



ENVIRONMENTAL ASSESSMENT

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Revision 0

United States Department of Transportation
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Atlanta, GA 30303-1512

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**CHARLOTTE STREETCAR PROJECT
CHARLOTTE-MECKLENBURG COUNTY, NORTH CAROLINA**

**ADMINISTRATIVE ACTION
ENVIRONMENTAL ASSESSMENT**

**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION
AND
CITY OF CHARLOTTE, NORTH CAROLINA**

DOCUMENT PREPARED BY:
URS CORPORATION – NORTH CAROLINA

Pursuant to the National Environmental Policy Act (NEPA) of 1969 as amended, 42 U.S.C. §4322(2); the regulations of the Council on Environmental Quality (CEQ), 40 CFR 1500-1508; the Federal Transit Laws, 49 U.S.C. Chapter 53; the National Historic Preservation Act of 1966, 16 U.S.C. §470(f); Section 4(f) of the Department of Transportation Act of 1966, as amended, Title 49 U.S.C. §303; the Federal Clean Air Act Amendments of 1990; the Endangered Species Act of 1973, 16 U.S.C. §1531; Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 U.S.C. §4601; Section 402 of the Clean Water Act, 33 U.S.C. §1342; Executive Order 12898, Federal Actions to Address Environmental Justice in Minority & Low Income Populations; Executive Order 11990, Protection of Wetlands; Executive Order 11988, Floodplain Management; Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency; and all relevant laws and procedures of the State of North Carolina.

FOR: FEDERAL TRANSIT ADMINISTRATION, REGION IV

**YVETTE G. TAYLOR
REGIONAL ADMINISTRATOR**

DATE

FOR: CITY OF CHARLOTTE

**JEB BLACKWELL, P.E.
KEY BUSINESS EXECUTIVE FOR ENGINEERING & PROPERTY MANAGEMENT**

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List of Acronyms and Abbreviations

APE	Area of potential effect	NHPA	National Historic Preservation Act
BAE	Bay Area Economics	NO _x	Nitrogen oxide
CATS	Charlotte Area Transit System	NEPA	National Environmental Policy Act
CCW	Center, Corridors, and Wedges Growth Framework	NESC	National Electric Safety Code
CDOT	Charlotte Department of Transportation	NRHP	National Register of Historic Places
CFR	Code of Federal Register	NSA	Neighborhood statistical area
CGS	Charlotte Gateway Station	OCS	Overhead Contact System
City	City of Charlotte	O ₃	Ozone
CO	Carbon monoxide	PED	Pedestrian overlay districts
CPPC	Central Piedmont Community College	ROP	Rules of practice
CSD	Context sensitive design	SCE	Secondary effects and cumulative effects
CTC	Charlotte Transportation Center	SIP	State Implementation Plan
GDP	General development policies	SHPO	State historic preservation officer
EA	Environmental assessment	SNF	Streetcar Neighborhood Forums
EPA	Environmental Protection Agency	TAP	Transportation Action Plan
EPM	Engineering and Property Management	TIF	Tax increment finance
FHWA	Federal Highway Administration	TIP	Transportation Improvement Program
FONSI	Finding of no significant impact	TSM	Transportation system management
FTA	Federal Transit Administration	UR	Urban residential district
HAWK	High-intensity activated crosswalk	URS	URS Corporation
HPO	Historic Preservation Office	USACE	U.S. Army Corps of Engineers
KBU	Key business unit	VC	Volume to capacity
LEP	Limited English proficiency	VMF	Vehicle maintenance facility
LPA	Locally Preferred Alternative	VMT	Vehicle miles traveled
LRT	Light rail transit	106	Section 106 (Federal historic preservation regulation)
LRTP	Long Range Transportation Plan	2030	Project planning horizon
MOU	Memorandum of Understanding	4(f)	Section 4(f) (U.S. Department of Transportation regulations protecting publicly owned historic properties, parklands, wildlife refuges, and recreational areas)
MTC	Metropolitan Transit Commission		
MUMPO	Mecklenburg-Union Metropolitan Planning Organization		
NAAQS	National Ambient Air Quality Standards		
NCDOT	North Carolina Department of Transportation		

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Executive Summary

This summary provides a brief description of the Charlotte Streetcar Project (the Project) Environmental Assessment (EA). The purpose of the EA is to evaluate the effects of the proposed Project on the environment. This document provides environmental information for public officials and citizens to review, and gives them an opportunity for participation and comment before decisions are made and actions are taken on the Project.

What is the streetcar? A streetcar is a lightweight electrically powered vehicle that runs on rails embedded in the street. In Charlotte, our streetcars will operate on tracks in current traffic lanes on existing streets and bridges. Visually, the streetcar looks similar to the LYNX Blue Line, the existing light rail line in Charlotte, but offers more operational flexibility because it can share traffic lanes with cars and buses and load passengers at street-level stops.

The Charlotte Streetcar Project will provide connectivity to Charlotte's central business district and surrounding communities and institutions to the west and east of Center City along Beatties Ford Road and Central Avenue. The identified 10-mile alignment will run from Rosa Parks Place Community Transit Center via Beatties Ford Road, through Center City on Trade Street/Elizabeth Avenue, to Plaza/Midwood via Hawthorne Lane, and to Eastland Community Transit Center via Central Avenue.

The streetcar has the following benefits:

- The passenger capacity of a streetcar is nearly double that of a conventional bus.
- Removing buses and other vehicles from roadways reduces emissions.
- Well established transit corridors, neighborhoods, educational institutions, business corridors, recreational centers, sports venues, and transit facilities are connected.
- The permanence of track in the street encourages development and redevelopment.

What is the purpose and need of the streetcar project? The purpose of the Project is to provide an urban transit circulator that serves the transportation needs of the residents, workers, and visitors traveling between several of Charlotte's diverse urban neighborhoods and central business district and spur economic development in these areas. The Project will meet the following needs:

- Effectively meet the increasing transit demand placed on the City of Charlotte's (City's) most productive bus corridors
- Improve transit connections between major urban activity centers within the urban core while expanding and connecting Charlotte's regional transit corridors
- Generate transit investment that spurs new development and economic revitalization along two of Charlotte's main commuter thoroughfares
- Improve transit services and facilities that support City



and regional land use and development goals and objectives

- Reduce short inner-city automobile trips and vehicle emissions

Has the public been involved in the development of the Project? The City of Charlotte developed a comprehensive outreach program to encourage participation by the public, elected officials, and interested governmental agencies in the decision-making process. Public and agency outreach activities are described in more detail in Chapter 5 of the EA.

How can I obtain more information about the streetcar, and how can I comment on the streetcar and the EA? Requests for copies of the EA and/or other supporting documents may be submitted in writing, by e-mail, or by telephone. The full EA is also available on the following website or from the City of Charlotte via the following contact information:

www.charlottefuture.com

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Comments on the Project and the EA are welcome, and can be submitted to the above contact. Comments must be received by the City of Charlotte by **May 9, 2011**.

Will the Project cause any significant impacts? The EA concludes that the Project is not expected to have significant negative impacts on the human and natural environment.

What happens next? At the conclusion of the public review and comment period, the lead federal agency, the Federal Transit Administration (FTA), is anticipated to prepare a Finding of No Significant Impact (FONSI) identifying the selected alternative. The FONSI will explain the reasons for the streetcar decision, summarize any mitigation measures that will be incorporated in the Project, respond to comments received on the EA, and document any approval required under Section 4(f) of the U.S. Department of Transportation Act. The FONSI completes the environmental documentation process under the National Environmental Policy Act (NEPA) and is required from the FTA to advance the Project into subsequent Project development steps. After receipt of FONSI, the City will proceed with Final Engineering of the Project.

1. PURPOSE AND NEED

1.1 Purpose and Need Statement

The proposed action is to construct, operate, and maintain a modern streetcar system within the City of Charlotte's urban core.

The purpose of the Charlotte Streetcar Project (the Project) is *to provide an urban transit circulator that addresses the transportation needs of the residents, workers, and visitors traveling between several of Charlotte's diverse urban neighborhoods and central business district and to spur economic development in these areas.*

The Project addresses several needs that are not currently met by the existing transportation system, including the following:

- **Transportation and mobility**
 - Effectively meet the increasing transit demand placed on the City's most productive bus corridors
 - Improve transit connections between major urban activity centers within the urban core while expanding and connecting Charlotte's regional transit corridors
- **Economic development**
 - Generate transit investment that spurs new development and economic revitalization along two of Charlotte's main commuter thoroughfares
- **Land use**
 - Improve transit services and facilities that support City and regional land use and development goals and objectives
- **Environment**
 - Reduce short inner-city auto trips and vehicle emissions

1.2 Project Study Area

The Project corridor, in fulfilling the goals defined in the Purpose and Need, establishes a connection between east and west through the heart of the City. The 10-mile streetcar alignment will traverse through Center City, which is Charlotte's central business district, and connect urban neighborhoods and business corridors to the east and northwest. The study area is divided into three subareas for more detailed analysis: Beatties Ford Road, Trade Street (or Center City), and Central Avenue. The subareas are based on geographic boundaries to assist in the analysis and evaluation of potential impact, and are not intended or implied to be defined as phases of the Project.

"Center City," "Trade Street," and "downtown" are interchangeable names for Charlotte's central business district and primary activity center.

The alignment begins in the Beatties Ford Road subarea in northwest Charlotte at the Rosa Parks Place Community Transit Center. The alignment continues south along Beatties Ford Road to Trade Street and the Center City subarea, running through the urban core of the City. The alignment then proceeds east to Elizabeth Avenue, eventually extending northeast along Hawthorne Lane to Central Avenue. From here, the Project enters the Central Avenue subarea, traveling east along Central Avenue to the Project end-of-line at Eastland Community Transit Center. Figure 1 identifies the Streetcar Project study area.

The Project study area encompasses a buffer approximately 0.5 mile wide on either side of the streetcar alignment and represents the maximum distance that most pedestrians will likely walk to access the service. The population within the Project study area is projected to experience an 81 percent overall increase. Mecklenburg-Union Metropolitan Planning Organization (MUMPO) population projections indicate that between 2008 and 2035, the number of people residing within the Project study area will increase from 45,727 to 82,417. This is a significantly faster rate than the metropolitan statistical area as a whole. However, the population increase is not expected to be uniform throughout the corridor; the Center City subarea is expected to attract the majority of new residents, growing to a population that will be twice the size of the other two subareas. The Beatties Ford Road and Central Avenue subareas are also forecasted to grow significantly, but at a rate much reduced from the Center City projections. These variations in growth rate, accompanied by several other factors, translate into different applications of the Project Purpose and Needs for the three subareas.

The Beatties Ford Road subarea is the northwestern segment of the Project. The subarea, a 1.9 mile portion of the alignment, encompasses the heart of the historic West End District, one of Charlotte's first suburban-style neighborhoods, and is home to historic landmarks, commercial nodes, schools and universities, parks, churches, and traditionally African-American residential areas close to downtown.

Much of Beatties Ford Road is either positioned for redevelopment or is showing signs of economic growth. Several properties are currently in the process of redevelopment or display potential, spurred on by the Charlotte Streetcar Project. Having a number of long range planning documents in place, the streetcar may also improve compliance with Land Use objectives within the corridor. The streetcar services will supplement one of the busiest bus routes in the City, improving transportation and mobility on a heavily traveled corridor.

The Center City subarea comprises the central portion of the corridor and follows the 4.5 mile stretch of the proposed alignment along Trade Street from Johnson C. Smith University to Central Avenue. The subarea includes the central business district and the four Center City wards. Major destinations include the Charlotte Transportation Center (CTC), Bank of America Corporate Center, Johnson & Wales University, City and County government centers, the Time Warner Cable Arena, Central Piedmont Community College, the future Charlotte Gateway Station, historic residential neighborhoods, and numerous other public and private office buildings, hotels, and cultural and entertainment attractions.

While it is unlikely that the Project will spur economic growth or change land use in the immediate Center City area, redevelopment is already occurring on Elizabeth Avenue as a result of the anticipated Project. This subarea will experience environmental benefits from individuals using the streetcar in place of automobiles for their short inner-city trips. Significant transportation and mobility benefits of the greater system are realized in this subarea – the streetcar alignment will connect the future Charlotte Gateway Station (heavy commuter rail, Amtrak station) to the Charlotte Transportation Center (bus system hub, LYNX Blue Line light rail service). The Center City subarea combines these connections with other attractions, businesses, and cultural destinations, providing access to, and mobility in, the urban core of Charlotte.

The Central Avenue subarea is situated to the east of Center City Charlotte. The subarea follows a 3.6 mile segment of the proposed alignment along Central Avenue beginning at The Plaza to just past the Eastland Community Transit Center adjacent to the former Eastland Mall. The subarea crosses numerous residential neighborhoods and commercial districts, including the Plaza-Midwood area, strip development / auto-dependent retail centers, and single and multi-family neighborhoods.

With several parcels showing redevelopment potential, thriving established businesses, and large Eastland Mall parcels positioned for major transit oriented redevelopment, Central Avenue exhibits economic development potential. While environmental benefits may be limited (low reduction in automobile trips), the Project will improve transportation and mobility on this heavily traveled corridor by supplementing one of the most-used bus corridors in the City. These anticipated benefits of the Project will improve compliance with City Land Use objectives.

1.3 Goals and Objectives

The City of Charlotte developed a set of Project goals and objectives using client, stakeholder, and public input. The goals and objectives are used to address the transportation, land use, and economic development needs in the Streetcar Project corridor.

Transportation and Mobility. Develop the streetcar as a mode that operates seamlessly within an integrated mass transit system by

- Improving the operational efficiency of transit in the corridor;
- Increasing transit ridership;

- Improving accessibility and mobility;
- Offering riders a high-quality transit alternative.

Economic Development. Support corridor-wide initiatives that guide development and reinvestment in neighborhoods by

- Serving projected population and employment growth;
- Improving connectivity between activity centers;
- Providing transit access to existing and planned development.

Land Use. Support City and regional land use and development goals by

- Integrating transit and land use along the corridor;
- Implementing transit policies highlighted in regional plans;
- Attracting/incentivizing higher development densities, thereby reducing sprawl.

Environment. Protect and enhance all aspects of the built and non-built environment by

- Reducing fuel and diesel emissions;
- Reducing automobile trips.

2. ALTERNATIVES CONSIDERED

This chapter presents the three alternatives assessed for the Project: the No-Build Alternative, the Transportation System Management (TSM) Alternative, and the Build Alternative, hereafter referred to as the Locally Preferred Alternative (LPA). The chapter begins with a description of the process for developing the LPA, including systems planning efforts and refinement of the alignment through Center City.

2.1 Development of Locally Preferred Alternative (LPA)

The Charlotte Streetcar Project has evolved through a decade of integrated land use and transportation planning efforts. It is the result of the coordinated land use and transportation planning efforts dating back to the early 1990's. A brief timeline of Project development can be found in Appendix I, while the adjacent Land Use, Transportation, and Area Plans can be found in Appendix E.

Previous system planning efforts envisioned the Charlotte Streetcar Project as an in-street fixed-guideway rail system that connects two transit centers in Center City and then extends the system along the alignments of Beatties Ford Road and Central Avenue. The City adopted the LPA in 2002 as part of the *2025 Transit Corridor System Plan* and again in 2006 with the adoption of the *2030 Transit System Corridor Plan* (Charlotte, 2006). This section presents some general characteristics of the Locally Preferred Alternative.

Vehicle Technology

Streetcar. The streetcar is the preferred mode. This technology does not produce diesel emissions, and one streetcar vehicle can carry the same number of passengers as two buses. In addition, streetcars attract higher development densities adjacent to the alignment, which maximizes use of existing infrastructure, increases the viability of public transportation, and reduces the carbon footprint when compared to sprawling or low-density development. Benefits of the mode support regional planning objectives.

Alignment Definition and Termini

Beatties Ford Road/Trade Street/Elizabeth Street/Hawthorne Street/Central Avenue.

The preferred 10-mile alignment begins in northwest Charlotte at the Rosa Parks Place Community Transit Center and continues south along Beatties Ford Road to Trade Street, running through Center City. The preferred routing through Center City is the Trade Street bidirectional alternative, as determined in the Uptown Alignment Evaluation Report, 2010. The alignment then proceeds east to Elizabeth Avenue, eventually extending northeast along Hawthorne Lane to Central Avenue. The corridor extends along Central Avenue east to the Eastland Community Transit Center. Details on the preferred alignment are provided in the Definition of Alternatives in Section 2.2.

Through the planning process, the LPA was selected based on a wide variety of factors supporting its viability and growth potential as a transit corridor. The LPA provides:

- Connectivity between four transit centers, two rail transit services, and numerous bus route connections,
- Supplemental services to two of Charlotte's busiest bus routes,
- Access to a major medical campus (Presbyterian Hospital) and educational centers (Johnson C. Smith University and Central Piedmont Community College), and,
- Access to employment, retail, cultural, residential, and entertainment centers.

LPA Termini

Rosa Parks Place Community Transit Center (west) and Eastland Community Transit Center (east). The proposed western terminus for the Streetcar Project is the existing Rosa Parks Place Community Transit Center located just north of I-85 on Beatties Ford Road. Its eastern terminus is located at the Eastland Community Transit Center on Central Avenue east of N. Sharon Amity Road. These two termini represent the only major transit centers on the corridor outside of the Center City area, providing excellent connections between the streetcar system and other transportation options.

2.2 Definition of Alternatives

This section summarizes the roadway and transit capital improvements and transit operating characteristics for the No-Build Alternative, the TSM Alternative, and the LPA.

A. No-Build Alternative

The No-Build Alternative serves as a reference point for comparing the travel benefits, costs, and environmental impacts of the TSM Alternative and the LPA. It includes the existing transportation network, as well as multimodal roadway improvements and expanded transit services. Anticipated changes to existing roadway and transit conditions are presented in this section.

Roadway Improvements. The No-Build Alternative includes the capital multimodal improvements programmed in the 20-year financially constrained list of projects developed by MUMPO and listed in the *City of Charlotte Capital Investment Plan* (Charlotte, 2010). No projects are programmed in the LRTP or Capital Investment Plan within the study area. Although specific projects may not be programmed for the study area in the Capital Investment Plan, it is likely that funding for citywide transportation programs may benefit the study area. It was determined that the No Build did not meet the Purpose and Need of the Project on the grounds that:

- Does not provide the necessary transit capacity in peak conditions.
- Would not spur new development or economic revitalization.
- Does not integrate transit and land use along the corridor.
- No reductions in emissions would be realized.

For these reasons, the No Build does not meet the Purpose and Need of the Project; however, it is analyzed in this EA as a point of reference for the LPA.

Transit Improvements. The No-Build Alternative assumes the City will implement the *2030 Transit System Corridor Plan* by 2035. The No-Build Alternative also includes new and expanded bus services that CATS has committed to through 2030 and routine replacement of existing facilities and equipment at the end of their useful life. Table 1 presents the operating characteristics of Routes 7 and 9 under the No-Build scenario.

Table 1. No-Build Bus Operations					
Routes	Alignment	Peak Headway	Midday Headway	Night Headway	Type
7–Beatties Ford	CTC to Rosa Parks Place Community Transit Center	10	15	15	Local
9–Central	CTC to Eastland Community Transit Center	7.5	15	15	Local

B. Transportation System Management (TSM) Alternative

A TSM option was evaluated as a baseline for establishing the cost effectiveness of the LPA. It was defined by a skip-stop bus service that would make the same 37 stops as the full-build Project between the Rosa Parks Place Community Transit Center and the Eastland Community Transit Center. The proposed service would supplement existing transit routes that serve the corridor, and allow for reduced headways and an increase in available transit capacity on the bus routes that directly serve the alignment. It was determined that the TSM did not meet the Purpose and Need of the Project on the grounds that:

- Does not provide the necessary transit capacity in peak conditions.
- Would not spur new development or economic revitalization.
- Does not yield the density of development required to support the defined City and Regional land-use objectives.
- While reductions in emissions would be realized by elimination of automobile trips, vehicle emissions will still be produced by the additional buses placed in service.

For these reasons, the TSM was eliminated from further consideration and evaluation in this EA.

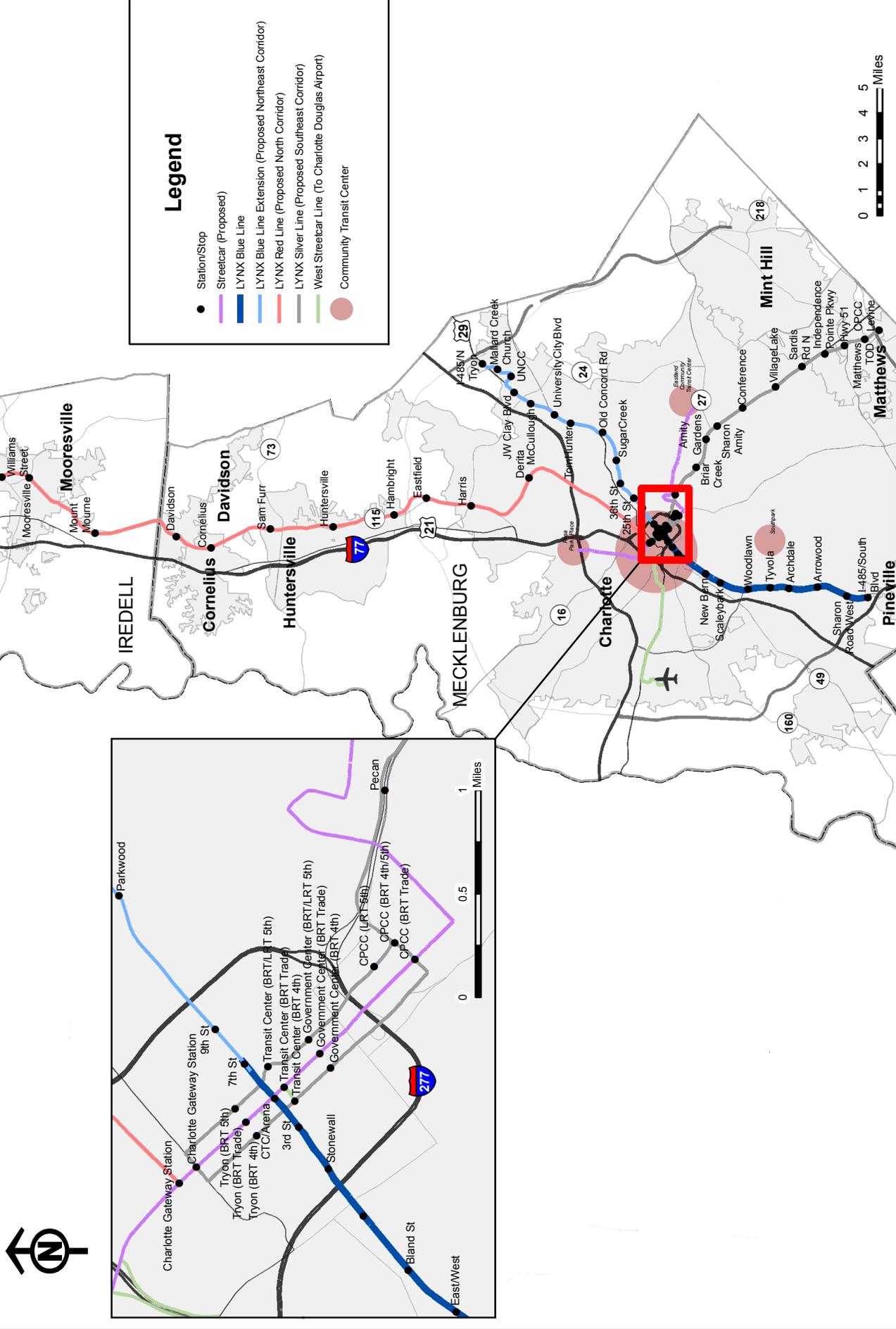


FIGURE 2. 2030 TRANSIT SYSTEM PLAN MAP



C. Locally Preferred Alternative (LPA)

Capital Improvements

Roadway. Roadway capital improvements include the roadway improvements that would occur under the No-Build Alternative. In addition, the LPA will change sections of the roadway along the proposed alignment to accommodate new track construction and/or operations at specific locations, such as new traffic signals, new phases to existing traffic signals, lane changes (striping and modification of existing travel lanes), and bicycle and pedestrian improvements. The typical sections for the Project design are shown in Appendix C. Pedestrian improvements included in the LPA, such as mid-block crosswalks, will be constructed to provide convenient and safe access to streetcar stops. A new roadway segment will also be constructed to connect Hawthorne Lane and Clement Avenue. A summary of proposed roadway improvements under the LPA is provided in Appendix C: LPA Design Recommendations.

Bus. CATS will make a policy decision for supplemental bus service along the Project alignment. At this time, the City does not anticipate any capital improvements for local bus service within the Project study area.

Streetcar. The following capital improvements are associated with implementation of the LPA. Figure 3A shows the LPA alignment and infrastructure components that are a part of the LPA. Figure 3A shows the corridor in its entirety and Figure 3B shows the subareas.

Alignment: Ten miles of double track will be installed along the length of the alignment. The Project alignment begins in northwest Charlotte at the Rosa Parks Place Community Transit Center and continues south along Beatties Ford Road to Trade Street, running through Center City. The alignment then proceeds east to Elizabeth Avenue and eventually extends northeast along Hawthorne Lane to Central Avenue and along Central Avenue east to the Eastland Community Transit Center. Starting at the Project's northwestern terminus, the entire segment of the Project alignment on Beatties Ford Road runs alongside the curb in the outer travel lane. The alignment runs alongside the median in the inner travel lane around Wesley Heights Avenue and continues through Center City along Trade Street. A brief segment of track between Church Street and College Street will run in the outside lane, before returning to the inside lanes for the remainder of the alignment on Trade Street, Elizabeth Avenue, and Hawthorne Lane. The Project alignment switches back to the curbside where Clement Avenue turns onto Central Avenue and continues running curbside to the Project's eastern terminus. Figure 3A and 3B illustrate where the alignment runs alongside the curb versus the median.

Nonrevenue Spur Line: A nonrevenue spur line will be installed from Trade Street around the Time Warner Cable Arena via N. Caldwell Street and E. Fifth Street to connect to the existing LYNX Blue



Line light rail service (see Figure 3A and Figure 3B). The purpose of this line is to gain access to the existing light rail maintenance facility at South Boulevard near New Bern Street. This allows the facility to service/maintain streetcars during the phased implementation of the Project alignment prior to construction of the vehicle maintenance facility (VMF) for the full-build scenario. After the VMF is constructed, this nonrevenue spur line will continue to be used to access the South Boulevard facility for heavy maintenance.

Right-of-Way: The new streetcar tracks for the LPA will be located within the existing street right-of-way and within existing travel lanes, except for a few locations where the Project will require small amounts of new right-of-way from adjacent properties. Additional right-of-way will be required for construction of a new nonrevenue spur that will connect the Project alignment with the LYNX Blue Line and for the new roadway segment that will be constructed to connect Hawthorne Lane and Clement Avenue. Total right-of-way impacts for the 10-mile corridor are estimated at approximately 3 acres.

Lane Configurations: One section along the Project alignment will undergo a roadway conversion where the existing four-lane roadway will be converted to a two-lane roadway with a center turning lane and/or median. This road conversion will occur on W. Trade Street between Wesley Heights Way and French Street (in front of Johnson C. Smith University). The section from Central Avenue to Seventh Street is already one lane in each direction. Most of the outside travel lanes along the LPA alignment will be classified as shared lanes. The section along the Project alignment where the road conversion is proposed is shown on Figure 3A. For impacts to traffic, see Appendix D: Traffic Analysis.

Streetcar Stops/Platforms: The LPA includes 37 stops along its alignment (see Figure 3A). Streetcar stops with shelters, information, etc., will be installed approximately every quarter mile. Four concepts have been designed for platforms.

- **Curbside Stop with Pedestrian Accommodations:** A standard-width side platform is approximately 53 feet long and 12 feet wide.
- **Curbside Stop with Pedestrian and Bicycle Accommodations:** A bicycle bypass side platform has the same dimensions as the standard-width platform, but includes a bicycle lane between the platform and sidewalk.
- **Curbside Stop–Narrow Width with Pedestrian Accommodations:** A narrow width side platform is designed to minimize impacts on the surrounding infrastructure where appropriate. These platforms are approximately 53 feet long and 7.5 feet wide.
- **Median Stop:** A center platform is approximately 75 feet long and 12 feet wide.

Streetcar Vehicles: The LPA will require 16 streetcar vehicles to meet the Project demand in 2030, with a peak requirement of 14 vehicles.

Vehicle Maintenance Facility (VMF): One VMF will be constructed on a City-owned lot located between Beatties Ford Road, French Street, Brookshire Freeway, and the CSX

Railroad (see Figure 3A and Figure 3B). Access to the facility will be from Beatties Ford Road.

Overhead Contact System and Power Supply: An overhead contact system (OCS) will electrically power the streetcar vehicle. The OCS requires the placement of poles along the Project alignment to support overhead wires. Approximately 14 substations located along the LPA alignment will provide electricity to the streetcar system. Substations consisting of metal boxes approximately 11 feet wide by 20 feet long by 12 feet tall will house the electrical equipment.

Transit Operating Characteristics

Under the LPA, the streetcar will operate at 10-minute headways with 7.5-minute peak headways. Service connections will be provided to bus and rail facilities at the Charlotte Transportation Center (bus and light rail transit facilities) and the future Charlotte Gateway Station (local and intercity heavy rail transit facilities). Changes to local and feeder bus routes servicing areas within the limits of the Project alignment will be a CATS policy decision as the project is implemented.

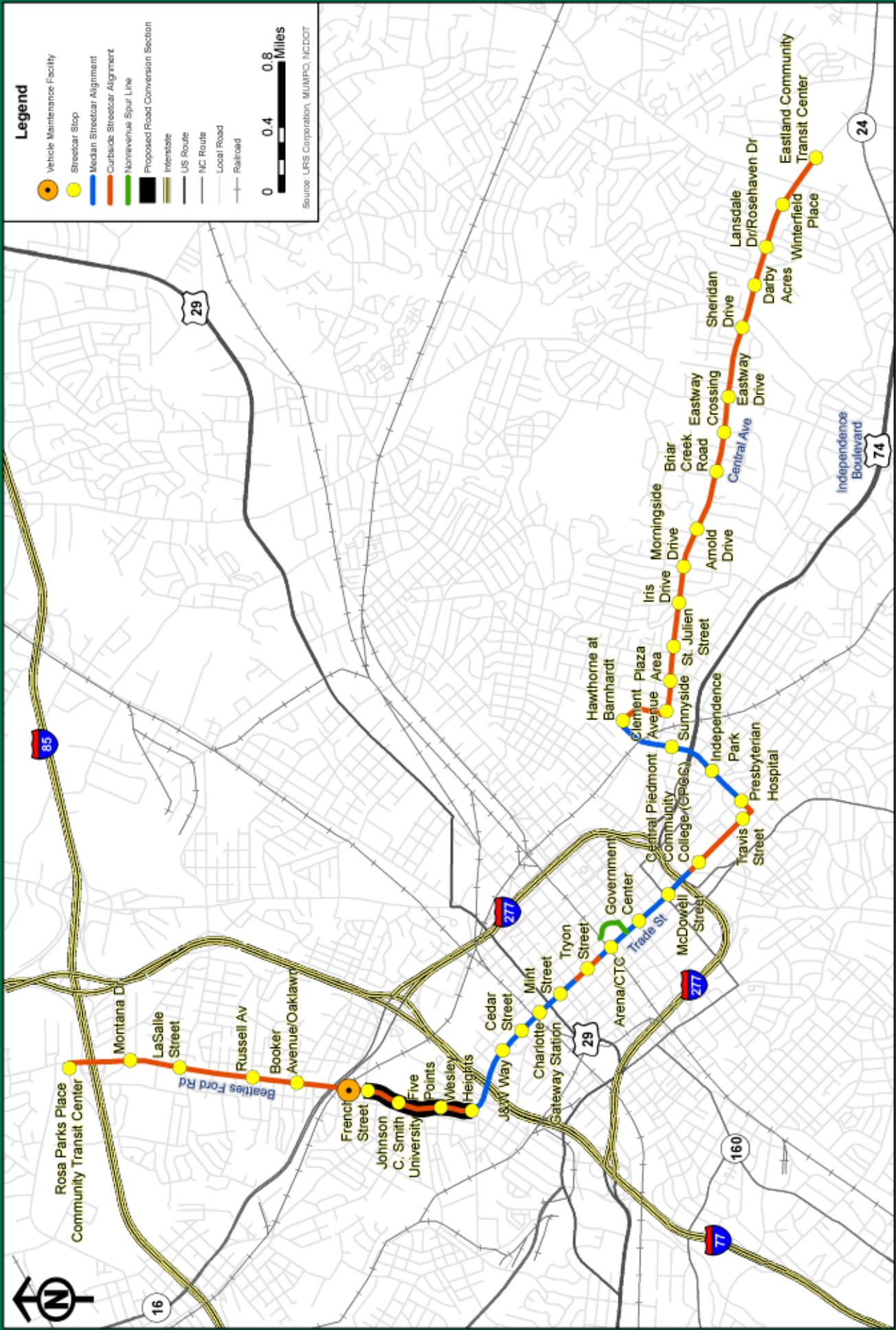
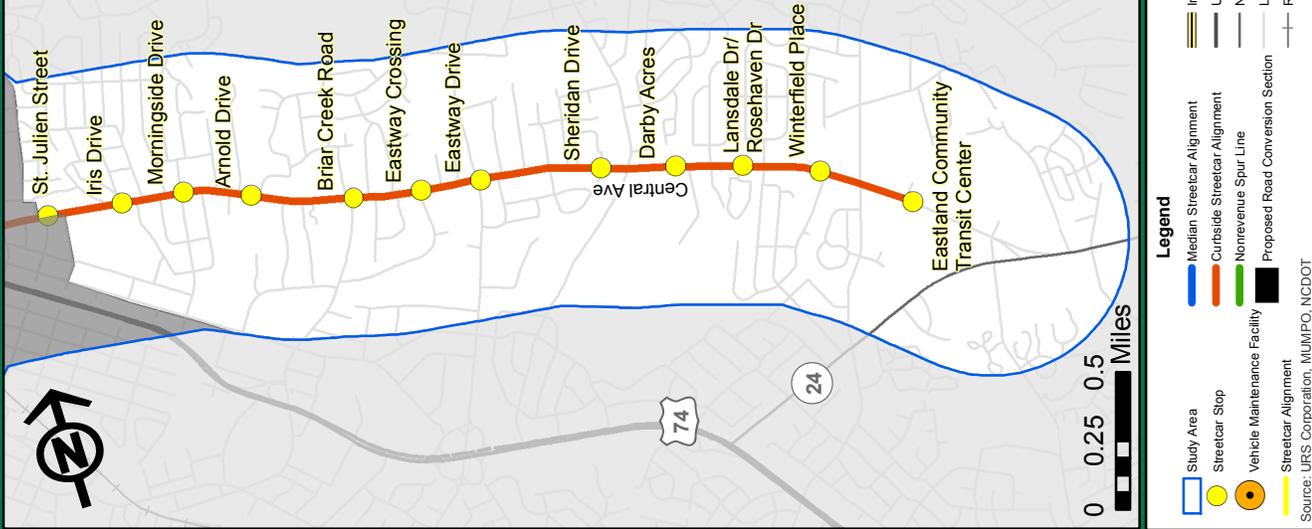


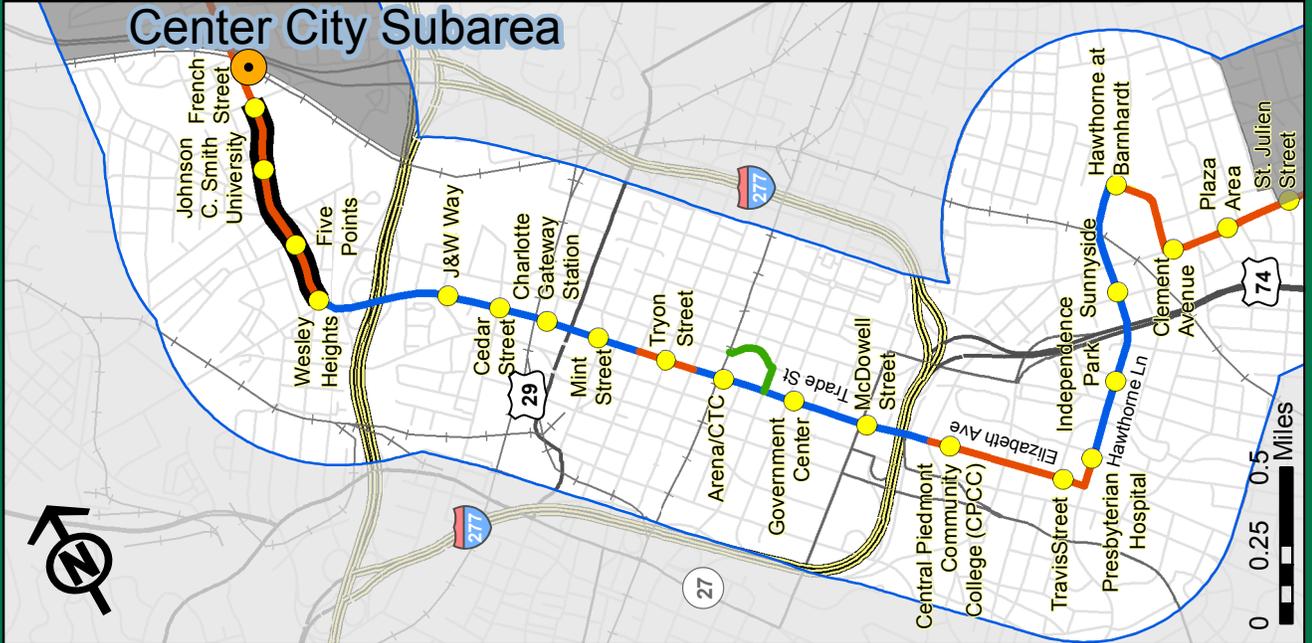
FIGURE 3A. LPA DEFINITION MAP
ENTIRE CORRIDOR



Central Ave Subarea



Center City Subarea



Beatties Ford Rd Subarea

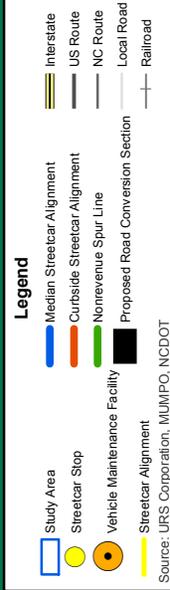
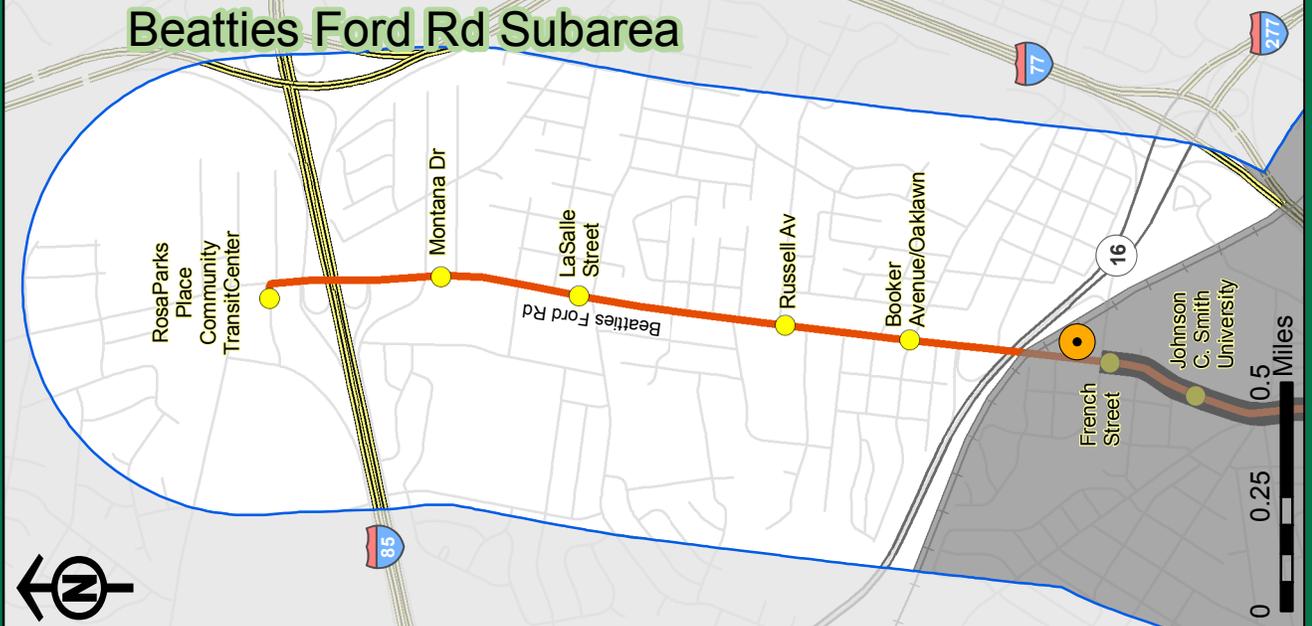


FIGURE 3B. LPA DEFINITION MAP SUBAREAS



3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment and environmental consequence of the No-Build Alternative and the LPA. The chapter also discusses the direct and indirect environmental consequences of the alternatives covering 16 discipline areas, and the cumulative and construction consequences. Technical memoranda have been prepared for most of the discipline areas and are listed in the References and Supporting Documentation located in Appendix F. In addition, a summary of specific methodologies contained in the technical memoranda are provided in Appendix A: Methodology Report.

While this chapter documents that the LPA will not result in any significant environmental impacts, there will be some relatively minor adverse effects. This chapter identifies and includes potential ways to mitigate those minor adverse effects.

Please note that a table summarizing impacts for each discipline area by alternative is provided at the beginning of each section. A key for these tables is shown in Exhibit 1.



Exhibit 1. Impacts Key

3.1 Transportation

This section analyzes the affected environment and the environmental consequences that the No-Build Alternative and the LPA will have on the existing transportation systems in the Project study area, particularly transit, local vehicular activity, parking, bicycle and pedestrian facilities and safety, truck freight, bridge clearances, and freight and passenger rail.

A. Transit

Impact Rating	
NB	○
LPA	+

Affected Environment. The affected environment for the No-Build and LPA reflect the capital improvements and operating characteristics defined in Section 2.2.

Environmental Consequences. Measures of assessed environmental consequences under the No-Build and LPA include capture area, offered capacity, ridership and transit connectivity.

Capture Area. The capture area for conventional bus is 0.25 mile; the capture area for streetcar is 0.5 mile. The streetcar could attract up to 31,394 more residents than the No-Build Alternative and provide access to 40,786 additional jobs (see Table 2).

Table 2. Residents and Jobs within Capture Area for No-Build and LPA*		
Measure	No-Build	LPA
Population	45,092	82,417
Employment	64,514	114,543

Source: MUMPO and URS Corporation, 2010
**The analysis assumes population and employment estimates for each traffic analysis zone are distributed equally. The percentages of population and employment calculated within the one-quarter and one-half-mile buffers are equal to the land area within each buffer.*

Offered Capacity. Providing higher capacity streetcars at lower levels of frequency is a tradeoff for higher frequency buses. The preferred operating plan balances the capital investment of the Project and takes advantage of its higher capacity by offering service that will reduce overall operating expenses within the corridor. Under the No-Build operating scenario, Routes 7 and 9 each can accommodate up to 320 spaces per hour operating at 10 minute headways. Assuming that bus routes 7 and 9 remain in service, the streetcar service will offer an additional 468¹ spaces per hour when operating at 10 minute headways. The LPA will allow the City to increase capacity along the alignment.

Ridership. In 2030, daily riders are expected to reach 14,206 for conventional bus under the No-Build Alternative.

