

# DRAFT ENVIRONMENTAL ASSESSMENT

## CATS CENTER CITY STREETCAR



Charlotte Area Transit System  
600 E. Fourth Street  
Charlotte, NC 28202

May 2007

Revision 4





## CENTER CITY STREET CAR CORRIDOR

May 2007  
Revision 4

Prepared for:

Charlotte Area Transit System  
600 East Fourth Street  
Charlotte, NC 28202

Prepared by:

URS Corporation - North Carolina





## CENTER CITY STREET CAR CORRIDOR

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### Document Revision Policy

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**Summary of Changes to the Environmental Assessment  
Revision 4**

<b>Location</b>	<b>Change</b>	<b>Explanation</b>
Charlotte	Text additions to Chapter 2 and 5 and minor text edits to Chapters 1, 2, & 3	Final Draft EA

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**APPENDICES**

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## PREFACE

### P.1 PROPOSED PROJECT

The proposed Center City Streetcar Corridor Project is located in the planning jurisdiction of the City of Charlotte, Mecklenburg County, North Carolina. The study area extends from Rosa Parks Place near the interchange between Beatties Ford Road and Interstate 85 to Eastland Mall via Beatties Ford Road, Trade Street, Elizabeth Avenue, Hawthorne Lane and Central Avenue. The alignment is approximately 10 miles long and serves the Center City area of Charlotte.

The Charlotte Area Transit System (CATS) proposes to enhance transit service in the corridor study area through the implementation of a fixed guideway transit system. The purpose of the project is to:

- Enhance and optimize service on the system's three most productive bus routes;
- Connect the existing Charlotte Transportation Center (CTC) with the planned Gateway Transit Center;
- Increase the viability of the five regional rapid transit corridors by providing circulation at their hub in Center City; and
- Support the City's economic development and redevelopment goals.

### P.2 PURPOSE OF THE DRAFT ENVIRONMENTAL ASSESSMENT

The purpose of this Draft Environmental Assessment (EA) is to provide environmental information to public officials and citizens, and to provide an opportunity for participation and comment, before decisions are made and before actions are taken on the Center City Streetcar Project (40 CFR Part 1500.1(a)). This EA contains information decision-makers will use to evaluate the effects of the proposed project on the human and natural environment relative to a no-build alternative and an alternative consisting of lower cost transportation investments.

This document was prepared in accordance with the requirements of the National Environmental Policy Act (NEPA), as amended, and the North Carolina Environmental Policy Act of 1971 (NCEPA). This document conforms to the Council on Environmental Quality (CEQ) regulations that provide direction regarding implementation of the procedural provisions of NEPA (40 CFR Parts 1500-1508, 1978), and the joint Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) regulations on *Environmental Impact and Related Procedures* (23 CFR Part 771). FTA regulations reference the FHWA regulations in 40 CFR Part 622 Section 101.

The EA will be circulated for review by interested parties, including citizens, community groups, officials and public agencies, for a period of at least 45 days. Public meetings and workshops will be held to encourage comments on the document.

The Metropolitan Transit Commission selected a locally preferred alternative for the Center City Streetcar Corridor Project on July 26, 2006 as an agenda item at a regularly scheduled meeting. A Final Environmental Assessment will be prepared to document the selection of the preferred alternative, any updates to the preferred alternative since the Draft EA, potential mitigation measures for adverse impacts, and responses to comments received on the project.

Finally, the lead federal agency, the Federal Transit Administration (FTA), will prepare a Record of Decision (ROD) identifying the selected alternative. The ROD will explain the reasons for the project decision, summarize any mitigation measure 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 US Department of Transportation Act. The ROD completes the environmental documentation process under the NEPA.

Formal approval from FTA is required to advance the project into subsequent project development steps, final design, and construction.

### **P.3 PLANNING BACKGROUND AND DECISION MAKING HISTORY**

The *Centers and Corridors Plan 1994* recommended modifying the region's growth patterns by concentrating development and redevelopment in five radial corridors extending from Center City Charlotte. The goal was to focus growth in order to make the best use of existing and future infrastructure investments and transportation systems.

Following an intensive planning process, the *2025 Integrated Transit/Land Use Plan* was completed in October 1998. The plan proposed a rapid transit system as a means of supporting land use initiatives to attain the *Centers and Corridors* vision established in 1994 and to maximize infrastructure investment. The plan identifies five major transportation and development corridors (North, Northeast, South, Southeast, and West) that extend out from the Center City to the Mecklenburg County border and beyond.

In November 1998, the citizens of Mecklenburg County approved the levy of a one-half cent sales tax to be used to finance public transportation systems. In February 1999, Mecklenburg County, the City of Charlotte, and the Towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville entered into a Transit Governance Inter-local Agreement to plan, finance, and implement a regional transit system, now known as the Charlotte Area Transit System. This agreement also mandated the establishment of a policy board, the Metropolitan Transit Commission (MTC).

During 1999, CATS prepared a Major Investment Study (MIS) for the South Corridor. Based on stakeholder and public comment and the results summarized in the MIS, the MTC identified light rail transit as the Locally Preferred Alternative (LPA) for the South Corridor. An EIS was prepared and operations on Charlotte's first light rail line are expected to begin in 2007.

In 2000, CATS began the Major Investment Studies for the other four corridors. Upon completion of the Major Investment Studies, the *2025 Transit Corridor System Plan* was adopted by the Metropolitan Transit Commission (MTC) in November 2002 and by the Mecklenburg-Union Metropolitan Planning Organization (MUMPO) in January 2003. The Plan consists of rapid transit improvements in five corridors (South, Southeast, Northeast, North, and West), a series of improvements in Center City Charlotte, including the Streetcar Corridor and bus service, and facility improvements throughout the region. **Figure P-1** shows the System Plan.



The Locally Preferred Alternative for the Center City Streetcar Corridor, adopted as part of the *2025 Transit Corridor System Plan*, was an in-street fixed guideway rail system designed to connect the two transit centers in Center City and then extend the system along the alignments of CATS two most productive bus routes which serve Beatties Ford Road and Central Avenue.

In 2004, a Memorandum of Understanding (MOU) was signed by the Charlotte Area Transit System and the Federal Transit Administration on “Addressing FTA’s New Starts and NEPA Requirements for Charlotte’s 2025 Transit System Plan”. The MOU details the process by which CATS should address NEPA, FTA New Starts, and metropolitan planning requirements for the Transit Corridor System Plan.

#### **P.4 PUBLIC AND AGENCY OUTREACH ACTIVITIES**

A comprehensive public involvement plan was developed for the Center City Streetcar Corridor project to serve as a guide for informing, notifying, and soliciting participation in the development of the streetcar project. The Streetcar Corridor public involvement program has provided, and will continue to provide, stakeholders the opportunity to stay informed and to participate throughout the environmental documentation process for the project.

A comprehensive outreach program was developed to encourage the participation of the public, elected officials, and interested governmental agencies in the decision-making process. Outreach activities included the following:

- Sub-Area Advisory Committee Meetings – Advisory committees are comprised of neighborhood leaders, developers, major employers and other interested citizens specific to the three sub-areas on the corridor – Trade Street, Beatties Ford Road and Central Avenue;
- Public meetings and open houses;
- Agency coordination meetings including Bi-weekly working sessions with CDOT, Planning Commission, Charlotte Engineering & Property Management the Charlotte Economic Development Department; Charlotte-Mecklenburg Utilities, and NCDOT;
- Quarterly updates with FTA;
- Presentations to neighborhood and business associations;
- Quarterly newsletters directly mailed to over 1,100 persons in the corridor database;
- Project information on CATS website; and
- Media relations and press releases.

To date, the conceptual design and environmental assessment of the project has included five rounds of public meetings that have been well-attended. Public input up to this point in the project development process indicates strong support for and consensus around project goals and concepts. Public and agency outreach activities are described in more detail in Chapter 6.

## CHAPTER 1 PURPOSE AND NEED

This chapter summarizes the need for transportation improvements in the proposed Charlotte Center City Streetcar Project corridor and outlines the purpose and need for the project. It contains an overview of the corridor, the transportation facilities and services in the corridor and the specific transportation problems to be addressed.

### 1.1 PROJECT DESCRIPTION

#### 1.1.1 Overview

The geographic location of the project is shown in Figure 1-1. This section describes the streetcar corridor in both a regional and corridor-level context.

##### **Regional Context**

The project is located entirely within the City of Charlotte in Mecklenburg County, North Carolina. The City of Charlotte is located in the Charlotte-Gastonia-Concord, North Carolina-South Carolina Metropolitan Statistical Area (MSA).

##### **Corridor Context**

The northern extent of the project corridor begins at the intersection of North Hoskins Road and Beatties Ford Road, approximately 1/5th of a mile north of I-85 and adjacent to the Mecklenburg County Health Department and Stewart Creek Business NW Park. From the intersection of North Hoskins and Beatties Ford Roads, the corridor follows Beatties Ford Road south to Trade Street. The corridor then follows Trade Street east to Elizabeth Avenue and along Elizabeth Avenue to Presbyterian Hospital. In the vicinity of Presbyterian Hospital, the corridor extends northeast from Elizabeth Avenue, along Hawthorne Lane to Central Avenue. The alignment is then proposed to extend north of Central Avenue where it crosses underneath the CSX rail line and then turns southeast into a privately-owned parcel (Barnhardt Manufacturing) across to Clement Avenue. The alignment then follows Clement Avenue back to Central Avenue. The corridor extends along Central Avenue east to Eastland Mall.

From its endpoints, the streetcar extends 9.93 miles. The Central Avenue segment is 3.2 miles from Eastland Mall to The Plaza. The Plaza to JC Smith University along Hawthorne and Trade Street is 4.99 miles in length, while the Beatties Ford Road segment from French Street to Rosa Parks is 1.74 miles.



### **1.1.2 Study Area**

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

For data collection purposes, the study area was delineated using the traffic analysis zones (TAZs) that compose an approximate half-mile buffer of the project corridor. The study area is shown in Figure 1-2. Throughout this environmental assessment, 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 sub-areas for more detailed study. For data collection purposes, the sub-areas are based on geographic boundaries rather than phases of the project. The sub-areas are the Beatties Ford Road sub-area, the Center City sub-area and the Central Avenue sub-area.

#### **Beatties Ford Road Sub-Area**

The Beatties Ford Road sub-area extends from near Johnson C. Smith University northward to 1/2 mile beyond I-85. For the purposes of defining travel demand later in the document, the sub-area is further divided into a Johnson C. Smith University Area and a Rosa Parks area.

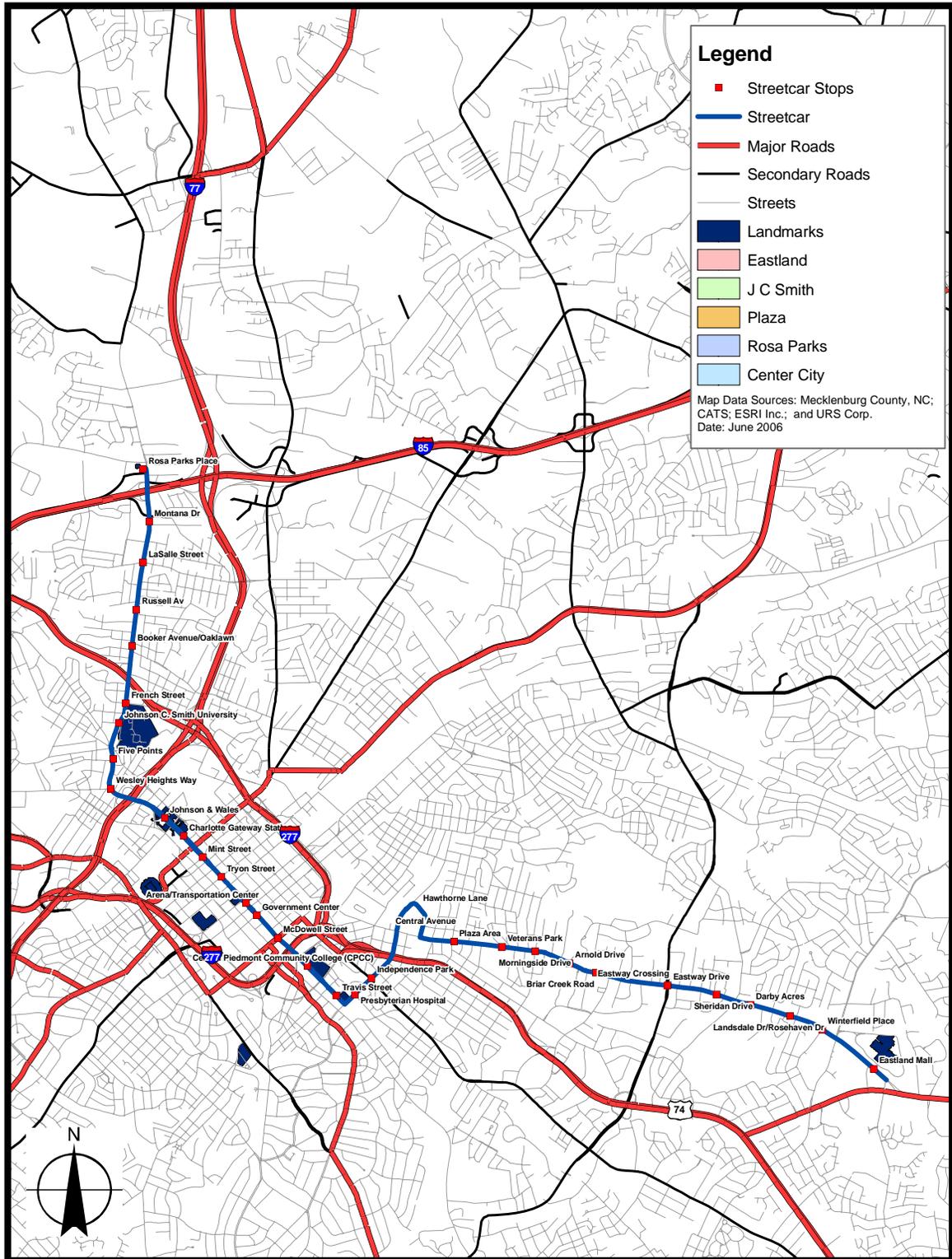
#### **Center City Sub-Area**

The Center City sub-area includes the Trade Street and Elizabeth Avenue corridors. The sub-area encompasses the Central Business District (CBD) and the four Center City wards. The Trade Street Corridor portion of the sub-area extends from Johnson C. Smith University, southeast to the eastern portion of the I-77/I-277 loop. The Elizabeth Avenue portion of the sub-area extends from East Trade Street and the I-77/I-277 loop southeast to Presbyterian Hospital and northeast along Hawthorne Lane to Central Avenue.

#### **Central Avenue Sub-Area**

The Central Avenue sub-area extends from near the intersection of Hawthorne Lane and Central Avenue to 1/2 mile beyond Eastland Mall. For the purposes of defining travel demand later in the document, the sub-area is further divided into a Plaza Area and an Eastland Mall area.

Figure 1-2: Study Corridor with Sub-Areas



**1.1.3 Population and Employment**

In this section population, housing and employment in the study area and surrounding geographies are discussed. Additional information is presented in Chapter 3 of this document.

**Population and Housing**

Population and housing are addressed together in this section as there is a strong correlation between population growth and household growth. Changes in population and housing when considered jointly relate to the change in density as well as growth, which is an important factor for transit propensity. Data is presented at the regional and county levels, and for the sub-areas that compromise the study area. In general, areas that are expected to grow in population are also expected to grow in the number of households.

**Region and County Level**

The City of Charlotte is located in the Charlotte-Gastonia-Concord, North Carolina-South Carolina Metropolitan Statistical Area (MSA), which has a year 2005 population of 1.5 million, and is ranked the 37th largest MSA in the country.<sup>1</sup> The MSA includes the North Carolina Counties of Anson, Cabarrus, Gaston, Mecklenburg and Union and the South Carolina County of York. Past growth trends and future population projections for the MSA and constituent counties are shown in Table 1-1. As shown in the table, Mecklenburg County is the most populous county in the MSA.

**Table 1-1: Charlotte MSA Population Trends and Projections 1990 – 2030**

MSA	1990	2000	2010	2020	2030
North Carolina					
Anson	23,474	25,275	26,273	27,597	28,650
Cabarrus	98,935	131,063	169,586	210,390	254,852
Gaston	174,769	190,304	200,543	212,937	223,762
Mecklenburg	511,211	693,454	867,451	1,059,519	1,227,928
Union	84,210	123,677	176,684	240,370	323,377
South Carolina					
York	131,497	164,614	198,730	229,470	261,330
MSA Total	1,024,096	1,330,398	1,663,703	2,013,256	2,382,774

Source: North Carolina State Demographics, South Carolina Budget and Control Board, Office of Research and Statistics; MUMPO, “2030 Long Range Transportation Plan”

The percent changes in the Charlotte MSA population projections between 1990 and 2030 are shown in Table 1-2. Between 2000 and 2030 a net population gain of 1,052,376 is projected for the MSA. The counties projected to experience the most rapid population growth over this 30 year period are Union, with an 161 percent increase, (an additional 199,700 people); Cabarrus, with a 94 percent increase (an additional 123,789 people); and Mecklenburg, also with a 77 percent increase (an additional 534,474 people). According to the *Corridor Systems Plan*, Mecklenburg County grew at a substantially more rapid pace than neighboring counties in the past two decades. According to the plan, “...while other regions have experienced substantial decentralization, Mecklenburg County has captured a greater share of growth than its region.”<sup>2</sup>

**Table 1-2: Percent Change in Charlotte MSA Population Projections  
 1990 – 2030**

MSA	1990-2000 (10 years)	2000-2030 (30 years)
Anson	7.7%	13.4%
Cabarrus	32.5%	94.4%
Gaston	8.9%	17.6%
Mecklenburg	36.0%	77.1%
Union	47.0%	161.5%
York	25.2%	58.8%
MSA Total	29.9%	79.1%

Source: North Carolina State Demographics, South Carolina Budget and Control Board, Office of Research and Statistics

**Study Area Level**

In 2003, Charlotte was estimated to have 584,658 residents, making it the 21<sup>st</sup> largest city in the country. Charlotte is expected to continue growing as the state’s population increases and its local economy expands. Current and projected population growth for the study area is compared to regional data in Table 1-1. As described in Section 1.1.2, the study area extends approximately one-half mile on either side of the preferred alignment and represents the maximum distance that most pedestrians would likely walk to access the streetcar transit services.

Year 2000 study area population was 57,078, or approximately eight percent of the total county population. Between 2000 and 2030, total population is expected to grow by about 77 percent, to 101,242. Through 2030, the study area is projected to increase in population at the same rate as Mecklenburg County and at a faster rate than the MSA as a whole.

**Table 1-3: Study Area Population Projections**

Geographic Area	Year 2000	Year 2030	Percent Change
Study Area	57,078	101,242	77
Mecklenburg County	693,454	1,227,928	77
Charlotte MSA	1,438,867	2,382,774	66

Source: North Carolina State Demographics, South Carolina Budget and Control Board, Office of Research and Statistics, TAZ Data Charlotte-DOT (2006).

In 2000, the number of households in the study area was 23,218. Between 2000 and 2030, the number of households is projected to grow by 96 percent, to a total of 45,582.

**Sub-Area Level**

**Beatties Ford Road Sub-Area**

In 2000, the Beatties Ford Road sub-area had a population of 11,521 and 4,511 households. The central third of this sub-area is primarily zoned residential (R-5) and overall contains the highest population density and concentration of households in the sub-area. Beatties Ford is projected to grow by 49 percent over the next 30 years. Most

of the population growth in the Beatties Ford Road sub-area is projected to be concentrated in the northern section.

**Center City Sub-Area**

In 2000, the Center City sub-area had a population of 21,618 and 8,959 households. The population of the Center City sub-area is expected to grow by 169 percent in the next 30 years. By 2020, the Center City sub-area will likely surpass the populations of the two other sub-areas.

**Central Avenue Sub-Area**

In 2000, the Central Avenue sub-area had the greatest population (23,939) and the highest number of households (9,748) of the three sub-areas. Most of the population and households are concentrated along Central Avenue. Zoning in this area is mostly residential with a narrow strip of commercial along Central Avenue.

Although the Central Avenue sub-area had the highest population and household count in 2000, population growth in this sub-area over the next 30 years is projected to be just 8 percent and household growth 7 percent. Despite the small percent of growth, the actual growth in population is expected to be approximately 1,900. Population and household growth in the Central Avenue sub-area is projected to be evenly distributed throughout the sub-area.

**Employment**

**Region and County Level**

According to the *Corridor System Plan* (2002), consistent and increased employment growth in Mecklenburg County has been possible because of industry diversity, economic strength in key areas such as financial services, the attraction and retention of upper-income households, and an integrated city and county planning framework.<sup>3</sup> Information pertaining to expected changes in employment for the study area is provided in this section.

The MUMPO area includes Mecklenburg County and portions of Union County. Future employment projections for the MUMPO area and constituent counties are shown in Table 1-4. As shown in the table, Mecklenburg County has the highest share of the region’s employment. Between 2000 and 2030, Mecklenburg County is expected to add over 400,000 jobs, growing 79 percent. Union County is anticipated to add 82,000 jobs, growing over 185 percent.

**Table 1-4: MUMPO Region Employment Projections**

AREA	2000	2010	2020	2030	Growth 2000-30	
Mecklenburg Co.	529,672	627,809	782,328	948,291	418,619	79.0%
Union Co.	44,390	61,653	92,522	126,794	82,404	185.6%
MUMPO	568,883	683,498	865,851	1,060,798	491,915	86.5%

Source: MUMPO, “2030 Long Range Transportation Plan”

**Study Area Overview**

In 2000 there were approximately 95,000 jobs in the study area. The largest employment center within the Charlotte region is the Charlotte CBD. The Center City sub-area encompasses the CBD employment center and accounts for approximately 87

percent of study area jobs followed by 8 percent in the Central Avenue sub-area and 5 percent in the Beatties Ford Road sub-area<sup>4</sup>.

Total employment in the study area is expected to increase by nearly 59 percent to 151,650 between 2000 and 2030, for an actual gain of 55,976 employees. Eighty-six percent of jobs are expected to be concentrated in the Center City sub-area, followed by 9 percent in the Central Avenue sub-area and 5 percent in the Beatties Ford Road sub-area<sup>5</sup>.

**Employment, Housing and Population Summary**

In the *Third Ward Neighborhood Vision Plan*, a comparison of mode of transportation to work and travel time to work for Center City Charlotte and citywide Charlotte was made using US Census data. The data used in the comparison is depicted in Table 1-5.

**Table 1-5: Mode and Time of Travel to Work**

Indicator	Center City Residents	Citywide Residents
Transportation to Work	20% bike or walk	<3% bike or walk
Travel Time to Work	80% spend less than 25 minutes	Average is 25 minutes

Source: "Third Ward Neighborhood Vision Plan." Adopted in 2003. Available: <http://www.charmeck.org/Departments/Planning/Area+Planning/Plans/home.htm>.

Another comparison of demographics showed that over two-thirds of Center City’s working population works in Center City. The data demonstrates that one factor influencing growth in Center City is the desire to live in close proximity to work. According to the vision plan, “these demographics suggest that future residential growth in Center City is highly dependent on Center City job growth. Today, there are approximately 55,000 jobs and 7,000 residents in Center City – a ratio of eight jobs for every one resident. Given the strong link between living and working in Center City, there are two factors that could contribute to a substantial increase in Center City’s residential population: 1) more sources of employment come to Center City; and/or 2) a percentage of people choose to move to Center City for lifestyle reasons, as opposed to their proximity to employment.”<sup>6</sup> This data demonstrates the positive correlation among population, housing and employment growth in the study area.

**1.1.4 Land Use Overview**

**Beatties Ford Road Sub-Area**

The predominant land use in the sub-area is single family residential with large scattered tracts of public/institutional. Land use immediately adjacent to Beatties Ford Road primarily consists of neighborhood/convenience oriented commercial interspersed with pockets of residential, public/institutional, and industrial. Major activity centers include Johnson C. Smith University, a commercial area near LaSalle Street, the Beatties Ford Road Branch of the Charlotte Mecklenburg Public Library System located just south of I-85, a community transit center located at the Northwest Mecklenburg County Health Department building, which is located just north of the I-85 interchange.

**Center City Sub-Area**

Land use within the sub-area is predominantly commercial and office with pockets of multi-family residential, single-family residential, vacant, public/institutional, parks and open space and industrial land uses. The sub-area encompasses Charlotte’s Central

Business District, is the region's major employment center, contains the government offices for the City of Charlotte and Mecklenburg County, and is also home to national corporations such as Bank of America, Wachovia Corporation, and Duke Energy Corporation. Center City offers many cultural attractions, sporting events and entertainment venues that include a new arena to house the NBA expansion team, the Charlotte Bobcats, the Bank of America Stadium that houses the Carolina Panthers, the Charlotte Convention Center, Presbyterian Hospital, new mixed-use development projects such as Gateway Village, as well as Central Piedmont Community College (CPCC), and Johnson & Wales University. The Elizabeth Avenue/Hawthorne Lane and Trade Street segments are described below.

### **Trade Street**

Starting at the southeast end of Trade Street and heading northwest, main features include a government/institutional office area; Gateway Village, which consists of the Johnson & Wales campus, office and some multi-family uses; and the Johnson C. Smith University area, which consists of light industrial and commercial uses.<sup>7</sup>

### **Elizabeth Avenue/Hawthorne Lane**

Land use immediately adjacent to Elizabeth Avenue primarily consists of commercial and office with pockets of multi-family residential, vacant, and public/institutional. Central Piedmont Community College (CPCC) is a major activity center within this corridor, occupying multiple blocks both north and south of Elizabeth Avenue. Conversely, Hawthorne Lane is predominantly residential with some small retail and restaurants at the intersection of 7<sup>th</sup> Street.

### **Central Avenue Sub-Area**

The predominant land use in the sub-area is single family residential with large scattered tracts of commercial, multi-family residential and public/institutional. Land use immediately adjacent to Hawthorne Lane/Central Avenue primarily consists of commercial interspersed with pockets of residential, public/institutional, industrial and office.

Major activity centers are located at Presbyterian Hospital, the Central Avenue/The Plaza Intersection, Central Avenue/Eastway Drive Intersection, Central Avenue/Sharon Amity Road Intersection, and the Eastland Mall. There is a community transit center located at Eastland Mall.

## **1.1.5 Travel Demand Patterns**

The Charlotte streetcar travel demand area is drawn into the following districts: Rosa Parks, Johnson C. Smith University, Center City, Kenilworth, Plaza/Hawthorne, and Eastland. The Rosa Parks district is comprised of 15 TAZs. It lies on the westerly limits of the streetcar alignment along Beatties Ford. The Johnson C. Smith University district also runs along the Beatties Ford, in the vicinity of Johnson C. Smith University. It consists of eight TAZs. The Center City district consists of 45 TAZs; since, it is in a densely employment and population area. This district runs along Trade Street to Elizabeth Avenue. The Plaza/Hawthorne district moves the length of Hawthorne Lane through Plaza area to a small segment of Central Avenue. This district is made 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<sup>8</sup>. Person trip data from the model were aggregated into travel sub-districts. The streetcar study area was divided into six districts, while the rest of the Region was broken down into nineteen 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

Center City Charlotte remains and will continue to be a primary destination for trips within the Region. In 2003, nearly 400,000 of 5.6 million daily trips began or ended within the Interstate 277 loop. By 2030 650,000 of the 9.6 million daily trips will begin or end within the interstate loop. These daily trips to Center City are anticipated to increase 63 percent by adding approximately 250,000 trips. Most of these trips are home-based work trips and result from the commutes of 114,000 employees projected for the Center City Area.

For the study area that extends to Rosa Parks Place and Beatties Ford Road from Eastland Mall, there were 318,000 or 5.6 percent of total regional daily trips in 2003. By 2030, there will be over 500,000 trips projected increasing the importance of offering streetcar services in the corridor. The streetcar corridor also shows significant connectivity to the five regional transportation corridors outlined in the 2030 Corridor System Plan. Table 1-6 lists the top ten zones for each sub-area in terms of trip exchange. Each column shows the number of trips between a specific sub-area within the Study Area and other areas with the region, which correspond to the map shown in Figure 1-2.

The Center City Zone appears on each of the sub-area lists and is in the top five for each. The travel patterns indicate that there is a significant travel flow from the Center City area and the regional high speed transit corridors. Nearly every corridor doubled its daily trips into the Center City zone. In 2030, these travel patterns account for more than 63% (375,756) of the trips going to and from the Study Area.

The analysis shows that the streetcar serves a growing sector of travel patterns in the region. Center City will continue to realize growth in both population and employment and as the transit system matures, the streetcar's role as a circulator at the hub of the regional corridors in Center City will continue to increase in importance. Over half of all trips that either begin or end in Center City have segments that could be served by the streetcar corridor. In other words, travel patterns for the 2030 network show that the streetcar is an option for at least a segment of travel for over half of all trips to or from Center City.

