

# STREETCARS AS AN ALTERNATIVE PUBLIC TRANSPORTATION OPTION IN ATHENS

## GEORGIA: A PLAN FOR A STREETCAR SYSTEM

By

KAREN PATRICE BLACKWOOD

(Under the Direction of John F. Crowley)

### ABSTRACT

This study is a visionary plan that outlines the possibility of reintroducing streetcars to Athens, Georgia. The proposed streetcar system would span 6.5 miles and could be an advantageous addition to the existing Athens Transit System. The streetcar system could replace existing bus service along the proposed streetcar routes. This proposed system for Athens could be beneficial to the economic and transportation system of the city. The study involves information gathered from case studies of other streetcar systems in the United States of America. The study considered different potential alignments and route combinations and identified three preferred lines. The study results in a streetcar plan document for Athens Clarke County to explore the opportunity of implementing a streetcar system.

INDEX WORDS: streetcars, alignments, urban circulator, ridership, Right-of-way, fixed guide-way, mobility

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## DEDICATION

I dedicate this to my nieces Ashley and Adin as well as my nephew Jonathan.

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## CHAPTER 1

### INTRODUCTION

#### Background

Many cities in the United States are considering streetcar systems as an alternative transportation mode and as a redevelopment tool. Several cities such as, Memphis, TN, Atlanta, GA, Portland, OR, Washington DC, and Little Rock, AR have incorporated streetcar networks into their public transit systems as an urban circulator. These cities are using streetcars to improve their transportation systems.

The Federal Transit Administration (FTA) defines an urban circulator as, “a system such as streetcars and rubber tire trolleys that provide transportation to connect urban destinations. They foster redevelopment of urban spaces into walkable, mixed -use high density environments” ([fta.dot.gov](http://fta.dot.gov)).



**Figure 1.1 Streetcars in Memphis** Source Photo by Author

Streetcars are public transportation systems that operate along a fixed rail guide-way that is embedded in the surface of the street. Streetcars are planned for moderately slow speeds, with frequent, closely spaced stops.

Streetcar systems refer to a local rail transportation system that is typically powered by electricity. The American Public Transportation Association (APTA) labels streetcars as a type of light rail transportation and defines it as:

“Lightweight passenger rail cars operating singly (or in short, usually two car trains) on fixed rails in right-of-way that is not separated from other traffic for much of the way. Light rail vehicles are typically driven electrically, with power being drawn from an overhead electric line, via trolley or a pantograph”.

(apta.com)



**Figure 1.2 Overhead Electric Lines for Streetcar System in Memphis, TN.**

Source Photo by Author

The American Public Transportation Administration (APTA) defines light rail as, “an electric railway system characterized by its ability to operate single or multiple cars along exclusive rights-of-way at ground level, on aerial structures, in subways or in streets, able to board and discharge passengers at station platforms or at street, track or car-floor level and is normally powered by overhead electrical wires” (apta.com).

They usually operate in downtown areas of cities and travel on short lines, from two to ten miles at low speeds, with many stops usually two to four blocks apart. They are urban amenities that transport people through urban areas efficiently. Streetcars operate almost entirely in streets, often mixed with automobile and pedestrian traffic. They are compatible with parking and buses and support sustainable development. There are three types of streetcars: vintage (antique), heritage (replica/reproduction) and modern. The modern systems are newly constructed, and do not typically use historic streetcar tracks. They use newly built trolleys. Portland, Oregon, Tacoma and Seattle, Washington boast modern streetcar systems.



**Figure 1.3 Streetcar Operating in Mixed Traffic in Memphis TN.**

Source Photo by Author

Vintage or Replica (see figure 1.3 above) lines operate historic equipment used before the 1970s, or modern replicas of streetcars. Replica streetcars are new made to look like vintage. Some operate on tracks built exclusively for streetcar lines; some cities are using abandoned railroad tracks; and some operate on restored streetcar tracks. Streetcars are operated as an important part of the city's transportation system. Streetcars tend to be quieter, smoother and have more capacity than a bus (about 80-150 passengers) depending on the type of streetcar vehicle.



**Figure 1.4 Modern and a Vintage Streetcar**

Source modernstreetcar.org

During the era from the 1880s to World War I streetcars were the dominant mode of transportation that shaped urban areas and “streetcar suburbs”. Streetcars changed the urban fabric. The reintroduction of streetcars as an alternative form of transportation is becoming very popular and many American cities are planning streetcar networks because they provide a high quality public transportation mode. Streetcars are environmentally friendly and are a good alternative form of transportation (Poticha and Ohland 2009).

This study and plan propose a new streetcar system for Athens- Clarke County (ACC) as a form of public transit that will be an urban circulator to connect neighborhoods.



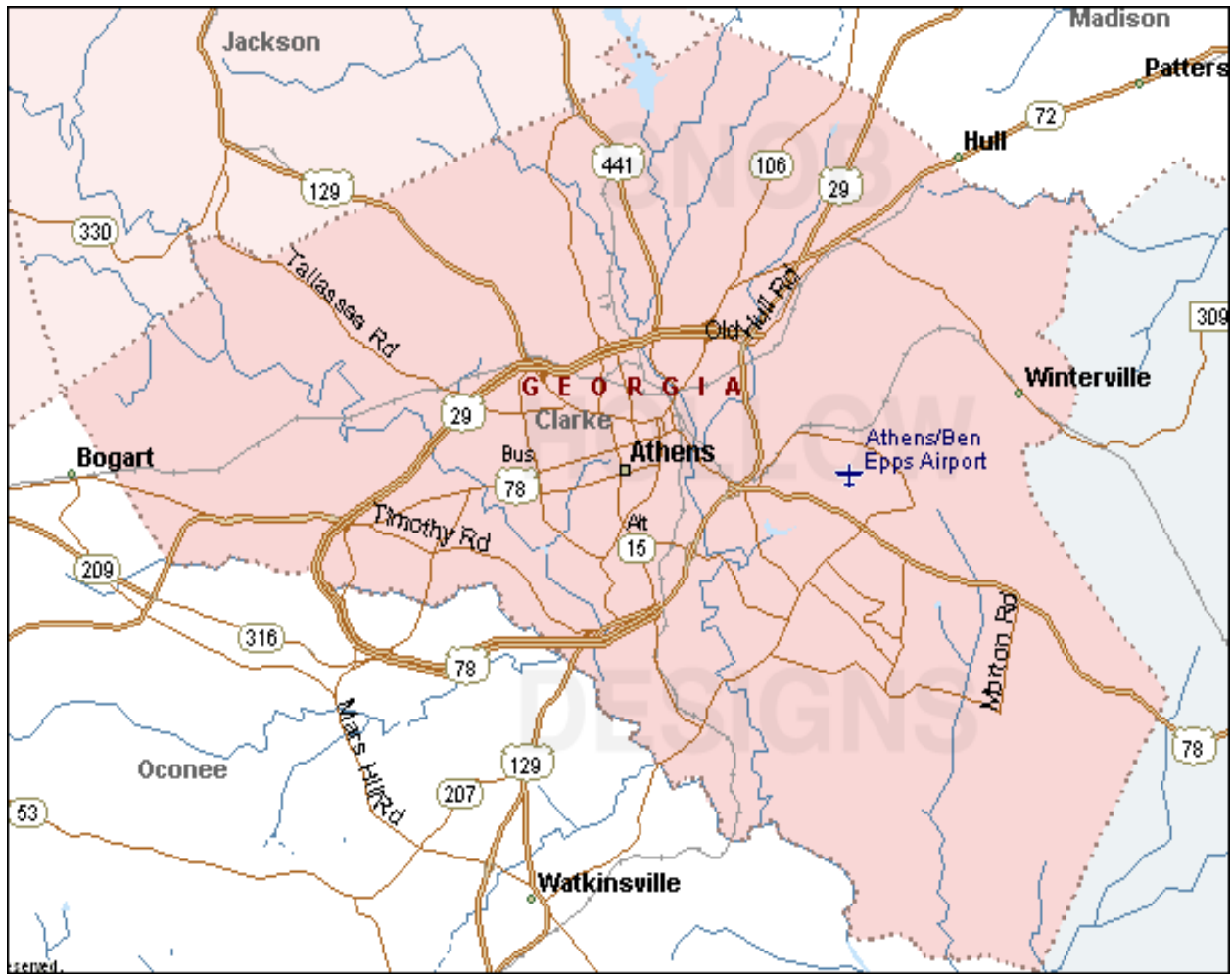
This proposed streetcar system has the prospect to be incorporated and maintained within the county's multi modal transit system. This system could supplement the Athens Transit system and the UGA bus service by providing more options for non-auto trips. This is an opportunity for the integration of streetcars as an additional transportation mode along significant corridors within the Athens Transit System.

This study explores the streetcar network as a feasible solution to the Athens urban area. Can the city of Athens integrate streetcar as an urban transportation mode along with other alternative modes?

Athens once had streetcars along a rich legacy of walkable streets and intercity rail transportation. The increased use of automobiles changed the historical transportation system of Athens. In the 20<sup>th</sup> century like most cities in U.S highway planning and infrastructure plans have been to accommodate motor vehicles. Like the other American cities that had streetcars, Athens' streetcar system was removed and replaced with the automobile.

### Athens

Athens is an urban area within rural edges and it is a college town located in North East Georgia. The downtown area abuts the University of Georgia. It is coined as the "Classic City". In addition to the University campus, the city has hospitals, offices, and retail stores, commercial and residential facilities that are located nearby.



**Figure 1.5 Map of Athens Clarke County**

Source [www.countymaps.org/georgia](http://www.countymaps.org/georgia)

The specific study area includes the neighborhoods of Milledge, Five Points, Normaltown, Boulevard, Baxter and East Athens. Thousands of people commute to Downtown Athens daily for employment, education or for the health care facilities. The city is growing rapidly and has experienced a 15% increase in population since 2000. On March 17, 2011 the U.S. Census Bureau released the 2010 population totals for the state of Georgia and reported that Athens grew from 100,421 in 2000 to 115,592 in 2010.

According to the US Census data for 2010, Athens is the fifth largest city in Georgia and has the highest growth rate of the five largest cities in Georgia. According to the University of Georgia's Office of Institutional research UGA enrollment also increased from 31,085 in 2000 to 34,677 for fall 2010. The rate of growth for this region is expected to increase with the job opportunities, especially from the University of Georgia's new medical college and engineering school expected to open in 2012.

Narrow streets in Athens make it susceptible to peak hour traffic congestion. The population increase will adversely impact the transportation system and can lead to increase auto dependency. Athens is served by a local public transit bus system called "the Bus" operated by Athens Transit System (ATS) as well as the University of Georgia's (UGA) campus bus system. Although the Athens has a bus system it still has traffic congestion, and insufficient service for low-income households along with inadequate citywide bus service. Most residents continue to drive their own cars making this area an auto dependent city. Only 2.4 % of residents commute to work by public transit (ATS Plan 2009). It is assumed that there will be a greater demand for mobility than what the current system offers (MACORTS Transportation Plan 2009). Whether today, or in the future the city will need to improve its transportation systems to meet the growing population demands. Increased population leads to increased vehicular miles travelled (VMT).

These issues raise the question. Should commuters in Athens have more public transportation options? Some of the other questions to address include: Is there an effective alternative transportation mode that can meet accessibility needs and stimulate a profitable benefit to Athens? There are different alternatives to improve transportation. Can a streetcar system work in a small city like Athens and is it the best alternative? Can this system be implemented and be an essential part of Athens regional transit system as the county grows?

One of the objectives of alternative transportation is to minimize the effects of greenhouse gases (GHG) and auto traffic. Public transit is an important part of a city's transportation network. When the population of a city grows then the region becomes more vulnerable to increasing auto use and increase transportation needs unless the city has a reliable accessible public transit to alleviate the auto dependency (MACORTS 2010). The Athens Transit Development Plan Update 2009 states that, "The mission of Athens Transit System (ATS) is to provide the public with a safe, courteous and efficient countywide transportation system that increases access and mobility, reduces congestion, improves the environment, and supports economic development, thereby enhancing quality of life" (ATS Update Plan 2009). Streetcars are sustainable systems that can accommodate many riders, reduce congestion, increase transit ridership, be easily accessible, and can boost economic development (Ohland & Poticha 2009). The more public transportation options a city has the more it is likely that people will use public transportation and drive less.

**The Purpose**

The purpose of this study is to examine streetcar planning in other U.S. cities to provide an understanding of the procedures and design requirements to implement a proposed streetcar system for Athens. When these measures are identified, a streetcar transportation plan will be suggested.

**The Opportunity**

Transportation planning has an important role in shaping urban environments. Rail transportation can help in creating higher density communities at rail stops. By showing how to connect to different areas of a city, transportation planning can improve a community by identifying what areas to protect and what land use areas to provide for economic development and access to housing and recreation. The factors that affect the need for public transportation include household income, unemployment rates, and the size of families (Yao 2007).

The use of mass transportation has been reduced in some areas because of high private auto use and cities have become less pedestrian friendly (Mumford 1989). In these economic and environmental times implementing alternative rail transportation should be a viable investment. Accessibility to affordable public transportation is important in today's society due to the challenges of high gas prices and urban problems related to automobile use, including pollution, storm water issues, and road maintenance costs.

Streetcars provide an enhancement to public transit and offer an alternative that can alleviate some of the current transportation problems in Athens.

This proposal for streetcars in Athens is based on the following conditions:

1. Economic Growth
2. Population growth
3. Persistent poverty among some populations
4. Air quality issues
5. Traffic congestion and cost of road expansion
6. Lack of reliable frequent bus travel times in areas covered
7. Fuel prices
8. Economic, local and environmental benefits as it relates to urban planning.

The subject of this planning study and plan is focused on how the central Athens area can improve mobility. The focus is at the local central city neighborhood level. How will daily trips, for the grocery shopping, to work, or to the retail, cultural, institutional and dining destinations in Athens be made for thousands of, students, residents, workers and visitors? Good quality public transit service to move people within Athens is very essential.

The city's population has direct impact on the need for transportation services because increasing population pressures increase in transit services (MACORTS). The existing Athens Transit systems along with streets are not sufficient to serve the population and redevelopment growth because the existing roadways are crowded (ATS Update Plan 2009).

The street system lanes are set for transporting automobiles. The current transit system consists of buses using the streets as well. The ATS bus system does an excellent job with connecting some neighborhoods to downtown Athens, however it is insufficient for improving circulation for a variety of short trips within the ACC area and do not access many of the areas that are experiencing the need for public transit and development.

Although the buses service the major corridors, the transit demands are not being fully met and streetcars could help because they serve a higher capacity and tend to attract more passengers than buses. How can Athens' remarkable growth be effectively supported and sustained? How will all those additional residents, workers and visitors travel about?

Athens has the highest rate of poverty in counties with a population of more than 100,000 across the United States of America (U.S. Census 2010). The issue of poverty is also a problem and most impoverished people cannot afford to purchase automobiles or fuel. Poverty affects accessibility to employment, education, and housing. Accessibility to public transit is vital for low-income families. The issue of high population growth and poverty in the area suggest that there is a need for more affordable low cost transportation. Is the current transportation system in Athens meeting their needs?

Forbes Magazine in March 2011 rated Athens Georgia as one of Americas "Top Unequal Cities". The magazine article stated that,

"Another college town, the home to the University of Georgia, has a significant income gap. The difference between richest and poorest is seen larger than in College Station- the rich earn 46 times as much as the poor. (Nationally the rich earn 26 times as much as the poor). The "rich" are defined as the top 5 % and the poor are defined as the bottom 20%.

In Athens the top 5% per capita income is over \$30,000 and the per capita income of the bottom 20% is just over \$6000. The official poverty rate in Athens is close to 40% of the population" (Forbes magazine 2009).

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) was enacted by the U.S. Department of Transportation and the Transportation Equity Act for the 21<sup>st</sup> century (TEA21) was also established. These two Acts encourage and mandate, states and cities to alleviate the problems of traffic congestion by establishing alternative transportation networks. According to the U.S. Bureau of Census 2010 an estimated 75% of people in Athens drove alone as a means of transportation.

The air quality is also of concern and pollution can be a problem in Athens. Athens is also affected by the Atlanta air shed. The Environmental Protection Agency (EPA) classified Athens Clarke County as an area at risk for declining into a non-attainment status due to increasing pollution. Air pollution, water pollution and global warming are problems that impact the environment, which is partially due to greenhouse gas emissions from automobiles.

These problems are unfavorable to the community its livability as well as social justice. Will the reintroduction of streetcars as a public transit system in Athens be a solution to address these transportation problems?



## **The Research Questions**

- Can streetcars improve the public transit system in Athens?
- Is the streetcar an alternative transportation option for the University of Georgia?
- Who are the potential riders?
- Which neighborhoods have the highest demand for public transit origins?
- What are the economic, social and environmental benefits associated with streetcar systems? What are the principle rider destinations?

## **The Significance of the Study**

The Federal Transit Administration (FTA) has funds available called Section 5309 for discretionary grants for Urban Circulatory System that will support the Department of Transportation Livability Initiative. The FTA defines urban circulator systems as streetcars and rubber-tire trolley lines that connect urban destinations and foster redevelopment of urban spaces into walkable mixed-use, high-density environments.

The eligible projects should promote walkable and mixed -used development. The funds also focus on projects that provide affordable housing, linking public transit and communities while improving access to jobs. It aims to lower transportation cost and protect the environment.

The potential streetcar system for Athens could be implemented in part by utilizing the funds from this grant and initiative program, due to the characteristics of the community. The proposed streetcar system for Athens has the potential to enhance livability and improve the quality of living for the population. The initiative includes the promotion of livability, pollution reduction and sustainability. It addresses the following six livability principles that are stated in the program. They are:

1. Provide more transportation choices.
2. Promote equitable, affordable housing.
3. Enhance economic competitiveness.
4. Support existing communities.
5. Coordinate policies and leverage investment.
6. Value communities and neighborhoods.

This plan can be useful for the Athens- Clarke County Unified Government (ACCUG) to develop a livable community for its residents with a reliable urban circulator like streetcars. The existing land use and economic situations in Athens supports these federal funding requirements that are related to livability and sustainability. This project recommends that ATS upgrade from a bus only system to add streetcars that can stimulate development as well as mobility. Athens had streetcars in the past and the urban pattern of downtown Athens was influenced by streetcars. With today's new streetcar technology, could it be reintroduced as a better form of transportation?

## **The Goals and Objectives**

The main goal of this study is to determine the need and demand for streetcars as an alternative transportation option. It will explore possible alignments/routes and cost estimates, concerning the future of a streetcar system in Athens Clarke County (ACC). In order to determine the need for streetcar system, the existing conditions such as current public transit services, community demographics, land use patterns and potential public transit routes will be evaluated.

The main planning objectives in determining the feasibility of implementing the streetcar system in Athens Clarke County is to maximize mobility within ACC region by ensuring that the streetcar network is provided in the right neighborhoods, in the right corridors to satisfy the varying transit needs within the county. The goals will reflect the ACC comprehensive plan, the Athens Transit Plan and the MACORTS transportation goals for Athens.

### **Goal 1**

Connect the major destination centers with each other and with rising activity centers, main corridors and major residential areas.

**Action** Develop key stops and transfer points.

**Action** Integrate major county developments, such as University of Georgia, Athens Regional Medical Center, The Classic Center, The historic Downtown Athens, housing projects, low income housing neighborhoods, Alps Shopping Center, the Georgia Mall and other employment centers.

## Goal 2

Provide a plan that will accommodate the growing transit dependent population.

**Objective:** recognize and identify the needs of the transit dependent.

**Action:** survey, interviews to correspond with potential riders to develop alignments and enhancements that serve the highest needs of the county.

**Action:** identify the population and employment growth and locations.

**Objective:** Support transit users by evaluating service hours, frequency and connections.

**Objective:** Develop connections (transfer points) to Athens Transit, UGA bus and the Multimodal Center.

**Objective:** Develop a streetcar network plan that is coordinated with the goals, objectives and policies of the ACC comprehensive plan, including the Athens Transit and MACORTS Plans.

## Goal 3

Explore opportunities for economic development.

It is expected that the long-term benefit of the potential streetcar system will be the reduction of single occupant, vehicular travel and improve mobility for the general public especially the impoverished. Alternative transportation like walking, biking, and other modes of rail transportation are going to play a greater role in the reduction of congestion, auto emissions, and automobile miles traveled as the population increases (MACORTS & ATS study 2009).

Sustainable development is defined by, the World Commission on Environment and Development in its (Brundtland Report) in 1987, as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. This report made the concept of sustainability popular and laid the foundation for a much larger discussion about other types of economic growth that valued the environment and added to the social connections.

There are three dimensions of sustainability: economic, social, and environmental. The key results of sustainable development should be economically feasible, socially equitable and ethically liable, and in harmony with the long- term ecological balance of the natural environment. Sustainable Transportation reduces the dependency on fossil fuel and personal transportation.

Linking sustainable transportation with neighborhood design and land use planning is very important. Neighborhood design impacts mobility and the way people travel. Streetcars can shape and attract sustainable development by increasing density. Streetcars can support Leadership in Energy and Environmental Design Neighborhood Development (LEED-ND) and the future of Athens.

## **CHAPTER 2**

### **STREETCAR SYSTEMS IN OTHER CITIES**

According to the Federal Transit Administration (FTA) there are over 45 streetcar systems built or in the process of being built in the USA. The FTA reported that one of the major reasons for the reintroduction of streetcars is because it cost less than traditional rail transportation. Today cities are rebuilding streetcars and reshaping their urban fabric.

The cities in America with daily operating streetcar services are: Boston, MA; Charlotte, NC; Kenosha, WI; Little Rock, AR; Memphis, TN; New Orleans, LA; Portland, OR; San Francisco, CA; Seattle, WA; Tacoma, WA; Tampa, FL and Savannah, GA. Some U.S cities with the modern streetcar system are in Portland, Oregon and Tacoma, WA. Additional profitable systems include Tampa, FL; Oakland, CA; and San Francisco, CA.

Many other cities are in planning or constructing systems.

## America Rediscovered the Streetcar

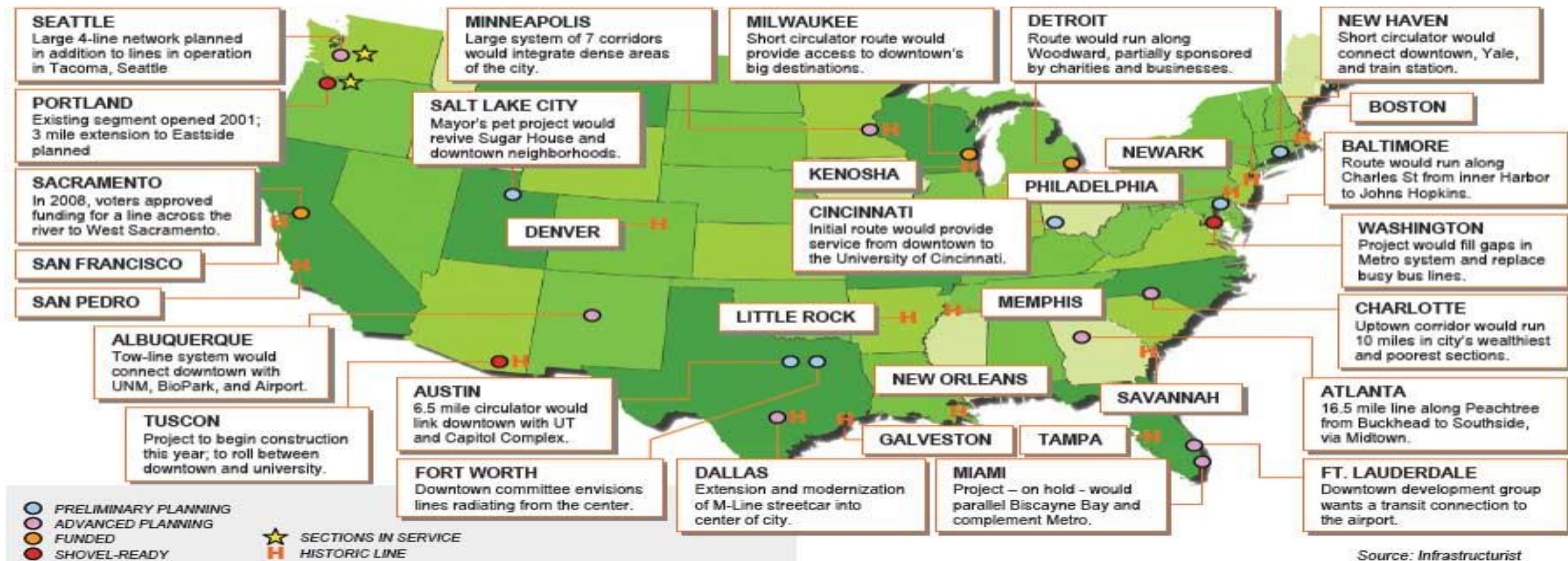


Figure 2.1 Cities in America with Streetcars

Source: Infrastructurist.

The table below provides basic information for peer cities that have existing streetcars or in the planning process of a system. (See table below)

**Table 2.1 Existing Streetcar Systems**

<b>Existing Streetcar Systems</b>	<b>Systems Planning</b>
Boston	Atlanta
Charlotte	Cincinnati
Kenosha	Denver
Little Rock	Forth Worth
Memphis	Los Angeles
New Orleans	Miami
Philadelphia	Minneapolis
Portland	Sacramento
San Francisco	Salt Lake City
Seattle	San Antonio
Tacoma	Tucson
Tampa	Washington DC
	Tucson
	Washington DC



**Table 2.2 Cost of Initial Alignments of Major Streetcar Systems in the U.S.A**

City	Year Service Started	Distance (Miles)	Initial Track Miles	Initial Cost Per Track Mile	Initial System Cost (Millions)	Stops	Peak Headway	System type	Vehicles
Dallas	1989	3.6	2.8	1.96	5.5	22	15	H	RD
Galveston	1988	6.7	5.2	1.92	10.00	15	20	H	R
Kenosha	2000	2.0	2.0	3.10	6.20	17	15	H	RD
Memphis	1993	7.0	5.0	6.60	33.00	32	10	H	RD
Little Rock	2004	2.5	2.5	7.84	19.60	11	15	H	R
New Orleans	1893	10	N/A	N/A	N/A	17	6	H	RD/R
Philadelphia	2006	8.2	16.4	5.18	85.00*	53	8	H	RD
Portland	2001	3.0	4.8	11.50	55.20*	38	13	M	M
San Francisco	1995	5.8	8	6.88	55.00	33	6	H	RD
Tampa	2003	2.3	2.3	21.00	48.30	12	15	H	R
Seattle SLU	2007	2.6	5.2	9.13	47.50	13	?	M	M

Source the book Street Smart Streetcars and Cities in the Twenty First Century (2009)

\*= The cost for the track upgrade to reinstate service

H = Heritage System; RD= Restored; R= Replica; M= Modern

## Case Studies

To determine the potential for a streetcar system in Athens, other cities basic streetcar information, service, operating budget, performance and benefit will provide useful information for a streetcar plan. This report investigates other streetcar services in the U.S. that provide ideas for development of a streetcar transportation system and related land use planning in Athens. These cities were selected because they were comparable to Athens by size, being a college town or other similar characteristics. In these cities streetcars have revived the economy and brought many businesses along streetcar corridors. They all integrated the streetcar system into the regional transportation system and have improved the public transit services.

Data analysis will be obtained from, Little Rock, AR, Memphis, TN, Portland, OR, and Seattle, WA. These are examples that can provide strategies that will be appropriate to the Athens streetcar transit network links. Their system transport people from residential neighborhoods into the downtown area and operate in city traffic instead of on their own right-of-way. Some systems travel long distances while others are small local distances. In these cities they have integrated transportation with land- use, which allows people to move more rapidly and freely.