For the LPA, daily ridership in 2030 for the Project alone ranges from 8,950 under the regional travel demand model, to 15,950 under off-model estimates. These are preliminary forecasts for ridership and reflect a level of detail commensurate with the stage of planning/conceptual design currently being undertaken. They should not be taken as absolute forecasts, but viewed primarily as estimates based on the specific assumptions outlined in the *Alternative Ridership Estimate Report (2006)*.

The off-model forecast strongly supports the potential for higher ridership on the Project facility. The higher ridership forecast accounts for riders that utilize shorter midday and non-home-based streetcar trips in Center City.

Connectivity. The No-Build Alternative will not impact transit connectivity. The LPA will enhance connectivity for travelers within the corridor, providing through-trips east and west of Center City providing overall travel time savings on all trips. It will also enhance overall

¹ Calculation assumes Streetcar has space for up to 78 passengers, based on seated capacity of 60 passengers and space for 18 standees, per CATS loading threshold of 130 percent capacity for bus. Capacity for Streetcar could increase if threshold is raised to meet light rail service standard, which is currently 320 percent.

system connectivity, providing a critical east-west link for the City’s rapid transit system within Center City and directly accessing and linking three highly utilized transit centers and a fourth planned transit center.

The enhanced capture area, capacity, ridership, and connectivity provided by the streetcar system will improve the quality of life available throughout the corridor as is revealed in the Quality of Life Study (see Section 3.5). The added local and City-wide transit options provided by the Project will benefit citizens throughout the City and especially protected populations.

Mitigation Measures. No mitigation measures will be required for the LPA.

B. Vehicles

Impact Rating	
NB	○
LPA	○

This section summarizes the effects that the No-Build Alternative and LPA will have on the local traffic within the study area. For methodology and additional information, see Appendix D: Traffic Analysis.

This traffic analysis resulted in two measures of assessing roadway and intersection operations: LOS and Volume-to-Capacity (VC) ratio. According to the 2000 edition of the *Highway Capacity Manual (HCM)*, LOS is defined with letter designations from A to F, with LOS A representing the best operating conditions and LOS F representing the worst conditions. An intersection or roadway is considered to be operating near capacity at LOS E and over capacity at LOS F. The VC ratio is the ratio of the traffic volume to the capacity for a transportation facility. When the VC ratio is greater than 1.0 it means the traffic volume exceeds the capacity of the roadway.

The traffic analysis was based on the 2009 (2035 Long Range Transportation Plan Conformity) TransCAD version of the Metrolina Regional Transportation Model, developed and maintained by the Charlotte Department of Transportation. These numbers are derived on a city-wide basis where the effect of mode choice (from automobile to streetcar) is not captured in the model. The impacts represented below are a worst-case scenario. Any amount of mode switch for trips within the corridor would serve to lessen these impacts. Traffic projection numbers generated for the No Build and LPA scenarios are not specifically related to the streetcar ridership models.

Affected Environment. The arterial analysis resulted with all roadway segments along the Project corridor currently operating below capacity. However, based on the intersection analysis along the Project corridor, 2010 afternoon peak hour traffic volumes exceed the intersection capacity at the I-77 southbound ramps unsignalized intersection with Trade Street and at the signalized intersection of Cedar Avenue with Trade Street. Additionally, the signalized intersection of Central Avenue and Sharon Amity Road is operating at LOS E in the afternoon peak hour.

Environmental Consequences. Under the No-Build conditions, based on the arterial and intersection analyses, in 2035, four roadway segments and 14 intersections will operate at

an LOS E or F and/or have a volume to capacity ratio greater than 1.0 in the morning and/or afternoon peak hours. Under the LPA condition, in 2035, six roadway segments and 14 intersections will operate at a LOS E or F and/or have a VC ratio greater than 1.0 in either the morning and/or afternoon peak hours.

By implementing the Streetcar, two additional roadway segments will operate at LOS E or F and/or have a VC ratio greater than 1.0 in either the morning and/or afternoon peak hours.

Affected roadway segments include Beatties Ford Road from Dixon Street to Rozzelles Ferry Road (LOS changed from C to F and VC ratio changed from 0.48 to 1.04) and Trade Street from Rozzelles Ferry Road to Wesley Heights Way (LOS changed from C to F and VC ratio changed from 0.52 to 1.13).

The intersection of Beatties Ford Road at Rozzelles Ferry Road/Fifth Street is affected (LOS remained at F; however, VC ratio changed from 1.26 to 1.5).

Mitigation Measures. As a result of implementing the LPA, one intersection and two roadway segments will operate at LOS F and/or have a VC ratio greater than 1.0 in the morning and/or afternoon peak hours. This is due to the road conversion that will be implemented along West Trade Street/Beatties Ford Road between Wesley Heights Way and French Street. The road conversion will reduce the vehicular capacity of the intersection and approaching roadways. Should traffic operations degrade as projected, NC 16 (West Brookshire Freeway) and I-277 could be used as an alternative route for motorists traveling along Beatties Ford Road and Trade Street to and from Uptown Charlotte during peak hour conditions. The *West End Plan* created a goal to eliminate driveways onto West Trade Street and improve street connectivity. These measures will serve to lessen traffic demand on West Trade Street and Beatties Ford Road.

C. Parking

Impact Rating	
NB	○
LPA	○

This section addresses how on-street parking will be affected.

Affected Environment. Parking under the No-Build Alternative is expected to be similar to existing conditions. Parking meters are located along E. Trade Street between S. Brevard Street and McDowell Street and from Church Street west along W. Trade Street. There are approximately 177 parking spaces along Trade Street,

Elizabeth Avenue, and Hawthorne Lane. Beatties Ford Road and Central Avenue offer no on-street parking.

Under the LPA, the Project will operate in the median along Trade Street where on-street parking is present. On Hawthorne Lane, the Project alignment follows the two existing through lanes where on-street parking is also present. On-street parking for Elizabeth Avenue was recently constructed as part of the Elizabeth Avenue Business Corridor Project and no impacts are expected.

Environmental Consequences. The No-Build Alternative is not expected to impact existing parking facilities. Under the LPA, eight on-street parking spaces will be impacted. One space is located near the Government Center stop area, another is located near Travis Avenue on Elizabeth Avenue, and six are located near the Sunnyside stop. Impacts from the loss of these parking spaces under the LPA are expected to be negligible.

Mitigation Measures. The LPA will not require mitigation.

D. Bicycles

Impact Rating	
NB	○
LPA	●

This section addresses the effects on bicycle travel conditions in the study area. For details on specific bicycle facilities and amenities included with the LPA, see Appendix C: LPA Design Recommendations.

Affected Environment. The most recent bicycle crash data along the Project corridor is available for the years 2007 through 2009 (Charlotte, 2010). Overall, 43 crashes involving bicycles occurred during the three-year reporting period.

The City of Charlotte's *Centers and Corridors Strategy and Transportation Action Plan* recognizes that the City's transportation system needs to be more diversified. These documents acknowledge that bicycling modes need to be upgraded and accommodated. The affected environment under the No-Build Alternative is expected to reflect existing conditions with enhancements proposed in the City's *Bicycle Master Plan*. The plan indicates that future bicycle lanes are proposed on Trade Street and Beatties Ford Road between Cedar Street and the Rosa Parks Place Community Transit Center and on Hawthorne Lane and Central Avenue between Elizabeth Avenue and Merry Oaks Lane. A bicycle lane will also be added along Beatties Ford Road between I-277 and I-77, which is happening as a result of a reduction in travel lanes that will allow space for a bicycle lane.

The design philosophy for the LPA includes maintaining or improving the provisions for bicyclists within the corridor. The LPA will maintain existing bicycle lanes through Central Avenue and adopt recommendations under the No-Build Alternative to the extent that the improvements do not present a conflict with Project operations.

In addition, given that streetcar ridership is primarily from local users who access the stop by walking or biking, every effort will be made to connect bicycle routes with streetcar stops.

Environmental Consequences. The No-Build Alternative will benefit bicycle facilities along the Project corridor. The 2030 No-Build scenario information was not available for the study area inside the I-277 loop and Elizabeth Avenue to Hawthorne Lane; however, bicycling conditions are expected to improve because the City of Charlotte has adopted plans, policies, and guidelines that embrace Smart Growth and transit oriented development principles that encourage walking and biking. These plans and policies make it likely that the study area will see improved bicycle facilities and signage.

An analysis of bicycle LOS shows that there will be a LOS of E at five intersections and an LOS of F at 17 intersections, indicating that the travel conditions will continue to be unsuitable for bicycle travel. Only one intersection, Central Avenue at Kilborne Drive/ Norland Road, will have a rating better than LOS C for bicycle travel. This poor LOS for bicycle travel within the study area is primarily due to the signal timing, competition for space with motorists, and posted speed limits of 35 miles per hour or higher on Beatties Ford Road, Hawthorne Lane, and Central Avenue.

The LPA will negatively impact bicyclists where they share the curb lane with the streetcar. The Project will add a point of conflict for bicyclists, as the bicyclists will have to move out of the way of the streetcar that will be on a fixed-route. In addition, the streetcar tracts will add a roadway hazard for bicyclists. This condition will occur along Beatties Ford Road and Central Avenue. This condition will not occur along Trade Street because the streetcar will be in the inside travel lane. On Central Avenue and Beatties Ford Road where the alignment uses the curbside lane, the streetcar stop design makes provisions to maintain the continuity of bicycle lanes where they have been installed or there are plans for them. In general, LOS under the LPA for bicyclists is expected to remain the same as the No-Build conditions. LOS at new signalized intersections will experience similar conditions to other signalized intersections in the vicinity.

Mitigation. The LPA will not require mitigation actions.

E. Pedestrians

Impact Rating	
NB	○
LPA	○

This section addresses the effects that the No Build Alternative and the LPA will have on pedestrian travel conditions in the study area. For details on specific pedestrian facilities and amenities included with the LPA, see Appendix C: LPA Design Recommendations.

Affected Environment. The most recent pedestrian crash data along the Project corridor is available for the years 2007 through 2009 (Charlotte, 2010). Overall, 143 crashes involving pedestrians occurred during the three-year reporting period.

The City of Charlotte's *Centers and Corridors Strategy and Transportation Action Plan* recognizes that the City's transportation system needs to be more diversified. These documents acknowledge that pedestrian modes need to be upgraded and accommodated. The affected environment under the No-Build Alternative is expected to reflect existing conditions with the following enhancements proposed in City plans and policies:

- Widened sidewalks in Center City, where possible, to 18–22 feet (*Center City Transportation Plan, 2006*)
- Modified building setbacks, sidewalk, parking, and landscaping that encourage pedestrian mobility in the Elizabeth neighborhood and West End district (*Elizabeth Land Use and Pedscape Plan* and *West End Land Use and Pedscape Plan*)

Additional projects may evolve from the *Comprehensive Pedestrian Plan*, which is currently being updated by the City of Charlotte.

The design philosophy for the LPA includes maintaining or improving the provisions for pedestrians within the corridor. The LPA will maintain existing sidewalks and adopt recommendations under the No-Build Alternative to the extent that the improvements do not present a conflict with Project operations. The following pedestrian design standards will be adopted when construction of the LPA is impacting the existing infrastructure:

- Sidewalks will be reconstructed around new streetcar stops.
- Sidewalks will be modified in some areas to accommodate any profile/elevation changes.
- A mid-block pedestrian crossing and high-intensity activated crosswalk (HAWK) signal will be considered for Trade Street at Wilkes Place to accommodate access to the future Charlotte Gateway Station.
- Additional mid-block crossings/HAWK signals may also be installed on Central Avenue to access streetcar stops.

A HAWK, also known as a pedestrian beacon, is a traffic control beacon used to warn vehicular traffic at mid-block crossing locations. The device is dark until activated by a pedestrian. A yellow beacon flashes, turns to solid yellow, and then to red. After a period of time, the red indication “wig-wags” to allow drivers to proceed if the pedestrian has cleared the crossing.
(source: CDOT USDG)

In addition, given that streetcar ridership is primarily from local users who access the stop by walking, every effort will be made to connect pedestrian routes with streetcar stops.

Environmental Consequences. The No-Build Alternative will benefit pedestrian facilities along the Project corridor.

The LPA will have no adverse effect on pedestrian facilities. To some degree, the Project will improve pedestrian facilities by providing improved sidewalks and other pedestrian-friendly amenities such as benches at the streetcar stops. The streetcar stop design preserves sidewalk widths. Median platforms at stop locations will provide an ancillary benefit because they will double as refuge islands for pedestrians. In general, pedestrian LOS under the LPA is expected to remain the same as the No-Build conditions. LOS at new signalized intersections will experience similar conditions to other signalized intersections in the vicinity.

Mitigation. The LPA will not require mitigation actions.



F. Truck Freight

Impact Rating	
NB	○
LPA	○

This section summarizes the effects on truck freight traffic within Charlotte's Center City.

Affected Environment. Commercial trucks traveling through the City of Charlotte must comply with the City's truck ordinance. Commercial vehicles must remain on designated truck routes until a point closest to their destination and are prohibited from using residential streets or any street posted "no trucks" unless taking on or discharging goods or it is the only street that accesses a destination. W. Trade Street between Graham Street and Rozzelles Ferry Road is the only designated truck route in the study area. This is expected to remain the case in the No-Build Alternative.

The existing conditions for the No-Build Alternative are mostly the same for the LPA. In addition, the LPA will include the installation of three new traffic signals along the designated truck route on W. Trade Street (at S. Bruns Avenue, Wesley Heights Way, and Wilkes Place). Other conditions that could affect truck operations under the LPA are curbside operations along Beatties Ford Road and Central Avenue and the overhead contact wire system, which will result in lower bridge clearances.

Environmental Consequences. The No-Build Alternative will have no impact on truck freight. The LPA will have minimal impacts on truck traffic. Because truck freight in the Center City area shares the same roadways as other vehicular traffic, changes in travel time for truck freight will be similar to travel time changes for non-truck traffic. A primary goal of the Project design is to site streetcar stops so that driveways and other access points are not negatively impacted. Along Trade Street, Elizabeth Avenue, and Hawthorne Lane, the streetcar is designed to be median running so that it will not interfere with trucking and deliveries. Also of concern are locations where curbside streetcar stops will obstruct access and loading; however, loading zones are currently located along the Project alignment where it runs along the curbside.

Mitigation Under the LPA, streetcar stop locations will be placed where they do not interfere with access to adjacent properties.

G. Freight and Passenger Rail

Impact Rating	
NB	○
LPA	+

This section summarizes the effects on freight and passenger rail.

Affected Environment. Under the No-Build Alternative, additional rail lines are not expected to be constructed through 2030. Operations along the rail lines, however, are expected to change. By 2030, the Charlotte Gateway Center will be constructed and the shared Norfolk Southern and Amtrak rail line that crosses over Trade Street in the vicinity of this future station will accommodate operations of the North Corridor Commuter Rail. Under the LPA, freight and passenger rail conditions will be the same as described under the No-Build Alternative. In addition, the LPA will construct 10 miles of track for the

Project alignment and a 0.3 mile nonrevenue spur line to the existing LYNX Blue Line. The Project alignment will utilize the existing grade separation on Hawthorne Avenue to cross under the CSX rail line located north of Central Avenue.

Environmental Consequences. The No-Build Alternative will have no impact on freight and passenger rail. The LPA will have no adverse impact on existing freight or passenger rail operations. In the four locations where the Project alignment crosses the railroad right-of-way, existing grade separations mitigate any potential right-of-way conflicts. The LPA will enhance passenger rail by providing a critical east-west spine that connects all five transit corridors in Center City Charlotte. It will also provide efficient access to the proposed multimodal Charlotte Gateway Station, which will become the new Amtrak station in downtown Charlotte and serve as the southern terminus for the proposed North Corridor Commuter Rail (LYNX Red Line).

Mitigation. The LPA will not require mitigation actions.

H. Bridge Clearance

Impact Rating	
NB	○
LPA	○

This section summarizes the effects that the No-Build Alternative and the LPA will have on bridge clearances.

Affected Environment. There are seven existing bridge locations along the Project alignment all of which are located in the Center City subarea. The locations of the bridges are listed in Table 3.

Environmental Consequences. The operation of the streetcar would require a clearance of 18 feet. Any reduction would violate National Electric Safety Code (NESC) and necessitate avoidance measures. Details of bridge clearance requirements of the streetcar can be found in the *Bridge Clearance Technical Memorandum* (2011). Under the LPA, all seven bridges along the alignment do not meet the required minimum clearance of 18 feet.

The technical analyses support applying for a variance in the NESC as opposed to other significantly intrusive and costly options such as lowering the road profile or reconstructing the bridge. However, the pedestrian bridge over Beatties Ford Road in front of Johnson C. Smith University and the bridge underpass at the CSX crossing of Hawthorne Lane (north of Central Avenue) are exceptions. In conjunction with a planned new entrance to the university (not related to the Project), the pedestrian bridge will be removed and replaced with a street-level pedestrian crossing. Removal of this bridge will eliminate the conflict with the OCS wire. For the CSX bridge over Hawthorne Lane, the road surface will be lowered more than 1 foot to accommodate additional clearance for the OCS. The LPA alignment at this location will provide sufficient clearance to allow a legal maximum vehicle to pass under the wire without making contact. Bridge clearances will be further evaluated during final design.

Table 3. Bridge Locations and Minimum Clearances			
Street	Cross Street	Existing Clearance – Minimum Clearance to Roadway (in feet)	Proposed Minimum Clearance to OCS Wire (in feet)
Beatties Ford Road	Johnson C. Smith University Pedestrian Bridge	16.17	NA (bridge to be removed by others)
Trade Street	Interstate 77	15.22	14.47
Trade Street	Norfolk Southern Railroad	14.92	14.17
Trade Street	Bank of America Pedestrian Bridge	16.66	15.91
Trade Street	LYNX Blue Line	14.69	13.94
Elizabeth Avenue	Interstate 277	15.16	14.41
Hawthorne Lane	CSX Transportation Railroad Bridge	13.75	14.21

Mitigation Measures. If the final design of the LPA at the six locations identified where existing bridges prevent the OCS wire from meeting the NESC minimum, then a variance to the NESC will be required. Alternatively, wireless technology, including battery or capacitor hybrid vehicles or other potential technological improvement, may mitigate these issues by reducing the need for some or all of the OCS wire system. The *Manual on Uniform Traffic Control Devices* requires that low clearance signs be used to warn road users of clearances less than 12 inches above the statutory maximum vehicle height, which is for clearances less than 14.5 feet in North Carolina. However, because of the danger from high-voltage electricity posed by the OCS wires, it is recommended to post signs at all locations where the OCS wire clearance is less than 18 feet. The signs should include the *Manual on Uniform Traffic Control Devices* standard low clearance sign (W12-2), as well as supplemental signs warning of the high-voltage condition. Additional signs should be placed in advance of these locations, such as at nearby intersections, to allow vehicles sufficient time to change lanes if necessary to avoid the obstruction.

3.2 Economic Development



This section summarizes the effects on economic development. For a more detailed analysis, see the *Socioeconomic Technical Memorandum* (2011) and the *Charlotte Streetcar Economic Development Study* (Charlotte, 2009).

A. Affected Environment

The affected environment is the project study area, which contains the central business district of Charlotte.

B. Environmental Consequences

The *Charlotte Streetcar Economic Development Study* for the Project (Charlotte, 2009) evaluated impacts on development and property values for three scenarios: No Streetcar (consistent with the No-Build Alternative), Baseline, and Accelerated, the latter two corresponding to varying degrees of growth induced by the Project. Total new development from 2010 to 2035 in the Baseline Scenario is projected to consist of 9,460 multifamily residential units (4,117 for-sale and 5,343 rental), a 44 percent increase over the No Streetcar Scenario; 365,723 square feet of net new retail, also 44 percent more than the No Streetcar Scenario; 4,338,849 square feet of new office space, a 13 percent increase over the No Streetcar Scenario; and 1,137 hotel rooms. Downtown captures by far the largest share of new development, with 54 percent of new residential and 78 percent of new office development. Table 4 provides a summary of the Project corridor development scenarios for 2010–2035.

Delineations of the study area for evaluation in the economic development study differed slightly from the subareas set for the environmental review. In general, “West” is consistent with the Beatties Ford Road subarea, “East” corresponds to the Central Avenue subarea, and “Midtown” combined with “Downtown” accounts for the Center City subarea.

Although redevelopment is anticipated in the Project corridor, the LPA is expected to accelerate infill development and redevelopment to more intensive uses over the No-Build Alternative. The summary of the analysis provided in Table 4 indicates that most new development will be concentrated within the Center City subarea and thus will largely be consistent with and support existing and forecast growth patterns in Charlotte’s primary activity center. Substantial new development is also expected outside of Downtown, as the Beatties Ford Road and Central Avenue subareas become more attractive to private developers. The new development will result in construction related jobs as well as an increase in employers within the study area for the businesses and offices that are projected to occupy the increased amount of retail and office space. An increase in availability of jobs will be beneficial for the low-income residents in the study area who may be unemployed or underemployed. Consequently, it is also possible the increased redevelopment could likely result in the gentrification of the more vulnerable neighborhoods and business districts (specifically the Beatties Ford Road and Central Avenue Business Corridors) in these subareas. Rising property values may displace lower income residents and the influx of new businesses and residents can shift the character of the existing communities. This is considered a secondary and cumulative effect and is further addressed in Section 3.18.

Table 4. Amount of New Development					
No Streetcar (Slower Growth Scenario)					
Segment	For Sale Units	Apt Units	Retail Sq Ft	Office Sq Ft	Hotel Rooms
West	416	508	12,228	0	0
Downtown	1,294	2,402	150,520	3,393,695	889
Midtown	468	889	69,729	434,159	114
East	249	345	20,819	0	0
Total	2,427	4,124	253,295	3,827,854	1,003
Baseline Growth Scenario					
Segment	For Sale Units	Apt Units	Retail Sq Ft	Office Sq Ft	Hotel Rooms
West	646	742	17,656	178,762	47
Downtown	2,169	2,896	217,329	3,393,695	889
Midtown	786	1,002	100,679	434,159	114
East	516	703	30,059	332,233	87
Total	4,117	5,343	365,723	4,338,849	1,137
Accelerate Growth Scenario					
Segment	For Sale Units	Apt Units	Retail Sq Ft	Office Sq Ft	Hotel Rooms
West	917	1,037	20,545	220,240	58
Downtown	2,282	3,052	221,940	3,409,258	893
Midtown	1,032	1,331	115,265	488,192	128
East	697	966	33,359	370,549	97
Total	4,928	6,386	391,109	4,488,439	1,176
Source: Charlotte, 2009					

C. Mitigation

Gentrification that may occur along the project corridor will stem from private development activity. Charlotte’s zoning code includes provisions for protecting low-income residents from property displacements, including working with local community development corporations and other community based organizations and business groups. Mitigation of gentrification caused by economic development resulting from the LPA can be established by mandating and enforcing these zoning controls on development early in the project development process.

3.3 Land Use

Impact Rating	
NB	○
LPA	○

This section describes the potential effects on land use in the study area.

A. Affected Environment

This section describes the affected environment for land use within the study area. *Centers, Corridors, and Wedges* defines the overall vision for growth within the City of Charlotte. Consistent with that framework, the northwestern portion of the study area between the Rosa Parks Place Community Transit Center and Center City is designated as a wedge area. Center City is designated as a center. East of the Center City, the proposed route runs through the Southeast Transit corridor until it reaches Briar Creek Road; from there it continues east and provides a connection to the Eastland mixed-use center area designated around Central Avenue and Albemarle Road.

While *Centers, Corridors, and Wedges* provides general guidance for future development, the City's *General Development Policies*, along with area plans and zoning and subdivision ordinances, make specific provisions for land use planning. Current and future land uses, as specified in these documents, generally vary by subarea and are described below.

Beatties Ford Road Subarea. Predominant land uses for the subarea are single-family residential and large scattered tracts of public/institutional. Land uses immediately adjacent to Beatties Ford Road primarily consist of neighborhood/convenience-oriented commercial interspersed with pockets of residential, public/institutional, and industrial. Exhibit 2 illustrates typical residential and commercial land uses within the subarea.

Future land use in the majority of the subarea is governed by the *West End Land Use and Pedscape Plan*. Key concepts in the vision for West End are: use of land use policies and zoning to drive the vision, protection of the historic character, better use of property, and development of five districts from I-77 up to I-85, including the Urban/Cultural Art District, University District, Historic District, Residential District, and Commercial/Civic District.

Center City Subarea. Land use within the subarea is predominantly commercial and office, with pockets of multifamily residential, single-family residential, vacant, public/institutional, parks and open space and industrial land uses. The land use character of the Project study corridor varies along the streets included in the following portion of the alignment: Beatties Ford Road, Trade Street, Elizabeth Avenue, and Hawthorne Lane.



Exhibit 2. Example residential (top) and neighborhood-oriented commercial land uses (bottom) in Beatties Ford Road subarea

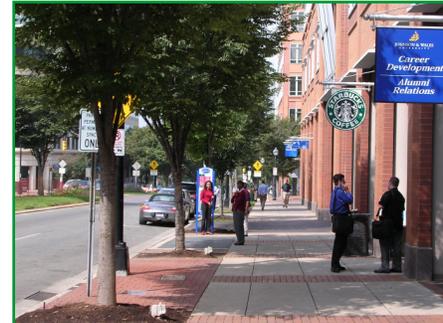
Beatties Ford Road. The northeast portion of the Center City subarea is covered by the *West End Land Use and Pedscape Plan* and includes two districts: the university district and the urban/cultural arts district. The university district begins at Five Points and extends to NC 16. Johnson C. Smith University is the main feature of this district. The Grand Theater building, located in this district at the corner of Beatties Ford Road and Mill Road, is currently vacant, but has potential to become a place of destination. The urban/cultural arts district begins at I-77 and ends at Five Points. It is dominated by vacant lots and an abundance of nonresidential uses that are not considered “neighborhood-serving retail.”



Trade Street. Starting at the northwest end of Trade Street and heading southeast, main features of the area includes light industrial and commercial uses; Gateway Village, which consists of the Johnson & Wales campus; offices and some multifamily use; and a government/institutional office area. Trade Street also encompasses the four wards defined by Trade and Tryon streets and the I-77/I-277 loop. Starting in the northeast quadrant and moving clockwise, the wards include:



- **First Ward:** This ward is largely comprised of residential land uses. Land uses include the Piedmont Courts, a large multifamily subsidized housing site, which is currently being redeveloped, commercial and industrial uses, and single-family housing.
- **Second Ward:** Land use in this ward is dominated by governmental offices and services. The NASCAR Hall of Fame and the Epi Center (an entertainment complex) are also major destinations. Other land uses include high-rise office and commercial buildings, hotels, and residential condos.
- **Third Ward:** This ward includes a mix of institutional, multifamily residential, and commercial uses. The Bank of America Stadium, home to the National Football League’s Carolina Panthers, is located in the Third Ward. Other notable land uses include the Johnson & Wales



University, several mixed-use condominium developments such as Gateway Village, and several businesses and commercial venues.

- **Fourth Ward:** This ward is primarily residential with a mix of historic single-family homes and modern mixed-use developments. Land use in this ward is comprised of a mix of multifamily and single family residential, with some neighborhood/convenience oriented commercial, institutional, and parklands. New condos are being constructed at the intersection of North Church Street and West 10th Street.



Elizabeth Avenue/Hawthorne Lane. Land use immediately adjacent to Elizabeth Avenue and Hawthorne Lane primarily consists of commercial and office uses with pockets of multi-family residential, vacant, and public/institutional uses, including Presbyterian Hospital. CPCC is a major activity center within this portion of the sub-area, occupying multiple blocks both north and south of Elizabeth Avenue.



Future land uses in the Center City subarea are set by a number of area plans including: *West End Land Use and Pedscape Plan*, *Second Ward Neighborhood Master Plan*, and *Third Ward Neighborhood Vision Plan*.

Central Ave Subarea. The predominant land use in the subarea is single family residential with large scattered tracts of commercial, multifamily residential, and public/institutional. Land use immediately adjacent to the corridor primarily consists of commercial interspersed with pockets of residential, public/institutional, industrial, and office uses.

Future land use is governed by two area plans. The first, the Belmont Area Revitalization Plan, envisions high commercial activity for a portion of the subarea (see Figure 4), including a neighborhood scale mixed-use project at Seigle and Belmont and additional retail development along Central Avenue. The retail along Central Avenue will likely be neighborhood-oriented retail and some small-scale dining and entertainment.



The second plan is the Eastland Area Plan. Specific recommendations relevant to the subarea are redeveloping the former Eastland Mall site into a Town Center and establishing an International District along Central Avenue from Kilborne Drive to Sharon Amity Road to reflect the ethnic diversity of the subarea.

In general, zoning designations within the three subareas allow for continued development consistent with existing uses; however, portions of the study area have upzoned to permit significantly denser development. In addition, various portions of the corridor are located within or can be designated as special urban zoning districts that complement intensive development typically associated with high-capacity transit. Specific zones include Pedestrian Overlay Districts for Sunnyside and Plaza Central, Transit Supportive Overlay District (does not apply to the Project), Mixed-Use Development District, the Urban Residential District, and the Center City Mixed-Use District. Collectively, these districts are essential to encouraging uses, densities, and high-quality design complementary of more compact, diverse, high intensity, and transit friendly development.



B. Environmental Consequences

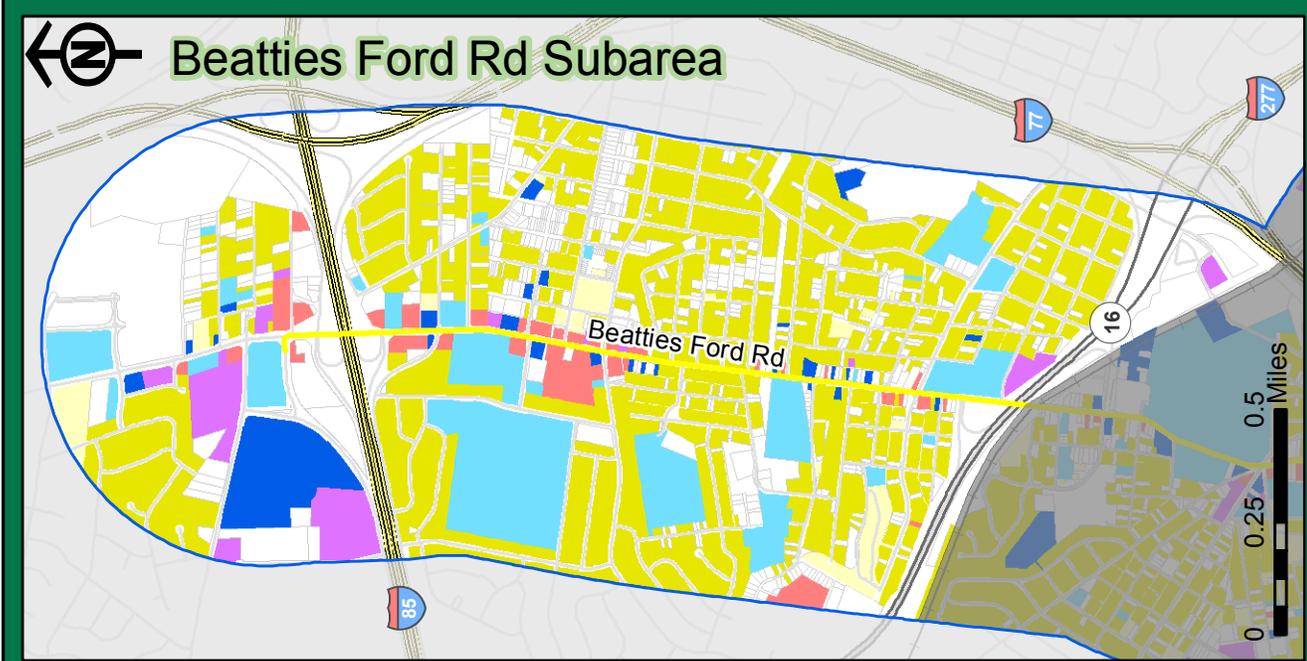
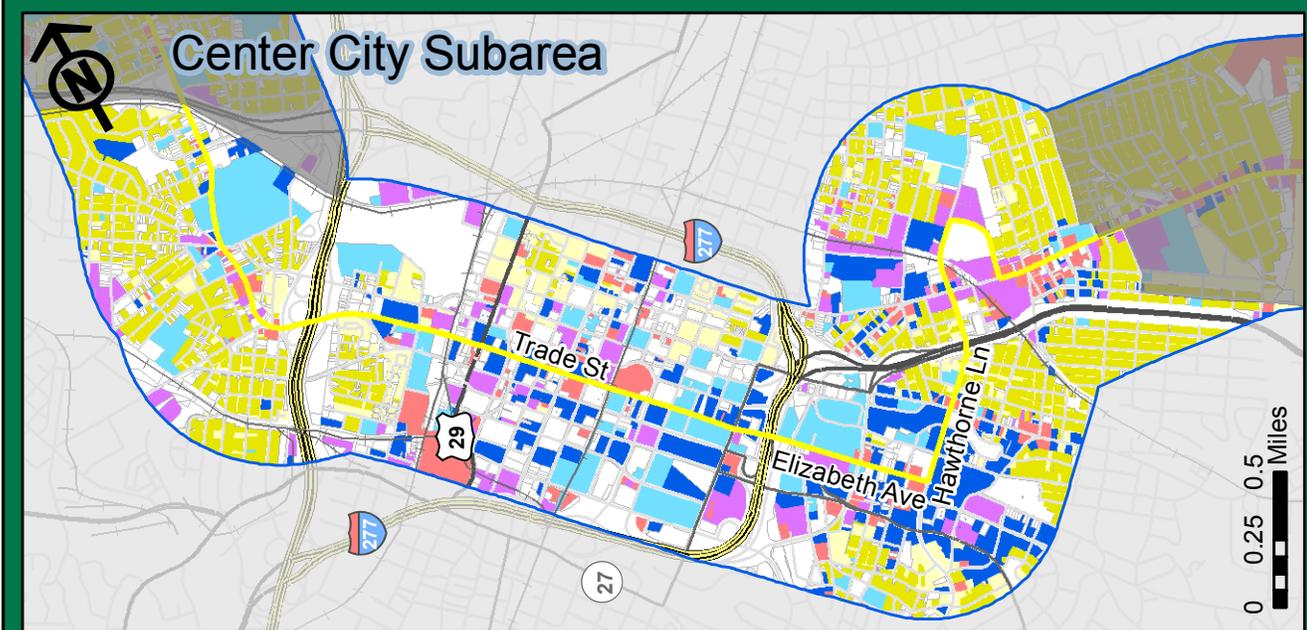
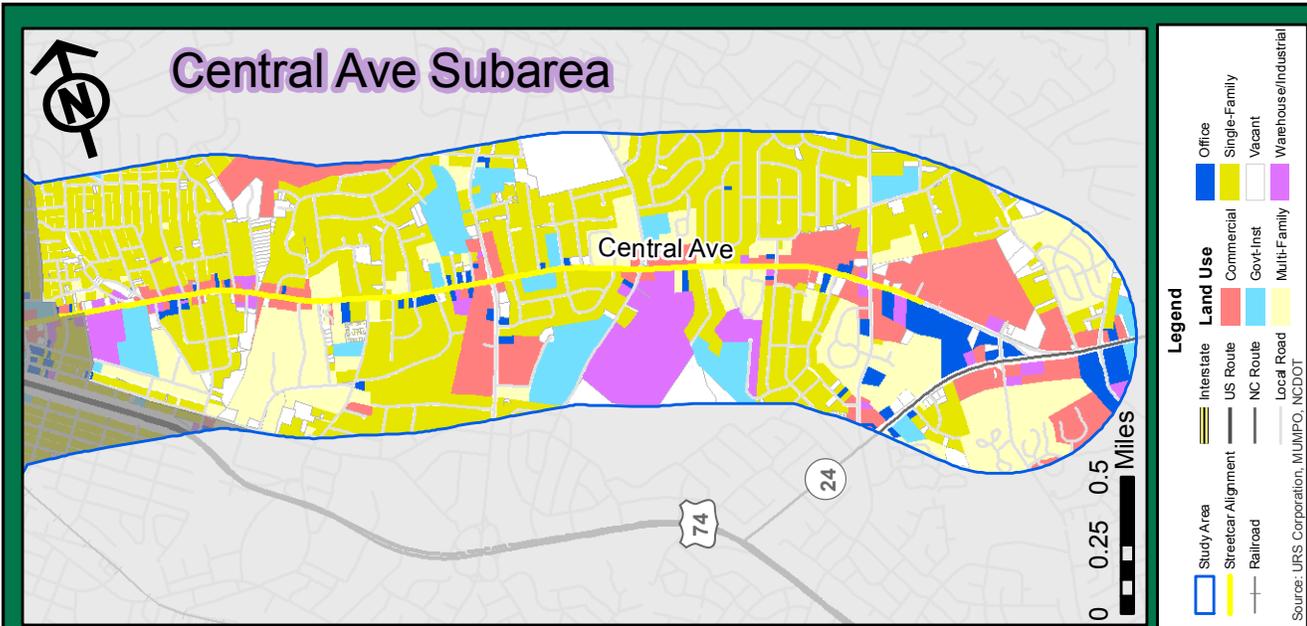
Direct land use effects constitute any conversion of land from current use to another use by the project. The No-Build Alternative will not require any conversion of existing land uses within the study area. The LPA will be constructed within existing street right-of-way, limiting the existing land required to be converted under existing uses. The proposed alignment will require utilization of approximately 3 acres of existing property, but will not require any total takings, rezonings, or changes in land uses. No adverse direct land use effects are anticipated.

The Project responds to the needs, goals, objectives, and recommendations adopted in Area Plans that apply to various segments of the study area. Yet, while the No-Build Alternative is not inconsistent with the respective needs, goals, and objectives of these plans, it is consistent to a lesser degree.

More detailed information on the various Area Plans and relevant recommendations is provided in Appendix E.

C. Mitigation

Because the LPA is not expected to impact land use, mitigation measures are not required.





CHARLOTTE



FIGURE 4. LAND USE MAP



CHARLOTTE STREETCAR PROJECT

3.4 Property Acquisition

Impact Rating	
NB	○
LPA	●

This section documents locations where the project could not be located entirely within existing street rights-of-way—that is, where the project would likely require the acquisition of property. The project alignment was evaluated for its potential to displace residents and businesses due to

Project right-of-way needs. It is important to note that the acquisitions listed in this report are based on the project design at 30 percent completion; therefore, impacts will continue to be refined through final design. For additional detail, see the *Property Acquisition Technical Memorandum* (2011).

A. Affected Environment

The project is located entirely within the urbanized area of the City of Charlotte. The project alignment is generally located within existing publicly owned transportation corridor rights-of-way. For more information, see the description of the project study area in Section 1.2.

B. Environmental Consequences

The No-Build Alternative will not require construction; therefore, no acquisitions will be required.

The LPA will be constructed within existing street rights-of-way. No buildings will be displaced because of the project and no full-property acquisitions are required. Some small-edge portions of parcels directly adjacent to the alignment will need to be acquired to accommodate platforms at proposed stops and traction power substations.

Under the LPA, the project would impact approximately 110 parcels, which would include the partial right-of-way taking of approximately 3 acres; 2.36 acres for the actual alignment and proposed stops, and 0.29 acres for substations. In addition, the project will require 11 driveway closings.

The VMF will be built on property that is currently owned by the City of Charlotte; therefore, it will not require any acquisitions.

C. Mitigation

Any property required for construction of the project will be acquired in accordance with all applicable Federal, state and local regulations. In the unlikely and unexpected event that a residential or business relocation would be required, the relocation would be performed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

The primary purpose of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, is to ensure that persons do not suffer disproportionate injuries as a result of programs and projects designed for the benefit of the public as a whole and to minimize the hardship of displacement on such persons.

3.5 Neighborhoods and Protected Populations



This section assesses the impacts of the Project on neighborhoods and protected populations within the study area. It also addresses the Project’s compliance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-income Populations.

A. Affected Environment

Neighborhoods

The Charlotte Streetcar Project Team used the *Charlotte Neighborhood Quality of Life Study 2010* (Metropolitan Studies Group, 2010) (Quality of Life Study) as the basis for identifying and understanding the existing characteristics and conditions of study area neighborhoods. Figure 5 shows the location of the neighborhood boundaries within the study area and the results of the Quality of Life Study for the Neighborhood Statistical Areas (NSAs).

The study also analyzed trends in the quality of life indices for each NSA between the 2002, the year the existing methodology was first adopted, and 2010, the current study year. Significant changes, either improvements or declines, were recorded, and each NSA was grouped into one of three categories: Trending Up to indicate positive change; No Change to indicate modest or slight change; and Trending Down to indicate declining change.

Of the 32 NSAs, 14 were identified as Stable, 11 were identified as Transitioning, and six were identified as Challenged. Most NSAs have exhibited positive change (trending up) since 2002. A few have not changed at all, and just one shows negative change. The more vulnerable neighborhoods are located in the Beatties Ford Road subarea. Since 2002, quality of life in the majority of the NSAs within the study area has been trending up.

Protected Populations

Transit-Reliant. For this assessment, a Transit-Reliant Index was developed to identify the concentrations of persons who rely on transit within the study area relative to the entire County. The majority of the study area is populated by a significantly higher concentration of transit-reliant persons than the County as a whole.

Figure 6 indicates that most transit-reliant communities are located within the Beatties Ford Road and Central Avenue subareas.

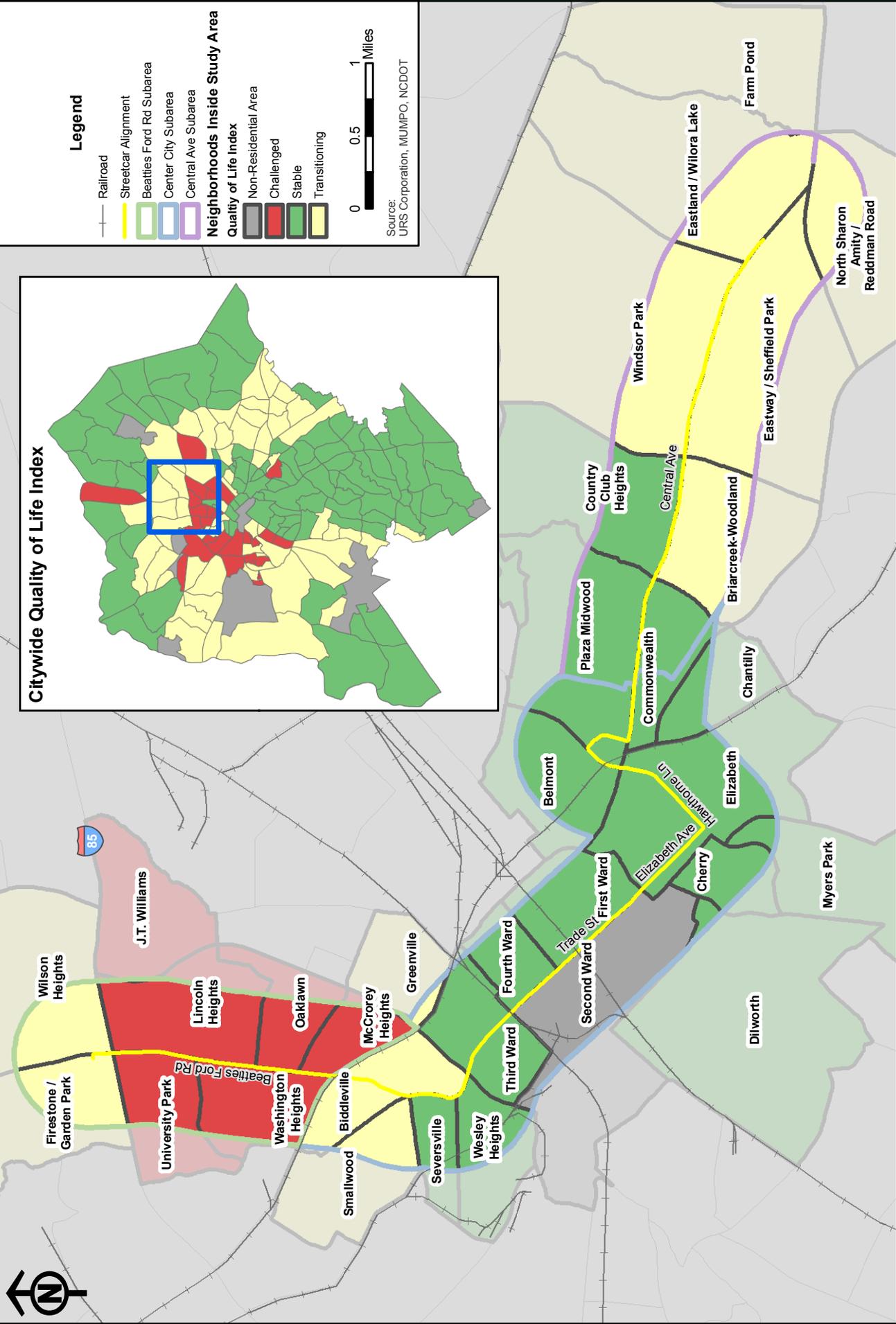


FIGURE 5. NEIGHBORHOODS

Environmental Justice Communities. As a whole, 19.8 percent of the study area population is classified as low-income-individuals. This is a higher percentage of low-income individuals than there are Countywide (9.2 percent) and Citywide (10.6 percent). Those block groups with the highest percentage of low-income individuals are concentrated around the Trade Street corridor. The corridor is also home to a higher minority population (67.8 percent) than the County (38.9 percent) and City (44.9 percent). While there are scattered areas around the Trade Street corridor where the percentage of minority individuals is above the City and County thresholds, the highest concentrations of minority individuals occur around the Beatties Ford Road corridor and the eastern-most portion of the Central Avenue corridor. Figure 7 illustrates the distribution of low-income and minority populations along the Project.