**Table 1-6: Top Ten Daily Travel Patterns per Sub-Area**

		To Center City		To Rosa Parks		
2030 Rank		2003	2030		2003	2030
1st	Center City	35,746	76,639	No. Corridor	3,069	5,920
2nd	So. Corridor	13,416	24,549	NE Corridor	3,142	5,198
3rd	So. Meck.	14,594	24,498	Center City	3,457	5,159
4th	SE Corridor	13,200	21,448	West Corridor	2,084	3,221
5th	NE Corridor	10,325	20,220	NW Meck.	1,403	3,082
6th	West Corridor	9,768	19,922	So. Corridor	2,163	2,607
7th	Kenilworth	10,043	15,520	SE Corridor	1,593	1,956
8th	No. Corridor	6,947	14,821	So. Meck.	1,701	1,909
9th	East Meck.	5,244	9,985	Cabarrus	787	1,663
10th	NW Meck.	3,757	8,789	Rosa Parks	654	1,461
<i>Within Study Corridor</i>	<i>Plaza</i>	<i>3,135</i>	<i>6,284</i>	<i>Plaza</i>	<i>418</i>	<i>604</i>
	<i>Eastland</i>	<i>2,961</i>	<i>4,469</i>	<i>JC Smith</i>	<i>242</i>	<i>435</i>
	<i>Rosa Parks</i>	<i>1,623</i>	<i>2,964</i>	<i>Eastland</i>	<i>379</i>	<i>429</i>
	<i>J C Smith</i>	<i>1,017</i>	<i>2,337</i>			
		To Plaza		To Eastland Mall		
2030 Rank		2003	2030		2003	2030
1st	SE Corridor	11,048	12,704	Center City	5,317	6,287
2nd	East Meck.	7,263	10,818	SE Corridor	4,567	4,797
3rd	Plaza	3,778	10,067	NE Corridor	3,396	4,261
4th	Center City	7,647	9,666	So. Meck.	3,991	4,233
5th	So. Meck.	8,910	9,620	East Meck.	2,410	2,902
6th	NE Corridor	6,581	8,781	Kenilworth	2,458	2,311
7th	So. Corridor	3,505	3,901	So. Corridor	2,135	2,242
8th	Kenilworth	3,505	3,298	Eastland	1,553	2,160
9th	West Corridor	2,347	2,899	Plaza	1,356	1,813
10th	No. Corridor	2,188	2,765	West Corridor	1,540	1,792
<i>Within Study Corridor</i>	<i>Eastland</i>	<i>1,619</i>	<i>1,734</i>	<i>Rosa Parks</i>	<i>309</i>	<i>346</i>
	<i>Rosa Parks</i>	<i>429</i>	<i>494</i>	<i>JC Smith</i>	<i>196</i>	<i>248</i>
	<i>J C Smith</i>	<i>272</i>	<i>367</i>			
		To JC Smith				
2030 Rank		2003	2030			
1st	Center City	3,030	4,216			
2nd	NE Corridor	1,909	2,640			
3rd	No. Corridor	1,566	2,449			
4th	So. Corridor	2,131	2,430			
5th	West Corridor	1,642	2,271			
6th	So. Meck.	2,131	1,862			
7th	SE Corridor	1,542	1,727			
8th	NW Meck.	849	1,551			
9th	Kenilworth	1,203	1,155			
10th	East Meck.	645	860			
<i>Within Study Corridor</i>	<i>JC Smith</i>	<i>275</i>	<i>786</i>			
	<i>Plaza</i>	<i>374</i>	<i>528</i>			
	<i>Rosa Parks</i>	<i>331</i>	<i>486</i>			
	<i>Eastland</i>	<i>338</i>	<i>352</i>			

## **1.2 TRANSPORTATION FACILITIES AND SERVICES IN THE CORRIDOR**

### **1.2.1 Existing Roadway Facilities**

Interstate-77 is a six to eight lane controlled access freeway that runs north-south through Charlotte. I-77 has an interchange with Trade Street, exit 10, which provides direct connection to the Center City area on the east and to Johnson C. Smith and the Beatties Ford Road area on the west. I-277 is considered Charlotte's downtown beltway. It is approximately 5 miles in length and makes a 270 degree loop around the Center City sub-area. I-277 connects with I-77 on the south at exit 9 and on the north side at exit 11.

Trade Street is a four-lane arterial that begins at Johnson C. Smith University on the west and ends at McDowell Street on the eastern side. Trade Street becomes Elizabeth Avenue from McDowell Street to Presbyterian Hospital at Hawthorne Lane. Trade Street/Elizabeth Avenue is classified as a major thoroughfare in the Mecklenburg-Union Metropolitan Planning Organization (MUMPO) Thoroughfare Plan. Portions of Trade Street between Johnson and Wales Way to Poplar Street have landscaped medians.

Hawthorne Lane and Central Avenue are both four lane arterials that are classified as major thoroughfares. Hawthorne Lane from the Presbyterian Hospital to Central Avenue is primarily a residential area. There is a bridge overpass on Hawthorne Lane that grade separates Hawthorne Lane and Independence Boulevard. Central Avenue runs through the Plaza-Midwood neighborhood and extends eastward past the Eastland Mall and ends at the intersection with Albemarle Road. The section of Central Avenue from Eastway Drive to Eastland Mall has dedicated bicycle lanes on both sides of the road and for portions of this section there are landscaped medians.

Beatties Ford Road is a four lane arterial that is also classified as a major thoroughfare. Beatties Ford Road begins at Johnson C. Smith University and extends northward over I-85 and ends in Huntersville, NC at the intersection with NC 73. There are interchanges located at the overpass with I-85 and at Brookshire Freeway, which is a limited access extension of the northern portion of I-277.

### **1.2.2 Existing Transit Services**

Existing service is provided by the Charlotte Area Transit System (CATS), which operates local, express bus, vanpool, paratransit, and community shuttle services for the City of Charlotte, Mecklenburg County, and surrounding counties. Currently, thirty local routes use the Trade Street/Elizabeth Avenue corridor for some or all of their Center City routing into the Charlotte Transportation Center (CTC). Ten of those routes use Trade Street and serve most of the stops from the Gateway Village or the CPCC/Elizabeth Avenue area to the CTC. See Figure 1-3 for a map of CATS bus routes. Routes 7 and 9 serve Trade Street from Rozelles Ferry to Kings Drive both terminating at the CTC. Four routes serve Trade Street and Elizabeth Avenue from the CTC to Hawthorne Lane. Route 39 serves Hawthorne Lane from Elizabeth Avenue to Central Avenue.

Three routes operate along the Beatties Ford Road and Central Avenue corridors from the CTC. Routes 9 and 39 operate along the Central Avenue corridor from Hawthorne and Central to Eastland Mall, with the 39 leaving the corridor at Eastway Drive. Route 9 continues on east of Eastland Mall to Albemarle Road. Route 7 operates along the Beatties Ford corridor from the CTC, passing the potential end of line area of I-85 and Beatties Ford.

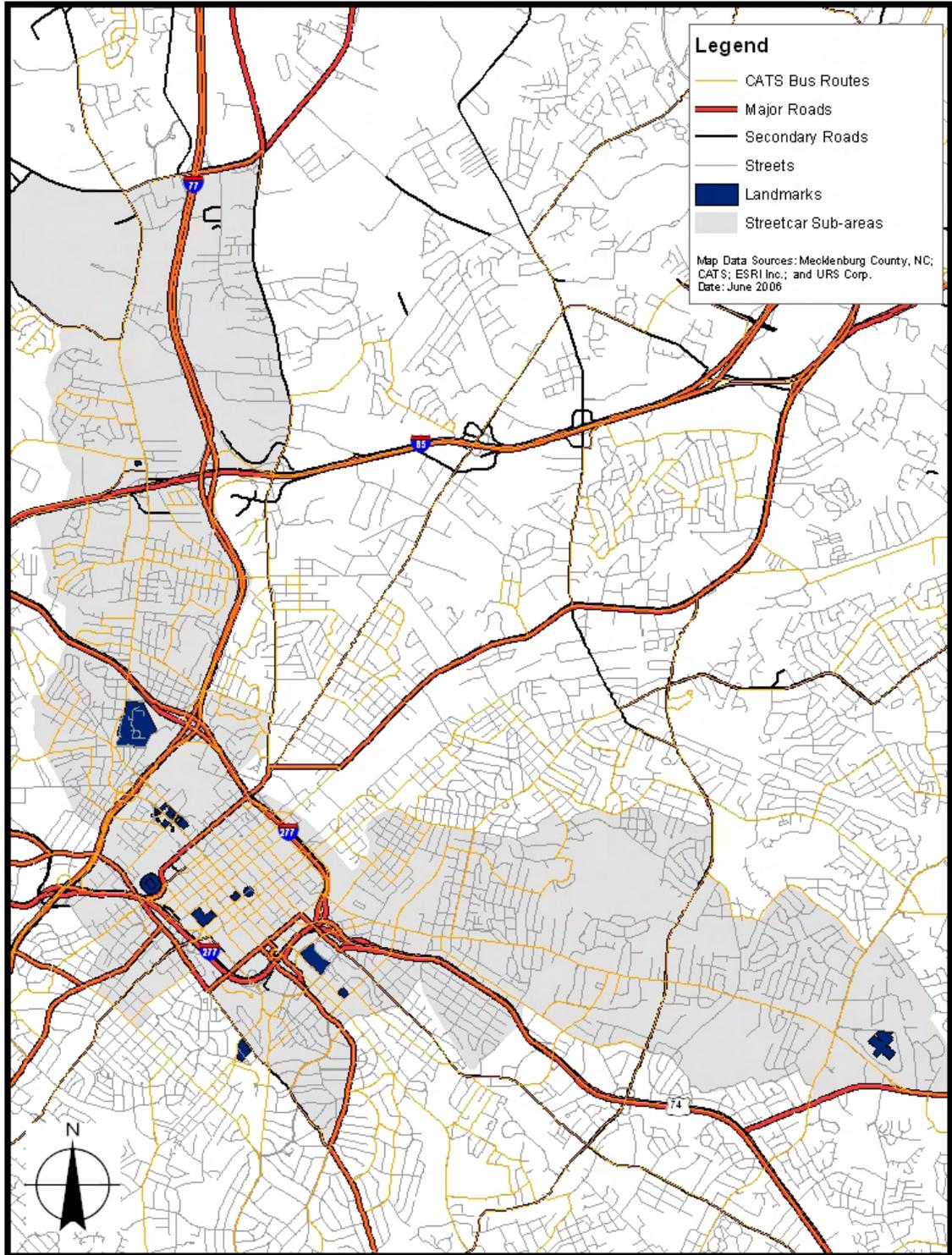
Between the Plaza-Midwood area to the CTC, Route 9 continues on Central Avenue to Kings Drive and the right on Elizabeth Avenue, while Route 39 follows an alignment similar to the streetcar. This route uses Hawthorne Lane to Elizabeth Avenue.

The proposed Charlotte Gateway Station, located at Graham, 4th and West Trade streets in Center City, will be the southern terminus for the North Corridor Commuter Rail Project. The new station will provide seamless integration of various rapid transit modes, including commuter rail, Amtrak, Greyhound, Center City Streetcar and Southeast/West Corridor rapid transit.

The Gold Rush Circulator Service is a free shuttle service that operates in the Center City Charlotte Area. It connects business, cultural and residential areas together using three routes that traverse through the area. The Orange and Red Lines utilize Tryon and Trade Streets, respectively as the main routes, with Blue Route following a circular alignment around Center City using Seventh, Third, McDowell and Stonewall Streets. The routes generally operate between 7 a.m. and 6 p.m. except for the Red Line which operates until 10 or 11 PM depending on day of the week.

The CTC is located on Trade Street and is bounded by Fourth, College, Trade, and Brevard Streets, immediately across the street from the Charlotte Bobcats Arena. This is the main transfer hub for CATS local and express bus routes. Currently, the facility is fully utilized to the point that CATS has been forced to establish additional bays at the curbside on Brevard and Fourth Streets. The center was used as a transfer point for the Charlotte Trolley line that has suspended service during Light Rail construction on the South Line. The CTC will facilitate transfers from the bus service to and from the light rail, once implementation of the South Line is complete.

Figure 1-3: CATS Bus Routes



### 1.2.3 Bicycle and Pedestrian Facilities

The City of Charlotte's *Centers and Corridors Strategy and Transportation Action Plan* recognizes the city transportation system needs to be more diversified. These documents acknowledge that bicycle and pedestrian modes need to be upgraded and accommodated. Foot and bicycle travel are an important component of the transportation system and there are a number of facilities designed for these types of travel in the study area.

#### **Pedestrian**

Sidewalks are located throughout the entire corridor of the study area, and an extensive and sometimes very wide network of sidewalks exists in the Center City area. The *Center City Transportation Plan* calls for widening of sidewalks, where possible, to 18-22 feet within Center City. Some parts of the streetcar corridor are also inside of Pedestrian Overlay Districts. This includes Center City, West Trade Street and Elizabeth Avenue. The *Elizabeth Land Use and Pedscape Plan*, along with the *West End Land Use and Pedscape Plan* identifies building setbacks, sidewalk, parking, and tree requirements that encourage pedestrian mobility. The *Center City 2010 Vision Plan* also addresses the need for pedestrian and bicycle enhancements along Trade Street.

The Gateway area probably presents the most significant investment in pedestrian circulation and safety. Trade Street has a planted median along the Gateway segment of its alignment and the only pedestrian specific signal on Trade Street. Brick pavers and stamped asphalt have been installed to encourage motorists to slow down while in the area and sidewalks are at their widest along the corridor.

Beatties Ford Road has relatively standard sidewalks for most of its alignment within the study area. The one exception would be the area around Johnson C. Smith University where the sidewalks have been recently widened and resurfaced with brick pavers. An under-utilized pedestrian bridge spans Beatties Ford Road in front of the university. All signalized intersections are equipped with pedestrian phases with the exception of the intersection on either side of the I-85 overpass.

A streetscape plan for Elizabeth Avenue is currently in final design that targets better pedestrian flow and allows for more substantial transit stops. The project also entails pre-installation of rails for eventual streetcar service on the corridor.

The Plaza is another area with good pedestrian facilities allowing circulation throughout. There is a high incidence of pedestrian travel especially to the shopping areas on Central Avenue between Pecan Avenue and The Plaza. There are very good connections to residential areas one and two blocks off of the alignment.

#### **Bicycle**

Bicyclists share the roadway with the vehicular traffic for the majority of the corridor. The section of Central Avenue from Eastway Drive to Sharon Amity Road currently has dedicated bicycle lanes on both sides of the road. The 1999 *Charlotte-Mecklenburg Bicycle Plan* recommends widening the outside lanes on Beatties Ford Road from Rozelles Ferry Road to I-85 to accommodate cyclists. This plan also states the need to make transit stations, transit corridors, and routes leading to the stations bicycle accessible. It also recommends that transit stations provide bicycle racks and that the vehicles themselves accommodate bicycles. In the *Transportation Action Plan*, adopted May 2006, it is recommended that the city's bicycle plan be updated every five years.

There are no bicycle facilities on the remaining segments of the streetcar alignment. However, construction is pending for a streetscape project on Elizabeth Avenue that includes bike lanes.

**Connections to Pedestrian/Bicycle Routes**

The 1999 *Bicycle Master Plan* will be updated soon, adding new bike lanes and bike routes across the City and within the study area. Charlotte is currently in the process of completing a connectivity study and a Comprehensive Pedestrian Plan that will give pedestrians more access to the Center City Streetcar Corridor.

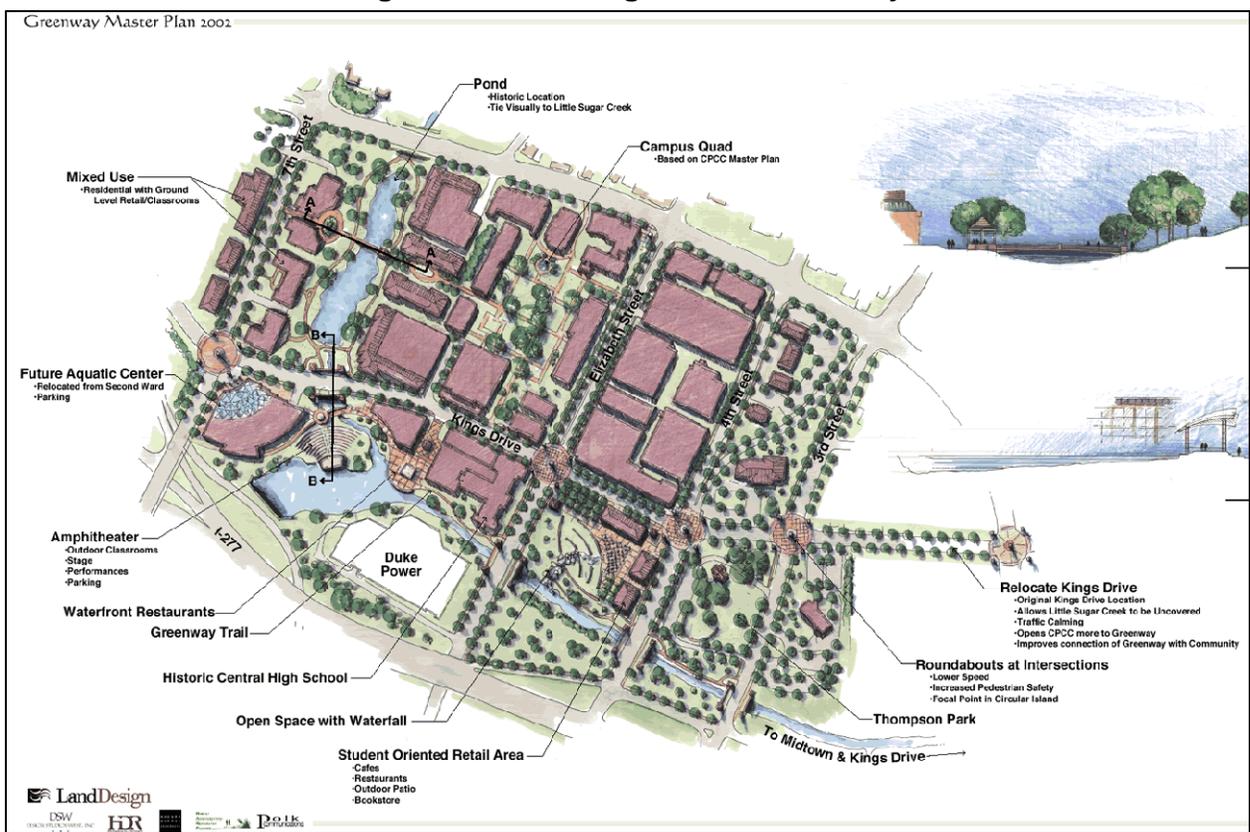
Mecklenburg County Parks and Recreation is currently designing a network of greenways that will extend the pedestrians' and bikers' reach in the city, and several existing and proposed greenways cross or run near the subject alignment. The Little Sugar Creek Greenway will cross Elizabeth Avenue near Kings Drive.

The Briar Creek Greenway presently runs from the north and stops at Central Avenue. It will eventually cross at Central Avenue with a mid-block crossing or an underpass if the present bridge over the creek is replaced. A spur will connect with the new Morningside development near Veterans Park on the southern side of Central Ave.

The Irwin Creek Greenway presently crosses under Trade Street adjacent to the access and ramp roads connecting I-77 with Trade Street and 5th Street.

The figure below shows an illustration of the proposed Little Sugar Creek Greenway that will cross the Streetcar alignment on Elizabeth Avenue and Kings Street.

**Figure 1-4: Little Sugar Creek Greenway**



#### **1.2.4 Railways**

Three existing rail lines cross through the streetcar corridor. One of those is owned by the City while the other two are used for freight and passenger rail services. The line owned by the City operates the Charlotte Trolley will operate daily service from the South End to 11th Street in Center City Charlotte (This service has been suspended during construction of the LYNX Blue Line LRT). This elevated crossing passes the corridor at Trade Street adjacent the Charlotte Transportation Center. One rail line used for freight services crosses over Trade Street near the proposed Charlotte Gateway Station, this line is operated by Norfolk Southern Railroad. When the center is completed, it will be terminus for the North Corridor Commuter Rail line. The final rail line that operates in the area is CSX Transportation, there is an at-grade rail crossing located on Central Avenue near Pecan Street.

### **1.3 PERFORMANCE OF THE TRANSPORTATION SYSTEM**

#### **1.3.1 Highway Performance**

This section describes the existing and future no build highway and roadway system in the study area and presents areas with problematic levels of service on the major roadway segments and intersections in the corridor. Refer to the *Center City Streetcar Travel Analysis Report* for more in-depth traffic analysis and data.

##### **Existing Arterial Capacity Analysis**

To evaluate the capacity conditions of the existing roadway network in the study area, twenty-seven arterial segments were analyzed. Study area roads were analyzed with the following typical sections:

- Beatties Ford Road was analyzed with four through lanes from Rosa Parks Place to the Brookshire Freeway southbound ramps/French Street and three through lanes (two lanes northbound and one lane southbound) from the Brookshire Freeway southbound ramps/French Street to Dixon Street. Between Dixon Street and Rozelles Ferry Road, Beatties Ford Road widens to four through lanes.
- Trade Street was analyzed with four through lanes from Rozelles Ferry Road to Johnson and Wales Way.
- Trade Street between Johnson Wales Way and McDowell Street and Elizabeth Avenue between McDowell Street and Hawthorne Lane were analyzed separately.
- Hawthorne Lane between Elizabeth Avenue and Central Avenue was analyzed with four through lanes.
- Central Avenue between Hawthorne Lane and Reddman Road was analyzed with four through lanes.

The analysis shows that for the 2004 existing conditions, the traffic demand on Beatties Ford Road, Trade Street, and Hawthorne Lane are well below the routes' capacities. Roadway segments and intersections are rated for a level of service based on volume to capacity and delay. Level of Service (LOS) range from A to F and are explained further in the traffic analysis technical memorandum for the project. Traffic demand is approaching or currently exceeds roadway capacity on Central Avenue at the following sections:

- Central Avenue between Morningside Drive and Briar Creek Road (LOS E at 33,200 vehicles per day);

- Central Avenue between Briar Creek Road and Eastway Drive (LOS E at 34,500 vehicles per day);
- Central Avenue between Norland Drive and Rosehaven Drive (LOS F at 36,800 vehicles per day); and,
- Central Avenue between Rosehaven Drive and Sharon Amity Road (LOS F at 36,800 vehicles per day).

On the section of Trade Street within the I-277 loop and the section of Elizabeth Avenue from McDowell Street to Hawthorne Lane automobile traffic is more free-flowing. The grid type street network with the Center City makes traffic movement more efficient. The *Center City Streetcar Travel Analysis Report* and Chapter four of this study have further details.

### **Existing Intersection Capacity Analysis**

Since the capacity of a roadway is usually limited by the capacity of its intersections, the 2004 existing traffic flow conditions were analyzed for 24 intersections along the project corridor.

Under the 2004 existing conditions, 22 signalized intersections and two unsignalized intersection are analyzed. Of the 22 signalized intersections, traffic flows with minimal congestion (v/c ratio less than 0.85) at 19 intersections; traffic flows with moderate congestion (v/c ratio between 0.85 and 0.94) at two intersections; traffic flows with severe congestion (v/c ratio 0.95 or greater) at one intersection (Central Avenue at Sharon Amity Road) where overall intersection operations in the evening peak hour yield Level of Service E. Because this intersection has a v/c ratio greater than 0.95, an Intersection Capacity Utilization (ICU) analysis was performed. The ICU analysis indicates that with a v/c ratio of 0.99, the duration of the PM peak period at this intersection is 75 minutes.

The unsignalized intersection of Beatties Ford Road and Rosa Parks Place operates at Level of Service E in the morning peak hour. The intersection capacity analysis further indicates that the eastbound right-turning traffic flows at Level of Service D or better throughout the day. The eastbound left-turning traffic exceeds the capacity limits (Level of Service F) during the AM and PM peak hours of the day. However, during the field visit for the data collection, it was observed that there are sufficient breaks in traffic flow on Beatties Ford Road due to the signals located on either side of Rosa Parks Place and traffic was able to exit from Rosa Parks Place without excessive delays.

At the unsignalized intersection of Trade Street and the I-77 southbound ramps, traffic on the cross street experiences long delays and subsequently yields an overall Level of Service F during the PM peak hour. The intersection should be monitored to determine whether a traffic signal is needed based on the warrants provided in the *Manual on Uniform Traffic Control Devices (MUTCD)*.

### **2030 No Build Arterial Capacity Analysis**

For the 2030 No Build Alternative arterial capacity analysis, the study area roads were analyzed with the same typical sections as under 2004 Existing Conditions with one exception. The exception is the section of Hawthorne Lane between 7<sup>th</sup> Street and Central Avenue is analyzed with two through lanes and a center left-turn lane since the City of Charlotte is planning to convert Hawthorne Lane from its existing four lane configuration. The 2030 No Build Alternative AADT and peak hour traffic volumes were estimated using the methodology described in the *Center City Streetcar Travel Analysis Report*.

The 2030 No Build Alternative arterial capacity analysis indicates that several sections of Beatties Ford Road, Trade Street and Central Avenue would be congested and would fail to serve the future traffic demand by the year 2030. On Beatties Ford Road, traffic demand would exceed the route's capacity in the vicinity of I-85 and Gilbert Street. On Trade Street, demand would exceed capacity in the vicinity of the I-77 ramps. On Central Avenue, traffic volumes would exceed the mainline capacity on most of the route with the exception of the segments between The Plaza and Morningside Drive and in the vicinity of Eastland Mall between Sharon Amity Road and Reddman Road. Traffic demand on Hawthorne Lane is well below the roadway's capacity under the 2030 No Build Alternative.

### **2030 No Build Intersection Capacity Analysis**

To determine the 2030 No Build Alternative traffic flow conditions at the study area intersections, capacity analyses were performed for all the 24 intersections along the study corridor. The following improvements are included in the 2030 No Build Alternative intersection capacity analysis:

**Trade Street/Beatties Ford Road at Rozelles Ferry Road:** The City of Charlotte plans to implement a road diet program for Rozelles Ferry Road west of its intersection with Trade Street/Beatties Ford Road. Under this plan, the eastbound Rozelles Ferry Road approach would have one through lane, an exclusive left-turn lane and an exclusive right-turn lane. The westbound 5th Street approach would have one through lane and an exclusive right-turn lane. The westbound left-turn movement is prohibited, as under 2004 Existing Conditions.

**Elizabeth Avenue/Hawthorne Lane:** The City of Charlotte proposes improvements to this intersection as part of Elizabeth Avenue Business Corridor Project. With these improvements, eastbound Elizabeth Avenue would have one through lane shared with left-turning movements and an exclusive right-turn lane. The westbound Presbyterian Hospital entrance would have one through lane shared with both left and right-turning movements. The exclusive left-turn lanes on these two approaches would be removed. There would be no changes for the northbound and southbound Hawthorne Lane approaches.

**Hawthorne Lane/7<sup>th</sup> Street:** The City of Charlotte proposes improvements to this intersection as part of the Hawthorne Lane road diet program between 7<sup>th</sup> Street and Central Avenue. With these improvements, northbound Hawthorne Lane would have one exclusive left-turn lane and one through lane shared with right-turning movements. Southbound Hawthorne Lane would have one exclusive left-turn lane and one through lane shared with right-turning movements. There would be no changes for the eastbound and westbound 7<sup>th</sup> Street approaches.

**I-77 southbound ramps at Trade Street:** Under 2004 Existing Conditions, traffic on the I-77 southbound exit ramp is controlled by a stop sign and has long delays during the PM peak hour. The Metrolina Regional Transportation Model projected that the traffic on Trade Street in this area would grow at a rate of 3.0% per year for the next 25 years. With this growth, under the 2030 No Build Alternative, this intersection should be monitored to determine whether a traffic signal is needed based on the warrants provided in the Manual on Uniform Traffic Control Devices (MUTCD). For the analysis purposes, this intersection is treated as a signalized intersection under 2030 No Build and Build Alternatives.

The analysis of 2030 No Build Alternative traffic flow conditions along the Center City Streetcar Corridor indicates that congestion at intersections would increase in the 2030 No Build Alternative compared to the 2004 Existing Conditions. Of the 23 signalized intersections analyzed, traffic will flow with minimal congestion (v/c ratio 0.85 or lower) at ten intersections, with moderate congestion (v/c ratios between 0.85 and 0.95) at five intersections, and with severe congestion (v/c ratios 0.95 or greater) at eight intersections.

At the unsignalized intersection of Beatties Ford Road and Rosa Parks Place, the intersection capacity analysis indicates that the eastbound left and right turning movements and the northbound left-turning movement would either exceed or approach the capacity limits (Level of Service E or F) during the AM peak hour. During the PM peak hour, the northbound left-turning traffic and eastbound right-turning traffic would function at Level of Service C, a good rate of traffic flow. The eastbound left-turning traffic would function at Level of Service F during the PM peak hour. Under the 2030 No Build Alternative, this intersection should be monitored to determine whether a traffic signal would be warranted in the future. The intersection of Beatties Ford Road and Rozelles Ferry / 5<sup>th</sup> Street will operate at LOS E in the PM peak hour under the future no build scenario. The intersections of Central Avenue at Eastway Drive and Central Avenue at Sharon Amity Road also will yield unacceptable Levels of Service (LOS E and LOS F) during both peak hours in the future no build scenario.

### **2030 Build Capacity Analysis**

In the build network, adding streetcar service will have little or no effect on traffic operations except at the intersection of Hawthorne Lane and Elizabeth Avenue and the segment of Beatties Ford Road between the Brookshire Freeway and Rozelles Ferry Road.

The Hawthorne Lane/Elizabeth Avenue intersection will be altered as a result of the streetcar implementation. The southbound approach will be reduced from two through lanes to one through lane and a left turn only lane (into Presbyterian Hospital). The proposed street cross section of Hawthorne Lane (two travel lanes and a left-turn lane) is essentially to be extended south of 7th Street to Elizabeth Avenue to accommodate the streetcar rail alignment.

In the 2030 Build, the southbound approach drops from LOS C to LOS D with the reduction in lanes. This degradation of service has been incorporated into the localized air quality analysis, however, it is expected that much of the traffic at that location will find alternative routes. The City will monitor the location on an ongoing basis.

The segment of Beatties Ford Road between Brookshire Freeway and Rozelles Ferry Road will be converted from three travel lanes (2SB, 1NB) to two travel lanes. This will also cause a modest degradation in service for the southbound direction. However, there is an alternative route via limited access highways (Brookshire Freeway and I-77) that will have the available capacity to accommodate motorists who may want to avoid the area. This segment will also be monitored over time.

More information about traffic impacts is outlined in Chapter 4.

### **1.3.2 Existing Transit Service Performance**

There are thirty bus routes that serve the CTC transfer facility on Trade Street and ten of these routes serve significant portions of the streetcar corridor. The aggregate number of daily boardings for all of these routes on the Trade Street corridor currently exceeds

16,700. These are trips currently on the bus system that could be served by a higher capacity technology. Table 1-7 shows these routes and their contribution toward total ridership in the system.

**Table 1-7: Current Ridership Central/Trade/Beatties Ford Road**

Daily	Inbound Boardings	Outbound Alightings	Total Ridership (2005 Data)
Route 1	96	114	210
<i>Route 7</i>	<i>1,452</i>	<i>1,534</i>	<i>2,986</i>
Route 8	103	79	182
<i>Route 9</i>	<i>2,652</i>	<i>2,613</i>	<i>5,265</i>
Route 10	13	21	34
Route 17	192	276	468
Route 20	183	52	235
Route 27	37	53	90
Route 39	208	264	472
<i>GR Red Line</i>	<i>3,424</i>	<i>3,423</i>	<i>6,847</i>
<b>Total</b>			16,789

The table was compiled only using trips that begin and end on the streetcar’s proposed alignment to aggregate existing trip patterns that could be served using a higher capacity form of transit. The routes that are italicized would be replaced by the new service while the other routes could be adjusted to serve new areas or to a new alignment with a shorter travel time to CTC.

The 2030 No Build Model projects a 28.2% increase in ridership on these routes by the horizon year, translating into approximately 21,500 trips. None of these routes are experiencing major schedule adherence issues but several trips per day are exceeding system standards in terms of volume over capacity.

Currently, Route 9 and the Gold Rush Red Route experience multiple trips where passenger volume exceeds 120% of the seated capacity throughout the day, but predominantly during midday and peak hour services. If the existing midday and peak hour volumes are increased by the percentage increase in daily ridership shown in the 2030 No Build Model then the occurrences of standing loads will increase considerably on Route 9 and the Gold Rush Red Line. The peak volume for each of these routes is shown in Table 1-8.