They all provide service seven days a week. These cities have seen an increase in ridership that exceeded expectations since the services began.

Portland, Memphis and Little Rock developed streetcar systems in their cities as a revitalization tool as an effort to rejuvenate their downtown core. These cities have relatively small to midsize populations. They all use streetcars to link major attractions, universities, convention centers, tourism, stadiums and retails while enhancing economic development. Athens is a historic downtown area similar to, Memphis and Little Rock and all these cities boast vintage and replica streetcars to complement their historic streetscape. Portland is a college town similar to Athens and its streetcars service serves Portland State University, the Historic Pearl district and Downtown NW 23<sup>rd</sup> street. All these cities have a streetcar heritage. They all successfully revitalized the downtown core with streetcars. They started with small lines to accommodate the population.

### Little Rock, Arkansas

Little Rock has a streetcar service called The River Rail Streetcar Line. It began service on November 1, 2004 with an initial 2.5 miles and is currently 3.5 miles. It services the downtown areas in Little Rock and North Little Rock. The River Rail provides direct route to the convention center, the historic River Market area in downtown Little Rock, the sports arena close to the Arkansas River in downtown North Little Rock, and the Clinton Presidential Library.

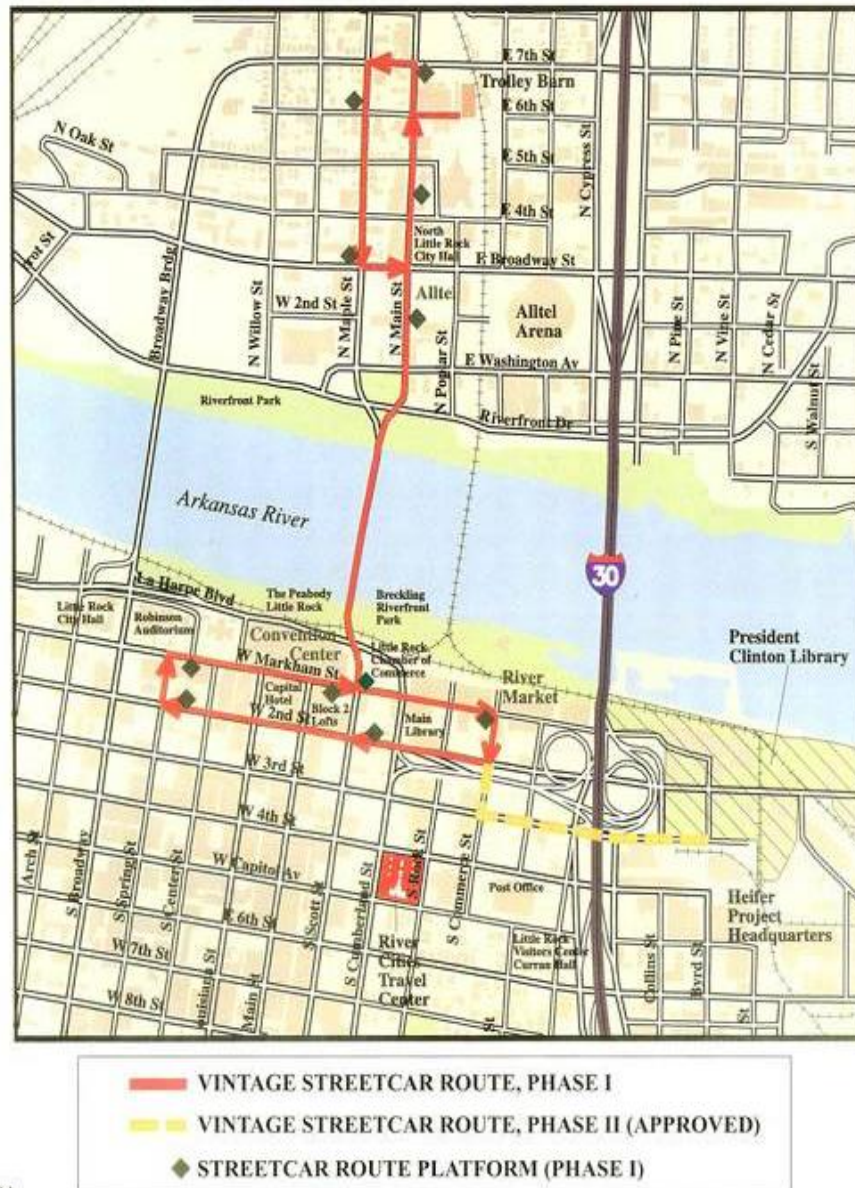
The Central Arkansas Transit Authority owns and operates the streetcars. Approximately eighty percent of the project was funded through a Federal grant program. The remaining twenty percent was funded by the local entities of Little Rock, North Little Rock and Pulaski County. Little Rock is currently anticipating the next expansion of the rails, which would be Phase III. There has been an increase of new development along the rail lines averaging 25 million dollars during the six years of operations. Construction had a total cost of 8 million dollars per mile with a total of 3.5 miles of rail. The total cost so far with the completion of Phase II of the streetcar system in February of 2007 is about 30 million dollars. In its first year of operation they carried 200,000 passengers. In the sixth year of operation River Rail has carried almost 800,000 passengers.

The current ridership is 4,000 weekly, roughly 2,000 on the weekends and 17,000 per month. The annual ridership averages about 170,000 passengers.

Little Rock uses replica streetcars that operate in mixed traffic. These streetcars have a capacity of 88 with 44 seats. The system has a fleet of five vehicles. There are eleven stops along the alignment about every two to four blocks. They operate Monday – Wednesday from 8:30AM – 5 PM; Thursday – Saturday 8:30 AM – Midnight and Sundays 11AM – 5PM. The streetcars run every 25 minutes. The fares for adults are \$1.00, children under age four are free, seniors and disabled persons pay 50 cents and the day pass is \$2.00.



## ROUTE MAP



January, 2004

**Figure 2.2 Little Rock Streetcar Map**

Source <http://www.littlerock.com/info-maps/PDF-maps/Trolley-map.pdf>

### Memphis, Tennessee

The city of Memphis decided to develop a streetcar system in 1990. Streetcar service began in 1993 with an initial 2.5-miles line as a revitalization tool to resurrect the deteriorated downtown pedestrian mall. It is currently seven miles long with combined single and double track. The vintage streetcars serve the downtown sections of the nearby neighborhoods.

The local Memphis Area Transit Authority operates the system. There are three lines, the Main Street, Riverfront and Madison Lines. The Main Street line is the initial line that started in 1993. The Riverfront line was developed in 1997 and the Madison line in 2005. The initial 2.5 miles on Main Street cost \$14 million per mile including tracks, cars and utilities.

The Main Street line is five track miles and it was 7 million dollars per mile, totally 34.9 million dollars. The Riverfront line has two track miles and it cost 4.7 million dollars per mile with a capital cost of 9.4 million dollars. The Madison line called Medical Center line is 5 track miles at 25 million dollars per mile with a total cost of 60 million dollars. The total operating budget is 4 million dollars. The total cost for Memphis' system was 107 million dollars.

The initial ridership was 166,000 annually. During its first complete year of operation in 1994 the streetcar ridership was about 468,000 and had a rapid increase in 2000 to 941,000. The highest ridership days are on weekends. The current ridership is 1,031,000 annually.

Memphis uses Heritage and Replica streetcars and has 20 streetcars in its fleet. There are 35 Streetcar stops combined with stations including inbound and outbound stops. The stops are two to three blocks apart. These three lines transport about 800,000 or more passengers a year. It also connects to the local bus terminals. The streetcars operate seven days per week from 6AM – 1 AM with headways of 10 minutes. The fare is \$1.00 and \$0.50 for seniors and disabled persons.



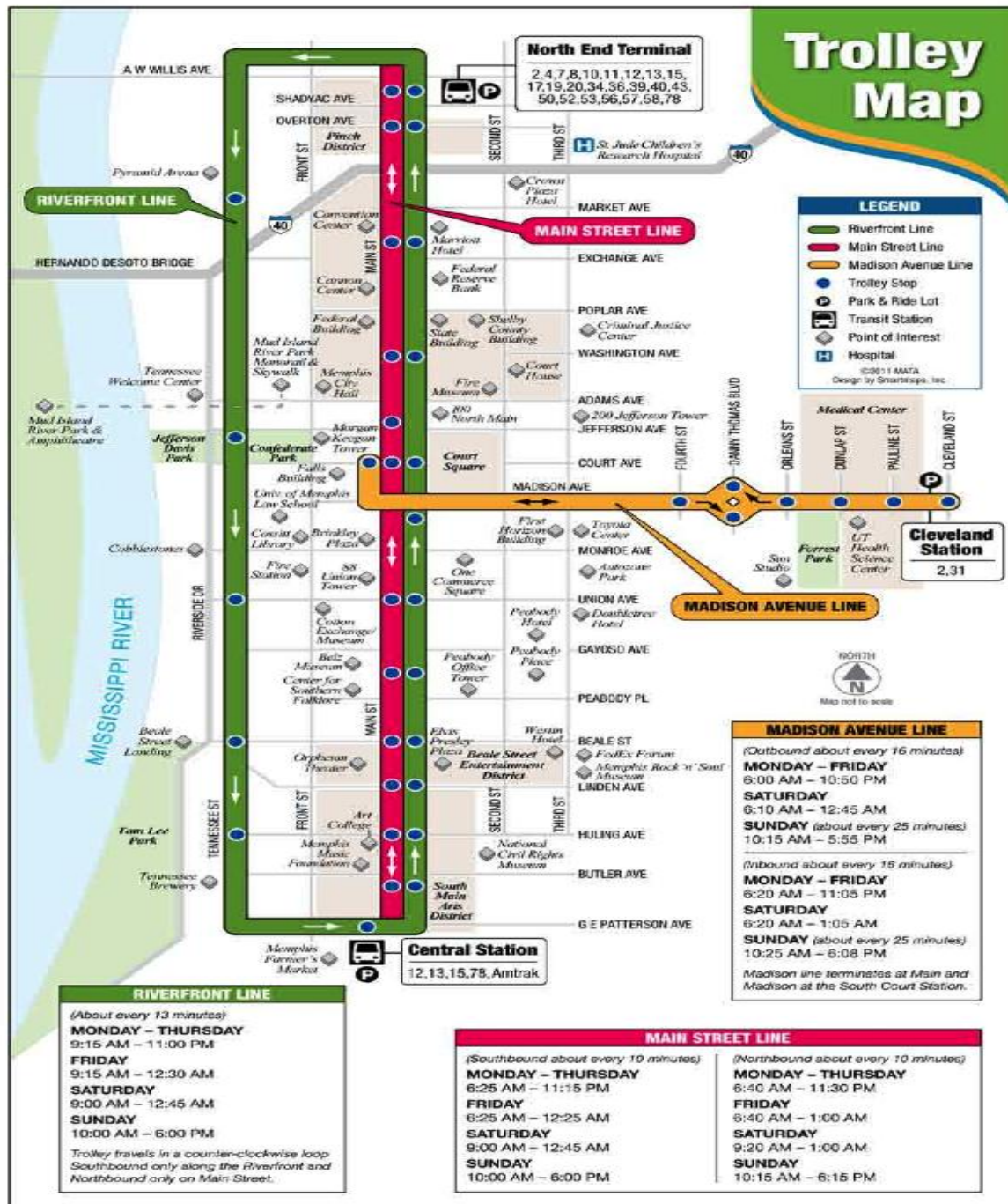


Figure 2.3 Memphis Streetcar Map  
Source <http://www.matatransit.com/>

## Portland, Oregon

The first modern streetcar vehicles on streetcar lines in the United States were started in Portland Oregon. In 2001 it began with an initial 4.8-mile loop of track. In 2005, the city constructed a 1.2-mile loop extension to the River District, and an additional 0.6-mile single-track extension to the Waterfront District. The network provided transit service to different older Portland communities. It created a connection between the main hospital, downtown and Portland State University. The expansion to the River District serves a lively mixed-use neighborhood at an abandoned rail yard and Brownfield. The streetcar stops are located every three to four blocks. Its primary passengers are students, workers, residents, workers and visitors. The Portland streetcar network connects to the regional bus and light rail systems. It follows the light rail system.

The design, construction, and operation of the streetcars were managed by Portland Streetcar, Inc., a nonprofit corporation that was formed in 1995. The city of Portland owns and operates the streetcars. Portland is recognized as a great model for streetcar development. This streetcar system has sparked urban development. It has drawn many real estate developers to the downtown neighborhoods with over 3 billion dollars in private investments. The construction of the initial 4.8-mile loop and its two shorter extensions cost about 87 million dollars; a large amount of it came from local sources, and the federal government contributed

only 5 million dollars. Approximately 28.6 million dollars (one-third of the funds) came from bonds derived from city parking revenues. The urban renewal agency generated 19.7 million dollars from property taxes paid by new developments created along the streetcar route. An additional 14.6 million dollars of the preliminary costs were funded through a “local improvement district,” a particular assessment available under Oregon state law. They also received a one-time contribution from businesses within the district based on their size and proximity to the line. The regional transit authority funds almost two-thirds of the line's 3.3 million dollars annual operating cost. The rest of the funds come from parking revenues, fares and promotions. Portland Streetcar's construction cost was 25 million dollars per track mile for the initial phase and this included the purchase of seven vehicles. The two expansions cost about 13 million dollars per track. Portland's streetcar initial ridership was 4,300 passengers on weekdays and has increased to 13,000 per day. The annual ridership is 3.6 million. The Streetcars travel on a 8.0-mile continuous loop (4.0-miles in each direction) from Legacy Good Samaritan Hospital at NW 23rd Avenue, on Lovejoy and Northrup, through the Pearl District and on 10th and 11th Avenues, Portland State University, SW River Parkway & Moody (River Place), SW Moody and Gibbs in the South Waterfront District where it connects with the Portland Aerial Tram to a terminus at SW Lowell and Bond.

These modern streetcars are 2.46 meters (about 8 feet) wide and 20 meters long (about 66 feet). They operate in mixed traffic and are compatible with the existing curbside parking and loading. The streetcars can carry about a hundred and forty passengers and are handicapped accessible. Portland has a fleet of ten Streetcars. There are forty-six stops along the street alignment about every 3-4 blocks. They operate Monday - Thursday 5:30 AM - 11:30 PM, Friday - 5:30 AM - 11:45 PM; Saturday - 7:15 AM - 11:45 PM, Sunday - 7:15 AM - 10:30 PM. These streetcars run every twelve minutes during the day on Monday through Saturday and less often in the early morning, evenings and Sundays. The fares for adults are \$2.00; seniors and disabled \$1.00; and children \$1.00.

#### Lessons For Athens

The Portland streetcar system has been effective in creating connections between its major activity centers, Portland University, The different districts and downtown. The frequency and accessibility of services have created high ridership for the system. The system got funding from parking services and private partnership with Portland University. The Athens system can be funded too as well as with a possible partnership with UGA.

Source [www.portlandstreetcar.org](http://www.portlandstreetcar.org)

### Seattle, Washington

The Seattle network is called the South Lake Union Streetcar system. It began operation in 2007 with an initial and existing 1.3 miles long and a 2.6 track miles. The service was initiated to spark economic redevelopment in the south Lake Union district that is adjacent to the Seattle Central business district. The system provide services to the downtown core, the University of Washington, the University of Washington Medical, the Denning Triangle, South Lake Union communities and the waterfront park in Lake Union. It also connects to buses, Monorail and the Central Link Light rail systems.

It is owned by the city of Seattle and is operated by the King County Metro Transit. Seattle's system was supported and initiated by the property owners who formed the Local Improvement District (LID). The LID funded half of the capital cost which was 25.7 million dollars. The other half was funded by federal and state sources. The capital cost was 52 million dollars. The operating cost is 2 million dollars annually.

The initial ridership was 970 daily in Jan 2008. It is currently 1,700 daily and an annual ridership of about 330,000. In its first year the ridership was 507,000 for the year. The system has modern streetcars with a capacity of 140 people (27 seats).

The fleet has three vehicles. There are eleven streetcar stops that are two to three blocks apart. The service operates Monday – Thursday from 6AM – 9PM, Friday- Saturday from 6AM – 11 PM and on Sunday from 10AM – 7PM

These cities have had great success with streetcars. What can streetcars do for Athens? The reintroduction of streetcars also poses the question, how will Athens benefit?

Similar to these cities that have resurrected streetcars it is possible for the revitalization and redevelopment of downtown Athens as well as the deteriorated neighborhoods.

#### Lessons for Athens

In Seattle property owners invested in the streetcar system and formed LID. The city of Athens could do the same by encouraging property owners to invest in the system. The property values increase along the streetcar corridor and encouraged economic development.





**Figure 2.5 Seattle Streetcar Map**Source:  
<http://www.railwaypreservation.com>



Table 2.3 Summary of Case Study Streetcar Systems

City	Initial Length (Miles)	Current Length (Miles)	Headway (Minutes)	Initial capital Cost in Millions	Total Cost In Millions	Average capital cost Per mile	Initial Ridership	Current Ridership	Annual Ridership
Little Rock	2.5	3.4	25	20.5	30	8.3	384 daily	134-567 daily	170,000
Memphis	2.5	7	5-10	N/A	107	8.7	457 daily	2,,825 daily	1.031,000
Portland	2.4	5	10-15	56.9	103.2	12.9	4300 weekday	13,000 weekday	3,600,000
Seattle	1.3	1.3	15	52	52	20	970 daily	1,780 daily	330,000

The implementation of streetcars in the cities described in the case studies show that a streetcar system could provide both transportation and economic development benefits. They prove that streetcars can improve accessibility to downtown areas and surrounding neighborhoods. This alternative form of transportation reduces the need for parking facilities and reduces vehicular traffic.

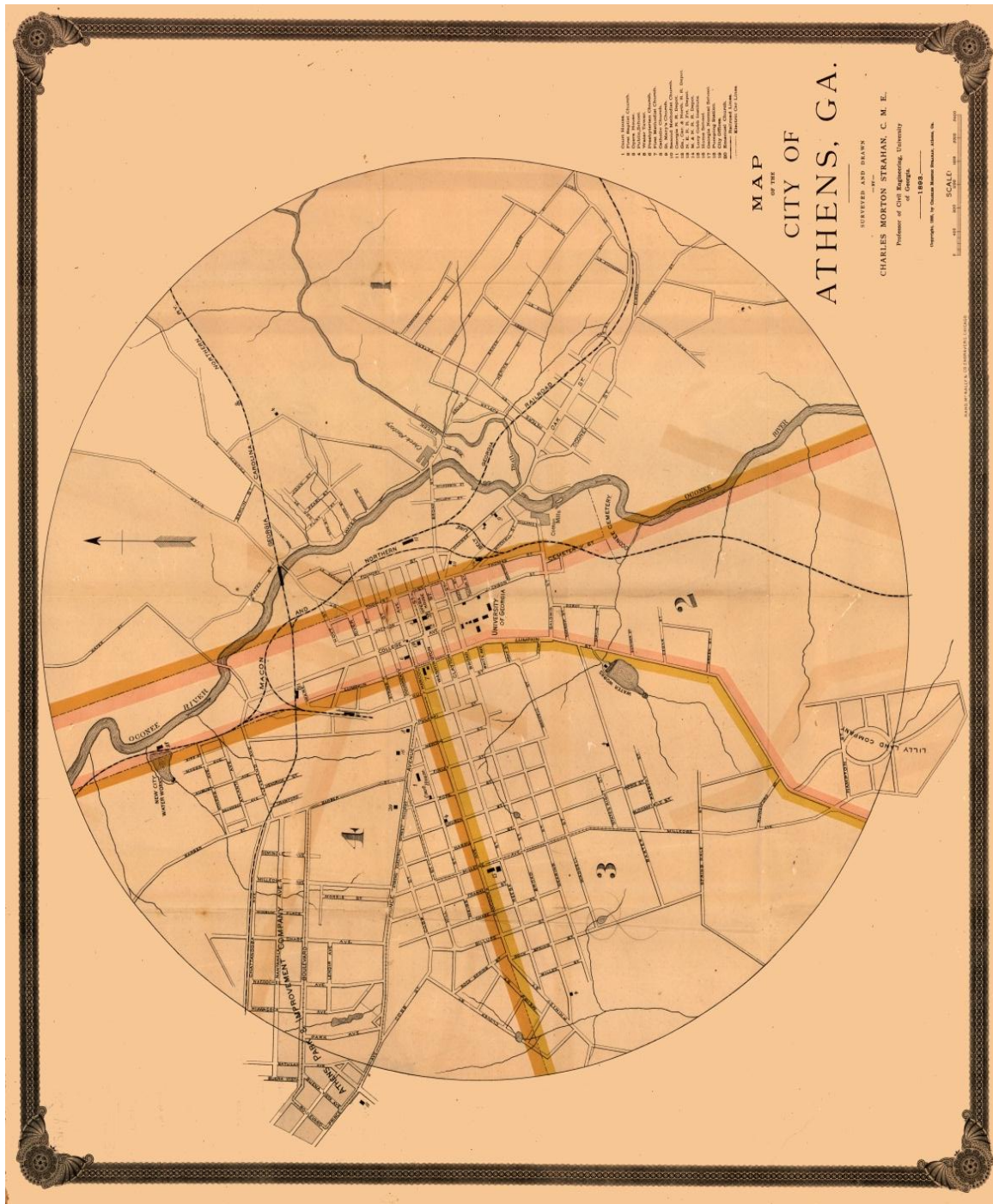
## CHAPTER 3

### BRIEF HISTORY OF STREETCARS IN ATHENS

Athens streetcar system was instrumental in forming the early development pattern of Athens and its suburban neighborhoods. The tracks were laid in the early 1880's. The system was originally designed to be mule or horse-powered, and in December 1885 the first streetcar was seen in Athens called the Classic City Railway. A Mr. Snodgrass from Texas developed the initial system. Snodgrass sold the streetcar system to some Athenians led by a Mr. Joseph Haswell Dorsey who later sold it in 1889 to E.G Harris and John Voss. They renamed it the Athens Railway Company.



**Figure 3.1 Athens Trolley Barn** Source: Hargrett Rare Book and Manuscript Library /University of Georgia Libraries.



**Figure 3.2 Historic Map of Athens 1893**

Source Courtesy of James Reap author of the book History of Athens



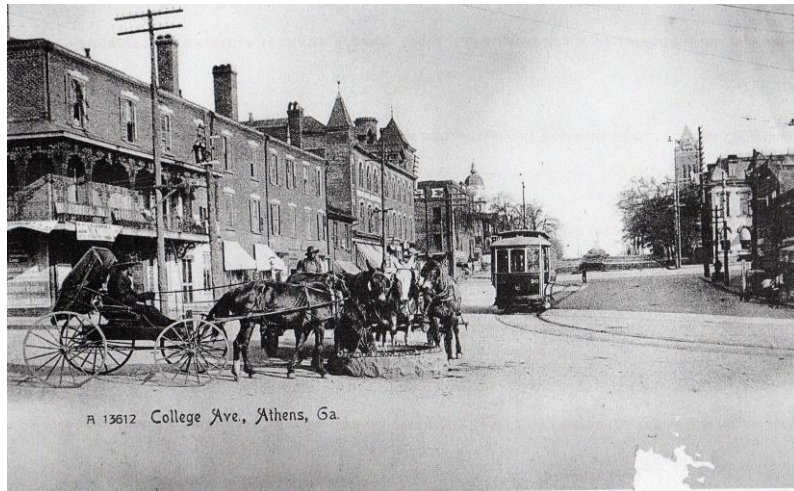
**Figure 3.3 Map of Historic streetcar routes in Athens**

Route Drawn by Author -Source Hargrett Rare Book and Manuscript Library /University of Georgia



In 1891 the developer E.G Harris switched it to electric power and in June 23 1891 the initial electric streetcar system began. In 1893 Harris and Voss declared bankruptcy. The new owners renamed it the Athens electric railway company, which also supplied electricity for the streetcars, residents and businesses in Athens. In 1926 the company was controlled by the Southern Power and Light Company, which joined forces with other electric companies statewide and formed the Georgia Power Company in 1927.

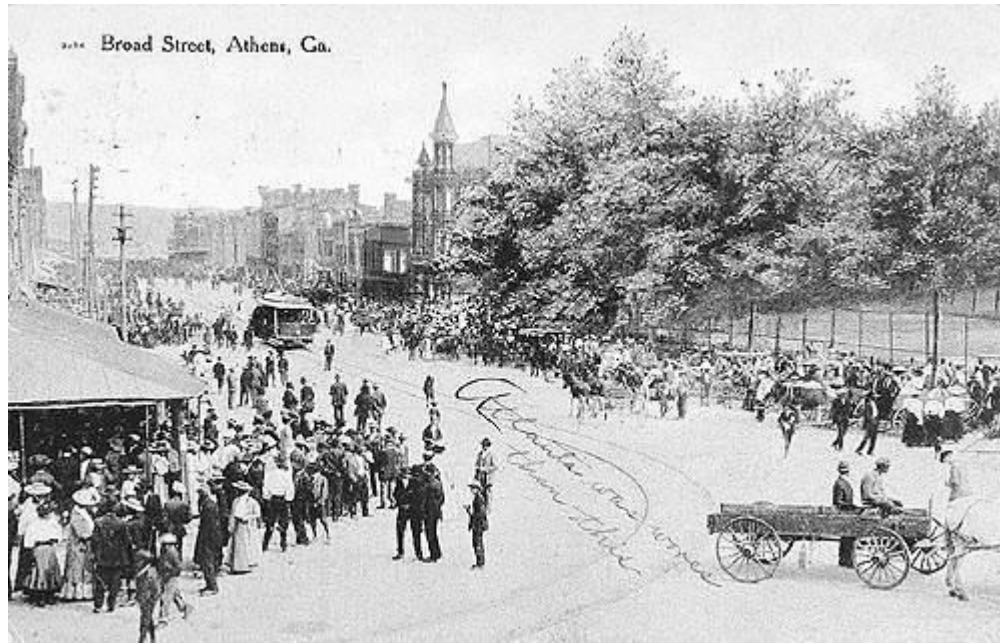
The first lines were constructed on Broad, College, Clayton, Lumpkin, Hancock, Prince, Milledge and Pulaski (Rowan 1823). These trolleys travelled on 18-pound rails (Doster 2002). The streetcars travelled down, Boulevard, Prince, Broad, College, Hill, Clayton, Lumpkin, Hancock, Pulaski, Thomas, Washington and Milledge streets. A new residential community north of Prince Avenue was developed and the lots were sold for housing in Athens as its first streetcar suburb along Boulevard. The streetcar barn was located on Boulevard and the residents were shuttled to the downtown areas of Athens. The longest routes were on Boulevard, Prince and Lumpkin.



**Figure 3.4 College Avenue Streetcar**

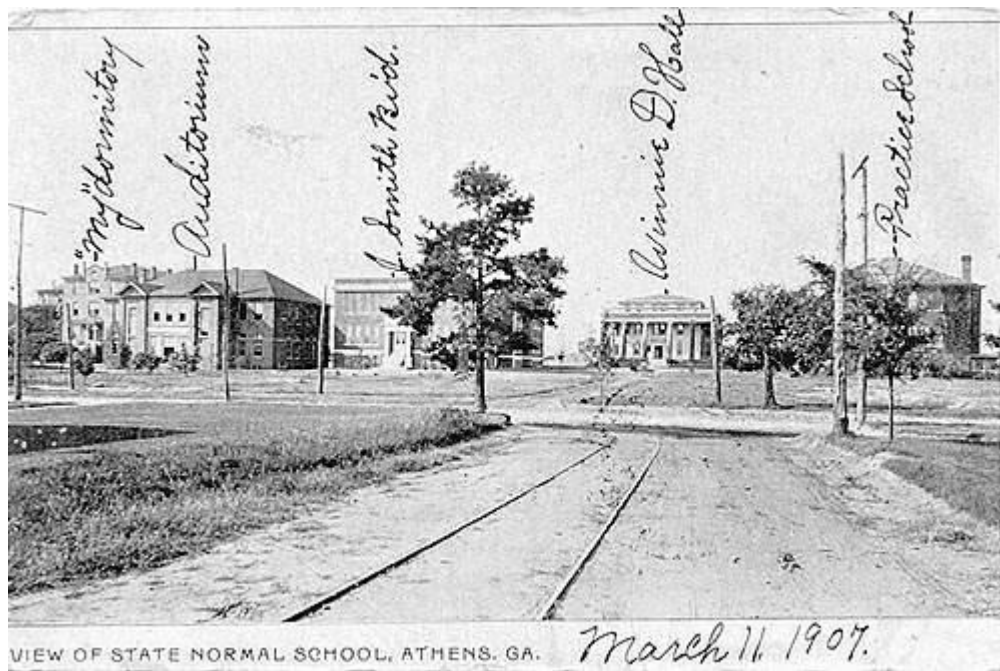
Source Hargrett Rare Book and Manuscript Library /University of Georgia Libraries.