Limited English Proficiency. For this assessment, the data used for the environmental justice analysis came from the U.S. Census Bureau. The census data was downloaded from the 2000 Census, Summary File 3 (SF 3)-Sample Data. Table PCT10. Age by Language Spoken at Home for the Population 5+ Years was also utilized.

For each language a total was determined for the populations in each block group that “Speak English not at all” and “Speak English not well.” The analysis of the population with limited English proficiency calculated the percent of the population in each block group that did not speak English at all or did not speak well by languages spoken.

B. Environmental Consequences

Neighborhoods

As measured in the Quality of Life Study, the No-Build Alternative will not impact any of the indicators measured in the quality of life assessment and will have no effect on existing neighborhoods.

To the neighborhoods deemed Transitioning or Challenged, the LPA will have a negligible impact. The Project expands the capture area for transit service from 0.25 mile to 0.5 mile, increasing the percent of persons with access to public transportation and slightly increasing access to transit for neighborhood populations.

The Council of Environmental Quality's (CEQ) guidelines, Environmental Justice: Guidance under the National Environmental Policy Act, state that agencies should determine the composition of minority populations, low-income populations, and Indian tribes present in the area affected by the alternatives under consideration. Minorities are defined as members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black; or Hispanic. The number of people in each group and the census category “two or more races” was aggregated to calculate the percentage of minorities. Low income is defined as households with incomes below the national poverty level.

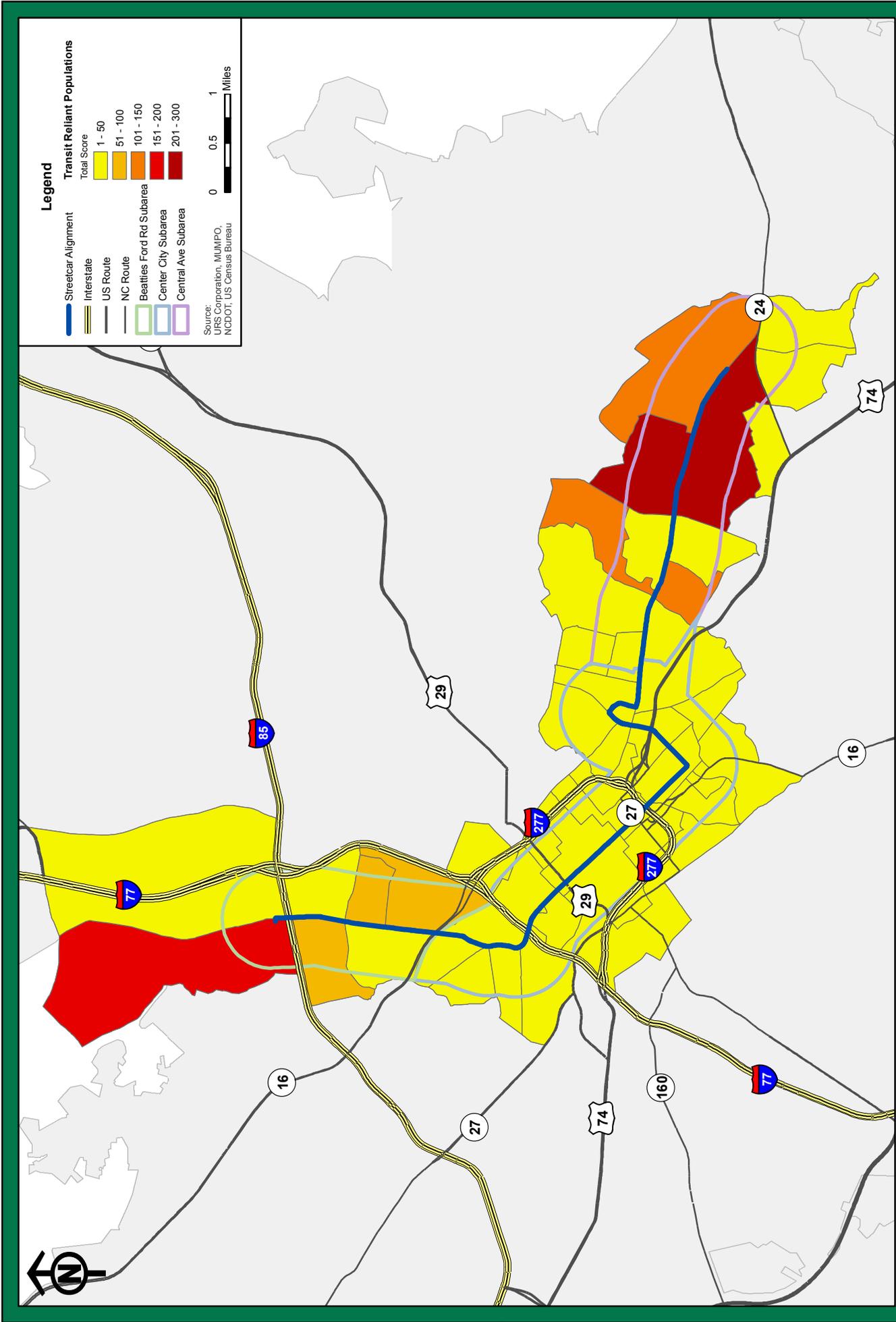
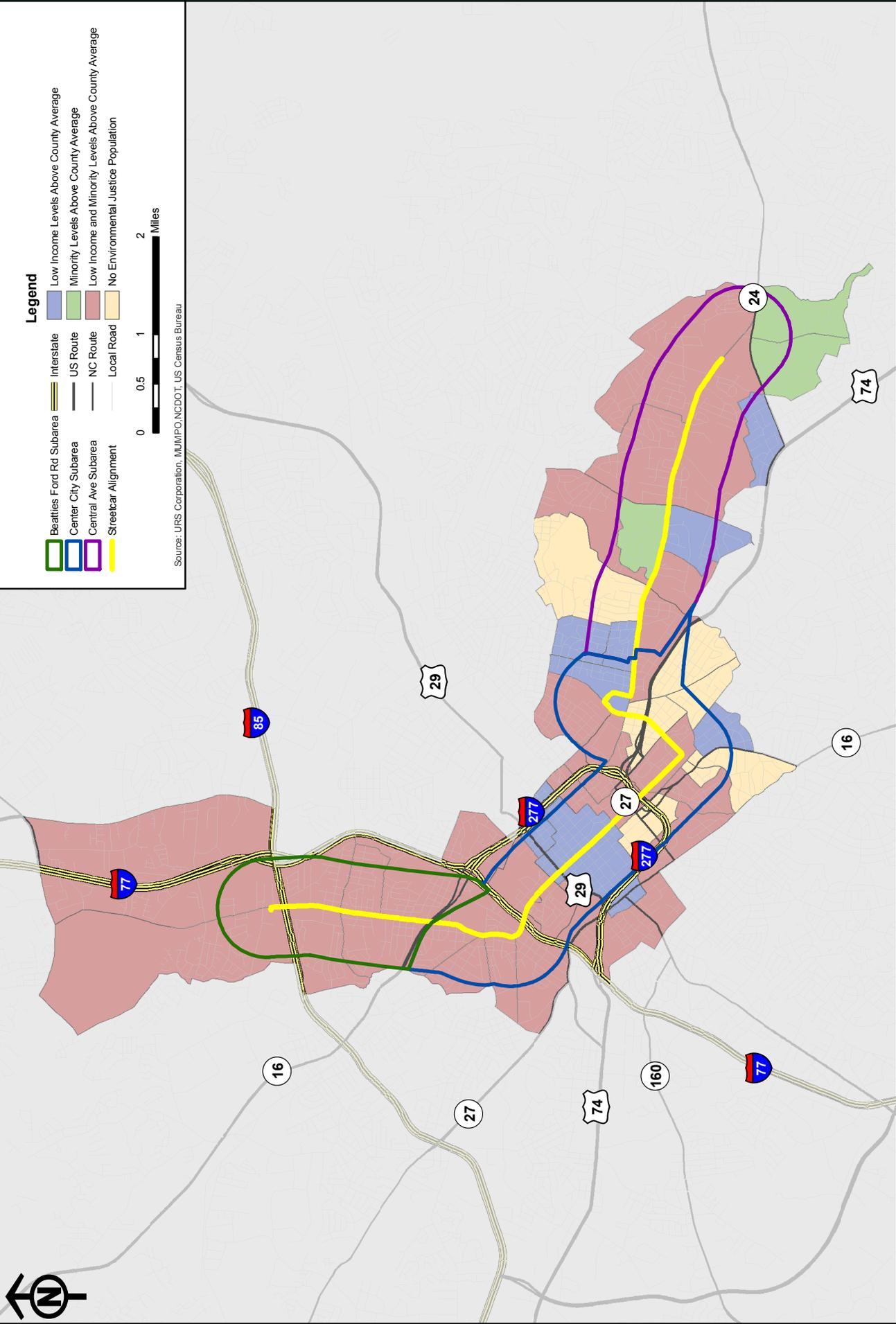


FIGURE 6. TRANSIT RELIANT POPULATIONS



Source: URS Corporation, MUMPO, NCDOT, US Census Bureau



The Quality of Life Study also assessed the physical conditions and assets for 11 business corridor segments across the City, including Beatties Ford Road and Central Avenue. The No-Build Alternative will still have virtually no impact on these corridors; however, the Project could directly or indirectly improve several factors assessed in the analysis, including: total office and retail square footage, vacancy index, aggregate tax revenue, and percent of bus stops with transit shelter or bench (a measure of amenities at transit stops). The majority of these changes will occur as the land near the Project becomes more desirable to both residents and business owners. This process of redevelopment, often referred to as gentrification, can have the negative implications of raising the costs of real estate for both residents and business owners, which has the greatest impact on low-income residents.

Protected Populations

The No-Build Alternative could be viewed as a negative impact to protected populations in the study area that would benefit from higher capacity and quality transit.

Overall, the Project is expected to positively affect Transit Reliant and environmental justice populations and there are no disproportionately high and adverse impacts. The LPA will improve transit service and increase accessibility and mobility to protected populations in the study area. While some negative impacts in the form of noise and visual changes could be associated with the VMF, the facility is consistent with planned land uses at the proposed site and will not represent a substantial negative or disproportionate impact on environmental justice populations. In addition, as discussed in Chapter 5, the project development process included efforts to involve transit-reliant, environmental justice, and Limited English Proficiency (LEP) populations in the project development process through public involvement and outreach activities. Table 5, shown on pages 39, 40, and 41, presents the expected impacts to protected populations as a result of the LPA.

C. Mitigation

The No-Build Alternative is not expected to adversely impact neighborhoods, communities, or environmental justice populations in the study area. The LPA could influence gentrification along the project corridor. Possible mitigation measures include affordable housing to help offset the higher real estate values and inclusionary zoning measures by the City to help foster a development environment that protects and promotes low-income housing opportunities. Mitigation of gentrification caused by economic development resulting from the LPA can be established by mandating and enforcing these zoning controls on development early in the project development process.

Table 5: Potential Impacts of the Build Alternative to Protected Populations

Criteria	Impact	Discussion
Involvement of protected populations in the project-development process	No disproportionate and adverse impacts	Efforts were made to include minority, low-income, transit-dependent, and limited English proficiency populations in the project development process.
Fare	No disproportionate and adverse impacts	Fares have not yet been determined.
Siting of stops	No disproportionate and adverse impacts	Efforts have been made to disperse the siting of stops throughout the project corridor.
Siting of VMF	No disproportionate and adverse impacts	The VMF site is located between Brookshire Freeway (NC 16), French Street and Beatties Ford Road. There is a high concentration of both low-income and minority populations surrounding the site. While a VMF would be consistent with the planned/zoned land uses for the site, it could cause some negative impacts to surrounding residents in the form of noise (See Section 3.11) and visual/aesthetics (see Section 3.7). The site is bordered by rail and highway facilities; VMF will be consistent with the current environment.
Amenities (e.g., furniture and maintenance at stops)	No disproportionate and adverse impacts	Efforts have been made to equally distribute amenities such as street furniture throughout the project corridor.
Air quality	No disproportionate and adverse impacts	It is expected that, overall, air quality would improve under the LPA as vehicle miles traveled would be reduced and there would be less use of diesel-fueled buses. This would be a benefit impact for all populations (including protected) in the study area.

Table 5: Potential Impacts of the Build Alternative to Protected Populations		
Criteria	Impact	Discussion
Noise	No disproportionate and adverse impacts	In the <i>Noise and Vibration Technical Memorandum (2011)</i> , there are receptors sensitive to track and station noise and vibration distributed throughout the length of the corridor. Most of the noise sensitive receptors in those areas that are heavily minority and low-income are non-residential, are for uses such as churches, parks, hospitals, and playgrounds. There are no noise and vibration impacts to any of the receptors.
Impacts to ecology	No disproportionate and adverse impacts	According to the <i>Natural Resources Technical Memorandum (2011)</i> , "The construction and operation of the streetcar is not expected to affect any natural areas, wildlife habitat or protected species." Since ecological impacts are not anticipated, there would not be a disproportionately negative impact to protected populations.
Impacts to parklands and recreation sites	No disproportionate and adverse impacts	The Streetcar will improve access to parklands for low-income and minority residents throughout the study area. No negative impacts to parklands are anticipated.
Access	No disproportionate and adverse impacts	Stops are expected to be sited at approximately equal distances throughout the corridor. Streetcar stops are expected to be spaced farther apart than existing bus stops. Efforts will be made to retain existing bus stops between streetcar stops to maintain the existing level of access to transit stops. All streetcar stops will be designed in accordance with Americans with Disabilities Act (ADA) standards and be accessible by both bicycle and pedestrian traffic. No disproportionately negative impacts are expected to protected populations.

Table 5: Potential Impacts of the Build Alternative to Protected Populations

Criteria	Impact	Discussion
Changes in geographic service area	No disproportionate and adverse impacts	Streetcar service will be implemented in an existing transit market and the geographic area served will be expanded beyond existing bus services. The streetcar is expected to be within walking-distance of individuals living within a half-mile of stops, this is further than the quarter-mile generally used for buses. This will result in a positive impact on protected populations.
Changes in travel times and reliability	No disproportionate and adverse impacts	Travel times and reliability will be improved by the additional transit service throughout the corridor.
Changes in frequency or hours of service	No disproportionate and adverse impacts	The frequency and hours of transit service will be improved by the streetcar throughout the corridor.
Changes in Traffic	No disproportionate and adverse impacts	Changes in traffic patterns are not likely within the corridor.
Relocations	No disproportionate and adverse impacts	No relocations would result from implementation of the LPA.
Economic impacts	No disproportionate and adverse impacts	The project is expected to have a positive economic impact in the study area as it will facilitate redevelopment, produce construction-related jobs, and improve access to employment centers.
Impacts to historic/archaeological resources	No disproportionate and adverse impacts	No impacts to historic/archaeological resources are expected.
Secondary and Cumulative Effects	No disproportionate and adverse impacts	Gentrification is likely from redevelopment induced by the LPA. Mitigation measures are possible through low-income housing measures that can be reinforced through inclusionary zoning measures.
Construction impacts	No disproportionate and adverse impacts	Construction of the project will take place in phases and mostly within existing road rights-of-way with limited disturbance to the surrounding area.

3.6 Safety and Security

Impact Rating	
NB	○
LPA	○

This section presents a preliminary assessment of safety and security along the Project alignment and discusses the potential effects on safety and security.

A. Affected Environment

The affected environment is the Project study area, which is located within the purview of the Charlotte-Mecklenburg Police Department within the Central, Eastway, Providence, and Metro Divisions. Safety and security of existing and proposed transit services, both onboard vehicles and in and around stops are subject to CATS safety and security policies and are patrolled by CATS Safety and Security officers.

The area encompasses 28 NSAs, as defined by the *Charlotte Neighborhood Quality of Life Study 2010* (Metropolitan Studies Group, 2010). Based on the study, 22 of 28 NSAs have higher property crime rates than the City of Charlotte average. Similarly, 25 out of 28 NSAs have higher violent crime rates than the City of Charlotte average. For more information on the NSAs, see Section 3.5.

B. Environmental Consequences

The No-Build Alternative will not impact safety and security.

Potential negative impacts to safety and security under the LPA include passenger trip/fall hazards, passenger safety onboard vehicles, lighting, bicycle and pedestrian safety, the VMF, tracks, and the OCS. The LPA is not expected to negatively impact crime rates within the study area. The additional safety and security measures may have positive effects on safety and security in the surrounding areas. New developments implemented as part of the Project will likely increase street activity; which can deter criminal activity. In addition, design measures may enhance safety and security in the vicinity of stops.

C. Mitigation

As the No-Build Alternative will not negatively impact safety and security, no mitigation will be required.

Several precautionary measures will be implemented under the LPA to mitigate potential negative impacts to safety and security and ensure that the Project includes adequate provision for safe and secure operations, does not increase the incidence of pedestrian and bicycle accidents, and improves the safety and security of transit patrons.

Recommended safety lighting standards will be met onboard the streetcar vehicle to decrease the likelihood of passenger trip/fall hazards. Vehicles will be equipped with external travel lights that meet roadway usage safety standards. While in mixed traffic operation, the streetcar vehicle will observe all traffic laws.

Streetcar stops will be well lit to meet safety lighting standards. The vehicle loading area surface will be covered by a highly visible tactile warning strip. Access ramps will be ADA

compliant and will include handrails where required. Where a stop platform will be raised above the sidewalk, appropriate provisions will be provided to decrease the risk of fall. Appropriate measures will be taken to promote the safe crossing of pedestrians to median stops, including crosswalks, dedicated signals, and pedestrian refuge areas.

The VMF site will be lit to safety lighting standards and fenced and secured from the public. Automobile traffic entering the VMF site will be granted access at appropriate times to avoid potential interaction with moving streetcar vehicles.



Exhibit 3: Vehicle Maintenance Facility

The streetcar track protrusion from the roadway will be less than 0.5 inch to reduce the potential for pedestrian and bicyclist trips and falls. Bicycle routes will be directed away from interaction with the streetcar tracks where possible.

Overhead wire will be well out of reach to persons at-grade and generally meet the OSHA recommended height above top of rail; however, there are isolated locations at low bridges where this will not be met. Substations equipment will be secured from the public, thereby reducing the potential for electrocution incidents.

3.7 Visual and Aesthetic Resources

Impact Rating	
NB	○
LPA	○

This section summarizes the effects on the visual and aesthetic environment. Additional detail may be found in the *Visual and Aesthetic Resources Technical Memorandum* (2011).

A. Affected Environment

In general, views within the right-of-way consist of the roadway itself, utility poles and wires, traffic signals and signage, commercial signage, mixed-vehicle traffic flow, and adjacent land uses including high-rise buildings, low-rise buildings, residences, landscaping, vacant areas, parking lots, parkland, and some public art. Historic resources are located near the Project. Other visually sensitive resources are concentrated in the Center City subarea and include the area near Johnson C. Smith University; the area surrounding Gateway Village between Cedar Street and Graham Street; public art in planted medians between Graham Street and Church Street; coordinated signals, lighting, and other street furniture between Church and Tryon streets; and public art between Tryon Street and College Street. The green space of Independence Park along Hawthorne Lane in the Central Avenue subarea is another visually sensitive resource.

B. Environmental Consequences

Under the No-Build Alternative, the existing conditions will remain and there will be no impacts.

The Project is expected to have a minimal impact on visual and aesthetic quality within the study area. All visual impacts are expected to be concentrated around the alignment. The specific impacts associated with the OCS, platforms, VMF, and substations at the corridor level are described in the *Visual and Aesthetic Resources Technical Memorandum* (2011).

C. Mitigation

Overhead Contact System. The most substantial visual impact associated with the LPA is likely associated with the poles and overhead wires that are part of the OCS. In an effort to minimize the visual impact of the OCS, several methods recommended in the FTA-sponsored report, *Reducing the Impact of Overhead Contact Systems*, will be used (Kulpa, et al, 1995). Efforts will be made to minimize the number of poles and hardware required to support the overhead system. Joint poles (i.e., poles that are used for both the OCS and street lighting) will be used where possible. Use of materials for poles that blend into the surrounding visual environment will be considered where possible, but wood poles will not be used. In addition, wireless vehicle technology exists that could be implemented to eliminate the need for the OCS in visually sensitive areas.



Exhibit 4: Examples of Overhead Contact Systems

Platforms. The platforms associated with the project will be similar to those used for buses and will not present a substantial visual impact. To integrate the platform with the surrounding visual environment and to add an element of visual interest to each platform, an artist will be chosen by the CATS Arts in Transit program to integrate public art into each stop. Landscaping will be used and street furniture will be chosen to ensure platforms are visually compatible with the surrounding environment. Stop Design workshops will be held during final design to elicit input from residents and businesses on the visual design of platforms.



Exhibit 5: Standard Side Platform, Typical Side (Narrow) Platform, and Typical Median (Center) Platform

Vehicle Maintenance Facility. While the VMF will consist of a building and tracks and will be highly visible, it will be consistent with the industrial land uses surrounding the site. Thus, no mitigation is proposed for the VMF.

Substations. Visual and aesthetic impacts, particularly to historic resources, will be taken into consideration in the placement of the substations. Landscaping and other treatments will be used to mask the substations.

3.8 Historic Resources

Impact Rating	
NB	○
LPA	○

This section summarizes the effects on historic resources within the study area to ensure compliance with federal, state, and local regulations that protect historic resources. The *Intensive-Level Architectural Survey Report* (Survey Report) (Charlotte, 2006) responds to and applies these regulations. For additional detail, see the *Intensive-Level Historic and Architectural Technical Memorandum* (2011).

A. Affected Environment

The Survey Report identifies 23 resources within the Area of Potential Effect (APE) that are

listed in or eligible for listing in the National Register of Historic Places (NRHP). An additional five resources were determined not NRHP-eligible following an intensive-level inventory. In addition, the report deemed 143 resources not worthy of intensive-level inventory (identified in Survey Report).

In a letter dated August 29, 2006, the North Carolina State Historic Preservation Officer (SHPO) concurred with all of the findings of the Survey Report. The SHPO reaffirmed this concurrence in e-mail correspondence on October 12, 2010. The NRHP status of the 23 NRHP resources is shown in Figure 8.

B. Environmental Consequences

The No-Build Alternative will not have an effect on the 23 NRHP-listed or eligible properties within the APE.

On February 1, 2011, the SHPO concurred with the finding of “no effect” for all but three of the 23 resources listed in or eligible for listing in the NRHP. The Concurrence Form for Assessment of Effects (February 1, 2011) documenting the effects findings can be found in Appendix H. The three resources of concern are as follows:

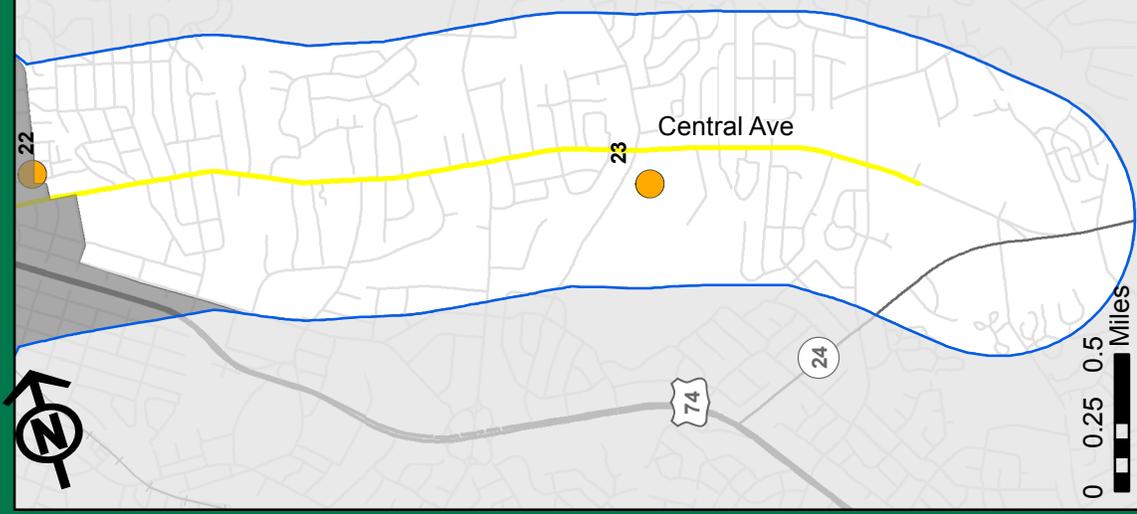
- Elizabeth Historic District – All work will occur within the public right-of-way, however one traction power substation (TPSS) may be located within an existing modern parking garage and another TPSS may be located just outside the northern boundary of the district and will require vegetative screen screening, at a minimum, to mask the TPSS building from view of the historic district – finding **“no adverse effect.”**
- Johnson C Smith University Historic District – A small amount of land may be necessary for sidewalk and support poles for the overhead contact system - finding **“no adverse effect”**
- Charlotte City Hall – Curb and sidewalk may require additional right-of-way – finding **“no adverse effect”**.

C. Mitigation

The No-Build Alternative will not have any impacts to historic resources; therefore, no mitigation measures for these alternatives will be required.

Under the LPA, per coordination with the SHPO, at a minimum, vegetative screening shall be provided to mask the TPSS located adjacent to the northern boundary of the Elizabeth Historic District. No other mitigation is required.

Central Ave Subarea



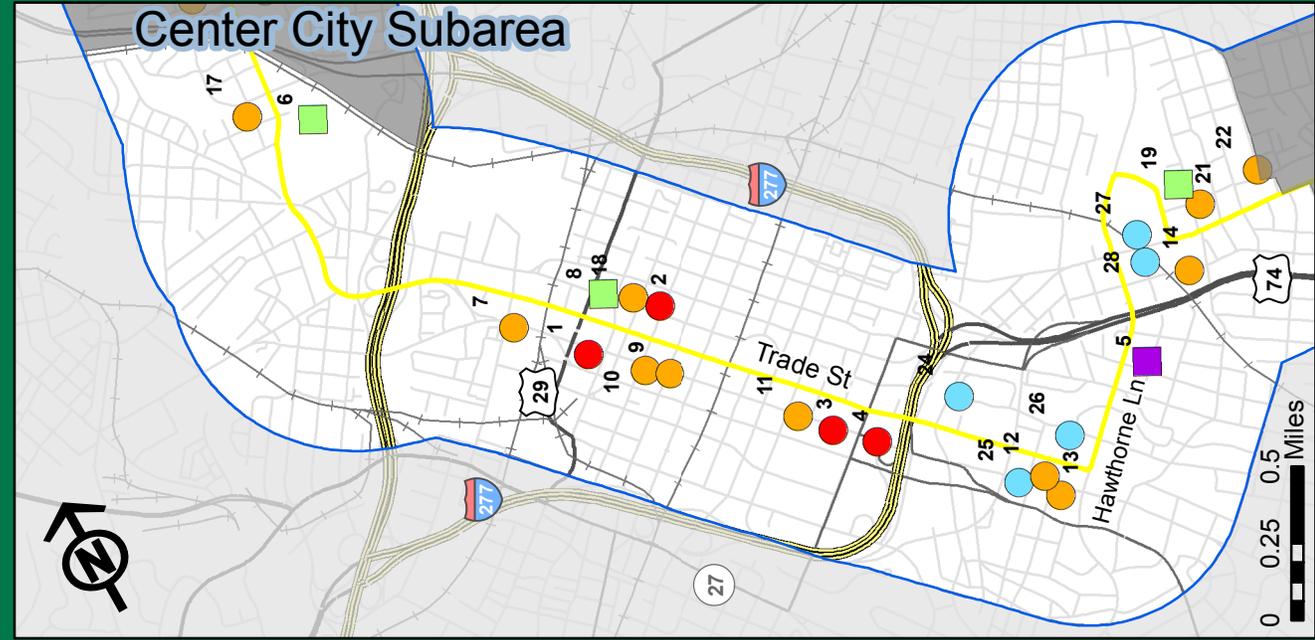
Legend

Historic Architectural Resources

- NR-eligible Individual Buildings (Orange circle)
- NR-listed Historic District (Purple square)
- NR-eligible Historic District (Green square)
- NR-listed Individual Buildings (Red circle)
- Not NR-eligible Individual Buildings (Blue circle)

Source: URS Corporation, MUMPO, NCDOT

Center City Subarea



Beatties Ford Rd Subarea

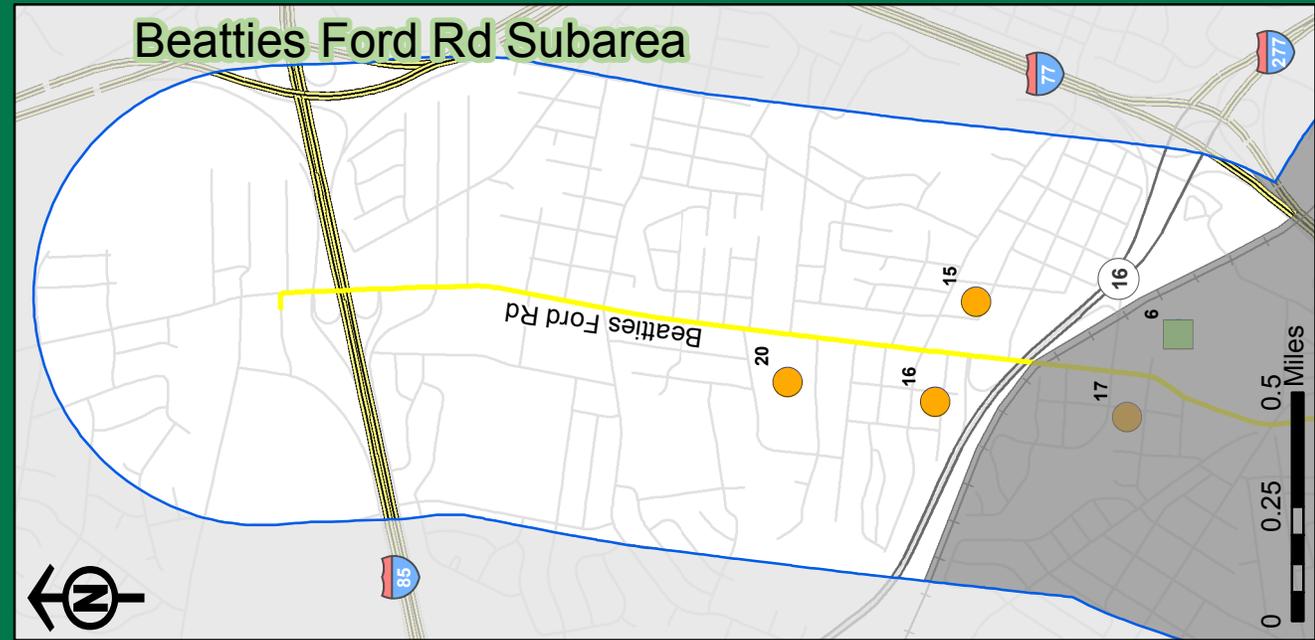


FIGURE 8. HISTORIC RESOURCES

3.9 Archaeological Resources

Impact Rating	
NB	○
LPA	○

This section summarizes the effects on archaeological resources within the Project study area.

A. Affected Environment.

The APE for the archaeological background research consists of the footprints of the streetcar tracks, the VMF site, and the substations. Previously recorded resources within 1,000 feet of the track alignment

were included within the background research to provide broad coverage of potential impacts.

Only one previously recorded archaeological resource is located within 1,000 feet of the Project alignment. This resource, archaeological site 31MK1089**, is a historic site dating from the late-nineteenth to early-twentieth century. The site was recorded in 2008 during Phase II Archaeological Testing for the proposed federal courthouse property in downtown Charlotte. Although the work at 31MK1089** identified several historic features and potential remnants of historic structures, the site was considered not NRHP eligible.

B. Environmental Consequences

The No-Build Alternative will have no adverse effect on archaeological resources. With the LPA, the streetcar tracks will be installed within existing streets and the VMF and substations sites will be located within 1,000 feet of the Project alignment. The narrow construction zone and the likelihood of prior disturbance suggest that the proposed construction will not affect unrecorded archaeological sites listed in or eligible for listing in the NRHP.

C. Mitigation

The LPA will not impact archaeological resources; therefore, no mitigation measures will be required.

3.10 Parks and Recreation Lands

Impact Rating	
NB	○
LPA	○

This section presents an inventory of nonhistoric Section 4(f) resources, including the publicly owned parklands, recreation areas, and wildlife and waterfowl refuges in the vicinity of the Project and summarizes the potential effects on those resources.

A. Affected Environment

A total of 37 parklands are located within 0.5 mile of the Project alignment (Figure 9). No recreation areas or wildlife or waterfowl refuges are located in the project area. Details on these facilities are provided in Appendix B: Inventory of Activity Centers, which identifies each facility by name, location, type of resource, and size.

Two educational institutions with open space and six park resources are located directly on the streetcar line. Johnson C. Smith University and CPCC campuses include open space

and athletic facilities; however, these campuses are generally not available for public use. Frazier Park, Independence Park, and Veterans Park are located directly on the Project alignment and are described in further detail below. Three greenway crossings, which are also park resources, are encountered along the corridor and are described below.

Frazier Park. Frazier Park is located on 1200 West Fourth Street Ext., just inside the I-277 loop. The park is located between the Wesley Heights stop and the Johnson and Wales stop. It connects with the Irwin Greenway along Irwin Creek up to Ray's Splash Planet and Elmwood Cemetery. Frazier Park is 11.9 acres and includes a soccer/flag football field, two full-court basketball courts, two tennis courts, greenway trails along Irwin Creek, and a playground. It also has a memorial for young children who died in Charlotte. Frazier Park is an active park hosting office tournaments for flag football and soccer for nearby Center City workers.

Independence Park. Independence Park is located along East Seventh Street from CPCC to Kings College. The park will have a streetcar stop on Hawthorne Lane between Park Drive and East Seventh Street. Independence Park is 24 acres with a baseball field, two basketball courts, two tennis courts, a rose garden, hiking trails, walking trails, a playground, volleyball court, and picnic areas.

Veterans Park. Veterans Park, at 2136 Central Avenue, is a County park located near The Plaza area. A streetcar stop is planned for the park. The park is 19 acres and includes a basketball court, playground, baseball field, softball field, six tennis courts, three volleyball courts, two outdoor shelters, an indoor shelter, and a playground. It is a popular park that draws many nearby residents.

Mecklenburg County Greenway System. The project encounters three portions of the Mecklenburg County Greenway System – Irwin Creek Greenway, Little Sugar Creek Greenway, and Briar Creek Greenway.

- Irwin Creek Greenway, as described above, extends through Frazier Park and currently crosses under Trade Street in an existing box culvert.
- Little Sugar Creek Greenway, in a portion of greenway integrated with the sidewalk, crosses Elizabeth Avenue at Kings Drive.
- Briar Creek Greenway has a proposed crossing of Central Avenue at Masonic Drive. The proposed greenway will cross under Central Avenue in an existing box culvert.

B. Environmental Consequences

The No-Build Alternative will not use or impact any parkland.

Acquisition of additional right-of-way for the LPA is limited to areas adjacent to the right-of-way for minor road widening associated with transit stops and for placement of substations. None of the required acquisitions are expected to impact parklands. In addition, the VMF is in an area that is not substantially disruptive to existing land uses or any parkland.

FTA intends to make a *de minimis* impact finding for the use of Veterans Park, pending public review and comment. Mecklenburg County Park and Recreation (MCPR), the official agency with jurisdiction over the park, has provided written concurrence.

MCPR, through coordination with the City, established that the Project would result in no impact to five park resources and a *de minimis* impact (discussed below) to Veterans Park. At Veterans Park, the existing sidewalk is narrower than the current City standard and is located within close proximity to the curb. The right-of-way line is currently located either in the sidewalk or along the back edge of the sidewalk. To meet the County's goals of including a planting strip between the sidewalk and curb, the sidewalk would be reconstructed in a sidewalk easement adjacent to the right-of-way further from the curb. Relocation of the sidewalk allows the streetcar infrastructure to remain in the right-of-way. Coordination with the park staff concluded that installing streetcar infrastructure and shifting the sidewalk would not affect the use of Park property or its facilities.

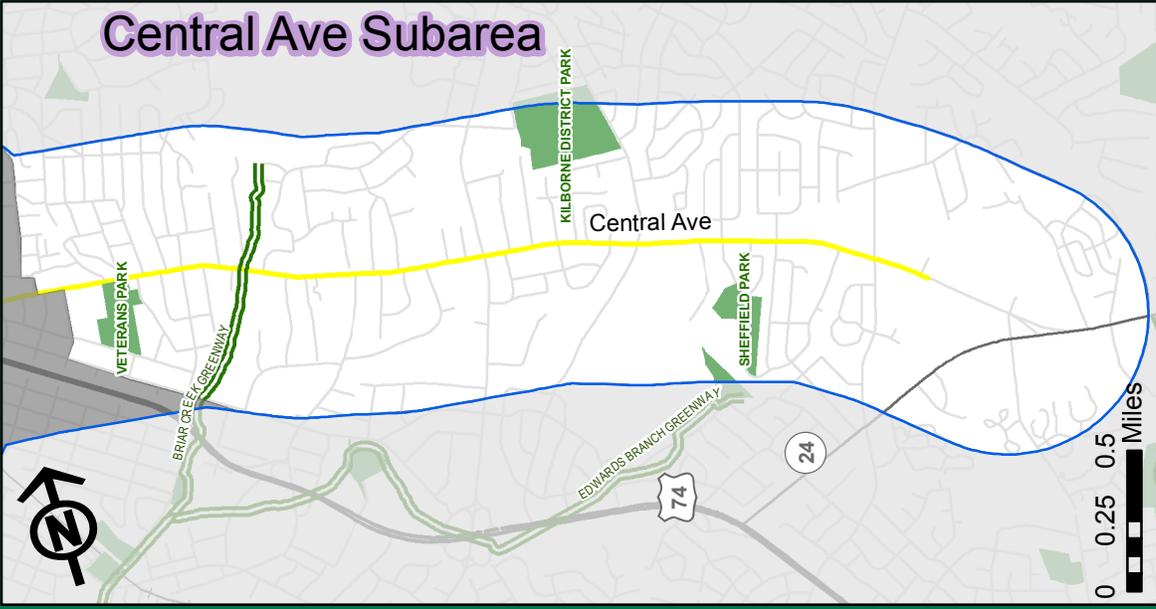
The City informed Mecklenburg County Park and Recreation (MCPR), the local agency with jurisdiction over Veterans Park, of its intent to propose *de minimis* findings for Veterans Park. A copy of this letter detailing the basis for the *de minimis* findings and MCPR's concurrence with this proposed finding is contained in Appendix H: Section 4(f) Resource Coordination. In addition, the City is seeking public review/input on this *de minimis* finding as part of the Draft EA circulation/public hearing and a final determination will be included in the Final EA.

Operation of the streetcar is not expected to affect any natural areas including parklands, wildlife habitat, or protected species; therefore, no substantial impacts to the parklands identified in the study boundary are anticipated. Rather, the high-quality, high-capacity streetcar system will provide enhanced access to parklands for Charlotte residents and visitors. Improved access to parklands could help bolster tourism by providing enhanced access to destination parks such as the Mecklenburg County Aquatic Center, while also improving community health and fitness by enhancing access to recreational areas.

C. Mitigation Measures

Because the LPA has no adverse impacts on all but one park resource or any other recreation lands and, for the one impact to Veterans Park, has received *de minimis* verification from local jurisdictions; no mitigation measures will be required.