**Table 1-8: Peak Volumes for Routes Directly Serving the Study Corridor**

Route	Existing Peak Volumes		2030 No Build Peak Volumes		120% Seated Capacity on Existing Equipment
	Midday	Peak Hour	Midday	Peak Hour	
7	30	35	32	39	48
9	50	54	57	61	48
Red Line	29	40	42	67	28

**1.3.3 Potential Transit Markets**

**Work Trips**

Center City has the largest concentration of jobs in the Charlotte Metropolitan Area and one of primary transit markets is home-based work commutes, which constitute 15% of all trips on a daily basis. The project alignment serves a significant travel shed of work commuters destined for Center City employment. The travel shed corresponds to trip patterns between Center City and the sub-areas depicted in Figure 1-2. The table below shows the number of daily work trips to and from Beatties Ford Road and Central Avenue into Center City.

**Table 1-9: Daily Work Trips within the Study Area**

Origin	Rosa Parks	JC Smith	Center City	Plaza	Eastland Mall	Total Work Trips
Rosa Parks	137	56	1,346	77	61	<b>1,677</b>
JC Smith	54	69	1,018	65	51	<b>1,257</b>
Center City	270	315	12,304	558	483	<b>13,930</b>
Plaza	72	69	2,749	699	227	<b>3,816</b>
Eastland	43	42	1,654	197	268	<b>2,204</b>
<b>Total Work Trips</b>	<b>576</b>	<b>551</b>	<b>19,071</b>	<b>1,596</b>	<b>1,090</b>	<b>22,884</b>

Like the streetcar corridor, the five regional transit corridors are also serving home based work trips in and out of the Center City area. However, to maximize the work commute on the regional corridors it will be important that transit is available in Center City for midday trips for employees. In fact, the regional travel demand model shows that daily non-home based (NHB) trips in the Center City Area total 79,089, or more than 85% of all trips that start or end in the Center City area. More employees will be willing to use transit to get to work, since many of these midday trips could be served by the streetcar.

**Environmental Justice Populations**

The project corridor also has a large concentration of low-income and minority residents. These populations tend to have higher transit propensity than higher income

populations. Table 1-10 shows the percentage of low income population for the project corridor, the City of Charlotte and Mecklenburg County. Table 1-11 shows the percentage of minority population for the project corridor, the City of Charlotte and Mecklenburg County.

Individuals are considered low-income if they reside in households (4 person households) with less than \$43,350 income annually. The “Below Poverty and Very Poor” categories have household incomes of \$27,100 and \$16,250 annually. **NOTE: The population figures in each column are subsets of the next category, i.e. the very poor population is included in the Below Poverty category.**

**Table 1-10: Low Income Population**

Area	Persons	Below Moderate	Below Poverty	Very Poor	Percentage of Total Population
<b>Study Area</b> (½ Mile Buffer of Alignment)	41,487	25,348	15,287	8,571	61.1%
<b>City of Charlotte</b>	542,131	214,736	115,965	57,811	39.6%
<b>Mecklenburg County</b>	695,454	249,428	131,449	64,932	35.9%

Source: US Department of Housing and Urban Development, 2006 – ST3 Sampling

**Table 1-11: Minority Populations**

Area	Persons	Black	Other Minority	Percentage of Total Population
<b>Study Area</b> (½ Mile Buffer of Alignment)	41,487	22,620	8,586	75.2%
<b>City of Charlotte</b>	542,131	175,563	68,067	44.9%
<b>Mecklenburg County</b>	695,454	191,352	78,823	38.8%

Source: US Department of Housing and Urban Development, 2006 – ST1

**Special Trip Generators**

The project alignment connects a number of areas with a high propensity for transit suggesting that a latent transit market exists. Existing ridership volumes on the bus routes indicate that transit is a viable option in the corridor and future enhancements to service are warranted and will be utilized. The neighborhoods are some of the most densely populated areas in Charlotte and there are many significant trips generators.

1. Johnson C. Smith University, Johnson & Wales University and the Central Piedmont Community College all have campuses along the project corridor.

- These are major educational institutions that also have a reciprocal agreement that allows students at each institution to take classes at the other schools.
2. Presbyterian Hospital is a primary health care facility and a major employer with a campus of buildings all within walking distance of Hawthorne Lane. If transferring from the South Line or a local route at the CTC, Presbyterian Hospital can be reached within five minutes via the streetcar.
  3. Charlotte Bobcat Arena/Bank of America Stadium/Blumenthal Center for the Arts are three entertainment facilities in Center City that host sporting events, concerts and the performing arts on a regular basis. These special events attract hundreds of thousands of patrons every year.
  4. There are numerous areas along the alignment where new developments are eminent or planned for the near future. New residential and mixed use developments at Morningside Drive, Central Avenue at Hawthorne Lane (Grubb-Barnhardt, Richey Lamar Street), Elizabeth Avenue (Grubb), Epicenter and two additional high rise residential facilities on Trade Street, Gateway developments, Wesley Heights and Beatties Ford will all intensify the land uses along the alignment and generate new transit ridership.
  5. The Government Center is a major employment and activity center on East Trade Street and into the Second Ward of Center City.

#### **1.4 TRANSPORTATION PROBLEM AND NEEDS**

The proposed action is in response to a growing need for improved mass transit within the existing study area. The need for the proposed action stems from rapid population and employment growth, planned development activities, diverse demographic character, numerous activity centers within the project corridor and the need to improve air quality in the Charlotte-Mecklenburg region. The following describes the purpose and need that will be met by the proposed action.

##### **1.4.1 Project Purpose**

The proposed action is to construct, operate, and maintain a streetcar system in Charlotte's Center City. The purpose of the project is to:

- Improve the availability and reliability of transit service in the corridor,
- Improve regional transit connectivity in the corridor,
- Connect the corridor's major activity centers via a high capacity transit system,
- Increase transit ridership in a high demand corridor,
- Support planned development and redevelopment in the Charlotte urban area,
- Enhance the region's economic potential through increased mobility,
- Reduce short inner-city auto trips, parking demand and vehicle emissions, and to
- Provide expanded transportation choices.

##### **1.4.2 Summary of Problems and Needs**

###### **1.4.2.1 Improve Transit Service in the Highest Demand Corridor**

The corridor has the highest combined boardings of any corridor in the system. Routes 1, 7, 9, 39 and Gold Rush Red Line all have their highest volumes on Trade Street, Elizabeth Avenue or Central Avenue.

Route 9 currently averages two trips inbound and 2-3 trips outbound with volumes that exceed the CATS loading threshold of 120% seated capacity. Per CATS service standards, Route 9 will need five minute frequencies within the next 5 years.

Peak volumes for the Route 9 occur in the midday and PM peak hours and usually occur near CPCC at Kings Drive and Elizabeth Avenue.

One of the highest volume stops for Route 9 is at Eastland Mall, where boardings are expected to increase as the neighborhood routes in that area are expanded and the transit center is established there.

The Gold Rush Red Line operates on Trade Street at 6 minute frequency during the peak and routinely experiences crush loads and passenger "leave behinds", especially during the AM peak.

The Route 7 does not currently have capacity issues but is expected to require an increase in peak hour frequencies within the next five years.

One of the highest volume stops for Route 7 is at Rosa Parks Place, where boardings are expected to increase as the neighborhood routes in that area are expanded and the transit center is established there.

The number of buses serving the CTC has increased beyond the capacity of the facility. A number of routes are now required to serve the CTC at curbside bays on Brevard and 4th Street. Increases in frequencies on Route 7 and 9 and other routes may require additional bays at the CTC.

The Route 39 highest volume stop occurs at Eastway Rd and Central Avenue. Route 1 has its highest volume stop at Rozelles Ferry and West Trade Street.

#### 1.4.2.2 Enhance Mobility

The project is needed to enhance mobility in the project corridor. As the focal point of employment and transportation within the region, Charlotte's Center City must have a modern transit system to support its growing mobility needs. The Project is part of a system plan with five major transportation corridors emanating out from Center City. The major transportation corridors are the focus of future development and redevelopment. According to the *Corridor System Plan*, "The Center City improvements are designed not only to serve travel within the CBD, but also to provide and enhance transit connectivity between the corridors. These improvements will benefit the entire region by enabling the individual corridors and local services to function as an integrated system."<sup>9</sup> The Project would establish an east-west transit spine that links all five rapid transit corridors in downtown Charlotte.

The streetcar would also provide easy movement between the new Rosa Parks Place Community Transit Center at the northwest terminus of the project, the existing Transportation Center and proposed Charlotte Gateway Station in Center City, and the Eastland Community Transit Center area at the eastern terminus of the project. Enhanced mobility provided through the efficiency and convenience of the streetcar and accessibility to key destinations will also enhance the walkability of Center City. According to the *Corridor System Plan*, "Operation of the streetcar along Trade Street would further enhance this street as a pedestrian/transit way."<sup>10</sup> The streetcar project would provide a new and unique mode of transportation, facilitating travel and improving transit access for residents and businesses throughout the project corridor.

The project would also enhance mobility in neighborhoods of diverse income and racial composition. Demographic analyses of the project corridor, as explained in further detail

in Section 5.4 of the Environmental Assessment, indicate that several existing single-family and multi-family neighborhoods throughout the corridor are comprised of low-income and minority households. The Project will enhance the quality of transit service to these neighborhoods thereby improving mobility among transit dependent populations, linking them to employment, education, medical services, and other modes of transportation. An analysis of corridor demographics shows that the one half-mile streetcar rider capture area would provide access to high-quality transit service for an additional 6,900 low income and 14,700 minority individuals<sup>11</sup> when compared to the one quarter-mile bus rider capture area.

#### 1.4.2.3 Serve Projected Population and Employment Growth

The project is needed to provide improved transit service that will keep pace with projected population and employment growth. As one of the fastest growing cities in the United States, the population and employment rates within Charlotte are projected to continue the rapid growth trend experienced throughout the 1990s and will increase substantially over the next twenty years. Much of the projected growth in population and employment will be experienced in the Center City sub-area where population and employment are expected to increase by 169 and 56 percent, respectively, by 2030. Population and employment within the overall project study area is expected to increase by 77 and 59 percent, respectively, by 2030.

The increased interest in living in an urban setting and the desire to live close to work has created a growing demand for residential development in the project corridor. Numerous development activities are planned or are under construction within the project vicinity. The proposed streetcar would provide existing and future residents with an efficient and attractive transit option for traveling to and from work and between other destinations proximal to CATS' transit system.

#### 1.4.2.4 Improve Connectivity between Activity Centers

The project is needed to improve connectivity between activity centers along the project corridor. The Project would provide high-quality transit service connecting key destinations along the proposed alignment. The project would link regional institutions, major event venues, transportation hubs and residential areas. Additionally, the system would directly serve the largest employment center in the region. Major activity centers within the corridor include Johnson C. Smith University, Johnson & Wales University, Government Center, the Transportation Center, Charlotte Bobcats Arena, the Square, Central Campus of Central Piedmont Community College, Presbyterian Hospital, the Plaza, and Eastland Mall. Shopping, medical offices and services, and key offices for federal, state, and regional agencies and community services are also located along the proposed alignment.

The streetcar would directly serve the educational institutions of Johnson C. Smith University, Johnson & Whales University, and the Central Campus of the Central Piedmont Community College. Johnson C. Smith University is a historically African-American university that enrolls approximately 1,500 students per year with a large portion of the student body living on campus. Johnson and Wales University enrolls approximately 2,100 students annually with approximately 750 students living on Campus. Central Campus of the Central Piedmont Community College enrolls between 16,000 and 17,000 students annually, all of which live off campus and commute to the college. The Central Campus hosts special events such as art exhibits, theatrical performances and conferences. The three institutions have recently agreed to allow student reciprocal access to classes on each of the campuses. Such an agreement

increases the need for reliable transportation between campuses all of which are directly situated along the subject alignment. Students of these institutions would greatly benefit from enhanced mobility with the project corridor.

Two other educational institutions, the University of North Carolina – Charlotte Uptown Campus and Kings College are also within walking distance of the alignment.

The Charlotte Bobcats Arena, located across the street from the Transportation Center, would be a well-used stop for the Center City streetcar. The arena is home to the National Basketball Association (NBA) Charlotte Bobcats and the East Coast Hockey League Charlotte Checkers. In addition to professional basketball and hockey, the arena also hosts other special events such as NCAA basketball conference tournaments, the circus, horse shows, and concerts.

In addition, by extending the streetcar outside of the I-77/I-277 loop, enhanced connectivity to Center City Charlotte would be provided to neighborhoods including Seversville, Biddleville, McCrory Heights, Washington Heights, Lincoln Heights, University Park Plaza Midwood and Elizabeth.<sup>12</sup>

#### 1.4.2.5 Serve Existing and Planned Development

The project is needed to serve existing and planned development within the streetcar corridor. According to the *Corridor System Plan*, “The primary purpose of the public transit system is to support the region’s land use vision.”<sup>13</sup> The City of Charlotte is growing in population and is proactively working to implement transit improvements that will support livable urban communities by promoting economic development, increased development density, and mixed income residential development. The project would provide mobility enhancement to diverse residential areas and housing types. The project would serve existing single-family and multi-family neighborhoods throughout the corridor as well as promote pedestrian and transit-oriented residential infill development characterized as multi-family, mixed-use development with new urbanism design elements. Such elements include streetscape scale, construction and features that serve pedestrians by providing them with distinctive and human-scale spaces. Nearly sixty development projects are planned or under construction within the project study area. These developments and others developments planned for the corridor support the streetcar project by increasing pedestrian-oriented activity throughout the corridor, which will promote transit and result in increased use of the system. Likewise, the streetcar would support the development activities by enhancing mobility and providing high-quality transit service to developing and redeveloping areas of Charlotte.

#### 1.4.2.6 Encourage and/or Accelerate New Development

Beatties Ford Road and Central Avenue illustrate substantial development interest and potential over the next few years. Current redevelopment trends demonstrate high-density projects with a mix of commercial and residential uses, particularly on parcels fronting the corridor. These development opportunities become more attractive and could potential be accelerated by the implementation of the streetcar. The following section shows the potential development for each of the outer segments of the streetcar.

##### **Beatties Ford Road**

This corridor has over 228 acres of land that could be redeveloped. This includes projects currently planned or under construction, primarily concentrated in the area south of the Brookshire Freeway, in and around the Wesley Heights neighborhood. A majority

of these projects are residential, with a mix of single-family, townhouses and multifamily products, as listed below:

- Mosaic mixed-use development (at West Trade Street near Brunns Avenue)
- Walnut Hill (multi-family development in the Wesley Heights neighborhood)
- Woodvale Place (single-family units in the Wesley Heights/ Seversville area)
- Seversville Redevelopment (at South Brunns and Sumter Avenue)
- Wesley View (townhouses in Wesley Heights)
- Johnson C. Smith Residence Halls (near French Street)
- Nia Point (multifamily apartments in Washington Heights)
- University Park (Office condominiums near LaSalle Street)
- Friendship Village mixed-use development north of I-85

Potential development along the corridor is concentrated in the short and mid-term, replacing older and partially vacant retail out-parcels or older housing. This development could add over 1,800 residential units and over 800,000 square feet of commercial development over the next 25 years. The numbers include about 1,200 residential units that are already planned or under construction. Development trends for mixed-used will continue along the Beatties Ford frontage with infill opportunities for lower density residential in the surrounding neighborhoods.

### **Central Avenue**

The Central Avenue corridor, starting at Hawthorne Lane and extending to Eastland Mall on the east is also experiencing significant development activity. Key projects are tabulated below. Overall, these planned projects will add around 1,000 residential units, mostly multifamily, to the Central Avenue corridor.

- Conformity Corp development (residential on Hawthorne Lane)
- Faison development (multifamily residential near Sunnyside)
- Piedmont Courts (multifamily residential at 10th Street and Seigle Avenue)
- Development at Autoverks site (residential off Commonwealth Avenue)
- Central 27 (condominiums on Central Avenue)
- Morningside residential redevelopment (over 1,000 units off Iris Drive)
- Mixed-use at Clement Avenue and Hawthorne Lane

In addition to these ongoing projects, there are several potential opportunities for redevelopment along the corridor, constituting almost 400 acres. These include short-term opportunities such as the redevelopment of underutilized parking lots on the Eastland Mall periphery and longer term projects for the densification of shopping centers such as Eastway Crossing and Eastway Square. Several smaller infill opportunities are scattered within neighborhoods and would be appropriate for single-family or townhouse development.

Based on the study assumptions, new development could add over 3,700 residential units, including development currently underway. Over one million square feet of new retail would include a variety of products –store-front retail near the Plaza, new shopping centers (built as part of mixed-use developments) and neighborhood oriented retail at the streetcar stops. Additionally, about 650,000 square feet of office and industrial development is anticipated based on the study assumptions. Industrial usage is assumed to be the redevelopment of existing warehouse sites near East 10th Street and Central Avenue. Potential institutional expansions are assumed at the vacant sites adjoining Eastway Middle School and Winterfield Elementary Schools.

The development in the study area translates into an overall investment exceeding \$1.4 billion based on unit costs per square foot assumptions established by the Charlotte-Mecklenburg Economic Development Office. Table 1-12 illustrates the total investment by segment, see the *Center City Streetcar Development Study* (October 2006) for further details.

**Table 1-12: Estimated Investment for Study Area Development**

Segment	Residential	Commercial	Institutional	Total
Beatties Ford Road	\$340.2	\$94.0	\$0	\$434.2
Central Avenue	\$766.8	\$209.5	\$8.6	\$984.9
Total	\$1,107.0	\$303.5	\$8.6	\$1,419.1*

\* Dollars in millions – based on \$100-200 per sq. ft.

#### 1.4.2.7 Improve Air Quality

The project is needed to improve air quality in the region. The proposed project, in combination with other proposed transit improvements in the region, would reduce vehicle emissions by reducing vehicle miles traveled (VMT) through increased transit efficiency (i.e., reduction in bus VMT), reduction of short inner-city automobile trips, and reducing inner city parking demand. Reduction in vehicle emissions would contribute to the efforts set forth by the Mecklenburg County Air Quality program to improve air quality in the county and region and goals set forth in the *Corridor System Plan* to promote Charlotte-Mecklenburg’s air quality.<sup>14</sup>

CATS Routes 7, 9 and the Red Line are operated with 1,139,900 vehicle miles traveled annually.

Automobiles and other motor vehicles represent a major source of air pollution in the region. Minimizing the growth in travel by single-occupant automobiles will be an important factor in achieving the regional air quality goals. The proposed project would provide a critical link in the regional network of high capacity transit services, increasing the opportunities for non-automotive travel. As a result, the Center City Streetcar is expected to have positive regional air quality impacts.

The net reductions in regional VMT for the Build Alternative was derived from the regional travel demand model. Comparing the highway network assignments of the No-Build and Build Alternatives provided an estimate of the reduction in regional VMT due to mode shift. The resulting net VMT reductions were used as the basis of the regional air quality analysis.

Year 2030 emission rates for CO and NOX were estimated using the EPA MOBILE6.2 model with selected parameters adjusted to reflect assumed conditions in the study area. Mobile emission rates were obtained from the North Carolina Department of Environment and Natural Resources, Division of Air Quality.

Table 1-13 summarizes the results of the Year 2030 regional air quality analysis for the No-Build and Build Alternatives. The analysis shows the net reduction in regional VMT for the Build Alternative relative to the No-Build Alternatives, along with the estimated pollutant emission factors and the corresponding differences in regional emissions.

**Table 1-13: Year 2030 Regional Air Quality Impact Analysis and Results**

Project Alternative	Daily VMT Reduction <sup>1</sup> (veh-mi)	Carbon Monoxide (CO)		Nitrogen Oxides (NO <sub>x</sub> )	
		Emission Factor (g/veh-mi)	Emission Reduction (kg/day)	Emission Factor (g/veh-mi)	Emission Reduction (kg/day)
No-Build	0.00	7.3	0.00	0.7	0.00
TSM <sup>2</sup>	-	7.3	-	0.7	-
Build	119,603	7.3	873.10	0.7	83.72

Source: URS Corp., October 2006

Notes: 1. Net reduction in VMT relative to the No-Build Alternative.

As the results in Table 1-13 indicate, the Build Alternative is expected to reduce the amount of regional vehicular travel relative to the TSM and No-Build Alternatives. A net reduction in VMT would result in lower emissions of CO, the ozone precursor (NO<sub>x</sub>) and greenhouse gases. Based upon this analysis the Build Alternative would not have an adverse effect on the regional air quality. Furthermore, by providing an alternative to single-occupant vehicle travel, implementation of the Build Alternative would support the attainment and maintenance of air quality standards in the region.

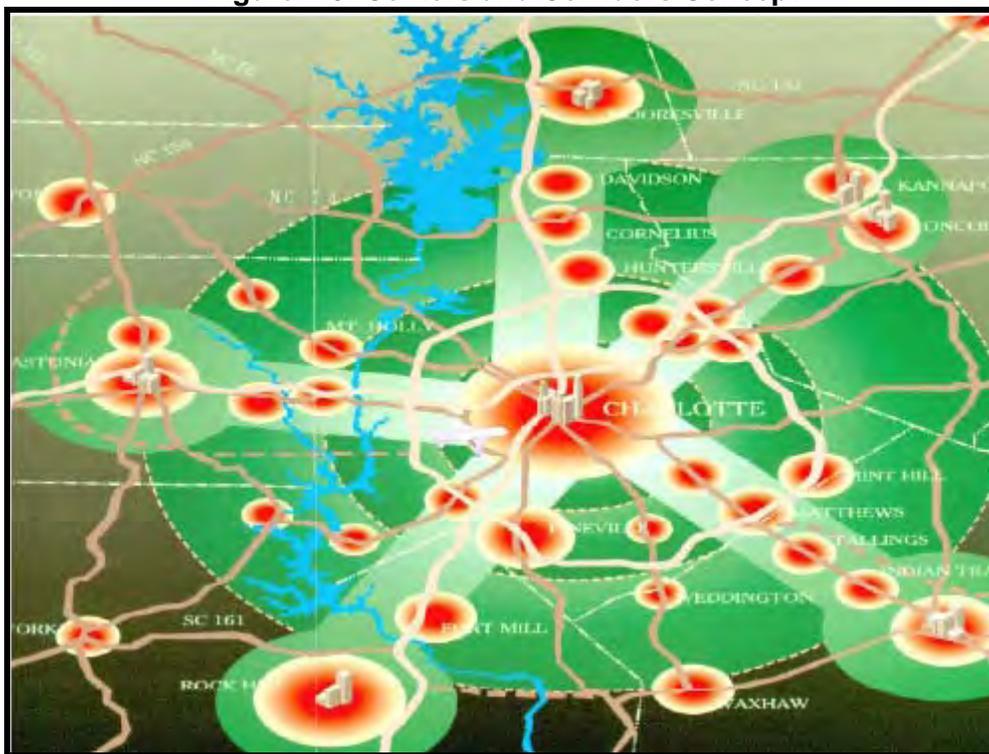
**1.4.3 Goals and Objectives**

The following plans have been developed to support the integration between land use and transit in the Charlotte-Mecklenburg region.

**1.4.3.1 Centers and Corridors Concept Plan**

The Centers and Corridors Plan was adopted by the Charlotte City Council and the Mecklenburg County Board of Commissioners in 1994. The focus of this plan was to concentrate new growth and redevelopment around the five corridors that extend from the Center City area as well as a number of key nodes or “centers,” as a means of managing growth and reducing sprawl in Mecklenburg County and the greater region. The goals for the development of a transit system to support the centers and corridors land use vision included sustaining economic growth and vitality, expanding to a regional system, concentrating development in Center City and along corridors and at key economic centers, and combining rapid transit with enhancement of the overall transit system. This would in turn support future transit improvements and transit-orientated development. A map of the centers and corridors concept is shown in Figure 1-5.

**Figure 1-5: Centers and Corridors Concept**



Source: Charlotte Area Transit System. "Corridor System Plan." September 2002.

#### 1.4.3.2 2025 Integrated Transit/Land Use Plan

The *2025 Integrated Transit/Land Use Plan*, which was completed in October 1998, built upon the Centers and Corridors Concept Plan. The Plan provided a direct connection between transit and land use decisions and promoted growth in the five major transit corridors. The plan also discussed 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 very crucial in the Mecklenburg County voters' approval of the ½ cent sales tax for transit in 1998.<sup>15</sup>

#### 1.4.3.3 2030 Long Range Transportation Plan

Policies, programs and projects to be implemented in the region encompassed by Mecklenburg and Union counties between 2005 and 2030 are described in the *2030 Long Range Transportation Plan (2030 LRTP)*.

Goals for the transportation system outlined in the 2030 LRTP are to:

- Provide a safe and efficient transportation system;
- Improve the quality of life for residents of the Mecklenburg-Union metropolitan planning organization (MUMPO);
- Provide a transportation system that affords the public with mobility choices including walking, bicycling, and transit options;

- Provide a transportation system that is sensitive to significant features of the natural and human environment; and
- Provide equitable transportation options to low income and minority neighborhoods.

The specific objectives relating to public transportation, as outlined in the 2030 LRTP, are to:

- Promote a safe, efficient, and diverse public transportation system that is accessible to various segments of the population;
- Operate safe and efficient scheduled transit services that minimize travel times and distances;
- Implement land use strategies that maximize the potential for transit patronage and coverage;
- Develop land use and density criteria for transit centers and corridors;
- Establish programs and incentives that encourage ridesharing and/or eliminate barriers thereto;
- Serve the elderly and transportation disadvantaged populations with convenient transportation to needed services;
- Increase transit patronage as a percentage of total trips;
- Maximize transit's coverage area to the extent feasible;
- Facilitate coordination between transportation modes with the establishment of intermodal facilities; and,
- Reserve designated rail and transit corridors for future needs.

Some of the objectives relating to the environment should particularly be considered in the preparation of the environmental assessment for each project; include:

- Develop a transportation system that preserves and enhances the natural and built environments,
- Develop transportation systems and programs that maintain or improve air quality,
- Plan transportation facilities that protect cultural and historic resources,
- Design attractive transportation systems that reinforce community standards of appearance, and
- Plan transportation facilities that minimize neighborhood disruption and related impacts.

Improving accessibility and mobility is cited as one of the most important objectives of MUMPO. Some of the methods by which this objective is achieved are:

- Integrating land use and transportation planning,
- Providing the necessary resources to enhance the existing transportation system,
- Expanding the existing transit system, and
- Implementing fixed route mass transit options.<sup>16</sup>

#### 1.4.3.4 Center City 2010 Vision Plan

In May of 2000 the Charlotte City Council and Mecklenburg County Board of Commissioners adopted the *Center City 2010 Vision Plan*. 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." Some of the actions recommended in the plan for Center City are to:

- 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, and
- Focus the urban density required to function as a central node for transit destinations and connections.

Among 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 it should be connected. In order to include connections to neighborhoods outside of the I-277 loop, enhanced transit options and pedestrian and bicycle paths should be emphasized.<sup>17</sup> Key points in the vision for the transit system included providing a viable transit alternative to vehicles, increasing transit ridership, establishing efficient points of transfer, and studying alternatives for an east-west transit corridor.

#### 1.4.3.5 2025 Corridor System Plan

The *2025 Corridor System Plan* was developed in 2002 by CATS and the Charlotte Mecklenburg Planning Commission. This plan built upon the *Centers and Corridors Concept Plan* and the *2025 Integrated Transit/Land Use Plan*. The 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 *2002 Corridor System Plan* include land use, mobility, environment, finance, and system development. According to the plan, Transit Oriented Development (TOD) 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 key activity centers.<sup>18</sup> The components of the plan in Center City, including the streetcar, fulfill system principles by integrating corridor components together as a system, promoting inter-corridor travel, and providing circulation and distribution throughout Center City as well as adjoining communities and institutions. The components also facilitate access and mobility in Center City.<sup>19</sup> The components also facilitate access and mobility in Center City. The *Corridor System Plan* is shown in Figure 1-5.

A brief summary of the plan from the CATS *Corridor System Plan* document is provided below.

#### **South Corridor**

Light rail transit (LRT) will be implemented from Seventh Street in Center City along the former freight right-of-way. Opening day is scheduled for Fall 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

servicing the eastern portion of the corridor, and enhanced bus servicing the western portion.

### **Northeast Corridor**

The Northeast Corridor (Blue Line Extension) extends from 9th Street in Center City through the North Davidson (NoDa) and University areas to I-485 north of UNC Charlotte. The service will operate generally within the existing railroad right of way from Center City to NoDa and then remain within the North Tryon Street (US 29) right of way from Sugar Creek north to I-485.

### **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 streetcar project, the Charlotte Transportation Center, the West Trade Multi-Modal Station, and a north-south LRT spine.

#### 1.4.3.6 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." According to the plan, "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. It is the strategic framework upon which the Center City Transportation Plan proposals have been built."<sup>20</sup>

#### 1.4.3.7 The City of Charlotte Transportation Action Plan

The *City of Charlotte Transportation Action Plan* is a document that strategizes in making Charlotte into "a premier city in the country for integrating land use and transportation choices." It is a comprehensive multimodal transportation plan that identifies, plans, implements and monitors the transportation system to ensure that that vision of the Center and Corridors study are accomplished. A primary goal for the transportation action plan is for all Charlotte's street to be appropriately designed to enhance and protect its residents' quality of life.

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<sup>1</sup> [http://www.charlottechamber.com/content.cfm?category\\_level\\_id=134&channel\\_id=47&content\\_id=187&CFID=1151281&CFTOKEN=74573428](http://www.charlottechamber.com/content.cfm?category_level_id=134&channel_id=47&content_id=187&CFID=1151281&CFTOKEN=74573428)

<sup>2</sup> Charlotte Area Transit System. *Corridor System Plan*. 18 September 2002.

<sup>3</sup> Charlotte Area Transit System. *Corridor System Plan*. 18 September 2002.

<sup>4</sup> TAZ Data Charlotte DOT, 2006.

<sup>5</sup> TAZ Data Charlotte DOT, 2006.

<sup>6</sup> "Third Ward Neighborhood Vision Plan." Adopted 2003. Available:  
<http://www.charmeck.org/Departments/Planning/Area+Planning/Plans/home.htm>

<sup>7</sup> "Charlotte Streetcar Trade Street Background Review, Draft Report." Prepared for Charlotte Area Transit System. Prepared by URS Corporation. January 2005.

<sup>8</sup> 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.

<sup>9</sup> Charlotte Area Transit System. "Corridor System Plan." 18 September 2002.

<sup>10</sup> Charlotte Area Transit System. "Corridor System Plan." 18 September 2002.

<sup>11</sup> US Census, 2000.

<sup>12</sup> Charlotte Area Transit System. "Corridor System Plan." 18 September 2002.

<sup>13</sup> Charlotte Area Transit System. "Corridor System Plan." 18 September 2002.

<sup>14</sup> Charlotte Area Transit System. "Corridor System Plan." 18 September 2002.

<sup>15</sup> Charlotte Area Transit System. *Corridor System Plan*. 18 September 2002.

<sup>16</sup> Mecklenburg-Union Metropolitan Planning Organization. "2025 Long Range Transportation Plan." Adopted 3 April 2002. Available:  
<http://www.charmeck.org/departments/transportation/roads/2025.htm>.

