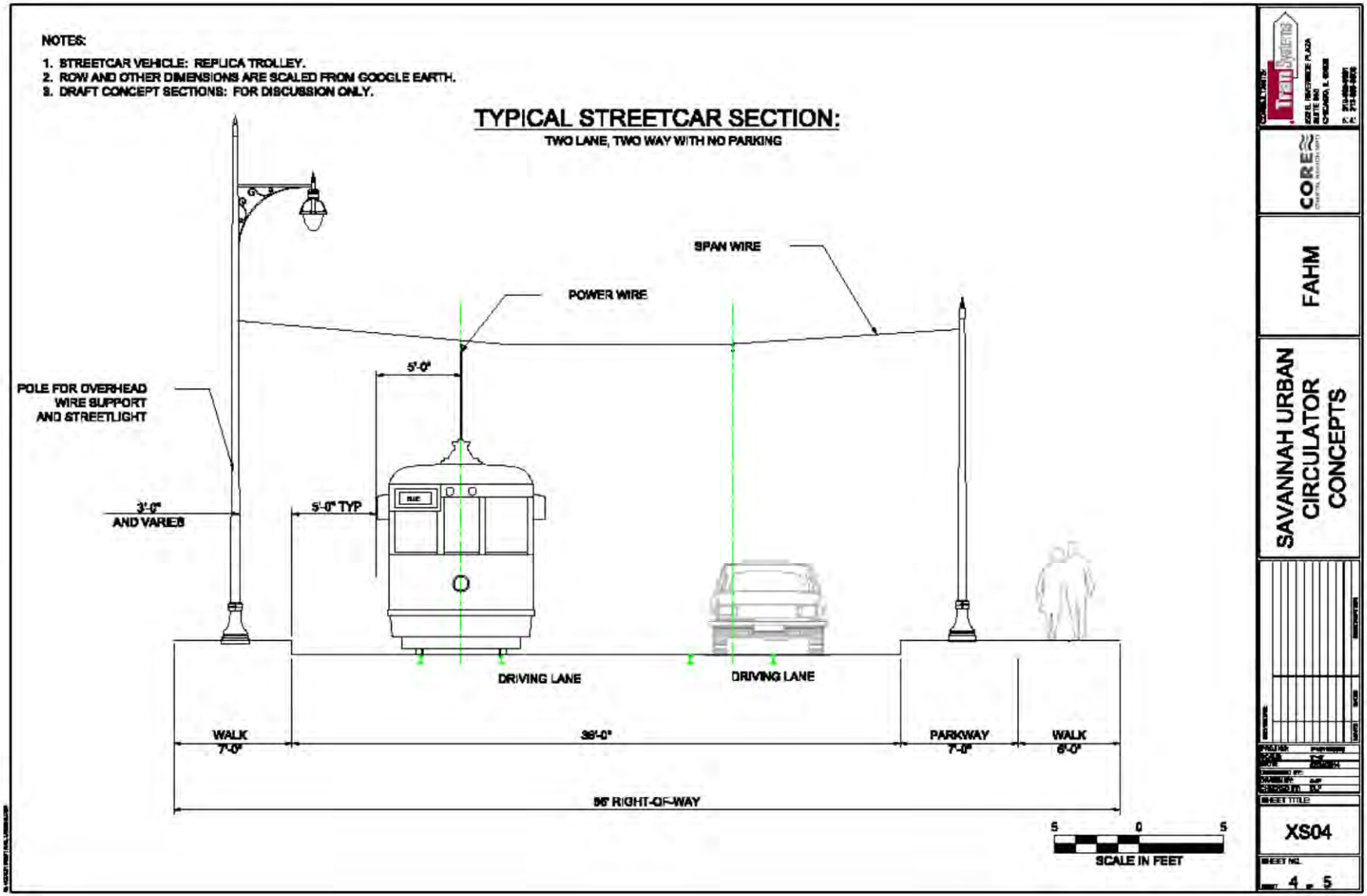


Figure 30. Typical Section – Fahm Street



4.6 Operating Characteristics

Recommended operating characteristics were developed for the urban circulator system based on a variety of factors. Operating characteristics of other modes in Savannah, as well as the systems identified in the case studies, were reviewed in order to set service hours and frequencies. It is important that a transit system provide enough frequency and have appropriate service hours to attract riders yet be viable in terms of operating costs. A new urban circulator would only attract riders if wait time, including walking to destinations, was reasonable and shorter than competitive modes. Hours of operation is also important to allow a passenger to get both to and from their destination and allow for flexibility in any given travel day.

Based on best practices and knowledge of bus and rail system operations in other urban downtowns, it is recommended that a policy of operating every 9-10 minutes during the "busy times" and no less than every 20 minutes during periods of the day when it was less busy or the "quiet times" should be established for this system. In addition to the recommended frequency, the following hours of service are proposed:

- **Monday-Thursday:** 6:00 a.m. to 9:00 p.m. (Service would start early to serve workers and run as late as the present dot and Liberty shuttles.)
- **Fridays**: from 6:00 a.m. to midnight (Hours would be extended to serve bar-goers, as provided for by SCAD buses.)
- **Saturday:** from 7:00 a.m. to midnight (Service would start later recognizing that employment starts a little later on Saturdays.)
- **Sundays and holidays:** 8:00 a.m. to 9:00 p.m. (service would start later recognizing that employment starts later on Sundays and not operate as late in the evening due to the fact that businesses are closed.)

4.7 Future System Expansion

Once the routing alternatives were developed for the initial buildout, opportunities were identified for expansion of the system to serve the remainder of the study area. Proposed routes were developed based on a variety of factors that included connectivity with major attractions and generators and the integration with existing services. The specific factors included:

- Good connection to the initial buildout of the system (i.e. Phase 1)
- Location of major retail centers and other concentrations of employment
- Creation of an "hierarchy of routes" with a few long haul mainline enhanced bus routes providing frequent service connecting the newer part of the City at the south end of the city with the historic area; these routes have the strong existing CAT routes at their heart (as proposed by CAT in their recent TIGER grant application for upgrade of the Abercorn route)
- Existence of a major transit center allowing convenient transfer between routes at Oglethorpe Mall
- Integration of most route segments served by existing CAT routes
- Location of SCAD facilities
- Location of two major medical facilities, Memorial Hospital and Candler Hospital
- Integration of elements of the BRT concept on Truman Parkway developed by SCAD students

The proposed routes, shown in Figure 31, were developed to meet the above criteria, as well as to provide a strong interface with the existing CAT system at "super stops". Super stops are proposed transfer centers with amenities such as weather protection, lighting, and real-time passenger information. The super stops would allow for convenient and comfortable transfers between the urban circulator route, the local feeder bus network and the existing Abercorn express route. The existing routes are shown with a solid black line in Figure 31, along with the proposed circulator routes.

Figures 31 through 34 show the proposed routes for Phase 2 overlaid with critical market data, i.e. households, employment, and SCAD facilities and the connections to the proposed routes for Phase 1. As indicated, the proposed routes would serve areas of relatively dense households located between the historic district and DeRenne Avenue at which point the residential density tapers off. Employment density however dramatically increases south of DeRenne Avenue, as there are many employment opportunities near the retail centers and medical centers located in the southern portion of the study area. Although, as can be seen in Figure 34, there are fewer SCAD facilities in the south part of the study area, it is important to identify and serve those facilities that do exist.

Operating characteristics in terms of hours of operation of the urban circulator routes are proposed to be similar to those now operated by CAT (which are fairly generous in comparison with most systems in similar-sized cities). Twenty minutes headways are proposed during "busy times". Due to the presence of the retail centers, busy times are from early morning until about 6 p.m., as proposed in the CAT Abercorn Enhanced Bus TIGER Application.