Central Ave Subarea



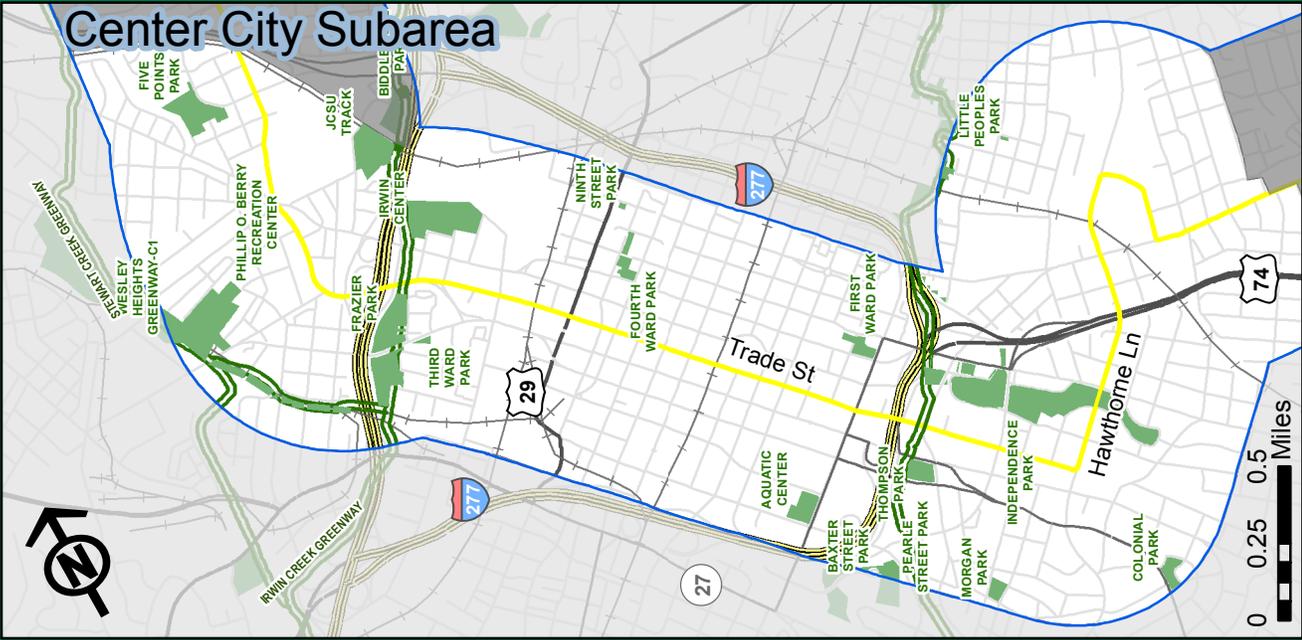
Legend

- Greenway
- Park Land
- Study Area
- Streetcar Alignment
- Railroad
- Interstate
- US Route
- Local Road
- NC Route

Source: URS Corporation, MUMPO, NCDOT



Center City Subarea



Beatties Ford Rd Subarea

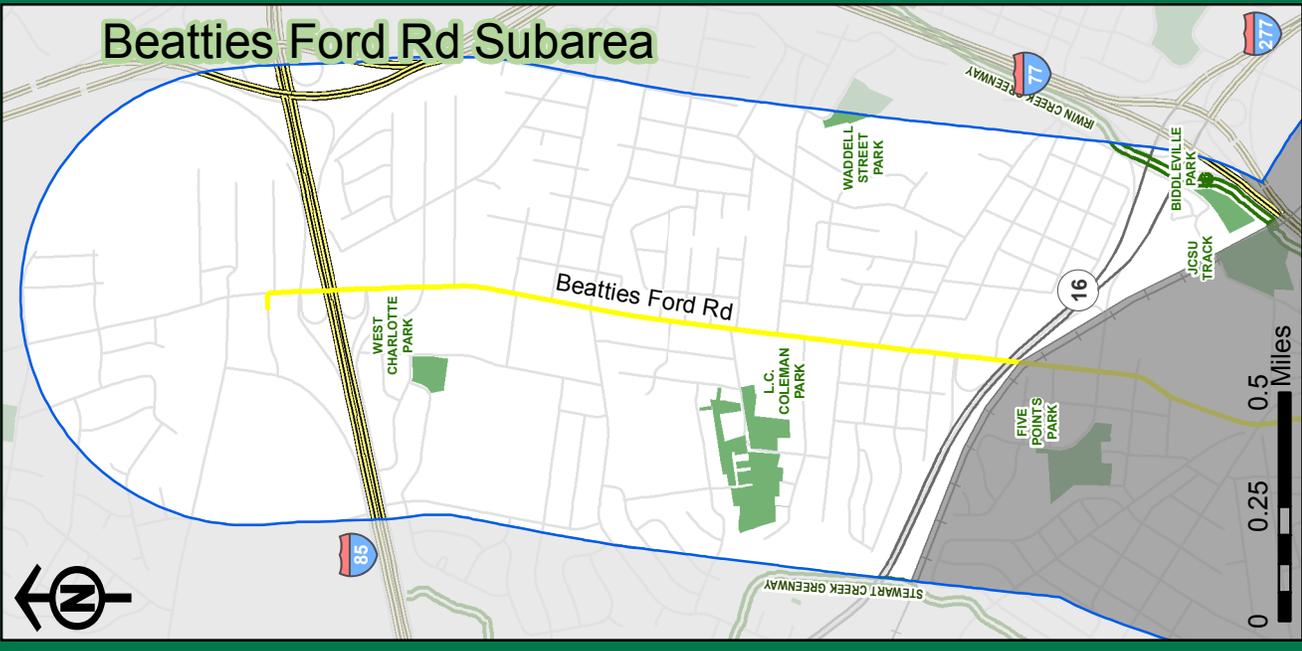


FIGURE 9. PARK LANDS WITHIN STUDY AREA



3.11 Noise and Vibration

Impact Rating	
NB	○
LPA	○

This section summarizes the expected impacts related to noise and vibration within the project study area and the effect that the No-Build Alternative and LPA will have on the identified noise sensitive receptors. A detailed analysis including assessment methodology, ambient noise and vibration levels, and impact assessment is provided in the *Noise and Vibration Impact Assessment Technical Memorandum* (2011).

A. Affected Environment

Some land uses are more sensitive to noise and vibration than others. Existing land uses along the proposed alignment of the streetcar extension are typical of urban core areas. Sensitive noise receptors identified in the project corridor include residences, churches, day cares, schools, residence halls, apartments, a hospital, a library, and parks. Land uses that are most sensitive to ground-borne vibration are hospitals, hotels, residential areas, and university research operations. The existing acoustic environments along the project corridor have high noise levels due to traffic on I-77, I-277, Beatties Ford Road, Trade Street, and Central Avenue, and typical noise levels associated with downtown regions.

B. Environmental Consequences

Based on a general assessment using the *Transit Noise and Vibration Impact Assessment* (Charlotte, 2011), no noise or vibration impacts will result from the No-Build Alternative.

Components of the LPA that could potentially impact noise include streetcar wheels rolling on rail, vehicle propulsion system, wheel squeal, occasional squealing of wheels when braking, and the use of bells. The day-night sound level (Ldn) of the streetcar operations is expected to range from 43–55 dBA in the study area. This is lower than the ambient noise level at all receptors; thus, the operation of the LPA will not result in noise impacts. The slow speed of the streetcar, low frequency of operations, and utilization of a streetcar vehicle that minimizes wheel squeal noise are the main contributors to the low noise emissions. Additionally, operation activities at the streetcar Vehicle Maintenance Facility (VMF) have also been found to have no impact on adjacent properties.

Noise and vibration impacts are anticipated to affect communities throughout the corridor during the construction of the LPA; however, these impacts are anticipated to be consistent with typical roadway construction and maintenance noise levels. Construction activities will adhere to *The City Code of Charlotte, Chapter 15 Offenses and Miscellaneous Provision*,

REAL-WORLD dBA COMPARISONS:

- 40 dBA quiet residential area or office
- 50 dBA refrigerator
- 70 dBA freeway traffic
- 90-115 dBA subway train
- 110 dBA car horn
- 130 dBA jackhammer
- 140 dBA airplane taking off

source: LowerManhattanInfo

Article III Noise with respect to times and total noise that will be allowed on the project. Construction impacts are discussed further in Section 3.17.

The LPA is not expected to impact ground-borne vibration.

C. Mitigation

No impacts to noise or vibration are expected from the LPA; therefore, no mitigation actions are required.

3.12 Air Quality

Impact Rating	
NB	○
LPA	○

This section summarizes the air quality analysis for the No-Build Alternative and LPA. Two potential sources of air pollution are associated with the Project: vehicular traffic and construction. This section focuses on vehicular-caused air pollution. See Section 3.17 for a discussion of construction activities and their effect on air quality. Additional detail on methodology and results can be found in the *Air Quality Technical Memorandum* (2011).

A. Affected Environment

The streetcar lies within a non-attainment region for 8-hour ozone. The *Metrolina Conformity Analysis and Determination Report*, dated February 8, 2010, documents the region's compliance.

B. Environmental Consequences

Based on this analysis, the No-Build Alternative and LPA will not have an adverse effect on regional air quality. No violations of the current CO standards are projected for the project alternatives. There is no difference in emissions output among the No-Build Alternative and LPA; however, because the LPA has a larger capture area of riders, implementation of the LPA will support the attainment and maintenance of air quality standards in the region. The LPA is expected to reduce the amount of regional vehicular travel relative to the No-Build Alternative. A net reduction in VMT will result in lower emissions of CO, the ozone precursor (NO_x), and greenhouse gases.

C. Conformity Determination

As stated previously, the LPA will not cause or contribute to any new violation of the federal air quality standards, increase the frequency or severity of any existing violation of the standards, or delay timely attainment of the standards. The FTA and FHWA have determined that the MUMPO 2035 LRTP conforms to the purposes of the State Implementation Plan (SIP).

D. Mitigation

Because no adverse local air quality impacts are associated with the LPA, no specific mitigation plan is recommended.

3.13 Hazardous Materials

Impact Rating	
NB	○
LPA	○

This section addresses hazardous material sites within the vicinity of the Project, evaluating the possibility for exposure and mobilization of hazardous materials from the operation of the project. For more detailed information, see the *Hazardous Materials and Utilities Technical Memorandum* (2011 respectively).

A hazardous material site is a location or facility that reportedly contains one or more hazardous substances or that has released a hazardous substance into the environment.

A. Affected Environment

The results of the survey for contaminated and hazardous materials in the Project corridor indicate there are sites of known or suspected concern.

Environmental Database Resources, Inc., indicates that 549 sites of known or suspected concern with respect to contaminated and hazardous materials are located within a 1-mile radius of the existing roadway centerline of the Project alignment; 401 are classified as sites with a low potential for impacts; 91 are classified as sites with moderate potential for impact; and 57 are classified as sites with a higher potential for project impact.

B. Environmental Consequences

The No-Build Alternative will not result in the exposure of any known hazardous material sites in the project area. This alternative will not affect or impact future environmental conditions within the study area.

The LPA will not result in any serious releases of contaminated or hazardous materials on a continuous basis; however, activities at the VMF could result in long-term impacts to the environmental conditions within the study area. Activities at the VMF will include the handling and use of volatile and hazardous substances such as lubricants, oils, greases, and solvents on a day-to-day basis. Accidental releases could be possible. Historic and current rail transit operations indicate that active streetcar track beds could potentially sustain an accumulation of petroleum hydrocarbons from the use of lubricants and some heavy metals deriving from the operation of steel wheels on steel rails as a result of normal and customary practices. The degree of hazard and magnitude of accumulations will not represent a public health concern. Implementation of transportation improvements, be it streetcar or roadway maintenance or installation, could result in the disturbance and release of contaminated or hazardous materials during construction activities on or near these sites.

The Resource Conservation and Recovery Act gives EPA authority and sets a framework to control generation, transportation, treatment, storage, and disposal of hazardous waste.

C. Mitigation

Because the No-Build Alternative will have no impact on hazardous materials within the study area, no mitigation will be required.

Under the LPA, additional assessments for the presence of contaminated and hazardous materials will be required to determine if mitigation actions will be required. For all sites identified within the corridor ranked low for severity of potential impact, the data accumulated will be revisited prior to project right-of-way acquisition and construction and an updated review of agency files and public records will be conducted to determine if there has been any substantial change in the status since the report was prepared. For those sites ranked with a moderate to high expected severity of impact, a further review of records will be conducted to determine the status of any contamination assessments or remedial actions taking place at those sites. A Phase II Site Assessment will be conducted as deemed necessary, prior to project right-of-way acquisition and construction including, at a minimum, soil and water sampling. It is anticipated a Phase II Site Assessment will be conducted on the VMF site and other locations potentially affecting the Project, such as TPSS sites. The resulting mitigation requirements will depend upon the nature, extent, and mobility of the contaminants, in addition to the proposed construction activity and ultimate use for a particular site.

Avoidance of contaminated areas, structural design modifications, containment of the contaminated areas, or other on-site treatment alternatives may need to be considered as part of the remediation effort. Health-based risk information and agency input will also be required to assess remediation alternatives. Overall, the objective will be to minimize the extent of the remediation requirements and to protect the public health.

Any handling, treatment, and disposal of hazardous materials will occur in full compliance with all federal, state, and local requirements. The Resource-Conservation-and-Recovery-Act-classified hazardous materials used at the VMF will be handled, captured, and disposed of in accordance with state and federal regulations. In addition, a hazardous waste Generator Identification Number will be obtained from the U.S. EPA for any disposal activities.

3.14 Biological Resources and Endangered Species

Impact Rating	
NB	○
LPA	○

This section summarizes effects on biological resources, including plant communities, wildlife, and species listed as threatened or endangered by the U.S. Fish and Wildlife Service. More detail can be found in the *Natural Resources Technical Memorandum (2011)*.

A. Affected Environment

The Project will affect the existing biological resources within the Project corridor, specifically within the immediate vicinity of the Project's proposed alignment, where short-term effects from construction will occur and where the Project will operate. These biological resources include plant communities, wildlife, and threatened and endangered species. Brief descriptions of the affected environment for each resource are provided below.

Plant Communities. The majority of the project area is urban land, including commercial, office, and industrial developments, residential areas, and transportation corridors. Most of the vegetation in these areas has been removed or altered by human activity. Consequently, the plant communities within the Project corridor are highly disturbed. The disturbed urban plant communities are primarily composed of maintained grass lawns and roadside right-of-ways, and ornamental landscape plantings. In most locations, urban development has occurred up to stream banks. Vegetation within these disturbed riparian areas has been colonized by invasive species. No wetland plant communities were identified within the Project corridor.

Wildlife. Although highly disturbed, the Project corridor provides habitat for populations of birds and mammals tolerant of urban conditions. Avian species include mockingbird, blue jay, American crow, American robin, common grackle, European starling, mourning dove, rock pigeon, and eastern phoebe. Mammalian species adaptable to urban areas include raccoon, opossum, gray squirrel, and eastern cottontail. The riparian corridors identified within the project area provide some habitat for many species of reptiles, amphibian, and aquatic wildlife common to urban areas, including salamanders, toads, tree frogs, true frogs, spiny lizards, skinks, and snakes. The exotic and invasive Asian clam, as well as many unidentified minnow species, was observed in several perennial streams.

Threatened and Endangered Species. Species with the federal status of endangered (E), threatened (T), proposed endangered (PE), and proposed threatened (PT) are protected under provisions of the Endangered Species Act of 1973 as amended (16 USC 1531 et. seq). Any action likely to adversely affect a species classified as federally protected will be subject to review by the U.S. Fish and Wildlife Service. Data available through North Carolina Natural Heritage Program did not indicate known occurrences of federally protected threatened or endangered species within 1 mile of the Project corridor.

B. Environmental Consequences

Under the No-Build Alternative, existing transit routes will continue in service. No long-term direct impacts to biotic resources of the region are predicted.

The design of the LPA is on existing pavement within the existing travel lanes. Construction activities will be limited to within the travel lane. No disturbance or clearing of vegetated areas or disturbance in riparian zones will be required. No long-term impacts to the biotic resources of the region are predicted. No long-term impacts to the Federal listed, Federal candidate, and State listed species in the vicinity of the project corridor are expected.

C. Mitigation

Because no impacts to biotic resources and wildlife are expected, no mitigation will be required.

3.15 Water Quality and Hydrology

Impact Rating	
NB	○
LPA	○

This section summarizes the analysis of how water quality and hydrology will be affected by the No-Build Alternative and the LPA. For additional detail, see the *Water Resources Technical Memorandum* (2011).

A. Affected Environment

This section describes the surface water, wetlands, floodplains and floodways, and groundwater within the water resources study area.

Surface Waters. The water resources study area is located in the Catawba River Basin, which extends from the eastern slopes of the Blue Ridge Mountains southeast to the state line near Charlotte. The basin covers 3,279 square miles and encompasses all or part of Alexander, Avery, Burke, Caldwell, Catawba, Gaston, Iredell, Lincoln, McDowell, Mecklenburg, Union, and Watauga counties. The Catawba River Basin is subdivided into nine subbasins. The water resources study area lies entirely within subbasin 03-08-34. According to the basinwide plan, the region containing subbasin 03-08-34 is the most heavily urbanized region of the basin and the state. Urban runoff has negatively affected the water quality in and around the Charlotte area.

Five jurisdictional streams are located within the limits of the study area. Streams found within the study area include Irwin Creek, Little Sugar Creek, an unnamed tributary (UT) to Little Sugar Creek, Briar Creek, and an UT to Briar Creek. Stewart Creek, Edwards Branch, and Campbell Creek drain the study corridor, but do not cross the water resources study area.

Wetlands. A pedestrian survey of the water resources study area was evaluated for the presence of wetlands. U.S. Army Corps of Engineers (USACE) wetland criteria were used to evaluate topographically low areas, areas having hydric soils, and areas with poorly drained soils (USACE, 1987A). No wetlands were identified during field investigations. Because no wetlands were identified within the water resources study area, Section 404 of the Clean Water Act, as it pertains to wetlands, does not apply.

Floodplains and Floodways. Mecklenburg County, in cooperation with the Federal Emergency Management Agency (FEMA) and the USACE, developed Digital Flood Insurance Rate Maps (FIRM) for Mecklenburg County. The FIRM maps for Mecklenburg County indicate that the floodways and floodplains of Irwin Creek, Little Sugar Creek, and Briar Creek fall within the water resources study area (Mecklenburg, 2010).

Groundwater. According to the North Carolina Department of Environment and Natural Resources, Division of Environmental Health, Public Water Supply Section, one public water supply well is located within the water resources study area. This well is classified as a Transient Non-Community public water supply well.

B. Environmental Consequences

The No-Build Alternative assumes that the Charlotte transportation system will develop as currently planned without providing public transportation in the form of a streetcar service. Under the No-Build Alternative, no construction will occur; therefore, no long-term impacts to water resources will result.

The majority of the project is on existing pavement within existing travel lanes; construction activities are limited to the travel lane area. One stream and its regulated buffers, UT to Little Sugar Creek, may be impacted by the proposed alignment along the new alignment portion between Hawthorne and Clement. A portion of this stream may need to be relocated to accommodate the project improvements. Potential unavoidable impacts to this stream will be addressed during the Section 404/401 permit process.

With the exception of a portion of UT to Little Sugar Creek, construction is limited to existing pavement; direct impacts to riparian vegetation and water quality is not anticipated. No long-term impacts to the water resources of the region are predicted.

C. Mitigation

Surface Waters. Best management practices will be used at stream crossings to prevent any construction materials from entering the waterway. Long- and short-term impacts related to surface waters will be compensated for through proper engineering design and best management practices for erosion control during and following construction. Any potential unavoidable impacts to UT to Little Sugar Creek will need to be approved by the USACE and the North Carolina Division of Environment and Natural Resources Division of Water Quality prior to construction. Compensatory mitigation will be addressed during the Section 404/401 permit process.

Wetlands. No impacts to wetlands are predicted to result from implementation of this project; therefore, no mitigation will be required.

Floodplains/Floodways. No impacts to flood zones are predicted to result from implementation of this project; therefore, no mitigation will be required.

Groundwater. No impacts to groundwater are predicted to result from implementation of this project. Spills, leaks, or other unintentional discharges of petroleum or other chemicals will be avoided through proper construction engineering and adherence to best management practices for materials control. No mitigation will be required.

3.16 Utilities

Impact Rating	
NB	○
LPA	○

This section provides a preliminary assessment of the locations of utilities within the area of the Project alignment that may be affected by construction. The Project's power needs have not been established. Information for this report has been gathered through discussions with the City of Charlotte, vehicle manufacturers, and local utility agencies. Because the Project is currently 30-percent complete for overall design and 10-percent complete for design of the traction power system and

OCS and the streetcar vehicle has not been determined for ultimate system operations, the power needs for the Project have not been established. For additional detail on Project interaction with public and private utility companies and infrastructure, see the *Utilities Technical Memorandum* (2011).

A. Affected Environment

Construction of the Project will occur generally within existing roadway rights-of-way, which is where the vast majority of utility lines are located in Charlotte. If a conflict exists between the Project alignment and facilities, the utility line may need to be relocated as part of the Project; however, because of the conceptual nature of this current design status, only an estimate of the number and locations of potential utility conflicts can be established. More detailed engineering in future phases of the Project will determine actual utility impacts and necessary mitigations (utility relocations, replacements, or other actions).

In general, underground impacts from constructing Project infrastructure within an existing roadway result from the process of installing the rails within a concrete slab into the existing roadway pavement. This process results in the disturbance of shallow utility lines in proximity to the slab and reduced access to deeper utilities adjacent to the slab. In addition, the OCS poles and cables used to power the Project often conflict with existing overhead utilities. Beyond these direct impacts, the OCS power supply for the streetcar vehicle can also create the potential for underground stray current, which is attracted to ferrous utility pipes, and can accelerate or concentrate corrosion. To accommodate the physical space constraints that will govern Project construction and address the long-term operational requirements of the Project and the other core infrastructure elements in its proximity, the utility Rules of Practice (ROP) have been developed.

The ROP represent a planning and design guideline to set forth a protocol for identifying and addressing conflicts between utilities and the Project system. The objective of the ROP is to promote Project design that achieves the appropriate balance between reducing the need and cost associated with Project's required utility relocations while also accommodating the efficient long-term service and maintenance of affected utilities.

Environmental Consequences

No impacts to utilities are expected from the No-Build Alternative. Applying the ROP to the Project limits, it is expected that utility impacts, both overhead and underground, will be encountered throughout the 10-mile corridor for construction of the LPA. Anticipated impacts between underground facilities and the Project system are defined and shown in three different project documents. For water and sewer utility lines owned and operated by

Charlotte-Mecklenburg Utilities, conflicts are defined in the *Water and Sewer Conflict Identification Plans* (included in the Charlotte Streetcar Project Plan set). For privately owned facilities such as electrical, gas, fiber optics and cable, as well as publically owned fiber optic and cable facilities, potential conflicts are documented in the *Private Utility Conflict Matrix*, with associated *Private Utility Impact Analysis Plans*. The *Water and Sewer Conflict Identification Plans* utilize the ROP to identify conflict locations and establish a concept design resolution. Final design of the conflict resolution will occur in later stages of design and will incorporate additional design factors such as the condition of the affected existing system elements.

Private Utility Impact Analysis plans were not developed based on the private utility ROP because utility companies are responsible for the operation and maintenance of their own facilities, and must operate per their current agreements with the City. A *Utility Conflict Matrix* and associated plans were developed to provide documentation and a summary of potential conflicts resulting from the implementation of the Project, and will serve as a beginning point for discussions between the City of Charlotte and affected utility companies.

B. Mitigation

Based upon the 30-percent plans and future determination of vehicle technology, impacts and mitigation cannot be assessed at this time. Because none of the alternatives is expected to have major utility impacts, no mitigation measures will be required.

3.17 Construction Activities and Consequences

Impact Rating	
NB	
LPA	

This section summarizes the anticipated sequence of construction events and the potential effects based on experiences from other projects.

A. Affected Environment

Before major construction activities commence, some private utility companies, under direction from the City, will need to relocate infrastructure that is in conflict with Project elements. This may include limited relocation of utility duct banks, reconstruction of utility vaults to provide an access outside of the streetcar operating envelope, or the relocation or adjustment of overhead utility service lines and poles.

Overall, construction of the Project is anticipated to take approximately three to four years. The streetcar track will be constructed in reaches, which can vary in length, and will be determined in coordination with the City traffic engineers to best expedite construction activities while minimizing disruption to the general circulation of automobile, pedestrian, and bicycle traffic. Public and some private utility relocation construction will lead the progression along the corridor, with track and civil construction following.

Typically, after private utilities have relocated most or all of their facilities from the construction zone, project construction will begin. Construction sequencing will be established during final design. Activities on site will typically begin with the installation of

general and specific traffic control, followed by installation of erosion control measures. The project will then address any remaining underground concerns not resolved in the utility phase of construction. In general, all remaining surface work will be constructed next—this surface work primarily consists of streetcar tracks and stops, roadway and sidewalk, and signal and OCS pole installations. After the surface and subsurface infrastructure is installed and substantially completed, systems work, including the OCS and system, can be installed on site. When the construction work is completed and approved, systems testing, vehicle testing, and safety and security certification will be completed prior to beginning streetcar service.

B. Environmental Consequences

The No-Build Alternative will not involve construction; therefore, no construction-related impacts are expected. Table 6 provides a description and summary of the short-term environmental consequences that will result from construction activities for the LPA.

Table 6. Summary of Construction Related Impacts from the LPA	
Resource	Expected Impacts
Truck Freight Traffic	Negative impacts will occur due to changes in access, detours, road closures, and construction workers, activities, and equipment.
Vehicular Traffic	
Bicycle Facilities	
Pedestrian Facilities	
Parking	
Transit	
Freight Rail	No Impact
Passenger Rail	No Impact
Economic Development	Positive impacts will occur due to the creation of jobs and services during the construction period. Negative impacts will occur due to the disruption of local businesses.
Property Acquisition/Relocations	No relocations of residences or businesses are expected; however, negative impacts will occur due to the acquisition of privately owned property along the corridor.
Neighborhoods/Community Services/Protected Populations	Negative impacts will occur during construction, including changes in access, detours, and daytime construction activities.
Land Use	Negative impacts will occur due to existing land, including some vegetated areas being acquired and converted to infrastructure use.
Noise	Negative impacts will occur from construction equipment

Table 6. Summary of Construction Related Impacts from the LPA	
Resource	Expected Impacts
Vibration	Negative impacts will occur from construction equipment
Air Quality	Negative impacts will occur from construction equipment exhaust emissions and dust.
Visual/Aesthetics	Negative impacts will occur due to the presence of construction equipment, and torn-up roads and sidewalks.
Public Services	No Impact
Utilities	Negative impacts will occur due to disruption in services while utilities are being relocated.
Energy	Negative impacts will occur due to the need for gasoline, diesel fuel, oil, and other energy sources for construction equipment and the production and transport of construction materials.
Cultural Resources	No negative impacts will occur due to physical disturbances created by construction equipment and activities. No adverse impacts to historic [Section 4(f)] resources (see Appendix H. See Section 3.8 for specific property details.
Parks/Recreation	No negative impacts associated with changes in access and the presence of construction equipment and construction activities. No adverse impacts to park and recreational [Section 4(f)] resources. See Section 3.10 and Appendix H.
Hazardous Materials	Negative impacts could occur due to the local presence of hazardous materials accessed during construction activities.
Natural Environment	No Impact
Water Quality/Hydrology	Negative impact will occur to a local stream and its associated riparian buffers.
Safety/Security	No Impact

C. Mitigation

Because the No-Build Alternative will not result in negative impacts due to construction activity, no mitigation activities will be required.

The LPA may have some negative impacts during construction. Mitigating these potential impacts requires a carefully prepared and executed construction plan. Throughout the construction process, it is the intent of the City to maintain one or two lanes of traffic through the construction areas, except during periodically required nighttime road closures.

Portions of the corridor that currently accommodate only two lanes of traffic may need to be completely closed during the construction process, requiring traffic to be detoured. Specifically, this may occur on portions of Hawthorne Lane and Clement Avenue. Construction occurring on the North Carolina Department of Transportation (NCDOT) bridges spanning I-77, I-277, I-85, Brookshire Boulevard, and Independence Boulevard may have different construction procedures and traffic accommodations based on NCDOT requirements.

The staging area for the track construction will likely require the use of one to two lanes of traffic or one traffic lane and an adjacent parking lane or other space. To avoid direct adverse impacts to parks and recreation facilities or cultural resources, no construction activities, other than those listed in Section 3.10, or staging areas will be allowed within the boundaries of these resources. Vehicular and pedestrian access for all residents and businesses in the vicinity of the project will be provided at all times through the use of signing, fencing, bridging mechanisms over construction trenches, and flaggers, as necessary.

Construction activities will generally occur during daytime hours (i.e., 7:00 a.m. to 7:00 p.m.). Periodic nighttime construction may be required to accommodate activities that require road closures and “rail-pulls.” Rail-pulls occur when the contractor moves a string of rail from an off-site welding yard to the construction site. Due to the length of the rails (from 120 to 800 feet), the contractor will likely pull the rails during early morning hours to avoid disruption of traffic.

All work will comply with the City of Charlotte’s Noise Ordinance, which will likely require major noise-generating work, such as rail grinding and jack-hammering, to occur outside of late-night hours. Construction noise will impact residential land uses within 70 feet of the construction zone, however impacts would be short term in nature, anticipated to last between six to eight weeks, depending on the construction duration of each “reach.” A mitigation plan will be developed by the contractor and coordinated with the City of Charlotte. As noted in the Water Quality section, spills, leaks, or other unintentional discharges of petroleum or other chemicals that would impact groundwater will be avoided through proper construction engineering and adherence to best management practices for materials control. Best management practices will be used at stream crossings to prevent any construction materials from entering the waterway.

All construction work will be performed in full coordination with CDOT and NCDOT (where required) and will comply with all applicable safety requirements.

3.18 Secondary and Cumulative Environmental Consequences

This section summarizes the potential secondary and cumulative effects of the Project and other actions in the same geographic area; and evaluating the interaction among the Project, other actions, and the resources.

A. Affected Environment

Impact Rating	
NB	
LPA	

Secondary Effects. Secondary effects are those that are caused by the project and may occur later in time and are farther removed in distance, but must be reasonably foreseeable. Secondary effects “may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems” (CEQ 1986, 40 CFR 1500–1508). It is important

to emphasize that secondary effects considered during NEPA must be reasonably foreseeable; not every conceivable scenario should be evaluated. Secondary effects may occur in three forms: alteration of the environment relating to land use change; development related to the accessibility changes from a proposed transportation project; and effects relating to land use change that may occur with or without the action or project.

Information from existing studies was reviewed and data was compiled regarding current and predicted land use and transportation patterns. See Appendix D: Traffic Analysis for a summary of existing transportation and land use plans.

Cumulative Effects. Cumulative effects are “environmental effects resulting from the incremental effects of an activity when added to other past, present and reasonably foreseeable future activities regardless of what entities undertake such actions. Cumulative effects can result from individually minor but collectively significant activities taking place over time and over a broad geographic scale, and can include both direct and secondary effects.” (40 CFR 1400–1508). Like secondary effects, cumulative effects can be further differentiated into categories as defined by the Council on Environmental Quality (CEQ): repetitive effects caused by the project; project effects that interact with a sensitive receptor to create a nonlinear effect; effects arising from multiple sources that produce additive effects; effects arising from multiple sources that combine to form a nonlinear effect.

Notable regional projects or development trends that have occurred or are reasonably foreseeable to occur in the project study area have been previously documented in Appendix E and the *Socioeconomic Technical Memorandum* (2011). When these developments and plans are considered simultaneously with the project, they have the potential to result in changes in land use, transportation patterns, socioeconomic conditions, and other resources within the study corridor.

B. Environmental Consequences

Impact Rating	
NB	○
LPA	+

Secondary Effects. As described in Section 3.2, construction of the LPA is likely to increase the rate of economic development in the Project study area. The majority of the redevelopment activity will be concentrated within the Center City subarea, while substantial new development is also expected in the Beatties Ford Road and Central Avenue subareas as they become more attractive to private developers.

While the expected increase in development is likely to have the beneficial effect of creating more jobs and employers within the study area, it also could likely result in the gentrification of the more vulnerable neighborhoods and business districts, including the Beatties Ford Road and Central Avenue Business Corridors, in these subareas. This is addressed in Section 3.2

Since the Project study is primarily developed with little to no natural areas, the Project is unlikely to generate secondary or indirect effects on natural resources, particularly wetlands, streams, or protected species or habitats critical to their survival.

Cumulative Effects. A summary of the expected direct, secondary, and cumulative effects associated with the project is provided in Table 7. In the table, direct impacts of the project are shown first, such as those associated with construction and secondary and cumulative impacts of the Project are indicated in the final columns.

Expected direct, secondary, and cumulative impacts are summarized under several different conditions in the table. In the second and third columns, expectations are summarized for what future conditions in the study area might be like if the Project is not constructed, such as under the No-Build Alternative. Impacts from other past actions and current actions are separated from impacts from potential future actions in the study area (other than the Project). When considering the impact of past actions, only actions taken since Charlotte has been considered an urban area are included. The remaining columns summarize expectations of what future conditions in the study area might be like if the Project is constructed.

Table 7. Overview of Potential Cumulative Effects					
Impact Type	No-Action Future Conditions (Conditions without the Proposed Action)		Impacts of the Proposed Action (Incremental Effect of the Proposed Action)		Cumulative Effect (Future Conditions w/ Proposed Action)
	Other Past/ Present Actions	Other Future Actions	Secondary Effects		
			Encroachment Alteration Effects	Effects Related to Induced Growth	
Transportation	●	●	N/A	N/A	+
Natural Environment	○	○	○	○	○
Water Quality/ Hydrology	○	○	○	●	○
Safety and Security	○	○	○	○	○
Utilities	/	/	/	/	/
Economic Impacts	+	+	⊙	+	+
Hazardous Materials	⊙	⊙	/	/	/
Cultural Resources	●	/	/	/	/
Noise/Vibration	⊙	⊙	●	●	●
Aesthetics/Visual	○	○	○	○	⊙
Parks/Recreation	+	+	○	○	+
Community/Protected Populations	●	⊙	●	●	+
Land Use	●	●	●	●	●

KEY: ⊙ = Low Adverse Effect ● = Moderate Adverse Effect ● = High Adverse Effect
 + = Positive Effect ○ = Negligible Effect
 /= Adverse effect is possible but likelihood and magnitude are unpredictable

C. Mitigation

No mitigation is warranted if the No-Build Alternative is selected.

Detailed mitigation of potential impacts that will occur as a result of implementing the LPA is discussed throughout Chapter 3 in each respective impact section. General direction for assessing consequences and mitigation development is provided in the *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina*,

Volume II: Practitioners Handbook (Louis, 2001). Portions of this guidance document applicable to the Project are summarized below.

Mitigation Techniques for Effects Related to Encroachment-Alteration

Encroachment-alteration secondary/cumulative effects, although often distant in time and space from the Project, are similar to many direct Project effects and can be addressed with similar mitigation strategies. As with direct effects, in many cases these strategies involve altering one of the following aspects of the Project or plan within the control of the City:

- Facility type
- Facility alignment
- Facility design features
- Techniques used during construction
- Facility maintenance

Mitigation Techniques for Induced Growth

Project-induced growth can be mitigated to some extent through a variety of land use control techniques implemented by local municipalities. In addition to managing residential and commercial growth induced by a transportation project, a local jurisdiction may also choose among strategies designed to mitigate the environmental and social effects related to induced growth.

North Carolina law makes provision for the use of performance standards in local zoning and subdivision regulations. Performance standards can define uses as of right or the standards required for obtaining a conditional-use permit. Performance standards encompass the following types of regulation:

- Regulation of height, bulk, setback, lot size, and other dimensional features
- Regulation of uses within zones and standards that define and distinguish uses
- Specification of site design features such as off-street parking, impervious surface, vegetative cover removal, landscaping and screening, and signage
- Specifications of standards for noise and pollutant emissions allowed in manufacturing or agricultural activities
- Standards for community appearance or historic preservation with review and limited enforcement powers vested in a planning agency or special commission

A technique for preservation of green space, habitat, or other important resource areas that is seeing increasing use is the acquisition of land or development rights by government agencies, nonprofit groups, or other private initiatives. These groups purchase or accept donations of land and pledge to keep the land permanently undeveloped. Development rights can also be purchased while the underlying title and use is retained by a landholder through the use of conservation easements. These easements, once written into a deed, can permanently prevent development on a parcel regardless of future ownership. Carefully

planned acquisitions can work to focus growth and protect notable features from growth-related impacts.

Similarly, the City can enact zoning measures which are meant to protect and encourage the development of affordable housing. Density bonuses are one method of encouraging developers to provide affordable housing in their projects by allowing them to construct buildings at a higher density than what is normally allowed if they dedicate a certain percentage of space for affordable housing. Other methods include inclusionary zoning practices that include affordable housing components for specific zones.

Another mitigation technique is context sensitive design. "Context sensitive design (CSD) is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility. CSD is an approach that considers the total context within which a transportation improvement project will exist" (U.S. Department of Transportation, 2006).

A major goal of CSD is to allow for local public input early in the design process so that costly delays and revisions can be avoided. Examples of CSD and flexible standards include deviation from the standard length of an acceleration or deceleration lane to protect a notable feature, modifying the design of an arterial that passes through a downtown area to allow for a boulevard that would better fit with the local context, and inclusion of special materials or design features to allow the facility to fit the scale and style of its surroundings.

4. SUMMARY AND CONCLUSIONS

4.1 Summary of Impacts

Table 8 summarizes the likely impacts of the No-Build and LPA based on the detailed analysis provided for each category in Chapter 3. Overall, the LPA is not expected to have a significant negative impact on the human and natural environment. Where negative impacts do exist, mitigation opportunities are suggested in Chapter 3.

Table 8. Summary of Environmental Effects

Impact Category		Impact Rating		Impact Category		Impact Rating	
		NB	LPA			NB	LPA
Transportation/Mobility				Human Environment			
3.1A	Transportation	○	+	3.7	Visual and Aesthetic Resources	○	○
3.1B	Vehicles	○	○	3.8	Historic Resources	○	○
3.1C	Parking	○	○	3.9	Archaeological Resources	○	○
3.1D	Bicycles	○	●	3.10	Parks and Recreation Lands	○	○
3.1E	Pedestrians	○	○	3.11	Noise and Vibration	○	○
3.1F	Truck Freight	○	○	3.12	Air Quality	○	○
3.1G	Freight and Passenger Rail	○	+	3.13	Hazardous Materials	○	○
3.1H	Bridge Clearance	○	○	Natural Environment			
Economic Development				3.14	Biological Resources and Endangered Species	○	○
3.2	Economic Development	○	+	3.15	Water Quality and Hydrology	○	○
Land Use				Infrastructure			
3.3	Land Use	○	○	3.16	Utilities	○	○
3.4	Property Acquisition	○	●	3.17	Construction Activities and Consequences	○	●
Human Environment				Secondary and Cumulative			
3.5	Neighborhoods and Protected Populations	○	+	3.18A	Affected Environment	○	○
3.6	Safety and Security	○	○	3.18B	Environmental Consequences	○	+
Symbol Key:		○	No Impact	+	Positive Impact	●	Negative Impact

4.2 Effectiveness

This section summarizes the tradeoffs in effectiveness between the two alternatives evaluated against the objectives identified in Chapter 1 (see Table 9 below). Implementation of the Project will improve the overall operations of the CATS system and benefit one of its most productive bus corridors. Three of the four most utilized bus routes will be supplemented or replaced by premium transit service that will be more reliable and have higher capacity than existing bus service or short-range bus service improvements.

Table 9. Objectives and Evaluation Measures for the No-Build and LPA		
Objective	No-Build Alternative	LPA
Improve transit services and facilities that support City and regional land use and development goals and objectives	●	+
Generate transit investment that spurs new development and economic revitalization along two of Charlotte's main commuter thoroughfares	●	+
Improve transit connections between major urban activity centers within the urban core while expanding and connecting Charlotte's regional transit corridors	●	+
Effectively meet the increasing transit demand placed on the City's most productive bus corridors	●	+
Reduce short inner-city auto trips and vehicle emissions	○	+
KEY: + = Positive Influence ○ = No Influence ● = Negative Influence		

4.3 Social Equity Considerations

Social equity is measured by assessing the impacts and benefits of the Project's No-Build and LPA alternatives and ensuring that the costs and benefits are not unfairly distributed across population subgroups. In particular, this assessment focuses on the relationship between the distribution of Project benefits in the form of improved access to fixed-guideway transit circulator service and Project impacts in the form of partial property acquisitions, noise, and exposure to hazardous materials. This analysis focuses on census block groups in the project study area that had a higher than average minority and/or low-income population compared to the City of Charlotte in the year 2000. See Chapter 3.5 for more details on the data underlying the analysis.

Project impacts, both beneficial and detrimental, will be shared equitably throughout the corridor. A brief summary of these factors is listed here:

- The improved transit service recognized by the installation of a premium fixed-guideway system (as compared to standard bus service) will be distributed

throughout all three subareas. Additionally, the bus service currently operating on the corridor will continue to serve these communities during streetcar service.

- The streetcar stops are spaced in a consistent fashion throughout the 10-mile alignment, giving similar access to all impacted communities and neighborhoods.
- The streetcar will predominately operate in existing right-of-way. Because of this, minority and/or low income populations will not be disproportionately affected.
- The VMF, located at the interface between the Trade Street and Beatties Ford Road subareas, is proposed to be located on property currently owned by the City.

In summary, the LPA will have no disproportionate impacts on minority and/or low-income populations. Residents of all of the census block groups with greater than average minority and/or low-income populations will have more access to transit under the LPA than under the No-Build Alternative and will benefit from the additional premium streetcar service. For additional detail, see Chapter 3.5. The LPA is likely to have the secondary effect of encouraging redevelopment of neighborhoods. This redevelopment process, often referred to as gentrification, can increase the cost of real estate for both residents and business owners, which has the greatest negative impact on low-income residents.

4.4 Unresolved Issues

This section discusses several unresolved issues related to the Project. Most of these issues are unresolved due to the fact that the Project is currently at a 30-percent level of design, and these issues will most likely not be resolved until the project approaches the Final Design Phase. The purpose of this section is to keep track of these unresolved issues and to outline measures to resolve them.

A. Low Bridge Clearances

Listed below are six low bridge clearance locations that have been identified along the proposed LPA alignment that will require a variance in the NESCS:

- I-77 bridge over Trade Street
- Norfolk Southern Railroad bridge over Trade Street
- Pedestrian bridge over Trade Street connecting two Bank of America buildings
- LYNX Blue Line bridge over Trade Street
- I-277 bridge over Elizabeth Avenue
- CSX Transportation bridge over Hawthorne Lane

Reduced clearances are permitted by the NESCS “where local conditions make it impractical to obtain the clearance given” in the code, provided that those reduced clearances are

Carefully maintained. These exceptions must be approved by the local jurisdiction having authority over the safe operation of the streetcar system. For the streetcar, CDOT is the appropriate local jurisdiction. Any mitigation measures would need to be approved by the City's Safety and Security Committee during final design.

B. Funding Options

Funding is a policy decision to be made by the City of Charlotte. As funding opportunities become available, the City of Charlotte will determine how and when streetcar projects will be implemented.

C. Vehicle Technology Options

It is recommended that the City continue with the conventional OCS design for the immediate streetcar system, while monitoring the progress of the development of battery and capacitor systems for line haul application. It is noted that the battery / capacitor systems can subsequently be utilized for limited distance application to address low clearance obstructions, areas of high visual significance and capturing regenerative energy resulting in operation savings.

4.5 Conclusion

The LPA is not expected to have any significant negative environmental consequences; it addresses the goals and objectives of the Project as identified in the Purpose and Need statement. In addition, the LPA will have no disproportionate and adverse impacts on environmental justice populations. The first segment of the LPA proposed for implementation is the Charlotte Streetcar Starter Project (TIP TE-5103). This 1.5-mile segment of the LPA in Center City Charlotte is also not expected to have any significant negative environmental consequences or disproportionate and adverse impacts on environmental justice populations.

5. PUBLIC AND AGENCY INVOLVEMENT

5.1 General Approach

The Charlotte Streetcar Project has employed a number of public involvement activities that vary by Project phase. This chapter provides a summary of the public involvement for both the Planning and Preliminary Engineering phases of the Project. A comprehensive collection of all public involvement materials from both phases of the Project are provided in the *Public Involvement Technical Memorandum* (2011). Due to Project administration changes within the City, changes in the overall approach and terminology vary as the Project transitioned from Planning into the Preliminary Engineering phase. This Project was known as the Center City Streetcar during the Planning Phase.

For both phases of the Project, the public involvement was tailored to the three subareas that comprise the Charlotte Streetcar Project corridor as shown in Chapter 1. Full inclusion was achieved by focusing meetings on a small geographic scale (subarea meetings) and a larger geographic scale (corridor-wide meetings); by focusing on small groups (advisory board meetings, small group meetings) and large groups (public meetings, community workshop); and by holding meetings at various times of day and at different locations.

A. Planning Phase

The structure of the public involvement process during this phase included Meeting Forums, which varied from advisory board meetings and public meetings at the subarea level, to community-wide public meetings and interviews. Additionally, Notification Forums were made available that included postcards, letters, a dedicated website, newspaper advertisements, bulletin boards, brochures, newsletters, and direct telephone contact. Comments were accepted through each of the meeting forums, through the CATS website, and through written comments, e-mails, or telephone calls to the Charlotte Streetcar Project Team.

B. Preliminary Engineering Phase

The City of Charlotte hosted three rounds of public meetings in each of the three subareas, and a separate Streetcar Stop and Shelter Design workshop during the 30-Percent Design Phase. Public meeting notification occurred across a broad spectrum of media outlets, as detailed in the *Public Involvement Technical Memorandum* (2011).

During the Preliminary Engineering Phase the public involvement process was structured around the primary goals outlined in the *Charlotte Streetcar Project Preliminary Engineering Phase Public Information Plan*, included in the *Public Involvement Technical Memorandum* (2011).