<sup>17</sup> City of Charlotte, Mecklenburg County and Charlotte Center City Partners. "Center City 2010 Vision Plan." Adopted May 8 and 9, 2000 by the Charlotte City Council and Mecklenburg County Board of Commissioners.

<sup>18</sup> Charlotte Area Transit System. *Corridor System Plan*. 18 September 2002.

<sup>19</sup> Charlotte Area Transit System. *Corridor System Plan*. 18 September 2002.

<sup>20</sup> "Center City Transportation Plan" April 2006.

## CHAPTER 2 ALTERNATIVES CONSIDERED

### 2.1 SCREENING AND SELECTION PROCESS

CATS completed Major Investment Studies (MIS) for the five transit corridors (North, South, Northeast, Southeast, and West). The South Corridor Light Rail Project is currently in construction with November 2007 as the date scheduled to begin operations. The other four corridors are completing DEIS phase. Coordination between all of these projects with the Center City Streetcar will be directed by CATS.

### 2.2 DEFINITION OF ALTERNATIVES

The alternatives under consideration for the Center City Streetcar Corridor Project are summarized in the table below.

**Table 2-1: Summary of Alternatives**

Alternatives	Source			Advanced to EA
	2025 Corridor System Plan	NEPA Required	Added by Public/Agency	
Future No-Action		✓		✓
Baseline/TSM		✓		✓
Streetcar Alignment 1 (Central Av/Hawthorne/Trade/Beatties Ford Rd – Median Running on Trade Street)	✓			✓
Center City Alt. Align. A (Trade St. Curbside Running)			✓	
<i>Alternatives B through F are curbside running.</i>				
Center City Alt. Align. B (3 <sup>rd</sup> and 4 <sup>th</sup> Street Couplet)			✓	
Center City Alt. Align. C (4 <sup>th</sup> and 5 <sup>th</sup> Street Couplet)			✓	
Center City Alt. Align. D (Trade and 4 <sup>th</sup> Street Couplet)			✓	
Center City Alt. Align. E (Trade and 5 <sup>th</sup> Street Couplet)			✓	
Center City Alt. Align. F (5 <sup>th</sup> and 6 <sup>th</sup> Street Couplet)			✓	

#### 2.2.1 Future No-Action Alternative

The No-Action Alternative includes transit services, highway and multi-modal facilities that are likely to exist in 2030. These include:

- The existing highway network;
- Multi-modal improvements that NCDOT has scheduled in the State Transportation Improvement Program (STIP) for implementation between 2006 and 2012 as adopted by the North Carolina Board of Transportation (BOT) and the

Mecklenburg-Union Metropolitan Planning Organization (MUMPO) on July 7, 2005 and September 21, 2005 respectively;

- Existing transit routes and schedules currently operated by CATS;
- The South Corridor Light Rail line scheduled to be completed in 2007;
- Other new bus services to which CATS has committed, including expansion of bus services in the other rapid transit corridors;
- New bus services to serve areas that will be developed by 2030; and,
- Routine replacement of existing facilities and equipment at the end of their useful life.

The No-Action Alternative provides the underlying foundation for comparing the travel benefits and environmental impacts of the other alternatives. It also is an alternative itself. While the No-Action Alternative may avoid some of the environmental impacts associated with the Build alternatives, it may also not provide the travel and land use benefits of the build alternatives.

**Multi-modal Improvements**

Multi-modal improvements listed in the 2006-2012 Transportation Improvement Program that are located in the study area are described in Table 2-2.<sup>1</sup>

**Table 2-2: Multi-modal projects in the 2006-2012 STIP**

TIP Number*	Description	Status
U-209B	US-74 (Independence Blvd) from NC 24-27 (Albemarle Rd) to Idlewild Rd. Widen to multi-lanes w/ HOV lanes, interchg w/ Sharon Amity Rd and Idlewild Rd and safety improvements. 1.4 mi.	Planning/Design – in progress Mitigation – FFY 11 ROW – FFY 09 Construction – FFY 12+
U-3850	I-277 (John Belk Freeway). Add westbound lane through I-77 interchange. 0.5 mile.	Planning/Design – by city Construction – FFY 11
U-4441	Bicycle/Pedestrian connections to trail system. Study to identify neighborhood connections for non-motorized transportation.	In progress
U-4442	North-South corridor transitway project study to review area’s land use patterns to concentrate development within major travel corridors to enhance high capacity transit service.	In progress
U-4912	Elizabeth Avenue redevelopment project.	Planning only.
FS-0510A	I-77 from 5 <sup>th</sup> Street in Charlotte to NC 73 (Sam Furr Road). Add HOV lanes. 14.4 miles.	Feasibility study in progress.
E-4714	Irwin Creek bikeway from Irwin Av Elem. School to Cedar Yard (near Bank of America Stadium).	Construction – FFY 06
E-4715	Little Sugar Creek Greenway from Cordelia Park to Baxter Street.	Construction – FFY 06
P-4403	I-77 - Charlotte North transit study (passenger rail).	In progress – work to be completed by City of Charlotte.

\* TIP Number is the project reference number the 2006-2012 MUMPO Regional Transportation Improvement Program.

**Bus Transit Improvements with the No-Action Alternative**

In November 2002, the Metropolitan Transit Commission (MTC) approved a 2025 Transit System Plan which consists of multiple rapid transit improvements in five corridors, a

series of improvements in Center City Charlotte, and bus service and facility improvements throughout the rest of the region. The transit component of the No-Action Alternative includes both bus transit service expansion and transit facilities. Transit services under the No-Action Alternative represent an expansion of existing bus services in all corridors of the 2025 Transit System Plan except for the South Corridor where LRT service would be in operation.

These proposed transit services are listed in Table 2-3.

**Table 2-3: Bus Service for the No-Action Alternative**

Routes	Alignment	Frequency (minutes)			Type
		Peak	Midday	Night	
7 – Beatties Ford	Trade/Beatties Ford to Beatties Ford Transfer Center	10	15	30	Local
7 – Beatties Ford-Sunset	Trade/Beatties Ford onto Sunset to Statesville Rd	30	30	30	Local
9 – Central-Lawyers	CTC to Eastland and Idlewild via Central	10	15	15	Local
9 – Central-Lawyers/I-485	CTC to Eastland & I-485 via Central & Lawyers	30	30	30	Local
17- Commonwealth	CTC to 7 <sup>th</sup> , Central, Pecan, Commonwealth, Woodland, Eastway, Central, Albemarle, Sharon Amity, and Independence out to Sardis North	30	30	30	Local
39- Eastway/UNCC	Trade, Elizabeth, Hawthorne, Central, and Eastway out towards UNCC	30	30	45	Local

**2.2.2 Future Baseline/Transportation System Management (TSM) Alternative**

The TSM Alternative is a lower capital cost approach for addressing the need for transit improvements in the Center City Corridor. Under this alternative, it is assumed that the implementation of the highway and transit improvements associated with the No-Action Alternative, along with expansion of transit service to 2030 to provide for growth in regional population and employment would be implemented. It is also assumed that bus service improvements associated with the TSM alternatives for the other corridors and light rail transit (LRT) operations in the South Corridor would be implemented. The TSM Alternative for the Center City Corridor provides the baseline for evaluating the cost-effectiveness of the Build Alternative. Transit improvements under the TSM Alternative include both transit services and transit facilities.

As shown in Table 2-4, Beatties Ford Road and Central Avenue will be served by two separate routes that have different termini. Service on CATS Routes 7-Beatties Ford and 9-Central-Lawyers is envisioned to be provided with articulated buses on 10 minute frequencies that are supplemented by two routes that extend further but operate at a frequency of 30 minutes. Combined, the routes effectively create 7.5 minute frequencies on the alignment corresponding with the Build Alternatives. This configuration of routes is consistent with the system-wide TSM Alternative that is used in all of CATS planning activities.

It should be noted that service levels on Route 9 are expected to increase to 5 minute frequencies in the next three to five years due to overloads on the route. Optimized levels of service resulting from the travel demand modeling runs are not currently yielding those levels of ridership for the horizon years. Since internal analyses are indicating significant growth, a higher level of service may be required in the streetcar corridor than the 7.5 minute frequencies tested in both the TSM and Build Alternatives.

From a traffic operations perspective, the 2030 TSM Alternative is expected to perform similarly to the 2030 Build Alternative, assuming that the Streetcar will have only negligible effects on vehicular traffic.

**Table 2-4: Bus Services in the Central Corridor for TSM Alternative**

Routes	Alignment	Frequency (minutes)			Type
		Peak Frequency	Midday Frequency	Night Frequency	
7 – Beatties Ford	Trade/Beatties Ford to Beatties Ford Transfer Center	10	15	15	Local
7 – Beatties Ford-Sunset	Trade/Beatties Ford onto Sunset to Statesville Rd	30	30	30	Local
9 – Central-Lawyers	CTC to Eastland and Idlewild via Central	10	15	15	Local
9 – Central-Lawyers-I485	CTC to Eastland and I-485 via Central & Lawyers	30	30	30	Local
17- Commonwealth	CTC to 7 <sup>th</sup> , Central, Pecan, Commonwealth, Woodland, Eastway, Central, Albemarle, Sharon Amity, and Independence out to Sardis North	30	30	30	Local
39- Eastway/UNCC	Trade, Elizabeth, Hawthorne, Central, and Eastway out towards UNCC	30	30	45	Local
105 – Central/Beatties Skip Stop Service	Beatties Transfer Center to Eastland Transfer Center	7.5	15	15	Skip-Stop

**2.2.3 Build Alternatives**

The Center City Streetcar project is a key recommendation of the 2025 Corridor System Plan. The Center City Streetcar is conceived as a “Portland” type streetcar system utilizing modern vehicle technology based on the European “tram”. This type of vehicle is smaller and more lightweight than traditional light rail transit vehicles, and is capable of operating within shared traffic lanes. The Center City Streetcar is an important component of CATS’ overall system plan, providing a critical link between other major transit corridors while also enhancing service currently provided on heavily-used bus routes. The Center City Streetcar system is illustrated in Figure P-1.

The proposed alignment extends from Rosa Parks Place along Beatties Ford Road to Trade Street to Elizabeth Avenue to Central Avenue and terminating at Eastland Mall.

**Beatties Ford Road Segment**

The Beatties Ford Road Corridor extends from Dixon Street on the campus of Johnson C. Smith University northward, just beyond I-85, to the Northwest Mecklenburg County Health Department located between Rosa Parks Place and North Hoskins Road. Stop locations have been identified at cross streets: Montana Drive; LaSalle Street; Russell Avenue; Booker Avenue/Oaklawn; French Street; and Rosa Parks Place.

**Trade Street Segment**

The Trade Street Corridor extends from just north of the I-77/I-277 loop near Johnson C. Smith University southward along Trade Street through Center City to Elizabeth Avenue. The corridor continues along Elizabeth Avenue to where Trade Street intersects Hawthorne Lane near Presbyterian Hospital. Stop locations have been identified at: Johnson C. Smith University; Five Points; Wesley Heights Way; Johnson & Wales University; Charlotte Gateway Station; Mint Street; Tryon Street; Charlotte Bobcat Arena/CTC; Government Center; McDowell Street; Central Piedmont Community College; Travis Avenue; and Presbyterian Hospital.



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A series of alternatives was defined using several streets in Center City that run parallel to Trade Street. Because all of the candidate streets (except Trade Street) operate one-way, several “couplet” options were developed, in which eastbound streetcars would operate on a different street than westbound streetcars. The Trade Street portion of Alignment 1 is comprised of median-running bi-directional service on Trade Street. Additional alternative alignments in Center City include the following:

- Trade Street (bi-directional / curb-running);
- Third Street / Fourth Street couplet (curbside running);
- Fourth Street / Fifth Street couplet (curbside running);
- Fourth Street / Trade Street couplet (curbside running);
- Trade Street / Fifth Street couplet (curbside running); and
- Fifth Street / Sixth Street couplet (curbside running).

**Central Avenue Segment**

The Central Avenue Corridor extends from Presbyterian Hospital along Hawthorne Lane to a site north of Central Avenue where the alignment passes under the CSX railroad. The alignment then turns east and transitions back to Central where it proceeds to Eastland Mall. Stop locations have been identified at: Independence Park; Hawthorne/Central, Hawthorne Lane; the Plaza; Veterans Park; Morningside Drive; Arnold Drive; Briar Creek Road; Eastway Crossing; Eastway Drive; Sheridan Drive; Darby Acres; Landsdale/Rosehaven Drive; and Eastland Mall.

**Table 2-5: Bus Service for the Build Alternative**

Build Alternative Routes	Frequency (minutes)			Type
	Peak	Midday	Night	
<i>Streetcar</i>	<i>7.5</i>	<i>10</i>	<i>15</i>	<i>Fixed Guideway</i>
<i>7 – Beatties Ford</i>	<i>30</i>	<i>30</i>	<i>30</i>	<i>Local Bus</i>
<i>9 – Central-Lawyers-I-485</i>	<i>30</i>	<i>30</i>	<i>30</i>	<i>Local Bus</i>
<i>39 – UNCC-Southpark</i>	<i>30</i>	<i>30</i>	<i>30</i>	<i>Local Bus</i>
<i>17 – Commonwealth</i>	<i>30</i>	<i>30</i>	<i>30</i>	<i>Local Bus</i>

**2.3 CAPITAL COSTS**

The project capital cost estimate was prepared in four steps. In the first step, the defined alignment was broken down into logical geographical limits or line segments for estimating purposes using a typical “node” type naming convention. The concept engineering drawings applicable to each line segment was used to define the nature of the work and facilitate a “take-off” or measurement of the work to establish quantities. Where actual quantities were measurable, length of track, item counts, pipe lengths etc., the US Standard Units of measure were used as appropriate (i.e. CY for Cubic Yard, FT for Feet, LS for Lump Sum, etc.). Where insufficient detail existed to estimate quantities with certainty, a conceptual design or cross-section was developed as the basis for the estimation of quantities.

The second step was the selective application of initial cost data to the quantities established in step one and to develop unit cost and lump sum cost items in current year dollars. These items were organized into a “Bid Item Tabulation” format.

The third step was the consolidation of these items into the major project cost elements. Descriptions of the work, quantities, unit costs, Engineering and Administration, and

Contingency were itemized and calculated in this portion of the estimate, in current year dollars (2006). The major cost elements were summarized and costs calculated in this step of the process.

The final step, step four, required the input of the resultant estimate cost data from step three into the new FTA standard cost categories (SCC) format guideline workbook. When the project estimate, project schedule (developed elsewhere) and the escalation rate (assume 3.5 percent until CATS and FTA agree on a rate) were input to the FTA workbook, the year of expenditure (YOE) estimated costs are automatically calculated in the FTA workbook. This required close coordination of URS and CATS to insure that this document accurately reflects the project sponsors reporting requirements.

A similar procedure was followed to estimate capital costs for the TSM alternative so that preliminary cost effectiveness criteria could be calculated for the Build Alternative. Four primary capital cost items are associated with the TSM: a fleet of articulated buses; upgrades to a maintenance facility to accommodate the new vehicles; enhancements to bus stops and a short bus-only road between Clement Avenue and Hawthorne Lane. Contingency costs were also included in the TSM capital cost estimate.

### **2.3.1 Current Year Dollars**

The capital costs for the Center City Streetcar Project were estimated in current US Dollars. It is expected that costs will be in year 2006 dollars (2006\$). Escalation to Year of construction will be calculated in the FTA "New Starts" workbook.

### **2.3.2 Contractor's Margins And Insurance**

An allowance for the contractor's margins (profit, overhead etc.) was incorporated into the unit prices used to prepare the cost estimate as well as insurance costs.

### **2.3.3 Project Cost Elements**

The major project cost elements used to assemble the cost estimate are described below:

- Civil Construction (includes track construction)
- Insurance (Included in Civil Construction)
- Utilities (included in Civil Construction)
- Track Materials Procurement (Included in Civil Construction)
- Structures
- Stops
- Park & Rides
- Operations Facility (all yard elements included)
- Traction Power System
- Signal System
- Communications and Central Control
- Fare Collection
- Engineering & Administration
- Contingency
- Right-of-Way
- Vehicles

These elements were used as required in the estimate development. A summary of the capital costs for the streetcar facility are shown in Table 2-6.

**Table 2-6: Capital Cost Summary for the Center City Streetcar Alternatives (2006 Dollars)**

<b>Build Alternative by Segment</b>	<b>Length</b>	<b>Stations</b>	<b>Vehicles</b>	<b>Estimated Cost</b>
<b>Rosa Parks to Brookshire</b>	1.7 Miles	5	4	\$47.1 M
<b>Brookshire to Plaza</b> (incl. Maintenance Facility)	4.9 Miles	18	7	\$129.9 M
<b>Plaza to Eastland Mall</b>	3.3 Miles	11	5	\$74.5 M
<b>Total</b>	<b>9.9 Miles</b>	<b>34</b>	<b>16</b>	<b>251.5 M</b>
	<b>Bus Road</b>	<b>Stations</b>	<b>Vehicles</b>	
<b>TSM Alternative</b> (incl. Maintenance Facility)	.15 Miles	34	21	\$41.7 M

## 2.4 OPERATING AND MAINTENANCE COSTS

### 2.4.1 Methodology

The Streetcar Operating & Maintenance Cost estimate methodology is based on the LRT cost methodology developed for CATS with some modifications. These modifications are predicated upon the idea that streetcar operations relate more closely to bus operations in most areas with the exception of propulsion power, operator wages and fringes and insurance costs. The formulae shown in Table 2-7 outline how the different categories of expense are estimated given the level of service provided by the streetcar system. The methodology and formulae are described in greater detail in the *CATS Center City Streetcar Corridor System Cost Estimation Methodology*.

**Table 2-7: Cost Estimate Formulae**

<b>Cost Category</b>	<b>Formula</b>
<b>Vehicle Operations Labor</b>	
Operator Wages and Fringes	Vehicle Hours (Revenue + Deadhead) x \$34.61
Other Wages and Fringes	Peak Vehicles x \$23,339.55
Services	Peak Vehicles x \$30,903.03
<b>General Administration</b>	
Wages and Fringes	Peak Vehicles x \$18,843.08
Services	Peak Vehicles x \$20,396.04
<b>Propulsion Power</b>	Vehicle Miles x 5.7 kWh/Veh. Mi. x \$0.055/kWh
<b>Vehicle Maintenance</b>	
Labor	Fleet Vehicles x 0.5 Mechanics per vehicle x \$100,000
Service	Peak Vehicles x \$48,000
Materials and Supplies	Fleet Vehicles x \$14,875
<b>Non-Vehicle Maintenance: Labor and Materials</b>	Directional Route Miles x \$51,528.36
<b>Casualty &amp; Liability</b>	Vehicle Hours x \$8.533
<b>Taxes and Miscellaneous</b>	0.02 x Total of all above costs

## 2.4.2 Operations and Maintenance Costs

The total annual costs were calculated using the methodology set forth in Section 2.4.1. If the streetcar were to have 7.5 minute peak headways, the total annual costs for operations and maintenance for the entire streetcar alignment from Rosa Parks Community Transfer Center to Eastland Mall Community Transfer Center would be \$6,928,132. Ten minute peak headways would decrease this annual cost by approximately 16 percent.

Seven-and-a-half minute peak headways for the Johnson C Smith University to Presbyterian Hospital segment would cost \$3,042,329 annually. Ten minute peak headways will decrease this cost by approximately 24 percent. Seven-and-a-half minute peak headways for the Johnson C Smith University to Plaza-Midwood phase would cost \$3,760,527. Ten minute peak headways will decrease this cost by approximately 19 percent. Seven-and-a-half minute peak headways for the Rosa Parks to Plaza-Midwood phase would cost \$4,893,359. Ten minute peak headways will decrease this cost by approximately 14 percent. Seven-and-a-half minute peak headways for the Johnson C Smith University to Eastland Mall phase would cost \$5,802,433. Ten minute peak headways will decrease this cost by approximately 18 percent. The project Operations Plan summarizes the detailed operations and maintenance costs for the varying operating scenarios.

The hourly rate is determined by dividing the cost by the number of vehicle hours. The hourly rate for the Full-Build scenario is \$99.00 for an operating schedule with 7.5 minute peak headways, and \$93.00 for an operating schedule with 10 minute peak headways. The phased options range from \$89.00 per hour to \$102.00 per hour. The hourly rate increases as more vehicles and personnel are needed to serve higher operating frequencies or to run longer track lengths. The TSM Alternative would have similar operating characteristics, but a slightly lower unit cost for operating and maintenance expenses associated with operating articulated buses. At ten minute peak frequencies, both build alternatives represent a cost savings over the No Build (5 minute peak frequencies) with higher capacity.

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<sup>1</sup> North Carolina Department of Transportation. 2006 – 2012 State Transportation Improvement Program. Available: <http://www.ncdot.org/planning/development/TIP/TIP/>. Accessed: 2 May 2006.

## CHAPTER 3 AFFECTED ENVIRONMENT AND CONSEQUENCES

### 3.1 OVERVIEW OF IMPACTS

#### 3.1.1 Overview of Short-Term Impacts

Any major construction project, public or private, will inconvenience or disturb the residents, businesses, and business customers adjacent to that construction project. Particular temporary effects during construction may include:

- Traffic congestion and detours,
- Interrupted access to businesses,
- Disruption of utility services,
- Presence of construction workers and materials,
- Noise and vibrations from construction equipment and vehicles,
- Airborne dust, and
- Removal of or damage to vegetation (e.g., trees, shrubs, grass).

Without proper planning and implementation of controls, these construction-related effects could have adverse affects on the comfort of residents and employees and inconvenience or disrupt the flow of customers, employees, and materials/supplies to and from businesses within the project area. Construction impact controls will be integrated into the project's contract specifications, which will contain construction phasing and traffic control plans.

The project would be constructed at-grade within existing street rights-of-way. Traffic and pedestrian control and coordination of construction would follow CATS and local jurisdictional guidelines. Since construction is for non-exclusive right-of-way, the pace of construction at intersections would be slowed because cross streets would remain open. At certain intersections it may be feasible to detour traffic and close the intersection during construction. Residential, business, and building access would be maintained continuously. Typical roadway construction traffic control methods would be used including signage and barricades. Existing utilities would be identified, prioritized, protected, or adjusted/relocated. Temporary signalization adjustment would be required when construction occurs at intersections. In some areas, existing streetscape and/or landscape would likely be temporarily removed. Construction equipment would generally be limited to the project right-of-way or an adjacent travel lane. Construction staging areas would be located on the right-of-way or on off-site locations when available. Staging areas would be temporary.

Implementation of the project would require improvements in the corridor that may result in impacts as construction proceeds. Each phase of construction would proceed in block-by-block stages with efforts concentrated in small, localized areas. This style of construction has proven effective on other transit projects in minimizing construction impacts. Discussion of the permits and approvals needed is presented below.

The permits and approvals shown in Table 3-1 would be required to implement the Build Alternative Streetcar project. Environmental clearances would be secured through coordination with the appropriate state or federal agency during the PE/FEIS phase of the project. Project development approvals, where necessary, would be identified and would be obtained from state or local agencies at appropriate times as project implementation proceeds.

**Table 3-1: Permits and Approvals Required for Project Implementation**

Regulatory Program or Proposed Action	Agency	Agency Responsibility MOS/Build Alternative <sup>a</sup>
Air Quality Permit	Mecklenburg County	P
Grading and Drainage Permit	Mecklenburg County, NCDENR, NCDOT	P/A
Concurrence on Effects on Cultural Resources	SHPO	A
Construction Permits	Municipalities	P
National Pollution Discharge Elimination System	NCDENR	A

<sup>a</sup>P = Permit A = Approval C = Coordination  
 Source: URS, March 2004.

Development of a project in an urban environment can have a variety of impacts during the construction period, depending on the size and scope of the project. Although they are short term in nature, construction impacts may be disturbing or disruptive to the use of or access to a community facility as well as to the ability of community services to fulfill their functions. The construction period will require up to 24 months. Construction would take place primarily during the weekday, although some activities may take place at night or on weekends. Potential construction period impacts of the project are addressed in the short-term impacts and benefits portions the following sections throughout this Chapter.

### 3.1.2 Overview of Long-term Impacts

Long-term alteration of the behavior and functioning of the affected environment caused by project encroachment can be characterized as effects to the human, physical and natural environments. The likely long-term effects (positive and negative) of the Center City Streetcar project on the affected environment were evaluated and are documented in the following subsections of this chapter. Overall, adverse effects of the project on the surrounding environment are generally not significant. The positive effects of the project outweigh any potentially adverse effects. The relative significance of adverse project effects for both the build and no-build alternatives are summarized in Table 3-2. In presentations to the public, a more detailed table of information was used to also illustrate benefits. This table is included in Appendix C.

**Table 3-2: Summary of Effect**

<b>Impact Category</b>	<b>Impacts: No-Build and TSM Alternative</b>	<b>Impacts: Build Alternative</b>
Population, Land Use, and Development	Generally not significant	Generally not significant
Displacements	No effect	Generally not significant
Neighborhoods and Community Features	Generally not significant	Generally not significant
Visual and Aesthetic	No effect	Generally not significant
Air Quality	Generally not significant	Generally not significant
Noise and Vibration	No effect	Generally not significant
Ecosystems	No effect	Generally not significant
Water Resources	No effect	Generally not significant
Energy	Generally not significant	Generally not significant
Historic, Archaeological, and Cultural Impacts	No effect	Generally not significant
Parklands	No effect	Generally not significant
Economic Impacts	Generally not significant	Generally not significant
Secondary and Cumulative Effects	Generally not significant	Generally not significant
Hazardous Materials	No effect	Generally not significant

Source: URS, January, 2007.

### **3.2 POPULATION, LAND USE AND DEVELOPMENT**

Since changes in population and housing are related to land use and development, they are discussed together in this section.

#### **3.2.1 Legal and Regulatory Framework**

##### **3.2.1.1 Land Use Controls, Policies and Guidelines**

In this section brief summaries of policies pertaining specifically to land use rather than land use and transit are provided. Those policies pertaining to both land use and transit that were presented in Section 1 and are not reiterated here are the *Centers and Corridors Concept Plan*, *2025 Integrated Transit/Land Use Plan*, *2025 Corridor System Plan*, and *Center City 2010 Vision Plan*.

#### **Planning for Our Future**

The centers and corridors concept was reinforced in the 2015 Plan: “Planning for Our Future,” which was adopted by city and county elected officials in November of 1997. In this document the desired future for the Charlotte-Mecklenburg area is outlined. The focus is on mixed-use pedestrian-oriented development at urban-level intensities. The importance of strong community design in the transformation of Charlotte-Mecklenburg into a more urban community is also highlighted in this policy.

#### **Smart Growth Principles**

In 2001, City Council adopted “Smart Growth Principles” to help assure a livable community in the future. The eight guiding principles are to:

- Maintain land use planning capacity,
- Sustain effective land use decisions,
- Strengthen community through healthy neighborhoods,

- Build a competitive economic edge,
- Design for livability,
- Safeguard the environment,
- Expand transportation choices, and
- Use public investment as a catalyst.

### **General Development Policies**

The recently updated *General Development Policies* (GDP) provide planning principles for the Charlotte-Mecklenburg area and are the basis for development of area-specific plans. The policy update process began with four priority areas. City Council adopted one policy area (Transit Station Area Principles) in November, 2001. Three others were adopted in November of 2003.

The GDP highlight community-wide issues, goals, objectives, policies and strategies. More specifically, these GDP seek to provide guidance for the location, intensity and form of future development and redevelopment throughout the community.

Transit-supportive development principles within the GDP provide direction for developing and redeveloping property around transit stations in a way that makes it convenient for many people to use transit. In transit-supportive development the focus is on creating compact neighborhoods with housing, jobs, shopping, community services, and recreational opportunities all within easy walking distance (i.e., within ½ mile) of a transit station. The intent is to create well-designed, very livable communities where people can get from home to such places as the office, grocery store, day care center, restaurant, dry cleaner, library or park without using a car.

Transit-supportive development policies provide direction for developing and redeveloping property around rapid transit stations in a way that makes it convenient for many people to use transit. Such policies focus on land use, mobility and community design.

### **Area Plans**

Area plans have been developed for specific portions of the study area. Since the boundaries of the geographic area subject to a plan may not correspond with the sub-area boundaries established for this EA, a map showing the planning area of each area plan is included as Figure 3-1. The planning area for the Eastside Strategy Plan is not shown, as it consists of several road corridors rather than an area.