There was an increase in automobile use as the city developed and streetcars were eliminated in March 1930. The trolleys were replaced with buses. The streetcar routes operated in mixed traffic. The trolleys operated on rights-of-way operate within the median of the streets, separated from traffic by raised curbs and controlled by specific traffic signals at intersections.



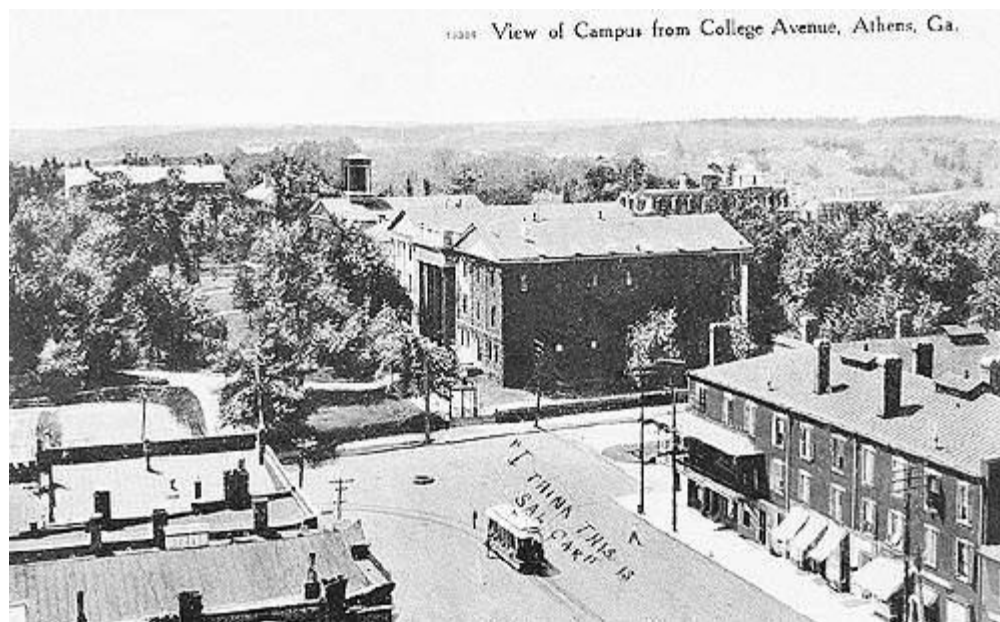
**Figure 3.5 Broad Street**

Source Hargrett Rare Book and Manuscript Library /University of Georgia Libraries.



**Figure 3.6 View of State Normal School currently the Navy School**

Source Hargrett Rare Book and Manuscript Library/ University of Georgia Libraries.



**Figure 3.7 View of UGA from College Avenue streetcar line**

Source Hargrett Rare Book and Manuscript Library/ University of Georgia Libraries.



## CHAPTER 4

### THE PLAN STUDY AREA

The study area is part of the Athens Clarke County municipality. The city of Athens is the principal urban area of Clarke County. It is a regional employment, retail, educational, entertainment and health services center. It is connected to University Parkway/316 and US 78, 441 and 29, which connect to other cities. Athens Clarke County is a member of the Madison Athens- Clarke County Transportation Study (MACORTS) and this is the metropolitan planning organization for the ACC area (MPO).

The regional employment centers of ACC are UGA, Athens Regional Medical Center (ARMC), Athens Clarke County Board of Education, and St Mary's Hospital. Downtown Athens is the heart of the county; it is the main location for entertainment, cultural centers and the multimodal transportation center. It is also a tourist destination and home to UGA Georgia Bulldogs.



**Figure 4.1 Downtown Athens at College Av.** Source author



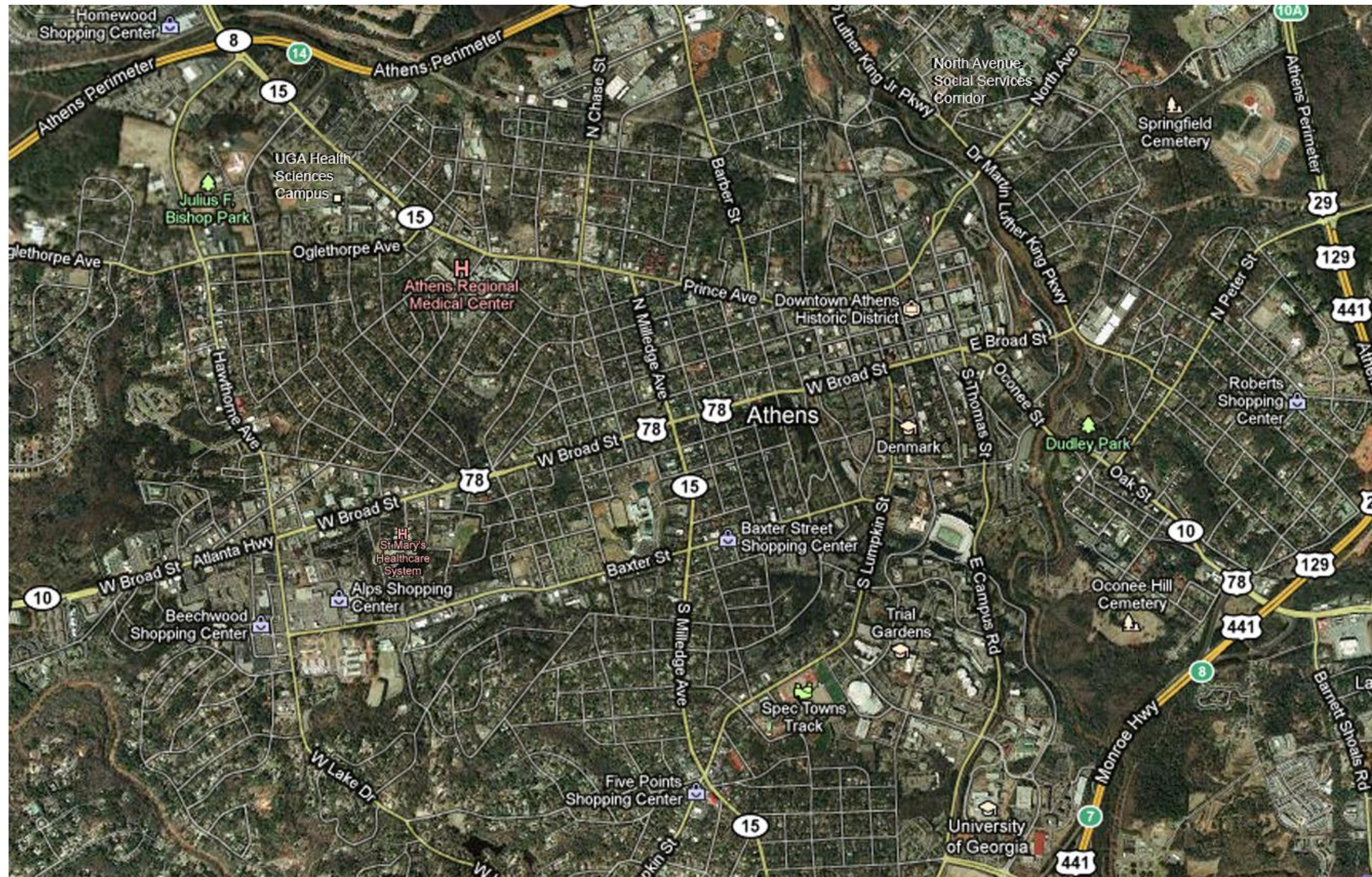


Figure 4.2 Map of Athens with Major Activity Centers  
Source: Google maps



## **The Potential for Streetcars in Athens**

The main reason for the reintroduction of streetcars in the U.S. is to serve the public and revitalization of cities. Since streetcars have been successful in other cities that have similar patterns, it has the potential to be successful in Athens. Streetcars have helped revitalize cities such as Memphis, Portland, and New Orleans. In Memphis, along Madison Avenue, streetcars promoted transit oriented development (TOD), Leadership in Energy and Environmental Design Neighborhood Development (LEED-ND).

Athens offers an opportunity for the reintroduction of streetcars. It has the attributes that can satisfy streetcar projects and it will be consistent with the county's land use vision. The city's urban form offers various areas that a streetcar can serve by planning the system throughout the denser areas of the city including, the deteriorated and low-income neighborhoods.

Streetcars are more attractive than buses, are quieter and with no greenhouse gas emissions (Poticha and Ohland 2009). The proposed streetcar system for Athens would replace most of the existing bus service along the streetcar routes and increase transit capabilities because streetcars carry more people than a bus. The tracks would be set in the streets' public right of way and sharing the streets with other vehicles. The proposed network would connect several neighborhoods.

The proposed streetcar system is intended to supplement and complement the other alternative transportation modes such as the buses. The different populations in Athens can benefit from the streetcar network including the UGA community, low-income households, the elderly, tourist and households without vehicles. The primary purpose of this system would be to link the neighborhoods with a more accessible and reliable public transit. The plan is to provide a streetcar service that extends from Downtown Athens into the surrounding neighborhoods especially into the low-income areas. This network should be linked to the ATS Multimodal Center.

Streetcars are a viable option for the corridors with high bus ridership and serve as an alternate to the buses. It can also replace some of the buses although buses can navigate on any street. Some people may prefer to invest in buses instead of streetcars, however buses do not promote development and more people are attracted to streetcars than buses (Weyrich and Lind 2009).

Streetcars increase ridership when they replace buses. Streetcars can supplement the existing bus system with a permanent rail line that shows developers that it will be there for years compared to bus line (Weyrich and Lind 2009). Streetcars attract choice riders. In comparison to buses they shape communities by connecting walkable neighborhoods and are very convenient for short trips (Taylor 2009).

The population continues to grow outwards and is increasing urban sprawl. Creating mixed-use development for entertainment, restaurants, educational, residential, institutional purposes and for healthcare facilities can help reduce sprawl. The combination of good quality transit such as streetcars combined with a walkable higher density neighborhood could offer Athens good quality of life characteristics. Walkable cities can offer urban lifestyle opportunities that will attract new residents and investors.

Based on the case studies and the analysis of other cities with streetcars the following conclusions were made:

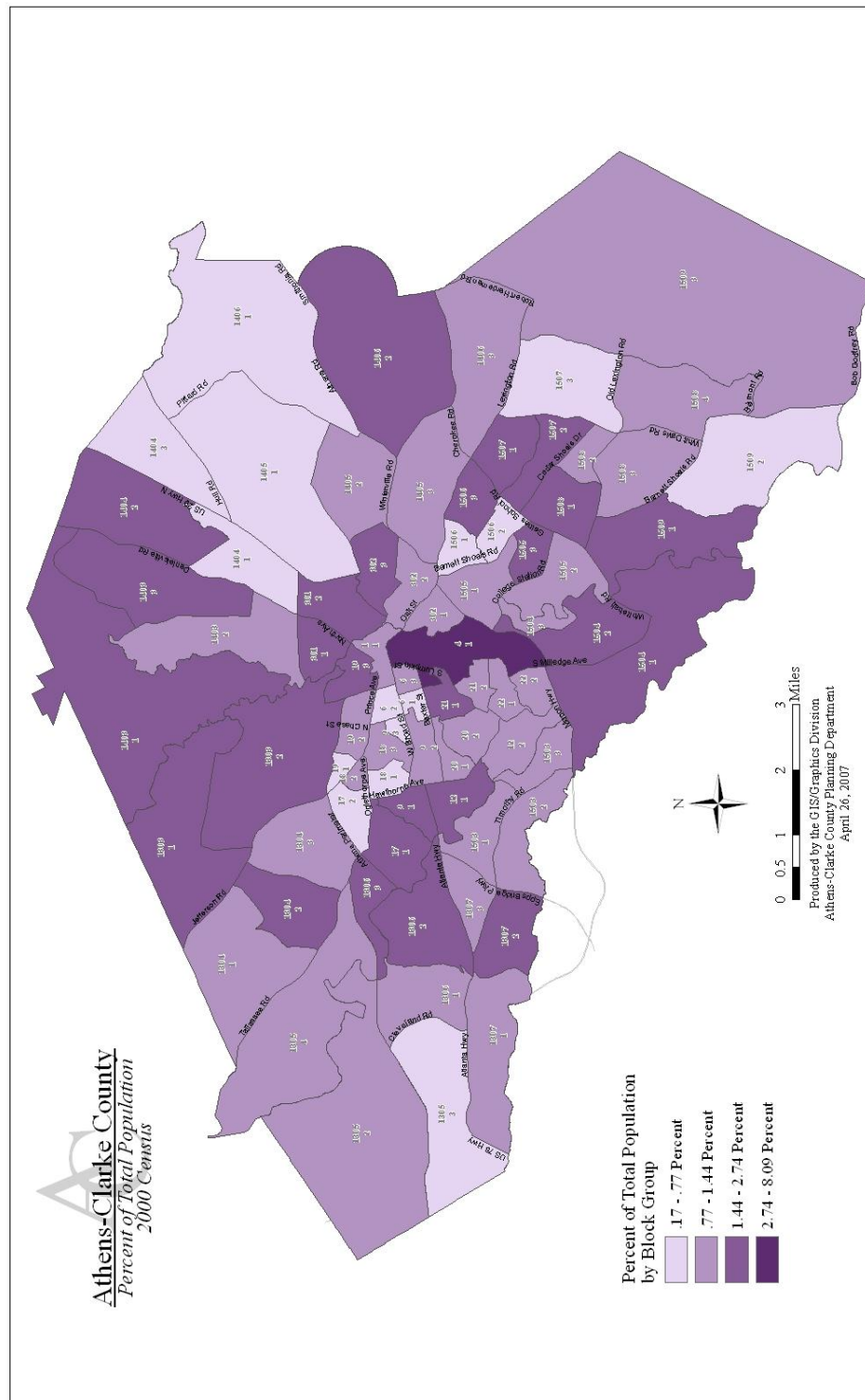
- Streetcars provide an alternative attractive transportation option. This would improve mobility within the city.
- It also increases transportation for those who cannot afford cars or buy fuel.
- Streetcars promote affordable housing and mixed used development. It also improves economic investments.
- It provides revitalization and access to existing and future affordable housing. Streetcars attract new investments.
- It would be an appropriate link supporting Prince Avenue, Athens Regional Medical Center, North Avenue, the planned UGA Medical College and Normaltown.
- Streetcars could support residential communities especially the low income and other underserved communities.

- They would support the ACC Comprehensive plan; support the sustainability goals, promotes the historic downtown core, provide additional transportation mode, and promote the historic characteristics of the city.
- They increase accessibility to activity centers, businesses and residences. They could foster partnership among neighbors, developers, UGA and ACC.
- Streetcars could be integrated into the existing alternative transportation modes, pedestrian and bike system, which could reduce, auto dependency and increase mobility for all forms of travel.

## **Demographic Profile**

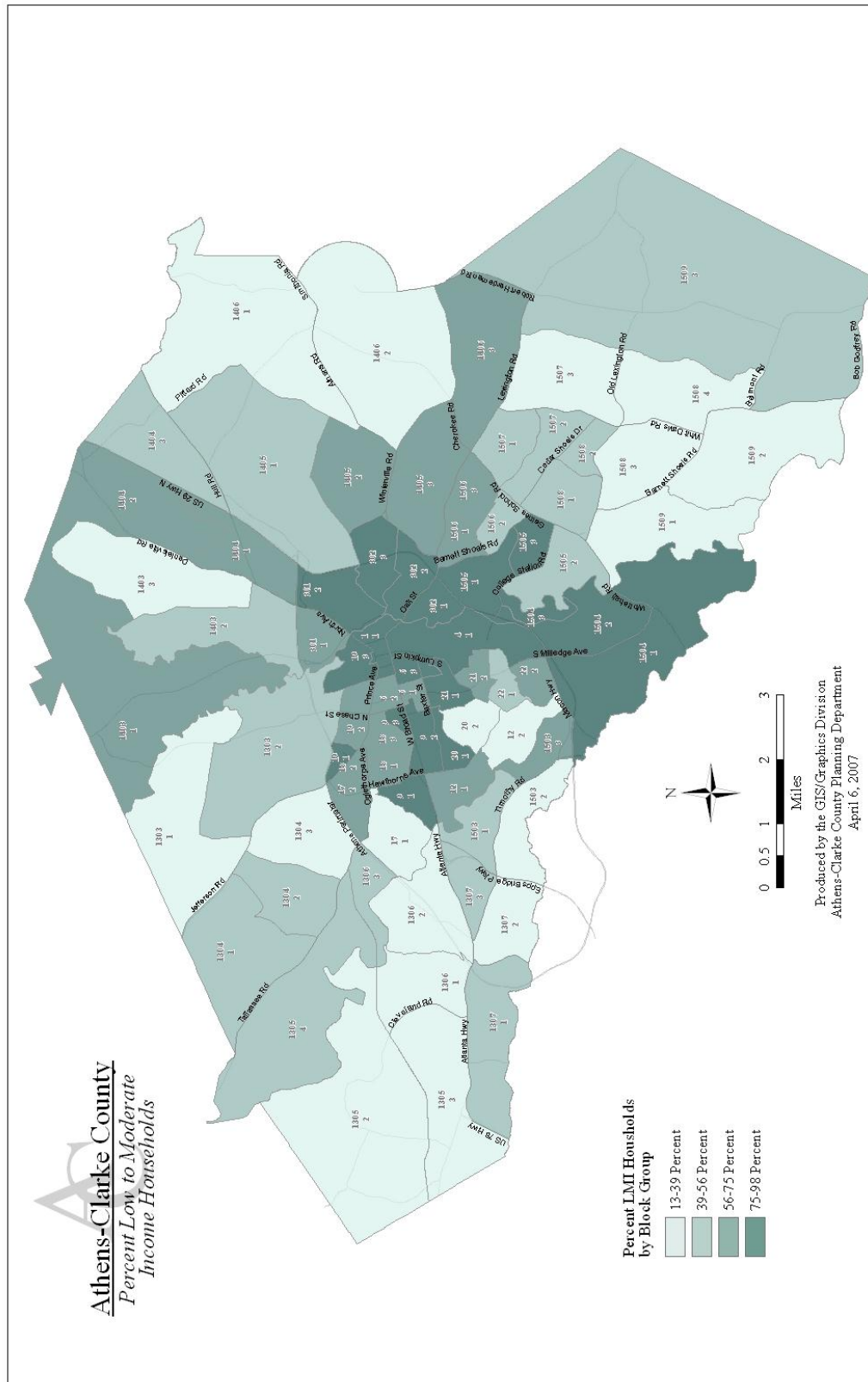
On March 17, 2011 the U.S. Census Bureau released the 2010 population totals for the state of Georgia. Athens grew from 100,421 in 2000 to 115,592 in 2010.

The population density for Athens in the US 2000 Census was 854.4 persons per square mile (ATS Update Plan 2009). The highest density was close to UGA, at Baxter Street and Lumpkin Avenue as well as South Milledge Avenue (ATS Plan Update 2009). The rate of growth for this region is expected to increase with the job opportunities and the University of Georgia's new Health Sciences campus and engineering school expected to open in 2012. The population is projected to be 127,571 by 2015, 135,077 by 2020, 143,024 by 2025, 151,440 by 2030 and 160,350 by 2035 (MACORTS 2009).

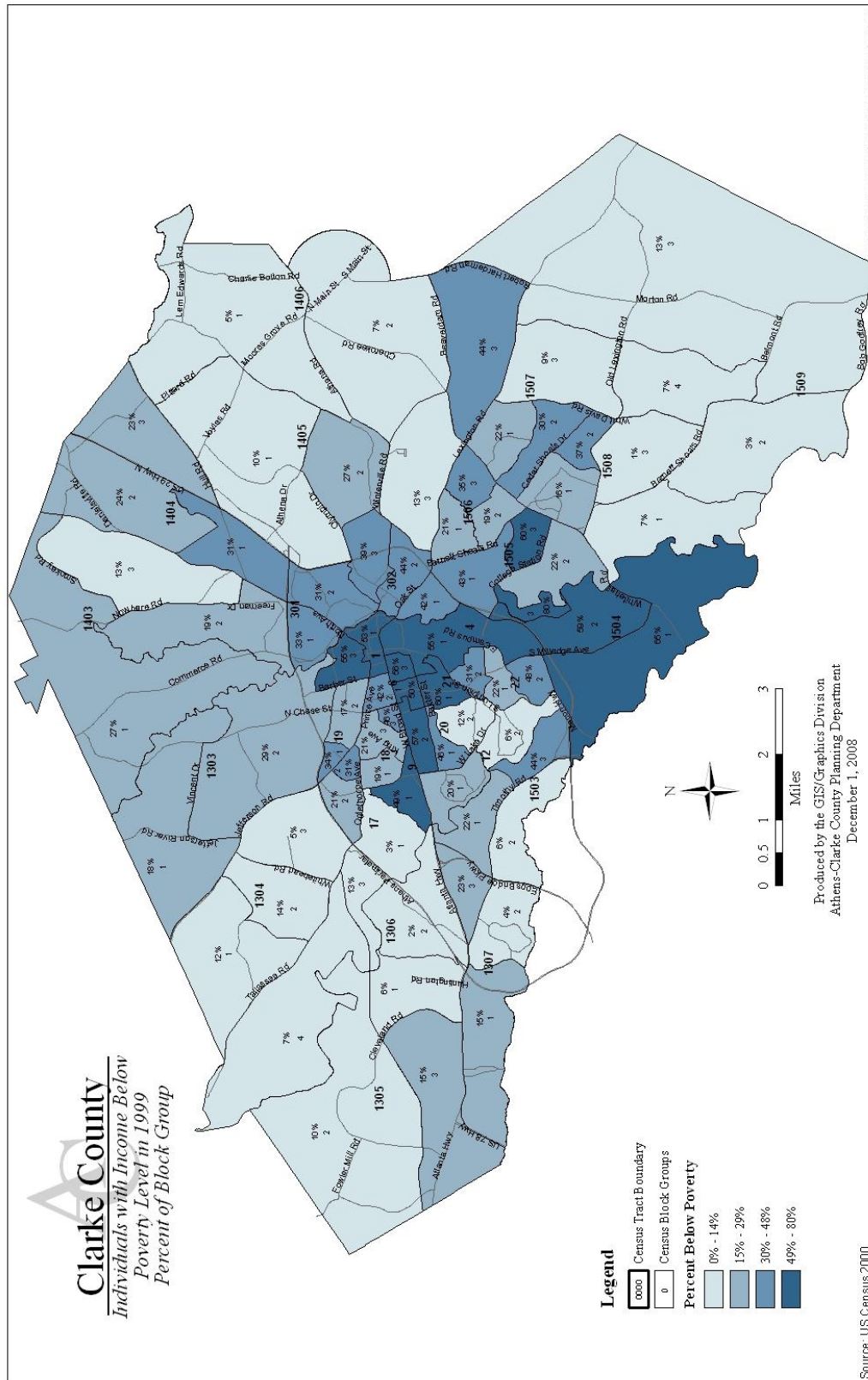


**Figure 4.3 Percent of Total Population by Block Group**  
Source: ACC Planning Department-GIS Division

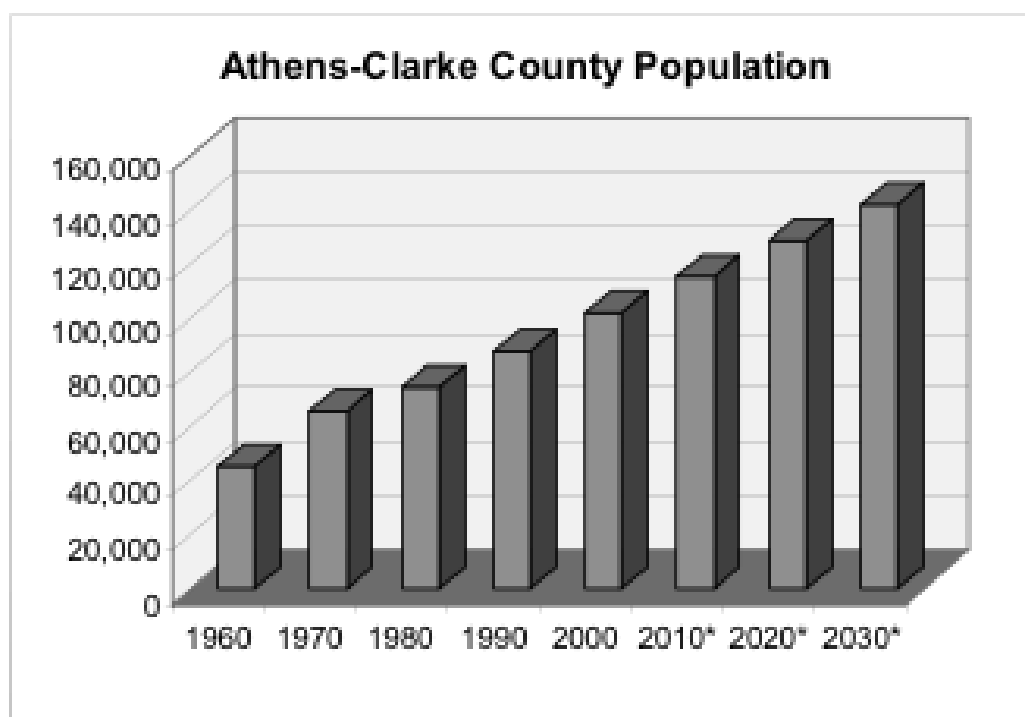




**Figure 4.4 Percent of Low To Moderate Income**  
Source: ACC Planning Department-GIS Division



**Figure 4.5 Individuals with Income Below Poverty**  
 Source: ACC Planning Department-GIS Division



Sources:

U.S. Census Bureau, 1960-2000 population.

MACORTS 2030 Long Range Transportation Plan, 2010-2030 population.

**Figure 4.6 Athens- Clarke County Population**

Source Athens Transit Needs Assessment Study

**Table 4.1 Athens Populations**

Total Population 2010	115,592
2010 Households	39,706
2010 Housing Units	50,504
Owner Occupied Homes	44.6%
Renter Occupied units	55.4%
Vacant Housing Units	15.5%
Median Household Income	\$33,364
Median Age	24.5
Percentage Of population 65 years or older	8.4%
<b>Means of Transportation to work</b>	
Drove Alone	75.1%
Public Transport (excluding Taxi)	3.7%
Carpooled	11.4%
Walked	5.0%
Other Means	2.4%
Work at Home	3.2%
Household With No Vehicle	8.1%
Low Income Household	19.1%
Unemployment Rate	7.1%
Poverty	28.6%
University of Georgia Enrollment (Fall 2010)	34,677(Fall 2010)

Source: US Bureau of Census 2010; 2010 Georgia County Guide, Center for Agribusiness and Economic Development, UGA, Athens, GA.