Figure 31. Proposed Routes

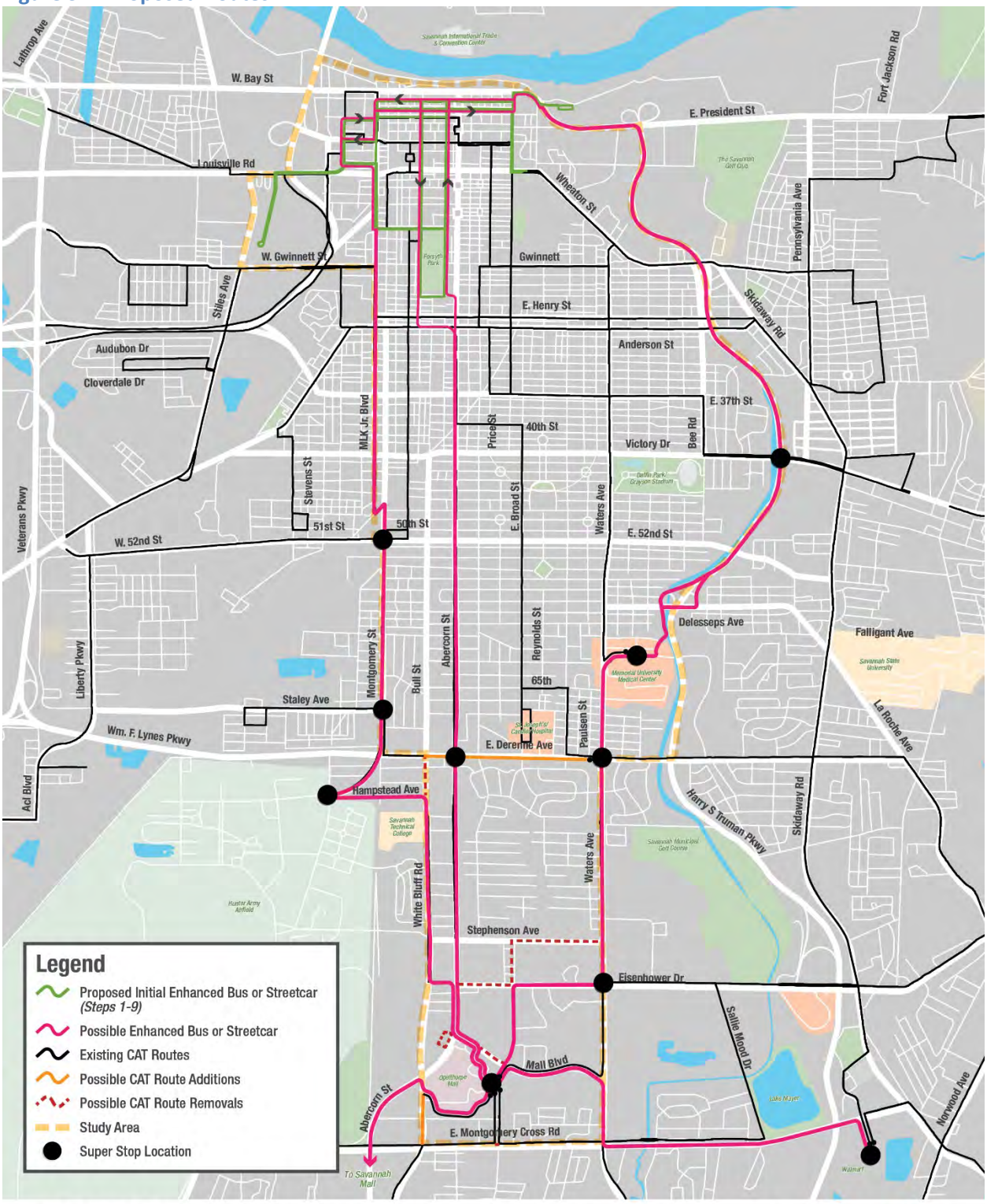


Figure 32. Proposed Routes with Population

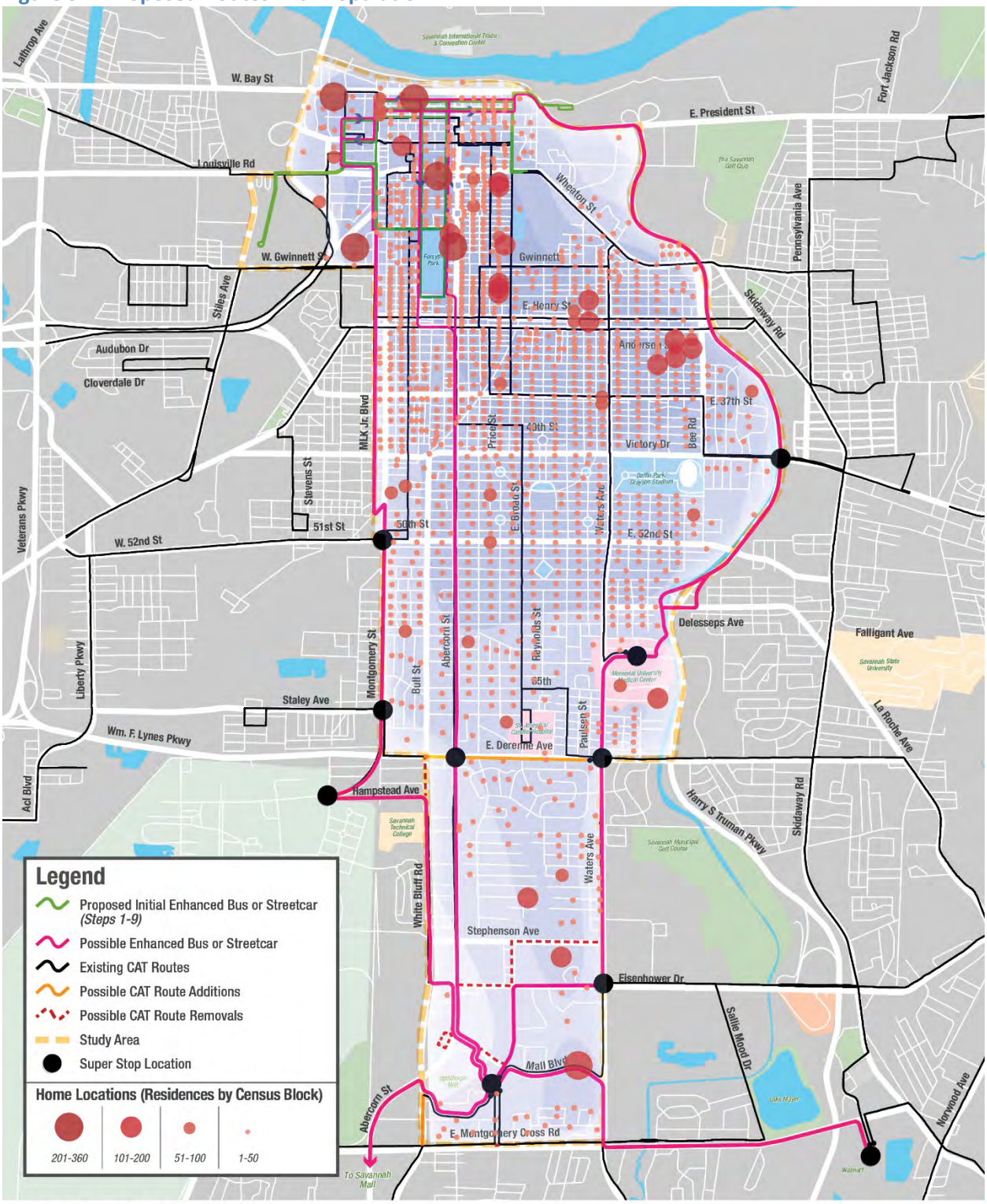


Figure 33. Proposed Routes with Employment

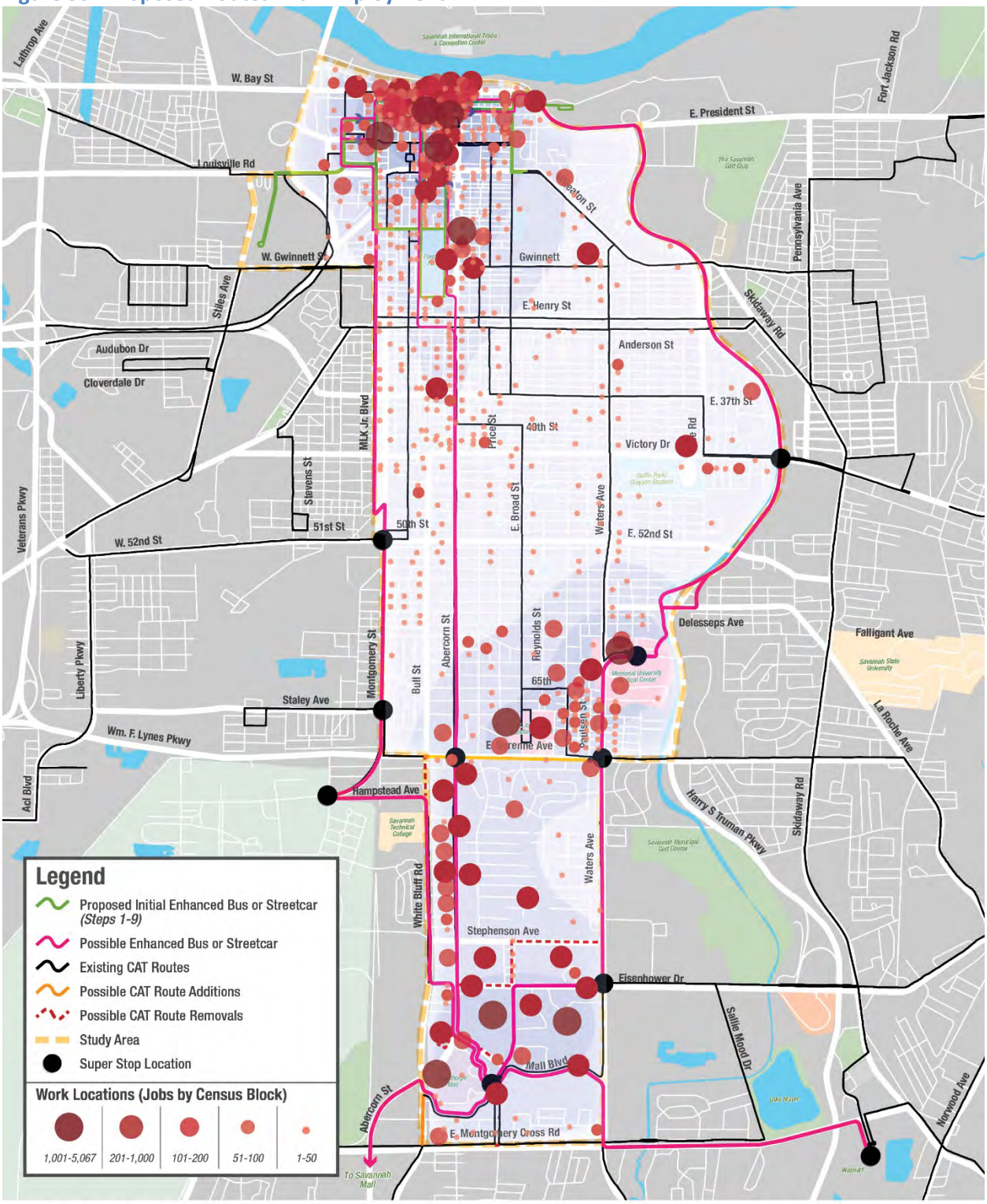
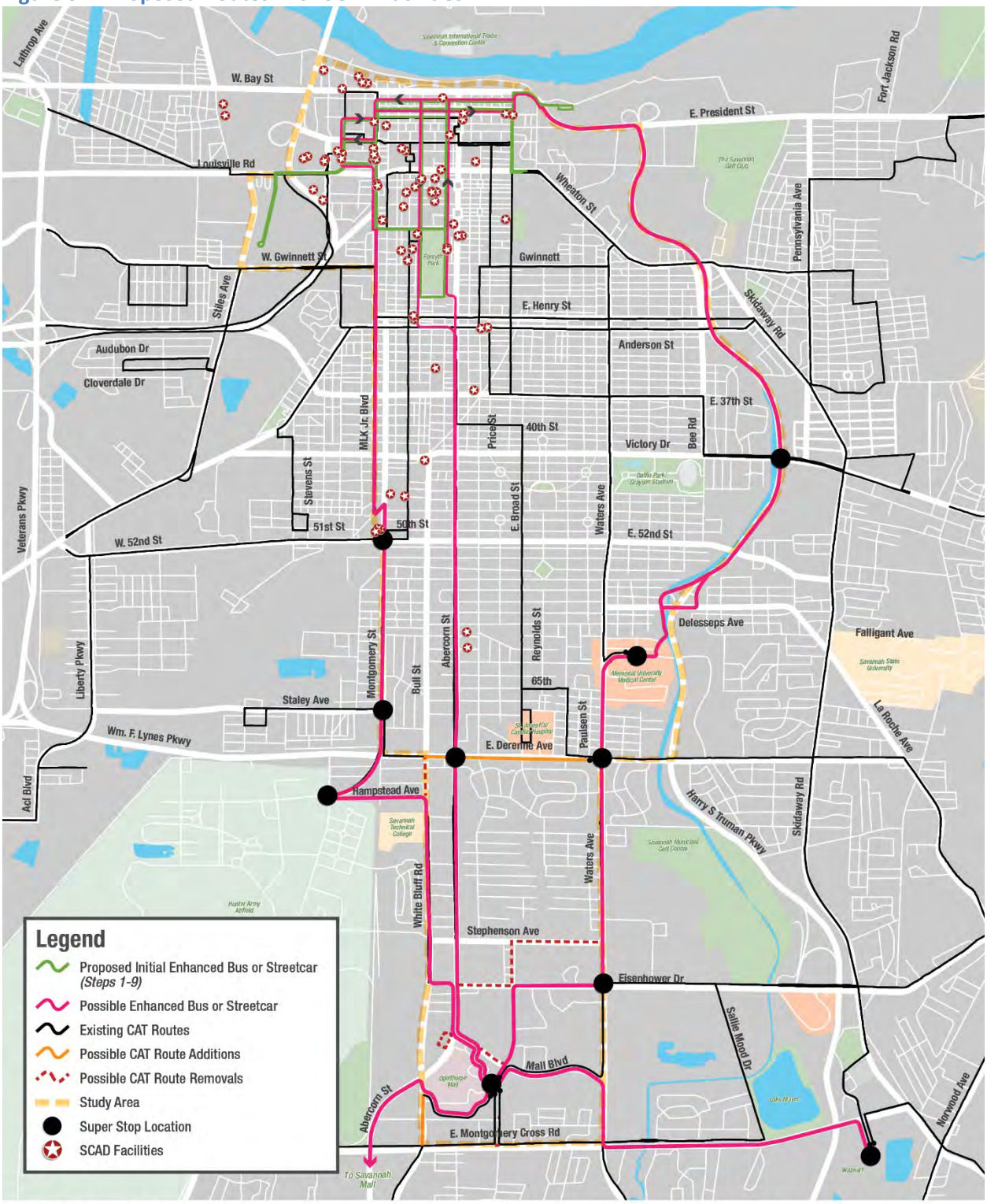


Figure 34. Proposed Routes with SCAD Facilities



5 Costs, Ridership and Revenues

Understanding the full costs of an urban circulator system is the most important element of determining the financial feasibility of an urban circulator system. The analysis for these costs must incorporate both the required capital outlay, as well as the ongoing operational expenses in order to develop the comprehensive assessment of the required resources for implementation. Capital and operating costs were developed for both the streetcar mode and enhanced bus mode. The information on the costs and the methodology for developing those costs is described below.

5.1 Capital Cost Estimate – Streetcar

To generate capital cost estimates for a streetcar system, nine streetcar projects that are either currently under construction or completed within the last year were researched to identify capital cost data. This research, which focused on the real costs of the most current projects, provided the best information in generating a realistic cost estimate for the urban circulator. The streetcar systems that were identified are located in the following cities:

- Atlanta, GA
- Dallas, TX (Oak Cliff)
- Charlotte, NC
- Cincinnati, OH
- Kansas City, MO
- New Orleans, LA
- Seattle, WA (both South Lake Union and First Hill)
- Tucson, AZ

Cost information for each of these systems varied in detail and included different elements; the cost information was analyzed and an estimated "average" high level cost estimate for construction of $3,700 per track foot (2013) was developed. This average per track foot cost includes transit stop amenities, including passenger shelters, benches, real time information and a ticket machine. The cost estimate also includes utility relocation. The cost of one maintenance and storage facility for the entire system is also contained in the costs estimate, although no specific location for such a facility has been identified.