5.2 Public Involvement Timeline

A timeline of each public involvement opportunity, the complete meeting summaries, and newsletters for both the Planning and Preliminary Engineering phases are included in the *Public Involvement Technical Memorandum* (2011).

5.3 Protected Populations

A. Environmental Justice

The City of Charlotte stresses the importance of including all groups of people affected by a given project. Due to the size, complexity, and potentially significant positive impacts of the Charlotte Streetcar Project, the City has made every attempt to include protected populations, inviting them and all the affected citizens to fully participate in the Project's public involvement process.

The Charlotte Streetcar Project Team used 2000 U.S. Census data at the block group level to identify Environmental Justice populations for block groups located within the Project study area. The Charlotte Streetcar Project Team utilized GIS to identify those populations meeting the criteria for low-income and minority populations, consistent with Executive Order 12898 and as defined by the U.S. Department of Transportation Order on Environmental Justice (62FR18377). For more information on how Environmental Justice populations were identified and their location within the Project corridor, see Section 3.5.

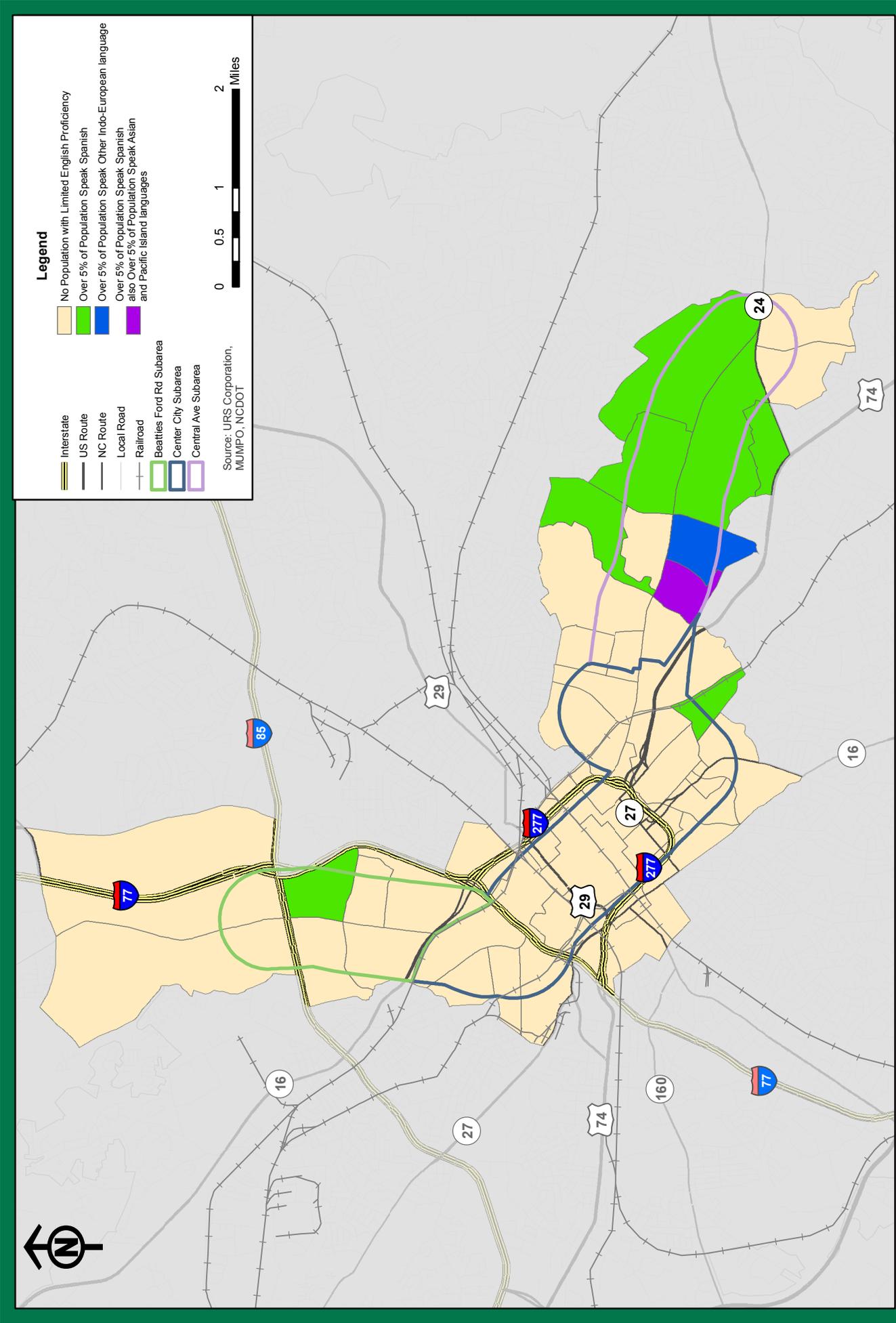
Outreach to low-income and minority populations within the Project's study area were integrated within the overall public involvement program. Throughout the Project development process, public involvement efforts targeted populations of diverse races, income status, and physical ability. For example, the Streetcar Neighborhood Forums (SNF) represented three distinct geographical subareas, each with varying incomes, diverse races, and special populations. Other outreach efforts included presentations to the Streetcar Advisory Committee; presentations to SNFs; distribution of Project notifications and summary documents in English and Spanish to the Project's postal mail and e-mail distribution lists; media advisories; public meetings held in accessible buildings within the Project study area; solicitation of public comment throughout the entire Project Planning and Preliminary Engineering phases; and acceptance of public comment via mail-back comment cards, the website, e-mail, and phone messaging; and the presence of a Spanish interpreter at the public meetings during the Planning Phase. (This service was discontinued for the last Planning Phase public meeting and throughout the Preliminary Engineering Phase due to a lack of demand.) This thoroughly inclusive approach has helped the City adhere to the letter and spirit of Executive Order 12898, prohibiting the disproportionate adverse impacts to low-income and minority populations, and directing federal grant recipients to communicate with these populations about potential Project impacts.

B. Limited English Proficiency (LEP)

As noted above, the City and Project Team attempted to coordinate and communicate with people throughout the affected corridor. This effort was noticeably evident in coordination with Limited English Proficiency populations.

The U.S. Department of Justice defines LEP individuals as those “who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English” (67 FR 41459). Using the 2000 U.S. Census data, the Charlotte Streetcar Project Team identified populations that speak English less than very well by Census block groups within the study area. Based on the U.S. Department of Justice’s Safe Harbor threshold of 5 percent or 1,000 persons that speak a language that is not English, qualifying populations were found within nine separate Census block groups, as illustrated in Figure 10. The primary languages spoken by the identified populations include Spanish, Asian and Pacific Island languages, and other Indo-European languages.

The integrated outreach to LEP populations in the Project study area is clearly apparent in the Project’s overall public involvement program, as summarized in Section 5.1. In addition to English, all notifications were printed in Spanish. The Charlotte Streetcar Project Team conducted additional outreach through the Asian Chamber of Commerce and local Latino newspapers, and provided interpreters at the public meetings. Through these efforts, Project coordination met or exceeded the stipulations of Executive Order 13166, which requires all recipients of federal funds to provide meaningful access to persons with LEP.



Legend

- No Population with Limited English Proficiency
- Over 5% of Population Speak Spanish
- Over 5% of Population Speak Other Indo-European language
- Over 5% of Population Speak Spanish also Over 5% of Population Speak Asian and Pacific Island languages
- Interstate
- US Route
- NC Route
- Local Road
- Railroad
- Beatties Ford Rd Subarea
- Center City Subarea
- Central Ave Subarea

Source: URS Corporation, MUMPO, NCDOT



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APPENDIX A: METHODOLOGY REPORT

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The purpose of this Appendix is to detail the technical methodologies utilized in various sections of the Environmental Assessment document. The following methodologies are included in this Appendix:

Identification of Study Area	1
Current and Forecast Population, Employment and Land Use	2
Travel Demand Patterns	3
Bicycle and Pedestrian Level of Service.....	4
Identification of Protected Populations	6
Air Quality	8
Noise and Vibration.....	10
Hazardous Materials	13
Parks & Recreation	15
Visual and Aesthetic Resources.....	16
Cultural Resources	17
Biological Resources and Endangered Species	18
Water Quality and Hydrology	20
Secondary and Cumulative Effects	22
Capital Cost Estimates.....	23
Operating Cost Estimates	25

IDENTIFICATION OF STUDY AREA

Methodology

A base study area was developed to frame all specific demographic, socioeconomic, land use, and environmental data for identification of potential effects of the Charlotte Streetcar Project (the Project). The methods used to identify the study area included consideration of the Project's purpose and needs, the service area of the proposed transportation improvement, and appropriate units for the collection and analysis of data.

For data collection purposes, the study area was delineated using the traffic analysis zones (TAZ) that compose an approximate half-mile buffer of the project corridor. Throughout the Environmental Assessment (EA), detailed information pertaining to the characteristics of the human and natural environment in the study area is provided. This information creates a baseline from which potential project impacts are identified.

The study area was divided into three subareas for more detailed study. For data collection purposes, the subareas are based on geographic boundaries rather than phases of the project. The subareas are the Beatties Ford Road subarea, the Uptown subarea, and the Central Avenue subarea.

EA Document References

Section 1.2 of the Environmental Assessment (EA) provides details of the study area.

CURRENT AND FORECAST POPULATION AND LAND USE

Methodology

This section summarizes the methodology used for the collection and assessment of socioeconomic data, including population, housing, and economic conditions such as employment, economic output, and government finance in the Project study area. The *Socioeconomic Technical Memorandum (2011)* is appended by reference.

Population and housing data in the region and study area were reviewed. Further details were based on the TAZ level. The City provided current and projected demographic data at the TAZ level. Current and forecast population and employment forecast were based on the TAZ shapefile provided by Mecklenburg Union Metropolitan Planning Organization (MUMPO). The Geographic Information System (GIS) includes the current and forecast data for both population and employment counts.

The existing land uses in the project corridor were evaluated, expectations for future use were presented, and potential impacts associated with the project assessed. Descriptions of existing land use were derived from field visits, as well as plans and documents provided by the City. Development activities were assessed using the *Charlotte Streetcar Trade Street Background Review*, a corridor study completed in 2005.

EA Document References

Section 1.2 of the EA provides details related to the socioeconomic characteristics of the study area. Section 3.3 of the EA provides details related to land use.

TRAVEL DEMAND PATTERNS

Methodology

The Charlotte Streetcar Project travel demand area is divided into five districts: Rosa Parks, Johnson C. Smith, Uptown, Plaza/Hawthorne, and Eastland. The Rosa Parks district is comprised of 15 TAZs. It lies on the westerly limits of the Project alignment along Beatties Ford Road. The Johnson C. Smith district also runs along the Beatties Ford Road, in the vicinity of Johnson C. Smith University. It consists of eight TAZs. The Uptown district consists of 45 TAZs because it is in a dense employment and population area. This district runs along Trade Street to Elizabeth Avenue. The Plaza/Hawthorne district moves the length of Hawthorne Lane through the Plaza area to a small segment of Central Avenue. This district consists of 13 TAZs. The Eastland district also runs along Central Avenue until reaching the vicinity of Eastland mall. It is composed of 13 TAZs.

Origins and destinations person trips were examined for the base year of 2003 and horizon year of 2030 using the Metrolina travel demand model outputs.¹ Person trip data from the model were aggregated into travel subdistricts. The Project study area was divided into six districts, while the rest of the region was broken down into 19 districts that correspond to the five regional transit corridors and other contiguous geographic areas. These person trip tables are aggregated from three trip purposes data sets:

- HBW Home-based work trips
- HBO Home based other trips
- NHB Non-home-based trips

¹ The Metrolina model has 2,999 TAZs, including the external stations. The model's matrices have nearly 9 million records each; hence, a more manageable geography and matrices were devised for the streetcar analyses.

BICYCLE AND PEDESTRIAN LEVEL OF SERVICE

Methodology

Design features that affect pedestrians and bicyclists crossing signalized intersections were analyzed using the Pedestrian and Bicycle Level of Service (LOS) Methodology for Crossings at Signalized Intersections developed by the Charlotte Department of Transportation (CDOT).

Pedestrian LOS Methodology

The pedestrian LOS methodology identifies key design components of the signalized intersections that affect the safety and comfort of crossing pedestrians. Key design components are ranked relative to one another using a point system and then summed to determine an overall pedestrian LOS rating for the intersection.

The two most important factors in determining the pedestrian LOS at signalized intersections are the roadway crossing distance and signal phasing and timing. Of the 100 points available in the pedestrian LOS analysis, approximately 50 percent is allocated to the crossing distance, which is measured by the number of lanes crossed. Signal phasing and timing accounts for over 25 percent of all points available in the pedestrian LOS analysis. This variable category identifies whether signal phasing and timing minimizes or exacerbates conflicts between pedestrians and turning vehicles.

While traffic volumes and speeds are not explicitly considered in this methodology, turning radius is used to evaluate the speed at which vehicles make turns that could conflict with pedestrian movements. In addition, the type of pedestrian crosswalk is considered for the analysis. Finally, an adjustment is made for traffic flow direction. The pedestrian LOS rating is penalized at intersections where one-way streets intersect with two-way streets and pedestrians are exposed to left and right-turning vehicles along the entire distance of the crosswalk.

Bicycle LOS Methodology

The bicycle LOS methodology identifies key design components of the signalized intersections that affect the safety and comfort of bicyclists. As with the pedestrian LOS analysis, key design components are ranked relative to one another using a point system and then summed to determine an overall bicycle LOS for the intersection.

The three most important factors in determining bicycle LOS at signalized intersections are signal phasing and timing, bikeway space, and the speed of adjacent traffic, which in total account for approximately 85 percent of available points. Of the 100 available points, approximately 35 percent is allocated to the signal phasing and timing, which can minimize conflicts between bicycles and turning vehicles at intersections. The availability of bikeway space accounts for approximately 30 percent of the points in the bicycle LOS analysis. This variable rewards intersections with separate space allocated for bicycles, such as marked bike lanes or widened outside travel lanes. Approximately 20 percent of the available points are related to the speed of adjacent traffic, which impacts the safety and comfort of bicyclists and is measured by the posted speed limit of the roadway.

Another factor in the LOS analysis is the evaluation of the potential for conflicts with right-turning traffic. Right-turns-on-red are particularly important because bicyclists can be overlooked when motorists make this turning movement. Finally, the roadway crossing distance is also taken into

consideration, although it is of lesser importance than other factors in the determination of the bicycle LOS analysis.

EA Document References

Section 3.1 of the EA provides bicycle and pedestrian LOS evaluations.

IDENTIFICATION OF PROTECTED POPULATIONS

Methodology

For this assessment, a Transit-Reliant Index was developed to identify the concentrations of persons who rely on transit for transportation within the study area relative to the county as a whole. Project studies indicate that the majority of the study area is populated by a significantly higher concentration of transit-dependent persons than the county as a whole. Most transit-dependent communities are located within the Beatties Ford Road and Center City subareas.

The data used for the transit-reliant population came from the U.S. Census Bureau. The census data was downloaded from the 2000 Census, Summary File 3 (SF 3)-Sample Data. Table P87. Poverty Status in 1999 by Age and table H44. Tenure by Vehicles Available were downloaded.

The H44. Tenure by Vehicles Available table had the total number of vehicles for rented or owned properties. The households that had “0 Cars” for both rented and owned were totaled. An average for each of the four transit-dependent variables was calculated per block group. The Mecklenburg County average had to be established. The county average for the four variables is shown in Table 1. Once the average for each variable was determined, the score for the variable could be established. Each variable was given a score based on Table 1.

Table 1. County Transit-Reliant Averages

	Score
≤ County average	1
> County average and ≤ 1.33 times the county average	2
> 1.33 times and ≤ 1.66 times the county average	3
> 1.66 times and ≤ 2.0 times the county average	4
> 2.0 times the county average	5

After the score was calculated for each variable, a total score was calculated using the following formula:

$$\text{Total Score} = (\text{Score of children below 18}) * (\text{Score of adults over 64}) * (\text{Score of residents below the poverty level}) * (\text{Score of zero car households})$$

Limited-English

For this assessment, the data used for the environmental justice analysis came from the U.S. Census Bureau. The census data was downloaded from the 2000 Census, Summary File 3 (SF 3)-Sample Data. The table PCT10. Age by Language Spoken at Home for the Population 5+ Years was downloaded

For each language the total was determined for the population in each block group that “Speak English not at all” and “Speak English not well.” The analysis of the population with limited

English proficiency calculated the percent of the population in each block group that did not speak English at all or did not speak well by languages spoken.

Environmental Justice

The data used for the environmental justice analysis came from the U.S. Census Bureau. The census data was downloaded from the 2000 Census, Summary File 3 (SF 3)-Sample Data. Tables for both P6. Race and P87. Poverty Status in 1999 by Age were downloaded.

For poverty status, the Mecklenburg County average for persons below the poverty line was determined. The county average was used as a baseline for determining which block groups in the study area had higher concentrations of residents below the poverty line.

The Mecklenburg County average was determined for minority populations. The county average was used when analyzing which block groups in the study area had higher concentrations of minority residents above or below the county average. Minority residents included in the total minority count for each block group were Black or African American alone, American Indian and Alaska Native alone, Asian alone, Native Hawaiian and Other Pacific Islander alone, Some other race alone, and Two or more races.

EA Document Reference

Sections 3.5 and 5.3 of the EA provide details related to the identification of protected populations.

AIR QUALITY

The methodology used for the collection and assessment of air quality issues in the study area is summarized below. The *Air Quality Technical Memorandum* (2011) is appended by reference.

A project-level air quality analysis for the Charlotte Streetcar Project was conducted in accordance with U.S. Environmental Protection Agency (EPA) and FHWA guidelines, and the *Guidelines for Evaluating the Air Quality Impacts of Transportation Facilities*, NCDENR, 2007. The purpose of this project-level air quality analysis was to evaluate the potential effects of the proposed alternatives on the air quality, including the analysis of carbon monoxide (CO), ozone precursors (NO_x) and Mobile Source Air Toxics (MSAT). A qualitative PM_{2.5} “hot spot” analysis is not required because the Charlotte Streetcar Project is not a project of air quality concern in accordance with 40 CFR 93.123.

Methodology

Conformity

The Charlotte Streetcar Project is included in the current Transportation Improvement Program (TIP). The Mecklenburg-Union Metropolitan Planning Organization (MUMPO) has determined that the 2035 LRTP and the 2009-2015 TIP conform to the intent of the State Implementation Plan. The Metrolina *Conformity Analysis and Determination Report*, dated February 8, 2010, documents the region’s compliance with the provisions of the CAA in concurrence with all conformity requirements as detailed in 40 CFR Parts 51 and 93 (the Transportation Conformity Rule) and 23 CFR 450 (the Metropolitan Planning Regulations as established in the Transportation Equity Act for the 21st Century [TEA-21]). On May 3, 2010, based on the conformity determinations and comments by the EPA, the Federal Highway Administration, and the Federal Transit Administration (FTA) issued its finding that the MUMPO 2035 LRTP and FY 2009–2015 TIP conform to the purposes of the State Implementation Plan.

Method for Local Air Quality

Each year, air quality data is collected from monitoring sites located in Mecklenburg County. Measurements taken at these monitoring stations provide the data necessary to make comparisons to the NAAQS. The Mecklenburg County Air Quality website indicates there are seven sites in Mecklenburg County that monitor air quality for one or more pollutants. The site closest to the project area is Garinger High School, which is located approximately one mile north of the study area. The most recent monitored pollutant concentrations (from 2006) are summarized in the *Air Quality Technical Memorandum*.

Specific steps in the air quality analysis include the following:

- Identify the impact of the project alternatives on the Year 2030 regional VMT.
- Estimate Year 2030 average pollutant emission rates for CO and NO_x.
- Determine the relative regional pollutant emissions for each alternative by applying the emission rates to the corresponding changes in regional VMT.
- Compare the relative pollutant emissions to identify potential regional air quality impacts.

Method for Mobile Air Source Toxics

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, nonroad mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

The FHWA *Interim Guidance on Air Toxic Analysis in NEPA Documents* (Guidance, February 3, 2006) requires analysis of MSATs under specific conditions. The EPA has designated six prioritized MSATs that are known or probable carcinogens or can cause chronic respiratory effects for analysis: benzene, acrolein, formaldehyde, 1,3-butadiene, acetaldehyde; and diesel exhaust (diesel exhaust gases and diesel particulate matter). As determined in the traffic analysis and the assessment of regional VMT, the Build Alternative will result in a reduction in regional traffic and regional VMT compared to the No-Build Alternative. Further, truck percentages are not anticipated to increase or decrease under the Build Alternative, relative to the No Build Alternative. Therefore, the Charlotte Streetcar Project is considered to have minimal effects on MSATs.

EA Document References

Section 3.12 of the EA provides details on and results of the air quality analysis. See the *Air Quality Technical Memorandum* (2011) for additional details on the analysis performed.

NOISE AND VIBRATION

Methodology

The methodology used for the assessment of noise and vibrational impacts in the project study area is summarized below from FTA's *Transit Noise and Vibration Impact Assessment* (2006). The City's *Noise and Vibrational Impact Assessment Technical Memorandum* (2011) is appended by reference.

Noise Screening Procedure

A noise screening procedure was conducted to identify noise sensitive areas within 200 feet of the centerline of the proposed streetcar tracks or from the center of each proposed stop, and within 1,000 feet of the proposed Vehicle Maintenance Facility (VMF) location. If intervening buildings existed between the source and the receiver, a screening distance of 100 feet was used for the streetcar tracks and stop locations. Maps, GIS databases, aerial photographs, and field studies were used to identify noise-sensitive land uses within the appropriate screening distances. Sensitive receivers include residences, schools, churches, day care facilities, playgrounds, parks, and existing and planned greenways.

Ambient Noise Conditions

Noise monitoring was conducted using a Metrosonics dB-3080 Statistical Sound Level Analyzer. Ambient noise levels were measured at nine representative locations near sensitive receptor areas in January 2006. To identify the best measurement locations, the corridor was reviewed relative to the location of each of the sensitive receiver areas identified. The sensitive receiver areas were then analyzed to determine where monitoring locations would represent similar noise characteristics amongst noise sensitive receiver areas.

Monitoring was conducted for a 15-minute period at each site during the midday (10:00 a.m. to 2:00 p.m.), evening peak hours (3:30 p.m. to 6:30 p.m.), and night (9:00 p.m. to 1:00 a.m.) periods during the week. This was extrapolated to one hour for the L_{eq} and to 24 hours for the L_{dn} equivalents. NOTE: CDOT's normal peak hours are between 4:00 p.m. and 6:00 p.m.

Ground-Borne Noise and Vibration Criteria

In its guidance manual, the FTA developed criteria for assessing vibration impacts related to rail transit projects. The criteria are based on community reaction to transit-related vibration and the potential for adverse effects on vibration-sensitive activities and processes. The criteria identify intensities of ground-borne vibration and noise that may be considered significant and, thus, require consideration of mitigation and abatement measures.

Table 2 contains the FTA criteria used for this project. Where vibration is intermittent (e.g., a transit train pass-by) human annoyance from ground vibration and noise is dependent on the number of vibration events that occur during a typical 24-hour period. The FTA manual presents two categories of criteria for infrequent and frequent events, respectively. "Frequent events" is defined as more than 70 vibration events per day. The FTA impact criteria for Frequent events is 65 VdB, 72 VdB, and 75 VdB for land use categories 1, 2, and 3, respectively. Land use categories are described in the following paragraph.

Table 2: Criteria for Impact for Human Annoyance and Interference to Use of Vibration-Sensitive Equipment

Land Use Category	Category Comment	Ground-borne Vibration (VdB re 1 micro in/sec)		Ground-borne Noise (dBA re 20 micro Pa)	
		Events*			
		Frequent	Infrequent	Frequent	Infrequent
1	Low interior ambient is essential	65	65	n/a	n/a
2	Residential & sleep	72	80	35	43
3	Institutional & daytime	75	83	40	48
4	Concert hall, TV/Recording Studio **	65	65	25	25
5	Auditorium **	72	80	30	38
6	Theatre **	72	80	35	43

Source: FTA Transit Noise and Vibration Impact Assessment, 2006

Notes: * Frequent is defined as greater than or equal to 70 events per day

** See section 12.2.2 of FTA Manual regarding potential for structural damage to fragile structures if operational during transit events

As shown in Table 2, some land use activities are more sensitive to vibration than others. For example, certain research and fabrication facilities, TV and recording studios, and concert halls are more vibration-sensitive than residences and buildings where people normally sleep, which are more sensitive than institutional land uses with primarily daytime use. At those locations where vibration-sensitive equipment is used, such as hospital, medical facilities, and high tech manufacturing and testing sites, there may be the potential for additional or more severe ground vibration impacts from transit operations. The FTA assigns sensitive land uses to the following three categories:

- Vibration Category 1–High Sensitivity: Buildings where low ambient vibration is essential for the interior operations in the building; vibration levels may be below the level of human perception.
- Vibration Category 2–Residential: Residences and buildings where people normally sleep; this includes private dwellings, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance. It also includes some special uses such as auditoriums or theaters.
- Vibration Category 3–Institutional: Land uses with primarily daytime use including schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment.

EA Document References

Section 3.11 of the EA provides details on and results of the noise and vibration analysis.

HAZARDOUS MATERIALS

Methodology

The methodology used for the collection and assessment of contaminated and hazardous materials in the project study area is summarized below. The *Hazardous Materials Technical Memorandum* (2011) is appended by reference.

The method used for this investigation and risk assessment generally follows American Society for Testing and Materials (ASTM) E 1527 Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process. Project analysts reviewed information gathered from a listing of Federal ASTM Standard Records, Federal ASTM Supplemental Records, State of North Carolina ASTM Standard Records, and State of North Carolina ASTM Supplemental Records through Environmental Database Resources, Inc. (EDR) to evaluate whether activities on or near the project corridor have the potential to create a Recognized Environmental Condition on the subject property. The complete list of databases reviewed by project analysts is provided in the *Hazardous Materials Technical Memorandum* (2011). The databases searched are listed below.

Federal ASTM Standard Records

- The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database.
- The Corrective Action Report (CORRACTS) identifies hazardous waste handlers with Resource Conservation and Recovery Act (RCRA) corrective action activity.
- The Resource Conservation and Recovery Information System (RCRIS) lists RCRA-regulated hazardous waste generators. This list also includes RCRA Treatment, Storage, and Disposal Facility (TSDF) sites. TSDF sites move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. These sites treat, store, or dispose of the waste.
- The Emergency Response Notification System (ERNS) List contains reported spill records of oil and hazardous substances.

State of North Carolina ASTM Standard Records

- The Leaking Underground Storage Tank (LUST) List contains information pertaining to confirmed and suspected releases from underground storage tanks.
- The Underground Storage Tank (UST) List contains state underground storage tank (UST) sites which list USTs regulated under Subtitle I of RCRA.
- The Inactive Hazardous Sites Inventory (SHWS) List is the state-equivalent priority list of uncontrolled or abandoned hazardous waste sites.

ASTM Supplemental Records

In addition to the ASTM Standard Records identified above, the following ASTM Supplemental Records were also included in the Hazardous Materials Assessment.

- The Department of Transportation, Office of Pipeline Safety (DOT OPS) List consists of incident and accident data.
- The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)/Toxic Substances Control Act (TSCA) Tracking System (FTTS) List identifies administrative cases and

pesticide enforcement actions and compliance activities related to FIFRA, TSCA, and Emergency Planning and Community Right-to-Know Act (EPCRA).

- The Historical FTTS (HIST FTTS) List consists of sites that may not be listed in the newer FTTS database.
- The Facility Index System/Facility Registry System (FINDS) List contains both facility information and pointers to other sources that contain more detail.
- The North Carolina Hazardous Substance Disposal Site (NC HSDS) List contains locations of uncontrolled and unregulated hazardous waste sites.
- The Incident Management Database (IMD) List contains information on known groundwater and/or soil contamination incidents.
- The LUST TRUST database contains information about claims against the State Trust Funds for reimbursements for expenses incurred while remediating LUSTs.
- The Aboveground Storage Tank (AST) List identifies facilities with aboveground storage tanks that have a capacity greater than 21,000 gallons.
- The Voluntary Cleanup Program (VCP) database lists sites in the North Carolina Responsible Party Voluntary Cleanup Program.
- The Drycleaners List identifies potential and known dry-cleaning sites, active and abandoned, that the Dry-cleaning Solvent Cleanup Program has knowledge of and entered into the database.
- The Brownfield List provides information on whether a brownfield site is an abandoned, idled, or underused property where the threat of environmental contamination has hindered its redevelopment. All of the sites listed in the inventory are working toward a brownfield agreement for cleanup and liability control.
- The National Pollutant Discharge Elimination System (NPDES) List contains general information regarding permits within its system.
- Manufactured Gas Plants EDR Proprietary Records

EA Document References

Section 3.13 of the EA provides details on and results of the hazardous materials analysis.

PARKS & RECREATION

Methodology

Parks were identified using the Mecklenburg County Geographic Information System (GIS) data. A half-mile buffer of the Project alignment was used to identify the parklands that may be impacted by the project. Documentation of coordination with Mecklenburg County Park and Recreation can be found in Appendix H.

EA Document References

Section 3.10 of the EA provides details on and results of the local parks and recreation sites search.

VISUAL AND AESTHETIC RESOURCES

Methodology

The methodology used for the assessment of visual and aesthetic impacts in the project study area is summarized below. The *Visuals and Aesthetics Technical Memorandum* (2011) is appended by reference.

The visual and aesthetic analysis follows the method outlined by the U.S. Department of Transportation and Federal Highway Administration Office of Environmental Policy in the report, *Visual Impact Assessment of Highway Projects* (1981). The five steps in the assessment process are (1) identification of components of the project, (2) description of the visual environment of the project, (3) identification of significant visual resources, (4) determination of the responses and values of viewers, and (5) summary of major visual effects and how to manage those impacts.

A study was completed to establish a baseline by conducting a field survey documenting the aesthetics and visual qualities near and along the Project alignment. Among the documented resources were several historic sites. Other visually sensitive resources include the area near Johnson C. Smith University; the area surrounding Gateway Village between Cedar Street and Graham Street; public art in planted medians between Graham Street and Church Street; coordinated signals, lighting, and other street furniture between Church Street and Tryon Street; and public art between Tryon Street and College Street. The greenspace of Independence Park along Hawthorne Lane in the Center City subarea is another visually sensitive resource.

EA Document References

Section 3.7 contains details on and results of the visual and aesthetic resources.

CULTURAL RESOURCES

Methodology

This section summarizes the methodology used for the assessment of architectural and archaeological resources in the project study area. The *Intensive-Level Historic Architecture Survey* (2011) and the *Intensive-Level Architectural Survey Report* (2006) (Survey Report) are appended by reference. Documentation of coordination with the North Carolina State Historic Preservation Office can be found in Appendix H.

The preparation of the reports required several field visits to the project study area, primary source research, and the use of secondary source materials primarily consisting of previous inventories and reports.

Charlotte conducted a reconnaissance-level survey in early March 2005. The Area of Potential Effect (APE) for the project was established as the buildings immediately fronting on the proposed streetcar line. Intensive-level fieldwork for the project, already commenced in mid-March 2006, was supplemented after the meeting by field visits in mid-May and early June.

The final report included National Register assessments of the resources reported on at the intensive level. The resources already listed in the Register or that had Determinations of Eligibility (DOE) were reported on in summary fashion. The assessments of the resources listed as Charlotte-Mecklenburg Historic Landmarks (CMHLs) were also detailed and largely relied on the detailed reports previously prepared for these resources, which are on file at the offices of the Charlotte-Mecklenburg Historic Landmarks Commission in Charlotte. Those resources not designated as National Register-listed or eligible or as CMHLs required more in-depth field assessment and research. All individual assessments contained the information necessary to determine whether they merit continued National Register listing or eligibility or should be determined eligible for such listing. The information included source histories and descriptions, a photograph or photographs, and, where not already established, proposed National Register boundaries. The buildings at the northeast corner of the Elizabeth Historic District were reassessed in the report.

Primary and secondary source research for the report was conducted at the following repositories: the Charlotte-Mecklenburg Public Library, the Charlotte-Mecklenburg Historic Landmarks Commission, the Mecklenburg County Courthouse in Charlotte (and online), the North Carolina Collection at the University of North Carolina in Chapel Hill, the North Carolina HPO, the North Carolina Archives and State Library, the design library at North Carolina State University in Raleigh, and the fire insurance maps of the Sanborn Map Company online. Useful secondary sources included three reports prepared for other CATS rail projects by Frances Alexander and Richard Mattson in 2005, and the many reports, histories, and resource assessments previously prepared by and for, or otherwise reproduced on, the website of the Charlotte-Mecklenburg Historic Landmarks Commission.

EA Document References

Sections 3.8 and 3.9 of the EA provide details and results of the cultural resource investigations (architecture and archaeological).

BIOLOGICAL RESOURCES AND ENDANGERED SPECIES

Methodology

The methodology used for the collection and assessment of the natural resource environment is summarized below. The *Natural Resources Technical Report* (2002, updated 2011) is appended by reference.

A review of existing literature and mapping was conducted prior to field surveys to identify soils, potential riparian and wetland areas, and threatened and endangered species within the project vicinity. Media consulted included the U.S. Geological Survey 7.5 minute Charlotte East and Derita topographic quadrangles, U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil survey mapping of Mecklenburg County, U.S. Fish and Wildlife Service National Wetland Inventory (NWI) mapping of Charlotte East and Derita quadrangles, and the US Fish and Wildlife Service and North Carolina Natural Heritage Program Endangered, Threatened, Proposed and Candidate Species for the project region.

For the purpose of the natural resource investigations, the project study area is defined as a 200-foot corridor. The corridor consists of the existing roadway and 100 feet on either side of the roadway centerline. URS Corporation (URS) conducted field investigations on October 19, 2004, and August 27, 2010, to identify the natural elements in the study area. Visual observations were made as necessary to ensure adequate coverage and characterization of the project area. Pedestrian surveys were performed to evaluate natural resource conditions and to document natural communities, wildlife, and the presence of protected species or their habitats.

The study area for the Charlotte Streetcar Project was investigated through review of aerial photography taken at a scale of 1 inch = 100 feet and flown specifically for the proposed project. Aerial photographs provided by Mecklenburg County were also reviewed.

The following references were used during background investigations:

- U.S. Geological Survey (USGS). 1991. Charlotte East Quadrangle, North Carolina (map scale 1:24,000) 7.5 Minute Series. Washington DC.
- U.S. Geological Survey (USGS). 1993. Derita Quadrangle, North Carolina (map scale 1:24,000) 7.5 Minute Series. Washington DC.
- McCachren, Clifford M. 1980. Soil Survey of Mecklenburg County, North Carolina. U.S. Department of Agriculture. Soil Conservation Service. Washington, D.C.
- U.S. Fish and Wildlife Service (USFWS). 1991. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, St. Petersburg, FL. <http://www.nwi.fws.gov>.
- U.S. Fish and Wildlife Service (USFWS). 2003. Lists of Endangered, Threatened, Proposed and Candidate Species for the Southeast Region. Mecklenburg County, North Carolina. Available URL: http://southeast.fws.gov/es/county_percent20lists.htm. [Accessed March 4, 2005].
- North Carolina Natural Heritage Program (NCNHP). 2004. Natural Heritage Program List of Rare Plant Species of North Carolina. Office of Conservation and Community Affairs, NC Department of Environment and Natural Resources. Raleigh, NC. Available URL: <http://www.ncsparks.net/nhp/county.html> [Accessed March 4, 2005].

EA Document References

Section 3.14 of the EA provides details on and results of the biological resources and endangered species investigations.

WATER QUALITY AND HYDROLOGY

Methodology

The methodology used for the collection and assessment of the natural resource environment is summarized below. The *Water Resources Technical Memorandum* (2011) is appended by reference.

For the purpose of this investigation, the project study area is defined as a 200-foot corridor. The corridor consists of the existing roadway and 100 feet on either side of the roadway centerline.

Groundwater, surface water, floodplains and floodways, and streams were assessed within the project study area using available information, where practicable. Data were obtained from the North Carolina Division of Water Quality (NCDWQ) web page <<http://h2o.enr.state.nc.us/>> and the Mecklenburg County web page <<http://www.co.mecklenburg.nc.us>>. A site visit was also conducted to verify surface water locations and assess stream conditions using NCDWQ's Stream Classification Forms.

The following references were used during background investigations:

- North Carolina Department of Transportation. 2006–2012 State Transportation Improvement Program. Available: <http://www.ncdot.org/planning/development/TIP/TIP/>. Accessed: 2 May 2006.
- Daniel, Charles C. III, and Paul R. Dahlen. "Preliminary Hydrogeologic Assessment and Study Plan for a Regional Ground-Water Resource Investigation of the Blue Ridge and Piedmont Provinces of North Carolina." U.S. Geological Survey Water-Resources Investigations Report 02-4105. Prepared in cooperation with the Groundwater Section of the North Carolina Department of Environmental and Natural Resources, Division of Water Quality, Raleigh, North Carolina. 2002. Available: <http://nc.water.usgs.gov/reports/wri024105/pdf/report.pdf>.
- "Groundwater Classifications and Standards." North Carolina Administrative Code, Subchapter 2L. Available: <http://gw.ehn.state.nc.us/Acrobat percent20Docs/webpt15a-02l.01.pdf>.
- Mecklenburg County, North Carolina. "Groundwater and Wastewater Services." Available: <http://www.charmeck.org/Departments/LUESA/Water+and+Land+Resources/Programs/Groundwater/Home.htm>.
- North Carolina Division of Water Quality, Stormwater Unit. "NPDES Phase I Stormwater Program." Available: http://h2o.enr.state.nc.us/su/NPDES_Phase_I_Stormwater_Program.htm.
- North Carolina Department of Transportation, Stormwater Program. "Frequently Asked Questions." Accessed: 21 June 2005. Available: <http://www.ncdot.org/environment/stormwater/faq/>.
- North Carolina Division of Water Quality, Stormwater Unit. "NPDES Phase II Stormwater Program." Available: http://h2o.enr.state.nc.us/su/NPDES_Phase_II_Stormwater_Program.htm.

- U.S. Fish and Wildlife Service (USFWS). 1991. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, St. Petersburg, FL. <http://www.nwi.fws.gov>.
- Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.
- Federal Emergency Management Agency. "The National Flood Insurance Act of 1968, as amended and the Flood Disaster Protection Act of 1973, as amended." Available: <http://www.fema.gov/pdf/nfip/floodact.pdf>.
- Charlotte, North Carolina. "Floodplain Regulations of Charlotte, North Carolina." 12 May 2003. Available: <http://www.charmeck.org/Departments/LUESA/Water+and+Land+Resources/Programs/Floodplains/Regulations.htm>.

EA Document References

Section 3.15 of the EA provides details on and results of the water quality and hydrology assessment.

SECONDARY AND CUMULATIVE EFFECTS

Methodology

The methodology used for assessing secondary and cumulative effects is summarized below.

This Secondary Effects and Cumulative Effects (SCE) assessment evaluates the pattern of land use change, population density, development rate, and environmental effects associated with the proposed project. The general qualitative approach taken to evaluate SCEs associated with the proposed project follows the process adopted by North Carolina Department of Transportation in 2001.

For data collection purposes, the study area was delineated using the traffic analysis zones (TAZ) that compose an approximate half-mile buffer from the centerline of the project corridor. The SCE study boundary was further divided into three subareas for more detailed study. The subareas are the Beatties Ford Road subarea, the Uptown subarea, and the Central Avenue subarea.

Information from existing studies was reviewed and data was compiled regarding current and predicted land use and transportation patterns.

EA Document References

Section 3.18 of the EA provides details on and results of the secondary and cumulative environmental consequences.

CAPITAL COST ESTIMATES

Methodology

The methodology used for completing the opinion of probable cost is summarized below. The *Opinion of Probable Cost Methodology for Preliminary Engineering* (2011) is appended by reference.

The specific approach that was used to complete the opinion of probable cost during the preliminary engineering phase of the Charlotte Streetcar Project included the following:

- Brief review of previous estimates
- Cost estimating methodology and components of the estimate
- A brief discussion of the streetcar design approach and potential value engineering options.

This methodology was provided to the City for review and approval and circulated within the preliminary engineering team prior to development of the estimate. Provisions were made for City allowances, including administration, project management, construction management, real estate procurement costs and fees, community relations and involvement, insurance/legal, start up and testing, and training. Provisions outlined in this document are pending careful review of and approval by the City. Some of the factors equate to staffing levels needed to carry out the project, which should be reflective of the degree to which City staff will oversee and administer the Project.

All estimates have been coordinated with the City for review regarding consistency with historical costs, soft costs, contingency, overhead, and escalation. Local factors that can influence an estimate and impact costs, such as resources availability (labor, equipment, and materials), were taken into consideration.

The capital costs estimate (Opinion of Probable Cost) is comprised of specific items that can be quantified from the preliminary engineering plans or captured by an allowance based on a track-foot basis. These items were used to summarize the project component costs into a comprehensive total estimate. The major cost items include fixed facilities, system-wide elements, professional services, right-of-way, and contingencies.

The contractor's delivery method during construction may have an impact on overall project costs. Generally, the contractor's costs for risk, profit, overhead, etc., are built into the individual bid items, but if an alternative delivery method is chosen, depending on the contractor, additional mark-up may be required. For the Preliminary Engineering Opinion of Probable Cost, it will be assumed that the project will be constructed with a traditional design-bid-build delivery method and that no additional contractor mark-up will be included.

Cost categories consistent with the FTA Standard Cost Categories (SCC) were used to summarize the unit prices into a comprehensive total estimate for each segment or alternative. The major cost categories are listed below:

- SCC 10: Guideway and Track Elements
- SCC 20: Stations, Stops, Terminals, Intermodal
- SCC 30: Support Facilities: Yards, Shops, Admin Buildings

- SCC 40: Sitework and Special Conditions
- SCC 50: Systems
- SCC 60: ROW, Land, Existing Improvements
- SCC 70: Vehicles
- SCC 80: Professional Services
- SCC 90: Unallocated Contingency
- SCC 100: Finance Charges

The sum of these ten cost categories make up the total Preliminary Engineering Opinion of Probable Cost for the system.

EA Document References

Appendix G of the EA provides details on and results of the capital costs estimates.

OPERATING COST ESTIMATES

Methodology

The methodology used for estimating the operating costs is summarized below.

The streetcar O&M cost estimate methodology was developed for CATS primarily with a combination of streetcar and bus operations data, with the exception of propulsion power, operator wages and fringes, and insurance costs, which were based on light rail standards. The formulas shown in Table 5-1 outline how the different categories of expenses are estimated given the level of service provided by the streetcar system.

Table 5-1 – Cost Estimating Formulas

Cost Category	Formula
Vehicle Operations Labor	
Operator Wages and Fringes - Using LRT Model Rate	\$38.07 x Vehicle Hours
Other Wages and Fringes - Street supervision	\$25,673.51 x Peak Vehicles
Services - Contracts, custodial services etc.	\$33,993.33 x Peak Vehicles
General Administration	
Wages and Fringes – Management and Administration	\$20,727.38 x Peak Vehicles
Services - Contracted Services including security	\$22,435.64 x Peak Vehicles
System Utilities - Allocation to streetcar for VMF utilities	\$2,248.36 x Peak Vehicles
Propulsion Power*	
	\$0.87 x Vehicle Miles
Vehicle Maintenance	
Fuel, Lubricants, Materials, and Supplies	\$2.26 x Vehicle Miles
Labor Wages and Fringes	\$83,146.90 x Peak Vehicles
Non-Vehicle Maintenance Labor	
Maintenance of Way	\$38,558.64 x Directional Route Miles
Materials and Supplies	\$1.03 x Vehicle Miles
Casualty and Liability	
	\$4.76 x Vehicle Hours
Taxes & Misc. Expenses	
	\$1,206.66 x Peak Vehicles

* Propulsion Power – PB kWh/veh.mi. converted to Charlotte Power Costs and escalated by 10% for inflation from 2007 Charlotte Streetcar Project Operations Plan.