## **Planning Context**

Athens is a very vibrant city with historic districts and stable neighborhoods. These historic districts are Athens Warehouse Historic District, Bloomfield Street Historic District, Boulevard Historic District, Buena Vista Heights Historic District, Cobbham Historic District, Dearing Street Historic District, Downtown Athens Historic District, Downtown Athens Historic District, Milledge Avenue Historic District, Milledge Circle Historic District, Oglethorpe Avenue Historic District, West Hancock Avenue Historic District, and Woodlawn Historic District.

The opportunity for a streetcar network can enhance the rich history and characteristics of the city. The streetcar system can complement the county's planning goals especially the comprehensive plan. As commercial and residential developments continue in Athens there will be an increase need for mobility. The University of Georgia will continue to grow as well as the employment centers such as Athens Regional Medical Center, St Mary's hospital, Prince Avenue corridor and East Athens. Providing access and mobility for downtown Athens, UGA students, employees, visitors and new residents could help maintain local businesses and push renewal to some neighborhoods.

Athens has initiatives that are improving the quality of the streets and public spaces. For Example, a corridor study of Prince Avenue was done by ACC planning department to identify streetscape and redevelopment initiatives. The county has also acknowledged the prospective need for parks, greenways, pedestrian and bicycle routes that will connect to existing and potential public transportation systems.

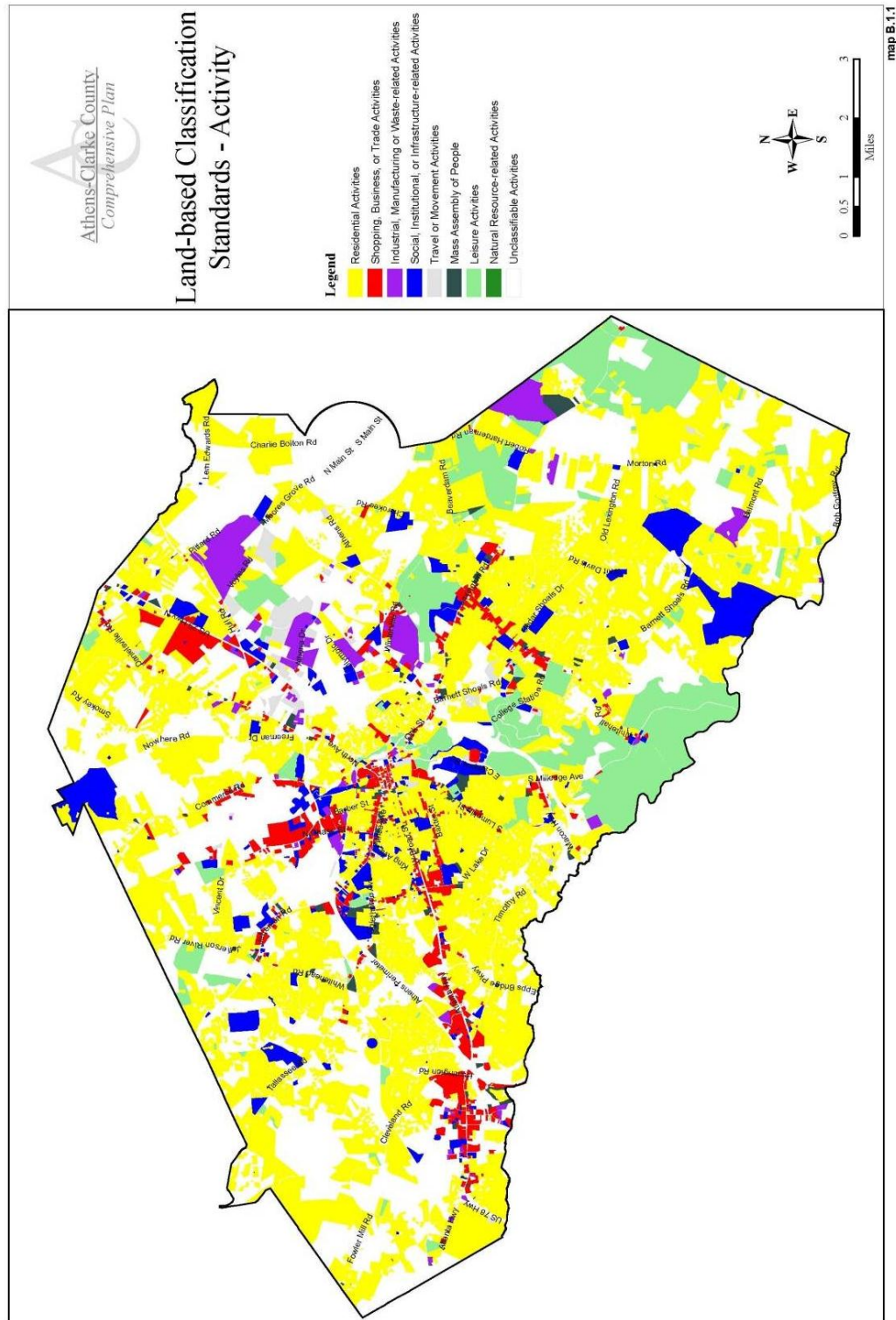
The planning context for this practicum includes both the physical attributes of the existing built environment, as well as the numerous plans, policies and guidelines that have been adopted for the county.

### **Land Use Plan and Existing Conditions**

The ACC planning department prepares a comprehensive plan to guide development and growth in the county. These plans address land use, housing, environment, economic development, future land use, zoning, infrastructure and transportation. The streetcar plan will be subjected compliant with or will require amendments to the ACC comprehensive plan. Transportation patterns in Athens like many other cities in America are related to land use and development. Streetcars have an effect on the urban fabric of a neighborhood. The impacts of Streetcar implementation have to be consistent with the ACC planning goals and would have to be a positive benefit to the ACC transportation planning goals.

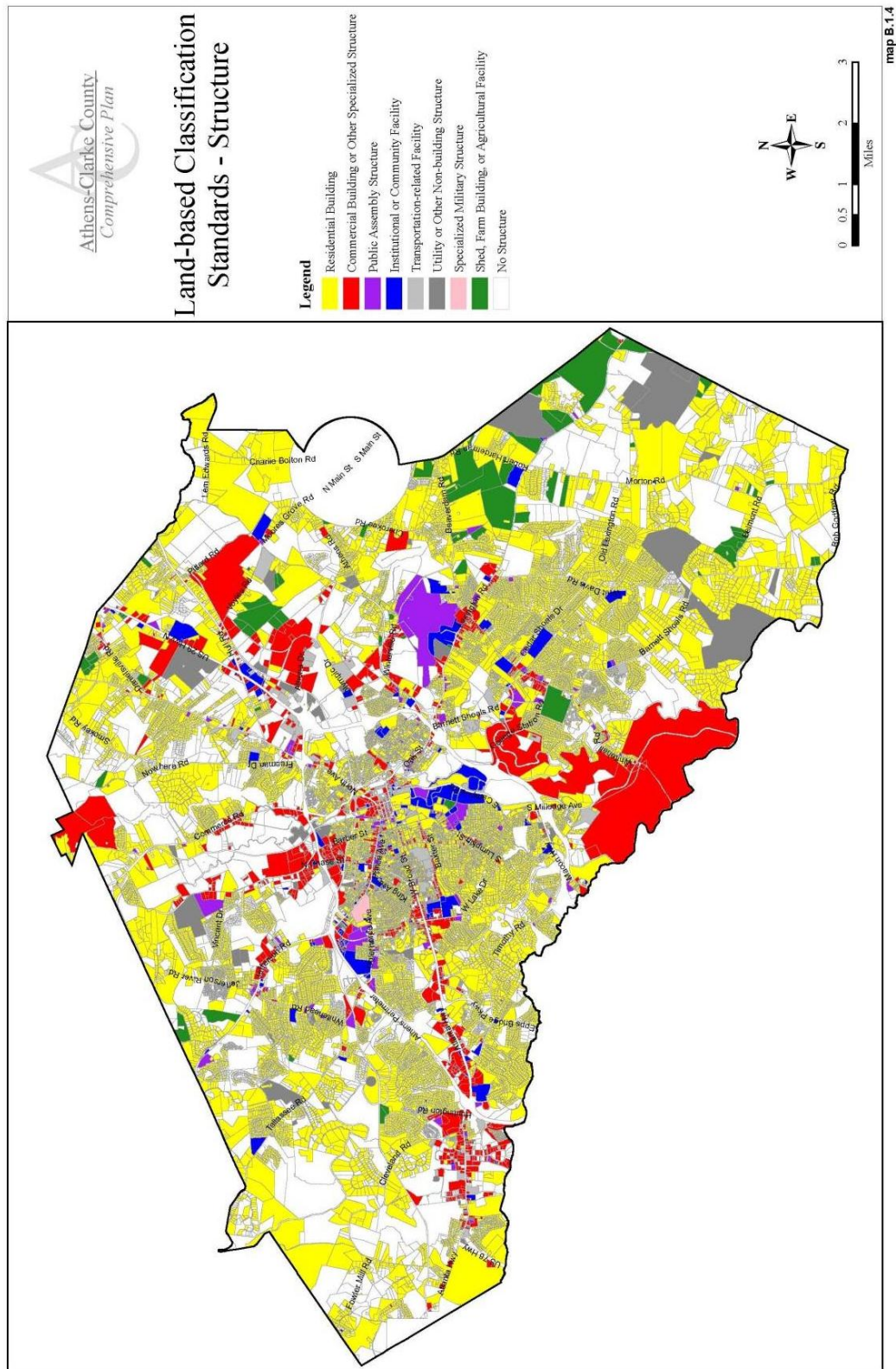
The ACC comprehensive plan envisions a sustainable transportation development for the county that will impact quality of life, quality of the environment, economic competitiveness, transit oriented development, housing, mobility and walkability (ATS Study 2009). The guiding principle for mobility in the ACC comprehensive plan is “to support transportation policies that offer viable alternative to the automobile” (ACC Comprehensive Plan 2008). A streetcar project is a viable alternative to the automobile and would have a positive impact on the county as well as ATS goals.

ACC planning department has initiatives for improving the street qualities and public environment. The city plans to improve parks, urban green spaces, and bike lanes along with pedestrian paths. Some of the ACC planning goals are applicable to the potential streetcar system for Athens for example; Athens comprehensive plan visions, guidelines and policies. The comprehensive plan has various guidelines and policies that support the reintroduction of streetcars. All these policies are relevant and support the proposed streetcar system. The ACC comprehensive plan guiding principles could be directly applied to the proposed streetcar system for Athens. This practicum will knit together the opportunities identified in the comprehensive plan guiding principles and explore potential opportunities to uncover the best potential routes for the streetcar system. Streetcars may help to enhance these corridors.

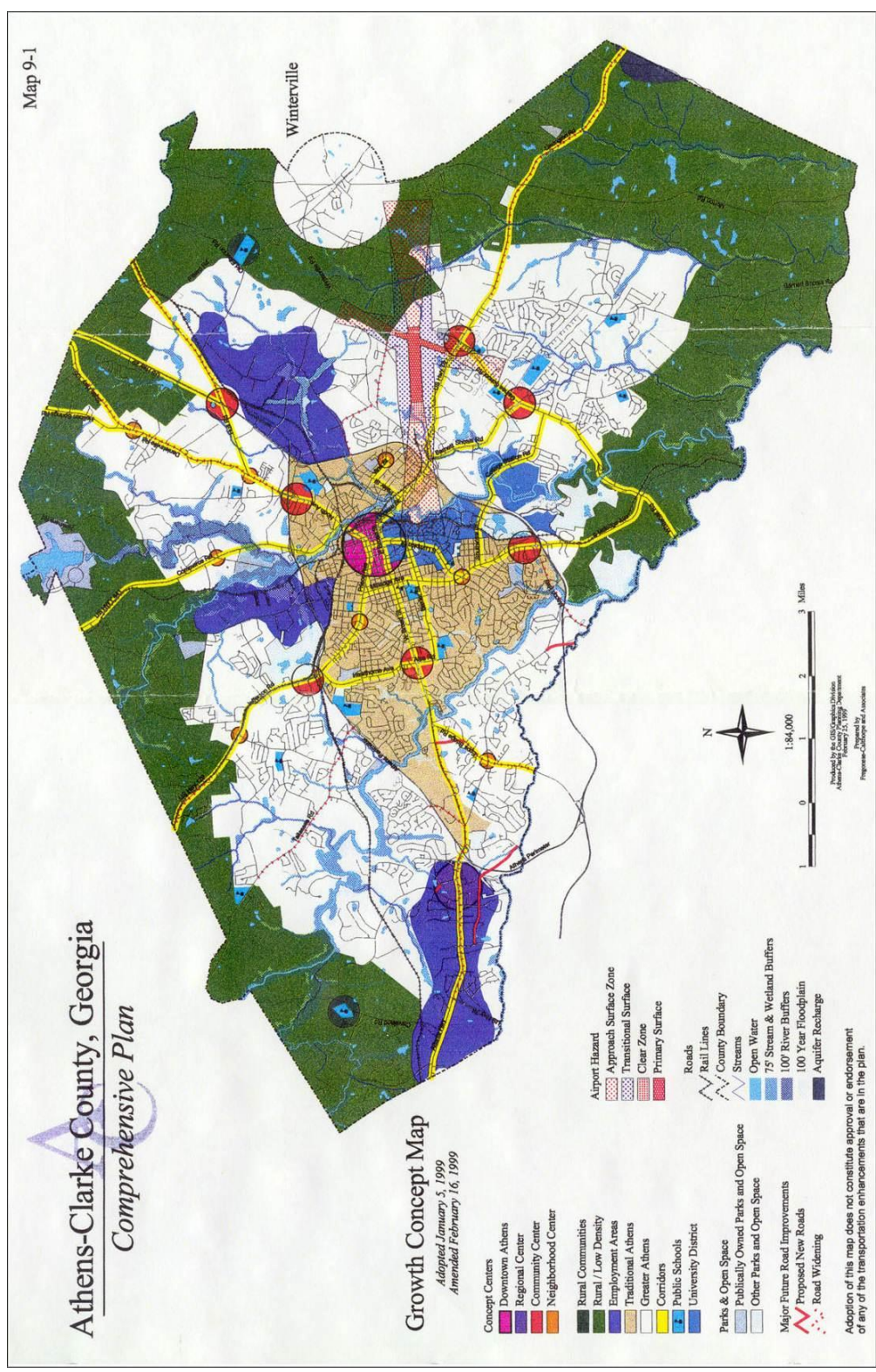


**Figure 4.7 ACC Existing Land Use Map Map**  
Source: ACC Planning Department



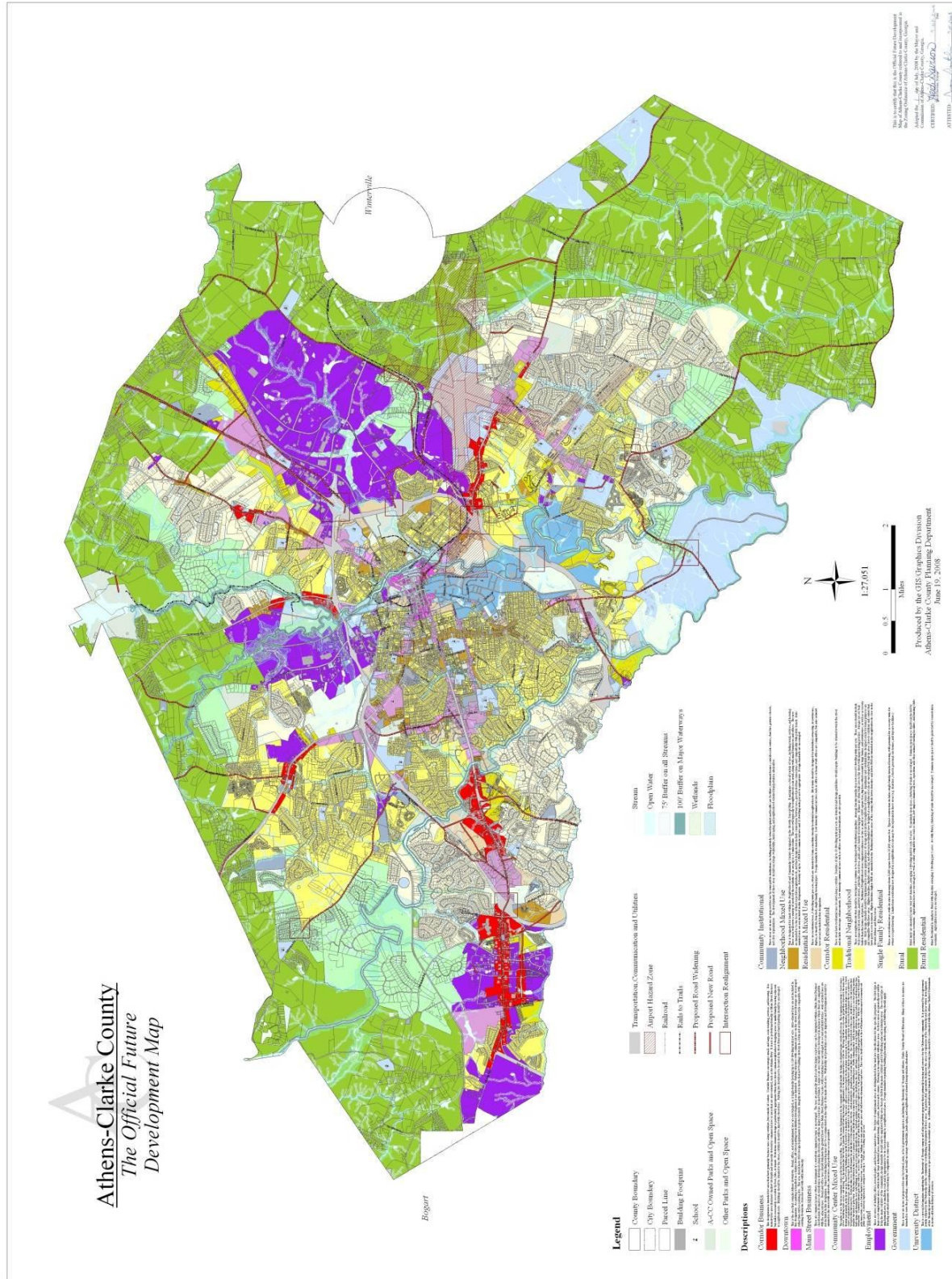


**Figure 4.8 ACC Land Use Map- Structures**  
Source: ACC Planning Department



**Figure 4.9 ACC Growth Concept Map**  
Source: ACC Planning Department-GIS Division





**Figure 4.10 ACC Future Development Map**  
Source: ACC Planning Department-GIS Division

**Table 4.2 ACC Comprehensive Plan Guiding Principles**

<b>ACC Comprehensive Plan Guiding Principles</b>	<b>How Streetcars Support the Guidelines</b>
1. To include the community in an open process of public decision-making.	Encourages the involvement of the public in the streetcar plan and implementation
2. To preserve the beauty of our community and act as responsible stewards of the natural environment	Streetcars support the development and management of transportation network that ensure the quality of air and water.
3. To support growth that protects community resources and sustains the high quality of life we want in Athens-Clarke County.	Streetcars can enhance the future growth of Athens. It encourages the development of Downtown Athens as a vibrant center for culture, government, dining, residential and retail diversity
4. To enact land use policies that avoids urban sprawl.	Streetcars support opportunities for residential and non-residential in-fill development that positively impacts the character of existing neighborhoods. It promotes the development of mixed uses, redevelopment and revitalization of existing underutilized commercial and industrial areas.
5. To establish Athens-Clarke County as a community that supports life-long learning for its citizens.	Streetcars support the prosperity of the community and can provide access to educational facilities, parks and recreational services, public libraries, museums and other cultural amenities.
6. To support transportation policies that offer viable alternatives to the automobile.	The streetcars support multi-modal transportation network. It can be used to support efficient land use, minimize traffic congestion and facilitate community-wide and regional mobility. It encourages walking and biking to areas served by transit. It supports the coordination of high-density land use with public transportation. Supports the east-west mobility in the northern part of Athens-Clarke County in a manner that discourages urban sprawl.
7. To assure that neighborhoods reflect standards that respect the history and character of the community	Streetcars encourage neighborhoods to be interactive communities where people have easy access to schools, parks, residences and businesses public transportation. Streetcars

	encourage mixed-use developments/redevelopment of residential, office, commercial and public uses in potential redevelopment areas. Supports guidelines that require walking paths and bicycle lanes that are easily accessible.
8. To reflect both a strong legislative and financial commitment to implementing the Comprehensive Plan.	Streetcars network will be compatible with the Comprehensive Plan.
9. To recognize that The University of Georgia and Athens-Clarke County will work in concert to address mutual needs.	Streetcar network can be done jointly with the University in developing strategies to address student, university and community issues of mutual concern. Support strategies that will accommodate University growth. Increase efforts to work with the University to address traffic impacts and transit needs of students, faculty and support staff.
10. To use sound design standards to govern development.	Streetcars encourage design standards that add visual value while creating a "sense of place" to the community.

**Table 4.3 The ACC comprehensive plan visions and how it supports streetcars**

ACC Comprehensive Plan Vision	How Streetcars Support the vision
Athens-Clarke County will include the community in an open process of public decision-making.	Streetcars promote community involvement
Athens-Clarke County as a community will support and encourage life-long learning. Higher education, vocational education, and public schools will be life-long learning opportunities for our residents and visitors.	Streetcars provide access to educational facility
Athens-Clarke County will be the educational, cultural, medical, and economic hub of Northeast Georgia. Athens-Clarke County's strengths and qualities will make it a world- class center for research and innovation. Athens-Clarke County's workforce will be capable of supporting existing and new enterprises. Athens-Clarke County will have a resilient, diverse economic base that provides a broad range of jobs and entrepreneurial opportunities making Athens-Clarke County one of the best places in the world to live work and retire.	Streetcars encourage local and regional development in many areas.
Athens-Clarke County will be an environmentally healthy, sustainable and aesthetically pleasing community in which air, water; soil, plant and wildlife habitat and scenic resources are protected and enhanced, and not degraded or depleted.	Streetcars are environmentally friendly alternative transportation with zero carbon emissions that promotes sustainable communities
Athens-Clarke County will be a county rich in cultural resources that enhance and maintain its unique character and also increase its economic vitality.	Streetcars can provide access to the cultural resources and destinations with the potential for increasing economic vitality.
Athens-Clarke County will support and sustain local government services and facilities that respond to the needs of our population and make our community a safe, attractive healthy and productive place to live and work.	Streetcars support the needs of the population and encourage a safe attractive place to live work and play. It encourages mixed-use development.
Athens-Clarke County will foster neighborhoods and housing opportunities that will: To support and preserve diversity while providing an adequate supply of quality housing to address housing needs; to Respect the rich history and character of our community in both new development and revitalization; To Promote healthy, safe, affordable, and sustainable housing that accommodates a growing population while enhancing the quality of life and preserving the environment.	Streetcars encourages diverse housing development. It promotes revitalization while enhancing mobility and environmental preservation.

Athens-Clarke County land use policies will encourage and enable a balance and diversity in the projected land uses while respecting the importance of a clean, sustainable and healthy environment.	Streetcars support the land use policies and will be consistent with it. The streetcar plan respects the importance of a clean, sustainable and healthy environment.
Athens-Clarke County will support transportation policies that promote context-sensitive street design principles and provide a balanced transportation system to encourage viable alternatives to the automobile, promote public health and safety, protect the environment, encourage efficient land use, relieve traffic congestion, maintain a sense of community, accommodate the needs of our diverse population and support the movement of goods, services and people.	Streetcars encourage street designs that are bike and pedestrian friendly. It is an Alternative transportation plan that can provide non-automotive connectivity throughout Athens-Clarke County. It can meet the transportation needs of the community.

### **Considerations of Regional and Local Planning**

This section analyzes the regional and local land use transportation plans as they relate to the proposed streetcar system. The planning documents that will be reviewed are MACORTS 2035 plan, ACC comprehensive plan and the Athens Transit System (ATS) plan. MACORTS is the designated federal transportation planning organization for the county. They work in partnership with the Georgia Department of Transportation, and ACC planning department. Athens needs to encourage and develop transit-oriented developments that are in compliance with the local and regional comprehensive plans (MACORTS 2009).

In the MACORTS 2035 plan it was stated, that Athens Transit System needs to expand its fleet to give its passengers adequate services (MACORTS 2009). Streetcars would be a viable option for expanding the ATS service to its patrons.

*The Public Transportation study for the MACORTS Region June 2009 stated that, "Athens-Clarke County stakeholders agreed that:*

- There is a need for public transportation in the region for everyone, especially people who cannot afford cars.
- There is not enough money for buses and their services; therefore, the frequency of buses is too low.
- Sprawl is a thing of the past and more and more people are moving into town.
- The residents of Athens-Clarke County would support public transportation" (MACORTS 2009).

A commuter rail has been proposed for ACC to connect to Atlanta (MACORTS 2009). The Athens Transit multimodal center was built close to the existing rail line in order to accommodate the proposed future commuter rail (MACORTS 2009). The ridership will increase as population increases (MACORTS 2009).

The MACORTS 2025 plan stated that,  
"In the future as transportation demands grow, we hope that residents of Athens Clarke County and the surrounding areas will consider ATS as the best alternative form of transportation into and around Athens Clarke County" (MACORTS 2009).



The MACORTS Transit Development Plan (TDP) identifies strength and weaknesses in the transit system and the study stated that, “it is a goal of the transit system to make improvements that would enable the system to have 10 minutes headway” (MACORTS 2009). Streetcars can provide this very easily. Streetcars could provide 10 minutes headway, increase ridership and provide more services.

### **Transit System in Athens**

Athens Transit System is the regional and city transit provider. It is the only public transit system in the county. The ATS provides both fixed and paratransit services. This transit system has 19 routes and 24 fleet buses. ATS operates from the Athens Multimodal Transportation center. The University of Georgia has 32 buses in its fleet that serves the University community. The UGA bus system boards more than nine million riders per year.

The system covers 44 square miles and serves the entire Athens Clarke County (ATS 2009). It serves the major shopping areas, residential neighborhoods, UGA, downtown Athens, East Athens, The Georgia Square Mall, and Athens Technical Institute. The bus fare is \$1.25 for adults and senior and people with disability \$.60.

### ATS Transit Study and Its Relationship to the Proposed Streetcar System

The city of Athens has two transit systems: The Athens Transit System (ATS) and the UGA bus service. This study does not analyze the UGA bus system because it is not an ACC public transit service and it mainly serves the UGA community and surrounding areas. UGA students pay a transportation fee that enable them to use the Athens bus system and is possible to do that for the proposed streetcar system. The existing public transit system is operated by Athens Transit system that provides services for Athens Clarke County. ATS has five core goals to address the needs of ACC. These goals were taken from Athens Transit System Overview.

**Table 4.4 Athens Transit Transportation Goals**

<b>ATS Transportation Goals</b>	<b>Opportunities for Streetcars in Athens</b>
Transit is to provide transportation to educational, cultural, medical, shopping and other resource centers for community members, with special attention to those who do not have access to other modes of transportation.	Streetcars can connect to all these major activity centers and provide access for those who do not have other modes of transportation.
Transit provides solutions to help manage transportation corridors within Athens-Clarke County that have a deficient level of service.	The streetcar will focus on establishing initial lines that will focus on connecting downtown Athens with adjoining neighborhoods that have deficient level of transit service.
Reduce the need for parking facilities within the CBD and UGA campus therefore allowing maximum utilization of land for more productive purposes.	Streetcar service can support increase mobility and pedestrian activity while reducing auto dependency that will reduce the need for parking facilities.
ATS operates in such a manner that is cost effective.	The streetcar system can be done in an affordable and manageable in a cost effective manner.
Continue to foster the ATS and UGA transit services interface in order to achieve community goals.	Streetcars can support and foster the transportation service interface between UGA and ATS by providing streetcar service to the UGA campus.