With regard to vehicle costs, all of the systems reviewed in the case studies utilize "modern" cars, with the exception of New Orleans which uses replica cars from its existing fleet for its newest route, Loyola Avenue. A typical 2013 cost for a modern car is $4,200,000 per car. Given the focus on the historic district, it is considered likely that the preference for a system in Savannah would be the use replica cars rather than the modern cars. Most recent systems using replica cars have purchased replicas of the relatively popular "Birney" car, originally built in the 1920s. Gomaco Trolley Company has supplied a total of 18 of these to Tampa, Florida, Little Rock, Arkansas, Charlotte, North Carolina and Memphis, Tennessee. All are equipped with air conditioning and wheelchair lifts. Gomaco provided a budgetary estimate of $1,300,000 per car, with the cars configured to have the ability to operate for some distance without wires and on battery power. This feature is particularly important when operating in Savannah with the numerous instances of a low hanging tree canopy. This vehicle cost is used in the capital cost estimate. These costs are in present day dollars and are not inflated for year of expenditure.

5.2 Capital Cost Estimate – Enhanced Bus

The development of capital cost estimates for an enhanced bus mode utilize the same methodology as that for streetcars. Research of recent design projects for enhanced bus systems included systems in in Chicago, Illinois (i.e. the Jeffrey Jump) and in Montgomery County, Maryland. Capital costs for enhanced bus include lane striping in locations where dedicated bus lanes are proposed in the conceptual routing layout, transit signal priority installation in the locations where traffic signals are present, and transit stop amenities. Transit stop amenities include lighted shelters, trash cans, benches, informational kiosks and "next bus" technology. Vehicle costs are based on information from the Federal Transit Administration[7] Inflated to year 2014. Capital costs for enhanced bus are displayed in Table 3.

Table 3: Enhanced Bus Capital Cost Estimate

Capital Cost Component	Unit Cost
Lane Striping	$300,000/per mile
Transit Signal Priority Installation	$25,000/per signal
Transit Stop Amenities	$96,000/per stop
Enhanced Bus Vehicle	$450,000/per vehicle

5.3 Operating Cost Estimate – Streetcar and Enhanced Bus

Estimated operating costs were calculated for each route in each stage of system development. For purposes of this study, the same operating cost was applicable to both a streetcar mode and an enhanced bus mode. This application is based on the assumption that both modes would have the same type of operation in terms of service hours, number of vehicles, labor, and maintenance.

A straightforward estimation approach was used by calculating hours of service and running time and then applying an average hourly rate used by the Chatham Area Transit (CAT). First, the length of each route was calculated. Second, the hours of service were calculated; service is proposed to start at 6 a.m. on weekdays, 7 a.m. on Saturdays, and 8 a.m. on Sundays and end at 9 p.m., extended until midnight on Fridays and Saturdays. These service hours are displayed in Table 4.

Table 4. Service Hours

Hours of Service		Hours/Day		
		"Busy Times"	"Quiet Times"	Total
Monday-Thursday	6 a.m.-9 p.m.	11	4	15
Friday	6 a.m.-12 a.m.	15	3	18
Saturday	7 a.m.-12 a.m.	13	4	17
Sunday	8 a.m.-9 p.m.	9	4	13

In the next step, average speed was estimated for defined "busy times and "quiet times", including an allowance for schedule recovery time. Quiet times are assumed to apply to 3-4 hours per day. This information allowed round trip running time to be calculated. Frequencies of 10 minutes, or better, were assumed for busy times and wider intervals of 20 minutes were assumed during quiet times.

[7] 2006 Update, *Vehicle Catalog: A Compendium of Vehicles and Powertrain Systems for Bus Rapid Transit Service,* United States Department of Transportation, Federal Transit Administration, pp. 1-34

Operating cost per vehicle of CAT's rate of $68.83/hour (2012, per National Transit Database) was used and this assumption was applied to both the streetcar mode as well as the enhanced bus mode.

5.4 Projected Ridership Assumptions – Streetcar

From our market analysis, it was determined that a streetcar system has the potential to serve multiple distinct markets, but would need to compete for ridership with the services currently operating and serving those markets. Therefore, the general approach utilized to estimate ridership for a streetcar system identified the current ridership for the existing transportation systems serving the key markets in the historic district and then, for each stage, estimated the following components:

- The portion of the existing ridership in each key market that would use a streetcar system
- The potential for ridership to likely increase or decrease because of differences in fares or service frequency from the current transportation systems
- The potential for ridership to increase because of the well-demonstrated, industry-wide preference of transit riders for streetcar systems over bus systems, and
- The potential for ridership to increase because of urban redevelopment resulting from the investment in an urban streetcar system.

The principal markets identified for service by a streetcar system include:

- Tourists, including both single day trips and multiple day trips
- SCAD students, staff and faculty
- Local workers, currently walking to work or using CAT for part or all of their trip
- Induced demand from new development

All of these markets are currently served by several transportation services that are described in Chapter 3. These include:

- Savannah's fare free downtown transportation system
- SCAD transit system
- CAT
- Tourist trolley operators

5.4.1 Key Assumptions

Overlapping CAT services: CAT provides somewhat overlapping services in the historic district with multiple routes. When assessing ridership, it was important to compare the existing CAT bus services with the proposed urban circulator routes identified for this study, which are color coded as Blue, Green, Purple and Red. CAT routes 4, 11, 14, 17, and 25 serve some of the same areas as the proposed Blue and Green routes on their way south from the CAT Transit Center. Routes 10, 27, 28, and 31 cross downtown on Oglethorpe, intersecting the proposed Blue, Green and Purple routes. Route 29 serves the proposed new Arena site. CAT routes generally operate on a 30 minute or hourly headway which provides good service throughout the region, but is not frequent enough to induce spontaneous trips downtown. CAT regular service is $1.50 for one trip or $3.00 for a one-day pass, while their downtown shuttle services are fare free.

Fares: It was assumed that fares would be similar to those of CAT regular service, i.e. $1.50 per ride. The assumption was also made that agreements would be negotiated to provide for:

- Free transfers between the streetcar and CAT bus service (with revenue sharing between the streetcar and CAT),
- Free travel for SCAD students, faculty and staff (with SCAD reducing its Bee Line and contributing to the cost of the streetcar), and
- Free travel for individuals parking in the Liberty Street Garage

Tourists: The assumption was made that because of the tour narration, tourists would still desire to ride the existing tourist trolleys on their first visit to Savannah. It was also assumed that tourists would generally prefer to use a cheaper, but still tourist-friendly, mode for additional days of travel around Savannah or on subsequent visits, provided that mode served their needs. Accordingly, it was estimated that a maximum 75% of current tourist trolley trips would switch to using the new streetcar system. This switch would occur at Stage 3 of the proposed circulator system (refer to Chapter 3), when the streetcar routing covers most of the hotels and tourist sites. Furthermore, it was estimated that tourist ridership would increase by 10% due to the lower fare on the new streetcar system and there would be additional new ridership after Stage 3 as the streetcar expands its coverage of downtown.

dot Express Shuttle and Liberty Street Garage Shuttle: It is assumed that half of the ridership of these services would switch to the streetcar at Stage 5 of the proposed circulator system, when there is reasonable service to the area of the Liberty Street Garage, and that these services would be eliminated (and the balance of their ridership switch to the streetcar) at Stage 7 of the proposed circulator system.

Induced ridership: Three categories of induced ridership were assumed. First, streetcars are considered more enjoyable to the rider than buses; some cities have seen streetcar ridership double that of buses, even when operated with the same frequency and fares. This ridership results from riders taking short trips with distances that they would otherwise walk. Tourist ridership and transfers from CAT have been increased by 50%, as these groups seem the most likely to be affected in this way. Second, rail transit, such as streetcars, has been shown to encourage redevelopment and more dense development. CAT, *dot* Express Shuttle, and Liberty Street Garage Shuttle ridership have been increased by 50% to reflect this additional development. Thirdly, the Stage 6 and Stage 9 extensions of the proposed circulator system are into areas where there is no significant existing development. It has been assumed that when these are developed, they will generate the same level of non-tourist and non-SCAD ridership per route mile as the streetcar had before these extensions.

5.4.2 Projected Ridership Assumptions - Enhanced Bus

Enhanced bus ridership was estimated by considering the similarities and differences between it and the streetcar system. Enhanced bus was considered to be significantly less attractive to tourists than a streetcar system, and attract only half of the ridership of the existing tourist system as the streetcar system. It has been assumed that the enhanced bus system will attract the same number of current SCAD, CAT, and *dot* riders as does the streetcar system. However, induced ridership from the enhanced bus system is assumed at one-third that of the streetcar, as it will both create less ridership from individuals currently downtown and have a significantly smaller positive impact on development. These assumptions are made based on the professional judgment and knowledge of the transit industry by the study team and with input and concurrence from the Technical Working Group. Costs and ridership for the streetcar system are shown in Figures 35 through 43. Figure 44 displays the route information and Figure 45 provides the detailed cost information for enhanced bus in Phase 2.

Figure 35. Streetcar Costs and Ridership Estimates: Stage 1

STAGE 1: Red Route
Initial Operating Segment

New Construction:	
Fahm Avenue	through edge of Visitor Center parking lot
Fahm Street	right lane
Zubley Street	right lane
Martin Luther King Jr. Boulevard*	center possibly on grass median includes double -track segment
Congress Street*	travel lane
Broughton Street *(alternative to Congress)*	convert street to one-way right lane
Drayton Street	right lane, with transition to left lane
Bryan Street	travel lane

** cross section(s) provided, as indicated on map detail*

Route Length:	1.9 mile		
Vehicles Required:	4	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$63M	$3.4M

Frequency (in min):	Red			
Busy Times				
Quiet Times				

Estimated Additional Annual System Operating Cost:	$1M
Estimated Annual System Operating Cost:	$1M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	187,000	136,000
Estimated System Annual Ridership:	187,000	136,000

Figure 36: Streetcar Costs and Ridership Estimates: Stage 2

STAGE 2: Red Route

(to be operated as part of Red Route during this stage)

Add Service to Forsyth Park

New Construction:	
Whitaker Street	right lane
Gaston Street	right lane
Drayton Street*	right lane

* *cross section(s) provided, as indicated on map detail*

Additional Route Length:	1.5 mile		
Additional Vehicles Required:	0	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$44M	$1.5M

Frequency (in min):	Red
Busy Times	10 min.
Quiet Times	11min.