**Figure 3-1: Applicability of Area Plans**

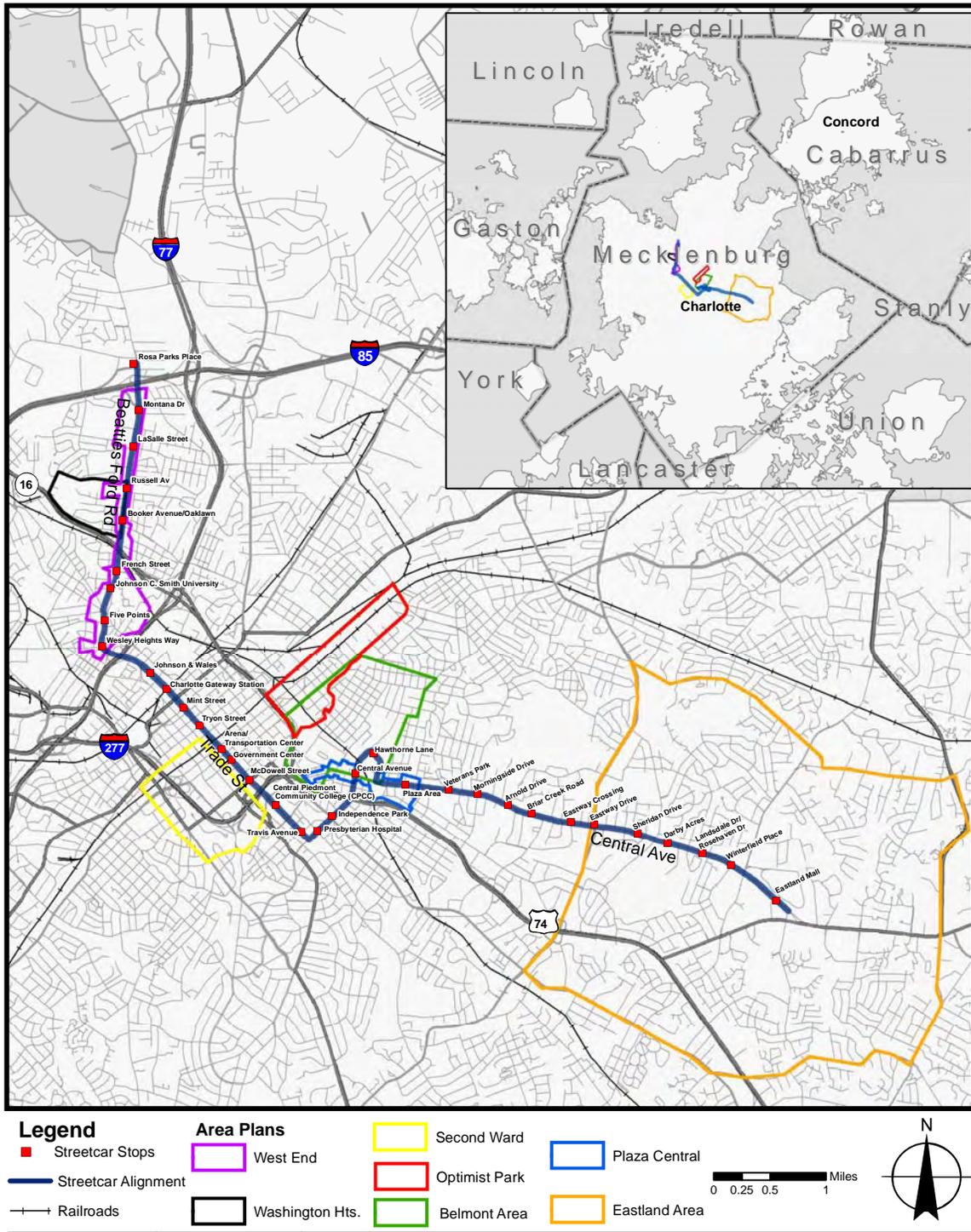


Figure No.:  
 Page No.:

**COMMUNITY AREA PLANS**  
 Map Data Sources: Mecklenburg County, NC;  
 and URS Corporation  
 Date: July 2006

### 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 the 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 Center City 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.<sup>1</sup> 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 were 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 will honor the history of the area.<sup>2</sup>

West End Land Use and Pedscape Plan, Adopted 2006

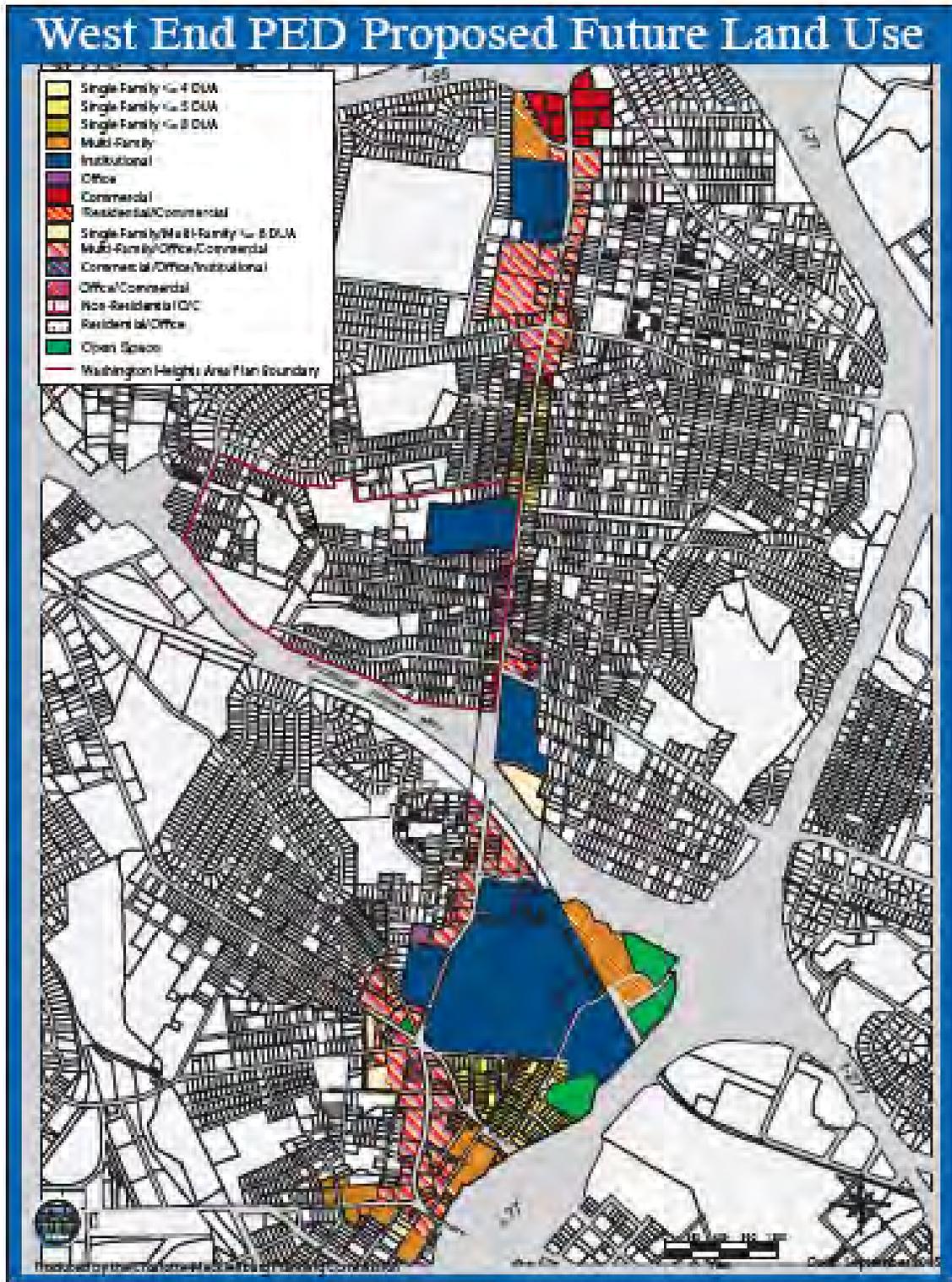
Similar to the pedscape plan for the Plaza-Central district, the purpose of the *West End Land Use and Pedscape Plan* is to define the vision and land use policy for West End and how it will be achieved. All parcels fronting West Trade Street, West 5th Street and Beatties Ford Road from I-77 to I-85, 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 having 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 Center City, 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 the development of the district from I-77 to Five Points/Rozelles Ferry Road into an urban/cultural/arts destination.

The Plan identified several mid-block and intersection pedestrian crossing of concern. Several of these crossing correspond to streetcar stops including.

- Five Points intersection – daunting 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; and
- LaSalle Street and Beatties Ford Road – is the busiest intersection in the area and 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 the incorporation of the streetcar. The proposed future land use map for West End is shown in Figure 3-2.<sup>3</sup>

Figure 3-2: West End Proposed Future Land Use



### Eastside Strategy Plan and Eastland Area Plan, Adopted 2001

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 there are a number of roads that 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 Center City, services providing lateral movement around Eastside are lacking. 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 has been constructed as a result of the plan. 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; and,
- 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. There are sidewalks 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 link to planned rapid transit routes, with a particular consideration of circumferential routes.

In the plan, Eastland Mall is identified as a potential revitalization/redevelopment opportunity as a 'town center'. According to the plan, "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."<sup>4</sup> In the *Eastland Area Plan*, this recommendation is explained 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.

An international district is also recommended in the *Eastland Area Plan*. The international district would extend along Central Avenue from Kilborne Drive to Sharon Amity Road and would expand upon the naturally emerging international district in this area.<sup>5</sup>

#### Optimist Park Neighborhood Plan, Adopted 2002

The boundaries of the Optimist Park neighborhood are Matheson Avenue, Brookshire Freeway, Little Sugar Creek, and the Norfolk-Southern Intermodal Rail Yard. It is located across I-277 from the First Ward and was originally developed as a streetcar suburb. The purpose of the neighborhood plan is to "...address the livability and long term viability of Optimist Park by developing strategies to address the neighborhood's physical, social, and economic conditions." Issues identified in the development of the plan are public safety, lack of homeownership, eroding residential fabric, aging industrial uses, and needed infrastructure improvements. The neighborhood has experienced a decline in population, with a decrease of 24 percent between 1990 and 2000. In 2000, almost 70 percent of the population was African-American, and there were nearly as many female heads of households with children as married households with children. Drug trafficking is cited as a community concern and is especially prevalent at the intersections of Parkwood Avenue and 18th Street, 17th and Caldwell, and Matheson Avenue and Brevard Street. The closest streetcar stops to these areas are at 10th and Church and at Otts Street. Among the strengths of the area listed in the plan are the relationship of Optimist Park to Center City and First Ward, and the location within the Northeast Transit Corridor.

The vision for the neighborhood, as established in the plan, is for well-maintained historic houses and new residential development that compliments the historic architecture; a mix of housing types and small businesses; an active neighborhood association, churches, schools, and facilities; and beautiful street and greenway amenities that provide links to all parts of the community. Among the recommendations related to transportation and infrastructure are to provide pedestrian linkages to transit stations and ensure that current and future transit services meet the needs of area residents, employers, and employees. In this area, the traffic volume and the speed at which cars travel along neighborhood streets are considered a problem.<sup>6</sup>

#### Third Ward Neighborhood Vision Plan, Adopted 2003

The *Third Ward Neighborhood Vision Plan* applies to an area bound by Morehead, Cedar, 5th 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, the potential streetcar, 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.

Specific street recommendations are also included in the plan. 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 reduced to the minimum feasible width, curbs realigned to be continuous along the length of the road, and on-street parking promoted.<sup>7</sup>

#### Belmont Area Revitalization Plan, Adopted 2003

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. In the plan, a series of 16 housing and economic development projects are suggested to meet transportation-related and other goals for the area. Specific recommendations that pertain to the Belmont area and are within the study area 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, Adopted 2002

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 safe, 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.

Among the goals related to transportation, the Plan calls to: 1) improve pedestrian, bicycle and vehicular circulation and safety; 2) identify infrastructure needs and improvements; 3) improve traffic flow and the pedestrian realm on Beatties Ford Road; and, 4) ensure that current and future transit needs are considered.

### 3.2.1.2 Zoning

Zoning varies widely within the Center City Streetcar corridor. Zoning districts include high density, transit-supportive districts to lower density residential districts with more of a suburban character. Transit-supportive districts found in the Center City Streetcar corridor are described below. Existing zoning in the area around the streetcar corridor was presented in detail in the document, *Charlotte Streetcar Trade Street Background Review, Draft Report*.<sup>8</sup>

#### **Uptown Mixed-use District (UMUD)**

The Uptown Mixed-use District (UMUD) is the most intense of Charlotte's zoning districts and applies primarily to the Center City area. The main purpose of this district is "to strengthen the high density core of the central city." This district has no maximum Floor Area Ratio (FAR) or height, allows a range of transit-supportive uses, and has resulted in the construction of numerous mid-rise and high-rise structures.

#### **Mixed-use Development District (MUDD)**

The Mixed-use Development District (MUDD) is another transit-supportive district that is similar to UMUD. As with UMUD, the MUDD district has no FAR limitation and permits a range of transit-oriented uses. Building heights are limited to 120 feet.

#### **Pedestrian Overlay District (PED)**

The Pedestrian Overlay District (PED) is designed to allow a mixture of transit-supportive uses developed in a pedestrian-friendly manner. The development standards for this district allow a substantial increase over the amount of development that is feasible under the more suburban zoning districts. For example, there is no maximum FAR for this district and, under certain conditions, building heights can be up to 100 feet.

#### **Transit-Oriented Development District (TOD)/ Urban Design Principles**

The Transit-Oriented Development districts (TOD) are a compact mix of residential, office, retail and civic uses in a pedestrian-friendly setting, typically within one half-mile of a station and representing a ten-minute walk. There are six Transit Oriented Development zoning districts: (1) Residentially Oriented (TOD-R), (2) Employment Oriented (TOD-E), (3) Mixed-Use Oriented (TOD-M), (4) Residentially Oriented – Optional (TOD-RO), (5) Employment Oriented – Optional (TOD-EO), and (6) Mixed-Use Oriented – Optional (TOD-MO).

The following five Urban Principles from the *Trade Street Vision Plan (2006)* form the foundation for the urban design of the Center City Streetcar and facilitate TOD in the corridor. Formed after extensive consideration and discussion during the project development process, the principles are based both generally upon successful experiences in other cities with fixed-guideway transit systems and specifically upon streetcars.

- Contextual Response – Respond to the character of the station area.
- System-wide Design – Create visual and functional continuity through a system wide design.
- Transit as Community Amenity – Encourage transit infrastructure and station areas as a community amenity.
- Alignment and Integration – Minimize physical disruption to the environment of the proposed alignment.
- Public Art – Identify opportunities for public art integration.

Urban design principles for the Center City Streetcar corridor ensure that each transit station is successfully integrated with its surrounding neighborhoods. Integral to the development of the Center City Streetcar corridor is the TOD district zoning classification for the area immediately adjacent to each station.

### **3.2.2 Method**

In the Population, Land Use and Development section, the existing population and land uses in the project corridor are evaluated, expectations for the future are presented and potential impacts associated with the project are assessed. Population and housing data at the region, study area and sub-area levels presented in Section 1.1.3 is summarized in this section. Further detail is provided at the TAZ level. Other aspects of the population that will aid in determining the impact of the project on specific populations, such as low-income, minority and those residing in zero-car households is assessed in Section 5.4. Current and projected demographic data at the TAZ level was provided by CATS.

In the discussion of land use and development, the information provided includes a description of the corridor sub-areas, a discussion of the current and planned development projects for each sub-area, and an analysis that identifies the land available for immediate development and what sites are likely candidates for redevelopment in the future. Descriptions of existing land uses were derived from field visits as well as plans and documents provided by the City of Charlotte and Mecklenburg County. Information available in the report, *Charlotte Streetcar Trade Street Background Review, 2005* lent to the inclusion of more detail for the Center City sub-area compared to the others.

### **3.2.3 Existing Conditions and Resources**

#### **3.2.3.1 Population**

##### **Current and Projected Population**

Current and projected population for Mecklenburg County, the study area and sub-areas was presented in Section 1.1.4.1, and is summarized in Table 3-3. Expected population growth at the TAZ level is shown in Figure 3-3. The Center City sub-area is expected to become the most populous sub-area with the highest change in population growth (169 percent) in the study area by 2030. The Central Avenue sub-area, on the other hand, is expected to grow at a much slower rate (8 percent). As shown in Table 3-4, relatively high absolute and percent increases in population are expected in the northern portion of the Beatties Ford Road sub-area, beyond I-85.

**Table 3-3: Summary of Population Growth by Geography**

<b>Geographic Area</b>	<b>Year 2000</b>	<b>Year 2030</b>	<b>Percent Change</b>
Mecklenburg County	693,454	1,227,928	92
Study Area	57,078	101,242	77
Beatties Ford Road Sub-Area	11,521	17,173	49
Center City Sub-Area	21,618	58,172	169
Central Avenue Sub-Area	23,939	25,897	8

Source: Derived using data from the Mecklenburg-Union Metropolitan Planning Organization.

**Population Density**

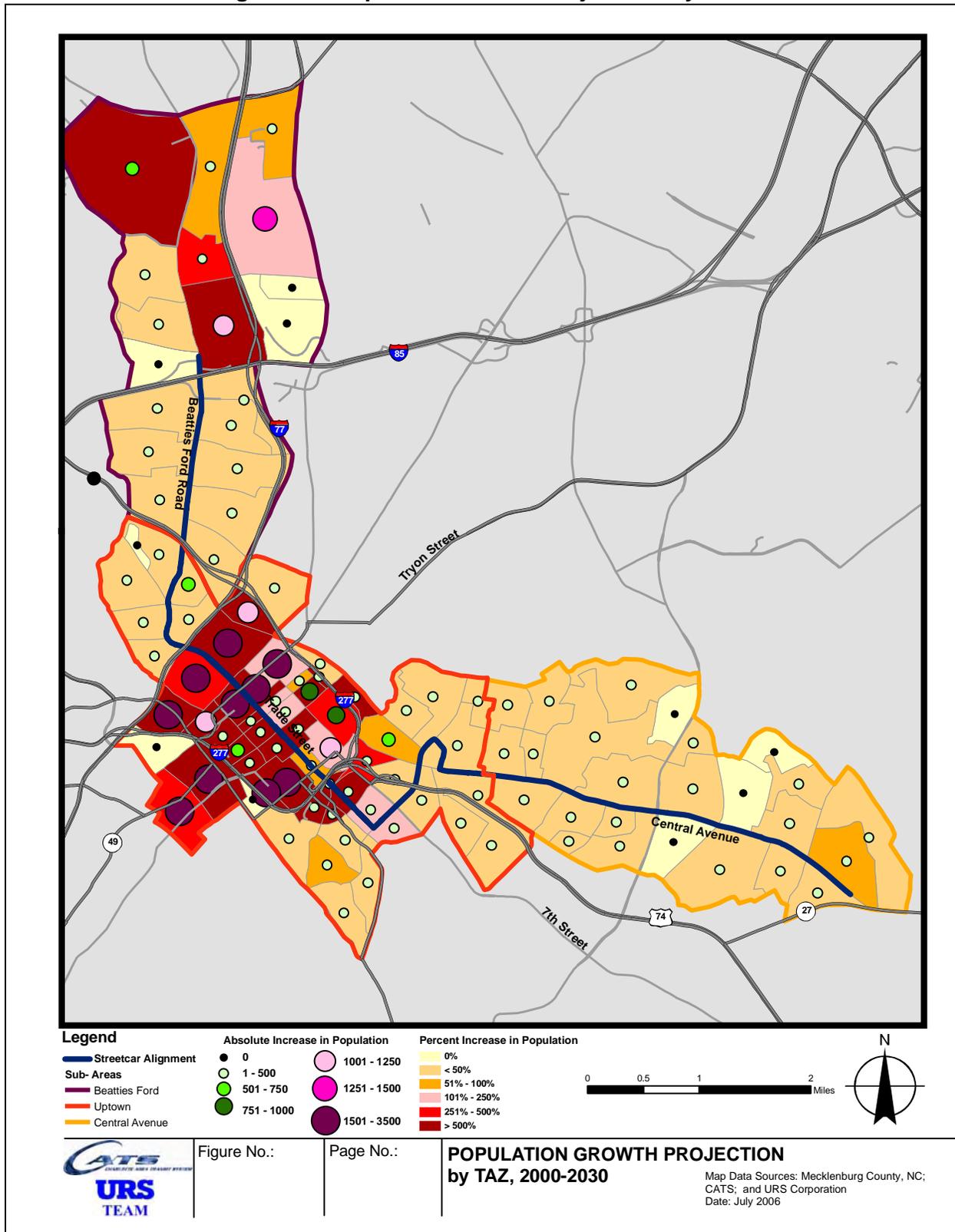
Current and projected population densities for Mecklenburg County, the study area and sub-areas are shown in Table 3-4. As shown in the data, the Central Avenue sub-area is currently home to the most people per square mile. While the density in the Central Avenue Sub-Area is expected to increase by only 11 percent, density in the Center City sub-area is expected to increase by 169 percent. In 2030, the population density (people per square mile) is expected to far exceed that of the other two sub-areas and the region as a whole. Overall, the study area is expected to be denser than the City of Charlotte and Mecklenburg County as a whole.

**Table 3-4: Population Density by Geography**

<b>Geographic Area</b>	<b>Year 2000 (people/square mile)</b>	<b>Year 2030 (people/square mile)</b>	<b>Percent Change</b>
Mecklenburg County	1,273	2,248	77
City of Charlotte	2,245	3,155	41
Study Area	2,980	5,285	77
Beatties Ford Road Sub-Area	1,708	2,547	49
Center City Sub-Area	3,132	8,429	169
Central Avenue Sub-Area	4,245	4,701	11

Source: Derived using data from the Mecklenburg-Union Metropolitan Planning Organization.

Figure 3-3: Population Growth Projections by TAZ



3.2.3.2 Land Use and Development

**Corridor Description**

**Beatties Ford Road Sub-area**

Predominant land uses in this sub-area are single family residential (see Figure 3-4) and large scattered tracts of public/institutional. Land use immediately adjacent to Beatties Ford Road primarily consists of neighborhood/convenience oriented commercial (see Figure 3-5) interspersed with pockets of residential, public/institutional, and industrial.

**Figure 3-4: Examples of Residential Land Use**



**Figure 3-5: Examples of Neighborhood-Oriented Commercial Land Use**



The Beatties Ford Road sub-area, in almost its entirety, is the subject of the *West End Land Use and Pedscape Plan*. In the plan, land uses in the area are summarized according to the percentage of total land area dedicated to a specific use. This summary is reproduced as Table 3-5. The summary reiterates that institutional and residential uses account for the bulk of the land area in the Beatties Ford Road sub-area and also highlights that there are vacant parcels available.

**Table 3-5: Land Uses in the West End Portion of the Beatties Ford Road Sub-area**

Land Use	Percentage of Total Land Area
Institutional	34
Vacant	20
Single-family Residential	14
Commercial	10
Warehouse/ Distribution	8
Office	6
Multi-family Residential	4
Park/ Open Space	4
Total	100

Source: Charlotte-Mecklenburg Planning Commission. *DRAFT West End Land Use and Pedscape Plan*.<sup>9</sup> September 2005. Available: <http://www.charmeck.org/Departments/Planning/Area+Planning/Plans/home.htm>.

Major activity centers include a community transit center located at the Northwest Mecklenburg County Health Department building just north of the I-85 interchange and the Beatties Ford Road Branch of the Charlotte Mecklenburg Public Library System, located just south of I-85. Further details regarding land uses are provided according to three of the five districts in the *West End Land Use and Pedscape Plan* (two are part of the Center City sub-area and are described in the next section): (1) the commercial/civic district, (2) the residential district, and (3) the historic district. The commercial/civic district extends from LaSalle Street to I-85. The Plan states, “A majority of the [commercial/civic] district is commercial, developed in a sprawling pattern with an abundance of parking that dominates the streetscape.” The residential district extends from Russell Avenue to LaSalle Street. The historic district encompasses non-residential uses fronting the corridor, including the Vest Water Treatment Plant and the Excelsior Club.<sup>9</sup>

Center City Sub-area

Land use within the sub-area is predominantly commercial and office with pockets of multi-family residential, single-family residential, vacant, public/institutional, parks and open space and industrial land uses. The sub-area encompasses Charlotte’s CBD, is the region’s major employment center, contains the government offices for the City of Charlotte and Mecklenburg County, and is also home to national corporations such as Bank of America, Wachovia Corporation, and Duke Energy Corporation. Center City offers many cultural attractions, sporting events and entertainment venues that include a new arena to house the National Basketball Association’s Charlotte Bobcats; the Carolina Panther’s Bank of America Stadium; the Charlotte Convention Center; Presbyterian Hospital; new mixed-use development projects such as Gateway Village; as well as Central Piedmont Community College (CPCC) and Johnson & Wales University. The portions of the Center City sub-area along Beatties Ford Road, Trade Street, Elizabeth Avenue, and Hawthorne Lane are described below.

*Beatties Ford Road*

The northeast portion of the sub-area is covered by the *West End Land Use and Pedscape Plan*. The two districts from the plan relevant to the Center City sub-area are the university district and the urban/cultural arts district. The university district begins at Five Points and extends to NC 16. The 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 non-residential uses that are not considered “neighborhood-serving retail.”<sup>10</sup>

*Trade Street*

Starting at the northwest end of Trade Street and heading southeast, main features include the Johnson C. Smith University area (see Figure 3-6), which includes light industrial and commercial uses; Gateway Village (see Figure 3-7), which consists of the Johnson & Wales campus, offices and some multi-family use; and a government/institutional office area (see Figure 3-8).<sup>11</sup>

**Figure 3-6: Examples of Land Use near Johnson C. Smith University at the Northwest end of Trade Street**



**Figure 3-7: Views of Gateway Plaza**



**Figure 3-8: Views of the Government Center**



The Trade Street portion of the Center City sub-area 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 are First Ward, Second Ward, Third Ward and Fourth Ward.

#### First Ward

The First Ward and the Belmont Community are largely made up 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.

**Figure 3-9: Development in the First Ward**



#### Second Ward

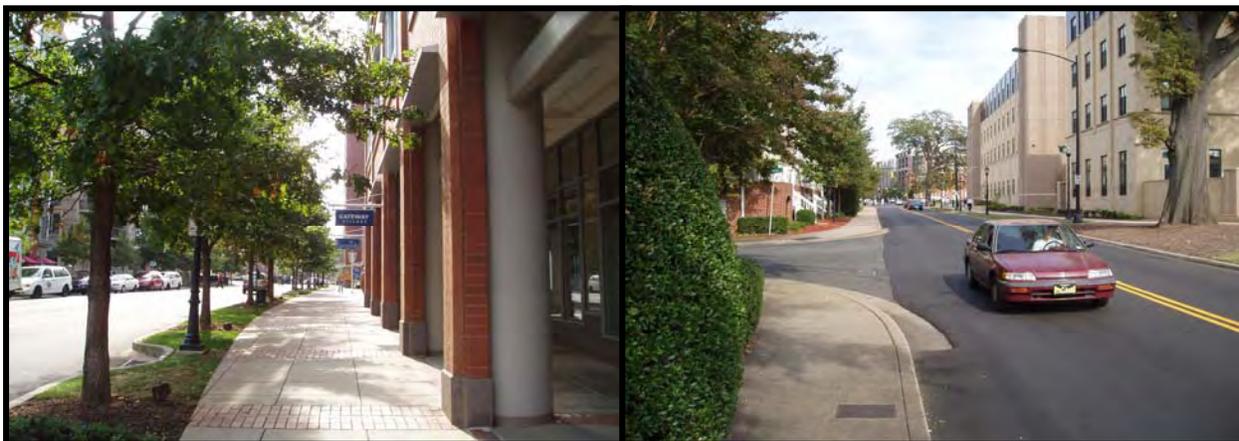
Land uses in this ward include the Charlotte-Mecklenburg Government Center, a number of hotels and commercial developments. Second Ward is also home to the Charlotte Convention Center and the future NASCAR Hall of Fame.

#### Third Ward

The Bank of America Stadium, home to the National Football League's (NFL's) Carolina Panthers, is located in the Third Ward. Land use in this ward also includes a mix of institutional, multifamily residential and commercial uses. Other notable land uses

include the Johnson & Wales University, several mixed use condominium developments such as Gateway Village, and several businesses and commercial venues.

**Figure 3-10: Development in the Third Ward**



#### Fourth Ward

The Fourth Ward is primarily residential with a mix of historic single family homes and modern mixed use developments. Land use in this ward is primarily 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.

**Figure 3-11: Development in the Fourth Ward**



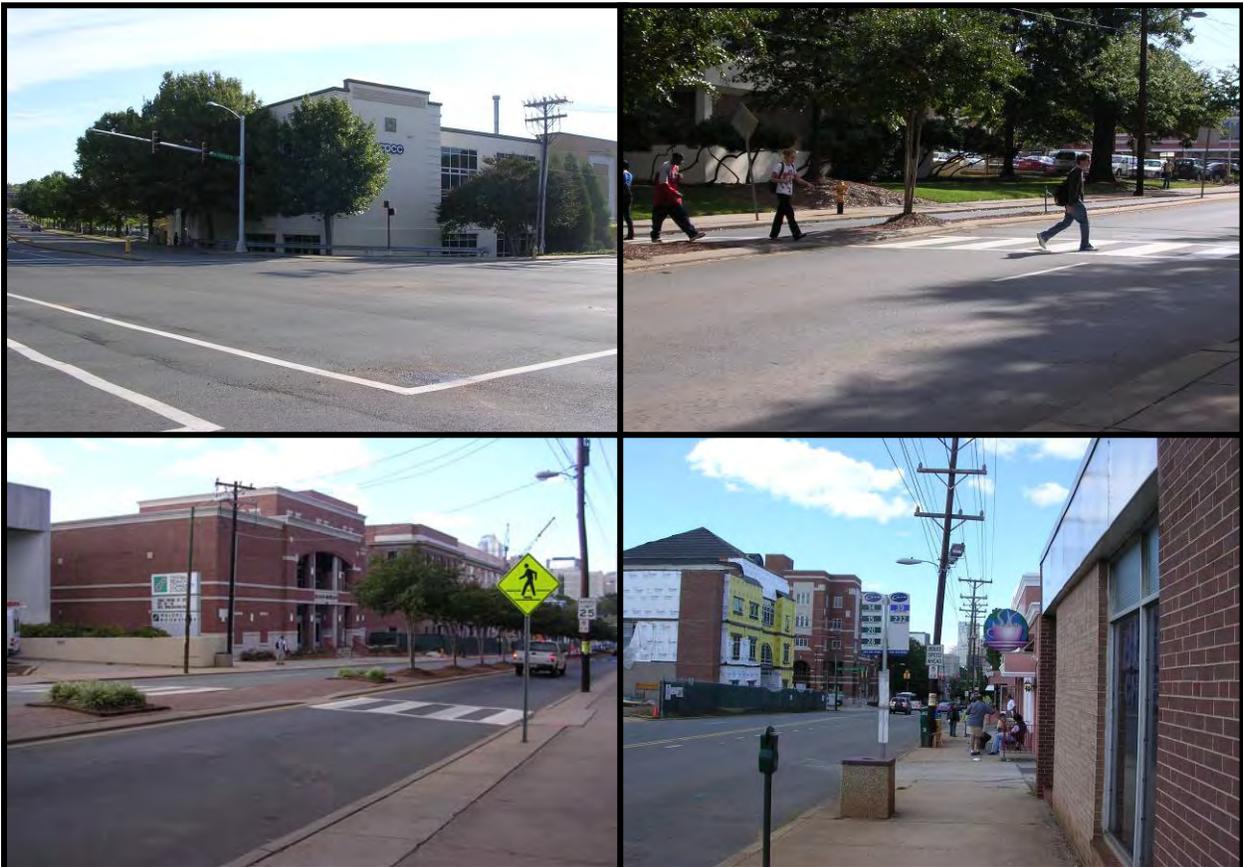
#### *Elizabeth Avenue*

Land use immediately adjacent to Elizabeth Avenue primarily consists of commercial and office uses with pockets of multi-family residential, vacant, and public/institutional uses including Presbyterian Hospital (see Figure 3-12). Central Piedmont Community College (CPCC) is a major activity center within this portion of the sub-area, occupying multiple blocks both north and south of Elizabeth Avenue (see Figure 3-13).

**Figure 3-12: Presbyterian Hospital**



**Figure 3-13: Views around CPCC on Elizabeth Avenue**



Central Avenue Sub-area

Major activity centers in the Central Avenue Sub-area are located at the Central Avenue/The Plaza intersection, Central Avenue/Eastway Drive intersection, Central Avenue/Sharon Amity Road intersection, and the Eastland Mall. The southeast terminus

of the corridor is at Eastland Mall, which is also the location of a community transit center. The predominant land use in the sub-area is single family residential with large scattered tracts of commercial, multi-family 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. Examples of the predominant land use types are shown in Figure 3-14 (Commercial), Figure 3-15 (Institutional) and Figure 3-16 (Residential).