EA Document References

Appendix G provides details on and results of the operating costs estimates.

APPENDIX B: INVENTORY OF ACTIVITY CENTERS

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This Appendix provides a brief summary of the activity centers located within the Charlotte Streetcar Project (Project) study area. Activity centers are grouped into the seven categories that are shown below.

	PAGE
PARKS AND RECREATION FACILITIES	1
TRANSIT FACILITIES	4
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The Activity Centers map geographically depicts the activity centers presented in this Appendix. Numbers on the map correspond to the description of activity centers in the document.

PARKS AND RECREATION FACILITIES

Beatties Ford Road Subarea

No parks are located immediately adjacent to the proposed Project alignment within the Beatties Ford Road subarea.

The following parks, while not adjacent to the alignment, are located within the subarea.



1. **Biddleville Park**
2. **L.C. Coleman Park**
3. **Waddell Street Park**
4. **West Charlotte Park**

Center City Subarea

The following parks are located immediately adjacent to the proposed Project alignment within the Center City subarea.



5. **Frazier Park**

Frazier Park is an 11.9-acre facility located along 4th Street. The park has a soccer field, two basketball and tennis courts, a dog park, access to Greenway trails, and a playground.



6. **Irwin Creek Greenway**

Irwin Creek Greenway runs through and around parts of uptown Charlotte, through Frazier Park and the Wesley Heights neighborhood. The Greenway links several neighborhoods to parks that include picnic areas, sporting fields, playgrounds, and indoor recreation centers.



7. **Independence Park**

Independence Park is a 24-acre facility located along Hawthorne Lane. The park has a baseball field, two basketball and tennis courts, a volleyball court, walking trails, picnic shelters, and a playground.



8. **Little Sugar Creek Greenway**

When completed, the Little Sugar Creek Greenway will span 15 miles from Cordelia Park, through the Midtown Square area, to the South Carolina line.



9. **Ray's Splash Planet**

Ray's Splash Planet is a community facility that brings together a water park, fitness center, aerobic and dance theatres. The facility is owned by Mecklenburg Parks and Recreation Department and located next to Trade Street.

The following parks are located in the Center City area, but are not immediately adjacent to the alignment.



10. Aquatic Center

11. Baxter Street Park

12. Colonial Park

13. First Ward Park

14. Five Points Park

15. Fourth Ward Park

16. Irwin Center



17. JCSU Track

18. Little People's Park

19. Marshall Park

20. Morgan Park

21. Ninth Street Park

22. Pearle Street Park

23. Phillip O. Berry Recreation Center

24. Stewart Creek Greenway

25. Third Ward Park

26. Thompson Park

27. Wesley Heights Greenway C1

Central Avenue Subarea

The following parks are located immediately adjacent to the proposed Project alignment within the Central Avenue subarea.



28. Briar Creek Greenway

Briar Creek Greenway will eventually stretch over 6 miles and link to Little Sugar Creek Greenway.

29. Veterans Park

Veterans Park is a 19-acre facility located along Central Avenue. The park has basketball courts, baseball and softball fields, tennis and volleyball courts, an indoor shelter, playground, a disc-golf course, and a walking trail.

The following parks are located in the subarea but are not immediately adjacent to the alignment.



30. Kilborne District Park

31. Sheffield Park

TRANSIT FACILITIES

Beatties Ford Road Subarea



32. Rosa Parks Place Community Transit Center

The Rosa Parks Community Transit Center is a neighborhood-scaled facility that allows neighborhood residents to board regular and small buses in a weather-protected, secure area in one of the most transit supportive neighborhoods in Charlotte.

Center City Subarea



33. Charlotte Transportation Center

The Charlotte Transportation Center is the main connecting hub for CATS bus and rail routes. The center is available for customer use during normal service hours (between 4:50am and 1:30am each day).



34. Proposed Charlotte Gateway Station

The existing Greyhound facility, located between Fourth Street and West Trade Street, will be the site for the future Charlotte Gateway Station. This new station will provide seamless integration of various rapid transit modes, including commuter rail, Amtrak, Greyhound, streetcar, and Southeast/West Corridor rapid transit.



35. Greyhound Bus Station

The current Greyhound Bus Station is located along Trade Street and provides bus service to many destinations within North America. It is expected that future Greyhound service will be operated through the new Gateway Station, which will be located at this site.

Central Avenue Subarea



36. Eastland Community Transit Center

Eastland Community Transit Center is a neighborhood-sized transit center. The facility covers roughly 1.5 acres and includes an open-air plaza, covered passenger waiting areas, and bicycle and pedestrian facilities.

COLLEGES AND UNIVERSITIES

Beatties Ford Road Subarea



37. Johnson C. Smith University

Johnson C. Smith University is a Division II, progressive liberal arts university located along Beatties Ford Road. The University was founded in 1867 and enrolls approximately 1,500 students.

Center City Subarea



38. Central Piedmont Community College

Central Piedmont Community College is North Carolina's largest Community College with six campuses across the Charlotte-Mecklenburg region. The College was established in 1963 when Mecklenburg College and the Central Industrial Education Center merged. The College currently serves over 70,000 people at its six full-service campuses.



39. Johnson & Wales University

Johnson & Wales University Charlotte Campus was established in 2004 and offers career-focused programs in Business, Culinary Arts, and Hospitality. The campus is now home to over 2,500 students.



40. Kings College

Kings College was founded in 1901 and offers degrees in Business, Design and Technology, and Health Care. The college currently enrolls almost 600 students.



41. UNC Charlotte Uptown Campus

UNC Charlotte has constructed a Center City Building at the corner of Ninth and Brevard streets, which will feature 143,000 square feet of classrooms, public space and offices. Construction began in the Spring of 2009 and has an anticipated completion by the Fall of 2011.

Central Avenue Subarea

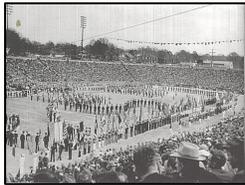
No colleges or universities are located within the Central Avenue subarea.

CULTURAL AND ENTERTAINMENT ATTRACTIONS

Beatties Ford Road Subarea

No cultural and entertainment attractions are located within the Beatties Ford Road subarea.

Center City Subarea



42. American Legion Memorial Stadium

The American Legion Memorial Stadium is an open-air stadium that is used mainly for high school sporting events and as a public venue. It includes seating for 21,000.



43. Bank of America Stadium

The Bank of America Stadium is an open-air stadium that serves as the home to the National Football League's Carolina Panthers and includes seating for 74,000.



44. Bechtler Museum of Modern Art

Opened in January of 2010, the Bechtler Museum of Modern Art is located several blocks southwest of Trade Street and displays a large collection of works by some of the most important and influential artists of the mid 20th century.



45. Blumenthal Performing Arts Center

The Blumenthal Performing Arts Center, located between Trade and Fifth streets, is home to 10 different art organizations and is now beginning to develop programs to educate the community.



46. Charlotte Convention Center

Opened in 1995 and located three blocks southwest of Trade Street, the Charlotte Convention Center has 300,000 sq. ft. of exhibit space, 850,000 sq. ft. of additional features, 90,000 sq. ft. of meeting space, and 75,000 sq. ft. of ballrooms.



47. Discovery Place

Located two blocks north of the alignment, Discovery Place is a private, not-for-profit education organization dedicated to exploring the natural and social world using specialized exhibits and educational programs.



48. Grand Theater Building

The Grand Theater Building, located along Beatties Ford Road in Biddleville, has been declared to be of special significance due to its historical relevance to the Jim Crow era of segregation.



49. ImaginOn Children's Learning Center

This facility is a cultural center geared toward children and young adults. It includes two theatres and performance spaces, exhibits, classrooms, and meeting space.



50. NASCAR Hall of Fame

Located three blocks southwest of Trade Street in Uptown Charlotte, the 150,000 sq. ft. NASCAR Hall of Fame is an interactive entertainment attraction honoring the history of NASCAR.



51. Time Warner Cable Arena

The Time Warner Cable Arena is home to the NBA's Charlotte Bobcats and the ECHL's Charlotte Checkers, and is a premier destination for top-rated concerts and events in downtown Charlotte. The arena includes seating for nearly 20,000 people.

Central Avenue Subarea

No cultural and entertainment attractions are located within the Central Avenue subarea.

RETAIL DESTINATIONS

Beatties Ford Road Subarea

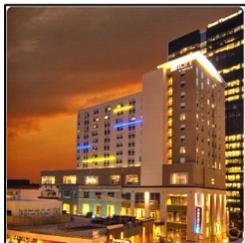
No major retail destinations are located within the Beatties Ford Road subarea. A community shopping center is located at the intersection of LaSalle Street.

Center City Subarea



52. Founders Hall Shops

Located adjacent to the Bank of America Corporate Center along Trade Street, Founders Hall is a dining, shopping, and entertainment venue with access to many downtown hotels.



53. The Epicentre

The Epicentre is located at 210 East Trade Street, and is the Southeast's hub for dining, entertainment, recreation, nightlife, and hospitality.

Central Avenue Subarea



54. Darby Acres Shopping Center

Darby Acres Shopping Center is a small retail center located directly along Central Avenue.



55. Eastland Mall Redevelopment

Eastland Mall opened in 1975 as the largest mall in North Carolina. Operation of the mall ceased in 2010; however, new redevelopment plans forecast the mall to be reopened in late 2011.



56. Eastway Crossing Shopping Center

Eastway Crossing Shopping Center is a retail destination consisting of a Wal-Mart, Post Office, small shops, and several eating locations, including McDonalds, and Pizza Hut.



57. Plaza Midwood Central Business District

Plaza Midwood is a unique neighborhood retail district that contains a blend of antique and consignment stores and art galleries.

COMMUNITY FACILITIES

Beatties Ford Road Subarea



58. Northwest School of the Arts

The Northwest School of the Arts is a small, comprehensive secondary school with an enrollment of 1,200 students in grades 6-12. The school is located on Beatties Ford Road.

The following facilities are also located in the area, but are not immediately adjacent to the Alignment.

59. Bethany Church

60. New Bethlehem Church

61. Oaklawn Elementary

62. Prince of Peace Church

63. University Park Creative Arts

64. Victory Christian High School

65. West Charlotte High School

66. Wilson Heights Church of God

Center City Subarea



67. Carolinas Healthcare System

Carolinas Healthcare System is a collection of physician practices, hospitals, and other healthcare facilities. One of the facilities is located at the intersection of Trade Street and Rozzelles Ferry Road, while the main campus is located in the area, but is not adjacent to the alignment.



68. First Presbyterian Church

Organized in 1821 and dedicated in 1823, the First Presbyterian Church is part of the oldest faith organization in Charlotte. The church is located along West Trade Street in the center of uptown Charlotte.



69. Hawthorne High School

Hawthorne High School is a Specialty School of Choice created to help students who come from the traditional school setting. It provides flexible scheduling and smaller classrooms.



70. New Hope Missionary Baptist Church

Located along Hawthorne Lane, the New Hope Missionary Baptist Church was established in 2003.



71. Presbyterian Hospital

Located directly on Hawthorne Lane, Presbyterian Hospital is a private, non-profit regional medical center and one of the largest health care institutes in the Carolinas.



72. St. John's Baptist Church

St. John's Baptist Church is a moderate Baptist church, affiliated with the Cooperative Baptist Fellowship, located in historic Elizabeth Community along Hawthorne Lane.

The following facilities are located in the area, but are not immediately adjacent to the Alignment.



73. Abiding Apostolic Christian Church

74. Charlotte Immanuel Church

75. Charlotte Mecklenburg Library

76. First Baptist Church – West

77. Hawthorne Lane United Methodist Church

78. St. Martin's Episcopal Church

79. St. Peter's Episcopal Church

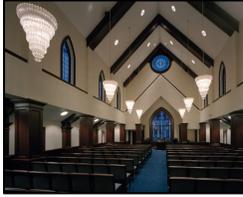
80. United House of Prayer

Central Avenue Subarea



81. Central Avenue Bilingual Preschool

The Central Avenue Bilingual Preschool was created to address the needs of the Hispanic/Latino families in the east Charlotte area. The school offers programs geared for both children and adults whose primary language is not English. The preschool is located along Central Avenue.



82. Memorial United Methodist Church

Located along Central Avenue, the Memorial United Methodist Church was founded in 1968 and seeks to combine Methodist and Wesleyan beliefs.



83. Midwood High School

Midwood High School is a ninth grade transitional, dropout prevention initiative for students whose home schools are elsewhere around the greater Charlotte region.



84. St. Andrews Episcopal Church

St. Andrews Episcopal Church is located along Central Avenue. Its aims are to provide pastoral care and provide focus on the development of young adults and families.

The following facilities are located in the area, but are not immediately adjacent to the Alignment



85. Calvary Christian Church

86. Eastway Baptist Church

87. Eastway Middle School

88. Merry Oaks Elementary School

89. Winterfield Elementary

GOVERNMENT INSTITUTIONS

Beatties Ford Road Subarea



90. Mecklenburg County Health Department

The Mecklenburg County Health Department operates a Northwest Campus along Beatties Ford Road adjacent to the western terminus of the alignment.

Center City Subarea



91. Charlotte Old City Hall

While no longer in use as City Hall, the Charlotte Old City Hall building was deemed as having special significance due to its place in Charlotte's governmental history. The building still houses some City government offices.



92. City and County Government Center

The City and County Government Center spans both sides of East Trade and East Fourth streets. The Center includes the police and fire departments, payroll, Community Health Services, Federal Reserve Bank, Courthouse, Corrections Division, and many other governmental departments.

Central Avenue Subarea

93. U.S. Army Reserve Facility

The U.S. Army Reserve Facility fronts Central Avenue at the intersection with Westover Street. The property address is 1330 Westover Street.

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APPENDIX C: LPA DESIGN RECOMMENDATIONS

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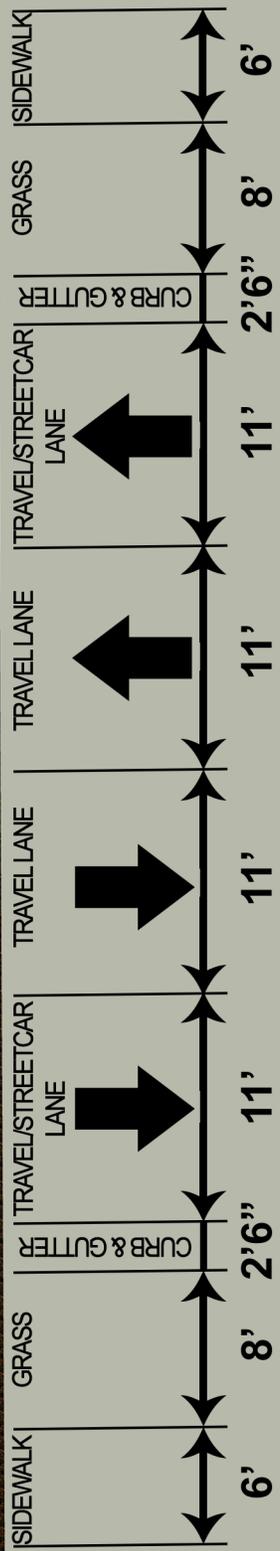
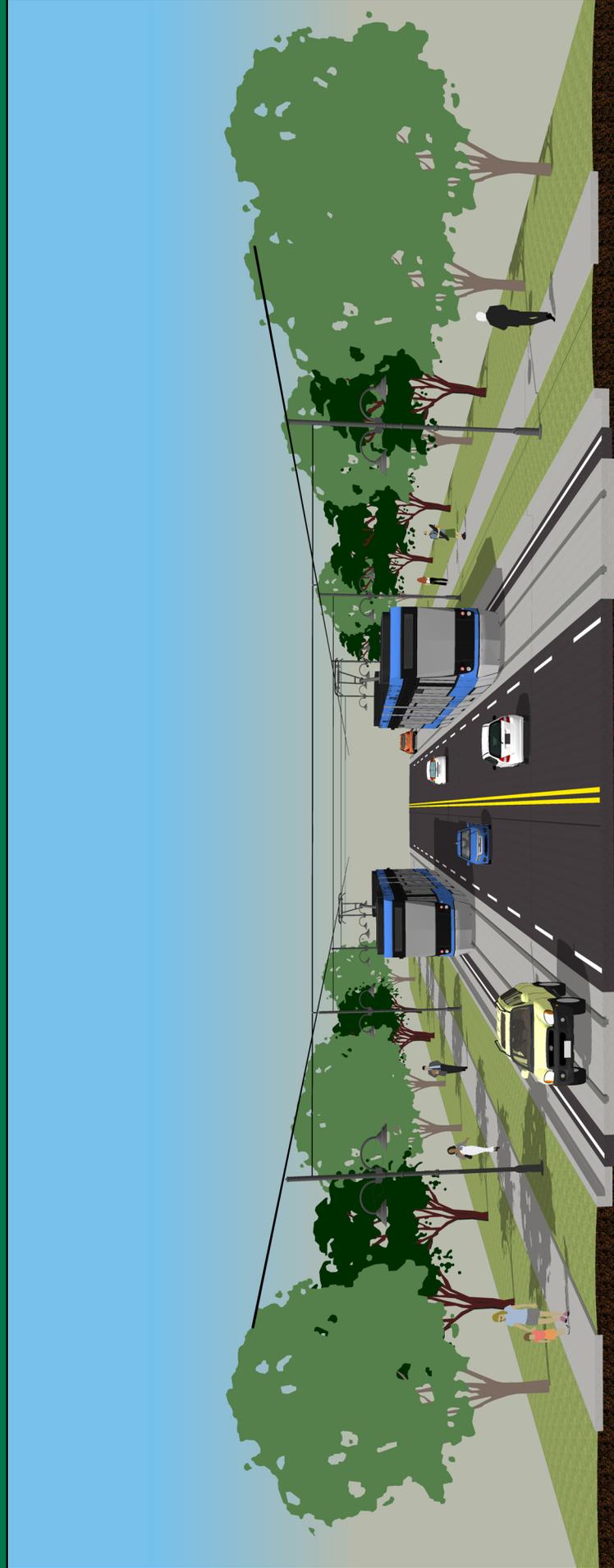
The following table summarizes design recommendations organized in the following categories: New Signal, Modify Existing Signal, New Pedestrian Accommodations, New Bicycle Accommodations, and Changes to Striping-Roadway Conversions. The representative typical sections for the Project design are shown in Figures C1 through C5.

LPA Design Recommendations

Location	Additional Notes (if applicable)
New Signal	
Rosa Parks Place	
Cemetery Street	
S. Bruns Avenue	May be coordinated with N. Bruns Avenue
Wesley Heights	
Wilkes Place	Assume median opened for CGS, but SC built first
8th Street	
Sunnyside Avenue	
Clement Avenue	
Central Avenue	
St. Julien Street	
Carolyn Drive	
Sheridan Drive	
Modify Existing Signal	
Sir Bailey	Span wire to mast arm (NCDOT)
I-85 Ramp	Span wire to mast arm (NCDOT)
Montana Drive	Span wire to mast arm
Keller Avenue (Emergency Signal)	Span wire to mast arm
Lasalle Street	Span wire to mast arm
St. Mark Street (Pedestrian Signal)	Span wire to mast arm
Russell Avenue	Span wire to mast arm

Location	Additional Notes (if applicable)
Oaklawn Avenue	Potential modifications to mast arms
Brookshire	Span wire to mast arm (NCDOT)
French Street	Span wire to mast arm
Dixon Street	Assumed to remain, new masts
JCSU New Entrance	Assumed location, assume mast
Rozzelles Ferry Road	Potential modifications to mast arms
I-77 Off Ramp (east)	Span wire to mast arm (NCDOT)
Johnson and Whales Way	Span wire to mast arm
Clarkson Street (Pedestrian Signal)	Potential modifications to mast arms
Cedar Street	
Graham Street	Potential modifications to mast arms
Mint Street	Potential modifications to mast arms
Poplar Street	Potential modifications to mast arms
Church Street	Potential modifications to mast arms
Tryon Street	Potential modifications to mast arms
College Street	Potential modifications to mast arms, adding left turn only
Brevard Street	Potential modifications to mast arms
Caldwell Street	Potential modifications to mast arms, removing left turn lane
Davidson Street	Curb modifications require relocating light pole
Alexander Street	Potential modifications to mast arms
McDowell Street	NCDOT intersection, potential modifications to mast arms
Kings Street	Potential modifications to mast arms
Charlottetown Street	Potential modifications to mast arms
Hawthorne Lane	Span wire to mast arm

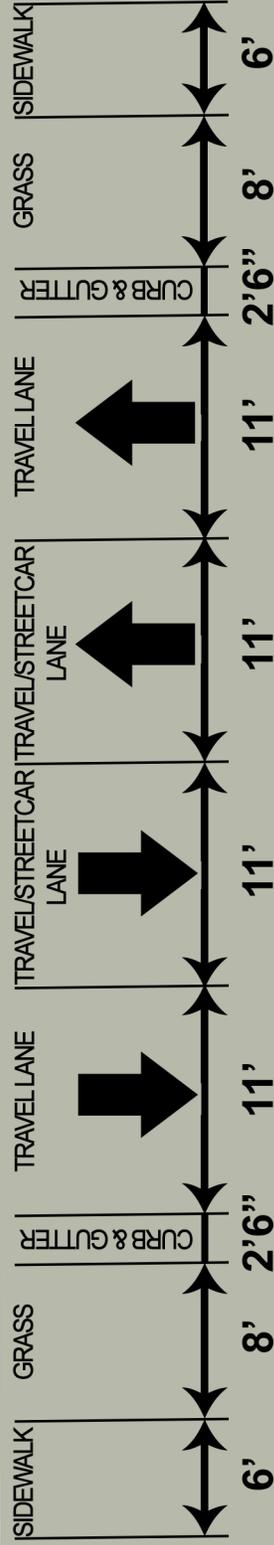
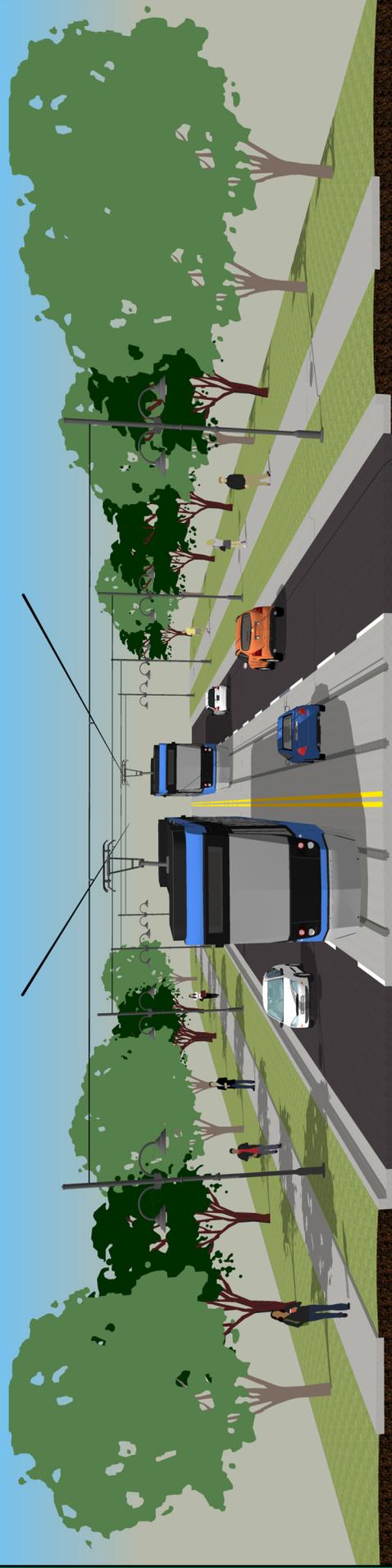
Location	Additional Notes (if applicable)
5th Street	Span wire to mast arm
7th Street	Span wire to mast arm
Central Avenue	Span wire to mast arm
Pecan Avenue	Span wire to mast arm
Thomas Avenue	Span wire to mast arm
The Plaza	Span wire to mast arm
Morningside Drive	Span wire to mast arm
Eastcrest Drive	Span wire to mast arm
Briar Creek Road	Span wire to mast arm
Eastway Drive	Span wire to mast arm
Kilborne Drive	Span wire to mast arm
Rosehaven Drive	Span wire to mast arm
N. Sharon Amity Road	Span wire to mast arm
Eastland Entrance	
New Pedestrian Accommodations	
Tippah Park Court	New pedestrian signal
Willow Park Drive	New pedestrian signal
New Bicycle Accommodations	
NA	N/A
Changes to Striping – Roadway Conversion	
W. Trade Street and Beatties Ford Road	Convert four lanes between Wesley Heights Way and French St. to two lanes with center turn lane/median



TYPICAL SECTION: 4-LANE UNDIVIDED - STREETCAR SHARE OUTSIDE LANES

Not to Scale

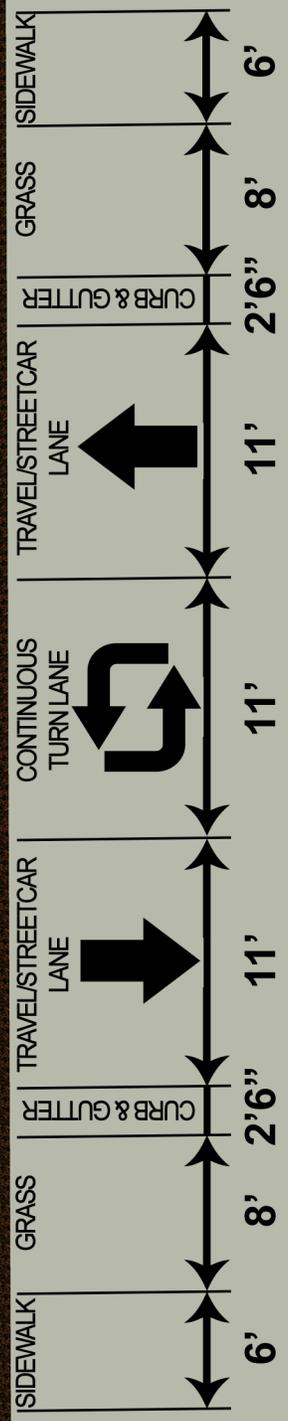
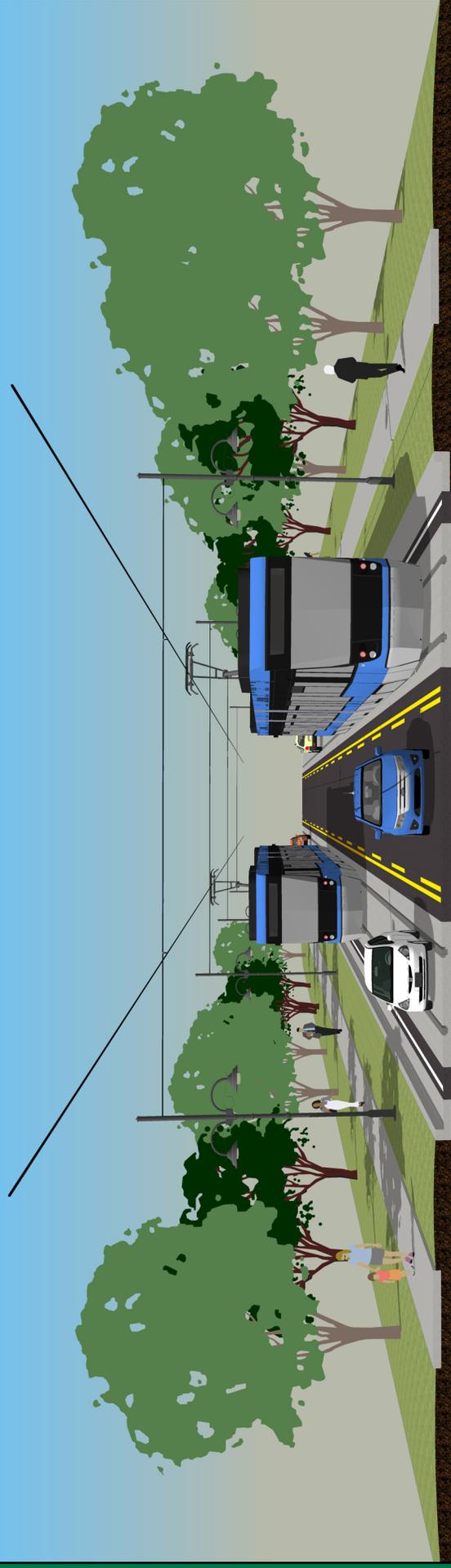




TYPICAL SECTION: 4-LANE UNDIVIDED - STREETCAR SHARE INSIDE LANES

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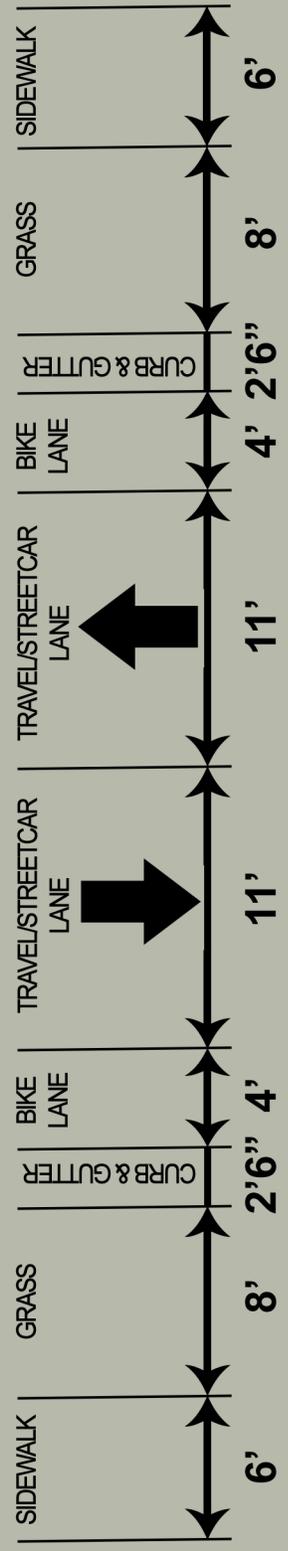
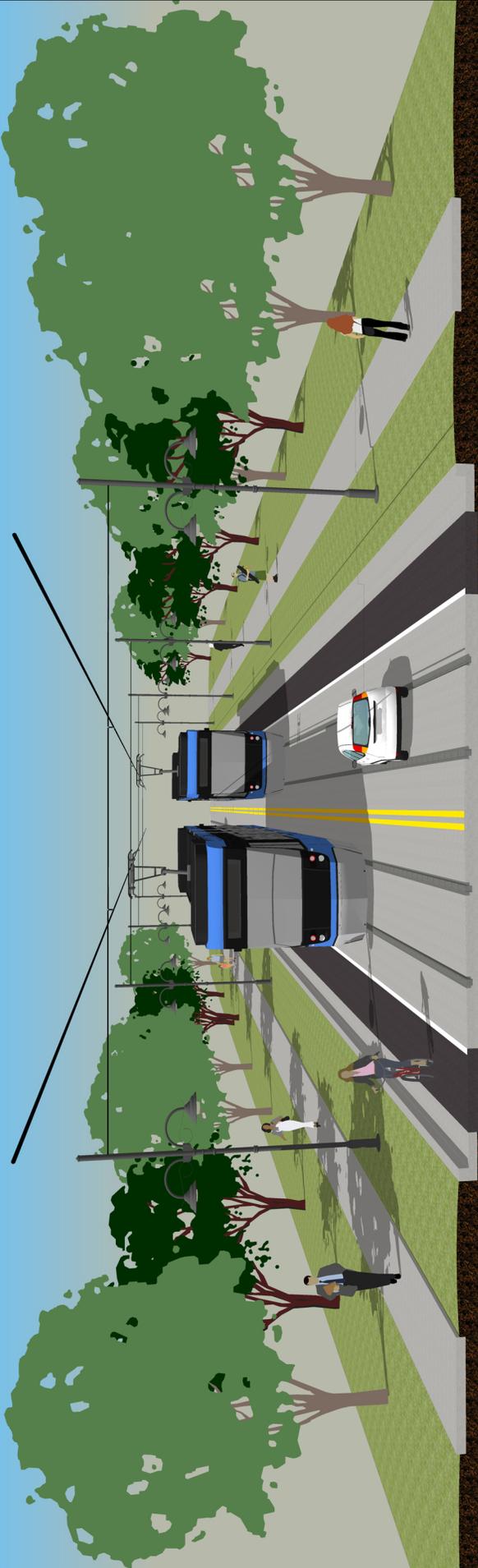


TYPICAL SECTION: 3-LANE UNDIVIDED

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FIGURE C3. TYPICAL SECTION

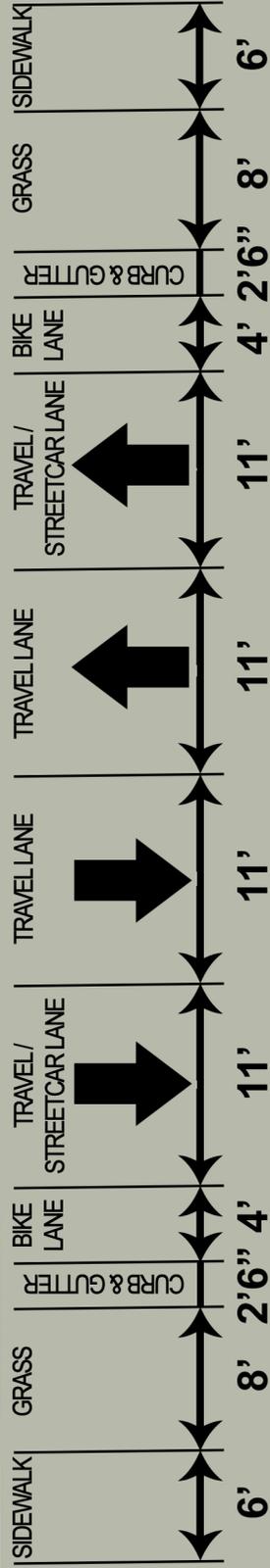


TYPICAL SECTION: 2-LANE UNDIVIDED WITH 4' BIKE LANES

Not to Scale



FIGURE C4. TYPICAL SECTION



**TYPICAL SECTION: 4-LANE UNDIVIDED WITH 4' BIKE LANES
STREETCAR SHARE OUTSIDE LANES**

Not to Scale



APPENDIX D: TRAFFIC ANALYSIS

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Traffic Forecasting

The traffic forecasts for the Center City Streetcar Corridor were obtained from the 2009 (2035 LRTP Conformity) TransCAD version of the Metrolina Regional Transportation Model developed and maintained by the Charlotte Department of Transportation (CDOT). The 2010 base year and 2035 future year Annual Average Daily Traffic Volumes (AADT) were used for this analysis.

The model results were compared to 2010 AADT count data (Source: CDOT) to determine the accuracy of model projections for the study area. The 2010 model projections and the 2010 AADT count data were compared for 30 locations along the study corridor.

To develop growth factors for the Center City Streetcar Corridor, the base year (2010) and future year (2035) model projections were used. A review of the estimated rate of traffic growth for the study corridor shows moderate increases along the entire corridor. Table 1 summarizes the annual traffic growth rates along the study corridor.

Using the growth factors developed from the model, the 2035 AADTs for the study corridor were estimated from the 2010 AADT count data.

Table 1 Traffic Growth Rates – Center City Streetcar Corridor

Location	Annual Growth Rate %
Beatties Ford Road	1.4
Trade Street	
From Rozzelles Ferry Rd to Johnson & Wales Way	1.8
From Johnson & Wales Way to McDowell St	1.4
Elizabeth Street	1.1
Hawthorne Lane	1.1
Central Avenue	1.3

The growth factors were also applied to existing (2010) turning movement counts to estimate future year (2035) turning movement counts at all signalized intersection along the study corridor. The 2035 turning movement counts were then balanced with help from the Synchro traffic analysis software.

Arterial Capacity Analysis

Arterial capacity analyses were performed for the existing (2010) and future (2035) travel conditions within the study area using Table 1: Generalized Annual Average Daily Volumes for Urbanized Areas of the *2009 Quality/Level of Service Handbook* published by Florida Department of Transportation. In this table, Level of Service thresholds were provided for the following three arterial classes:

- Class I: Arterial streets with 0 to 1.9 signalized intersections per mile
- Class II: Arterial streets with 2.00 to 4.50 signalized intersections per mile
- Class III/IV: Arterial streets with more than 4.5 signalized intersections per mile

The Level of Service thresholds defined in Class II were used to analyze the following segments

- Beatties Ford Road between Hoskins Avenue and Rozzelles Ferry Road
- Trade Street between Rozzelles Ferry Road and Johnson and Wales Way
- Elizabeth Street between McDowell Street and Hawthorne Lane

- Hawthorne Lane between Elizabeth Avenue and Central Avenue
- Central Avenue between Hawthorne Lane and Reddman Road

The Level of Service thresholds defined in Class III/IV were used to analyze the remaining center city segment of Trade Street between Johnson and Wales Way and McDowell Street.

As can be seen in Table 2, the capacity of a Class II two-lane arterial street is 16,200 vehicles per day (vpd) and the capacity of a four-lane arterial is 35,100 vpd. It should be noted that the capacity of the three-lane section was interpolated from the two- and four-lane sections. The Level of Service is directly related to the volume to capacity ratio as shown in the following table.

Table 2 Arterial Level of Service Thresholds – Center City Streetcar Corridor

Class II	No. of Lanes	Level of Service and Volume to Capacity Ratios (vehicles per day and v/c)						
		B	C		D		E	
			vpd	v/c	vpd	v/c	vpd	v/c
	2	**	10,500	0.65	15,200	0.94	16,200	1.00
	3	**	17,750	0.69	24,200	0.95	25,600	1.00
	4	**	25,000	0.71	33,200	0.95	35,100	1.00
Class III/IV			vpd	v/c	vpd	v/c	vpd	v/c
	4	**	12,600	0.39	28,200	0.88	31,900	1.00

Source: Table 1 Generalized Annual Average Daily Volumes for Urbanized Areas, 2009 Quality/Level of Service Handbook, Florida Department of Transportation

Intersection Capacity Analysis

The intersection capacity analysis was performed for the existing (2010) and (2035) future travel conditions within the Center City Streetcar Corridor study area using the 2000 Highway Capacity Manual methodology. The Synchro traffic analysis software was used for all signalized intersections to compute the vehicle to capacity ratios, delay, and level of services.

The following parameters were used in the intersection capacity analyses for the Center City Streetcar Corridor project in accordance with the CDOT Signalized Intersections Analysis Guidelines:

- an ideal saturation flow rate of 2000 vehicles per hour per lane (vphpl);
- a peak hour factor of 0.92 for signalized intersections;
- total lost time of four (4) seconds per phase with 3.5 seconds of amber signal time and 0.5 second of all red signal time; and
- a factor of 2% heavy vehicles.

Traffic flow through an intersection is affected by the volume of traffic and by the intersection geometry. These intersection-specific characteristics are used to define two measures of congestion: the volume to capacity ratio (v/c) and the Level of Service. The volume to capacity ratio (v/c) reflects the proportion of a movement's capacity used by traffic demand. The v/c ranges from 0.0 to 1.0 with 1.0 indicating that the traffic demand fully utilizes a movement's capacity. The overall intersection v/c ratio is obtained by generating the HCM Signals report from Synchro Level of Service.

At intersections with signals, the Level of Service is used to measure delay. Six levels of service—from A to F—are related to vehicle delay. Level of Service A represents no congestion; Level of Service E represents long delays; and Level of Service F represents excessive delays with vehicles having to wait several signal cycles to clear an intersection. Table 3 summarizes the Level of Service criteria used in the intersection capacity analysis.

Table 3 Intersection Level of Service Criteria – Center City Streetcar Corridor

Level of Service	Mean Delay Time per Vehicle (seconds)		Description
	With Signal	Without Signal	
A	Less than 10	Less than 10	Little to no delay
B	10 to 20	10 to 15	Short traffic delays
C	20 to 35	15 to 25	Average traffic delays
D	35 to 55	25 to 35	Longer but acceptable delays
E	55 to 80	35 to 50	Very long traffic delays
F	More than 80	More than 50	Unacceptably long traffic delays

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, Washington, D.C., 2000.