Estimated Additional Annual System Operating Cost:	$0.1M
Estimated Annual System Operating Cost:	$1.1M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	394,000	234,000
Estimated System Annual Ridership:	581,000	370,000

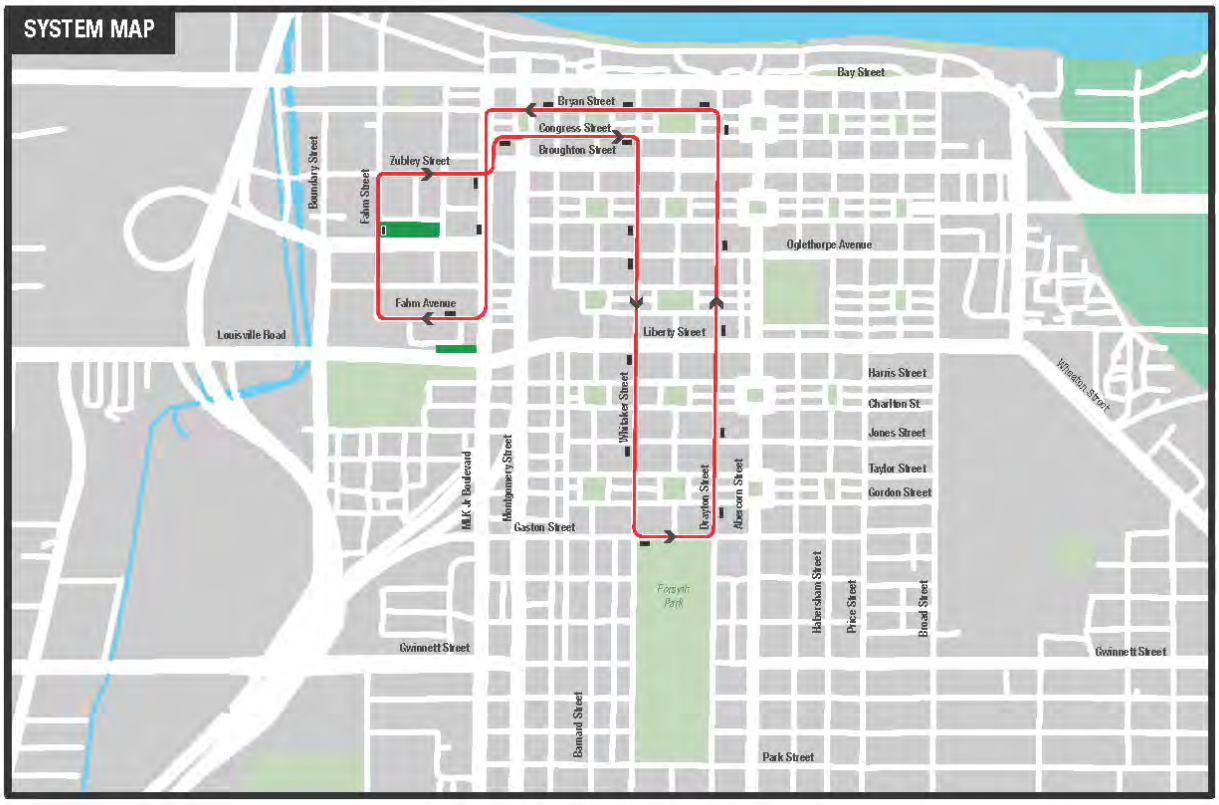


Figure 37: Streetcar Costs and Ridership Estimates: Stage 3

STAGE 3: Red/Green Route

(operate Green Route independently)

Add Service to East Side of Historic District

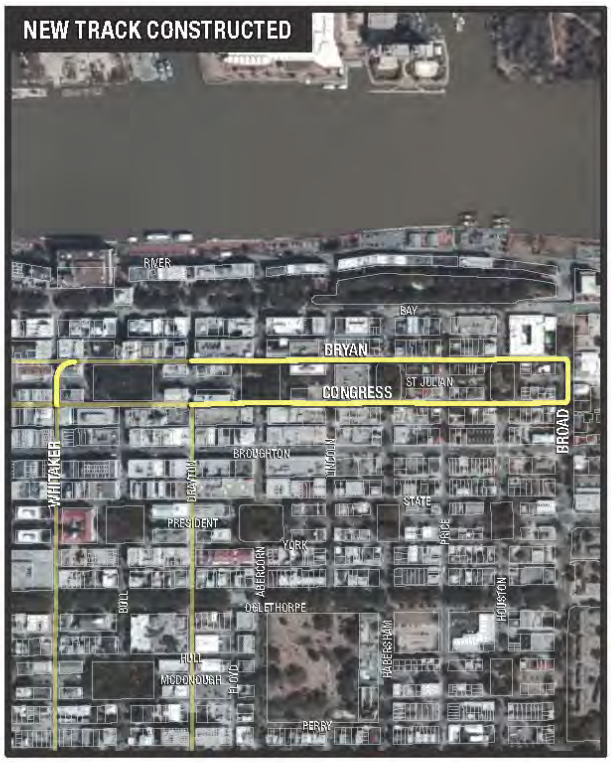
New Construction:	
Congress Street	right lane
E. Broad Street	right lane
Bryan Street	right lane
Whitaker Street	right lane

Additional Route Length:	0.9 mile		
Additional Vehicles Required:	1	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$27M	$1.6M

Frequency (in min):	Red	Green		
Busy Times	9 min.	12 min.		
Quiet Times	10 min.	10 min.		

Estimated Additional Annual System Operating Cost:	$0.4M
Estimated Annual System Operating Cost:	$1.5M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	442,000	233,000
Estimated System Annual Ridership:	1,023,000	603,000



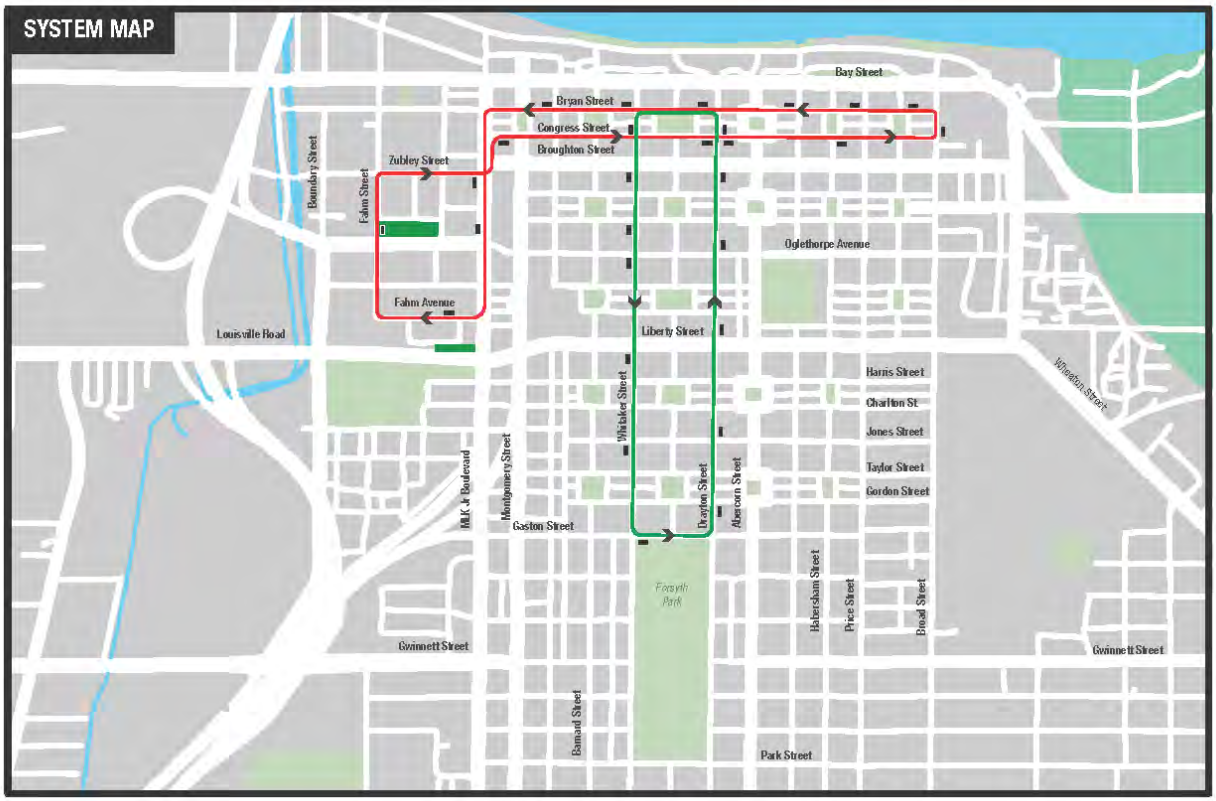


Figure 38: Streetcar Costs and Ridership Estimates: Stage 4

STAGE 4: Purple Route
Extend South on E. Broad Street - Double Track

New Construction:	
Broad Street	right lanes
Broad Street Alternative	in grass median

Additional Route Length:	2.0 mile		
Additional Vehicles Required:	1	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$28M	$1.7M

Frequency (in min):	Red	Green	Purple	
Busy Times	9 min.	12 min.	20 min.	
Quiet Times	10 min.	10 min.	15 min.	

Estimated Additional Annual System Operating Cost:	$0.4M
Estimated Annual System Operating Cost:	$1.8M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	250,000	118,000
Estimated System Annual Ridership:	1,273,000	721,000

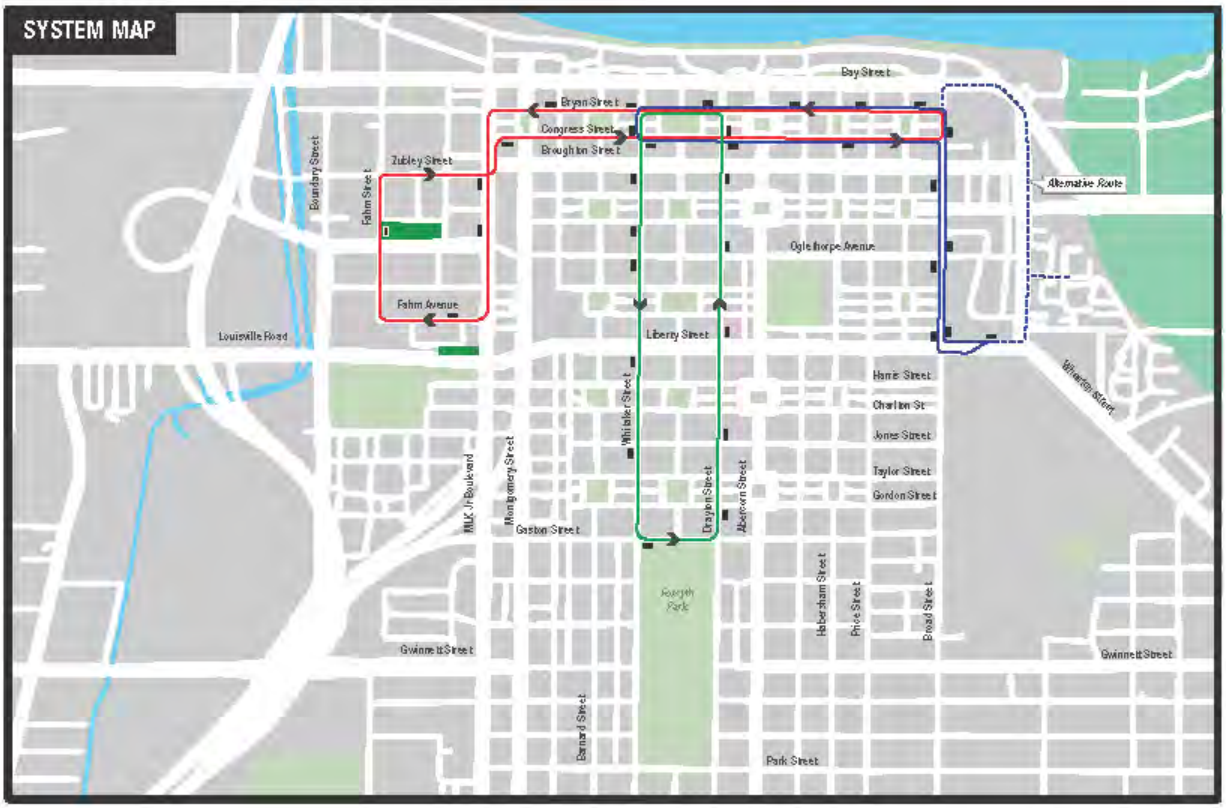


Figure 39: Streetcar Costs and Ridership Estimates: Stage 5

STAGE 5: Blue Route
Create Loop Circulating Through Historic District

New Construction:	
Fahm Street	right lane
Fahm Avenue	through edge of Visitor Center parking lot
Martin Luther King Jr.	center (in grass median)
Gaston Street	travel lane

Additional Route Length:	1.1 mile		
Additional Vehicles Required:	4	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$41M	$2.7M

Frequency (in min):	Red	Green	Blue	Purple
Busy Times	9 min.	12 min.	8 min.	20 min.
Quiet Times	10 min.	10 min.	18 min.	15 min.