Source Athens Transit System Plan Update 2009

The Athens Transit development plan update summarizes a public participation survey that involves on-board customer survey, stakeholder interviews and public meetings. These show what the community needs are for public transportation.

The key priorities that were recommended in the development plan by the stakeholders for ATS to focus on in the future plans are to, “ extend service in the evenings; serve citizens at or below poverty level and aging population; educate and market public transit; improve public perception of transit; seek funding from external sources; provide service to Oconee residents; expand transit to include trolley, commuter rail, circulators; coordinate service with UGA; implement employer subsidies for public transit use and increase service frequency”. (ATS 2009)

The following list was derived from the Athens Transit Development Plan Update 2009. The public involvement program determined that:

- 57% were concerned about the infrequency of the buses
- 70% did not receive incentives from their employers for public transit
- 78% of the transit riders took it to work or school
- 74% stated that the stops were less than ½ mile from their residence
- 56% prefer to walk less than ½ mile to the bus stop
- 70% of the non-transit riders stated that they used the bus because cars were convenient because of the lack of service in their neighborhood or infrequency of buses.

The ATS also did a ridership survey to determine the most important improvements.

The following list was derived from the survey report of the ATS development plan update for 2009 (ATS 2009):

- Need for Sunday services
- Night service
- 24-hour service
- Frequency of service
- Weekend services
- Cheaper fares
- Seated shelters
- Connect transit with land use
- Cost of fare
- Getting closer to destinations
- More routes
- Being on time
- More service to the Eastside of Athens.

There were some key topics that became apparent through the public participation process associated with frequency, reliability, route coverage and transit amenities. Streetcars as an addition to the Athens Transit system bus network could expand the transit opportunities for the transit dependent population.

**Table 4.5 Most Important Improvements needed for ATS- Relationship to Streetcars**

<b>The Most Important Improvements to ATS based on the Ridership Survey of ATS Development Plan Update 2009</b>	<b>How Streetcars Relate to the Improvements</b>
Frequency	Streetcars can provide more frequent services with headways minimum of 10 minutes. It can run 24 hours per day; 7 days a week while providing more night and weekend service to and from downtown Athens
Reliability	Streetcars can provide more timely services that are consistent and reliable
Route Coverage	Can cover high need areas and accessibility to major activity centers, while providing links to the Multimodal station and other transit options Provide clear direct routes for the riders.
Transit Amenities	Streetcar stations are typically 2 to 4 blocks apart and will have more stops. Streetcar stops are shelters with seats that provide shelter from the weather elements.

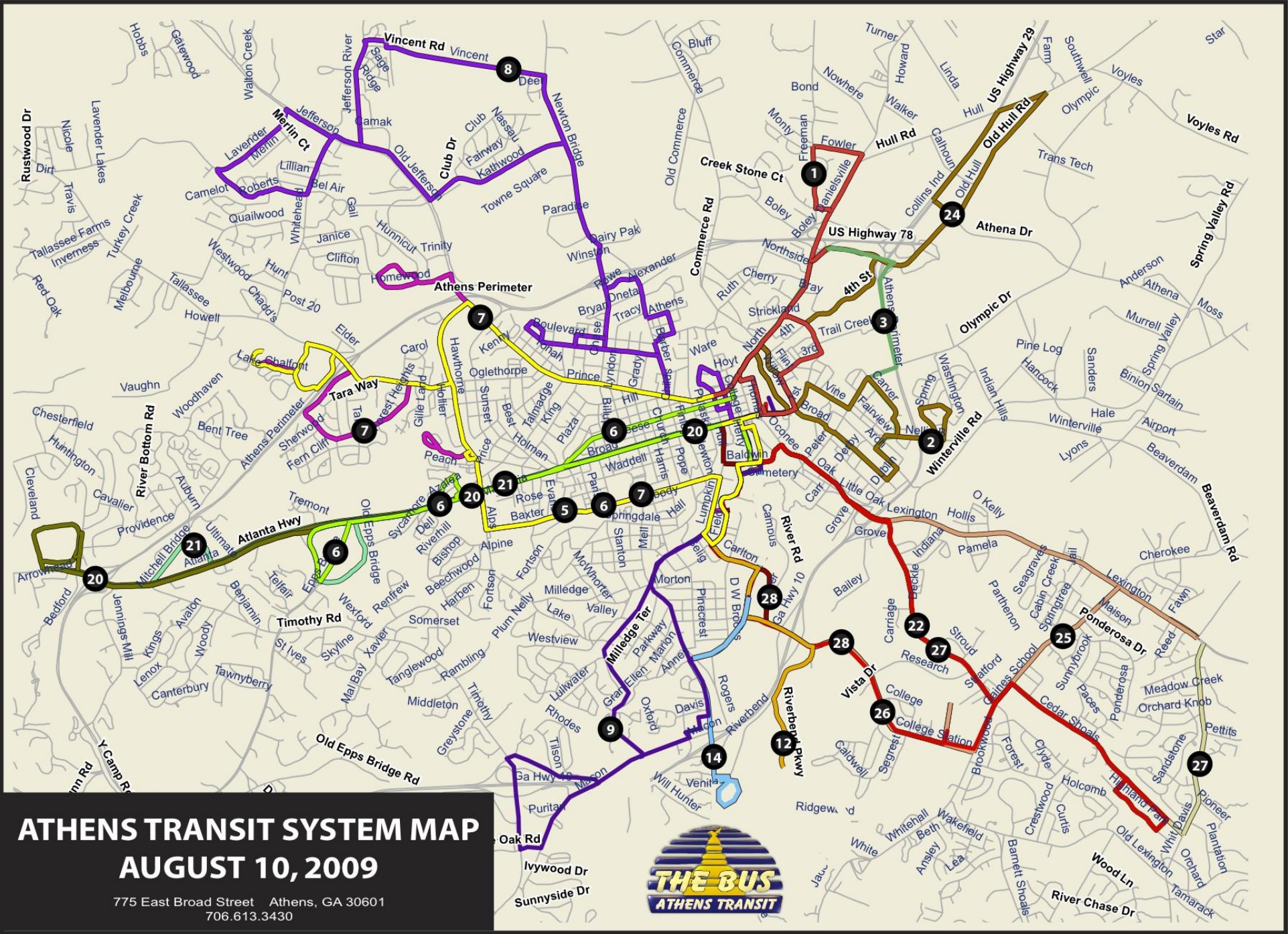


Figure 4.11 Athens Transit System Map  
Source: Athens Transit 97



## CHAPTER 5

### THE STREETCAR SYSTEM PLAN

The plan summarizes the vision, concepts, and design solutions for the proposed Athens streetcar system. The design involves:

- Alignment concepts,
- Design criteria,
- Routes,
- Operation,
- Maintenance,
- Stop locations,
- Right- of -way requirements,

It was reported in the FTA sponsored research the *Transportation Cooperative Research Program (TCRP): Synthesis 86: Relationships between Streetcars and the Built Environment*, that it is not easy to simplify the planning and goals of streetcar systems, as each has a distinctive history.



## **Athens Streetcar Goals**

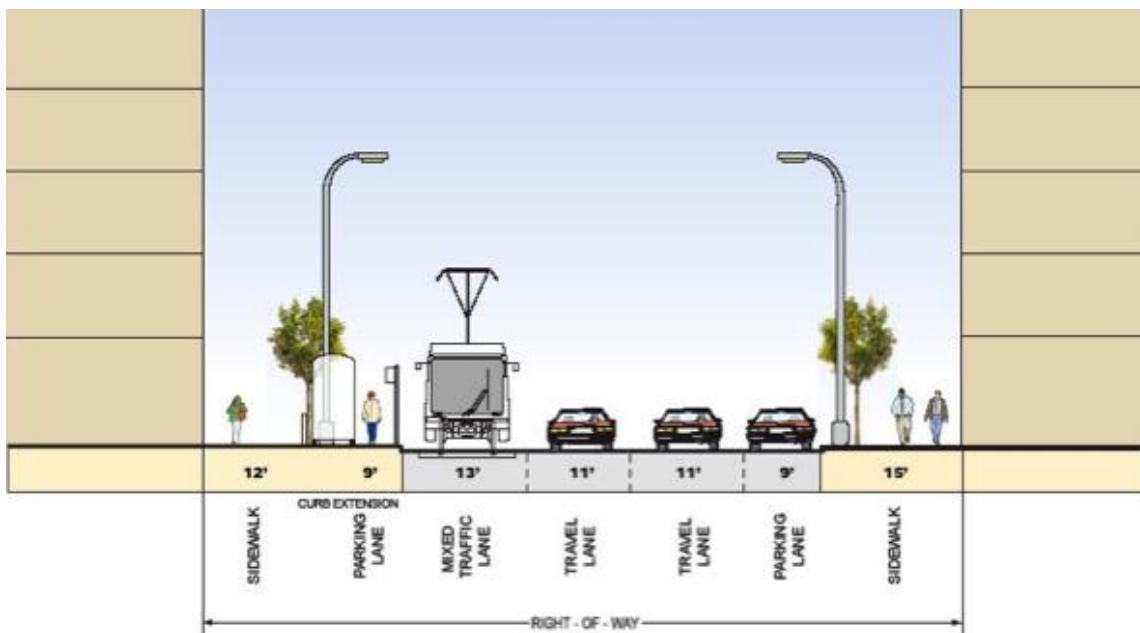
The Athens Streetcar would implement an initial line in downtown Athens that will:

- Move passengers from Downtown Athens to the adjoining neighborhoods.
- Improve connectivity and mobility.
- Improve Transit use in ACC.
- Integrate with and become a part of ATS and MACORTS.
- Link the Athens Multimodal Station with the key business districts, attractions and destinations.
- Promote transit-oriented development (TOD) along the streetcar corridors.
- Provide high-density residential areas with streetcar service.
- Provide an accessible system that is connected to additional public transit service.
- Develop a streetcar initial system that can extend to adjacent communities and destinations.
- Minimize impact on the environment and promote sustainable pedestrian friendly neighborhoods.

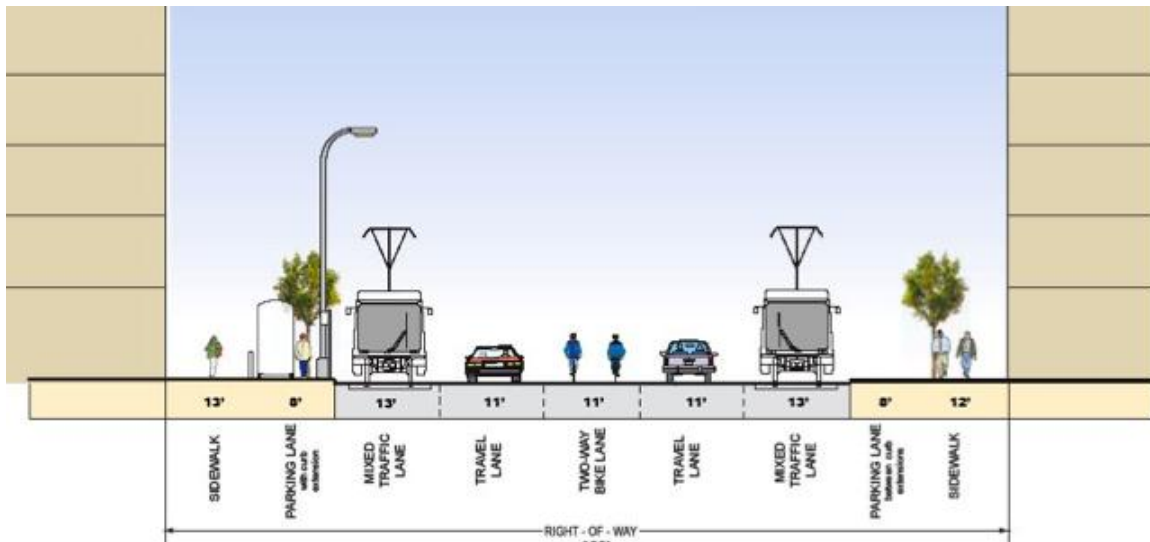
**Table 5.1 Streetcar Alignment Criteria**

In order to assess and decide the proper streetcar routes the following criteria were developed. The criteria will help to determine the best alignments.

CRITERIA	ASSESSMENT FACTORS
Public Input	<ul style="list-style-type: none"> <li>• Public suggestions, comments</li> <li>• Stakeholder support</li> </ul>
Ridership Goals	<ul style="list-style-type: none"> <li>• Current transit ridership</li> <li>• Population density</li> <li>• Key destinations and activity centers</li> <li>• Attractions</li> <li>• Bike and pedestrian activity</li> </ul>
Capital Costs	<ul style="list-style-type: none"> <li>• Width of Right of way</li> <li>• Length of route</li> <li>• Maintenance facility</li> <li>• Transit services</li> <li>• Size of fleet</li> <li>• Condition of pavements</li> </ul>
Cost of Operation	<ul style="list-style-type: none"> <li>• Frequency of service</li> <li>• Fares</li> <li>• Operation time</li> <li>• Size of fleet</li> </ul>
Potential for economic development	<ul style="list-style-type: none"> <li>• Comprehensive plan</li> <li>• Land use</li> <li>• Zoning</li> <li>• Underutilized and vacant lots</li> </ul>
Operations	<ul style="list-style-type: none"> <li>• Length of route</li> <li>• Stop spacing</li> <li>• Design of lanes</li> <li>• System linkages</li> <li>• Travel information</li> <li>• Traffic volume</li> </ul>
Traffic and other impacts	<ul style="list-style-type: none"> <li>• Bike lanes</li> <li>• Traffic signals</li> <li>• Access to driveways</li> <li>• Turning movements</li> <li>• Acquisition of properties</li> <li>• Parking impacts</li> <li>• Access to employment</li> <li>• Demographics</li> <li>• Proximity to existing transit</li> <li>• Circulation impacts</li> </ul>



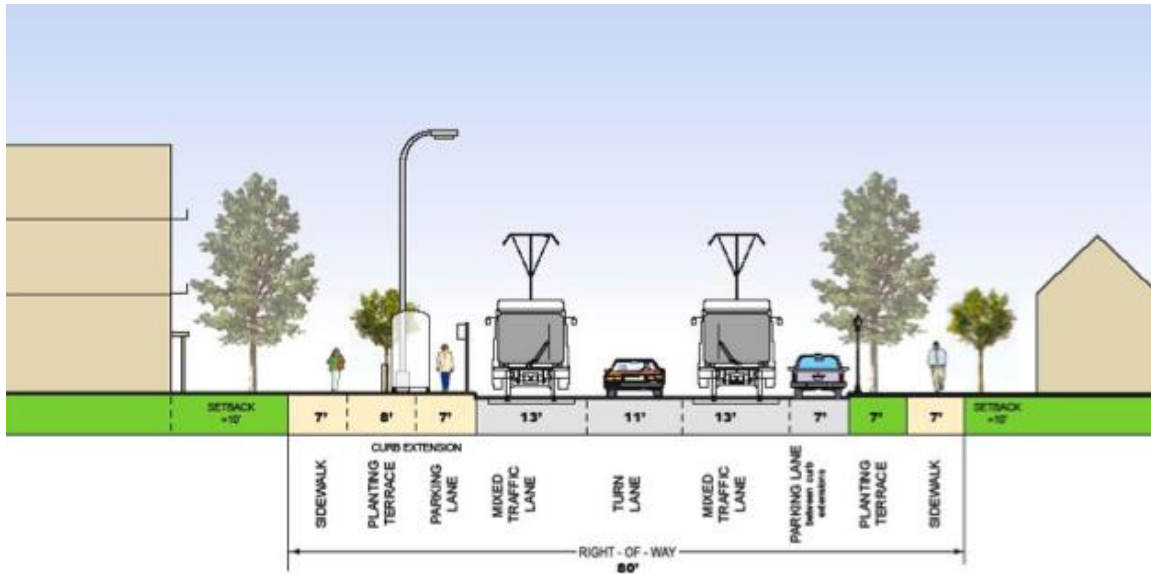
**Figure 5.1 Typical One Way Street-downtown Corridor Cross Section**  
 Source: Both images Minneapolis Streetcar Feasibility Study



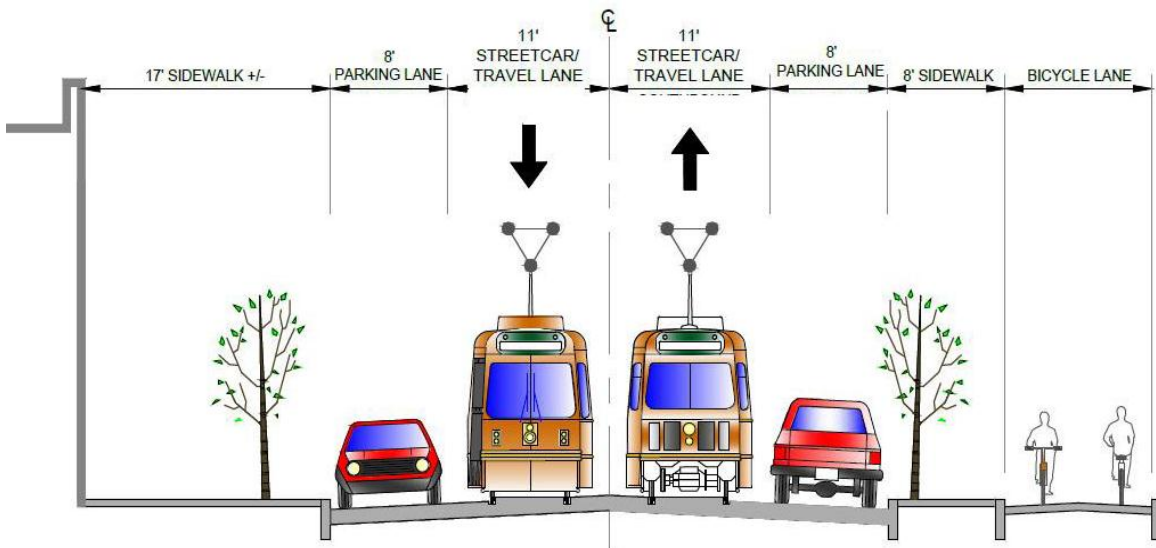
**Figure 5.2 Typical Downtown Streetcar Cross section**  
Source Minneapolis Streetcar Feasibility Study



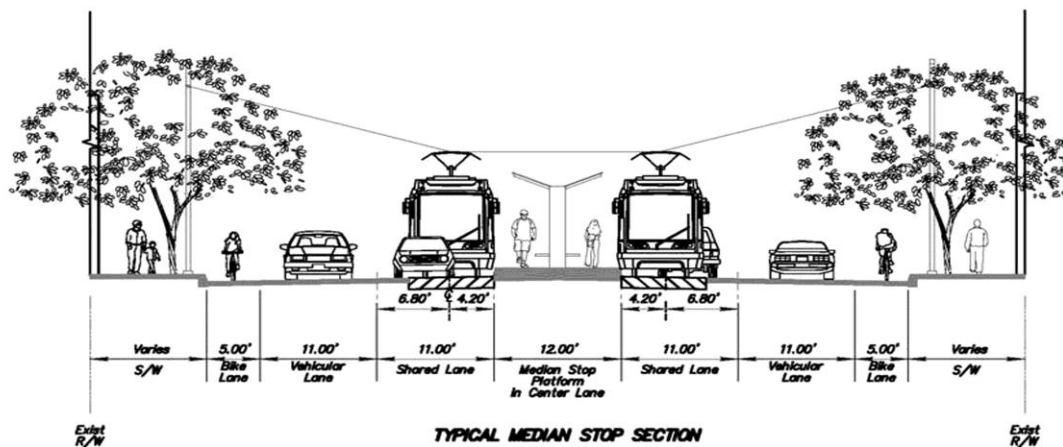
**Figure 5.3 Typical Community Corridor Cross Section**  
Source Minneapolis Streetcar Feasibility study



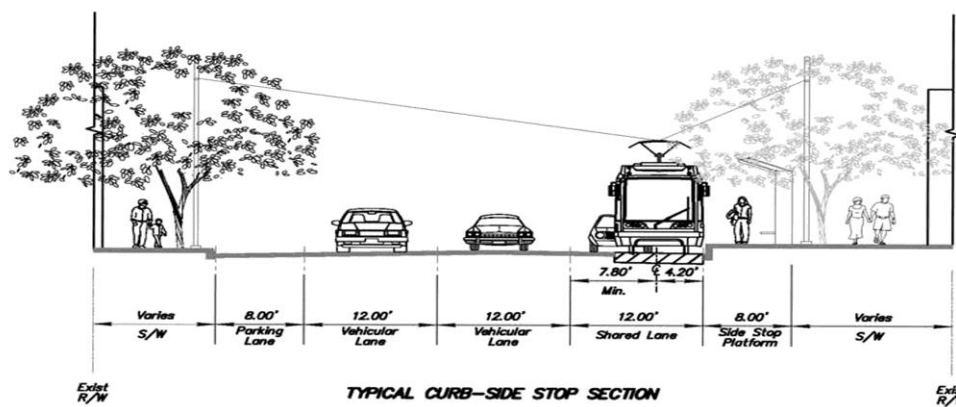
**Figure 5.4 Typical Community Corridor Cross Section  
(Neighborhood Commercial Node)**  
Source Minneapolis Streetcar Feasibility Study



**Figure 5.5 Streetcars in the Middle lanes**  
Source URS Corporation



**Figure 5.6 Typical Left-Lane Streetcar with Station**  
 Source Fort Worth Modern Streetcar Design Assumptions Draft



**Figure 5.7 Typical One-Way Roadways with Streetcar Station**  
 Source Fort Worth Modern Streetcar Design Assumptions Draft

**Table 5.2 Basic design requirements for streetcars:**

Vehicle travel width	11ft minimum travel lane
Static vehicle width	8'4
Vehicle length	60-70 ft
Vehicle height	13 ft minimum
Vehicle weight	60,000-65,000 lbs
Passenger capacity	30-45 seated; 70- 100 standees
Track gauge	4' to 8.5'
Track slab	8'2" concrete construction
ADA accessible	
Minimum vertical curve radius	620 ft
Minimum horizontal curve radius	60 ft
Spiral length	25ft
Maximum grade	9%
Maximum cross slope	1%
Maximum speed	30 - 40 mph
Standard traffic lane	11 – 12 ft
Stop location is dependent on the opportunity to serve surrounding land uses but as a general rule.	The streetcar stop spacing can be from 200-400 ft apart/ 2 – 4 blocks.

The vision for the Athens streetcar plan was developed after analyzing the local context, existing site conditions, the comprehensive plan, the ATS plan and economic development goals for the county.

The potential alignments are developed from Athens' existing transportation, land use transit plans and future land use plans. The key

opportunities and constraints for the study area are identified to determine where the streetcar routes should be. The study will focus on 3 routes within the city for the initial streetcar lines that support the surrounding neighborhoods.

The plan encourages the city to also consider a streetcar line from downtown Athens to Prince Avenue, North Avenue and Baxter Street corridors. This will promote a pedestrian experience, livability and mixed-use gateway into Athens. The plan will support the goals of the ACC comprehensive plan and encourages the city to have streetcar lines in corridors such as Prince Avenue, Baxter Street, North Avenue, Milledge Avenue, Lexington and downtown Athens.

The plan for the streetcar network will be considered based on:

1. Placing the streetcars in corridors that will have more pedestrians and high ridership. The system will support walkability and bicyclists.
2. Link and connect to the greatest amount of existing destinations and other transit modes.
3. Encourage development potential by serving prime destinations for revitalization.
4. Relate to the street grid and pattern to operate in the existing streets.
5. Clear direct routes and stops.
6. Develop plans for a maintenance facility.



7. Plan for future extensions and connections.
8. Access to major activity centers.
9. Minimum environmental impact on the community.
10. User friendly.

Historically streetcars were a part of the Athens development pattern and the reintroduction of the streetcars will reflect the “old Athens” streetcar legacy and its lively character.

### **Route Studies**

The key destinations for the ACC streetcar project will be identified.

There are several routes that could be considered for this system, for example:

- East Athens to UGA campus
- Lumpkin Avenue
- Milledge Avenue
- Baxter Street to Alps Road
- Prince Avenue
- Downtown Athens
- Lexington to Downtown
- Downtown to North Avenue

## **Alignment Concepts and Alternatives**

The proposed system is on double tracks on most streets except on one-way streets to accommodate frequency of service.

### Downtown

This would be running from Classic Center on Washington Street and Thomas Street down Washington Street in the downtown core to Lumpkin Street to Dougherty Street to Prince Ave to the Medical District and the Navy School ending at Ogelthorpe Avenue.

#### 1. Baxter Street

- A. From the downtown core to Lumpkin Street to Baxter to Alps Road.
- B. Baxter Street to Milledge Avenue to Broad Avenue to Prince Ave.
- C. Alps line to Atlanta Highway and Georgia Mall.

#### 2. UGA line

- A. North Thomas to East Campus Road to Baldwin to Lumpkin to Baxter to Milledge Avenue.
- B. Sanford Drive: From Carlton to Baldwin (down Sanford Drive to Baldwin to Jackson to Broad to Multimodal Center.
- C. Can extend from East campus road pass Baldwin to intersection with street by Carlton Street.

3. Prince Avenue

A. Prince Avenue to Ogelthorpe Street with potential extension to Holmwood Hills.

B. Boulevard to Barber to Newton Bridge to Jefferson Road.

4. Lexington Avenue

ATS Multimodal Center to Lexington Avenue.

5. The Inter City Loop around UGA to Lumpkin to Milledge back to Prince Avenue.

6. North Avenue

Downtown core to North Avenue and connect to Hwy that goes to Lexington and go up to Athens Tech and back downtown.

7. Minor Loop

Milledge Avenue to Lumpkin Street at the intersection of south Milledge Avenue to Riverbend Road going east to connect to College Station to East Campus Road. Can also have the streetcars turn around at Cloverhurst and Milledge.

8. College Station Road

Connect to College Station Road to Family and Graduate Housing.