Arterial Capacity Analysis - Existing Conditions (2010)

Segment		Average Annual	Level of	V/C
From	To	Weekday Traffic (vpd)	Service	Ratio
Beatties Ford Road				
Hoskins Rd.	I-85	30,900	D	0.88
I-85	Gilbert St.	22,900	C	0.65
Gilbert St.	Lasalle St.	22,900	C	0.65
Lasalle St	Oaklawn Ave	21,400	C	0.61
Oaklawn Ave	Brookshire Frwy	21,400	C	0.61
Brookshire Frwy	Dixon St	12,500	C	0.49
Dixon St	Rozzelles Ferry Rd	12,500	C	0.36
Trade Street				
Rozzelles Ferry Rd	Wesley Heights Wy	12,600	C	0.36
Wesley Heights Wy	Johnson & Wales Wy	17,800	C	0.51
Johnson & Wales Wy	Graham St	15,100	D	0.47
Graham St	Mint St	12,200	C	0.38
Mint St	Poplar St	11,900	C	0.37
Poplar St	Church St	11,500	C	0.36
Church St	Tryon St	11,900	C	0.37
Tryon St	College St	10,900	C	0.34
College St	Brevard St	14,700	D	0.46
Brevard St	Caldwell St	10,700	C	0.34
Caldwell St	Davidson St	9,500	C	0.30
Davidson St	McDowell St	9,600	C	0.30
Elizabeth St				
McDowell St	Kings Dr	10,150	C	0.29
Kings Dr	Charlottetowne Ave	6,500	C	0.40
Charlottetowne Ave	Hawthorne Dr	5,300	C	0.33
Hawthorne Lane				
Elizabeth Ave	5th St	12,200	C	0.35
5th St	7th St	12,200	C	0.35
7th St	Bay St	10,600	D	0.65
Bay St	Central Ave	9,800	C	0.60
Central Avenue				
Hawthorne Ln	Pecan Ave	23,300	C	0.66
Pecan Ave	Morningside Dr	19,900	C	0.57
Morningside Dr	Eastway Dr	22,900	C	0.65
Eastway Dr	Norland Dr	23,600	C	0.67
Norland Dr	Sharon Amity Rd	26,400	D	0.75
Sharon Amity Rd	Eastland Mall West	21,900	C	0.62

Arterial Capacity Analysis - 2035 No Build

Segment		Average Annual	Level of	V/C
From	To	Weekday Traffic (vpd)	Service	Ratio
Beatties Ford Road				
Hoskins Rd.	I-85	41,700	F	1.19
I-85	Gilbert St.	30,900	D	0.88
Gilbert St.	Lasalle St.	30,900	D	0.88
Lasalle St	Oaklawn Ave	28,900	D	0.82
Oaklawn Ave	Brookshire Frwy	28,900	D	0.82
Brookshire Frwy	Dixon St	16,900	C	0.66
Dixon St	Rozzelles Ferry Rd	16,900	C	0.48
Trade Street				
Rozzelles Ferry Rd	Wesley Heights Wy	18,300	C	0.52
Wesley Heights Wy	Johnson & Wales Wy	25,800	D	0.74
Johnson & Wales Wy	Graham St	20,200	D	0.63
Graham St	Mint St	16,300	D	0.51
Mint St	Poplar St	15,900	D	0.50
Poplar St	Church St	15,400	D	0.48
Church St	Tryon St	15,900	D	0.50
Tryon St	College St	14,600	D	0.46
College St	Brevard St	19,700	D	0.62
Brevard St	Caldwell St	14,300	D	0.45
Caldwell St	Davidson St	12,700	D	0.40
Davidson St	McDowell St	12,900	D	0.40
Elizabeth St				
McDowell St	Kings Dr	12,800	C	0.36
Kings Dr	Charlottetowne Ave	8,200	C	0.51
Charlottetowne Ave	Hawthorne Dr	6,700	C	0.41
Hawthorne Lane				
Elizabeth Ave	5th St	15,600	E	0.96
5th St	7th St	15,600	E	0.96
7th St	Bay St	13,600	D	0.84
Bay St	Central Ave	12,500	D	0.77
Central Avenue				
Hawthorne Ln	Pecan Ave	31,000	D	0.88
Pecan Ave	Morningside Dr	26,500	D	0.75
Morningside Dr	Eastway Dr	30,500	D	0.87
Eastway Dr	Norland Dr	31,400	D	0.89
Norland Dr	Sharon Amity Rd	35,100	E	1.00
Sharon Amity Rd	Eastland Mall West	29,100	D	0.83

Arterial Capacity Analysis - 2035 Build

Segment		Average Annual	Level of	V/C
From	To	Weekday Traffic (vpd)	Service	Ratio
Beatties Ford Road				
Hoskins Rd.	I-85	41,700	F	1.19
I-85	Gilbert St.	30,900	D	0.88
Gilbert St.	Lasalle St.	30,900	D	0.88
Lasalle St	Oaklawn Ave	28,900	D	0.82
Oaklawn Ave	Brookshire Frwy	28,900	D	0.82
Brookshire Frwy	Dixon St	16,900	C	0.66
Dixon St	Rozzelles Ferry Rd	16,900	F	1.04
Trade Street				
Rozzelles Ferry Rd	Wesley Heights Wy	18,300	F	1.13
Wesley Heights Wy	Johnson & Wales Wy	25,800	D	0.74
Johnson & Wales Wy	Graham St	20,200	D	0.63
Graham St	Mint St	16,300	D	0.51
Mint St	Poplar St	15,900	D	0.50
Poplar St	Church St	15,400	D	0.48
Church St	Tryon St	15,900	D	0.50
Tryon St	College St	14,600	D	0.46
College St	Brevard St	19,700	D	0.62
Brevard St	Caldwell St	14,300	D	0.45
Caldwell St	Davidson St	12,700	D	0.40
Davidson St	McDowell St	12,900	D	0.40
Elizabeth St				
McDowell St	Kings Dr	12,800	C	0.36
Kings Dr	Charlottetowne Ave	8,200	C	0.51
Charlottetowne Ave	Hawthorne Dr	6,700	C	0.41
Hawthorne Lane				
Elizabeth Ave	5th St	15,600	E	0.96
5th St	7th St	15,600	E	0.96
7th St	Bay St	13,600	D	0.84
Bay St	Central Ave	12,500	D	0.77
Central Avenue				
Hawthorne Ln	Pecan Ave	31,000	D	0.88
Pecan Ave	Morningside Dr	26,500	D	0.75
Morningside Dr	Eastway Dr	30,500	D	0.87
Eastway Dr	Norland Dr	31,400	D	0.89
Norland Dr	Sharon Amity Rd	35,100	E	1.00
Sharon Amity Rd	Eastland Mall West	29,100	D	0.83

Intersection Capacity Analysis - 2010 Existing Conditions

Major Street		AM Peak Hour			PM Peak Hour		
Cross Street	Delay (seconds)	Level of Service	V/C Ratio	Delay (seconds)	Level of Service	V/C Ratio	
Beatties Ford Rd							
Hoskins Rd/A Ave	19.1	B	0.51	16.8	B	0.62	
Rosa Parks Pl (Unsignalized)	0.9	A	0.55	0.8	A	0.45	
I-85 SB ramps/Kansas Dr	30.6	C	0.89	22.9	C	0.80	
I-85 NB ramps	13.8	B	0.75	18.8	B	0.76	
Montana Dr/Gilbert St	7.2	A	0.44	7.9	A	0.53	
LaSalle St	15.2	B	0.43	24.2	C	0.83	
Booker Ave/Oaklawn Ave	8	A	0.50	20.4	C	0.70	
Brookshire Frwy NB ramps	8.8	A	0.45	17.5	B	0.71	
Brookshire Frwy SB ramps/French St	10.6	B	0.61	14.4	B	0.64	
Dixon St	4.6	A	0.32	7.7	A	0.34	
Rozzelles Ferry Rd./5th St	29.4	C	0.44	41.3	D	0.66	
Trade St							
I-77 SB ramps (Unsignalized)	4.8	B	0.59	30.4	C	1.52	
I-77 NB ramps	19.5	B	0.65	14.4	B	0.71	
Irwin St/Johnson & Wales Way	12.2	B	0.40	18	B	0.60	
Cedar St	7.7	A	0.30	42.4	D	1.19	
Graham St	16.7	B	0.67	33.4	C	0.57	
Mint St/Pine St	7.3	A	0.25	8.4	A	0.22	
Poplar St	6.5	A	0.28	17.3	B	0.36	
Church St	19.4	B	0.47	8.8	A	0.42	
Tryon St	24.6	C	0.28	13.2	B	0.23	
College St	17.6	B	0.52	13.2	B	0.40	
Brevard St	16.4	B	0.34	17.2	B	0.27	
Caldwell St	7.8	A	0.30	9.4	A	0.35	
Davidson St	17	B	0.49	14.4	B	0.36	
Alexander St	7.9	A	0.19	5	A	0.18	
McDowell St	15.5	B	0.37	16.4	B	0.44	
Elizabeth St							
Kings Dr	11.9	B	0.51	12.9	B	0.60	
Charlottetown Ave	13.8	B	0.39	14.7	B	0.43	
Hawthorne Ln	25.4	C	0.57	20.1	C	0.51	
Hawthorne Ln							
5th St	16.5	B	0.38	13	B	0.30	
7th St	18.8	B	0.48	16.2	B	0.65	
Central Ave	21.4	C	0.62	23.1	C	0.58	
Central Ave							
Pecan Ave	9.2	A	0.67	10.5	B	0.54	
Thomas Ave	5.6	A	0.46	6.4	A	0.45	
The Plaza	27.2	C	0.65	21.3	C	0.63	
Morningside Dr	6.6	A	0.46	9	A	0.49	
Eastcrest Dr	4.6	A	0.34	4.4	A	0.34	
BriarCreek Rd	11.1	B	0.37	17.9	B	0.50	
Eastway Dr	46.5	D	0.77	44	D	0.82	
Kilbourne Dr/Norland Rd	38.1	D	0.81	41.8	D	0.76	
Rosehaven Dr	25.9	C	0.64	18.5	B	0.64	
Sharon Amity Rd	52.1	D	0.95	55.2	E	0.83	
Eastland Mall west entrance	27.2	C	0.40	11.4	B	0.35	

Intersection Capacity Analysis - 2035 No Build

Major Street		AM Peak Hour			PM Peak Hour		
Cross Street	Delay (seconds)	Level of Service	V/C Ratio	Delay (seconds)	Level of Service	V/C Ratio	
Beatties Ford Rd							
Hoskins Rd/A Ave	22.7	C	0.73	18.5	B	0.83	
Rosa Parks Pl (Unsignalized)	1	B	0.75	0.9	A	0.52	
I-85 SB ramps/Kansas Dr	106.7	F	1.18	66.1	E	1.08	
I-85 NB ramps	53.1	D	1.04	44.9	D	1.05	
Montana Dr/Gilbert St	8.5	A	0.61	10.3	B	0.83	
LaSalle St	17.4	B	0.60	109.5	F	1.80	
Booker Ave/Oaklawn Ave	11.3	B	0.71	30.1	C	0.96	
Brookshire Frwy NB ramps	9.7	A	0.63	44.4	D	0.97	
Brookshire Frwy SB ramps/French St	46.8	D	0.90	46.2	D	1.27	
Dixon St	5.8	A	0.44	8.9	A	0.47	
Rozzelles Ferry Rd./5th St	39.2	D	0.65	121.7	F	1.26	
Trade St							
I-77 SB ramps	13.2	B	0.50	11.3	B	0.54	
I-77 NB ramps	34.9	C	0.97	30.5	C	1.03	
Irwin St/Johnson & Wales Way	17.4	B	0.58	35.3	D	0.88	
Cedar St	8.3	A	0.49	140.1	F	1.88	
Graham St	46.7	D	0.89	47.8	D	0.83	
Mint St/Pine St	7.9	A	0.34	8.6	A	0.30	
Poplar St	7.8	A	0.39	17.3	B	0.49	
Church St	22.6	C	0.65	10.2	B	0.62	
Tryon St	24.8	C	0.38	13.7	B	0.31	
College St	22.5	C	0.75	14.5	B	0.55	
Brevard St	15.8	B	0.46	18.2	B	0.37	
Caldwell St	8.6	A	0.41	10.5	B	0.47	
Davidson St	23.7	C	0.66	15.7	B	0.49	
Alexander St	9.6	A	0.26	6	A	0.24	
McDowell St	17.4	B	0.54	20.4	C	0.77	
Elizabeth St							
Kings Dr	21.3	C	0.78	18.1	B	0.79	
Charlottetown Ave	16	B	0.50	16.9	B	0.55	
Hawthorne Ln	73.8	E	1.02	47.5	D	0.89	
Hawthorne Ln							
5th St	18.6	B	0.60	17.4	B	0.69	
7th St	78.8	E	0.80	41.9	D	0.97	
Central Ave	29.8	C	0.83	29.1	C	0.77	
Central Ave							
Pecan Ave	23.8	C	0.94	17.1	B	0.75	
Thomas Ave	6.4	A	0.61	8.3	A	0.60	
The Plaza	70.4	E	0.87	27.4	C	0.80	
Morningside Dr	7.9	A	0.61	11.1	B	0.65	
Eastcrest Dr	5.3	A	0.46	4.5	A	0.52	
BriarCreek Rd	12.6	B	0.51	40.4	D	0.67	
Eastway Dr	88.1	F	1.03	87	F	1.09	
Kilbourne Dr/Norland Rd	113.9	F	1.08	71.6	E	0.98	
Rosehaven Dr	88.5	F	0.86	29.8	C	0.78	
Sharon Amity Rd	130.9	F	1.27	98.1	F	1.10	
Eastland Mall west entrance	37.2	D	0.54	11.6	B	0.48	

Intersection Capacity Analysis - 2035 Build

Major Street		AM Peak Hour			PM Peak Hour		
Cross Street	Delay (seconds)	Level of Service	V/C Ratio	Delay (seconds)	Level of Service	V/C Ratio	
Beatties Ford Rd							
Hoskins Rd/A Ave	22.7	C	0.73	25.3	C	0.83	
Rosa Parks Pl	11	B	0.70	11.2	B	0.73	
I-85 SB ramps/Kansas Dr	110.8	F	1.18	68.7	E	1.08	
I-85 NB ramps	53.1	D	1.04	44.7	D	1.05	
Montana Dr/Gilbert St	8.5	A	0.61	10.3	B	0.83	
LaSalle St	17.3	B	0.60	109.5	F	1.80	
Booker Ave/Oaklawn Ave	11.2	B	0.71	30.1	C	0.96	
Brookshire Frwy NB ramps	9.8	A	0.63	44.4	D	0.97	
Brookshire Frwy SB ramps/French St	46.8	D	0.87	43.5	D	1.25	
Dixon St	6.8	A	0.65	17.5	B	0.75	
Rozzelles Ferry Rd./5th St	62.9	E	0.83	172.7	F	1.50	
Trade St							
I-77 SB ramps	13.2	B	0.50	11.3	B	0.54	
I-77 NB ramps	34.9	C	0.97	30.5	C	1.03	
Irwin St/Johnson & Wales Way	17.4	B	0.58	35.3	D	0.88	
Cedar St	8.3	A	0.49	140.1	F	1.88	
Graham St	46.7	D	0.89	47.8	D	0.83	
Mint St/Pine St	7.9	A	0.34	8.6	A	0.30	
Poplar St	7.8	A	0.39	17.3	B	0.49	
Church St	22.6	C	0.65	10.2	B	0.62	
Tryon St	24.8	C	0.38	13.7	B	0.31	
College St	22.5	C	0.75	14.5	B	0.55	
Brevard St	20.1	C	0.54	16.8	B	0.39	
Caldwell St	9.1	A	0.45	12.2	B	0.57	
Davidson St	23.7	C	0.66	15.7	B	0.49	
Alexander St	9.6	A	0.26	6	A	0.24	
McDowell St	17.4	B	0.54	20.4	C	0.77	
Elizabeth St							
Kings Dr	21.3	C	0.78	18.1	B	0.79	
Charlottetown Ave	16	B	0.50	16.9	B	0.55	
Hawthorne Ln	73.8	E	1.02	47.5	D	0.89	
Hawthorne Ln							
5th St	18.5	B	0.60	17.3	B	0.69	
7th St	78.8	E	0.80	41.2	D	0.97	
Central Ave	29.8	C	0.83	29.1	C	0.77	
Central Ave							
Pecan Ave	23.8	C	0.94	17.1	B	0.75	
Thomas Ave	6.4	A	0.61	8.3	A	0.60	
The Plaza	70.6	E	0.87	27.4	C	0.80	
Morningside Dr	7.9	A	0.61	11.1	B	0.65	
Eastcrest Dr	5.3	A	0.46	4.5	A	0.52	
BriarCreek Rd	12.6	B	0.51	40.4	D	0.67	
Eastway Dr	88.1	F	1.03	87	F	1.09	
Kilbourne Dr/Norland Rd	113.9	F	1.08	71.6	E	0.98	
Rosehaven Dr	88.5	F	0.86	29.8	C	0.78	
Sharon Amity Rd	130.9	F	1.27	98.1	F	1.10	
Eastland Mall west entrance	37.2	D	0.54	11.6	B	0.48	

Major Street		AM Peak Hour			PM Peak Hour		
Cross Street	Delay (seconds)	Level of Service	V/C Ratio	Delay (seconds)	Level of Service	V/C Ratio	
Beatties Ford Rd							
Hoskins Rd/A Ave	0		0.00	6.8		0.00	
Rosa Parks Pl	10		-0.05	10.3		0.21	
I-85 SB ramps/Kansas Dr	4.1		0.00	2.6		0.00	
I-85 NB ramps	0		0.00	-0.2		0.00	
Montana Dr/Gilbert St	0		0.00	0		0.00	
LaSalle St	-0.1		0.00	0		0.00	
Booker Ave/Oaklawn Ave	-0.1		0.00	0		0.00	
Brookshire Frwy NB ramps	0.1		0.00	0		0.00	
Brookshire Frwy SB ramps/French St	0		-0.03	-2.7		-0.02	
Dixon St	1		0.21	8.6		0.28	
Rozzelles Ferry Rd./5th St	23.7		0.18	51		0.24	
Trade St							
I-77 SB ramps	0		0.00	0		0.00	
I-77 NB ramps	0		0.00	0		0.00	
Irwin St/Johnson & Wales Way	0		0.00	0		0.00	
Cedar St	0		0.00	0		0.00	
Graham St	0		0.00	0		0.00	
Mint St/Pine St	0		0.00	0		0.00	
Poplar St	0		0.00	0		0.00	
Church St	0		0.00	0		0.00	
Tryon St	0		0.00	0		0.00	
College St	0		0.00	0		0.00	
Brevard St	4.3		0.08	-1.4		0.02	
Caldwell St	0.5		0.04	1.7		0.10	
Davidson St	0		0.00	0		0.00	
Alexander St	0		0.00	0		0.00	
McDowell St	0		0.00	0		0.00	
Elizabeth St							
Kings Dr	0		0.00	0		0.00	
Charlottetowne Ave	0		0.00	0		0.00	
Hawthorne Ln	0		0.00	0		0.00	
Hawthorne Ln							
5th St	-0.1		0.00	-0.1		0.00	
7th St	0		0.00	-0.7		0.00	
Central Ave	0		0.00	0		0.00	
Central Ave							
Pecan Ave	0		0.00	0		0.00	
Thomas Ave	0		0.00	0		0.00	
The Plaza	0.2		0.00	0		0.00	
Morningside Dr	0		0.00	0		0.00	
Eastcrest Dr	0		0.00	0		0.00	
BriarCreek Rd	0		0.00	0		0.00	
Eastway Dr	0		0.00	0		0.00	
Kilbourne Dr/Norland Rd	0		0.00	0		0.00	
Rosehaven Dr	0		0.00	0		0.00	
Sharon Amity Rd	0		0.00	0		0.00	
Eastland Mall west entrance	0		0.00	0		0.00	

APPENDIX E: SUMMARY OF TRANSPORTATION AND LAND USE PLANS

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This appendix presents a comprehensive summary of regional land use and transportation plans and area plans applicable to the Charlotte Streetcar Project (Project). The Project is consistent with several of the local and regional plans and policies defined in this appendix. The Locally Preferred Alternative (LPA) responds to the needs, goals, objectives, and recommendations adopted in the various Area Plans that apply to segments of the Project study area. The No-Build is consistent with many of the respective needs, goals, and objectives of these respective plans, however, the LPA is more successful in meeting these needs, goals, and objectives. Plans are organized as follows:

Land Use Plans.....	1
Centers, Corridors, and Wedges Growth Framework	1
General Development Policies	2
Center City Vision Plan 2010.....	2
Transportation Plans.....	4
2025 Integrated Transit/Land Use Plan	4
2025 Corridor System Plan.....	4
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Urban Street Design Guidelines	6
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Mecklenburg-Union MPO Thoroughfare Plan	7
Area Plans	8
Second Ward Neighborhood Master Plan.....	8
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Belmont Area Revitalization Plan.....	10
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Eastside Strategy Plan and Eastland Area Plan	12
Briar Creek/Woodland/Merry Oaks Small Area Plan.....	13
Figure E1 – Applicability of Area Plans	15

LAND USE PLANS

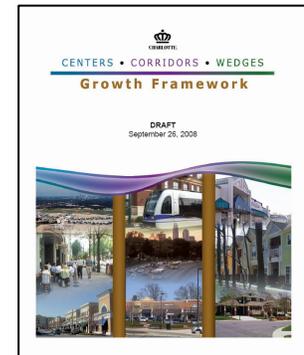
Centers, Corridors, and Wedges Growth Framework

The *Centers, Corridors, and Wedges Growth Framework* (*Centers, Corridors, and Wedges*) is the policy for organizing and guiding growth and development within the City of Charlotte and Mecklenburg County. The original development framework, *Centers and Corridors*, was introduced in 1994. It focused on forming a stronger link between land use and transportation to maximize use of existing transportation facilities and reduce demand for new infrastructure. The 1994 plan defined two types of growth areas: centers and corridors. Centers are focal points of economic activity, typically planned for concentrations of compact development. Many existing activity centers have the capacity for significant new growth in conjunction with enhancements to the supporting infrastructure. There are three types of activity centers: Center City, Mixed Use Centers, and Industrial Centers. Growth Corridors include five linear areas that extend radially from Center City to the edge of Charlotte and are defined as appropriate for significant new growth. Within the Growth Corridors there are three types of subareas: General Corridor areas, Transit Station areas, and Interchange areas.

Centers, Corridors, and Wedges updates the original Centers and Corridors plan and was adopted by the Charlotte City Council in August 2010. The update provides more specific definitions and guidance for centers and corridors and expands the growth framework to include a new category called “wedges.” Wedges are large areas between growth corridors where residential neighborhoods have developed and continue to grow. Wedges are predominately areas of low-density development with a limited amount of moderate-density housing and support facilities and services. The revised plan also broadens the original transportation-oriented focus to include other aspects of planning and development such as public facility needs and environmental concerns.

The Project alignment would link activity centers (Rosa Parks Place Community Transit Center, Center City, Eastland mixed use center area), corridors (Southeast Transit Corridor), and wedges, which include areas adjacent to Beatties Ford Road and Central Avenue. Beginning at the Rosa Parks Place Community Transit Center, the route runs southeast through a wedge area along Beatties Ford Road, providing a direct connection to Center City, a primary activity center. East of the Center City, the route runs through the Southeast Transit Corridor until it reaches the vicinity of Central Avenue at Briar Creek Road; from there it continues east and provides a connection to the Eastland mixed use center area designated around Central Avenue and Albemarle Road.

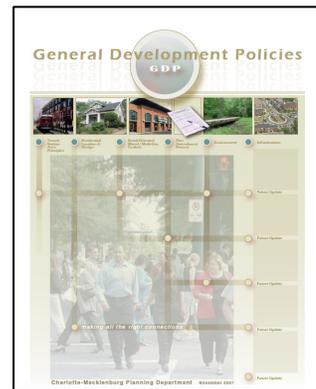
Streetcar supports the governing land use vision document for Charlotte by providing a critical east-west transit connection. In line with the vision, the Project would support sustained economic growth and vitality, concentrated development in Center City and along corridors and at key economic centers, and combined rapid transit with enhancement of the overall transit system. The Project would enhance mobility to diverse residential areas and housing types.



General Development Policies

The *General Development Policies* (GDP) broadly direct land use plans, updates to zoning and subdivision ordinances, and the integration of land use planning with capital facilities planning, particularly capital improvements related to transportation.

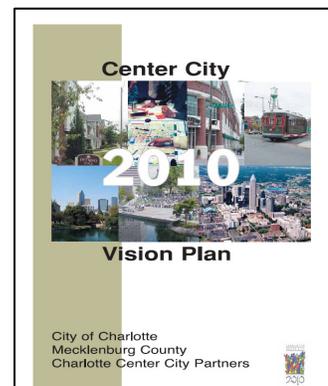
The original GDP were adopted in 1990 and have since been updated in two phases. Phase I was completed in 2003 and includes policies in four key areas relevant to streetcar development: Transit Station Area Development; Residential Location and Design; Retail-Oriented Mixed/Multi-Use Centers; and Plan Amendment Process. Phase II was adopted in 2007 and strives to minimize negative environmental impacts of land use and land development and to more closely link land use and land development decisions with the public infrastructure needed to support them.



In line with stated goals and objectives, the proposed streetcar project contributes to creation of well-designed communities that are appropriately served by public infrastructure, facilities and services; promote healthy lifestyles; and offer a variety of transportation choices.

Center City Vision Plan 2010

In May of 2000, the Charlotte City Council and Mecklenburg County Board of Commissioners adopted the *Center City 2010 Vision Plan*. The plan is scheduled for an update for the year 2020; but this has not yet been completed. The purpose of the plan is to provide direction for future urban design and development in Center City. The vision developed in the planning process is “To create a livable and memorable Center City of distinct neighborhoods connected by unique infrastructure.” The following actions are recommended in the plan for Center City:



- Create an area that serves as the symbolic focus of Charlotte and Mecklenburg County
- Encourage centralized density that discourages decentralized sprawl and development of rural land
- Focus the urban density required to function as a central node for transit destinations and connections

Three of the guiding principles described in the plan are that Charlotte should have a nationally recognized rapid transit and trolley system, that high quality design should be used in transit and other infrastructure and architectural elements, and that both should be connected.

To include connections to neighborhoods outside of the I-277 loop, enhanced transit options and pedestrian and bicycle paths should be emphasized. Key points in the vision for the transit system include providing a viable transit alternative to vehicles, increasing transit ridership, establishing efficient points of transfer, and studying alternatives for an east-west transit corridor.

Streetcar supports several points outlined in the plans vision including providing a viable transit alternative to vehicles, increasing transit ridership, establishing efficient points of transfer, and

studying alternatives for an east-west transit corridor. Further, the streetcar will be critical in creating a transit focused and pedestrian oriented center city through developing an integrated transportation system of pedestrians, bikes, motor vehicles, transit, parking, and land use.

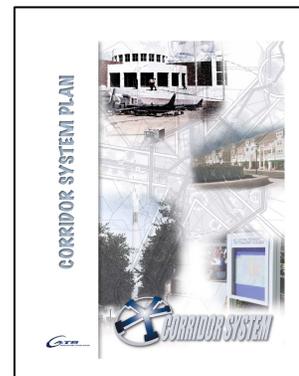
TRANSPORTATION PLANS

2025 Integrated Transit/Land Use Plan

The *2025 Integrated Transit/Land Use Plan*, completed in October 1998, built on the *Centers and Corridors Concept Plan*. The *2025 Integrated Transit/Land Use Plan* provides a direct connection between transit and land use decisions and promotes growth in the five major transit corridors. It also discusses transit technologies for each of the five corridors, as well as improvements to the existing bus services. Goals include linking the wedges to the corridors by a feeder bus system so that every part of the Charlotte-Mecklenburg area has access to transit, combining transit solutions with road improvements, and involving citizens extensively in the system development process. This plan was crucial in the Mecklenburg County voters' approval of the half-cent sales tax for transit in 1998.

2025 Corridor System Plan

The *2025 Corridor System Plan* was developed in 2002 by CATS and the Charlotte Mecklenburg Planning Commission. This plan built on the *Centers and Corridors Concept Plan* and the *2025 Integrated Transit/Land Use Plan*. The *2025 Corridor System Plan* ties together recommended improvements in the five transit corridors and Center City as an integrated system to support the land use objectives and address mobility needs within available financial resources. The key principles of the *2025 Corridor System Plan* includes land use, mobility, environment, finance, and system development. According to the plan, transit-oriented development around transit stations will help sustain economic growth and vitality within close proximity to the stations while contributing to the enrichment of the Center City and other key activity centers. The components of the plan in Center City, including the Project, fulfill system principles by integrating corridor components as a system, promoting inter-corridor travel, and providing circulation and distribution throughout Center City, adjoining communities and institutions. The components also facilitate access and mobility in Center City. A brief summary of the plan from the *2025 Corridor System Plan* document follows.



South Corridor

The 2025 Corridor System Plan outlined the implementation schedule for the South Corridor. This light rail transit (LRT) was implemented as the LYNX from Seventh Street in Center City along the former freight right-of-way to I-485. The LYNX began revenue service in November 2007.

North Corridor

The North Corridor extends from Mooresville in Iredell County to Center City in Charlotte. Two rapid transit components will be used in the corridor: commuter rail serving the eastern portion of the corridor and enhanced bus service serving the western portion.

Northeast Corridor

The Northeast Corridor extends from Concord Mills in Cabarrus County through the UNC-Charlotte/University Research Park area to Center City in Charlotte. Both LRT and Bus Rapid Transit (BRT) services are recommended to serve the mobility needs in this corridor.

Southeast Corridor

The Southeast Corridor extends from the Mecklenburg County border with Union County into Charlotte's Center City. Both BRT and streetcar services are recommended to serve this corridor.

West Corridor

The West Corridor extends from the Catawba River to Center City. The recommendation for West Corridor includes BRT and enhanced bus service.

Center City

Recommendations for transit in Center City include the Project, the Charlotte Transportation Center, the West Trade Multi-Modal Station (Charlotte Gateway Station), and a north-south LRT spine.

2030 Transit Corridor System Plan

The City of Charlotte adopted the *2030 Transit System Corridor Plan* in 2006. The plan furthers the vision outlined in the *2025 Integrated Transit/Land Use Plan*. The plan helps to focus future growth along five primary transportation corridors, linking the area's key centers of economic activity. The document consists of multiple rapid transit improvements in five corridors, a series of Center City improvements, and bus service and facility improvements throughout the region. Key objectives of the plan are as follows:

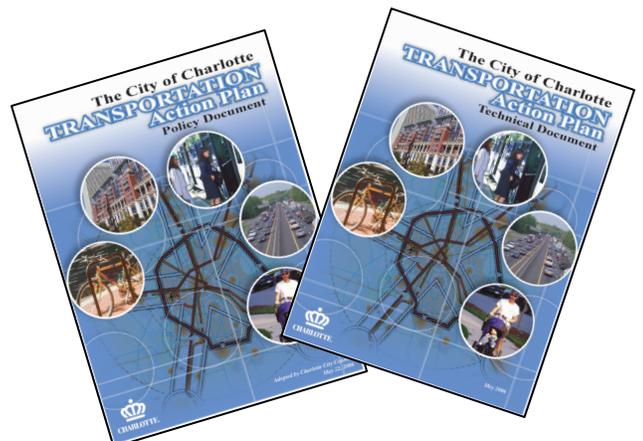


- Support the development of pedestrian-friendly urban neighborhoods with a mixture of land uses
- Enhance quality of life
- Support sustainable regional growth
- Enhance pedestrian safety
- Reduce dependence on gridlocked roads
- Contribute to the region's attainment of air quality standards

When completed, recommended projects in the plan will add 25 miles of commuter rail, 21 miles of light rail, 16 miles of streetcar, 14 miles of bus rapid transit, and an expanded network of buses and other transit services.

Transportation Action Plan

In May 2006, the Charlotte City Council adopted its first comprehensive transportation plan, the *Transportation Action Plan* (TAP). Consisting of two parts, the policy document and the technical document, the TAP evaluates the existing and future



transportation system. The plan sets a short- and long-term strategy for implementing the following goals:

1. Continue implementation of the Centers and Corridors strategy
2. Prioritize, design, construct, and maintain convenient and efficient transportation facilities to improve safety, neighborhood livability, promote transportation choices, and meet land use objectives
3. Collaborate with local and regional partners on land use, transportation, and air quality to enhance environmental quality and promote long-term regional sustainability
4. Communicate land use and transportation objectives and services to key stakeholders
5. Seek financial resources, external grants, and funding partnerships necessary to implement transportation programs and services

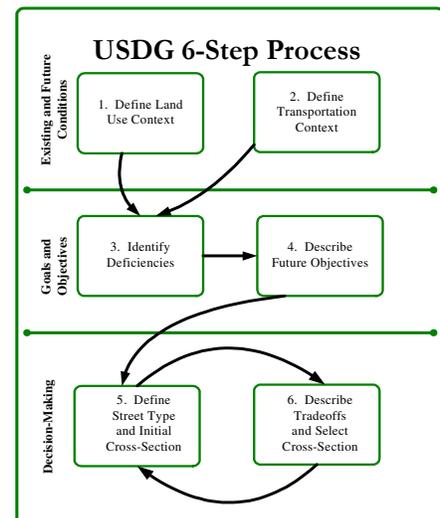
The TAP highlights necessary improvements, approximates costs, and proposes revenue sources.

Urban Street Design Guidelines

Urban Street Design Guidelines (USDG) is the governing policy document for creating “complete streets” that balance the safety, capacity, and mobility needs of motorists, pedestrians, and cyclists. It defines a process that ensures the appropriate street types and street design elements are used to support land development and transportation objectives. Further, this process ensures that street design and land use/urban design decisions are complementary. Public involvement is at the core of the USDG process.

The following steps comprise the USDG process:

1. Define the land use context
2. Define transportation context
3. Identify deficiencies
4. Describe future objectives
5. Define street type and initial cross-section
6. Describe tradeoffs and select cross-section



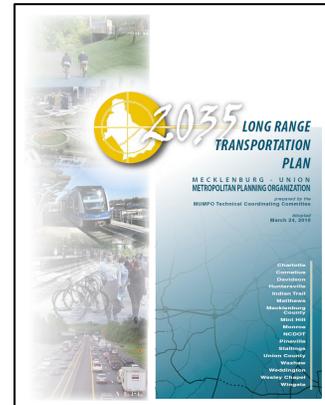
Center City Transportation Plan

The *Center City Transportation Plan* is a strategy to encourage everyone to become a pedestrian in downtown Charlotte. The focus of this study is the area encompassed by the I-77/I-277 loop, as well as connections to adjacent areas. The objective of the plan is to “plan transportation strategies to maximize economic development opportunities in the Center City and, by extension, the Charlotte region.” The plan states, “The combination of all major destinations being within a five minute walk from transit, all drivers able to take a short drive on Center City streets to a convenient parking location, and each of them able to walk or use transit

between Center City destinations rather than driving because of the pedestrian-friendly environment.” That statement is the strategic framework upon which the Center City Transportation Study proposals have been built.

2035 Long Range Transportation Plan

The Mecklenburg-Union Metropolitan Planning Organization (MUMPO) adopted the *2035 Long Range Transportation Plan* on March 24, 2010. MUMPO is required to periodically develop a long-range transportation plan (LRTP), with a planning horizon of at least 20 years. The 2035 LRTP is an update of the 2030 LRTP, which was adopted in 2005.

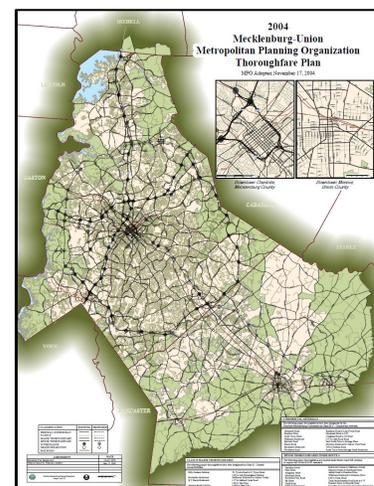


The 2035 LRTP defines policies, programs, and projects to be implemented over the next 20-plus years in order to reduce congestion, improve safety, support land use plans, and provide mobility choices in MUMPO’s planning area. The LRTP contains recommendations for the following types of surface transportation: streets and roads, transit routes, guideways, greenways, and bicycle and pedestrian facilities. The LRTP also contains descriptions and assessments of conditions or factors affecting the surface transportation of persons and/or the movement of freight within MUMPO’s planning area.

MUMPO is required to develop an LRTP that prioritizes transportation projects that cumulatively do not exceed identified revenues. The LRTP identifies 64 fiscally-constrained projects, with an estimated future year cost of \$4.8 billion.

Mecklenburg-Union MPO Thoroughfare Plan

The MUMPO adopted the bicounty Thoroughfare Plan on November 17, 2004. The plan provides a functional hierarchy of major streets and recommends the most appropriate street system to meet existing and future travel needs in an area. The plan is designed to reduce travel and transportation costs and reduce the costs of major street improvements, mainly through coordination with private participation. The plan aims to minimize impacts to people, business, and the environment.

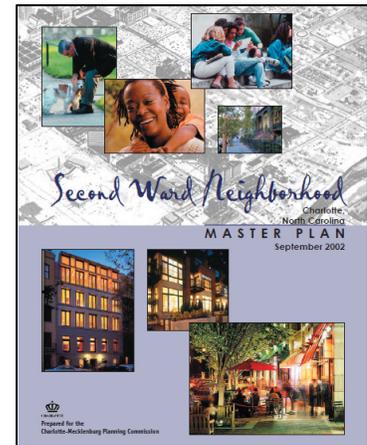


The existing plan defines four thoroughfare classifications: Freeway-Expressway; Class II Major Thoroughfares – Limited Access Facilities; Class III C- Commercial Arterials; and Minor Thoroughfares. Beatties Ford Road, Central Avenue, Elizabeth Avenue, and Trade Street are each classified as a Major Thoroughfare. Hawthorne Lane is a Major Thoroughfare between Elizabeth Avenue and Central Avenue; however, it becomes a Minor Thoroughfare north of Central Avenue. Clement Avenue is not classified in the Thoroughfare Plan because it is considered a neighborhood street.

AREA PLANS

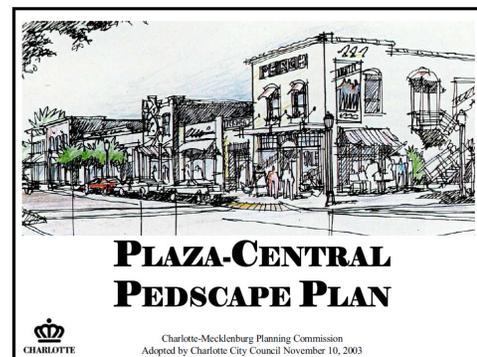
Second Ward Neighborhood Master Plan

The *Second Ward Neighborhood Master Plan* was created to focus and refine the vision established in the *Center City 2010 Vision Plan*. As described in the master plan, the Second Ward was once a vibrant African-American urban community known as “Brooklyn” that has been transformed into a low-density, nine-to-five, office district. Included among the goals established for the Second Ward are the creation of a diverse residential population, a livable 18-hour urban neighborhood, and provision of a safe and secure pedestrian-friendly environment. According to the master plan, “As the Center City wards continue to develop and draw residents to the uptown area, the wards must be better connected to one another and to the adjacent neighborhoods outside the I-277 loop. The Second Ward’s proximity to the stable and desirable communities of Dilworth, Midtown, and Elizabeth will reinforce the vision of an urban residential district. Improved pedestrian and transit connectivity will help weave the Second Ward into the fabric of the Center City neighborhoods and the region.” Specific recommendations include the development of a substantial residential population, a diversity of land uses, and open spaces. Access to future transit is described as critical to the success of a new urban residential community. Some transportation and parking recommendations outlined in the master plan are to create an intricate pattern of streets reminiscent of the Brooklyn neighborhood, advocate and support alternative transportation modes, provide on-street parking where possible, and provide enhanced pedestrian and bicycle amenities.



Plaza-Central Pedscape Plan

The *Plaza-Central Pedscape Plan* was adopted in 2003 with the purpose of defining a pedestrian-oriented future for the Plaza-Central district and describing how the vision can be achieved. The Plaza-Central district encompasses all of the parcels fronting Central Avenue, from the intersection with Independence Boulevard to Nandina Street. Other parcels within walking distance that are zoned for business, office, or mixed-use, as well as an area currently zoned as industrial adjacent to Central Avenue are also included. Current land uses in the district include commercial, some office and institutional, and scattered residential.



The Plaza-Central district originally developed along streetcar lines, but eventually became automobile-centered. According to the pedscape plan, “revival in Charlotte’s Center City and the emergence of a strong residential market at the City core has reenergized many of the old neighborhoods close by. Neighborhoods such as Plaza Midwood and adjoining Commonwealth-Morningside have continued revitalization and emerged as safe, attractive, and sought-after

residential areas. The Plaza-Central district is the commercial area adjacent to and serving these neighborhoods. While the east end of the district generally has a complete network of streets allowing for multiple means of pedestrian access, the continuity of the grid-system street network is severed west of the CSX Railroad tracks.

According to the pedscape plan, the overall vision for the district is the creation of a vibrant mixed-use district primarily serving surrounding neighborhoods and the realization of a historic way of living while protecting special aspects of the area. Included among elements articulated in the vision for the corridor are a range of transportation choices such as streetcar stops and a rapid transit station. It is expected that trees and pedestrian activity will define the corridor, along with outdoor commercial activity and pedestrian-oriented building types that honor the history of the area.

West End Land Use and Pedscape Plan

Similar to the pedscape plan for the Plaza-Central district, the purpose of the *West End Land Use and Pedscape Plan* is to define the vision and land use policy for West End and how it will be achieved. All parcels fronting West Trade Street, West 5th Street, and Beatties Ford Road from I-77 to I-85, as well as areas along adjacent streets zoned for nonresidential use are included in this area plan. The area is divided into five districts: (1) I-77 to Five Points/Rozelles Ferry Road, (2) Five Points/Rozelles Ferry Road to the Brookshire Freeway, (3) Brookshire Freeway to Russell Street, (4) Russell Street to LaSalle Street, and (5) LaSalle Street to I-85. West End is described as a unique combination of historic landmarks, commercial nodes, schools, parks, and residential areas, including a locally registered historic community. The area also has convenient access to Uptown, major highways, and heavily used transit routes. Needs in the area include development of vacant property and reuse of buildings. The key concepts in the vision for West End are: use of land use policies and zoning to drive the vision, protection of the historic character, better use of property, and development of the district from I-77 to Five Points/Rozelles Ferry Road into an urban/cultural/arts destination.



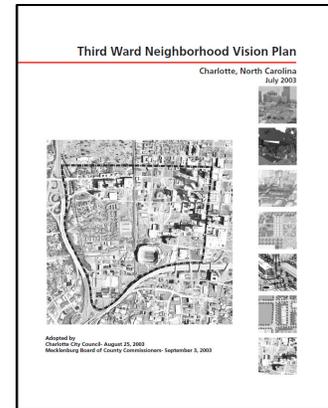
Intersections and mid-block crossings that are currently intimidating for pedestrians are described in the plan. Each of the following crossings corresponds with possible streetcar stops:

- Five Points intersection: intimidating because of a wide crossing dimension
- French Street and Beatties Ford Road: the crosswalk is marked and crossing distances are manageable
- Oaklawn/Booker Avenue and Beatties Ford Road: recent alignment has shortened crossing distances; decorative pedestrian lighting and improved wheelchair ramps have been added
- LaSalle Street and Beatties Ford Road: the busiest intersection in the area; could benefit from minor improvements but is relatively easy to cross

Detailed recommendations for land use, design, and street layers are provided in the pedscape plan, including incorporation of the Project.

Third Ward Neighborhood Vision Plan

The *Third Ward Neighborhood Vision Plan* applies to an area bound by Morehead, Cedar, Fifth, and Tryon streets. The main landmark within the ward is Bank of America Stadium, the home of the National Football League's Carolina Panthers. A key aim of the plan is to lure development back into vacant land in the Third Ward. Assets of the Third Ward, as described in the plan, are its direct access to I-77, park connections, new investments in Gateway Village and at Fifth and Poplar, historical features such as Latta Arcade, stable neighborhoods, consolidated ownership of parcels, and a short walking distance to the intersection of Trade and Tryon streets. Opportunities identified in the plan include new institutions such as Johnson and Wales University, the multimodal station (Charlotte Gateway Station), the potential streetcar service, and "Green Street" (pedestrian/bicycle-friendly street) plans for Poplar and Second streets. Principles for the area outlined in the plan include the use of mixed-use neighborhoods, capitalization of Trade and Tryon's identity, balanced street design where pedestrian safety and comfort are emphasized, connecting east and west sides of Third Ward, tying Third Ward with green streets and parks, and taking advantage of transit corridors for mixed use development.



A main emphasis in the plan is for a new park called New West Park. Three locations and three park designs are proposed in the plan: county-owned land centered around the Virginia Paper building and bisected by Third Street, a location on Trade Street, or a location on Tryon Street.

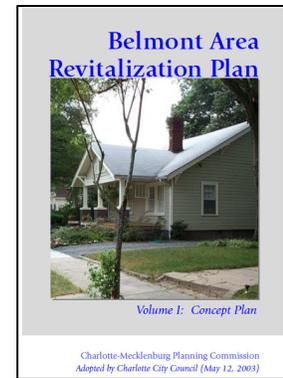
The plan also includes specific street recommendations. It is indicated that transit (a streetcar) along Trade Street could emphasize the use of Third/Fourth and Fifth/Sixth streets as major thoroughfare couplets and as one-way "workhorse streets," stressing the importance of promoting pedestrian safety and comfort along and across the intersections. Also, according to the plan, "the pedestrian realm along Trade Street should reflect the significance of Trade Street to Charlotte's history—a grand civic streetscape, made with high quality materials and detailing. Efforts should be sought to retain the landscape median that exists in the Third Ward portion of Trade Street." The design of two streets, Graham and Church, which are also potential locations of streetcar stops, were identified as pedestrian problem areas. In the plan, it is recommended that street widths be kept to a minimum, wide traffic lanes be reduced to the minimum feasible width, curbs be realigned to be continuous along the length of the road, and on-street parking be promoted.

Belmont Area Revitalization Plan

The *Belmont Area Revitalization Plan* pertains to the land area bound by Catawba Avenue on the north, the Plaza to Belvedere Avenue to Thomas Avenue on the east, Central Avenue and Tenth Street on the south, Brookshire Freeway on the southwest, and North Davidson Street on the west. This area incorporates part of, but extends beyond the project corridor. According to the plan, the vision for the Belmont area is that "Belmont will be a family-oriented community, diverse in age, culture, and income, that promotes public safety, economic and community

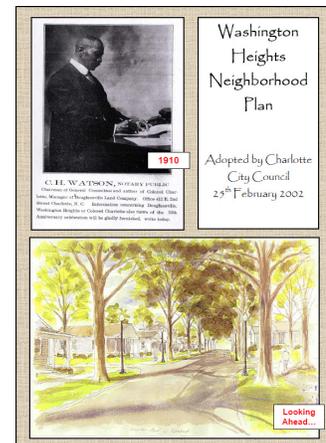
development, affordable housing and community pride—a place to live, work, and play.” Challenges faced in the area include a perception of high crime and disinvestment, a need for major repair of over 25 percent of the homes, a high percentage of renter-occupied homes, and low household incomes.