Estimated Additional Annual System Operating Cost:	$1.0M
Estimated Annual System Operating Cost:	$2.8M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	268,000	211,000
Estimated System Annual Ridership:	1,541,000	932,000

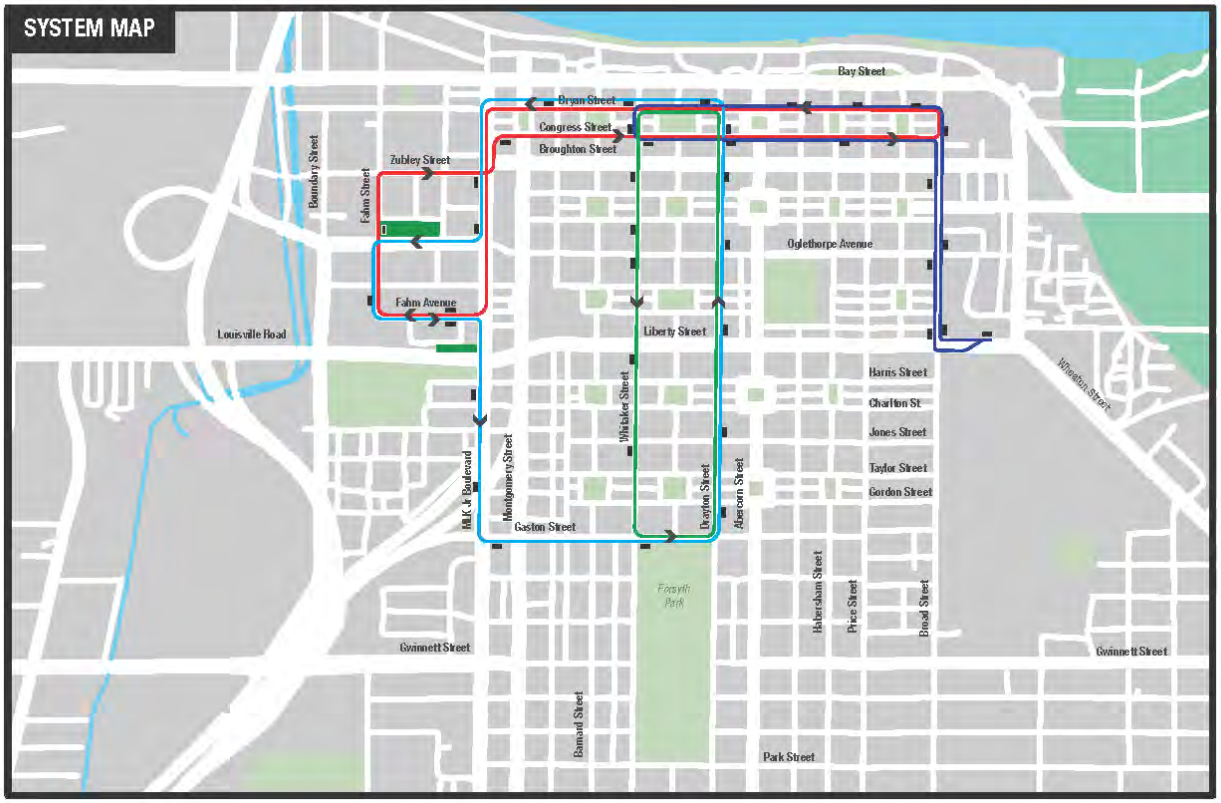


Figure 40: Streetcar Costs and Ridership Estimates: Stage 6

STAGE 6: Red Route
Extend to Proposed Arena Through Visitor Center Lot and Over Viaduct

New Construction:
On Fahm Street, add second track*
On existing railroad right of way, across bridge and under US 17 on railroad-style track
Cross Louisville Road at grade with lights and gates
Near towpath on railroad-style track (or Louisville Road and Stiles Avenue to be reconstructed)
Arena Terminal to be integrated into facility design

** cross section(s) provided, as indicated on map detail*

		Streetcar	*Enhanced Bus*
Additional Route Length:	1.8 mile		
Additional Vehicles Required:	1		
Approximate Cost:		$20M	$1.8M

Frequency (in min):	Red	Green	Blue	Purple
Busy Times	8 min.	12 min.	8 min.	20 min.
Quiet Times	12 min.	10 min.	18 min.	15 min.

Estimated Additional Annual System Operating Cost:	$0.3M
Estimated Annual System Operating Cost:	$3.1M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	145,000	130,000
Estimated System Annual Ridership:	1,686,000	1,062,000

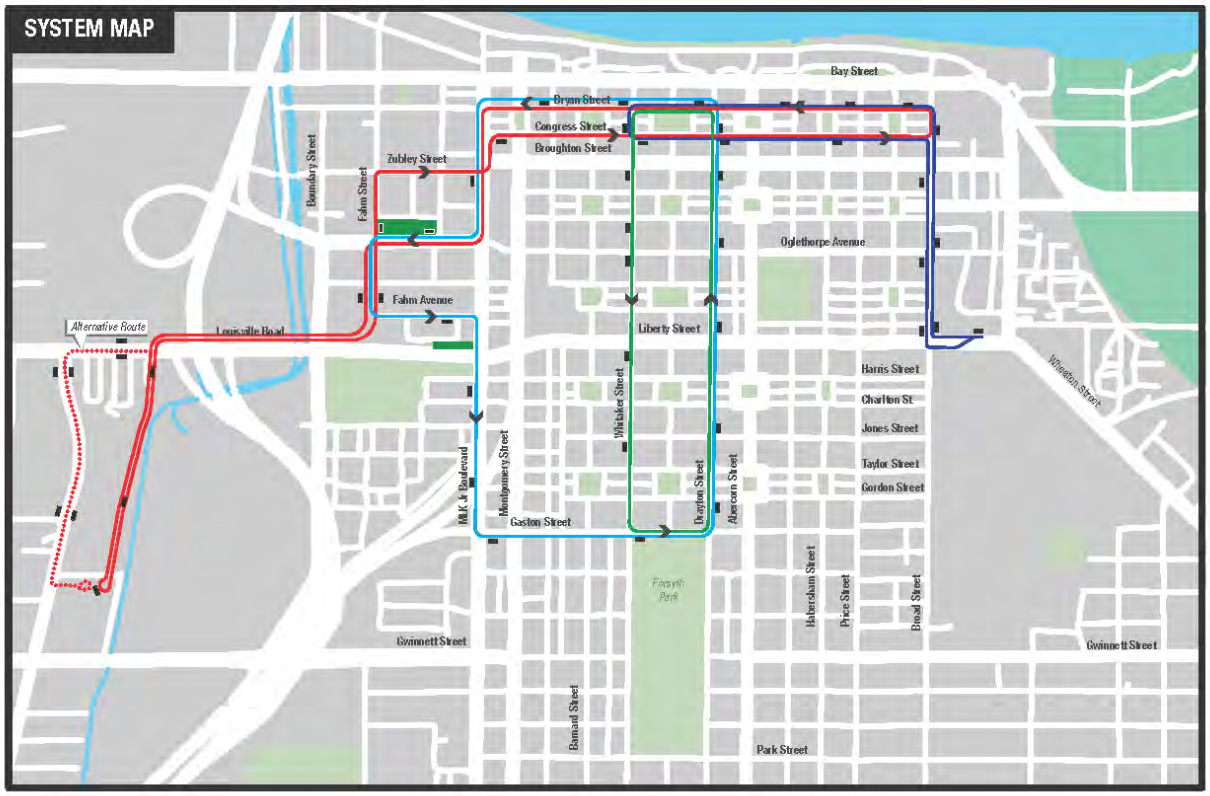


Figure 41: Streetcar Costs and Ridership Estimates: Stage 7

STAGE 7: Green Route
Create Bi-Directional Loop Circulating Through Historic District - All Double Track

New Construction:	
Fahm Street	right lane
Fahm Avenue	through edge of visitor center parking lot
Martin Luther King Jr.	center (in grass median)
Gaston Street*	in travel lane

** cross section(s) provided, as indicated on map detail*

Additional Route Length:	0.6 mile		
Additional Vehicles Required:	1	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$20.5M	$1.1M

Frequency (in min):	Red	Green	Blue	Purple
Busy Times	8 min.	10 min.	8 min.	20 min.
Quiet Times	12 min.	15 min.	18 min.	15 min.

Estimated Additional Annual System Operating Cost:	$0.3M
Estimated Annual System Operating Cost:	$3.5M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	116,000	73,000
Estimated System Annual Ridership:	1,802,000	1,135,000

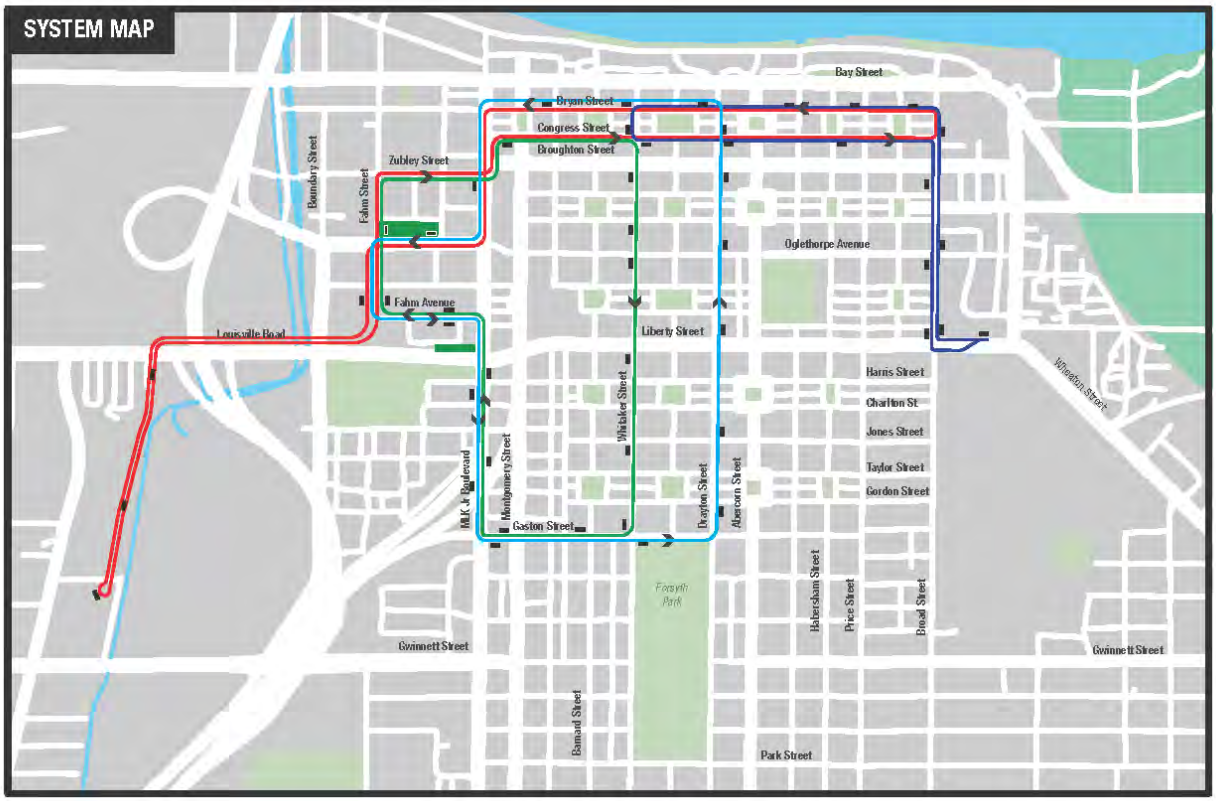


Figure 42: Streetcar Costs and Ridership Estimates: Stage 8

STAGE 8: Green Route
Extend to South End of Forsyth Park

New Construction:	
Whitaker Street	right lane
Park	right lane
Drayton	right lane

Additional Route Length:	0.6 mile		
Additional Vehicles Required:	1	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$32.6M	$2.4M

Frequency (in min):	Red	Green	Blue	Purple
Busy Times	8 min.	9 min.	10/8 min.	20 min.
Quiet Times	12 min.	15 min.	15/18 min.	15 min.