Principal Destinations

UGA Health Sciences Campus (UGA HSC)

Athens Regional Medical Center

Sanford Stadium

St Mary's Hospital

Downtown Athens

Athens Transit Multimodal Center

Boulevard Historic District

Cobbham Historic District

Five Points

Milledge Avenue Historic District

Georgia Mall

Alps Shopping Center

Walmart on the Eastside

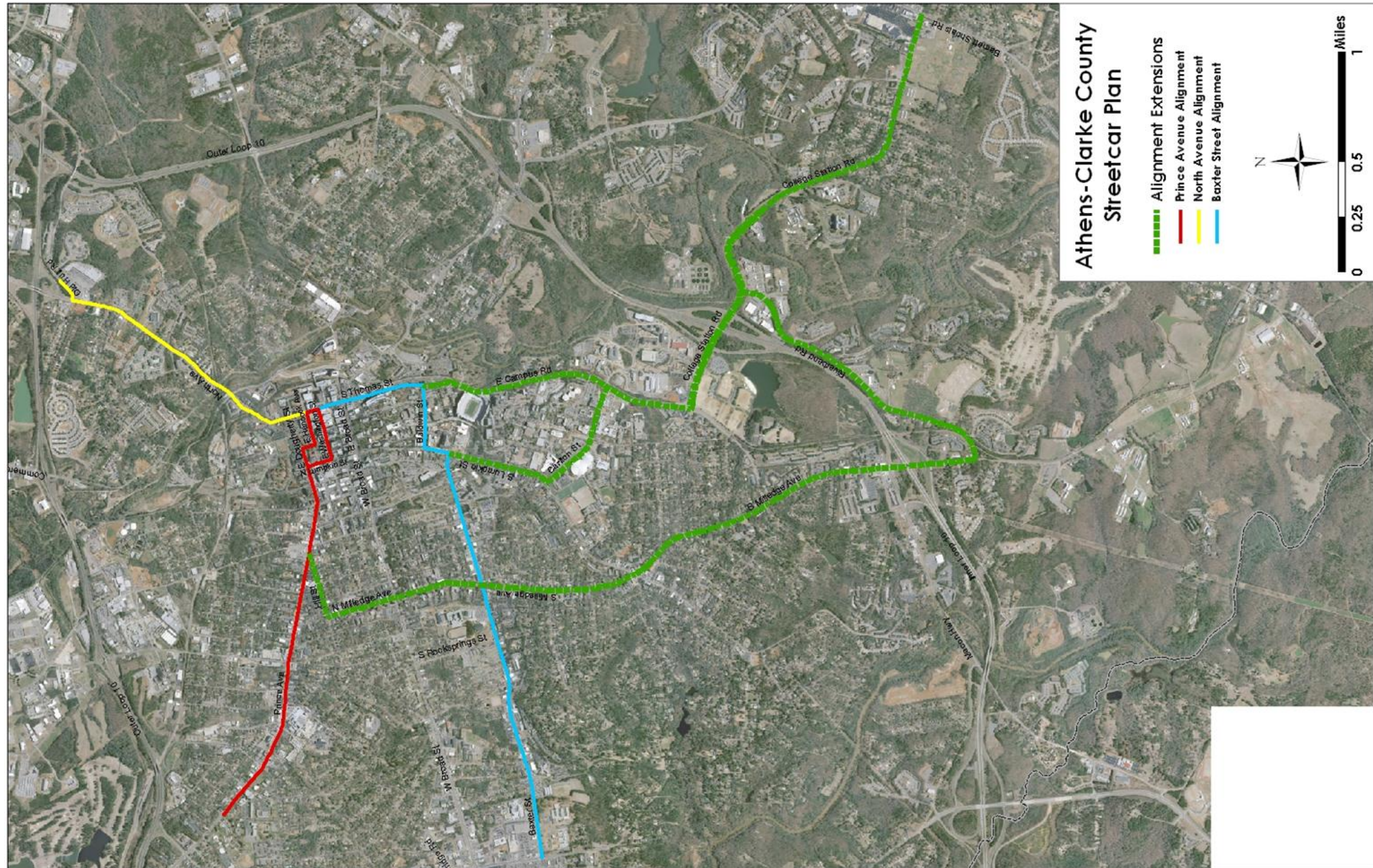
The University of Georgia

The Classic Center

Athens Plaza

Piedmont College Athens

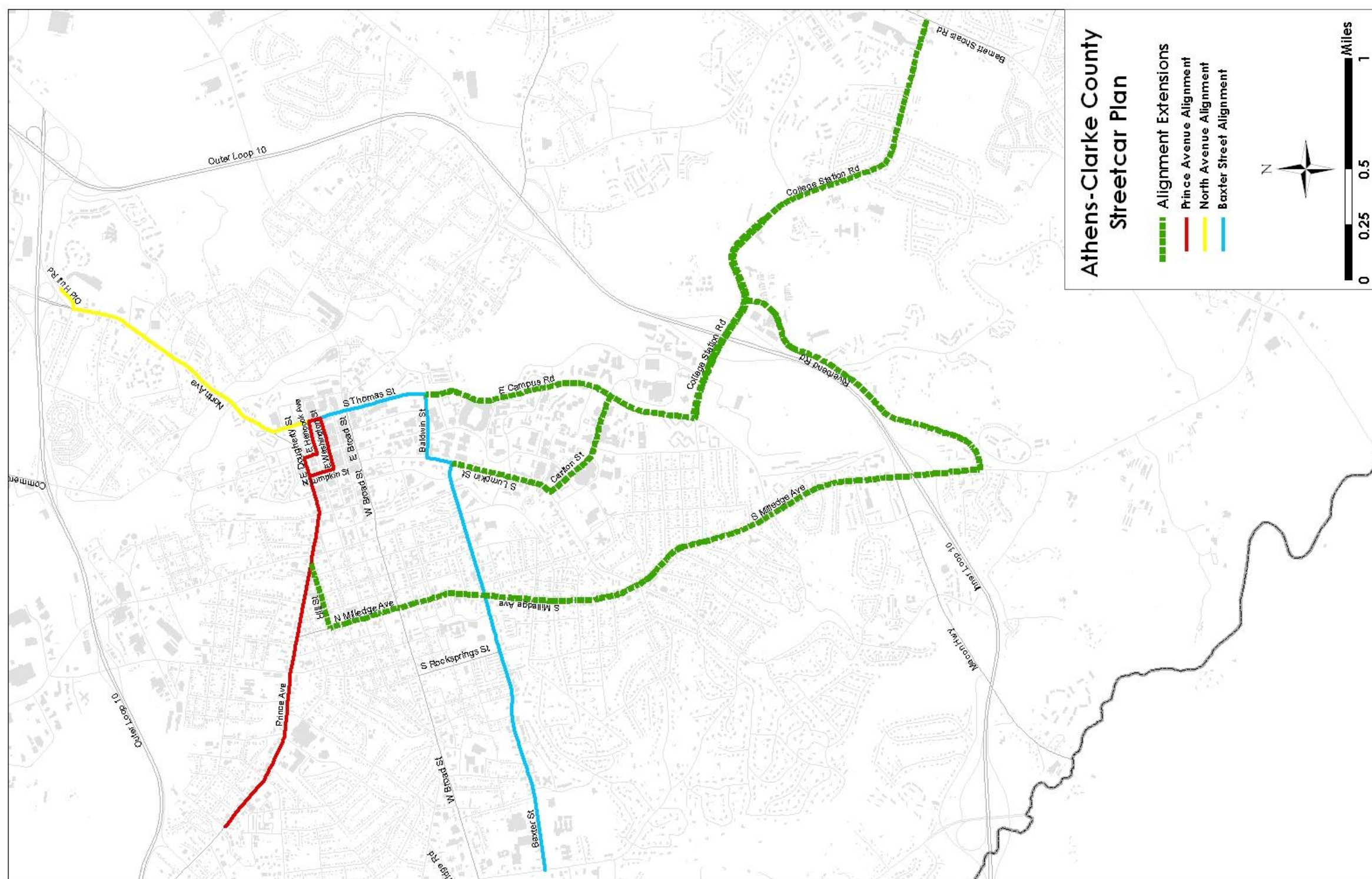




**Figure 5.8 the Concept Streetcar Aerial for Athens**

Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.9 the Concept Streetcar Plan for Athens**

Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division

## **The Proposed Alignments**

The overall design concept proposed for the Athens streetcar system is to strengthen the communities. Based upon its existing land use, historic, urban form, pedestrian nature, a more pedestrian-oriented community could be established along these alignments. This could provide the chance to include a more diverse building types and mixed uses. A pedestrian and transit oriented development could reinforce these corridors to be less automobile dominated.

Athens has a diverse range of existing land uses, as illustrated in the ACC land use maps. Land uses along the streetcar corridors include low-density residential, high-density residential, retail, commercial and industrial uses. Retail and commercial development predominantly border the Prince Avenue and Baxter Street alignments. Residential units primarily border the North Avenue alignment. Moderate density is along the Prince Avenue and Baxter Street corridors. The least concentrated development is along North Avenue.

With the ATS buses serving these proposed streetcar corridors, the frequency of the service is not high enough to attract consistent transit ridership because most people use automobiles. In order for the streetcars to become an accepted alternative to the automobile the transit services need to be more frequent, more accessible, pedestrian friendly, be mixed use areas and safe.

The proposed routes all connect downtown at the Classic Center by Thomas Avenue and the Athens Multimodal Transportation Center could serve as the major transportation hub for the downtown area (see Figure 5.7). If the link between the downtown area and the ATS multimodal center is directly accessible and pedestrian oriented it could effectively serve as a useful link between the station and the streetcar downtown core stop. One key factor that could make the streetcar's main termini successful is to provide services that link the multimodal center with the adjacent Classic Center and proposed rail (see Figure 5.11). This would allow more interaction between neighboring communities. Residents and visitors from other communities could then come to Athens by public transportation rather than by automobile (which could possibly help reduce the parking demands downtown).

#### The Preferred Initial Alignments

The alignments were chosen in areas that the streetcars could effectively serve, as well as encourage development (see Figure 5.13). The land use and future development patterns around the proposed alignments were considered. The population and employment within these areas were important factors in selecting the alignments.



The important considerations in selecting these alignments were:

- Service to key destinations and major employment centers where it could attract high ridership, provide efficient service and generate trips.
- To provide service to areas that needs redevelopment and revitalization.
- Provide service to low-income areas.
- The Potential for extensions to neighboring communities.

The proposed Athens streetcar system will be approximately 6.5 miles long (see Figure 5.13). Three routes for the streetcar system were selected, Prince Avenue, Baxter Street and North Avenue lines. The alignments are preferred based on a review of the existing bus service, existing transportation, land use and economic development plans. These proposed alignments provide a more favorable opportunity for an initial streetcar system because of the ridership needs and future development needs.

They all connect to Downtown Athens primarily where the main eastern Terminus will be, at North Thomas Avenue by Washington Street, adjacent to the Classic Center and the Multi-modal Station. This is where all three lines begin proceeding to Prince Avenue, Baxter Street and North Avenue. (See Figure 5.14)



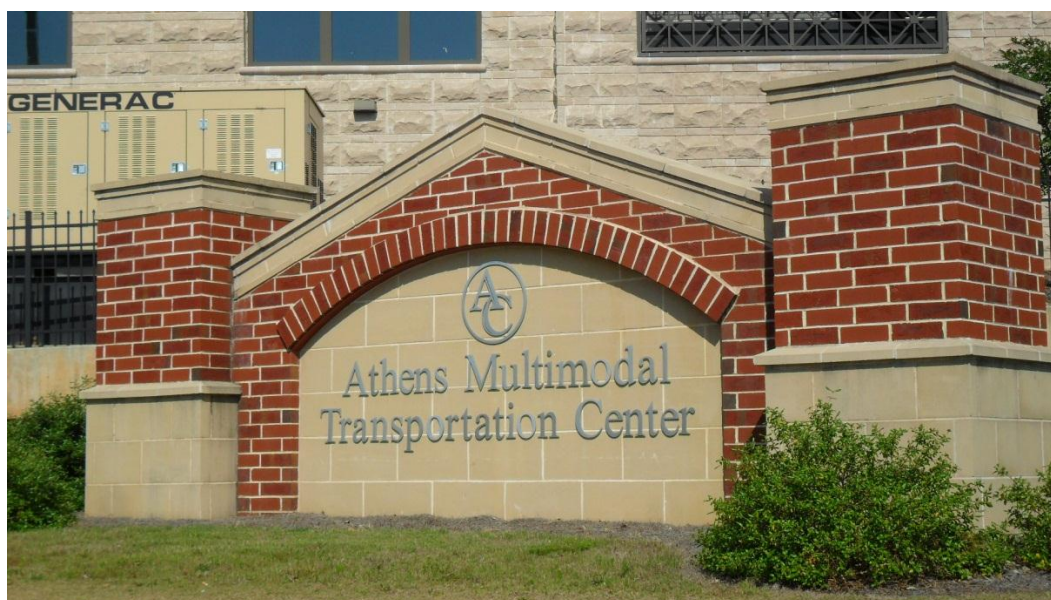
**Figure 5.10 Classic Center**  
Source photo by Author



**Figure 5.11 ATS Multimodal Transportation Center Connections to the Classic Center**  
Source: Photo by Author



**Figure 5.12 Bridge from Classic Center to ATS Multimodal Center**  
Source: Photo by Author



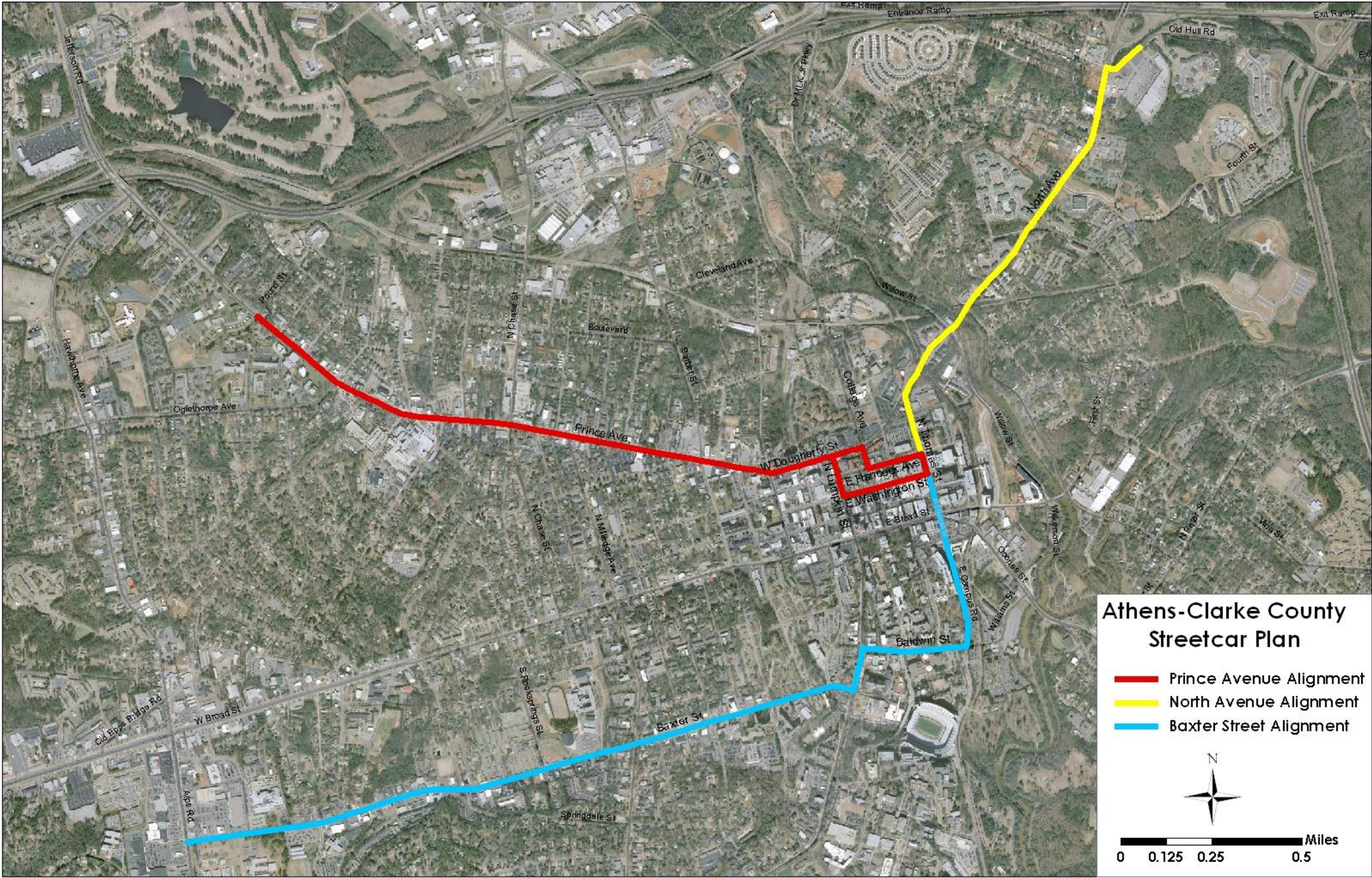
**Figure 5.13 Athens Multimodal Center**  
Source: Photo by Author

The proposed streetcar alignments could provide services in both directions, with stops located within every two to four blocks. The streetcar system along these routes could be integrated into the Athens Transit system and could serve some of the low-income housing areas in Athens. They could replace the existing buses along these alignments and will have a higher capacity for passengers with more frequent headway. The main corridors will have double tracks embedded in the right-of-way of the public street, with one for each direction except for Washington Street and Hancock Avenue.

Table 5.3 Summary of Streetcar Corridors

Corridor	Markets Served	Strengths	Constraints
Prince Avenue 2.6 miles	Transit service to local neighborhood, downtown core, tourist, visitors, Athens Regional Medical Center (ARMC), workers, UGA students, UGA health sciences campus, staff and local residents, possible game day connections to UGA main campus. Potential redevelopment along corridor and Normaltown district, Classic center, restaurants, Athens multimodal transportation center.	<ul style="list-style-type: none"><li>• Connectivity to UGA, employment centers and residential units.</li><li>• Development potential on corridor</li><li>• It has a high ridership potential especially if linked to the UGA Health Sciences campus.</li><li>• Opportunity to link to Holmwood Hills neighborhood.</li><li>• Opportunity to replace the buses on this route.</li></ul>	Traffic and on street parking on Washington, Hancock and Prince Ave downtown
North Avenue 1.5 miles	Downtown core, Students, residents, DFCS, Department of Labor, low-income communities along corridor, Classic Center, Athens multimodal transportation center.	<ul style="list-style-type: none"><li>• Strong economic development potential on North Avenue and Northcrest Drive to downtown.</li><li>• Good opportunity for maintenance/storage facility on Old Hull Road.</li><li>• Provides additional service in underserved corridor and low income neighborhood.</li><li>• Adequate right of way width; limited conflict with bus system High ridership potential</li><li>• Opportunity to replace buses along route to downtown.</li><li>• Connectivity to employment and residences from Athens Mutimodal Center.</li></ul>	Requires single-track construction from Dougherty to North under bridge.
Baxter Street 2.5 miles	Athens multimodal transportation center, downtown core, restaurants, shops, Beechwood shopping center, St. Mary's Hospital, employees, residents, low-income homes, university students, staff and local residents, UGA, possible game day connections to Sanford stadium.	<ul style="list-style-type: none"><li>• Prominent downtown circulator service from Alps Road</li><li>• Potential to reduce bus service once the line connects with UGA; could possibly eliminate buses on East Campus Road, Baldwin, and Baxter.</li><li>• Potential for higher density development between downtown and Franklin Avenue.</li><li>• Very high ridership potential</li></ul>	Inadequate opportunity for maintenance facility





**Figure 5.14 Athens Streetcar Plan**  
Source Author -Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.15 Where all three lines meet at the Classic Center Termini**  
Source: Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division



**Figure 5.16 Classic Center at N. Thomas and Washington Street**  
Source: Author

A double track system is recommended for these lines to facilitate frequent service. The streetcar tracks can be in the side traffic lane or middle lanes. It is recommended that the tracks and stops be in the middle lane to facilitate bike lanes as well as pedestrian paths. A detailed analysis of each corridor will be needed to determine the impacts and challenges of each corridor.

The potential extensions would connect to the downtown lines. The streetcar plans show the different alignments with the extensions that should be considered as part of the system (see Figure 5.8). The streetcar system has potential routes that would extend the system to serve the Milledge, Five Points, Eastside neighborhood, Riverbend, the University of Georgia main campus, including the new Veterinary school site, and offering connections to the other lines. These alignments will connect the major activity centers with Downtown Athens and the Multimodal Center. The passengers will connect to the Multimodal Station over the bridge that connects to the Classic Center at Thomas Avenue (see Figure 5.10 and 5.11). The alignments will be very clear and direct. Future extensions to other neighborhoods including UGA campus are possible. The streetcars will turn around at the end of each alignment to make the return trips to downtown Athens.



## The Streetcar Alignments

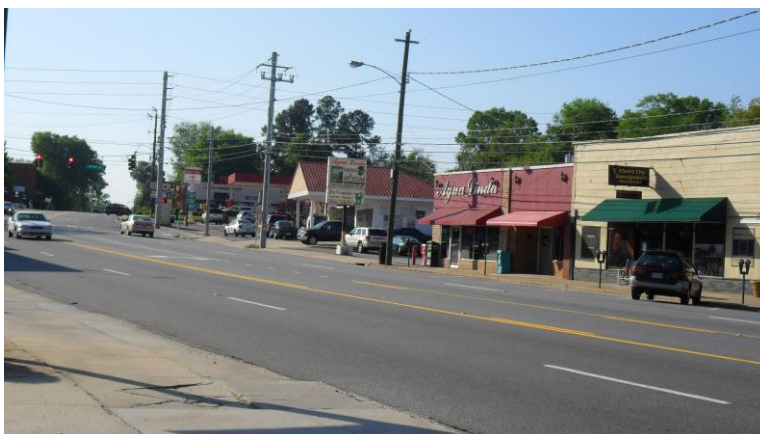
### Prince Avenue:

This route is 2.6 miles long. This will travel from North Thomas Street onto Washington Street (which is a one-way street westbound) to Lumpkin Street (one-way north bound) up to Dougherty Street to travel down to Prince Avenue and will terminate at Prince and Pound Street by the UGA Health Science campus. From the Pound Street terminus it will travel back to Downtown Athens from Prince Avenue to Dougherty Street onto Hancock Avenue eastbound to North Thomas with connections to the Multimodal Station. There is a possibility that it could terminate on the UGA health sciences campus (see Figure 5.27). The Prince Avenue line has the potential for future extension to Normaltown District.

### Site Context



**Figure 5.17 Prince Ave. at Ogelthorpe**  
Source author



**Figure 5.18 Prince Av. Streetview 1**



**Figure 5.19 Prince Av. Streetview 2**



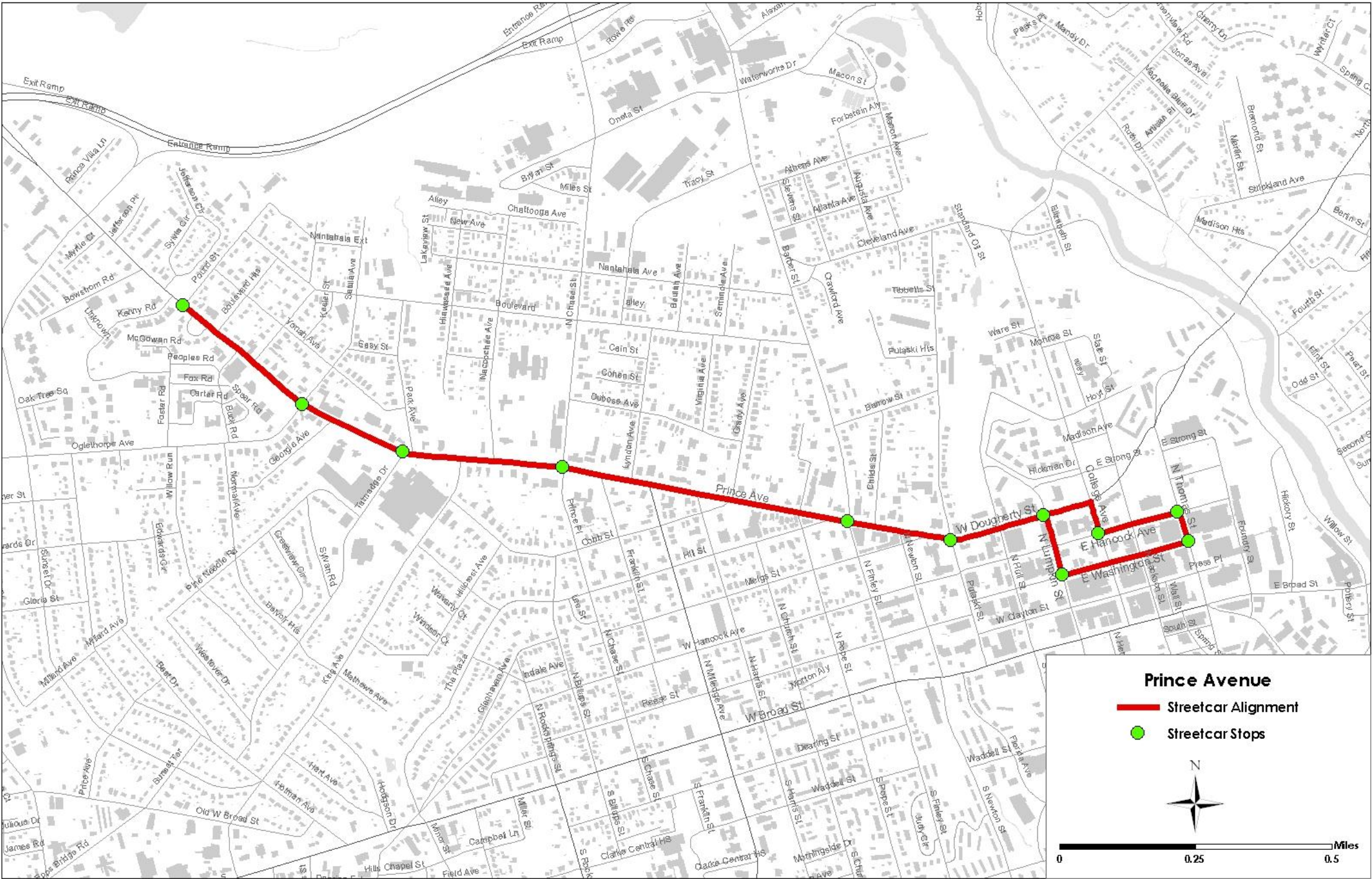
**Figure 5.20 Prince Av. Streetview 3**  
Source: Photos by Author





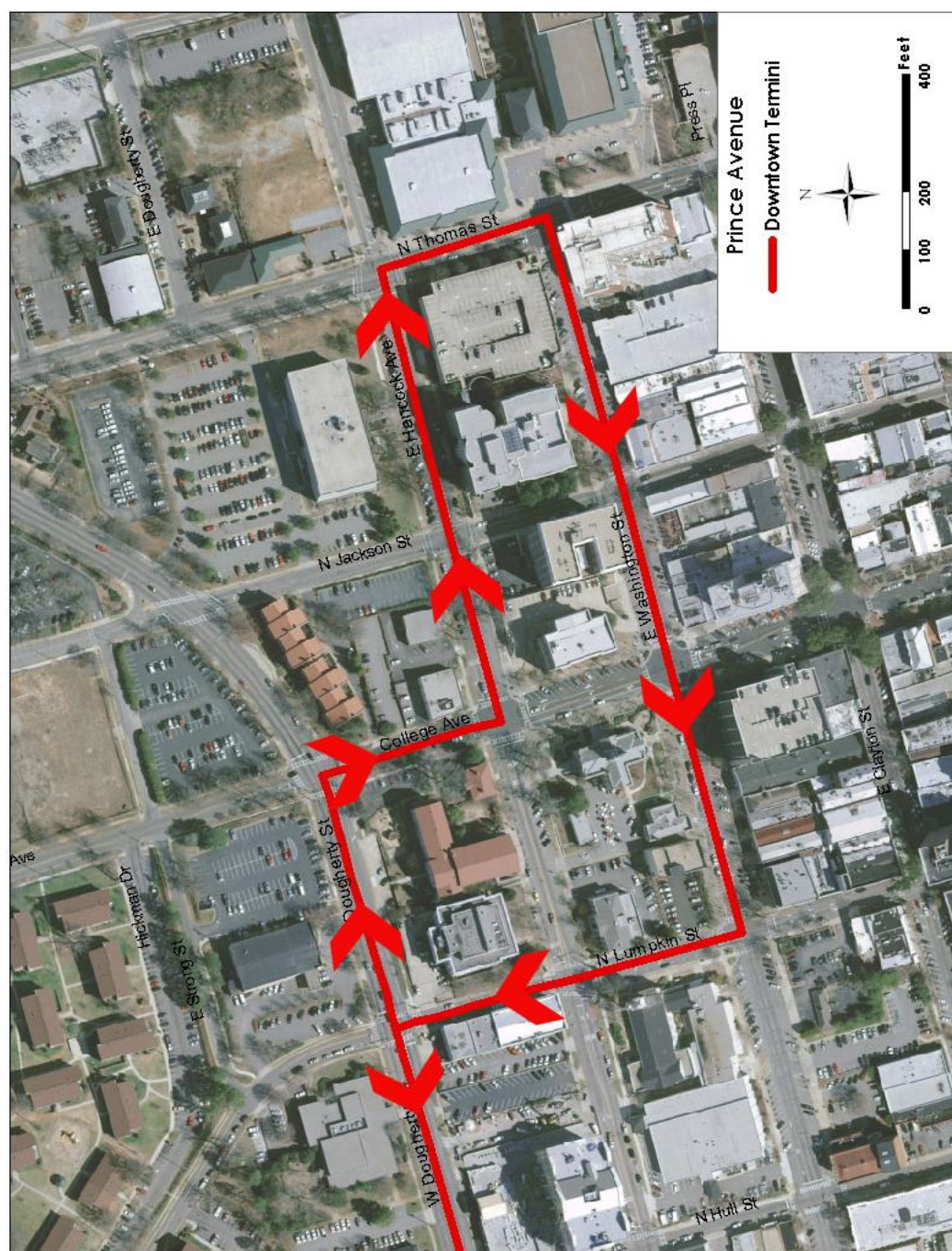
**Figure 5.21 Prince Avenue Alignment**  
Source Author-Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.22 Prince Avenue Alignment**  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.23 Prince Avenue Downtown Termini**

Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division



**Figure 5.24 Washington Street at N. Thomas to Prince Ave**  
Source: Photo by Author



**Figure 5.25 Hancock to Thomas from Prince Avenue**  
Source: Photos by Author





**Figure 5.26 Proposed Prince Avenue Streetcar Terminus at UGA Health Sciences Campus**

Source; Photo by Author



**Figure 5.27 Prince Av. and Pound St - Proposed Terminus**

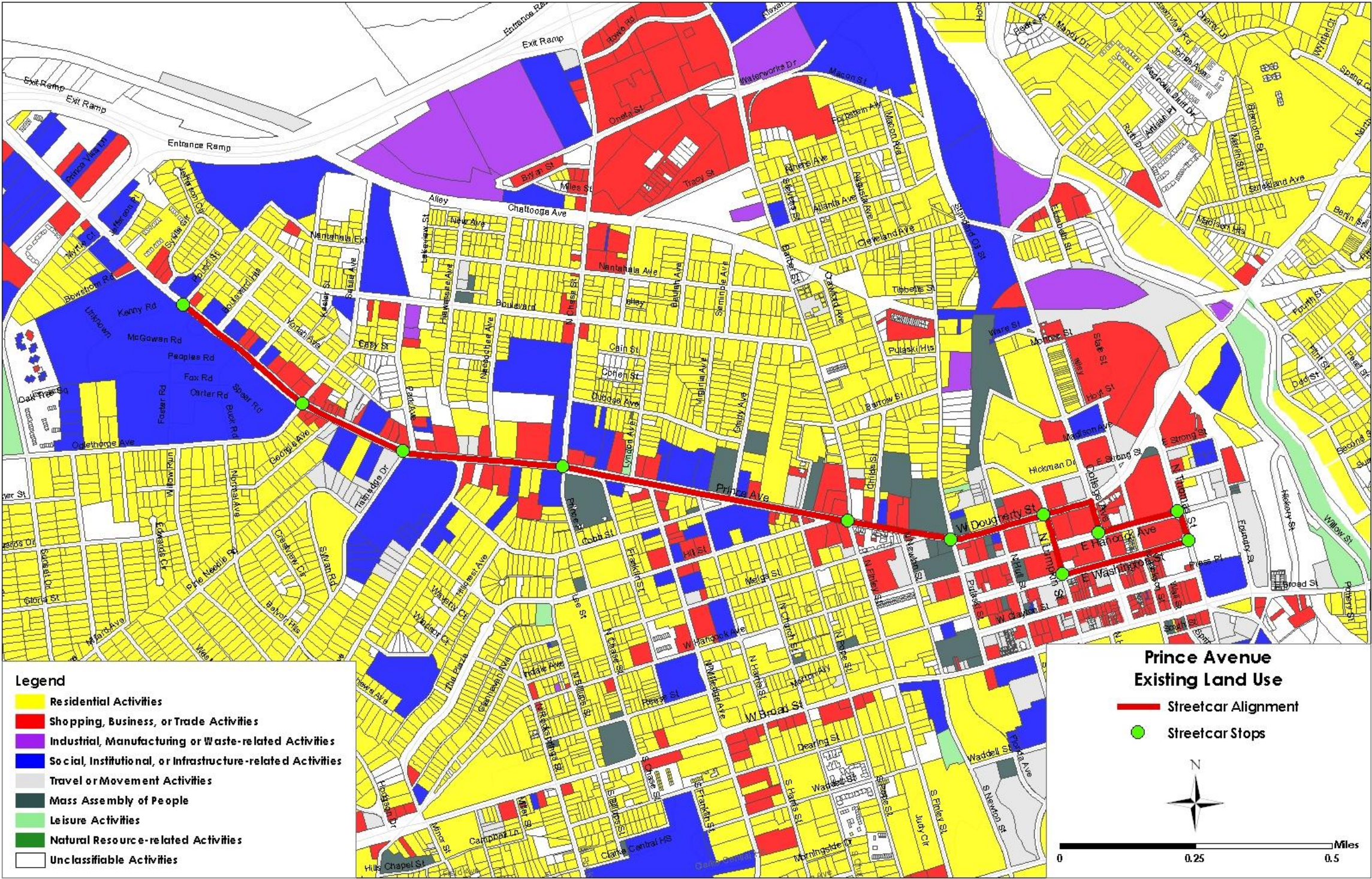
Source Photo by Author



**Figure 5.28 Prince Avenue Alignment –Potential Termini at UGA Health Science Campus Entrance by Pound Street.**

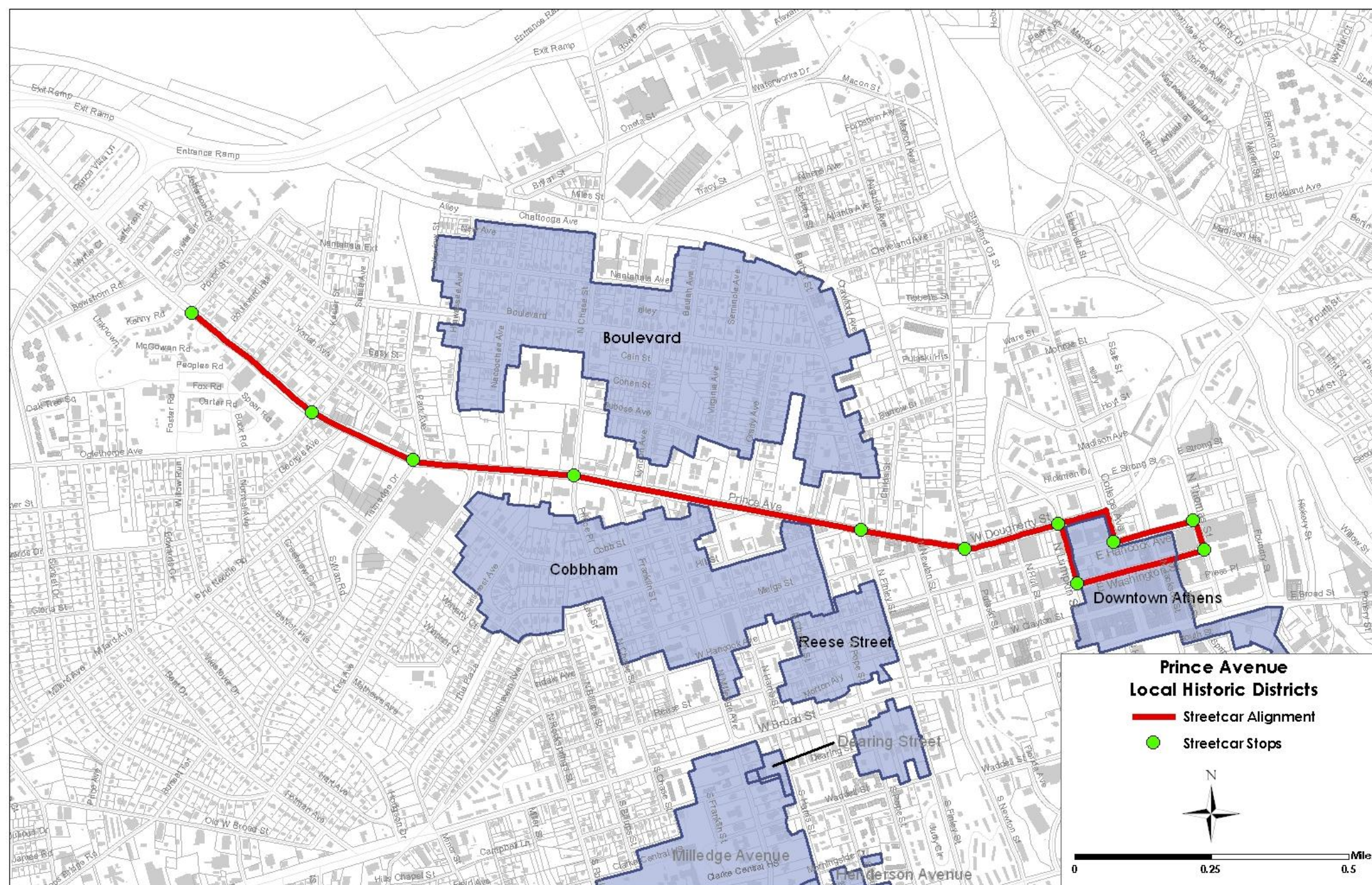
Source : Master Plan of Future UGA Health Sciences Campus -UGA University Architects for Facilities Planning





**Figure 5.29 Prince Avenue Alignment Existing Land Use Map**  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.30 Prince Avenue Alignment Historic District Map**

Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division



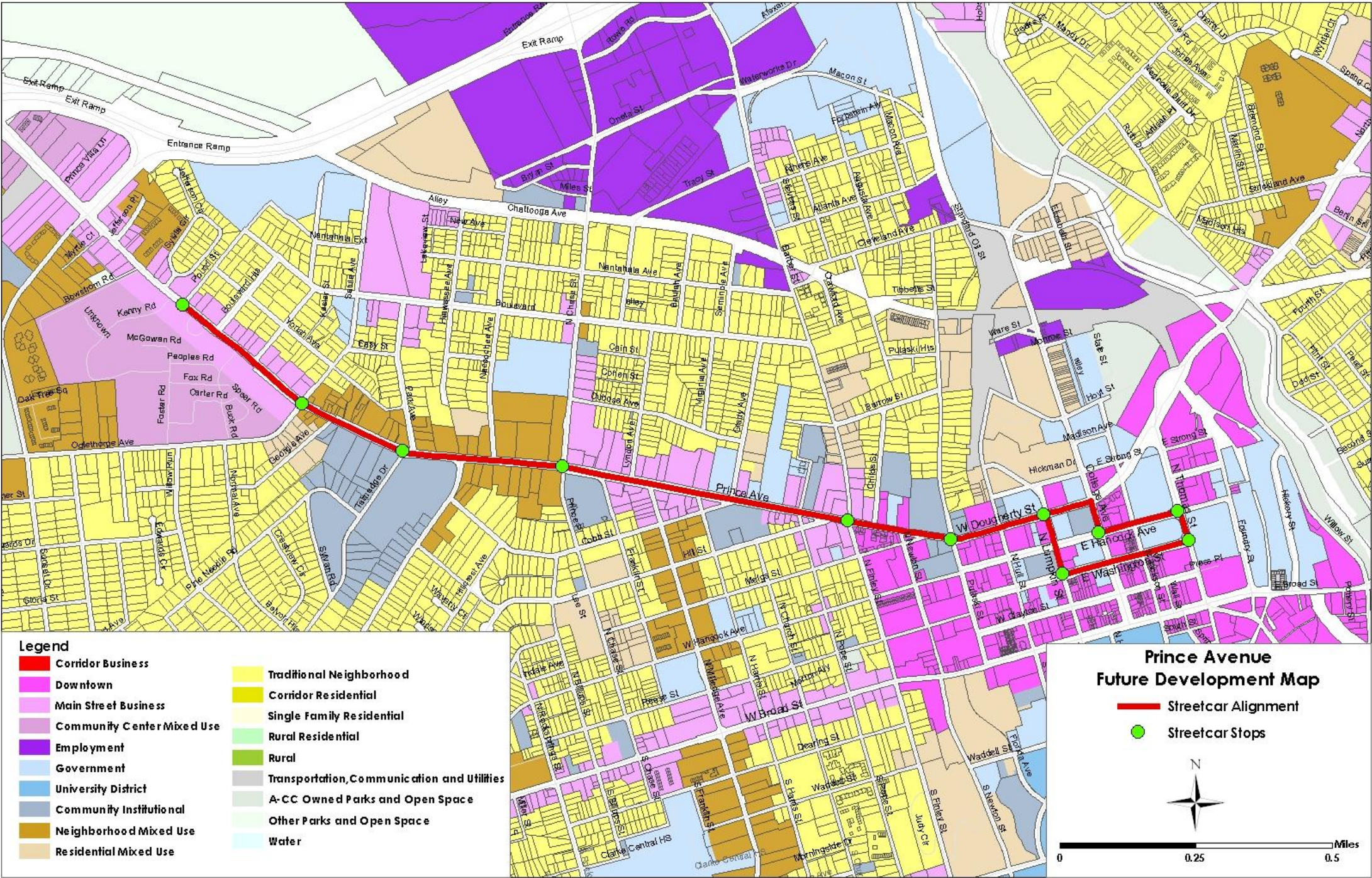


Figure 5.31 Prince Avenue Alignment Future Development Map  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division



### Baxter Street Line:

This route is 2.5 miles long. This will begin at the Thomas Avenue Terminus by the Classic Center down East Campus Road onto Baldwin Street and travel down South Lumpkin Street onto Baxter Street. It will terminate at Alps Road adjacent to the Beechwood Shopping Center. There's the possibility that it could turn around on the Beachwood shopping center property if there is a private – public partnership (see Figure 5.37). This line will serve UGA, St. Mary's Hospital, restaurants, shops and other businesses along the route.

### Site Context



**Figure 5.32 Baxter Alignment @ downtown termini**  
Source Photo by Author



**Figure 5.33 Baxter St View 1**



**Figure 5.34 Baxter St View 2**



**Figure 5.35 Baxter St. View 3**  
Source: Photos by Author







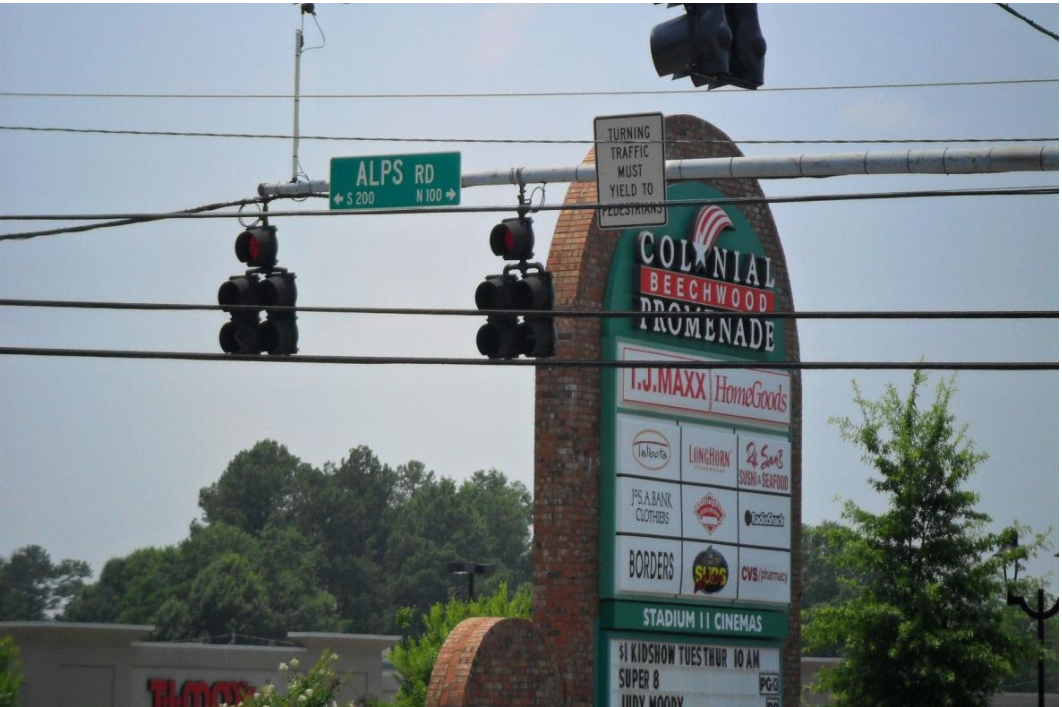






**Figure 5.38 Baxter Street Alignment Terminus at Alps Road**

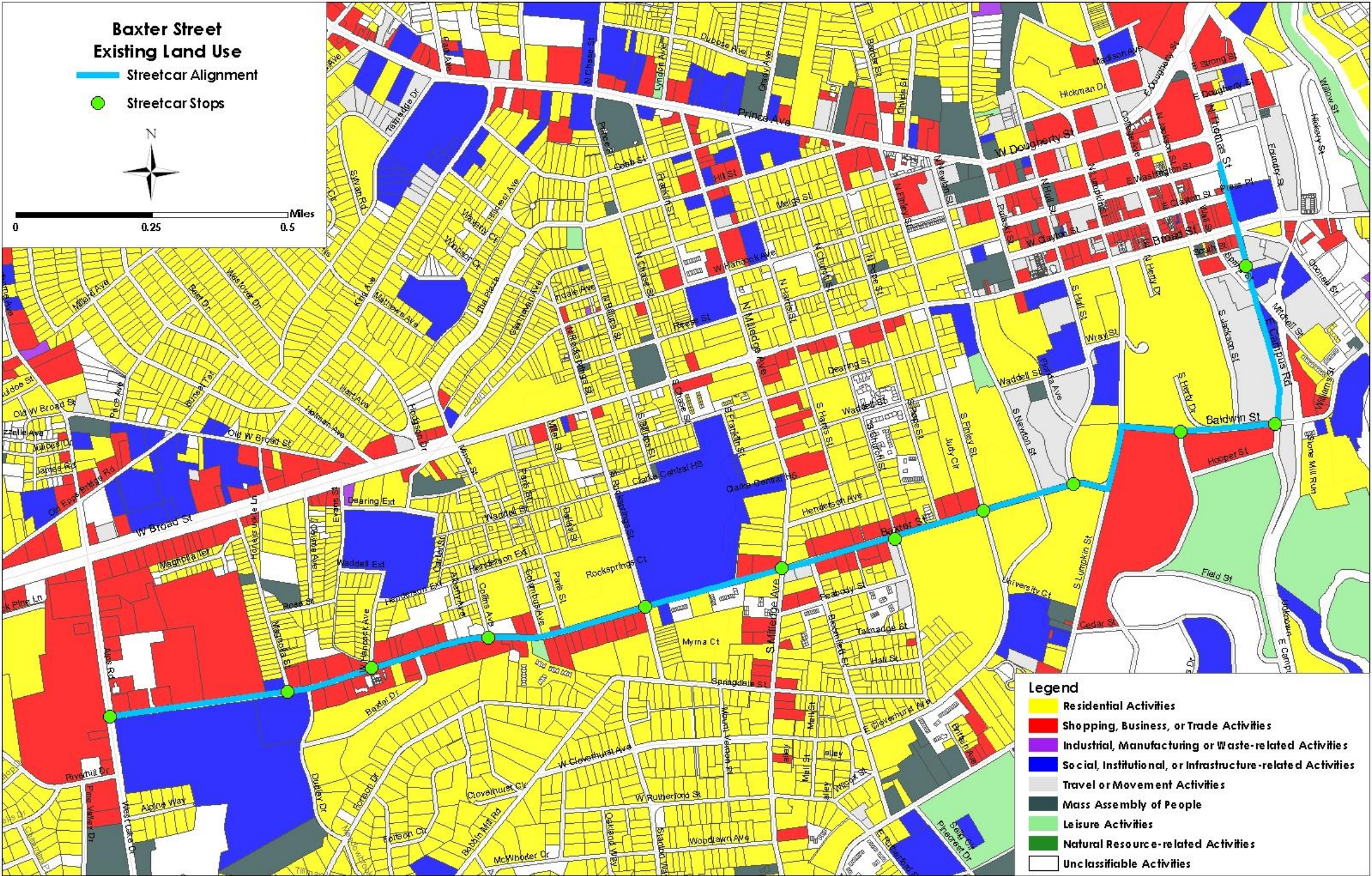
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division



**Figure 5.39 Terminus at Alps Road**

Source: photo by author





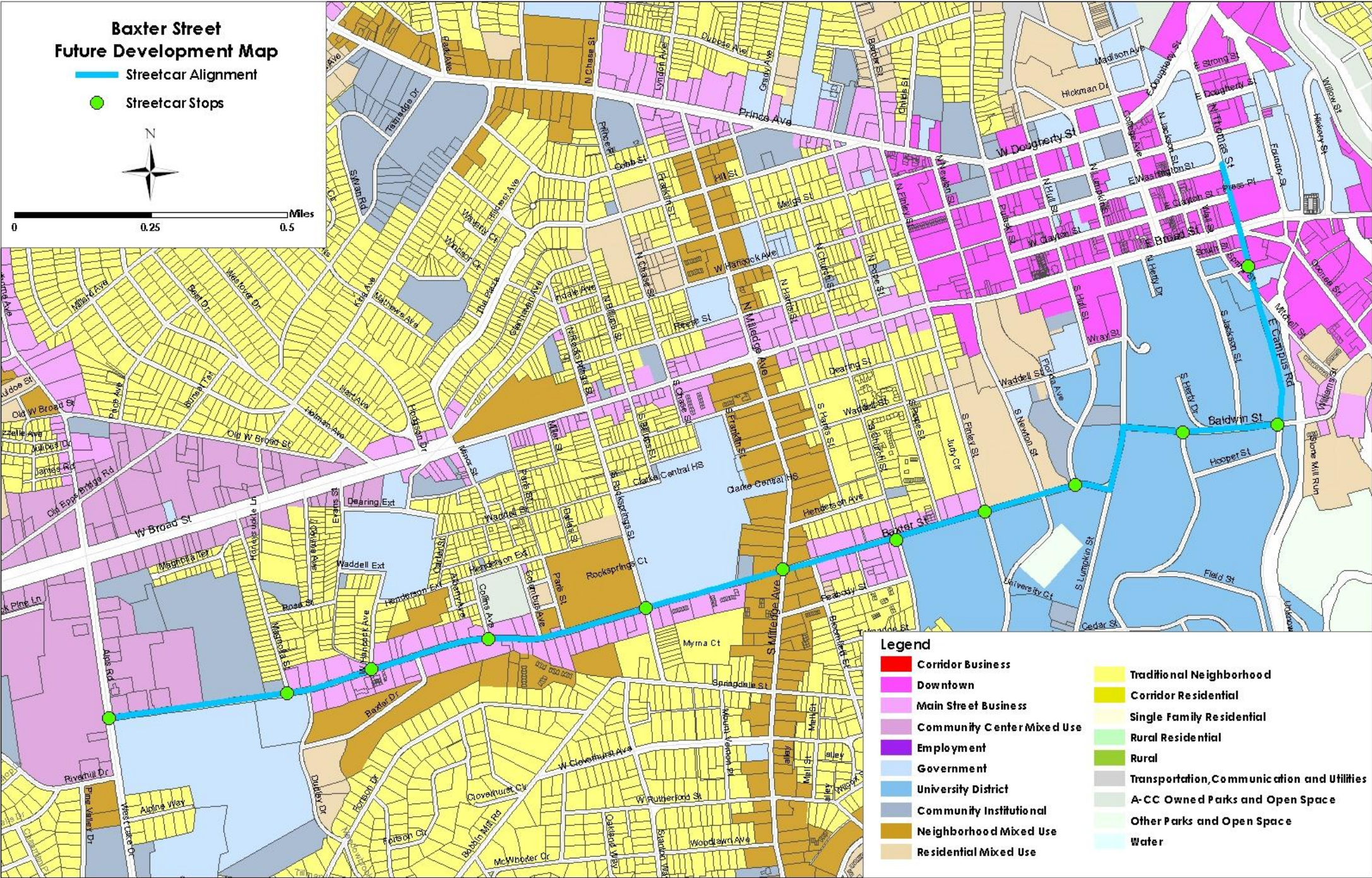
**Figure 5.40 Baxter Street Alignment and Existing Land Use Map**  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.41 Baxter Street Alignment and Historic District**  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.42 Baxter Street Alignment and Future Development Map**  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division



### North Avenue Line:

This route is 1.5 miles long. It will begin at the Classic Center terminus and will travel to North Avenue, terminating at Northcrest Drive and Old Hull Road by Athens Plaza. This line serves the Department of Family and Children Services, the Department of Labor and some low-income neighborhoods. The proposed streetcar maintenance facility is along the North Avenue alignment (see Figures 5.45 and 5.47).