**Figure 3-14: Variety in Commercial Development in the Central Avenue Sub-area**



**Figure 3-15: Public Land Uses in the Central Avenue Sub-area**



**Figure 3-16: Residential Areas in the Central Avenue Sub-area**



Land use in a portion of the Central Avenue sub-area is addressed in further detail in the *Belmont Area Revitalization Plan* (see Figure 3-1 for the geographic area addressed). Belmont itself is considered a residential neighborhood and Table 3-6 includes the breakdown of land uses in the area. The neighborhood has a substantial number of vacant parcels, thought to encourage unlawful activity.<sup>12</sup>

**Table 3-6: Breakdown of Land Uses in Belmont Portion of Central Avenue Sub-area**

Land Use	Percent of Land Area
Single Family	34
Vacant	14
Multi-family	12
Industrial	10
Institutional	8
Commercial	6
Warehouse	6
Open Space	5
Office	2
Parking	2
Total	100

Source: Charlotte-Mecklenburg Planning Commission. *Belmont Area Revitalization Plan, Volume I: Concept Plan*. Adopted 12 May 2003 by Charlotte City Council.

The portion of the Central Avenue sub-area from Eastway Drive to Eastland Mall is the subject of the *Eastland Area Plan* (see Figure 3-1 for the subject area). According to the plan, about 70 percent of the land in this portion of the Central Avenue sub-area is occupied by neighborhoods consisting of residences, parks and greenways, schools and religious institutions. The Eastland Mall consists of four department stores, specialty shops, a food court, movie theater and indoor ice skating rink. Other retail development consists of numerous strip malls, fast food restaurants, convenience stores and gas stations. This development is concentrated along main corridors including Central Avenue. Several small shopping areas along Central Avenue cater to the area's growing international population. Office development is limited and is concentrated along Central Avenue from Sharon Amity Road toward Eastland Mall. Most of the multi-family housing

is also concentrated along Central Avenue.<sup>13</sup> Land uses along Central Avenue from Eastway Drive to Sharon Amity Road are summarized in the plan and reproduced in Table 3-7.<sup>14</sup>

**Table 3-7: Land Use along Central Avenue in the Eastland Area**

Land Use Category	Percent of Area
Single Family	32
Commercial	25
Multi-Family	22
Office	8
Institutional	6
Vacant	4
Warehouse/Distribution	3
Total	100

Source: *Eastside Strategy Plan, Volume I: Concept Plan*. Adopted 2001, Charlotte-Mecklenburg Planning Commission. Available:

<http://www.charmeck.org/Departments/Planning/Area+Planning/Plans/home.htm>.

**Development Activity**

The development climate in Charlotte has been positive throughout recent years. In particular, Center City has thrived as the home to several large financial institutions. The corporate presence coupled by capital investments and planning by city officials has led to a vibrant downtown that has had several large-scale projects come to fruition in recent years. Additionally, as growth has pushed outward from Center City, adjacent areas have also experienced an increase in development pressure and growth.

Strengths supporting development and challenges to development in Center City were highlighted in the *Center City 2010 Vision Plan*. According to the plan, strengths include the corporate presence and involvement in downtown, reemerging residential communities, community interest in Center City, and the city’s regional focus. Challenges Center City faces are the lack of financing opportunities to spur development, the tendency to use suburban patterns for urban development, and the need for a variety of housing types and costs.<sup>15</sup> A snapshot of development trends in Center City provided by the Center City Partners was that, in 2005 there were “...more than 40 development projects announced, breaking ground, undergoing renovation or reaching completion.” According to the source, “These projects represent an investment of over \$1.6 billion of development activity, encompassing more than 6 million square feet of office, residential, retail, entertainment and institutional space in Center City.”<sup>16</sup>

In the following sections, major development projects within and in close proximity to the study area are highlighted and areas that have potential for future development and redevelopment are identified. Development projects are summarized in Table 3-8. Potential areas for development or redevelopment along Beatties Ford Road and Central Avenue are further described in the *Development Study: Center City Streetcar*. (June 2006)<sup>17</sup>

**Table 3-8 - Development Projects in the Proximity of the Study Area**

Sub-area	Name	Type	Location	Status
Beatties Ford Road	CMPD Metro Division Station	Police station/mixed use.	Location between Beatties Ford Road, Oaklawn Avenue and Keller Avenue to be announced.	Begin construction in 2007/2008.
Beatties Ford Road	Nia Point	Multi-family (apartments). Hope VI project (mid \$600s), tax credits (mid \$200s). 81 units on 6 to 7 acres at about 11 dua.	Washington Heights.	Complete construction in 10/2006.
Beatties Ford Road	University Park Office Condos	Offices on .32 acre.	Beatties Ford Road – eight parcels south of LaSalle Street.	Begin construction in spring 2006.
Beatties Ford Road	Mixed use development	Mixed/ multi-use development.	Two blocks in the northeast area along Beatties Ford Road between I-85 and B Avenue.	To be announced.
Beatties Ford Road/Center City	Multi-family project	Multi-family/ residence hall (Johnson C. Smith University). 12 to 24 units on .47 acres at 25- 53 dua.	Southeast corner of Beatties Ford Road and French Street.	Begin construction around 2007.
Center City	Wesley Heights	Neighborhood bond project Curbs, gutters, storm drainage, sidewalks	Just outside of downtown, to the north of I-277 and adjacent to the Third Ward	
Center City	Mosaic	Mixed-use. Over 300 residential units. 20,000 – 30,000 square feet commercial/office space.	West Trade Street between I-77 and Bruns Avenue.	Begin construction 2008 – 2009.
Center City	Walnut Hill	Multi-family priced from \$150,000. 20.5 acres with 20 dwelling units per acre (dua). 40 units.	Wesley Heights (located just outside of the downtown, to the north of I-277 and adjacent to the Third Ward).	Under construction.
Center City	Woodvale Place	Five single family units located on 0.75 acres at a density of 7.5 dua. Priced from \$175,000.	Southeast corner of the intersection of Woodvale Place and Westbrook Drive (in the Wesley Heights/ Seversville area).	Begin construction Spring 2006.
Center City	Seversville Redevelopment	25-30 multi-family units on 1.27 acres at 22 dua.	Southeastern corner of South Bruns Avenue and Sumter Avenue.	Begin construction in 2007.
Center City	Wesley View	Multi-family (townhome condominium).	Wesley Heights neighborhood at 117 and 127 South Summit Avenue.	Est. completion in winter 2006.

**Table 3-8 - Development Projects in the Proximity of the Study Area (Cont.)**

Sub-area	Name	Type	Location	Status
Center City	Gateway Village	Brownfield redevelopment Mixed use, 1.5 million square feet.	Trade Street	Complete
Center City	West Park	Recreation/ Open space	Third Ward. 2nd, Graham, Mint, and Fourth. 8 acres.	Complete in 2008.
Center City		Recreation Potential baseball park	Third Ward, Second Ward or Memorial Stadium near CPCC	TBD
Center City	EpiCentre	Mixed use Entertainment complex, condominiums	Trade and College streets. Second Ward.	TBD
Center City	Charlotte Sports and Entertainment Arena	Recreation Charlotte Bobcats and Charlotte Checkers	Trade and Fifth streets along the LRT/trolley corridor. First ward.	Completed October 2005
Center City	ImaginON Children's Learning Center	Recreation	Sixth and Brevard streets. First ward.	Completed
Center City	Courthouse/ parking lot	Government/ Retail/ Transportation	Fourth and McDowell streets. Second ward.	Parking lot – Dec. 2005 Courthouse –January 2007
Center City	Elizabeth Avenue	Mixed use redevelopment. Entertainment, retail, office	Elizabeth Avenue between Kings Drive and Hawthorne Lane.	10-year project. Completion in 2010-2012.
Center City	The Vue	Residential/Retail Condominiums-411 units, 50 stories	West Fifth and Pine.	Complete in 2008.
Center City	Avenue	Residential. Condominiums – 386 units, 36 stories	West Fifth at North Church. Fourth Ward.	Complete in early 2007.
Center City	TradeMark	Residential. Condominiums – 100 units, 28 stories	South Poplar at West Trade. Third Ward.	Complete in 2006.
Center City	The Park	Residential. Condominiums – 107 units, 21 stories	Third and North Caldwell	Completed early 2007

**Table 3-8 - Development Projects in the Proximity of the Study Area (Cont.)**

Sub-area	Name	Type	Location	Status
Center City	Courtside	Residential. Condominiums – 107 units, 17 stories	North Caldwell and Sixth. Next to Bobcats arena.	Complete early 2006
Center City	230 S. Tryon	Residential. Condominiums – 110 units, 13 stories	Tryon and Third	Complete summer 2006
Center City	Two Wachovia project	Building Renovation. Mixed use.	East Third and South Tryon	Complete in 2006
Center City	First Ward	HUD HOPE VI grant – mixed use revitalization		
Center City	8th Square	Residential. Condominiums – 16 units	East 8th Street, 1-acre lot. First ward.	Construction start fall 2005, complete fall 2006
Center City	Court 6	Residential. Condominiums – 80 units, four floors	North Davidson and East 6th streets. Two blocks from Bobcat arena. First ward.	Complete 1st quarter 2006
Center City	First Ward Urban Village	25+ acres Mixed use – open space, office, parking, cultural, office, retail, multi-family	First ward	Planning stages
Center City	M Street	Residential. Condominium	North McDowell at East 7th	Complete first quarter 2006
Center City	Ritz-Carlton Hotel	Hotel	East Trade Street at North College	2008
Center City	The Renwick	Hotel 85 units, 4 floors	700 block of East 7th Street	Complete fall of 2006
Center City	UNCC academic building	Institutional	North Brevard Street at East 9th Street	Complete 2009
Center City	Cameron Brown Building	Office. Renovated space.	East 3rd Street at South McDowell Street	TBD

**Table 3-8 - Development Projects in the Proximity of the Study Area (Cont.)**

Sub-area	Name	Type	Location	Status
Center City	NASCAR Hall of Fame/ Convention Center Ballroom	Entertainment, Museum	East Stonewall between Brevard and Caldwell	2009
Center City	Metro School	Institutional.	Second and Davidson. Second Ward.	Complete 2006
Center City	1st Row Warehouse	Residential. Condominium	West 1st Street at Elliott Street. Third Ward.	Complete September 2006
Center City	Charlotte Gateway Station	Transportation/ Mixed use	Graham between Fourth and Trade. Third Ward.	Complete in 2009
Center City	Johnson & Wales University Business School	Institutional/ Office	West Trade Street at Norfolk Southern RR. Third Ward.	Complete in September 2007
Center City	Wachovia Mixed-Use Project	Mixed Use. Residential, office, museum, retail	South Tryon at West 1st Street. Third Ward.	Complete in 2008.
Center City	200 W. 10th	Residential. Condominium	West 10th Street at North Church Street. Fourth Ward.	TBD.
Center City	217 N. Graham	Retail/office	North Graham Street at West Sixth Street. Fourth Ward.	TBD.
Center City	The Citadin at Fourth Ward Square.	Residential/ retail. Up to six condominium buildings.	North Graham Street at West 8th Street. Fourth Ward.	Complete July 2006.
Center City	City View Towers.	Residential Apartments	North Graham at West 5th Street. Fourth Ward.	Complete Fall 2005.
Center City	Fourth Ward Corners	Retail/office	North Graham at West Sixth Street. Fourth Ward.	Complete 2005.
Center City	The Garrison at Graham	Residential	North Graham at West 10th Street. Fourth Ward.	Fall 2006.
Center City	North Carolina Music Factory	Entertainment/ Retail	Hamilton Street at Seaboard Street. Fourth Ward.	Mid 2007

**Table 3-8 - Development Projects in the Proximity of the Study Area (Cont.)**

Sub-area	Name	Type	Location	Status
Center City (Elizabeth Avenue)	Grubb Properties	Mixed use, 800 residences, 350k sf office, 275k sf retail	Fourth, Fifth, Independence, Hawthorne Lane	Initiated
Center City (Elizabeth Avenue)	Midtown Square Redevelopment	Mixed use, 206 residences, 165k sf office, 572k sf retail	Independence Blvd/ South Kings Drive/ Baxter Street	2007 - 2008
Center City (Elizabeth Avenue/ Hawthorne Lane)	Central Piedmont Community College Redevelopment	Institutional Expansion project.	East Seventh and North King	
Center City (Hawthorne Lane)	Monte Ritchey	Residential, 135 units	Hawthorne / Sunnyside	
Center City (Hawthorne Lane)	Faison	Residential, 132 units	Hawthorne / Sunnyside	
Center City (Hawthorne Lane)	Piedmont Courts	Residential, 254 units	10 <sup>th</sup> /Siegle	
Center City/Central (Elizabeth Avenue/ Central Avenue)	Little Sugar Creek Greenway	Recreation	Cordelia Park north of Center City to North Carolina/South Carolina state line	TBD
Center City (Central Avenue)	Autoverks	Residential, 20 units	Central Avenue / Commonwealth Avenue	
Central Avenue	Plaza Midwood	Neighborhood bond project Curbs, gutters, storm drainage, sidewalks		
Central Avenue	Tuscan Central 27	Residential, 24 units	Central Avenue	
Central Avenue	Morningside	Residential, 1000 units	Iris Drive	

Sources:

*Development Report.* Charlotte Center City Partners. Available: <http://www.charlottecentercity.org/home.cfm>

*Living Here 2005.* Charlotte Observer. Posted September 17, 2005. Available: <http://www.charlotte.com/mld/charlotte>

Personal communication. John Howard, Charlotte Mecklenburg Planning Commission and Jerry Roberson, AICP, Charlotte Area Transit System. March 2006.  
 dua – Dwelling Unit per Acre

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### Beatties Ford Road Sub-area

In the Beatties Ford Road sub-area, a portion of the streetcar corridor is routed through an established neighborhood with few vacant parcels available for new development. The largest tracts of undeveloped land are near the project terminus, adjacent to I-85. This area is part of the Friendship Village Mixed Use Area. The remaining vacant parcels are scattered along the corridor and are smaller lots, consistent with low-density residential neighborhoods.

Other parcels along this corridor have existing uses in place, but have been determined to be underutilized based on the surrounding land uses. An example of an underutilized land use would be a single family home located on the corner of a high volume intersection. Several parcels to the south of I-85 along the corridor have been identified as being underutilized based on their current use, the surrounding uses, and future land use plans. These areas are potential sites for redevelopment.

Several projects ranging from a Hope VI multi-family housing project to mixed use and office projects are scattered around the corridor and are listed in Table 3-8.

### Center City Sub-area

The Center City sub-area encompasses the most dense and heavily developed area in Charlotte. Recent activities and current development plans underway for projects in the area are highlighted in this section and are summarized in Table 3-8.

As part of the 2000 Neighborhood Bond Project; \$1,000,000 was approved for improvements to the Wesley Heights Neighborhood. The neighborhood is located just outside of the downtown, to the north of I-277 and adjacent to the Third Ward. The proposed improvements include the installation of curbs and gutters, sidewalks, and improvement of storm drainage. The goal of the project is to help stabilize and strengthen the neighborhood.

Gateway Village is a multi-use brownfield development project of 1.5 million square feet. The village is called a “technology center” and incorporates 900,000 square feet of office space; 100,000 square feet of retail; and 800 residential units with 5,300 parking spaces. Development occurred in two phases. Partners in the project, Bank of America, were the first to occupy the development in 2000.<sup>18</sup>

**Figure 3-17: Recent Development of Gateway Village**



Source: The source of the picture on the right is: <http://www.gatewayvillage.com/gateway/slideshow.asp>.

The Johnson & Wales Campus, part of the Gateway Village, includes a 145,000 square foot academic facility, an 800-resident dormitory, and an apartment building with 200 four-bedroom units. Future plans call for an additional building to accommodate academic administration.

The existing Federal Courthouse, located at the corner of Trade Street and Mint Street will be vacated by the federal courts that are relocating to a new facility. The City of Charlotte, which currently owns the building, has an agreement that will transfer ownership to Queens University for academic uses once the federal courts vacate the building.

A new multi-modal station, called the Charlotte Gateway Station, has been proposed along Trade Street and the North Commuter Rail Line. This facility is designed to serve local, regional, state, and interstate needs. It will incorporate all modes of land-based passenger transportation including Amtrak, commuter rail, intercity bus, taxi service, express bus, CATS Gold Rush service, local bus and the proposed streetcar.

Within the Third Ward, Charlotte and Mecklenburg County are considering plans for a new park as a part of the Third Ward Plan. The park is to be constructed with the intent of serving the residents and employees of the Third Ward.

Charlotte and the Charlotte Knights (a minor league baseball team) are in talks to locate a new baseball park in downtown Charlotte. Possible sites include the Third Ward, Second Ward, and Memorial Stadium near the Central Piedmont Community College.

At Trade Street and College Street, the Old Convention Center has been razed. Plans for the site are to construct a 3.2 acre multi-use development. The development, called the Epicenter, will include a 267,000 square foot entertainment complex, a 53-story condominium tower and a new Ritz-Carlton Hotel. Retail tenants include Fox Sports Grill, Prime Steakhouse, a coffee and wine bar and a pub.<sup>19</sup>

**Figure 3-18: The EpiCentre at Trade and College Streets**



The source of the picture on the left is The Ghazi Company. Available: <http://www.theghazicompany.com>

The recently completed Charlotte Sports and Entertainment Arena (Figure 3-19) was constructed between Trade and Fifth Streets along the LRT/Trolley Corridor. The approximately 750,000 square feet of space is home to the Charlotte Bobcats (NBA) and Charlotte Checkers and includes seating for roughly 20,000. In addition to the arena, the building includes several retail outlets.

**Figure 3-19: Charlotte Sports and Entertainment Arena**



Source: Left – Soul of America. Available: <http://www.soulofamerica.com/cityfldr/charlotte13.html>  
Right – Munzo Contracting. Available: <http://www.munozcontracting.com/index.htm>

The ImaginOn Children’s Learning Center (Figure 3-20) was recently constructed between 6<sup>th</sup> and 7<sup>th</sup> Street. The facility is a cultural center geared towards children and young adults. The space includes two theatres/performance spaces, interactive exhibits, library space, classrooms, and meeting spaces in over 106,000 square feet.

**Figure 3-20: ImaginOn Joe and Joan Martin Children’s Learning Center**



Source: Charlotte Center City Partners. ImaginOn: Joe and Joan Martin Children’s Learning Center. Available: [http://www.charlottecentercity.org/files/pdf/062905\\_734\\_0030228.pdf?CFID=338312&CFTOKEN=12130029](http://www.charlottecentercity.org/files/pdf/062905_734_0030228.pdf?CFID=338312&CFTOKEN=12130029)

Mecklenburg County recently opened a new courthouse at Fourth and McDowell Streets. The 568,000 square foot eleven-story building consists of 34 court rooms and facilities for the agencies of the criminal justice system. Adjacent to the facility is an eight level garage with accommodations for 1,100 to 1,200 vehicles. The parking structure consists of 12,000 square feet of retail space and an outdoor plaza.

Along Elizabeth Avenue, a redevelopment project will create a pedestrian-friendly environment with a mix of retail, office and residential uses that support the City of Charlotte's policies for land use density along transit corridors. The \$240 million ten-year redevelopment plan is a collaborative effort between Grubb Properties, Presbyterian Hospital and Central Piedmont Community College and encompasses a six-block area between the two institutions. The project is envisioned to contain 340,000-square-feet of Class A office space, ultimately more than 800 residential addresses in a range of market types and more than 250,000-square-feet of retail including a high-end grocer, boutiques, service-oriented shops, a 150-plus room hotel, an eight screen movie theater and about 25 restaurants. The first building completed and the site plan for the project are shown in Figure 3-21. Current and future tenants of the project include Whole Foods Market and Eastern Federal Theaters.

**Figure 3-21: Example of Development and Site Plan for Elizabeth Avenue Project**



Source: Grubb Properties. *Elizabeth Avenue*. Available:

<http://www.grubbproperties.com/retail/index.cfm?show=gallery&pid=44&sid=28>.

Charlotte Center City Partners. *Elizabeth Avenue Redevelopment*. Available:

[http://www.charlottecentercity.org/files/pdf/063005\\_390\\_0040269.pdf?CFID=338312&CFTOKEN=12130029](http://www.charlottecentercity.org/files/pdf/063005_390_0040269.pdf?CFID=338312&CFTOKEN=12130029)

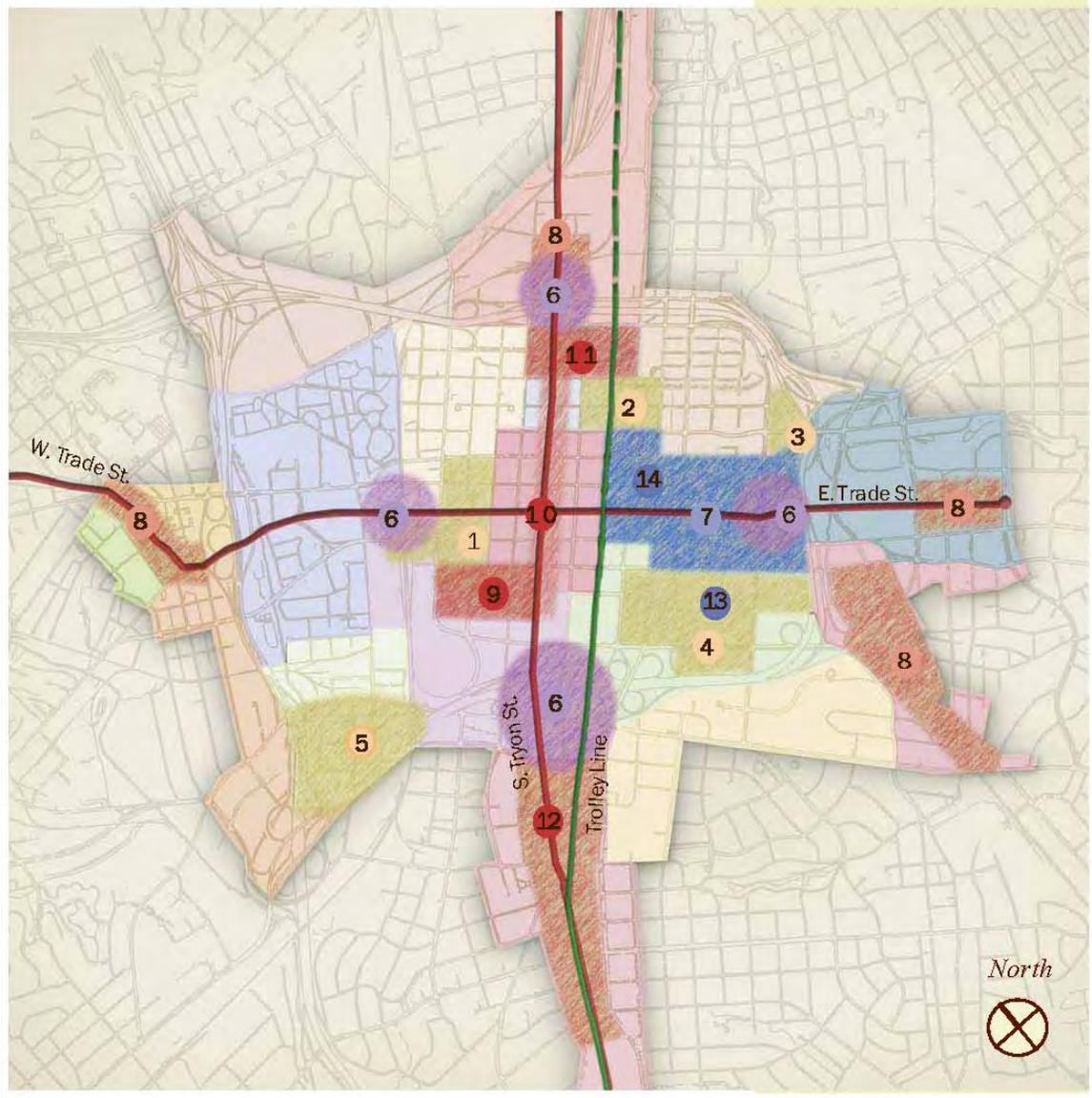
The section of the corridor along Hawthorne Lane, between Elizabeth Avenue and Central Avenue, is a densely developed residential area with scattered institutional uses. There are no vacant parcels available for short term development projects. A few parcels, adjacent to I-277, have been identified as being underutilized. These parcels have the potential to be redeveloped in the future with more intense land uses that will be more appropriate based on the surrounding context of development and infrastructure.

Recommendations for the direction of future development in the Center City sub-area were provided in a diagram the *Center City 2010 Vision Plan* and are reproduced as Figure 3-22.

**Figure 3-22: Land Use, Growth and City Form Recommendations  
 from Center City 2010 Vision Plan**

DIAGRAM: Land Use, Growth and City Form Recommendations

- |  |                                       |
|--|---------------------------------------|
| 1 Multi-Family Housing                   | 8 Neighborhood Retail along Corridors |
| 2 First Ward Multi-Family Housing        | 9 South Tryon Entertainment District  |
| 3 New Multi-Family Housing               | 10 CBD Street-Level Retail            |
| 4 Second Ward Residential Development    | 11 North Tryon Urban Village          |
| 5 West Morehead Conversions: Office/Home | 12 South End Entertainment District   |
| 6 Office Development at Gateways         | 13 New Second Ward School             |
| 7 Government District Consolidation      | 14 Education Quad                     |



### Central Avenue Sub-area

Along Central Avenue, the overall land use pattern is a mix of commercial, office/institutional, and residential. There are approximately a dozen sites where parcels are either vacant or are for sale, indicating they are available for development in the short-term. The majority of the parcels along the corridor have been identified as being potential targets for redevelopment in the mid- to long-term time frame. As the area is built out, pressure will increase for more intense land uses along this corridor. From an economic perspective, it will be more viable for the land to be used more efficiently and at greater densities.

Charlotte recently approved \$3.7 million in bonds for neighborhood improvements to the Plaza Midwood area along Central Avenue. This plan includes the installation of curbs and gutters, sidewalks, and improved stormwater drainage. The objective of the project is to stabilize and strengthen the community. Other development projects are summarized in Table 3-8 and more information about the development in the corridor is described in Section 1.4.2.

## **3.2.4 Environmental Impacts and Benefits**

### **3.2.4.1 Short-term Impacts and Benefits**

In this section the short-term impacts of the project alternatives on land use and development along the corridor are discussed. Short-term impacts are typically associated with the construction phase of a project.

It is not likely that any of the alternatives would have a short-term impact on population changes or development. While construction activities associated with the Build-Alternative could cause some short-term inconveniences, it is not likely to have an impact on population or development. Currently-slated development project are likely to be built under each alternative.

### **3.2.4.2 Long-term Impacts and Benefits**

In the following section the impacts of the project alternatives on existing and future land use within the study area are discussed.

#### **No-Build Alternative and TSM Alternatives**

The current trend of increased development and population growth in the study area is not expected to change under the No-Build or TSM Alternatives. However, development is not likely to be as concentrated as with the Build Alternative. Additionally, an increase in parking amenities in the study area will likely be needed since, as development continues there will still be a continued reliance on automobiles. Opportunities for transit-oriented development associated with the Build Alternative will not be available. This type of development would not be consistent with the *2025 Integrated Transit and Land Use Plan*, the *Centers and Corridors Plan*, or other land use plans and area plans described in Section 3.2.1.1. Generally, these plans focused on increasing the density and livability of the study area, in part, through a decreased need for automobile use. A common goal stemming from the *Centers and Corridors Plan* is also to concentrate growth in five transportation-oriented centers and corridors.

#### **Build Alternative**

In order to determine the potential impact of the streetcar on population and development in the study area, it is best to turn to a case study of the results of a streetcar already implemented in another city. Five years after the opening of the

streetcar in Portland, Oregon the effects of the streetcar on growth and development were assessed. According to the assessment, “Since 1997 when the original streetcar alignment was identified, properties along its length have experienced significant changes: Over \$2.28 billion has been invested within two blocks of the streetcar alignment; 7,248 new housing units and 4.6 million square feet of office, institutional, retail and hotel construction have been constructed within two blocks of the alignment; 55 percent of all CBD development since 1997 has occurred within 1-block of the streetcar and properties located closest to the streetcar line more closely approach the zoned density potential than properties situated farther away; developers are building new residential buildings with significantly lower parking ratios than anywhere else in the region.”<sup>20</sup>

Based on the results of the implementation of the Portland streetcar, and based on current development trends of growth and major projects in the Center City sub-area; it can be expected that the Center City Streetcar would have a substantive positive impact of concentrating development around the streetcar alignment. The impact of the Center City Streetcar project considered cumulatively with the implementation of transit projects in the four other corridors will be higher density development in the Charlotte area. It is likely that this development would be dense, would have a variety of uses, and would be pedestrian oriented. It is likely that the highest concentration of development would occur in the Center City sub-area, but the Beatties Ford Road and Central Avenue sub-areas could also expect an increase in the density and quality of development surrounding the streetcar alignment. This outcome would be consistent with both the *Centers and Corridors Plan* and the *2025 Integrated Transit and Land Use Plan*.

### **3.2.5 Mitigation**

The mitigation for any residential or business relocations associated with the project are described in Section 3.3, Displacements. The section of either the No-Build Alternative or TSM Alternative will not require a mitigation plan. The negative consequences of both alternatives do not require mitigation. Additionally, no mitigation would be necessary under the Build-Alternative as only positive impacts are expected.

## **3.3 DISPLACEMENTS**

### **3.3.1 Legal and Regulatory Framework**

#### **3.3.1.1 Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as Amended**

In Title II of the subject act, a policy is established for the uniform treatment of individuals that need to be relocated because of a Federal or Federally funded program or project. The primary purpose of Title II, as described in the act, “...is to ensure that such persons shall 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.” In the Title procedures for managing relocations and provisions for funding assistance are described for moving and related expenses, replacement housing, planning and preliminary expenses and other administrative processes. In Title III of the act, a policy for the administrative procedures and provisions for the acquisition of real property are established.<sup>21</sup>

### 3.3.1.2 North Carolina General Statutes Chapter 40A – Eminent Domain

In this statute, condemnation procedures are established for North Carolina. Both public and private parties with the right to condemn are listed, as well as the types of purposes for which property may be condemned.<sup>22</sup>

### 3.3.1.3 City of Charlotte Municipal Code – Article V, Eminent Domain

In this code, procedures for implementing Chapter 40A of the North Carolina General Statutes in the City of Charlotte are established.<sup>23</sup>

## 3.3.2 Method

The project alignment was evaluated for its potential to displace residents and businesses as a result of property acquisitions for project right-of-way.

## 3.3.3 Existing Conditions and Resources

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.

## 3.3.4 Environmental Impacts and Benefits

### 3.3.4.1 Short-term Impacts and Benefits

#### **No-Build and TSM Alternatives**

No residences or businesses would be displaced under either the No-Build or TSM alternatives. No short-term impacts are expected.

#### **Build Alternative**

No residences or businesses would be displaced under the Build Alternative. Acquisition of small slivers of privately owned property would be necessary at 12 locations along the project alignment.

### 3.3.4.2 Long-term Impacts and Benefits

#### **No-Build and TSM Alternatives**

No residences or businesses would be displaced under either the No-Build or TSM alternatives. No long-term impacts are expected.

#### **Build Alternative**

The partial takings expected are not substantial enough to affect the existing use of the properties in the long-term.