Estimated Additional Annual System Operating Cost:	$0.7M
Estimated Annual System Operating Cost:	$4.2M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	116,000	90,000
Estimated System Annual Ridership:	1,918,000	1,225,000

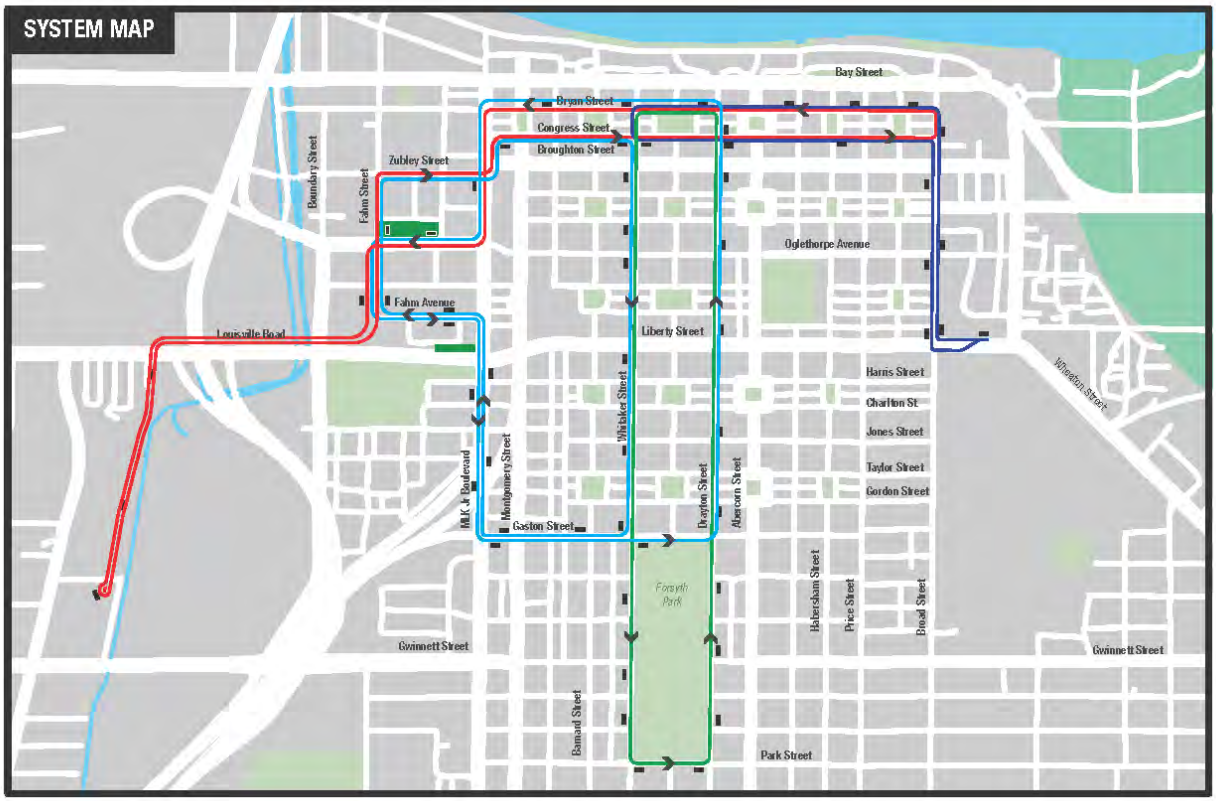


Figure 43: Streetcar Costs and Ridership Estimates: Stage 9

STAGE 9: Red Route
Extend to River Landing Site

New Construction:	
Whitaker Street	right lane
Park	right lane
Drayton	right lane

Additional Route Length:	0.6 mile		
Additional Vehicles Required:	1	*Streetcar*	*Enhanced Bus*
Approximate Cost:		$17.7M	$0.8M

Frequency (in min):	Red	Green	Blue	Purple
Busy Times	9 min.	9 min.	10/8 min.	20 min.
Quiet Times	12 min.	15 min.	15/18 min.	15 min.

Estimated Additional Annual System Operating Cost:	$0.4M
Estimated Annual System Operating Cost:	$4.6M

	Streetcar	*Enhanced Bus*
Estimated Additional System Annual Ridership:	48,000	44,000
Estimated System Annual Ridership:	1,966,000	1,269,000

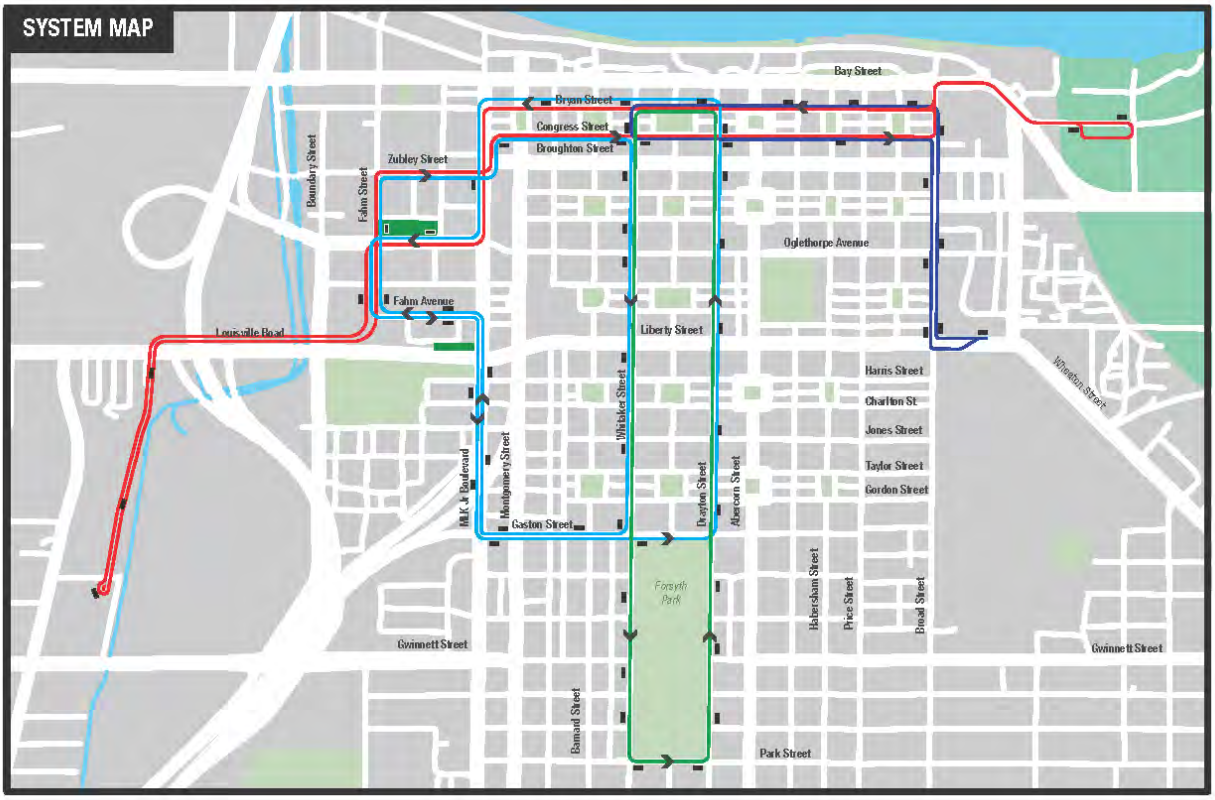
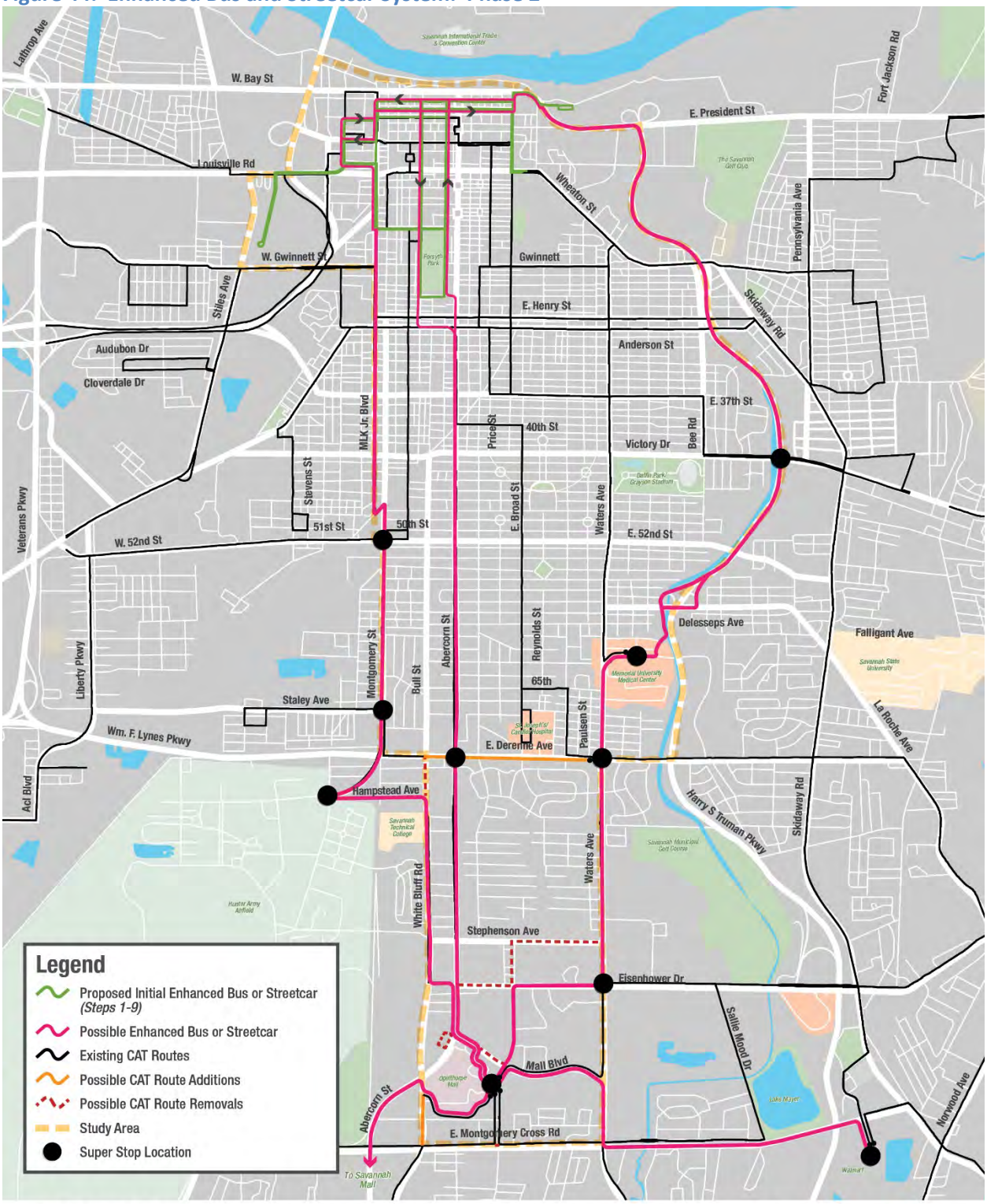


Figure 44: Enhanced Bus and Streetcar System: Phase 2



SAVANNAH URBAN CIRCULATOR STUDY /// OVERALL STUDY AREA CONCEPTS

Proposed Initial and Possible Enhanced Bus or Streetcar Routes with Modified CAT Routes

09.22.14

Figure 45: Cost Comparison for South Extension of Enhanced Bus and Streetcar by Route

MLK	STREETCAR	ENHANCED BUS
Route Length	11.4 Miles	Same
Vehicles Required	4	Same
Approximate Capital Cost	$338 M	$6.1 M
Approximate Annual Operating Cost	$795,800	Same
TRUMAN PARKWAY	**STREETCAR**	**ENHANCED BUS**
Route Length	N/A	15.6 Miles
Vehicles Required	N/A	3
Approximate Capital Cost	N/A	$7 M
Approximate Annual Operating Cost	N/A	$1.1M
ABERCORN	**STREETCAR**	**ENHANCED BUS**
Route Length	9.2 Miles	Same
Vehicles Required	3	Same
Approximate Capital Cost	$272 M	$4.7 M
Approximate Annual Operating Cost	$371,900	Same

5.5 Revenue Estimates

It is assumed that the fare for the streetcar system and the enhanced bus system would be the same, i.e. $1.50 per ride. Fares would be reduced for seniors, persons with disabilities and students; typically one half the regular fare. It is also anticipated that there would be agreements with certain facilities (e.g. schools, hotels, etc.) to allow their students/guests to ride for free under a blanket contract agreement with CAT.