### Site Context



**Figure 5.43 Downtown Termini at Thomas Ave- Classic Center**

Source Photo by Author



**Figure 5.44 North Av. View 1**



**Figure 5.45 North Av. View 2**



**Figure 5.46 North Av. View 2**  
Source Photos by Author

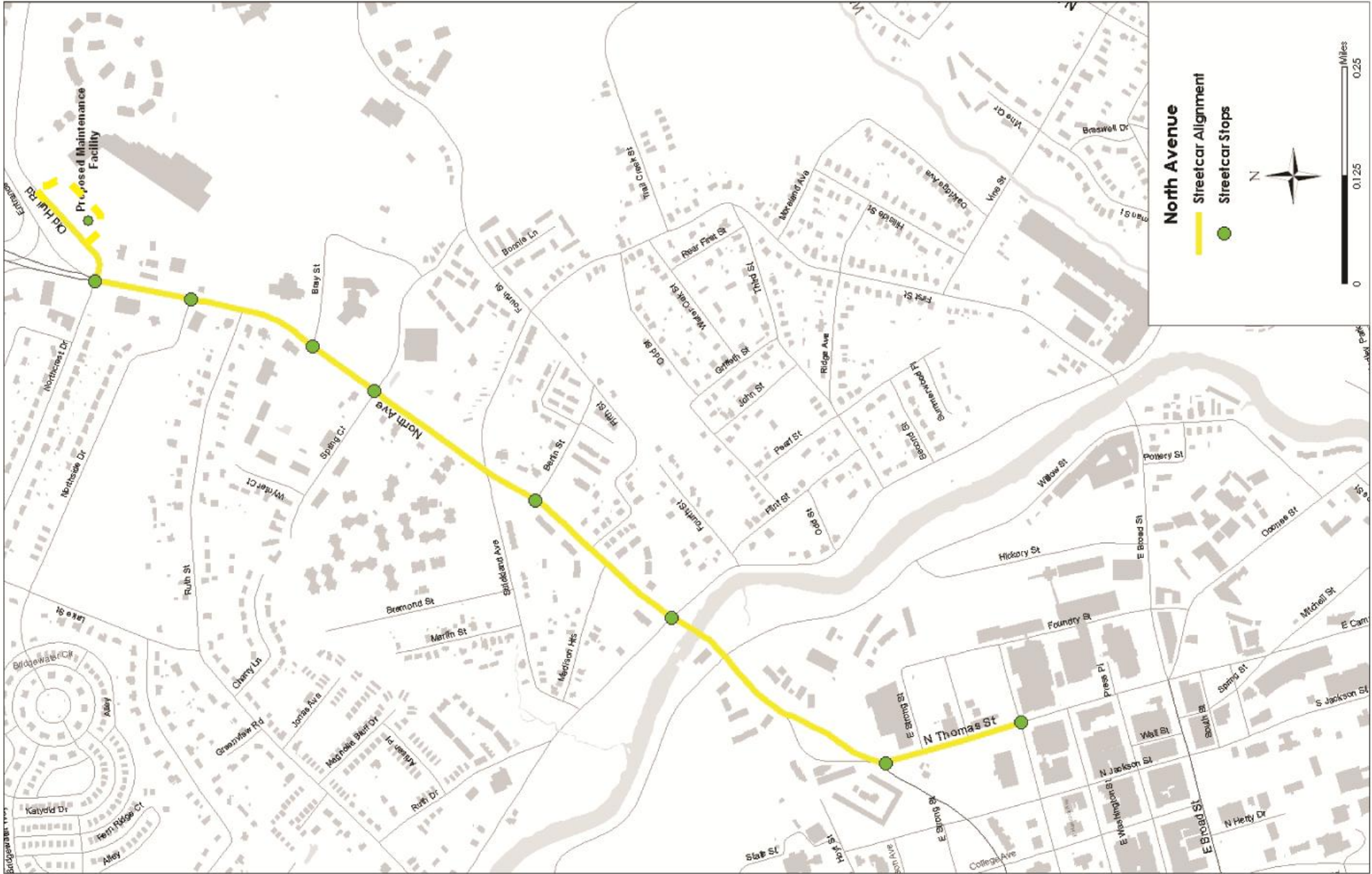




**Figure 5.47 North Avenue Alignment**

Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.48 North Avenue Alignment**

Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.49 Proposed Termini and Maintenance Facility at North Ave. and Old Hull Rd.**  
Source Author-Base Map Provided by Athens Clarke County Planning Department- GIS Division



**Figure 5.50 Terminus at North and Old Hull Rd.**

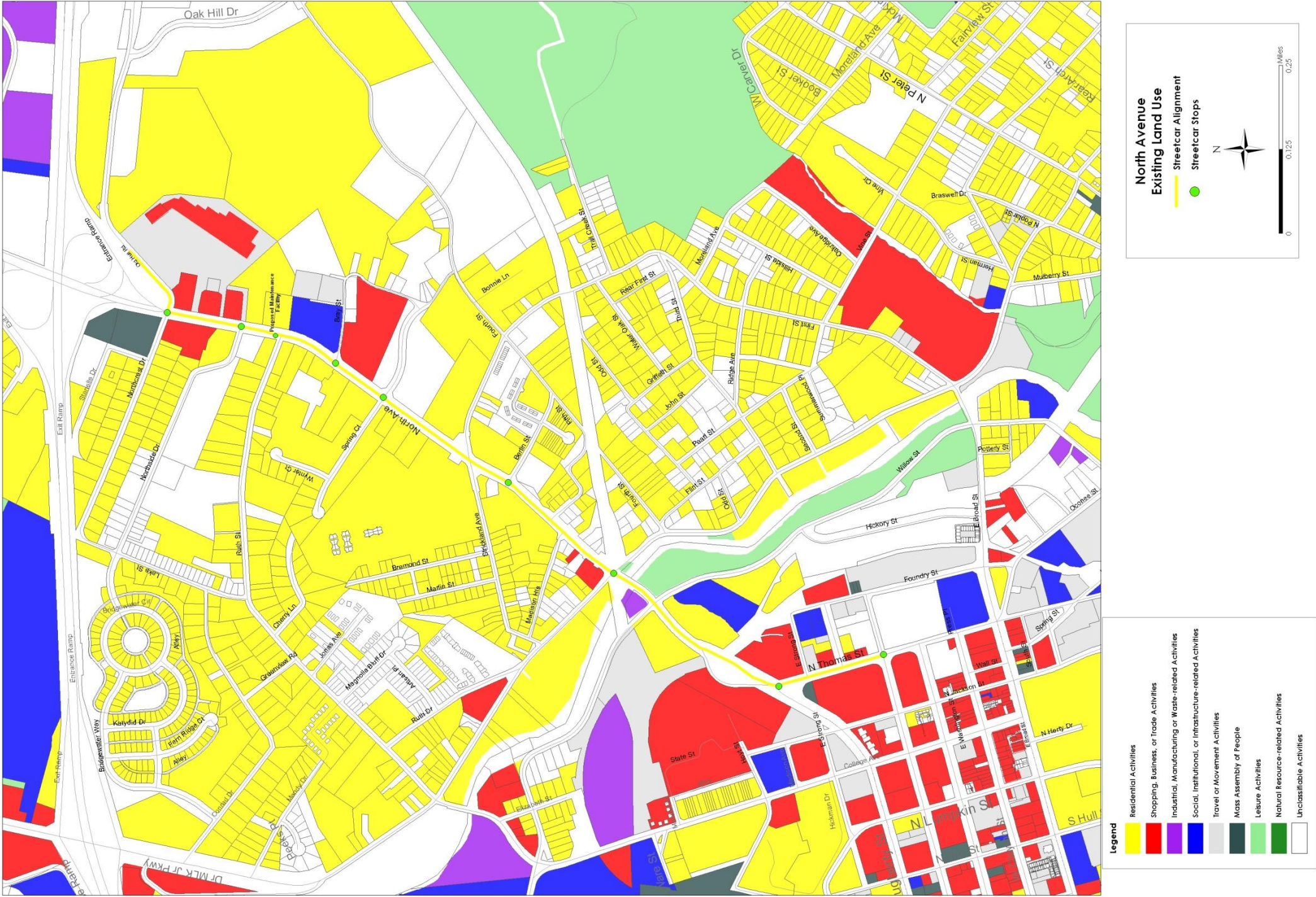


**Figure 5.51 Proposed Maintenance facility site on Old Hull Rd**  
Source: Photos by Author



**Figure 5.52 Terminus at North and Old Hull Rd and Northcrest**

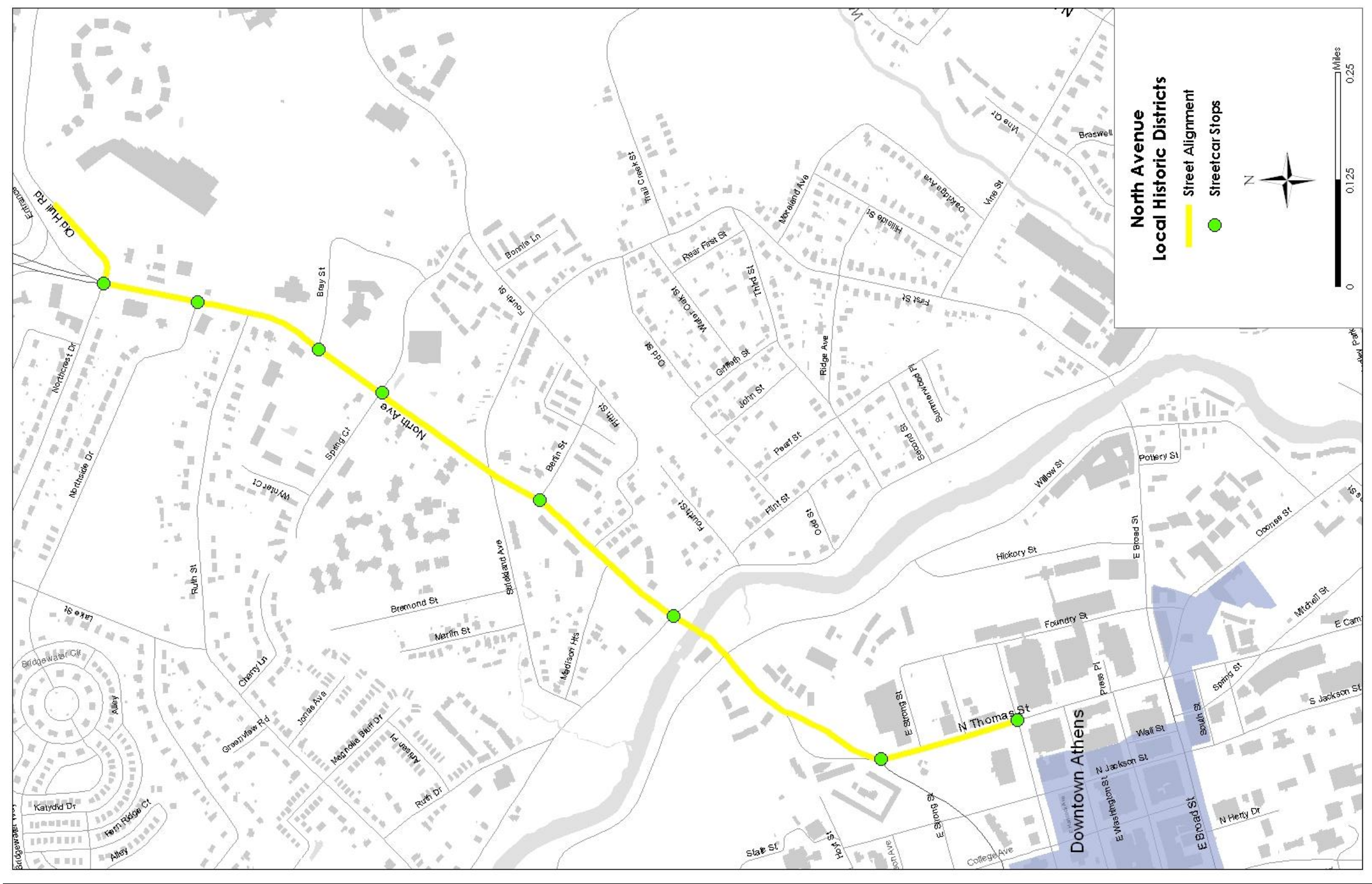




**Figure 5.53 North Avenue Alignment and Existing Land Use Map**

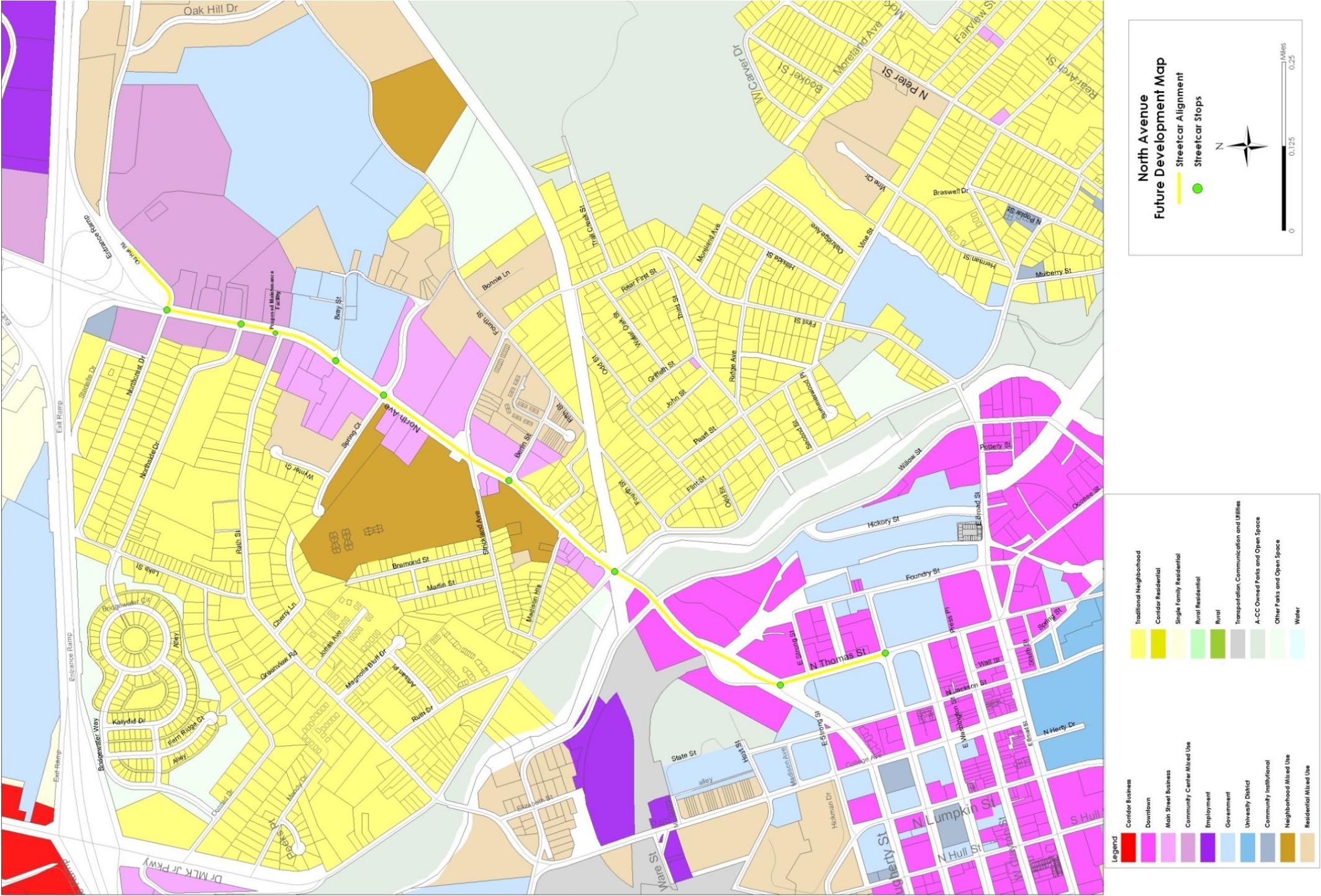
Source Author-Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.54 North Avenue Alignment and Historic Districts**  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division





**Figure 5.55 North Avenue Alignment and Future Development Map**  
Source Author- Base Map Provided by Athens Clarke County Planning Department- GIS Division



## **Ridership Potential**

One of the key factors in constructing this streetcar system is the potential ridership. An analysis will be needed based on the corridors with the most ridership potential, highest activity areas, areas with the most residential, retail and commercial developments. The travel times could be determined based on the number of stops and traffic patterns for the corridors of the alignments.

The streetcar ridership estimates were not developed for the alignments. The Prince Avenue and Baxter Street alignments seemed to have the greatest potential to serve many of the existing and planned developments. North Avenue presents the lowest potential for serving residents, students and visitors. All three alignments would serve the downtown core and could provide the greatest service to downtown and the major activity centers. Table 5.4 shows the factors that influence ridership.

**Table 5.4 Factors Influencing Ridership for Streetcars**

<b>Factor</b>	<b>How it Influences Ridership</b>	<b>Ridership Advantage-Bus vs. Streetcar</b>
Intensity of Land use	Density is the most direct influence transit ridership- the greater the intensity of land use, the greater the ridership.	Slight advantage to streetcar, which tends to have higher capacity than buses on a one for one basis.
Mix of Land Uses	Different land uses have different demand patterns. Mixing land uses ensures steady ridership through the day, rather than directional peaking.	Streetcar has a proven track record attracting some type of trips that generally do not use bus transit-especially visitor and tourist oriented travel and weekend trips.
Travel Time	Riders are attracted to transit services that more closely match auto travel times.	Both bus and streetcar could be designed for fast service. The flexibility of bus service may give it slight advantage as buses could swerve around obstacles.
Frequency and Span Of Service	Frequent service reduces wait times and allows riders to make trips without planning	No advantage-both bus and streetcar could be designed to run frequently.
Fares	High fares discourage ridership. Lower fares encourage ridership.	No advantage-fares could be the same for both.
Connectivity to a Broader Network	Connecting to regional services provides greatly enhanced mobility and enhances the ridership of the overall system.	Slight advantage to streetcar which provides a highly visible connection to other routes.
Legibility and Information	The easier it is to understand a transit system, the more likely it is that occasional rides would use it. Real time information had been proven to increase ridership by as much as 5%.	Both bus and streetcar could be designed for quality real time information. However streetcar has a slight advantage in that the tracks provide instant legibility.
Comfort	Roomier seats, ample room for standees, and a less "rocky ride" contribute to rider comfort and to increase ridership.	Slight advantage to streetcar, which operates on rails and therefore has less lateral movement than a bus. Riders often report they can read on streetcars but not on buses.

Source: Seattle Streetcar Network and Feasibility Study June 30 2004

**Service Criteria**

The potential streetcar schedule of operations will be evaluated including hours and days of operation, frequency and ridership capacity, the route architecture, and whether it is single, double or loop track lines.

**Streetcar Vehicle Options**

There are different vehicle and equipment options available for streetcars including vintage, heritage/restored, replicas, a popular type called Presidents Conference Committee (PCC) cars and modern. Characteristics of streetcars for example vehicle size, width, height, and carrying capacity will be evaluated for compatibility with the area. Streetcar vehicles can be single -ended; single -sided, double -ended and double sided. They can also use heating, ventilation, and air conditioning (HVAC) system for comfort.

The streetcar vehicle type that is selected for Athens should capitalize on capacity, facilitate rapid service; provide accommodation for bicycles and wheelchairs; American Disability Act (ADA) accessible; air conditioned and comfortable. It is possible that Athens could use a mixture of vehicle types, which would allow variation in the fleet. Double sided and double -ended vehicular configuration would be more suitable for Athens because they are less restrictive. There would be a need for at least six streetcars and two spares in the initial fleet. It is important that the streetcar vehicles are accessible for the mobility impaired.



Modern streetcars are more ADA accessible than the vintage or replica streetcars. The modern vehicles do not have steps. They have low floors and do not need wheelchair ramps or lifts. The modern streetcars are air conditioned while most vintage cars have heating but no air-conditioning system.

**Table 5.5 Summary of Vehicle Types**

<b>Vehicle Characteristics</b>	<b>Heritage</b>	<b>Replica</b>	<b>Modern</b>
Length	40-50feet	40-45 feet	60-180 feet
Width	8 feet	8 feet	8- 9 feet
Configuration	Single or double ended	Single or double ended	Single or double ended
Capacity	88	88	200
HVAC	No but has heat	Possible	Yes
ADA accessible	Very difficult needs on board lift	Good	Low floor Very good
Maintenance needs	Very high	High	Average
Cost	\$0.5 to 1.5 Million	\$0.5 to 1.5 Million	\$1.5 to 3.5 million

Source: Street Smart and Cities in the twenty First Century

### **Concept for Maintenance Facility**

The streetcar system would require a maintenance facility to service and store the 8 streetcar vehicles. It is important that the facility be connected to the streetcar alignments.

The recommended maintenance facility would be located at the end of the North Avenue line on Old Hull Road by the existing Athens Plaza. The facility needs to be on a one to two acre site, preferably on a flat site. This proposed location is a prime area for this because it is right at the end of the North Avenue line, which is the shortest distance of the three streetcar alignments.

### **Station Design Criteria and Locations**

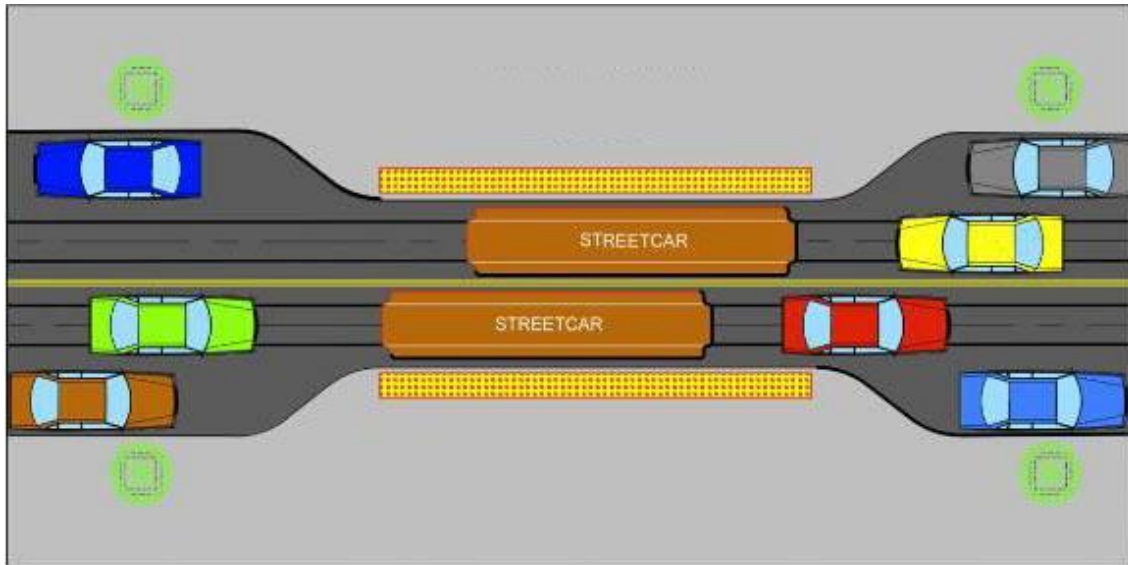
The station design criteria deal with streetcars stops and potential station requirements, for example, boarding issues, accessibility issues, curbside or platform stops etc. The stops should be simple design. Streetcar stops will be located about every 2 to 4 blocks along the routes. The stops would incorporate a waiting area, a shelter, and system information board regarding fares, routes, and schedules. The stops could be located on a special platform that enables level boarding, or they could use portions of the sidewalk where feasible. In neighborhoods with on-street parking, the streetcar stop could be located on a curb bulb-out that widens the sidewalk to meet the streetcar vehicle operating in the travel lane. The stations need to be fully ADA accessible and should be compatible with buses.

Table 5.5 summarizes the stops for each alignment. Figure 5.46 illustrates a plan view of a streetcar stop. Figure 5.47 a picture of a streetcar station in Memphis.

**Table 5.6 Proposed Station Stops**

<b>Prince Avenue Line</b>	<b>Baxter Street Line</b>	<b>North Avenue Line</b>
N Thomas @Washington St.	N. Thomas St. @ Washington St.	N. Thomas St @ Washington St.
N. Lumpkin @ E Washington St.	Spring St.@ East Campus Rd	E. Dougherty St @ Thomas St.
E. Hancock @ College Av.	Baldwin St. @ East Campus Rd.	Dr. MLK Jr. Pkwy @ North Av.
W. Dougherty St. @ N. Lumpkin	Baldwin St. @ S. Lumpkin St.	Berlin Street @ North Av.
N. Finley St @ Prince Av.	S. Hull St. @ Baxter St.	Spring Court
Cobb St. @ Prince Av.	S. Finley @ Baxter St.	Bray Street @ North Av.
Chase St @ Prince Av.	S. Church St. @ Baxter St.	Northside Drive 2 North Av.
Talmdage Dr. @ Prince Av.	S. Milledge Av @ Baxter St.	Nothcrest Dr. @ North Av.
Ogelthorpe Av @ Prince Av.	S. Rockspring St @ Baxter St.	
Pound St @ Prince Av.	Collins Av. @ Baxter St.	
	W. Hancock @ Baxter St.	
	Magnolia St @ Baxter St.	
	Alps Rd. @ Baxter St.	
<b>Total 10 Stops</b>	<b>13 Stops</b>	<b>8 Stops</b>





**Figure 5.56 Typical Streetcar Stop**

Source: URS Brooklyn Streetcar Feasibility Study



**Figure 5.57 Typical Streetcar Stop in Memphis TN.**

Source: Photo by Author

## Concepts for Operation

This provides information on how the system can be operated and operation hours. A review of the other streetcar systems in the U.S was done to determine the operating parameters. Majority of the streetcars operate in mixed traffic with segregated or non- segregated alignments. Some system headways in the U.S. operate from 6-15 minutes. The streetcar system could potentially operate seven days per week with service frequencies of about 15 minutes throughout the day and evening, including late night service on Fridays and Saturdays. The streetcars could operate during the times described in Table 5.6. These times could be adjusted with additional market analysis and do not reflect special events that may demand extension of the hours of service.

**Table 5.7 Potential Streetcar Hours of Operation**

Day of Week	Start Time	End Time	Hours of Operation
Mon. through Thurs.	6:00 AM	12:00 AM	18
Friday	6:00 AM	2:00 AM	20
Saturday	6:00 AM	2:00 AM	20
Sunday	9:00 AM	10:00 PM	11

On special event days and game days at UGA there could be additional services and at later times. The fares could start from \$0.50 to \$1.00.

## **Benefits of Streetcars**

Streetcars encourage economic development that improves the existing infrastructure, decreases auto trips on the streets and emphasizes walkable neighborhoods. Streetcar implementation allows a wide variety of economic opportunities and drives urban development. They encourage infill development in urban neighborhoods and increase housing availability. In Portland, Oregon streetcars have encouraged over 10,000 new residential units and 5.4 million square feet of commercial spaces. Streetcars can cost 12-40 million dollars per mile depending on the type of streetcar vehicle, whereas, light rail cost between \$50 – 100 million per mile (Ohland and Poticha 2009).

Streetcars use electricity instead of a combustion engine to operate and therefore offer several environmental benefits including decrease in carbon dioxide emissions. Emissions from automobile combustion engines are hazardous to health and have detrimental effects on the respiratory system in people. In effect, streetcars are a more sustainable alternative transit system with electrical energy generated power that is cleaner and more renewable. It enhances the health and wellbeing of the community. Electric streetcars can reduce vehicle trips and lower traffic. They increase ridership into the downtown areas. Streetcar use also reduces the need for new parking facilities.

## Estimate of Conceptual Cost

Cost is an important factor in implementing a streetcar system. The cost estimate for the proposed system will be based on data available from the case studies. The cost will be mainly based on a modern system similar to Portland.

Table 5.8 summarizes the number of stations, lengths and cost.

**Table 5.8 Summary of Capital Cost for the Athens Streetcar System**

<b>Capital Cost by Alignment</b>	<b>Prince Av.</b>	<b>Baxter St.</b>	<b>North Av.</b>
Length double track	2.6 miles	2.5 miles	1.5 mile
Total track length	5.2 miles	5.0 miles	3.0 miles
# of Stations	10	13	8
Average cost/mile	\$10 million	\$10 million	\$10 million
Total # of Stations	10	13	8
<b>Total Cost</b>	\$52 million	\$50 million	\$30 million
<b># of vehicles</b>	2	2	2
Average cost/ vehicle	\$3 million	\$3 million	\$3 million
<b>Subtotal (plus 2 spares)</b>	\$6 million	\$6 million	\$6 million
<b>Total</b>	\$58 million	\$52 million	\$36 million

## Funding Options

A review of the funding for the streetcar systems in the case study cities gave a better understanding of the different funding options available for the capital and operating costs. A specific type of funding was not specified for Athens streetcar services but there are a variety of options available to be pursued, for example; private, local, regional, state, public/ private and Federal funding. See list of potential funding below.



### Federal Funding

- Transportation Investments Generating Economic Recovery grant (TIGER)
- FTA Circulator Grant Program
- FTA Small starts
- Federal transportation fund
- Housing and Urban Development funds

### State and Local Funding

- State transportation funds
- Local transportation funds
- Regional transportation authority
- Local transit administration
- City parking bonds and parking fees
- Local improvement district
- Tax increments

## **CONCLUSION**

The goal of this practicum was to explore the possibility of the reintroduction of streetcars to Athens. The project also provided insight into the design and physical characteristics of implementing a streetcar system. It has proven that a streetcar system could be developed in Athens. The streetcar system can be more beneficial in transit oriented development along with the Athens multimodal transportation systems. Further research, environmental impact studies, engineering studies and refinement will be needed to provide more accurate results.

Streetcars depict a growing alternative transportation in America. Based on the research done for the Athens streetcar system, it was possible to identify various streetcar systems design and development criteria. The standards are necessary and included:

- Establishing the potential or feasibility for a streetcar implementation.
- Identifying ridership and target population groups that will need the service.
- Identifying the best possible alignments.
- The operation and service plans.

This system should be implemented the public needs to be informed as well as give input on its implementation. The community leaders, stakeholders and

residents need to become engaged in the process in order for this to be successful.

An economic development strategy needs to be developed in order to determine the economic benefits of this proposed streetcar system. The city officials, ATS, MACORTS and the ACC planning department should facilitate discussions of an economic development strategy of how to approach the implementation and operation of the system.

Funding the project will be of importance and probably the greatest obstacle for implementation. It may likely be dependent upon Federal funding, local improvement district (LID), public –private partnership and private investments. This planning project was a “vision” to find the possibilities for the potential streetcar system in Athens. Streetcars can change the future of public transit in Athens.

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