## 3.3.5 Mitigation

CATS will adhere to the requirements pertaining to land acquisition for projects funded by the Federal Transit Administration (FTA) as prescribed in Volume 49 Code of Federal Regulations (CFR) Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs, the North Carolina General Statutes Chapter 40A Eminent Domain, and 136 Roads and Highways, and the Municipal Code of the City of Charlotte Article V, Section 7.81. These regulations implement and supplement applicable provisions governing federally funded land acquisition and relocation assistance contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

Part 49 of CFR contains regulations relating to the necessity for, and means of preparation for: (1) the appraisal and acquisition of real property; (2) relocation services; (3) moving, relocation and replacement housing payments; and (4) other expense payments when land acquisition and/or relocation is involved. All relocation mitigation would follow the state and local guidelines for compliance with the Uniform Relocation Assistance and Real Property Acquisition Act.

### **3.4 NEIGHBORHOODS AND COMMUNITY FEATURES**

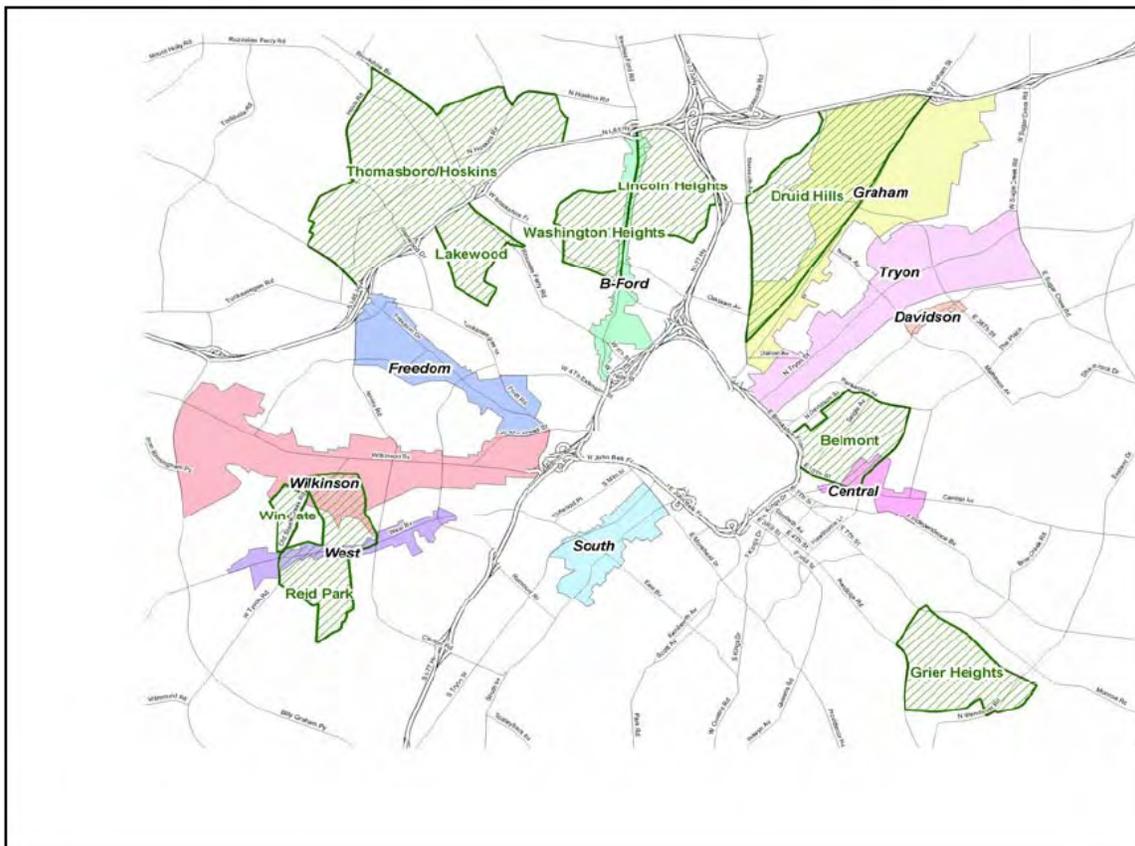
#### **3.4.1 Legal and Regulatory Framework**

Charlotte recognizes neighborhoods as identified by the *Charlotte Neighborhood and Quality of Life Study 2004*. The city tracks statistical information and rates the quality of life for each neighborhood. Additionally, the city encourages neighborhoods to be active and to organize themselves. Charlotte's Department of Neighborhood Development has created a model vision for neighborhood capacity that includes the following indicators of success:

- Neighborhood residents know each other;
- Organizations are established with a clear vision and mission;
- Organizations are able to identify and solve neighborhood problems;
- Neighborhood leaders are politically active and astute;
- Access to and opportunities for leadership training are utilized throughout the neighborhood;
- Openness to culturally, ethnically, and economically diverse backgrounds;
- Partnerships are established with the city and county government as well as private and non-profit organizations; and
- Broad participation from all segments of the neighborhood is encouraged.<sup>24</sup>

The City of Charlotte and Mecklenburg County created a strategy to address affordable housing, community and economic development needs identified in the *Charlotte Neighborhood Quality of Life Study 2004* and documented it in *City of Charlotte and Charlotte-Mecklenburg Regional Housing Consortium Five-Year Consolidated Plan and FY2006 Annual Action Plan*. Guiding principles of the strategy include: (1) targeting investments in low wealth and distressed areas of the community; (2) de-concentrating poverty; (3) leveraging federal, state, and local government resources; and (4) planning and creating partnerships and other collaborative relationships. According to the strategy, nine neighborhoods in Charlotte's urban core have been the target for revitalization. A map of the targeted areas is shown in Figure 3-23. Three of these neighborhoods, Belmont, Lincoln Heights, and Washington Heights, fall within the project study area. It is indicated that these neighborhoods will continue to be targeted over the next five years. One aspect of the strategy related to transportation infrastructure is the need to improve the living environment/quality of life in low-income neighborhoods. Common needs among these neighborhoods include infrastructure improvements and greater access to public transportation.<sup>25</sup>

**Figure 3-23: Targeted Neighborhoods and Corridors**



Source: City of Charlotte and Charlotte-Mecklenburg Regional Housing Consortium Five-Year Consolidated Plan and FY2006 Annual Action Plan. June 2005.

Additionally, the Charlotte-Mecklenburg Planning Commission has adopted area plans that typically address land use, zoning, transportation, environment, infrastructure, revitalization, community appearance, and public safety. The most recent area plans are discussed in more detail in Section 3.2.1. Area plans that cover portions of the project corridor are:

- Briar Creek/Woodland/Merry Oaks Small Area Plan, 1998
- Center City 2010 Vision Plan, 2000
- Cherry Small Area Plan, 1993
- First Ward Master Plan, 1997
- Second Ward Neighborhood Master Plan, 2002
- Third Ward Future Concept Plan, 1997
- Third Ward Vision Plan, 2003
- Washington Heights Neighborhood Concept Plan, 2002
- Wesley Heights, 1999
- Elizabeth Avenue Land Use and Pedscape Plan, draft form
- Plaza Central Pedscape Plan, 2003

### 3.4.2 Method

Information on identifying and describing corridor neighborhoods was taken from the *Charlotte Neighborhood Quality of Life Study, 2004* that was completed in 2004 for the City of Charlotte

Neighborhood Development Department and the Charlotte-Mecklenburg Planning Commission by the Metropolitan Studies Group at the University of North Carolina at Charlotte.<sup>26</sup> Additional information was obtained from site visits and discussions with community members.

The Metropolitan Studies Group developed the neighborhood boundaries for the *Charlotte Neighborhood Quality of Life Study* in conjunction with the Charlotte-Mecklenburg Planning Commission. They were delineated based on location, census boundaries, physical features, and town limits. There were two phases to the neighborhood identification process. The first phase was initially conducted in 1993 and identified neighborhoods as Cities within a City (CWAC), which only identified neighborhoods in the inner core of the city. In 2000, this process was expanded to include the entire city and those areas just outside the immediate city limits that are likely to become part of Charlotte in the near future. These neighborhoods were delineated using a similar method as the CWAC. However, they were named as Neighborhood Statistical Areas (NSA). The neighborhoods along the corridor include both CWAC and NSA defined neighborhoods.

### 3.4.3 Existing Conditions and Resources

#### 3.4.3.1 Neighborhoods

The *Charlotte Neighborhood Quality of Life Study, 2004* was used to develop an understanding of the existing characteristics and conditions of the neighborhoods. This report provides a detailed profile of the physical, social, economic, and crime dimensions of each neighborhood located along the corridor. The study evaluated Charlotte's neighborhoods based on these criteria and assigned an overall quality of life index rating using the following three indices:

- **Stable** - neighborhoods identified as having few social problems, low rates of crime, few physical needs, sound housing, and high levels of economic vitality;
- **Threatened** - neighborhoods that scored relatively high on most of the dimensions but may have a significant problem in one or more areas. These neighborhoods are characterized by moderate levels of physical decline, average crime rates, moderate levels of social needs, and modest level of income change; and,
- **Fragile** - neighborhoods that scored low to moderate on all four dimensions and characteristic of lower quality of life and at risk on multiple dimensions. These neighborhoods are characterized by high rates of physical deterioration, high crime, high levels of social needs, and low rates of income change (even declines).

Table 3-9 presents the results of the *Charlotte Neighborhood Quality of Life Study* as it relates to the defined neighborhoods located along the corridor. The neighborhoods are presented in geographic order from northwest to southeast. Figure 3-24 shows the location of the neighborhood boundaries within the study area.

**Table 3-9: Summary of Quality of Life Index for the Study Area**

Neighborhood	Social (Public Assisted School Performance Indicators)	Crime (Rates)	Physical (Appearance, Substandard Housing, Homeowners)	Economic (Income Growth)	Overall Quality of Life
Firestone/ Garden Park	Threatened	Stable	Stable	Fragile	Threatened
Slater Road/ Hamilton Circle	Stable	Stable	Threatened	Threatened	Threatened
Wilson Heights	Stable	Fragile	Fragile	Stable	Threatened
University Park	Fragile	Fragile	Stable	Fragile	Fragile
Lincoln Heights	Fragile	Threatened	Threatened	Threatened	Fragile
Washington Heights	Fragile	Threatened	Fragile	Fragile	Fragile
Oaklawn Park	Fragile	Threatened	Threatened	Threatened	Fragile
McCrorey Heights	Fragile	Threatened	Threatened	Threatened	Threatened
Smallwood	Fragile	Threatened	Fragile	Threatened	Fragile
Biddleville	Threatened	Stable	Threatened	Threatened	Threatened
Greenville	Stable	Stable	Stable	Threatened	Stable
Seversville	Threatened	Threatened	Stable	Stable	Threatened
Wesley Heights	Threatened	Threatened	Stable	Stable	Stable
Third Ward	Stable	Threatened	Stable	Stable	Stable
Fourth Ward	Threatened	Threatened	Stable	Stable	Stable
First Ward	Stable	Fragile	Stable	Stable	Stable
Second Ward	Not addressed in the <i>Charlotte Neighborhood Quality of Life Study</i>				
South End	Not addressed in the <i>Charlotte Neighborhood Quality of Life Study</i>				
Cherry	Threatened	Fragile	Stable	Stable	Threatened
Elizabeth	Stable	Threatened	Stable	Stable	Stable
Belmont	Threatened	Fragile	Threatened	Stable	Threatened
Plaza Midwood	Stable	Stable	Stable	Stable	Stable
Commonwealth	Threatened	Fragile	Stable	Stable	Stable
Chantilly	Threatened	Stable	Stable	Stable	Stable
Country Club Heights	Threatened	Stable	Stable	Threatened	Stable
Briarcreek/ Woodland	Threatened	Fragile	Stable	Stable	Threatened
Windsor Park	Threatened	Stable	Stable	Threatened	Stable
Eastway/ Sheffield Park	Threatened	Threatened	Stable	Threatened	Threatened
Wilora Lake	Threatened	Threatened	Stable	Threatened	Threatened



## **Beatties Ford Road Sub-Area**

### **Firestone/Garden Park**

The Firestone/Garden Park neighborhood is located at the northern end of the corridor, just north of I-85. It is bounded by Sunset Road to the north, Beatties Ford Road to the east, I-85 to the south, Auten Road to southwest, and Peachtree Road to the northwest. The predominant land use in the Firestone/Garden Park neighborhood is single family residential with a few clusters of multi-family units. The exception is along I-85 where there is a mix of office, commercial, and light industrial land uses. The profile of the area indicates that the median household income is below the citywide average. The average house value is roughly half the citywide average. From a social perspective the area has a higher than average percent of residents over 64 and of adolescent parents. On an economic perspective, the neighborhood has a high number of residents on food stamps and a low income growth rate. Crime rates for the community were lower than city wide averages in all categories. The overall quality of life index of the neighborhood is threatened.

### **Slater Road/Hamilton Circle**

The Slater Road/Hamilton Circle neighborhood is also located at the northern end of the corridor, between Beatties Ford Road, Sunset Road, Statesville Road and Cindy Lane. The median household income and average house value are below the city averages, and the unemployment index is high. Social and crime rate statistics for the neighborhood are comparable to those of the city as a whole. Measures of the physical characteristics of the neighborhood fall below that of the city, with 36.3 percent of persons having access to public transportation (compared to 58.8 percent city-wide) and 6.2 percent having access to basic retail (compared to 18.5 percent city-wide). The overall quality of life index of the neighborhood is rated as threatened.

### **Wilson Heights**

The Wilson Heights neighborhood is located in the northern section of the corridor and is bisected by I-77. The neighborhood is bounded by Cindy Lane to the north, Statesville Road to the east, I-85 to the south, and Beatties Ford Road to the west. The Wilson Heights neighborhood contains a mix of land uses that include single family housing, commercial, and open space. The parcels adjacent to the project corridor and I-85 are commercial land uses. The median household income and average house value are less than citywide numbers. The social and economic dimensions of the community are rated as stable. From a physical perspective, the neighborhood has a higher percent of substandard housing than the city as a whole and a lower percent of homeowners. The crime rates for the neighborhood are higher than citywide averages. The overall quality of life index of the neighborhood was rated as threatened.

### **University Park**

The University Park neighborhood is adjacent to the northern section of the project corridor along Beatties Ford Road. The neighborhood is bounded by I-85 to the north, Beatties Ford Road to the east, LaSalle Street to the south, and the Oakview Terrace Neighborhood to the west. The dominant land use for the neighborhood is single family residential. There is also a school located within the neighborhood. The physical dimension of the neighborhood is rated as stable. From a social perspective, compared to citywide percentages, the neighborhood has nearly four times the percentage of residents over 64 and three times the percentage of adolescent parents. The crime rate for the neighborhood is also higher than the city rates. The overall quality of life index for the neighborhood is rated as fragile.

### Lincoln Heights

The Lincoln Heights neighborhood is bordered by I-85 to the north, I-77 to the east, Russell Avenue to the south, and Beatties Ford Road to the west. Single family residential is the predominant land use in the neighborhood with a few scattered low density commercial sites immediately along the project corridor. The social dimension of the neighborhood is rated as fragile because of a large percentage of elderly residents and a large number of adolescent parents compared to citywide averages. From a physical perspective there are a low number of homeowners in the neighborhood and the average house value is far less than the average home value across the city. The crime rates are higher than citywide statistics. Economically, the neighborhood has a large percentage of residents on food stamps compared to the city as a whole. The overall quality of life index for the neighborhood is rated as fragile.

### Washington Heights

The Washington Heights neighborhood is bounded by LaSalle Street to the north, Beatties Ford to the east, Brookshire Boulevard to the south, and the Oakview Terrace Neighborhood to the west. The neighborhood is mostly comprised of single family residential. In addition, there are also education facilities, parks/open space, and a small commercial center. From a social perspective the neighborhood has a high school dropout rate three times that of the city. Physically, the neighborhood has a high percentage of substandard housing and a low percentage of homeowners. From an economic standpoint, the neighborhood has a high rate of unemployment and a low income growth rate. The crime rate for the neighborhood is higher than the citywide crime rate. The overall quality of life index for the neighborhood is fragile.

### Oaklawn Park

The Oaklawn Park neighborhood is bordered by Russell Avenue to the north, I-77 to the east, Oaklawn Avenue to the south, and Beatties Ford Road to the west. The land use in the neighborhood is mostly single family residential with a few scattered multi-family housing sites and an education facility. In addition, there are some scattered commercial sites along the major roadways. The social dimension of the neighborhood is fragile. There is a low percent of students passing competency exams and a high percentage of adolescent pregnancies. Crime rates are higher than citywide averages. From a physical perspective there are a high number of substandard housing units. Economically, the average house value is substantially lower than the citywide average. In addition, income growth for the neighborhood is lower than the income growth rate of the city. The overall quality of life index for the neighborhood is fragile.

### McCrorey Heights

The McCrorey Heights neighborhood borders the project corridor near I-77. The neighborhood is bounded by Oaklawn Avenue to the northeast, I-77 to the southeast, the Biddleville neighborhood to the southwest, and Beatties Ford Road to the northwest. The McCrorey Heights neighborhood has single family residential and industrial land uses. The industrial land uses are located immediately along the project on the west side of the neighborhood. From a social perspective, the neighborhood has a large senior citizen population and a high number of births to adolescent parents. The crime rate for the neighborhood is slightly above the citywide crime rate. The physical needs of the neighborhood are few. Economically, the neighborhood has a low median household income, low average home value, and a high unemployment rate. The overall quality of life index for the neighborhood is rated as threatened.

## **Center City Sub-Area**

### **Smallwood**

The Smallwood neighborhood is located to the east of the corridor and is bounded by West Trade Street to the northeast, State Street to the south, and Parkway Avenue and Norwood Drive to the northeast. The neighborhood has a mix of land uses that include single family and multi-family residential, industrial, and open space. The social dimension of the neighborhood shows that there is a higher than average drop out rate compared to the city as a whole. There are also a high number of adolescent parents. From a physical standpoint there is a substantial amount of substandard housing and a low number of homeowners. Economically, the median household income of the neighborhood is nearly half that of the citywide median household income. The crime rate is higher than city averages; in particular the violent crime rate is more than double that of the entire city. The overall quality of life index for the neighborhood is rated as fragile.

### **Biddleville**

The Biddleville neighborhood is bisected by the corridor. It is bounded by Brookshire Boulevard to the northeast, I-77 to the southeast, and West Trade Street to the southwest. This neighborhood contains a mix of land uses including single family residential and educational facilities. The Johnson C. Smith University is located in Biddleville. The profile of the area indicated few social or physical needs. From an economic standpoint the income growth for the area is lower than that of the community as a whole. Additionally, the average house value is significantly lower than the citywide average house value. The crime rate of the neighborhood is comparable to that of the entire city. The overall quality of life index for the neighborhood is rated as threatened.

### **Greenville**

The Greenville neighborhood is located around the interchange of I-77 and Brookshire Freeway and is bordered by I-77, Oaklawn Avenue, Statesville Avenue and Seaboard Street. The median household income and average house value are both lower for the neighborhood than the city as a whole. The unemployment index is also high. The overall quality of life index of the neighborhood is rated as stable.

### **Seversville**

The Seversville neighborhood is bordered by State Street to the north, West Trade Street to the east, Tuckaseegee Road to the south, and Berryhill Road to the west. The neighborhood contains a mix of land uses that includes single family housing, multi-family housing, industrial, and open space. From a social perspective, the neighborhood has a high drop out rate, a low percentage of students passing competency exams, and a high number of adolescent parents. The neighborhood also has a high number of violent crimes. From a physical standpoint the neighborhood is stable. Economically, the neighborhood has a percentage of individuals receiving food stamps and a low income growth rate. However, the percent change in house value is significantly higher than community wide averages. The overall quality of life index for the neighborhood is threatened.

### Wesley Heights

The Wesley Heights neighborhood is located just outside of Center City Charlotte along the I-77 corridor. The neighborhood is bounded by Tuckaseegee Road to the north, I-77 to the east, Freedom Drive to the south, and Berryhill Road to the west. The land uses in the neighborhood include single family residential, multi-family residential, industrial, and scattered commercial. The profile of the area indicated few social needs or physical needs. The violent crime rate for the neighborhood was higher than the citywide violent crime rate. From an economic standpoint the neighborhood has experienced a high increase in house value compared to that of the city. However, actual income growth for neighborhood residents is significantly lower than the income growth of the city as a whole. The overall quality of life index for the neighborhood is stable.

### Third Ward

The Third Ward neighborhood is located within Center City Charlotte and the I-77/I-277 Loop. It is bounded by Trade Street to the northeast, Tryon Street to the southeast, the I-277 to the southwest, and I-77 to the northwest. The neighborhood has a mix of dense development and surface lots associated with the Carolina Panthers stadium. The land uses in the neighborhood are mixed and include single family residential, multi-family residential, office, commercial, retail, university, and open space. The profile of the area indicated that the social, physical, and economic dimensions of the study area were stable. There is a higher than average percentage of adolescent parents living in the neighborhood. The overall quality of life index for the neighborhood is stable; however, the crime rate for the neighborhood is higher than the citywide averages.

### Fourth Ward

The Fourth Ward neighborhood is located within interstate loop in Center City Charlotte. It is bounded by Brookshire Freeway to the northeast, North Tryon Street to the southeast, West Trade Street to the southwest, and North Smith Street to the northwest. This neighborhood contains single family and multi-family residential land uses. There are also a few commercial land uses and a church. The profile of the area indicates low social needs and stress, low incidents of crime, and few physical needs. The overall quality of life index rated this area as stable.

### First Ward

The First Ward neighborhood is located in Center City Charlotte and is bordered by Brookshire Freeway to the east, East Trade Street to the southwest, and North Tryon to the northwest. The land uses in this neighborhood are single family residential, multi-family residential, public housing, government facilities, and commercial. The social and physical indicators are stable. From an economic standpoint, there are a high number of individuals receiving food stamps, but income growth is higher than the citywide average. In addition, the percent change in house value for residents in the neighborhood are significantly higher than citywide figures. The overall quality of life index rating for the neighborhood is stable.

### Cherry

The Cherry neighborhood is located to the southeast of the interstate loop and of the corridor. It is bordered by East 4th Street to the northeast, Queens Road to the southeast, Henley Place to the south, and South King Street to the west. The neighborhood land uses are single family and multi-family residential, commercial, and office. The social dimension of the neighborhood is relatively stable, with the exception of a high number of adolescent parents. The crime rate for juvenile arrests is six times the citywide average. The physical aspects are stable. From an economic standpoint,

the neighborhood has a lower income growth rate than the rest of the city, but has a higher percent increase in house value. The overall quality of life index for the neighborhood is threatened.

#### Elizabeth

The Elizabeth neighborhood (also referred to as Colonial Heights) is bisected by the project corridor. The neighborhood is bound by East 10th Street and Central Avenue to the north and east. Randolph Road, Providence Road, and East 4th Street form the southwest boundary. The Belk Freeway borders the northwest corner of the neighborhood. The neighborhood contains a mix of land uses that include single family and multi-family residential throughout, and then educational, office/institutional, and commercial along the section near Elizabeth Avenue. The land uses along Elizabeth Avenue are heavily influenced by the Central Piedmont Community College and the Presbyterian Hospital. The social and physical characteristics of the neighborhood are stable. The median house value is substantially higher than the citywide average. Property crime rates are higher than the citywide averages. The neighborhood is also economically stable and has experienced a higher than average percent increase in property value than the rest of the city. The overall quality of life index for the neighborhood is stable.

#### Belmont

The Belmont neighborhood is located to the north of the project corridor. It is bordered by Parkwood Avenue to the northeast, Hawthorne Lane to the southeast, East 10th Street to the southwest, and North Alexander Street to the northwest. The land uses in the neighborhood are mixed and contain single family and multi-family residential, office, industrial, commercial, and education facilities. The social indicators for the neighborhood show that the high school drop out rate is higher than the citywide rate and that there are a high number of adolescent parents. The violent crime rate and juvenile arrest rate are both higher than citywide averages. Physically, the neighborhood has a low number of homeowners. Economically, the neighborhood has a higher increase in income growth and change in housing value than the citywide averages. The overall quality of life index for the neighborhood is threatened.

#### Commonwealth

The Commonwealth neighborhood is located along the project corridor. It is bound by Central Avenue to the north, the Briar creek neighborhood to the southeast, and Independence Boulevard to the southwest. The land uses in the neighborhood consist of single family and multi-family housing with a few scattered commercial and office/institutional facilities located along Central Avenue. The social indicators for the neighborhood show that the number of adolescent parents is higher than the citywide percentage. The violent crime and property crime rates are significantly higher than the citywide statistics. The physical needs and economic conditions of the neighborhood are both stable. The overall quality of life index for the neighborhood is stable.

#### Chantilly

The Chantilly neighborhood is bordered by Independence Boulevard to the northeast, the Coliseum Drive neighborhood to the southeast, and the Elizabeth neighborhood to the southwest. The neighborhood is predominately single family residential with a few instances of multi-family housing. The social dimension of the neighborhood shows that the high school drop out rate is higher than the citywide rate. The crime rate for the neighborhood is lower than the citywide crime rate. The physical indicators and the

economic conditions of the neighborhood are stable. The overall quality of life index of the neighborhood is stable.

### **Central Avenue Sub-Area**

#### **Plaza Midwood**

The Plaza Midwood neighborhood is bound by Mecklenburg Avenue to the north, the Country Club neighborhood to the east, Central Avenue to the south, and Hawthorne Lane to the west. The neighborhood is predominately single family residential. However, there are commercial and light industrial land uses found along Central Avenue. The social and physical needs of the neighborhood are relatively low. In addition, the neighborhood has a low crime rate. From an economic perspective, the neighborhood has a low income growth rate, but the percent change in house values has increased at a much faster rate than the city as a whole. The overall quality of life index for the neighborhood is stable.

#### **Country Club Heights**

The Country Club Heights neighborhood is located along the project corridor. It is bound by Hilliard Drive to the north, Eastway Drive to the east, Central Avenue to the south, and the Plaza Midwood neighborhood to the west. The land uses in the neighborhood are characterized as single family residential. Notable features include a school, park and the Charlotte Country Club. The social dimension of the neighborhood shows a high percent of adolescent parents compared to citywide statistics. The crime rate in the neighborhood is comparable to the citywide crime rate. The physical needs of the neighborhood are low. Economically, the neighborhood has a lower income growth rate than the citywide growth rate. The overall quality of life index of the neighborhood is stable.

#### **Briarcreek-Woodland**

The Briarcreek-Woodland neighborhood is bordered by Central Avenue to the north, Eastway Drive to the east, Independence Boulevard to the south, and the Commonwealth neighborhood to the west. The land uses consist of single family and multi-family housing with scattered offices and businesses. From a social perspective, the neighborhood has a low percent of children passing competency exams. The violent crime rate is higher than the citywide rate. The physical needs of the community are low. The economic conditions are stable. The overall quality of life index of the neighborhood is threatened.

#### **Windsor Park**

The Windsor Park neighborhood is bounded by Shamrock Drive to the north, Sharon Amity Road to the east, Central Avenue to the south, and Eastway Drive to west. The dominant land use of the neighborhood is single family residential with scattered multi-family units. In addition, there are a few commercial and office sites located along Central Avenue. The social dimension of the neighborhood shows a large percentage of residents who are over 64. Crime rates for the neighborhood are lower or the same as citywide statistics. The physical needs of the neighborhood are low. The economic conditions are stable. The overall quality of life index for the neighborhood is stable.

#### **Eastway/Sheffield Park**

The Eastway/Sheffield Park neighborhood is located at the southern terminus of the project corridor. It is bordered by Central Avenue to the north, Albemarle Road to the southeast, Independence Boulevard to the southwest, and Eastway Drive to the west. The neighborhood contains a mix of single family and multi-family residential,

commercial, public facilities, and open space. The social dimension of the neighborhood shows that the high school drop out rate is higher than the citywide drop out rate. The crime rates are higher in the neighborhood than citywide crime rates. The physical indicators for the neighborhood show that there is a high number of substandard housing and a low percentage of homeowners. Economically, the neighborhood has experienced a lower income growth rate and a lower percent change in house value than the city as a whole. The overall quality of life index for the neighborhood is threatened.

#### Wilora Lake

The Wilora Lake neighborhood is at the southern terminus of the project corridor. It is bordered by Hickory Grove Road on the east, Central Avenue in the south, and Sharon Amity Road in the west. The neighborhood contains a large amount of single family residential land uses. However, the Eastland Mall and neighboring commercial developments along Central Avenue are the dominant land use in this neighborhood. Social indicators show that there is a higher than average number of elderly residents living in the neighborhood. In addition, the high school drop out rate is higher than the citywide drop out rate. There is also a higher juvenile arrest rate in the neighborhood compared to the city as a whole. The physical needs of the neighborhood are low. The economic indicators show a lower than average income growth rate and a lower percent change in house value than the city as a whole. The overall quality of life index for the neighborhood is threatened.

#### 3.4.3.2 Community and Social Service Providers

Community facilities and resources provide basic needs and services to the surrounding neighborhoods. They include schools, churches and religious centers, libraries, hospitals, parks, greenways, recreation centers, and emergency services (fire stations, police stations). These facilities and services shape the quality of life and help foster a sense of community identity. The number of community facilities and resources corresponds to the density of development. For example, the more densely populated portions typically have more services and resources located in proximity to or within neighborhoods. As population density decreases, fewer community facilities are present.

Community facilities and potential impacts of the project on community facilities are discussed in this section. Impacts are anticipated to be primarily positive due to the fact that many community facilities will be within an easy walk of a station. Community facilities are listed in Table 3-10 and shown Figure 3-25, with the exception of parklands, in Figure 3-25. A discussion of existing parklands, greenways, and recreation centers is included in Section 3.12.