Annual revenue estimates were generated by multiplying the project ridership estimates per mode by an "average fare" that recognizes discounts, transfers, and monthly fares. An estimate of $1.00 per rider was used to calculate the revenue estimates. The revenue estimates based on ridership of each mode, for each stage of the urban circulator system are found in Table 5.

Table 5: Estimated System Revenue by Route Stage and Mode

Route Stage	Streetcar Mode Annual Ridership	Enhanced Bus Mode Annual Ridership	Streetcar Mode Estimated Annual Revenue	Enhanced Bus Mode Estimated Annual Revenue	Streetcar Mode Estimated Annual Operating Cost	Enhanced Bus Mode Estimated Annual Operating Cost	Net Streetcar Operating Cost Offset by Revenue	Net Enhanced Bus Operating Cost Offset by Revenue
1	187,000	136,000	$ 187,000	$ 136,000	$ 1,000,000	$ 1,000,000	$ 813,000	$ 864,000
2	394,000	234,000	$ 394,000	$ 234,000	$ 100,000	$ 100,000	$ (294,000)	$ (134,000)
3	442,000	233,000	$ 442,000	$ 233,000	$ 400,000	$ 400,000	$ (42,000)	$ 167,000
4	250,000	118,000	$ 250,000	$ 118,000	$ 400,000	$ 400,000	$ 150,000	$ 282,000
5	268,000	211,000	$ 268,000	$ 211,000	$ 1,000,000	$ 1,000,000	$ 732,000	$ 789,000
6	145,000	130,000	$ 145,000	$ 130,000	$ 300,000	$ 300,000	$ 155,000	$ 170,000
7	116,000	73,000	$ 116,000	$ 73,000	$ 300,000	$ 300,000	$ 184,000	$ 227,000
8	116,000	90,000	$ 116,000	$ 90,000	$ 700,000	$ 700,000	$ 584,000	$ 610,000
9	48,000	44,000	$ 48,000	$ 44,000	$ 400,000	$ 400,000	$ 352,000	$ 356,000
TOTAL	1,966,000	1,269,000	$ 1,966,000	$ 1,269,000	$ 4,600,000	$ 4,600,000	$ 2,364,000	$ 3,331,000

As shown, revenue estimates have been used to offset operating costs to calculate the net operating cost per stage for both the streetcar mode and the enhanced bus mode and then the total for both systems overall. The analysis indicates that the net annual operating cost for a full build out of a streetcar system would be estimated at $2,634,000 and the enhanced bus system would be estimated at $3,331,000.

6 Economic Development Potential

A growing amount of research literature is confirming that public transit can increase the development potential of real estate near "high-capacity" transit lines and stations and thereby, increase property values. The term used to describe new development and redevelopment associated with public transit is coined "transit oriented development" or TOD. The level of value capture depends largely on the local regulatory policies, political environment, regional transit connections, and local, regional, and state economics. Achieving the potential for the increased value of property generally requires building more complex, mixed use projects at higher densities near transit centers.[8]

Development potential is greatest near high-capacity transit that offers permanent infrastructure, and higher travel speeds and ridership capacity. Modes associated with high-capacity transit include commuter rail, metro rail, light rail and bus rapid transit. Streetcar systems are similar to light rail in terms of infrastructure requirements and therefore, also have the potential for positive impacts on land values.

Enhanced bus can also capitalize on development potential given the infrastructure elements required (e.g. station platforms) that make this transit option more "permanent" than a typical local bus route. Case studies of streetcar systems in Memphis, Tennessee and Portland, Oregon indicate that there has been significant investment directly related to the implementation of these streetcar systems.

In Memphis, since 1991, $3 billion in projects have been planned, developed, or are being built along the streetcar lines. Examples include expansion of two medical districts, construction of a $12 million hotel, and two 45-unit housing developments. Construction of the FedExForum (the NBA stadium home to the Memphis Grizzlies) and the Beale Street Landing (a recreation area along the riverfront) have also followed streetcar construction. Additionally, large national retailer interest in Memphis' Center City has increased.

The City of Portland reports that, with the implementation of the streetcar system, $3.5 billion has been invested within two blocks of the streetcar alignment. This development has included over 10,000 new housing units and 5.4 million square feet of office, institutional, retail and hotel construction[9].

This information and the perception of dramatic economic development associated with a high-capacity transit system needs to be tempered to different conditions in Savannah, particularly related to the historic district development restrictions. However, it is expected that an urban circulator would attract new housing, commercial, and office developments.

[8] *Public Transportation Boosts Property Values,* (June 16, 2014), Transportation and Real Estate:Making the Connections, www.realtor.org/transtools

[9] *Golem, Ron & Smith-Heimer, Janet (2010),* TCRP Synthesis 86:Relationships between Streetcars and the Built Environment*, Transportation Research Board*

6.1 Urban Circulator Approach

The economic development potential of the urban circulator system was evaluated in terms of estimated changes in land use and in assessed valuation. Assessed valuation is directly related to potential tax collections, and thus a key factor to consider with respect to financing a new transportation investment.

To estimate the value of potential development, Phase 1 of the study area was divided into two areas: the historic district and the proposed Canal District west of Boundary Street. A field survey and tax record analysis was conducted of all properties located within three blocks of a proposed service corridor. Current use and status was assigned to each parcel and mapped, with those properties considered "underutilized" identified.

Underutilized property was considered to be the following uses in the historic district:

- Private parking lots on independent parcels of property and with no structures
- Underutilized government owned parking lots
- Vacant land with no known or permitted development plans
- Properties at a high level of disrepair or listed for sale or lease
- Civic Center property currently under evaluation for demolition and/or adaptive reuse

Underutilized property for the future Canal District included:

- Land owned by the Norfolk Southern Railroad
- Industrial land
- Vacant government owned land

Square footage of each underutilized parcel was calculated and an assessed valuation was determined. In the historic district, the current assessed valuation of the land was estimated based on the current use of the land (ranging from $34 per square foot for vacant land and open parking lots to $113 per square foot for the Civic Center). The potential valuation of the identified land was estimated at a rate of $365 per square foot, based on a sample of office and business parcels in this area.

In the future Canal District, the current assessed valuation of the land was estimated based on the current use of the land (ranging from $1.50 to $3.00 per square foot). The potential valuation of the identified land was estimated at a rate of $17.50 per square foot, based of parcels in the area with the highest assessed valuations.

The valuations were then applied to the square footages of each type of land identified as underutilized. In order to reflect a more realistic development potential, it was assumed that only 50% of the land that is currently identified as surface parking would be redeveloped. This assumption was based on the fact that many of the surface parking lots are expected to remain to serve the future need for parking. The City's zoning code stipulates minimum parking space requirements for different types of uses and does not offer incentives for a reduction in parking requirements. Even with the introduction of an urban circulator, parking will be needed in the future for residents, workers, shoppers, tourists, faith based

organizations during religious services, and for special events. Subsequently it was estimated that half of the current parking spaces would remain once the urban circulator was implemented.

6.2 Estimated Economic Development Potential of a Streetcar System

Table 6 shows the estimated economic development of a streetcar system. As indicated previously, the economic development potential is greater for modes with fixed infrastructure, such as a streetcar system than for less permanent modes such as bus.

Table 6: Estimated Economic Development Impact of Streetcars

	Type of Use	Acreage	Current Value	Increased Value	% Change
Historic District	Private Parking	9.1	$ 13,434,204	$ 144,220,123	974%
	Govt. Parking	1.3	$ 1,991,269	$ 21,376,856	974%
	Land Available for Revitalization	6.7	$ 21,974,033	$ 106,940,292	387%
	Vacant Land	5.8	$ 8,564,122	$ 91,938,368	974%
	Civic Center	7.1	$ 34,748,761	$ 112,241,573	223%
	TOTAL	**30**	**$ 80,712,388**	**$ 476,717,213**	**491%**
Canal District	NS Railroad	2.0	$ 259,936	$ 1,516,293	483%
	Industrial	14.9	$ 974,343	$ 11,367,335	1067%
	Govt. Local	44.1	$ 2,548,533	$ 29,733,122	1030%
	TOTAL	**61**	**$ 4,116,331**	**$ 46,507,568**	**1030%**

6.3 Economic Development by Route Stage

In order to attribute the economic development potential for each stage of development of the streetcar system, underutilized parcels were allocated to each route stage, i.e. Stages 1-9. Each underutilized parcel was allocated only once to the route stage that was the closest in proximity. The potential capital return on investment for each route stage is shown in Table 7. It is important to note that Stage 6 capitalizes entirely on the potential of the future Canal District and Arena site development. The economic development potential for Stages 7 and 9 have been capitalized on earlier stages of route implementation.

Table 7: Estimated Economic Development Impact of Streetcars on Under Utilized Parcels by Implementation Stage

Route Stages	Estimated Current Value	Estimated Increased Value	% Change
Stage 1	$ 38,352,307.00	$ 111,508,328.00	190.75%
Stage 2	$ 9,737,469.00	$ 95,714,274.00	882.95%
Stage 3	$ 6,505,735.00	$ 61,212,642.00	840.90%
Stage 4	$ 1,698,841.00	$ 8,267,691.00	386.67%
Stage 5	$ 14,853,981.00	$ 128,784,983.00	767.01%
Stage 6	$ 4,116,331.00	$ 46,507,568.00	1029.83%
Stage 7	---	---	---
Stage 8	$ 9,564,055.00	$ 71,229,295.00	644.76%
Stage 9	-----	-----	-----
TOTAL	**$ 84,828,719.00**	**$ 523,224,781.00**	**516.80%**

6.4 Estimated Economic Development Potential of Enhanced Bus

As an enhanced bus system is expected to have less permanent infrastructure, it is likely to have less impact on the location of development within the Historic and Canal Districts and provide less benefit when competing for investment from outside the region. However, there is still an expectation of a positive development impact due to the fact that there will be some "permanency" related to station platforms and other enhanced bus amenities. Infrastructure, such as station platforms, generate a "captive" market of riders who would utilize nearby retail stores, restaurants and other commercial developments.

It is estimated that the economic benefits of enhanced bus are approximately one-third of the economic development potential of the streetcar. This assessment, based on state of the practice research, is strictly an estimate and there could potentially be less or greater development associated with enhanced bus. Table 8 provides an estimate by stage. Approximately $174 million in increased value is estimated to be realized by an enhanced bus circulator system.

Table 8: Estimated Economic Development Impact of Enhanced Bus on Under Utilized Parcels by Route Stage

Route Stages	Estimated Current Value	Estimated Increased Value	% Change
Stage 1	$ 38,352,307.00	$ 38,352,307.00	0.00%
Stage 2	$ 9,737,469.00	$ 31,585,710.42	224.37%
Stage 3	$ 6,505,735.00	$ 20,200,171.86	210.50%
Stage 4	$ 1,698,841.00	$ 2,728,338.03	60.60%
Stage 5	$ 14,853,981.00	$ 42,499,044.39	186.11%
Stage 6	$ 4,116,331.00	$ 15,347,497.44	272.84%
Stage 7	---	---	---
Stage 8	$ 9,564,055.00	$ 23,505,667.35	145.77%
Stage 9	-----	-----	-----
TOTAL	**$ 84,828,719.00**	**$ 174,218,736.49**	**105.38%**

6.5 Return on Investment

To properly assess the return on investment, the total benefits are divided by total investment. Different measures of benefits including potential for real estate development, vehicle operating cost, travel times and reliability, emissions and other environmental impacts, safety benefits, road pavement conditions, employment impacts and tax revenue gains would be included in the analysis.