A goal for the area related to traffic and transportation is to create a more pedestrian-friendly community and allow for an easier flow of vehicle traffic. Specific recommendations include providing more traffic signals at major pedestrian crossings; exploring traffic calming; and exploring additional connections for buses and other transit modes, particularly in the interior of the Belmont neighborhood. The plan presents a series of 16 housing and economic development projects to meet transportation-related and other goals for the area. Specific recommendations that pertain to the Belmont area and are within the study criteria include a neighborhood-scale mixed-use project at Seigle and Belmont and additional retail development along Central Avenue. According to the plan, the retail along Central Avenue is likely to be neighborhood-oriented retail and some small-scale dining and entertainment.



Washington Heights Neighborhood Plan

The *Washington Heights Neighborhood Plan* pertains to the area bound by the Brookshire Freeway to the south, Beatties Ford Road to the east, Estelle Street to the north, and LaSalle Street to the west. According to the plan, Historic Washington Heights has a strong sense of pride and place, formed by its tree-lined streets, distinctive architecture, proximity to the City’s commercial and cultural heart, and history as a walkable urban neighborhood. The vision for historic Washington Heights is to develop and maintain an attractive, historic neighborhood that has a variety of stable housing opportunities and pedestrian-friendly streets that provide access to jobs, parking, transit, schools, businesses and other resources. In accordance with this vision, the plan provides recommendations for addressing land use and urban design, infrastructure, economic development, public recreation and open space, and education.



The plan contains the following goals related to transportation:

- Improve pedestrian, bicycle, and vehicular circulation and safety
- Identify infrastructure needs and improvements
- Improve traffic flow and the pedestrian realm on Beatties Ford Road
- Ensure that current and future transit needs are considered

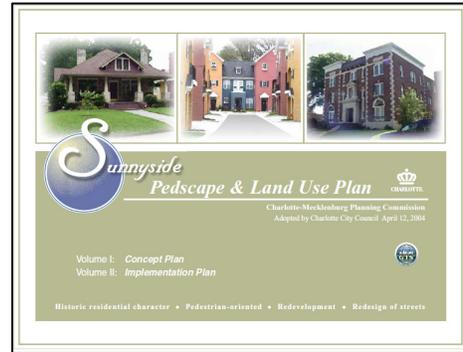
Sunnyside Pedscape & Land Use Plan

The *Sunnyside Pedscape & Land Use Plan* defines the vision and the land use policy for the Sunnyside area, and shows how this vision will be achieved: first, by providing standards for private-sector investment in new development and redevelopment efforts, and then by making recommendations for public sector improvements.

The plan updates the Central District Plan (Charlotte, 1993) as the land use policy for the area within the plan boundary. The *Sunnyside Pedscape & Land Use Plan* is intended to achieve the following goals:

- Serve as the future land use policy document for this area
- Identify the ultimate curb line, as well as building setbacks and streetscape requirements for new development within the proposed Pedestrian Overlay District part of the plan area
- Recommend possible public investments to enhance the pedestrian environment

The overall vision is to preserve the existing residential core for the western half of the area and create a well-designed mix of residential and office land uses for the eastern half of the area. In addition, the area will contain new pedestrian amenities and help support existing and future transit initiatives.



Eastside Strategy Plan and Eastland Area Plan

The Eastside Strategy Plan was adopted in October 2001, and the Eastland Area Plan was adopted in June 2003. The Eastside encompasses 44 square miles from Eastway Drive to the west, the Plaza/Plaza Road Extension to the north, Monroe Road to the south, and the Charlotte City limits to the east. The portion of the area from Eastway Drive to just beyond Eastland Mall on Central Avenue falls within the study area. The Eastside is characterized as ethnically diverse with attractive and affordable neighborhoods, but also has some challenges. Challenges include a large amount of apartment and strip development, aging commercial areas, limited employment opportunities, an automobile-oriented transportation system, and some community appearance issues. One particular challenge is the reliance on automobiles for mobility. According to the plan, sidewalks exist along many of the corridors in the area, but a number of roads are unsafe for pedestrians and bicyclists. Intersections along Central Avenue are cited as one of the areas that are particularly dangerous. It is also indicated that, while a fairly good public transportation system is available for mobility between the Eastside and Uptown, services providing lateral movement around Eastside are lacking. According to the plan, funding has been approved to construct a new sidewalk with planting strips and decorative pedestrian lights on both sides of Central Avenue from Morningside Drive to Sharon Amity Road, as well as the addition of bike lanes and a center turn lane or median on Central Avenue from Eastway Drive to Sharon Amity Road. A study of the Eastland Mall area is also underway to identify streetscape projects in that area.

The vision for the Eastside is a place where people

- have a wide variety of desirable and affordable housing options available to them;
- are able to live in close proximity to where they work and shop;



- can safely and easily walk, bicycle, drive, or ride transit to get to destinations throughout the area;
- find excellent public schools and a host of educational opportunities;
- appreciate the area’s safe and beautifully landscaped streets.

One of the goals set to achieve this vision is to ensure that roads, sidewalks, bikeways, and public transit are in place to allow people to move about safely and with ease. According to the plan, the Central Avenue bus route, CATS Route 9, which provides frequent service to Eastland Mall, is one of the most successful transit routes in the City of Charlotte. Sidewalks are located along most of the Central Avenue corridor, but not on the frontage of Eastland Mall where there is substantial pedestrian traffic. Specific recommendations in the plan related to transit are to improve service along the corridor and to link to planned rapid transit routes, with particular consideration given to circumferential routes.

In the plan, Eastland Mall is identified as a potential revitalization/redevelopment opportunity as a town center. “Eastland Mall and the surrounding area provides an opportunity for redevelopment leading to the creation of an attractive pedestrian-oriented “town center” environment. Development of such a center could breathe new life in this Eastside area that is beginning to age and show signs of decline” (Eastland Area Plan). The plan explains this recommendation in further detail. Recommendations for specific uses to incorporate in the town center include retail, entertainment, office uses, urban housing, a town square or village green, civic uses, and a community transit center.

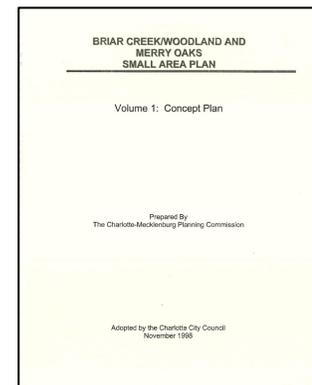
The Eastland Area Plan also recommends creating an international district that would extend along Central Avenue from Kilborne Drive to Sharon Amity Road and would expand upon the naturally emerging international district in this area.

Briar Creek/Woodland/Merry Oaks Small Area Plan

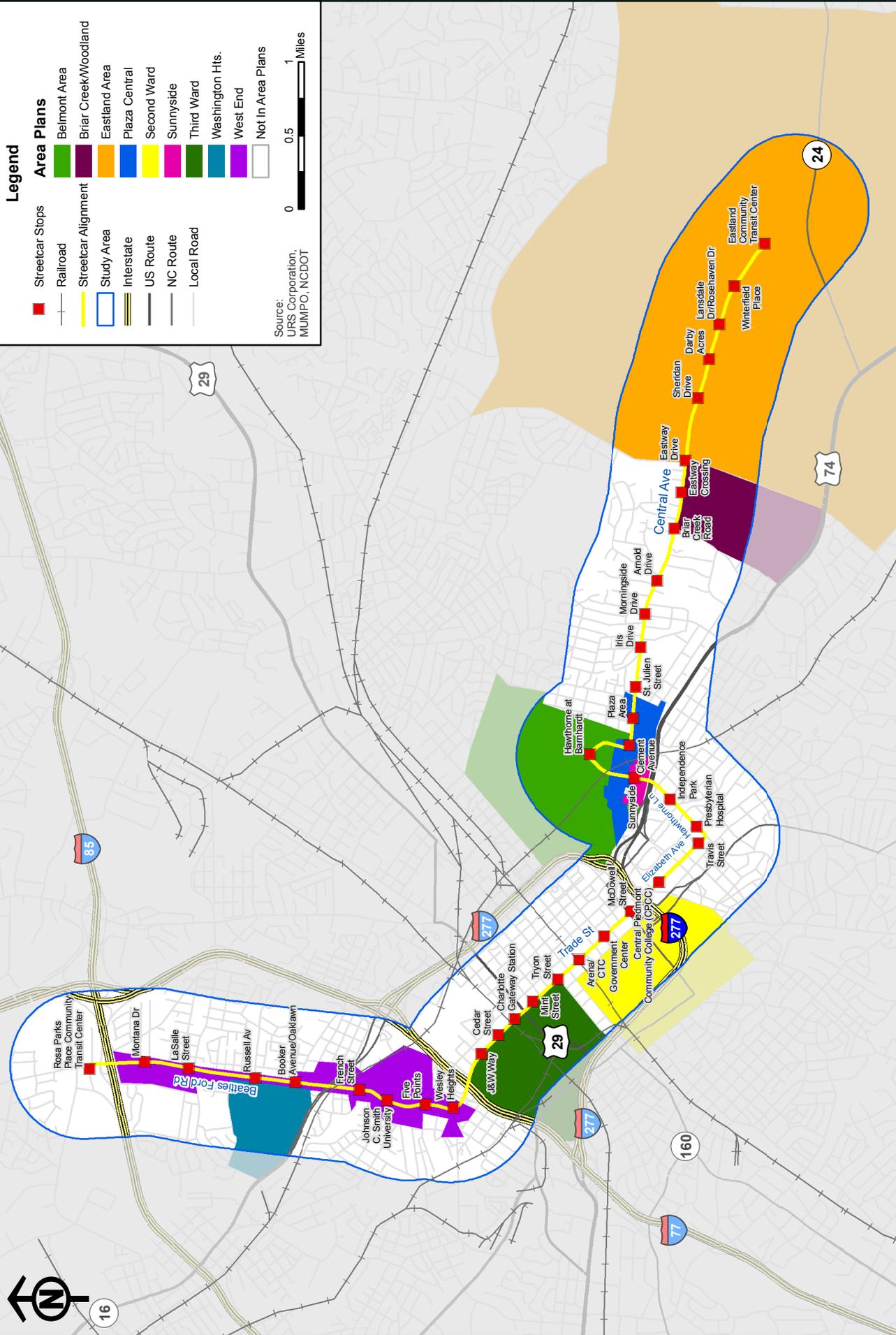
The *Briar Creek/Woodland/Merry Oaks Small Area Plan* was adopted in 1998. It refines the 1993 Central District Plan. The boundaries for the plan include Briar Creek on the west, the Charlotte Country Club and the Park Apartments on the north, Eastway Drive on the east, and East Independence Boulevard on the south. The plan provides further direction for guiding development within the study area. The vision for this area is to develop and maintain the region as the center of the international community in Charlotte characterized by the following:

- Diverse cultural mix of people living and working in a safe environment
- Thriving pedestrian-oriented, international business district along an attractive, prospering, Central Avenue
- Wide variety of stable single family and multi-family housing opportunities
- Recreational and cultural facilities
- Good pedestrian and bicycle accessibility

The plan identifies issues across seven categories: land use, economic development, transportation, parks and recreation, community safety, schools, and human services. To



ensure the stability and vitality of the study area neighborhoods, plan recommendations address each of the aforementioned issue categories. Transportation recommendations include improving safety and mobility for pedestrians, bicyclists, transit riders, and motorists, and creating a vision for Eastway Drive as a tree-lined boulevard with a median and linear park on the eastern side of the corridor.



Legend

■ Streetcar Stops	Area Plans
— Railroad	■ Belmont Area
— Streetcar Alignment	■ Briar Creek/Woodland
 Study Area	■ Eastland Area
 Interstate	■ Plaza Central
 US Route	■ Second Ward
 NC Route	■ Sunnyside
 Local Road	■ Third Ward
	■ Washington Hts.
	■ West End
	 Not In Area Plans

Source: URS Corporation, MUMPO, NCDOT

0 0.5 1 Miles



APPENDIX F: REFERENCES AND SUPPORTING TECHNICAL DOCUMENTATION

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REFERENCES AND SUPPORTING TECHNICAL DOCUMENTATION

This appendix lists the documents that were used to develop this Environmental Assessment. The reports listed in Supporting Documentation are on file at the offices of the City of Charlotte for public review. To schedule an appointment to review them, please contact Tonia Wimberly, Deputy Project Manager, at (704) 353-1931, or by email at twimberly@charlottenc.gov.

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APPENDIX G: FINANCE

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FINANCE

This chapter summarizes the proposed capital, operating, and maintenance financial plan for the Charlotte Streetcar Project (Project). It also contains a summary of confirmed and potential funding sources for the effort. The information presented is consistent with the Opinion of Probable Cost Technical Memorandum (2010) and the Operations Plan that is currently in development. The City of Charlotte is still refining the financial plan and, to the extent possible with the information available at the time of this publication, this chapter notes where adjustments may occur in the future.

Capital Finance Plan

This section identifies capital costs and provides a summary of capital funding sources.

Capital Costs

This section presents the capital cost estimates for the Charlotte Streetcar Project, followed by a summary of funding sources. The funding plan described in this section is limited to the opening year of the streetcar system.

The Charlotte Streetcar Project Team developed the following capital cost estimates based on preliminary engineering plans completed at the 30-percent level. The estimates include elements that could be quantified based on preliminary engineering plans or captured by an allowance based on a track-foot basis. The methodology applied 10 cost categories consistent with FTA Standard Cost Categories that can be tracked and audited as the project definition is refined through final design and construction. Estimates are presented in both current-year (2010) and year-of-expenditure (2030) dollars. Current-year estimates are scaled to the projected year-of-expenditure by applying an escalation factor generated from market trends, economic outlook, and material availability analysis.

Table 1 presents the capital cost estimates for the Project by cost category. The probable cost for the Project is \$403 million in 2010 dollars.

Table 1. Current Year¹ and Year of Expenditure Probable Cost for the Project by Cost Category	
Cost Category	Current Year – 2010 (millions)
Guideway and track elements	\$51,776,357
Stops, terminals, intermodal	\$9,697,024
Support facilities: yards, shops, admin buildings	\$13,753,140
Site work and special conditions	\$67,196,253
Systems	\$58,812,749
Right-of-way, land, existing improvements	\$5,918,223
Vehicles ²	\$69,120,000
Professional services	\$55,615,751
Unallocated contingency ³	\$33,000,000
Finance charges	\$0
TOTAL	\$364,679,812
Optional items ⁴	\$37,977,029
TOTAL including optional items	\$402,656,841

¹ Expressed in millions of 2010 dollars, based on the Streetcar’s opening year (2030) operating plan and capital needs.

²Based on the purchase of 16 vehicles needed to operate in 2030 as set in the Operations Plan.

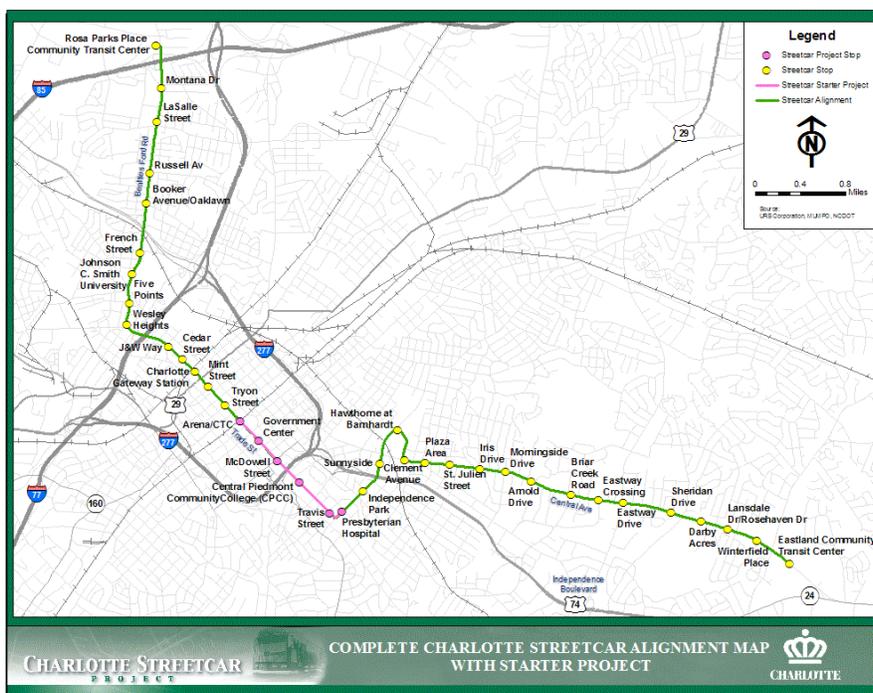
³ Unallocated contingencies are approximately 10 percent of project costs. Other line items, excluding professional services, unallocated contingency, and finance charges, include allocated contingencies ranging from 10 to 20 percent of the line item cost (before contingency).

⁴ Optional items not required for system operation. For the purposes of this estimate, they include: closed circuit television monitoring at each stop, “Blue Light” emergency phones at each stop, robust communication system (fiber optic duct), on-platform ticket vending machines, and battery or super-capacitor installation on vehicles.

Implementation

The Project could be constructed in several phases over a projected 20-year period. The schedule is largely dependent on the availability of proposed funding sources and the progress of the two higher priority projects for the region: the LYNX Blue Line and the North Corridor Commuter Rail. Two milestone investments for the Project occurred prior to completion of the EA documentation – the installation of streetcar infrastructure with the Elizabeth Avenue Business Corridor Project, and the Project Preliminary Engineering and Design. Collectively, these efforts reduce the overall capital financing required for the project.

As part of a recently completed business corridor construction project on Elizabeth Avenue, the City embedded rails on 0.5 miles of the proposed segment to be funded under this program. The business corridor project also included the installation of contact poles for this portion of the Project alignment. This was achieved through a joint public/private venture between four City departments, CPCC, and Grubb Properties, a local developer.



Phase I of the Project, *TE-5103 Charlotte Streetcar Starter Project*, entails construction of the first 1.5 miles in Center City extending along Trade Street and Elizabeth Avenue to Hawthorne Lane and utilizing the 0.5 mile of existing track on Elizabeth Avenue. The main terminus for the project is the CTC; the other terminus is on Hawthorne Lane adjacent to Presbyterian Hospital. The Project segment from CTC to Hawthorne Lane

connects Center City to the campus of CPCC, Presbyterian Hospital, Presbyterian School of Nursing, and the shops and restaurants along Elizabeth Avenue. Three replica trolleys can be used for service on the proposed starter alignment. The trolleys were formally used on the Charlotte Trolley Service in the South Corridor, but the service was discontinued in 2010 due to budget constraints.

The following section discusses funding for the Starter Project.

Proposed Capital Funding Sources

The financial package for the Project is comprised of federal, state, and local funding sources. At the time of this publication, revenues available from the existing one-half cent sales tax were constrained and undetermined. Currently, the region's top transit priorities listed in the 2030

Transit Corridor Systems Plan are the LYNX Blue Line Extension Light Rail and the LYNX Red Line North Corridor Commuter Rail (Red Line). A summary of potential sources follows.

Proposed Federal Funding Sources

Section 5309 Urban Circulator System Grant. In July 2010, the City of Charlotte was awarded an Exempt Discretionary Program Grants (Section 5309) for Urban Circulator Systems in the amount of \$24.99 million to fund the Streetcar Starter Project. The City will contribute \$12 million in local matching funds. Awarding of the federal grant is contingent upon initiating construction within 18 months of the award.

Section 5309 New Starts/Small Starts. This funding program is extremely competitive, particularly for the streetcar projects. This source is not viable in the near-term because funding likely could not be pursued until the LYNX Blue Line and Red Line are funded, primarily because the Project cannot demonstrate a stable local funding source because revenue from the one-half cent sales tax cannot be utilized, and if presented for New Starts funding, the project will directly compete with both aforementioned priority projects.

Miscellaneous Grants. The City of Charlotte may also pursue additional federal funding grant opportunities that arise, such as American Reinvestment Recovery Act (ARRA) funds and Transportation Investments Generating Economic Recovery (TIGER) Discretionary grants.

Proposed State Level Funding Sources

Current transit funding policy in the State of North Carolina requires the state to pay a share equal to one-half of the federal share of transit projects. This state support is programmed into the *2030 Transit Corridor Systems Plan*; the Charlotte Streetcar Project Team expects it will be available for the Project after the LYNX Blue Line and Red Line commitments are met.

Tax Increment Finance (TIF) is a form of debt that is secured by and repaid from property and other tax revenue generated by new development

Proposed Local Funding Sources

County Revenue. The following new revenue sources are authorized or could be authorized for Mecklenburg County (Charlotte, 2009B):

- A one-quarter cent sales tax (authorized by the State Legislature in 2007)
- A four-tenths cent land transfer tax (authorized by the State Legislature in 2007)
- An additional one-half cent sales tax for transit (must be authorized by the Legislature)

City of Charlotte Budget. Funding for the Project may be appropriated from the City of Charlotte's Capital Investment Plan and/or operating budget. Funding could be allocated from the General Government Program, which combines a variety of sources, including debt capacity, pay-as-you-go, and capital reserves. Funding must be approved by the Charlotte City Council. For the Starter Project, the City's \$12 million match consists of \$5.5 million from debt capacity and \$6.5 million from the pay-as-you-go capital fund.

Land-Value-Based Financing Mechanisms. The Charlotte Streetcar Economic Study (Charlotte, 2009) evaluated land-value-based revenue sources. Considering current North Carolina law, the study concluded that the most viable financial sources for the Project are a

new Tax Increment Finance (TIF) district, which was recently authorized by the Legislature, and a Municipal Services District (MSD), already established in portions of downtown. The study projected TIF- and MSD-generated funding based on the development scenarios defined in Section 3.2.3 and adjusted for factors affecting tax proceeds, including the potential MSD rate (0.02 percent to 0.06 percent per year); increases in land value due to a one-time streetcar premium ranging from zero to 10 percent; and appreciation due to neighborhood revitalization (combined, ranging from zero to 0.3 percent per year) (Charlotte, 2009).

Table 2 summarizes the cumulative revenue projections from 2008 through 2035. These value-captured mechanisms alone cannot fund the local share of capital costs because they build value over time, and capital improvement costs are expended up front. Cumulative revenue cannot be directly translated as available potential revenue sources for the Project.

Table 2. Cumulative Revenue Projections 2008 through 2035 (figures in constant 2008 dollars)			
Revenue projections	Revenue Generation Scenarios		
	Low/baseline	Moderate/baseline	High/baseline
MSD revenues	\$27,127,031	\$55,232,861	\$86,149,986
TIF revenues	\$182,079,935	\$193,301,874	\$218,530,175
Total revenues	\$209,206,965	\$248,534,735	\$304,680,160

Low and moderate projections of TIF and MSD use the baseline development scenario, and the high projection uses the accelerated development scenario.

These projections assume no payments from tax-exempt institutions in the Project corridor, consistent with North Carolina law for property taxes and MSDs.

The potential amount of financing that can be supported will be less than the amounts indicated in Table 2 due to interest and bond issuance costs, and will be affected by the timing of Project construction.

The moderate scenario assumes a higher MSD tax rate and higher rates for property value appreciation factors than the low scenario. The high scenario assumes a higher MSD tax rate, larger transit oriented development premium, and an accelerated projection of the amount of new development that will occur in the Project corridor than the moderate and low scenarios.

Vehicle Registration Fee. The City of Charlotte could seek authorization from the State Legislature to increase the annual vehicle registration fee, which is currently \$30 per year.

Operation and Maintenance Finance Plan

This section presents the operation and maintenance cost estimates for the Project LPA, followed by a summary of funding sources. The funding plan described in this section is limited to opening year for the streetcar system.

Cost Estimates

Pending completion of Operations Plan.

Funding Source

The City will assume responsibility for Project operation and maintenance. Expenses will be funded by the City through various departments' funding sources, such as the one-half cent sales tax, fare box revenues, sales tax, interest income, and federal and state operating assistance income, to name a few.

APPENDIX H: SECTION 4(f) RESOURCE COORDINATION

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The purpose of this Appendix is to document the coordination that has occurred between the City of Charlotte, Mecklenburg County Park and Recreation, and the North Carolina State Historic Preservation Office with respect to Section 4(f) properties located on or near the Charlotte Streetcar Project corridor. The following communications are included in this Appendix:

Letter dated August 29, 2006

From: Peter Sandbeck, North Carolina State Historic Preservation Office
To: Marvin Brown, URS Corporation – North Carolina
Regarding: Intensive-level Historic Architectural Survey Draft, CATS City Center Streetcar, Charlotte Area Transit System, Charlotte, Mecklenburg County, ER 05-2463

Letter dated January 28, 2011

From: John Mrzygod, City of Charlotte
To: James Garges, Mecklenburg County Park and Recreation Department
Regarding: Charlotte Streetcar Project

Concurrence Form dated February 1, 2011

Signed By: Renee Gledhill-Earley, North Carolina State Historic Preservation Office
Marvin Brown, URS Corporation – North Carolina
Regarding: Concurrence Form For Assessment of Effects, ER 05-2463



North Carolina Department of Cultural Resources
State Historic Preservation Office

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

August 29, 2006

Marvin Brown
URS Corporation – North Carolina
1600 Perimeter Park Drive
Morrisville, NC 27560

Re: Intensive-level Historic Architectural Survey Draft, CATS City Center Streetcar, Charlotte Area Transit System, Charlotte, Mecklenburg County, ER 05-2463

Dear Mr. Brown:

Thank you for the Letter of Transmittal of July 18, 2006, conveying your draft survey report for the above project.

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following properties are listed in and remain eligible for listing in the National Register of Historic Places:

- Charles R. Jonas Federal Building/United States Post Office and Courthouse, 401 West Trade Street.
- First Presbyterian Church, 200 West Trade Street.
- Mecklenburg County Courthouse, 700 East Trade Street.
- (Former) East Avenue Tabernacle Associated Reformed Presbyterian Church, 926 Elizabeth Avenue.
- Elizabeth Historic District, roughly bounded by Central Avenue, Seaboard Coast Line Railroad, Bascom Street, East Fifth Street, Kenmore Avenue, Park Drive, and East Independence Boulevard. (Proposed reduction of historic boundary due to loss of twenty-two resources within the district).

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following properties were previously determined eligible and remain eligible for listing in the National Register of Historic Places:

- Johnson C. Smith University Historic District, east side of Beatties Ford Road, north of Martin Street.
- West Avenue Presbyterian Church/Mount Moriah Primitive Baptist Church, 747 West Trade Street.
- Fourth Ward Historic District, West Trade Street at south, West Eleventh Street at north, North Church Street at east, and North Smith Street and railroad tracks at west.
- (Former) First National Bank Building, 112 South Tryon Street.
- Wachovia Bank and Trust Company Building, 129 West Trade Street.
- Charlotte City Hall, 600 East Trade Street.

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-4763/733-8653
RESTORATION	515 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6547/715-4801
SURVEY & PLANNING	515 N. Blount Street, Raleigh, NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6545/715-4801

- Medical Office Building, 1530 Elizabeth Street.
- R.C. Biberstein House, 1600 Elizabeth Avenue.
- Cole Manufacturing Company, 1318 Central Avenue.

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following properties are Charlotte-Mecklenburg Historic Local Landmarks and are recommended as eligible for listing in the National Register of Historic Places under the Criteria cited:

- Charlotte Water Works/Vest Station, east side of Beatties Ford Road between Oakland and Patton Avenues, Criterion A, in the area of Community Development, as the largest and best equipped North Carolina water treatment plant in 1924. And Criterion C, for Architecture, as an excellent example of Moderne-style civic building in Charlotte. We concur with the proposed National Register boundaries as described and delineated in the report.
- Excelsior Club, 921 Beatties Ford Road, Criterion A, in the area of Black Ethnic Heritage, for its central position in Charlotte's African-American community. For Criterion B for its association with James Robert "Jimmie" McKee, one of Charlotte's most prominent mid-twentieth-century black citizens. And Criterion C for Architecture, as embodying the characteristics of the Art Moderne style in the city. We concur with the proposed National Register boundaries as described and delineated in the report.
- (Former) Grand Theater/Pharr Building, Criteria A in the area of Black Ethnic Heritage, as Charlotte's only remaining African-American theater from the mid-twentieth century. We concur with the proposed National Register boundaries as described and delineated in the report.
- Builders Building, 312 West Trade Street, Criterion A in the area of Commerce, for its association with contractors, architects, and building-component manufacturers to create a builders exchange in Charlotte. We concur with the proposed National Register boundaries as described and delineated in the report.

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following properties are recommended as eligible for listing in the National Register of Historic Places under the Criteria cited:

- (Former) West Charlotte High School, 1415 Beatties Ford Road, Criteria C and Exception G in the areas of Education and Ethnic Heritage-Black for its association with the history of African-American education and the recent history of desegregation and court-ordered busing in Charlotte. It should be noted that the school retains sufficient integrity to qualify as potentially eligible under these Criteria despite the non-eligible evaluation determined by Woodard and Wyatt in their survey of Charlotte's early twentieth-century industrial and school buildings. We concur with the proposed National Register boundaries as described and delineated in the report.
- Central Avenue Commercial Historic District, 1501-1521 and 1500-1518 Central Avenue, is eligible for the National Register under Criterion A in the areas of Commerce and Transportation for its association with Charlotte's east side trolley line that precipitated the development of this commercial center outside downtown Charlotte. We concur with the proposed National Register boundaries as described and delineated in the report.

- Former Midwood School/Lawyers Road School, 1817 Central Avenue, is eligible for the National Register under Criterion A in the areas of Education and Community Planning and Development, as a good representative example of a post-World War I consolidation-era school in Charlotte. We concur with the proposed National Register boundaries as described and delineated in the report.
- World War II Veterans Memorial, S side of Central Avenue east of Norland Road, at the entry to Evergreen Cemetery, is eligible for the National Register under Criteria A and C and Criterion Consideration (Exception) F, as an unaltered commemorative object, significant for its Art Moderne design and symbolic value as a memorial to Charlotte's World War II dead. We concur with the proposed National Register boundaries as described and delineated in the report. The boundary includes the grassy triangle upon which the memorial rests, two plainly finished stone benches, and modern stone posts and metal pickets.

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following properties are recommended as not eligible for listing in the National Register of Historic Places:

Properties listed in pages 103 through 116 and properties listed in Appendix A, pages 122 through 127.

We look forward to receiving the final copy of this draft survey report.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-733-4763. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,



 Peter Sandbeck

cc: Dave Dickey, URS Corporation
Jeff Weisner, URS Corporation
Historic Dilworth

bc: Brown/McBride
106
County



January 28, 2011

Mr. James Garges, Director
Mecklenburg County Park and Recreation Department
5841 Brookshire Boulevard
Charlotte, NC 28216-2403

RE: Charlotte Streetcar Project

Dear Mr. Garges:

The City of Charlotte (City) is currently planning the 10 mile Charlotte Streetcar Project (CSP). The project is proposed to be constructed with local, state, and federal funding. As such, an Environmental Assessment (EA), in accordance with the National Environmental Policy Act, is in the process of being developed that will document the potential for impacts to publicly-owned parklands, recreation facilities, greenway trails, and wildlife and waterfowl refuges. The project's impacts are also evaluated pursuant to Section 4(f), a provision of federal transportation law at Title 49, USC 303 that affords certain protections to public parks, historic sites, and wildlife refuges.

A coordination meeting was held with Park and Recreation Department staff and CSP team representatives on January 7, 2011 to discuss the project and the potential effects of the project on park lands. This input was used to arrive at a *de minimis* finding and is consistent with the regulations as set forth in Section 6009 of SAFETEA-LU.

After careful review of the resources within the study area and the potential impacts and consultation with your Department, the City has determined that the project would result in no impact to 5 park resources and a *de minimis*, or minimal, impact on one park resource.

The *de minimis* impact would be expected to occur along the road frontage at Veteran's Park. The existing sidewalk in front of Veteran's Park is located adjacent to the curb on Central Avenue and is narrower than the current City standard. To meet the County's and the City's project goals, the sidewalk would be reconstructed in a sidewalk easement adjacent to the right of way, thus providing a preferred planting strip in the right of way between the curb and the sidewalk.

The City is seeking your concurrence with these findings for inclusion in the Draft EA. Following the release and public review of the Draft EA, your concurrence will permit FTA to conclude its Section 4(f) responsibility, with respect to this park, with a determination that the project will have *de minimis* impacts on the resources. If you concur, please sign and date this letter in the space below and return a copy.

We appreciate your Department's participation in the Charlotte Streetcar Project. If you have any questions or concerns, please contact me at (704) 336-2245 or jmrzygod@charlottenc.gov.

Sincerely,

A handwritten signature in black ink that reads "John Mrzygod". The signature is written in a cursive, flowing style.

John Mrzygod, PE
Project Manger
Charlotte Streetcar Project

cc: Keith Melton, FTA Region IV
Lee Jones, County Park and Recreation Department
Gwen Cook, County Park and Recreation Department

As the official with jurisdiction over the referenced park resources, I concur that the proposed Charlotte Streetcar Project, as described in this letter, will not adversely affect the activities, features, and attributes of Veteran's Park. I have also been informed that, based on my concurrence, the FTA intends to make a *de minimis* finding regarding impacts to these resources, thus satisfying the requirements of Section 4(f).

Signature:

Handwritten signature of J. F. Gause in cursive script, written over a horizontal line.

Date:

Handwritten date 2-7-11 in cursive script, written over a horizontal line.

CONCURRENCE FORM FOR ASSESSMENT OF EFFECTS

Project Description: City of Charlotte, Charlotte Streetcar Project, Environmental Assessment

On February 1, 2011, representatives of the

- North Carolina State Historic Preservation Office (HPO)
- City of Charlotte
- Federal Transit Administration (FTA)

Reviewed the subject project and agreed on the effects findings listed within the table on the reverse of this signature page.

Signed:

Representative, HPO

Date

[Signature]

2-1-11

Representative, City of Charlotte

Date

Marvin A. Brown

FTA, for the Division Administrator

Date

[Signature]
State Historic Preservation Officer

2.1.11

Date

Property Name and National Register of Historic Places (NRHP) or Determination of Eligibility (DOE) Status	Effect Finding	Alternative	Reasons
Charles R. Jonas Federal Building/United States Post Office and Courthouse (NRHP)	No Effect	Preliminary 30% plan	No work on historic property
First Presbyterian Church (NRHP)	No Effect		No work on historic property
Mecklenburg County Courthouse (NRHP)	No Effect		Work at "modern" gail end of property
(Former) East Avenue Tabernacle Associated Reformed Presbyterian Church (NRHP)	No Effect		No work on historic property
Elizabeth Historic District (NRHP)	No Adverse Effect		All work in R.O.W. & one TPSS in parking garage. However, TPSS just N of HD would require screening of some sort.
Johnson C. Smith University Historic District (DOE)	No Adverse Effect		Small amount of R.O.W. needed for sidewalk and 2 poles - FTA may use de minimis finding if they agree.
West Avenue Baptist Church/Mount Moriah Primitive Baptist Church (DOE)	No Effect		Small sidewalk change
Fourth Ward Historic District (DOE)	No Effect		Work on other side of street
(Former) First National Bank Building (DOE)	No Effect	↓	No work on historic property

Property Name and National Register of Historic Places (NRHP) or Determination of Eligibility (DOE) Status	Effect Finding	Alternative	Reasons
Wachovia Bank and Trust Company Building (DOE)	No Effect	Preliminary 30% plan	No work on historic property
Charlotte City Hall (DOE)	No Adverse Effect	↓	No work will require A.O.W. - De minimus use of historic property, if FTA agrees
Medical Office Building (DOE)	No Effect	↓	No work on historic property
R.C. Biberstein House (DOE)	No Effect	↓	No work on historic property
Cole Manufacturing Company (DOE)	No Effect	↓	No work on historic property
Charlotte Waterworks/Vest Station (DOE)	No Effect	Preliminary 30% plan	Nothing happening on historic property
Excelsior Club (DOE)	No Effect	↓	No work on historic property
(Former) Grand Theatre/Pharr Building (DOE)	No Effect	↓	No work on historic property

Property Name and National Register of Historic Places (NRHP) or Determination of Eligibility (DOE) Status	Effect Finding	Alternative	Reasons
Builders Building (DOE)	No Effect	Preliminary 30% plan	No work on historic property
Plaza-Midwood Historic District (DOE)	No effect	↓	Minimal sidewalk work at edge of HD
(Former) West Charlotte High School (DOE)	No Effect		Nothing happening on historic property
Central Avenue Commercial Historic District (DOE)	No Effect		No work on historic property
(Former) Midwood School/Lawyers Road School (DOE)	No Effect	↓	No work on historic property
World War II Veterans Memorial (DOE)	No Effect		No work on historic property
(Former) Central High School (not determined eligible for NRHP listing)			
House (not determined eligible for NRHP listing)			

Federal Aid #:

TIP#:

E.R.#: 05-2463

County: Mecklenburg

Property Name and National Register of Historic Places (NRHP) or Determination of Eligibility (DOE) Status	Effect Finding	Alternative	Reasons
Hawthorne Medical Center (demolished) (not determined eligible for NRHP listing) <i>not his town</i>			
(Former) First Methodist Protestant Church (not determined eligible for NRHP listing)			
(Former) Queens Pie Company Building (not determined eligible for NRHP listing)			

Initialed: HPO BBB

Representative, City of Charlotte WKB FTA _____

FTA intends to use the HPO's call of "No Effect" as the basis of a "de minimis" finding for the following historic properties, pursuant to Section 4(f) of the Department of Transportation Act: Johnson C. Smith University Historic District; Charlotte City Hall

FTA initials _____

APPENDIX I: PROJECT HISTORY

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PROJECT HISTORY

This appendix summarizes the history of the Charlotte Streetcar Project (Project) from early development to today, as well as documents the planning work that governs the corridor, furthering the vision of the Project. The Project is the result of coordinated land use and transportation planning efforts dating back to the early 1990s. A chronological summary of the early development of the Project is outlined below.



1994
(August)

City of Charlotte releases the *Centers and Corridors Growth Framework*, the policy document for organizing and guiding growth within the City and Mecklenburg County. The document directs new development and redevelopment to the City's main activity centers and five linear growth corridors (North, Northeast, South, Southeast, and West) and away from wedges of low-density, single-family residential where uncontrolled growth can burden existing limited support facilities.



1998
(October)

City of Charlotte adopts its first long range transit plan, the *2025 Integrated Transit/Land Use Plan*. The document proposes rapid transit to support land use initiatives and improved mobility within the City's five growth corridors.



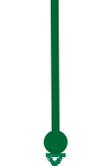
1998
(November)

Based on recommendations in the *2025 Integrated Transit/Land Use Plan*, the citizens of Mecklenburg County approve a one-half cent local sales and use tax to finance public transportation.



1999
(February)

Mecklenburg County, the City of Charlotte, and the towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville enter into a Transit Governance Inter-local Agreement to plan, finance, and implement a regional transit system, now known as the Charlotte Area Transit System (CATS). CATS is established as a department within the City of Charlotte. The agreement also mandates establishment of a policy board, the Metropolitan Transit Commission (MTC).



1999–2000

City of Charlotte initiates implementation of the *2025 Integrated Land Use Plan* recommendations. CATS prepares a Major Investment Study for the South Corridor in 1999. A Major Investment Study for each remaining corridor commences in 2000. The MTC identifies light rail transit (LRT) as the locally preferred alternative (LPA) for the South corridor. This is the first rapid transit project to advance.





2002–2003

The MTC and the Mecklenburg-Union Metropolitan Planning Organization (MUMPO) adopt the *2025 Transit Corridor System Plan* in November 2002. The plan integrates recommended transit improvements in the five growth corridors and Center City as a single system to support land use objectives and address mobility needs. The LPA for the Project, formerly called the CATS Center City Streetcar, is adopted as part of the plan. The preferred project is an in-street fixed guideway rail system designed to connect the two transit centers (one existing and one planned) in Center City and extend the system along Beatties Ford Road (northwest) and Central Avenue (east).



2004

CATS and the Federal Transit Administration (FTA) enter into a Memorandum of Understanding on addressing FTA's New Starts and National Environmental Policy Act (NEPA) Requirements for Charlotte's *2025 Transit Corridor System Plan*. The Memorandum of Understanding details the process by which the City of Charlotte should address NEPA, FTA New Starts, and metropolitan planning requirements for the Transit Corridor System Plan.



2005

MUMPO adopts the *2030 Long Range Transportation Plan* (LRTP). The overriding goals and objectives for the region are aligned with those outlined in the *2025 Integrated Transit/Land Use Plan*.



2006

Charlotte adopts the *2030 Transit Corridor System Plan*, an update to the *2025 Transit Corridor System Plan*. The MTC votes to prioritize the advancement of the transit projects identified in the plan. While the Project is not on one of the five main transportation spokes, it is highlighted in the plan as the transit service that "will bring Center City together like never before." The Project is envisioned as an east-west connection for the rapid transit projects proposed for the five growth corridors. The Project is ranked third in priority for the City, after the LYNX Blue Line Extension Light Rail (LYNX Blue Line) and the North Corridor Red Line Commuter Rail (Red Line) projects, respectively.

City of Charlotte completes an initial feasibility assessment, 10 percent conceptual plans, and design for the CATS Center City Streetcar. The planning process included extensive public involvement.



2007
(November)

The LYNX Blue Line is initiated, Charlotte's first light rail line.



2008

The City of Charlotte commissions Bay Area Economics (BAE) to prepare the *Charlotte Streetcar Economic Development Study*.

As part of the Elizabeth Avenue Business Corridor Project, the City of Charlotte completes business corridor redesign project along a 0.5 mile segment of Elizabeth Avenue. In anticipation of the Project, improvements include installation of streetcar rails and reinforced concrete track slabs for future streetcar alignment.

The City of Charlotte Business Corridor Revitalization Program provides public improvements along inner-city business corridors to strengthen economic vitality and complement the stabilization of neighborhoods.



2009
(April)

City of Charlotte releases the BAE study. The study analyzes the potential of the streetcar route to stimulate infill development, capture increases in property values, and finance a portion of the capital costs using contemporary financing mechanisms based on increased property values. Key findings in the study compare projected development growth trends for No-Build, Baseline, and Accelerated development scenarios specific to new multifamily dwellings, commercial, retail, and hotel rooms.



2009
(September)

Following completion of the BAE study, the Charlotte City Council authorizes \$8 million to advance preliminary engineering for the Project, independent of the MTC-prioritized projects list. As a result, all funding for the 30 Percent Design and Engineering Services Phase is derived from City funds and not from the one-half cent sales and use tax dedicated for transit.

The name of the streetcar officially changes to the Charlotte Streetcar Project to more accurately reflect the alignment's extents into the City's urban neighborhoods to the east and northwest of Center City.

Administration of the Project shifts from CATS to the City's Engineering and Property Management Department.



2010
(July)

City of Charlotte is awarded an Urban Circulator Systems grant in the amount of \$25 million to fund the Charlotte Streetcar Starter Project (SSP); the City commits \$12 million in matching funds. The SSP will construct the first 1.5-mile segment of the Project alignment utilizing existing track on Elizabeth Avenue.

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APPENDIX J: LIST OF PREPARERS

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PUBLIC AGENCIES

Federal Transit Authority (FTA)

Region IV Office

Yvette G. Taylor, *Regional Administrator*

Keith Melton, *Community Planner*

City of Charlotte

Engineering and Property Management

John Mrzygod, PE, *Project Manager*

BS, Civil Engineering, Gonzaga University, 1994

Tonia Wimberly, PE, *Deputy Project Manager*

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Charlotte Area Transit System

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