For purposes of this report, except for potential real estate development, additional detail required for a thorough return on investment analysis was not available. However, a more simplistic approach to return on investment was taken and consists of generating a ratio of anticipated development divided by capital investment. Table 9 shows an estimated return on investment by route stage for both the proposed streetcar and enhanced bus systems.

Table 9: Estimated Return on Investment for Streetcar and Enhanced Bus

Route Stages	Streetcar Increased Value	Streetcar Capital Cost	Return On Investment	Enhanced Bus Increased Value	Enhanced Bus Capital Cost	Return On Investment
Stage 1	$ 111,508,328.00	$ 63,000,000.00	2:1	$ 38,352,307.00	$ 3,500,000.00	11:1
Stage 2	$ 95,714,274.00	$ 44,000,000.00	2:1	$ 31,585,710.42	$ 1,500,000.00	21:1
Stage 3	$ 61,212,642.00	$ 27,000,000.00	2:1	$ 20,200,171.86	$ 1,600,000.00	13:1
Stage 4	$ 8,267,691.00	$ 28,000,000.00	0:1	$ 2,728,338.03	$ 1,700,000.00	2:1
Stage 5	$ 128,784,983.00	$ 41,000,000.00	3:1	$ 42,499,044.39	$ 2,700,000.00	16:1
Stage 6	$ 46,507,568.00	$ 20,000,000.00	2:1	$ 15,347,497.44	$ 1,800,000.00	9:1
Stage 7	---	$ 20,500,000.00	---	---	$ 1,100,000.00	---
Stage 8	$ 71,229,295.00	$ 32,600,000.00	2:1	$ 23,505,667.35	$ 2,400,000.00	10:1
Stage 9	-----	$ 17,700,000.00	-----	-----	$ 800,000.00	-----
TOTAL	**$ 523,224,781.00**	**$ 293,800,000.00**	2:1	**$ 174,218,736.49**	**$ 17,100,000.00**	10:1

7 Potential Funding Strategies

Capital and operating costs of new transit systems are substantial. The capital cost for a full build out of the urban circulator system (i.e. Stages 1 through 9) could range from $17.1 million for an enhanced bus mode to $293 million for a streetcar system. Even for initial build out of the Stage 1 Red Route, the capital costs would be significant, ranging from approximately $3.4 million for the enhanced bus to $63 million for the streetcar system. Annual operating costs for Stage 1 are estimated to be $800,000 after being offset by projected fares.

If an urban circulator system is constructed, it is expected that the route stages would be constructed over time, with implementation potentially spanning several decades, and dependent on a variety of factors, including increased ridership of each stage and significant economic development of key areas along the corridors in order to make the urban circulator viable.

There are a variety of federal, state and local funding sources that can fund transit projects. However, public funding for transit is becoming increasingly limited and competitive. In order to pursue various federal and state grants, it is imperative that the CORE MPO, CAT, the City of Savannah and other partners work collaboratively to secure the limited funding available.

7.1 Federal Funding

There are several discretionary and formula programs under MAP-21[10]. The Federal Transit Administration provides the majority of its transit capital investment through its Urbanized Area Formula Program (Section 5307)[11] and through the Bus and Bus Facility Discretionary Grants. Eligible activities include planning and engineering design of transit projects; capital investments in bus and bus related activities, including replacement of buses; and capital investments in new and existing fixed guideway systems, including rolling stock. For urbanized areas with 200,000 in population and over (the 2010 Savannah urbanized area population is 260,677[12]), funds are apportioned and flow directly to a designated recipient selected locally to apply for and receive Federal funds. The Federal share is not to exceed 80 percent of the net project cost with 20 percent provided by a local entity. As a regional authority, CAT is eligible for these transit formula funds and utilizes them for capital investment requirements for its current system.

Section 5309 Fixed Guideway Capital Investment Grants (i.e. New and Small Starts) awards grants on a competitive basis for new and expanded rail and bus rapid transit systems. Section 5309 is a discretionary program which requires project sponsors to undergo a multi-step, multi-year process to be eligible for funding. "Core capacity" projects have recently been included for funding and are defined as projects that expand capacity by at least ten percent in existing fixed guide way transit corridors that are at or above capacity, or are expected to be at capacity within five years. Projects are evaluated on a variety of criteria including mobility improvements, environmental benefits, congestion relief, cost-effectiveness, economic development and land use. The Federal share is not to exceed 80 percent.[13]

[10] Moving Ahead for Progress in the 21st Century (MAP-21) Act was signed into law on July 6, 2012 and is the federal funding source for surface transportation projects.
[11] www.fta.dot.gov/map21.html
[12] United States Census Bureau, www.census.gov
[13] http://www.fta.dot.gov/12304_15522.html

The American Recovery and Reinvestment Act (ARRA)[14] established the Transportation Investment Generating Economic Recovery (TIGER) Program. TIGER Discretionary Grants have gone through six rounds of funding since first authorized in 2009. Funding is allocated on a competitive basis, and projects must demonstrate they will deliver the following long-term outcomes: safety, economic competitiveness, state of good repair, livability and environmental sustainability. Projects are also evaluated on their expected contributions to the economic recovery, as well as their ability to facilitate innovation and new partnerships.

Projects that are awarded funding are generally multi-modal, multi-jurisdictional, and difficult to fund with other grants. The minimum total cost of a project must be $12.5M, and at least 20 percent of that cost must be funded locally. Over the last five years, CAT and the CORE MPO have pursued TIGER grants for transit projects. In August 2010, MPC submitted a TIGER II grant application for a streetcar system in the historic district was submitted; in June 2013, CAT submitted a TIGER V grant application for the initial stage of a streetcar system in the historic district. In April 2014, CAT submitted a TIGER VI grant application for the Abercorn Enhancement project for enhanced bus service along Abercorn Street. The TIGER grant selection process is extremely competitive and none of these submittals were successful; review comments of the two streetcar applications indicate there needed to be additional cost benefit technical analysis completed and a dedicated local funding source identified.

TIGER funding, albeit at a reduced level, will continue to be available for funding new capital projects.

7.2 State Funding

In 1985, the SPLOST law, enacted by Georgia legislators, authorized a county tax of 1 percent on items subject to state sales tax for funding capital projects throughout the state. Various forms of SPLOST tax initiatives have been proposed since the law was initiated including the Transportation Special Purpose Local Option Sales Tax or T-SPLOST, a one-cent sales tax initiative designed to fund infrastructure and transportation projects across Georgia as a countermeasure to declining federal and state funding. In 2012, a T-SPLOST referendum was proposed in 12 regional commission districts throughout the state, with Chatham County included in the Coastal Region. The sales tax was proposed to pay for regional transportation projects including road and bridge projects, bike paths, sidewalks and new buses, shelters and services for CAT. However, in July 2012, residents voted overwhelmingly to defeat the T-SPLOST referendum in most areas including the Coastal Region. Only 3 of the 12 regions in the state voted to approve T-SPLOST. There is no other state funding identified for transit.

7.3 Local Funding

Local funding sources for CAT include funding through the County, City and the farebox. For residents who live within the CAT transit service district, Chatham County places an annual tax levy on each homeowner; this transit tax is based on the property value of the home. The City of Savannah provides funding for specific bus services, including the downtown shuttles. The farebox recovery ratio is approximately 22%, and farebox revenues generate approximately $2.7million to $3million annually to CAT's budget.

[14] American Recovery and Reinvestment Act of 2009 is an economic stimulus package enacted by the US Congress and signed into law on February 17, 2009. The program directed spending to infrastructure, education, health and energy programs in order to stimulate jobs impacted by the recession. Funding expired September 1, 2015.

CAT continues to look for other local funding sources to support new services. A proposal for the establishment of a tax allocation district (TAD), a variation of a Tax Increment Finance (TIF) district, was recently investigated in 2013 to fund a streetcar system. CAT proposed that a TAD district be established around the proposed routes and facilities in the Canal District, allowing a designated portion of the property taxes in the area to be used to fund construction of streetcar system. The proposed TAD, however, was not accepted by City Council due to the need for a full technical and financial assessment and more in-depth coordination with involved partners.

Other ideas for local funding could include taxing parking, either by levying an assessment on a per space basis, or increasing the tax on paid parking and dedicating a portion of traffic enforcement fees and fines to transit capital funding.

7.4 Private Funding

With the decline in transit funding on the federal, state, and local level (especially for capital projects), some transit agencies have turned to the private sector to fund construction of transit systems. Sources such as public-private partnerships (PPP), developer impact fees, special districts, and contributions from organizations including universities may be potential sources of funds for portions of the system.

A public-private partnership is a contractual agreement formed between public and private sector partners where the government agency contracts with a private company to renovate, construct, operate, maintain and/or manage. While the public sector usually retains ownership in the facility or system, the private party will be given additional decision rights in determining how the project or task will be completed.

If CAT wishes to explore a public-private partnership in constructing, maintaining, or operating the urban circulator system, technical assistance is available through Section 5315, Private Sector Participation Section of MAP-21. The United States Department of Transportation provides assistance to grant recipients by helping to coordinate public and private sector services through guidance, education on laws and regulations, identifying best practices including developing standard Pubic Private Partnership (PPP) transaction model contracts, as well as performing financial assessments on proposed PPP transactions.[15]

Developer impact fees is a one-time fee imposed on a new or proposed development project to pay for all or a portion of the costs of providing public services to the new development. This type of fee could be applied to new development in the historic district that would be directly benefitted by an urban circulator.

Special districts, sometimes called special service areas, are special taxing districts in business districts that are established by ordinance in order to pass on the costs of infrastructure improvements to the businesses residing within the district. This type of district can be established around a transit station with the businesses located close to the station reaping the benefits of captive riders waiting for transit immediately outside their businesses.

[15] http://www.fhwa.dot.gov/map21/docs/11sep_p3.pdf

Partnerships with SCAD and other organizations that would directly benefit from the urban circulator could also be established. Allowing students to ride for free on the urban circulator, in exchange for annual contribution from SCAD, could alleviate some of the transportation resources SCAD provides at a potentially lower cost to SCAD. This arrangement could also benefit other agencies and organizations, such as hospitals, shopping centers, and major employers. Besides contributions for operating costs due to direct benefits to their clients, other contributions could include "naming rights" at transit stops and stations and provisions of shelters with advertising.

8.0 Conclusion

The intent and underlying goal of the study was to provide a non-biased, data driven look at the feasibility and benefit of an Urban Circulator System in order to provide the underpinning for future Federal funding applications and to provide the City of Savannah and Chatham Area Transit with the information needed to make a sound business decision. The Urban Circulator Study assessed existing conditions, potential markets for existing and induced transit ridership, feasibility of implementation of an Enhanced Bus or Streetcar system given the physical characteristics of the city and traffic patterns, capital and operating costs and economic development potential.

The results of the analysis demonstrate that Phase I of the study area has existing bicycle and pedestrian infrastructure that provide adequate facilities for the average user. There are existing bus and trolley services provided by both public and private agencies and organizations that combine to address the demand within the historic downtown. Additional analysis is needed to define the existing parking resources and demands within the historic downtown, however observation of travel patterns indicate that parking resources are available and widely utilized by residents and visitors. The analysis results demonstrate that mobility demands for citizens and visitors are being met by the current modal options and from a transportation mobility standpoint, investment in a supplemental mode such as Streetcar or Enhanced Bus service to serve a transportation need or deficiency is not warranted.

With regard to the economic benefits and potential return on investment in the downtown Savannah area, the historic district is largely built out and protected by preservation ordinances. These constraints limit the potential for economic development. While the analysis does demonstrate the potential for significant increases in property value primarily in the western part of the study area, the limitations created in the downtown by current preservation policies, coupled with a scarcity of property available for development, result in overall return on investment projections significantly lower than peer systems.

As the City of Savannah continues to assess the viability of the Savannah Streetcar or Enhanced Bus system, local financial investments will be a critical component for successful Federal and State funding applications. As various funding options are explored, key partnerships with the Chatham County Board of Commissioners, Chatham County School Board, Housing Authority of Savannah, Chatham Area Transit and the CORE MPO will be critical.