**Table 3-10: Community Facilities**

<b>Schools</b>	
University Park Elementary	2400 Hildebrand Street
Lincoln Heights Elementary	1900 Newcastle Street
Oaklawn/Brunswick Avenue Elementary	1810 Oaklawn Avenue
First Ward Elementary	715 N. Caldwell
Winterfield Elementary	3100 Winterfield Place
Merry Oaks Elementary	3508 Draper Avenue
Irwin Avenue Elementary	329 N. Irwin Avenue
Elizabeth Traditional Elementary	1601 Park Drive
Piedmont/Hawthorne Middle School	1241 E. 10th Street
Eastway Middle School	500 Bilmark Drive
West Charlotte High School	2219 Senior Drive
Midwood High School/Tate Teenage Parents	1817 Central Avenue
Northwest School Of The Arts	1415 Beatties Ford Road
Metro School	700 E. Second Street
Central Piedmont Community College – City View Center	1609 Alleghany Street
Central Piedmont Community College – Central Campus	1201 Elizabeth Avenue
Dudley's Beauty College	1950 John Macdonald Avenue
Johnson C. Smith University	100 Beatties Ford Road
Johnson & Wales University	901 W. Trade Street
King's College	322 Lamar Avenue
Southeastern College Of Beauty	1535 Elizabeth Avenue
Teach South Central Center	500 W. Trade Street
<b>Churches</b>	
New Emmanuel Congregational Church	PO Box 16502
Apostolic Church of God of America	200a Honeys Building
Clement Memorial A M E Zion Church	312 N. Davidson Street
First Baptist Church of Charlotte	301 S. Davidson Street
First United Presbyterian of Charlotte	201 E. 7th Street
Greater Mount Moriah Primitive Baptist Church	747 W. Trade Street
St. Peters Protestant Episcopal Church	115 W. 7th Street
Caldwell Memorial Pres Church	1615 E. 5th Street
Faith Presbyterian Church	1805 E. 7th Street
Hawthorne Lane Methodist Church	501 Hawthorne Lane
St Martins Episcopal Church	1500 E. 7th Street
Commonwealth Baptist Church	1451 Briar Creek Road
Eastway Baptist Church	2749 Eastway Drive
Emmanuel Pentecostal Church	1201 Pegram Street
First Assembly of God of Charlotte	2633 Eastway Drive

**Table 3-10: Community Facilities (Cont.)**

<b>Churches (continued)</b>	
Memorial United Methodist Church	4012 Central Avenue
Seigle Avenue Church of God	1620 Seigle Avenue
St Andrews Protestant Episcopal	3601 Central Avenue
Third Presbyterian Church	4019 Central Avenue
Jerusalem Pentecostal Holiness Church	421 E. 18th Street
Little Church on Moravian Lane	528 Moravian Lane
Bethel A M E Church of Charlotte	201 Grandin Road
Clinton Chapel Amez Church	1901 Rozelles Ferry Road
New Jerusalem Trinity Church	2526 Old Steele Creek Road
St Peters Baptist Church	2315 Roslyn Avenue
Jerusalem Holy Pentecostal Church of Apostolic	3814 Crestridge Drive
Apostolic & New Testament Church of God	B Avenue East
Friendship Primitive Baptist Church	2015 Kennesaw Drive
Macedonia Baptist Church of Charlotte	1300 Hateras Avenue
Memorial Presbyterian Church	2600 Beatties Ford Road
Pentecostal Temple Jesus Christ Holiness	1914 Renner Street
Prince of Peace Lutheran Church	3001 Martin Luther King
University Park Baptist Church	2348 Keller Avenue
Wilson Heights Church of God	2137 B Avenue
Victory Christian Center Inc	7224 Old Pineville Road
Smallwood Presbyterian Church	PO Box 16117
Progressive Church of Our Christ The Lord	237 N. Graham Street
St Peters Catholic Church	501 S. Tryon Street
Grace A M E Zion Church	219 S. Brevard Street
Little Rock AME Zion Church	403 N. Myers Street
Trinity Episcopal School	750 E. 9th Street
Galilean Baptist Church	1220 E. 10th Street
St Johns Baptist Church	300 Hawthorne Lane
New Hope Missionary Baptist Church	1303 Hawthorne Lane
Green Memorial Baptist Church	1324 The Plaza
Calvary Christian Church of The Apostolic Faith	2429 E. Independence Boulevard
True Holiness Church of Jesus Christ	1801 Griers Grove Road Apt E
New Bethlehem Baptist Church	2001 Cummings Avenue
Tabernacle Baptist Church	1135 Redbud Street
Muhammad Mosques of The Islam	1230 Beatties Ford Road
Gethsemane A M E Zion Church	314 Cemetery Avenue
Greater Fellowship Missionary Baptist Church	PO Box 18645
First Methodist Church	PO Box 31603
Cannon E C Crusade Inc	PO Box 31773

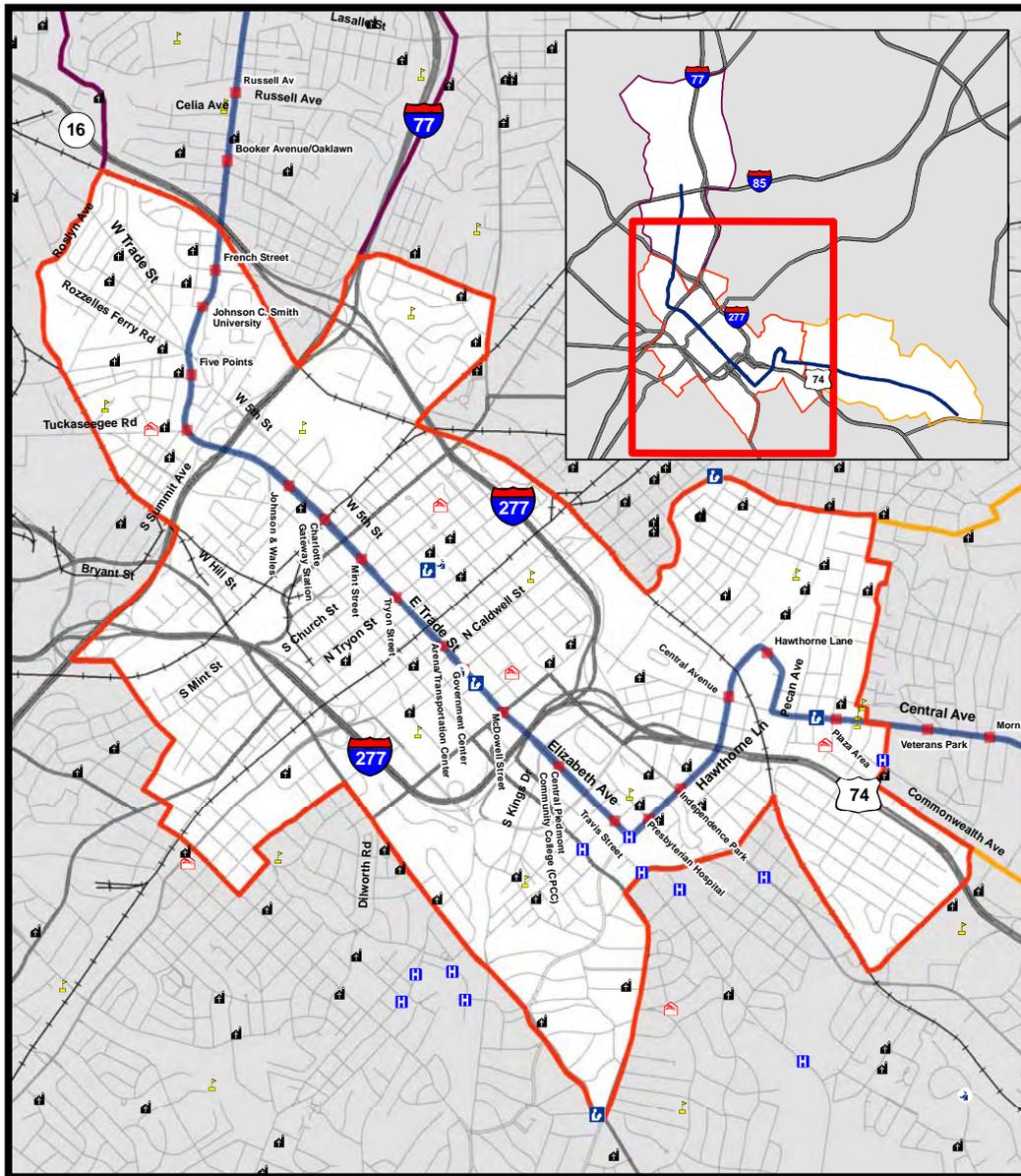
**Table 3-10: Community Facilities (Cont.)**

<b>Police Stations</b>	
Charlie-2	3024 Eastway Drive
David-2	601 E. Trade Street
David-1	119 E. 7th Street
<b>Fire/Medic Stations</b>	
Fire Station 1	221 N. Myers Street
Fire Station 4	525 N. Church Street
Fire Station 5	224 Tuckaseegee Road
Fire Station 8	1201 The Plaza
Fire Station 18	2337 Keller Avenue
<b>Hospitals</b>	
US Army Hospital	1330 Westover Street
Presbyterian Hospital	200 Hawthorne Lane
Presbyterian Specialty Hospital	1600 E. Third Street
Presbyterian Orthopedic Hospital	1901 Randolph Road
<b>Libraries</b>	
Main Library	310 N. Tryon Street
Beatties Ford Road Branch	2412 Beatties Ford Road
Law & Government Library	700 E. Trade Street
North Branch	2324 LaSalle Street
Plaza Midwood Branch	1623 Central Avenue
<b>Parks, Greenways, and Recreation Centers</b>	
Alexander Park	739 E. 12th Street
Aquatic Center	800 E. 2nd Street
Biddleville Park	500 Andrill Terrace
Chantilly Park	222 Wyanoke Avenue
Colonial Park	219 Providence Road
Evergreen Nature Preserve	No Address
Five Points Park	200 French Street
Fourth Ward Park	301 N. Poplar Street
Frazier Park	1200 W. 4th Street Ext
First Ward Center	610 E. 7th Street
First Ward Park	301 N. McDowell Street
Grady Cole Center	310 N. Kings Drive
Hawthorne Center	345 Hawthorne Lane
Independence Park	300 Hawthorne Lane
Irwin Center	329 N. Irwin Avenue
Johnson C. Smith University Track	100 Beatties Ford Road
Kilborne District Park	2600 Kilborne Drive
L.C. Coleman Park	1501 McDonald Street

**Table 3-10: Community Facilities (Cont.)**

<b>Parks, Greenways, and Recreation Centers (continued)</b>	
Lincoln Heights Park	No Address
Little Peoples Park	1120 Harrill Street
Memorial Stadium	310 N. Kings Drive
Merry Oaks Center	No Address
Ninth Street Park	417 W. 9th Street
Phillip O. Berry Recreation Center	440 Tuckaseegee Road
Progress Park	1301 Parkwood Avenue
Staff Annex	1418 Armory Drive
Staff Office	1900 Park Drive
St Mary's Chapel	1129 E. 3rd Street
St Paul's Ray of Hope Center	1401 Allen Street
Thompson Park	1129 E. 3rd Street
Third Ward Park	1001 W. 4th Street
Veterans Park	2136 Central Avenue
Waddell Street Park	1505 Waddell Street
West Charlotte Center	2401 Kendall Drive
West Charlotte Park	2401 Kendall Drive
Ray's Splash Planet	215 N. Sycamore Street
Charlotte Country Club	2465 Mecklenburg Avenue
Center City Branch – YMCA	301 S. College Street

**Figure 3-25: Community Facilities in the Study Area (Center City)**



<b>Legend</b>	<b>Sub-Areas</b>	<b>Community Facilities</b>			
	<ul style="list-style-type: none"> <li><span style="color: purple;">—</span> Beatties Ford</li> <li><span style="color: red;">—</span> Uptown</li> <li><span style="color: orange;">—</span> Central Avenue</li> </ul>	<ul style="list-style-type: none"> <li> Schools</li> <li> Library</li> <li> Church</li> </ul>	<ul style="list-style-type: none"> <li> Fire Stations</li> <li> Police Stations</li> <li> Hospitals</li> </ul>	 	
	<ul style="list-style-type: none"> <li> Streetcar Stops</li> <li><span style="color: blue;">—</span> Streetcar Alignment</li> </ul>				

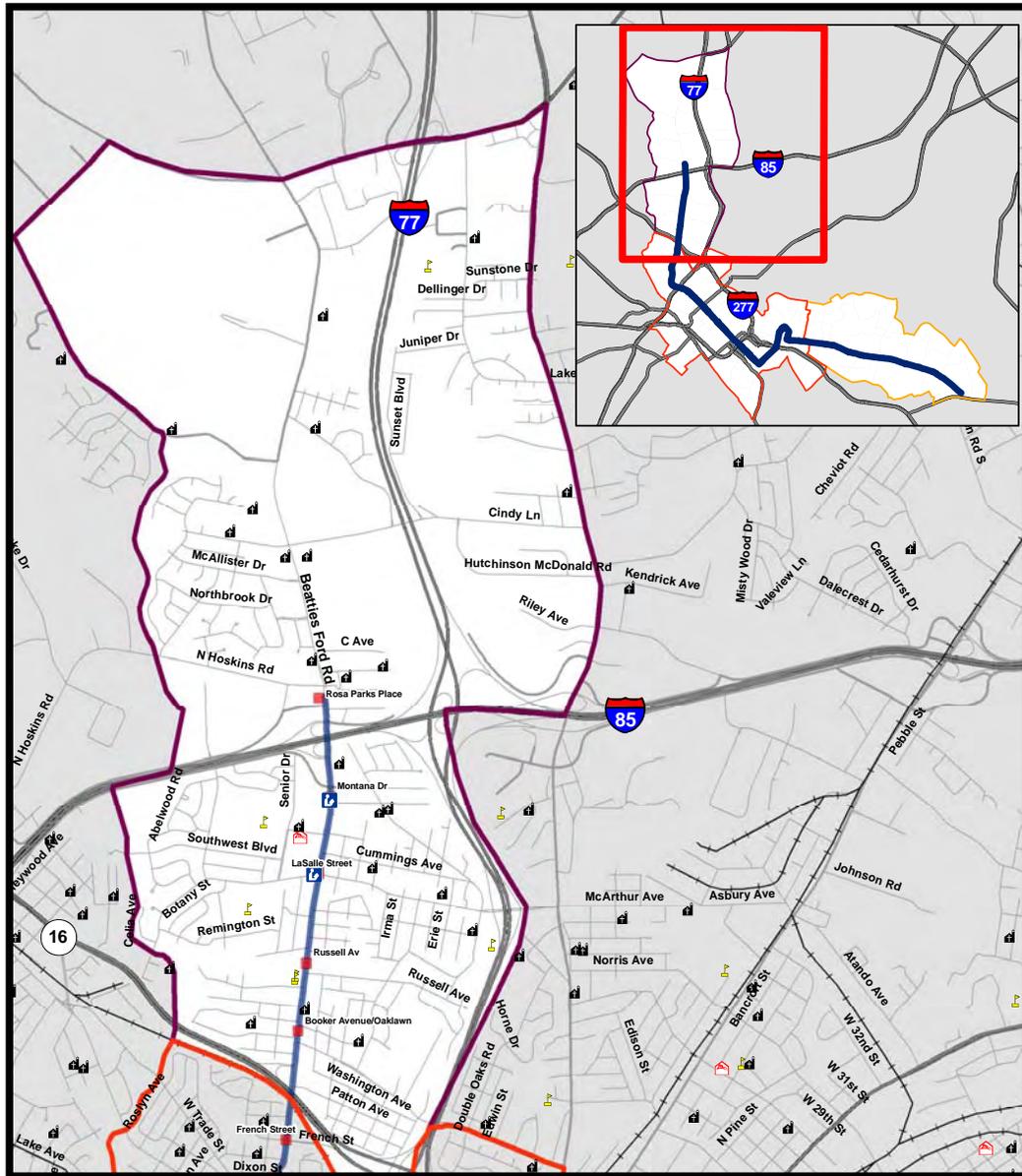


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**UPTOWN COMMUNITY FACILITIES**

Map Data Sources: Mecklenburg County, NC;  
 and URS Corporation  
 Date: July 2006

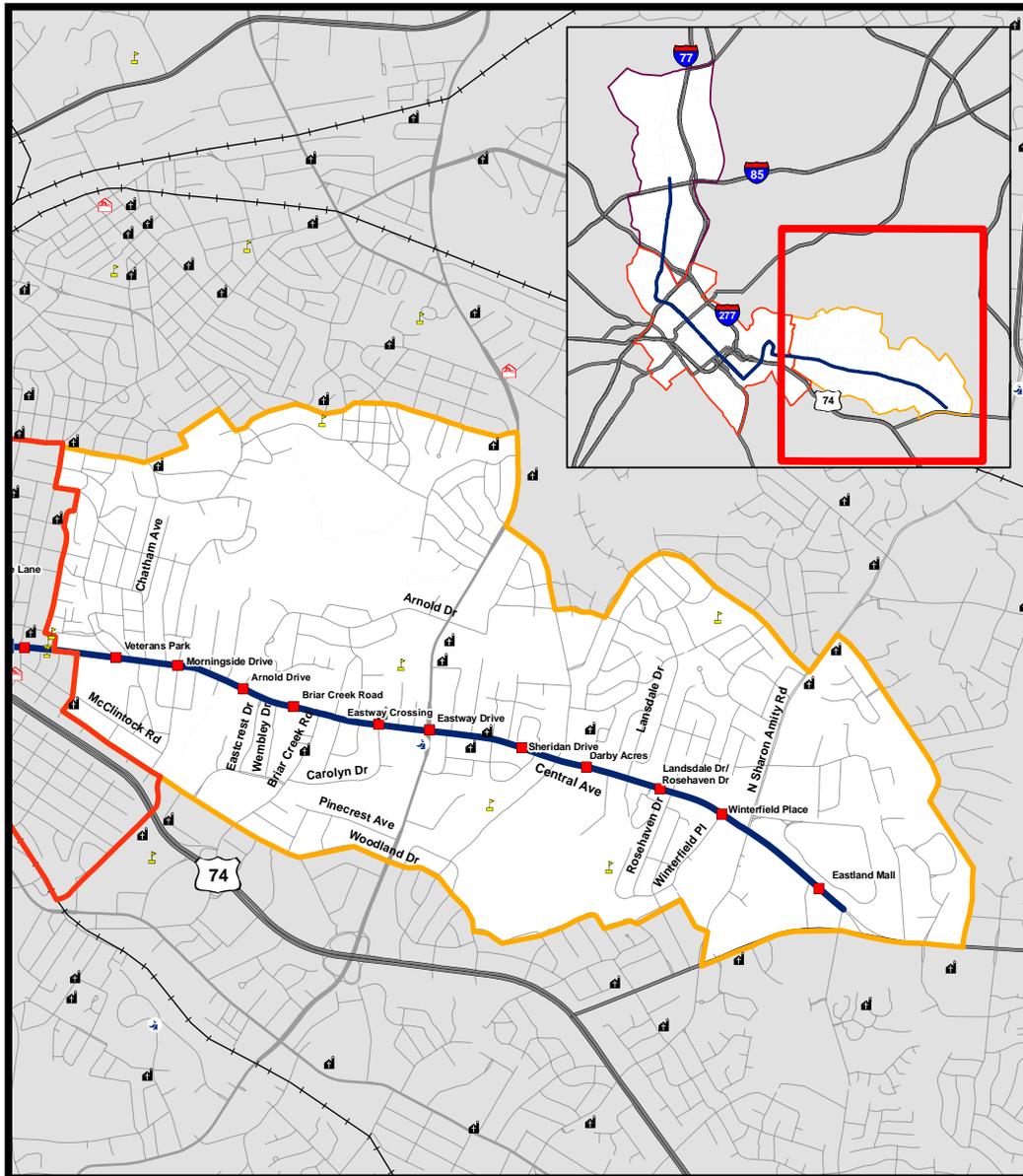
**Figure 3-26: Community Facilities in the Study Area (Beatties Ford Road)**



<b>Legend</b> Streetcar Stops Streetcar Alignment	<b>Sub-Areas</b> Beatties Ford Uptown Central Avenue	<b>Community Facilities</b> Schools Library Church Fire Stations Police Stations Hospitals	 
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 	Figure No.:	Page No.:	<b>BEATTIES FORD COMMUNITY FACILITIES</b> Map Data Sources: Mecklenburg County, NC; and URS Corporation Date: July 2006

**Figure 3-27: Community Facilities in the Study Area (Central Avenue)**



<b>Legend</b>	<b>Sub-Areas</b>	<b>Community Facilities</b>	
	<ul style="list-style-type: none"> <li><span style="color: purple;">■</span> Beatties Ford</li> <li><span style="color: red;">■</span> Uptown</li> <li><span style="color: yellow;">■</span> Central Avenue</li> </ul>	<ul style="list-style-type: none"> <li> Schools</li> <li> Library</li> <li> Church</li> <li> Fire Stations</li> <li> Police Stations</li> <li> Hospitals</li> </ul>	

 	Figure No.:	Page No.:	<h3>CENTRAL AVENUE COMMUNITY FACILITIES</h3> <p>Map Data Sources: Mecklenburg County, NC;              and URS Corporation              Date: July 2006</p>
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### **3.4.4 Environmental Impacts and Benefits**

In the following sections, potential impacts on residential neighborhoods and community facilities in the study area are addressed. The types of impacts assessed include:

- Disruption of community cohesion and the physical division of a neighborhood,
- Reduction of access to neighborhoods and community facilities,
- Alteration of neighborhood character,
- Interruption of service areas to community facilities, and
- Enhancement of mobility and connectivity.

#### **3.4.4.1 Short-Term Impacts and Benefits**

##### **No-Build and TSM Alternatives**

The No-Build and TSM alternatives would have no short-term impacts or benefits to neighborhoods or community services. Under these alternatives, no disruption would occur from streetcar construction.

##### **Build Alternative**

###### **Neighborhoods**

Short-term impacts to neighborhoods would result from construction of the project. Impacts would generally consist of temporary alteration of neighborhood access, traffic detours, and increased day-time disturbance from construction activities. While every effort will be made to maintain existing access routes and travel patterns, at times temporary alteration may be necessary. Short-term impacts from project construction are not anticipated to be substantially adverse. Potential negative effects would be minimized by implementing a rolling construction method that would affect small segments of the project corridor at one time rather than constructing the project all at once and having widespread project effects. This method would limit the duration of construction activity at any one location, thereby minimizing disturbance of neighborhoods.

Overall, neighborhoods along the project corridor would not likely experience short-term benefits from construction of the project.

###### **Community Services**

The short-term impacts to community services would be similar to those described for neighborhoods. Access to community facilities and services would be maintained throughout the construction process; however, access routes could be temporarily altered during construction. Some delays in emergency response times could be experienced from temporary changes in travel patterns. With implementation of the rolling construction method described above, any delays in emergency response would be temporary and are not likely to be substantial.

Overall, community services would not likely experience short-term benefits from construction of the project.

### 3.4.4.2 Long-term Impacts and Benefits

#### **No-Build and TSM Alternatives**

##### Neighborhoods

Over the long-term, neighborhoods along the project corridor would generally not experience adverse impacts to community cohesion, access, or alteration of character from either the No-Build or TSM alternatives. While bus service headways would be decreased to match demand in the future, no substantial long-term benefits are anticipated from either alternative.

##### Community Services

Community service facilities and access to these services would not be adversely affected by the No-Build or TSM alternatives. While bus service headways would be decreased to match demand, provision of and access to community services would generally remain unchanged from the existing condition. No substantial long-term benefits are anticipated from either alternative.

#### **Build Alternative**

##### Neighborhoods

Over the long-term, neighborhoods along the project corridor would generally not experience direct adverse impacts to community cohesion, access, or alteration of character from the streetcar project. Long-term benefits associated with this alternative include provision of a state-of-the-industry alternative mode of transportation and enhanced transit service to neighborhoods along the project corridor. As indicated in Table 3-9, many of these neighborhoods have a low, or degraded, overall quality of life index. Provision of a modernized, high-quality transit system would enhance transportation between neighborhoods, educational facilities, and employment centers.

The streetcar project would support transit oriented development and redevelopment activities within the project corridor. Transit-oriented development results in pedestrian friendly neighborhoods and land uses that encourage the use of neighborhood businesses. This type of interactive neighborhood, as opposed to vehicle oriented communities, encourages neighbors to interact with each other and build stronger ties to the community. They can also contribute to the ability for residents to live closer to where they work. Results of a research study on walkable neighborhoods found that, "residents living in walkable, mixed-use neighborhoods are more likely to know their neighbors, to participate politically, to trust others, and to be involved socially."<sup>27</sup>

Community cohesion could be impacted by an influx of new residents that will bring about socioeconomic changes to the neighborhoods. The ability of newcomers to neighborhoods to mesh and build ties with the "old timers" could be difficult because these groups may have different life experiences and expectations for the community.

Other development activities within the project area combined with the streetcar project could have cumulative effects on neighborhoods and communities within the project corridor. A combined induced effect of these development activities could be an increased demand for property proximal to the central business district. The increased demand, in turn, could create a rise in property values which could create a change in the character of the neighborhood. Increases in rents and property taxes could push vulnerable elements of the population (e.g., low-income residents, students, and seniors on fixed incomes) out of the study area. The cumulative impact of this would be a loss of

a sense of community among existing residents who have historical ties to the neighborhoods along the corridor. On the other hand, the potential effect of increased property values can also be considered as a beneficial secondary or cumulative effect that could improve the overall quality of life index of certain neighborhoods along the study corridor. Additionally, the City of Charlotte's Neighborhood Development Housing Services provides a variety of programs that help residents deal with affordable housing issues. These services include financing for affordable housing, housing subsidies, counseling programs, and administering federal and local funding programs related to affordable housing.

#### Community Services

Community service facilities and access to these services would not be adversely affected by the streetcar project. Long-term benefits associated with the streetcar project include provision of a state-of-the-industry alternative mode of transportation and enhanced access to community services located throughout the project corridor.

Adverse secondary and cumulative effects on community facilities and services within the study area are unlikely. Likely secondary effects are increased patronage of services induced from improved access to community resources throughout the study corridor.

### **3.4.5 Mitigation**

#### **3.4.5.1 No-Build or TSM Alternatives**

No impacts would occur to neighborhoods or community services and mitigation is not required.

#### **3.4.5.2 Build Alternative**

The impacts anticipated from the streetcar project on neighborhoods and community services do not warrant a need for mitigation. Potential short-term impacts would be minimized through implementation of a rolling construction method that would affect small segments of the project corridor at one time rather than constructing the project all at once and having widespread project effects.

### **3.5 VISUAL AND AESTHETIC**

Transportation improvement projects can have varying degrees of visual and aesthetic impacts on the surrounding environment. In this chapter the visual and aesthetic characteristics of the Center City Streetcar Corridor and the visual and aesthetic effects of each alternative are discussed.

#### **3.5.1 Legal and Regulatory Framework**

The legal and regulatory framework for considering visual and aesthetics is based on policy and regulations outlined in the Department of Transportation Act of 1966; the Historic Preservation Act of 1966, Section 106; and the National Environmental Policy Act of 1969. These regulations each have broad guidelines that include the consideration of visual and aesthetic impacts to projects that are either federal projects or those that use federal funds.

##### **3.5.1.1 Department of Transportation Act of 1966, Section 4(f)**

(a) It is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

(b) The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities.

(c) The Secretary may approve a transportation program or project (other than any project for a park road or parkway under Section 204 of Title 23 USDOT) requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if—

(1) there is no prudent and feasible alternative to using that land; and

(2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.<sup>28</sup>

#### 3.5.1.2 Historic Preservation Act of 1966, Section 106

The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking.<sup>29</sup>

#### 3.5.1.3 National Environmental Policy Act of 1969, Title I

The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.<sup>30</sup>

### 3.5.2 Method

The visual and aesthetic analysis follows the method outlined by the US Department of Transportation and Federal Highway Administration Office of Environmental Policy in the report, *Visual Impact Assessment of Highway Projects*.<sup>31</sup> The five steps in the assessment process are (1) identification of components of the project that may have a significant effect on project appearances, (2) description of the visual environment of the project, (3) identification of significant visual resources, (4) determination of the response and values of viewers, and (5) summarization of major visual effects and how to manage those impacts.

A general overview of the visual environment of the study area is provided in Section 3.5.3, Existing Conditions and Resources. The visual impacts associated with the No-Build Alternative, the Transportation Systems Management (TSM) Alternative, and the Build Alternative are described in Section 3.5.4. The mitigation needed for the identified environmental impacts is described in Section 3.5.5, Mitigation.

### 3.5.3 Existing Conditions and Resources

In order to form a baseline to assess the potential impacts of each alternative, a field survey was conducted to document the aesthetic and visual qualities near and along the streetcar alignment. Visual qualities are described in this section for visual districts, or portions of the sub-area generally identified using cross-streets. Descriptions are provided beginning in the northern extent of the Beatties Ford Road sub-area and moving south.

#### 3.5.3.1 Visual Districts

##### Beatties Ford Road Sub-area

###### Griers Grove Road/Cindy Lane to Interstate 85

North of Interstate 85, the commercial buildings are scattered. There are also a few scattered single-family homes and some open space. There are quite a few trees, although they seem to occur naturally and are not planted in an orderly fashion, with the exception of a planted median after Hoskins Road. The road seems expansive in this area. A large church and a construction site for a new large church stand out.



Beatties Ford Road near I-85 and Cindy Lane

###### Interstate 85 to Keller Avenue

Around I-85, the main visual feature is the road itself. Beatties Ford Road widens and there are views of exit and entrance ramps. Passing over the I-85 there are views of the interstate itself. Commercial buildings are replaced by trees surrounding the interchange.



I-85 at Beatties Ford Rd

Keller Avenue to St. Luke Street

Beyond St. Luke Street there is a transition area that causes the utilities to stand out. Approaching LaSalle Street, there is a heavy concentration of billboards and commercial buildings, mostly single-story in strip developments. A large church with a tall steeple and surrounding black iron fence is also a visual feature.



Beatties Ford Road at Keller Avenue and St. Luke Street

St. Luke Street to St. Paul Street

In this area, single-family residences front the road, which is four lanes without a median. Utilities are above ground.



Beatties Ford Road near St. Paul Street

St. Paul Street to Renner Street

There are single-family houses converted to commercial use in this area. Several buildings are surrounded by chain link fence. There is a fair amount of trees and the Northwest School of the Arts, a large, multi-story brick and glass building stands out as a visual feature.



Beatties Ford Road near Renner Street

Renner Street to Brookshire Freeway

The road is wider and there is no median in this area. There is a large green open space and tall black iron gate surrounding the sprawling cement building that is the Vest Water Treatment Plant. While the area has a low density, there are a few scattered commercial buildings.



Beatties Ford Road near Brookshire Freeway (Vest Water Works)

Center City Sub-area

Brookshire Freeway to 5th Street/Rozelles Ferry Road

Johnson C. Smith University is located near Dixon Street. The views are described further under the following section, but generally there are plenty of shade trees, multi-story red brick college buildings, unique lighting, a pedestrian bridge and black iron fencing. The road is four lanes with no median. Approaching Brookshire Freeway, a water tower is the main visual feature. There are a few one-story commercial buildings. There are open parcels, but it appears that some will be developed soon. Passing over Brookshire Freeway there is a view of the expansive road below, railroad tracks and trees.



Beatties Ford Road between Brookshire Freeway and Johnson C Smith University

### 5<sup>th</sup> Street/Rozelles Ferry Road to Bruns Avenue

Near the intersection of 5<sup>th</sup> Street and Trade Street, the entrance to Johnson C. Smith University is the dominating feature. The area surrounding the university is characterized by an arched stone entryway, well-manicured landscaping, detailed brick-work in the sidewalk, and a black iron gate with coordinated street lighting. Other visual features in the area are a pedestrian bridge near the university and a small greenspace with a colorful raised flower-bed, mature trees and sidewalks. These features stand out from the surrounding area; which is characterized by more narrow sidewalks, low-rise buildings and standard street lighting. Heading away from 5<sup>th</sup> Street toward Bruns Avenue, there is the first glimpse of high-rises in the skyline. There are some overgrown grassy areas and buildings are somewhat dilapidated and sparse, but there are also some signs of redevelopment. This stretch of Trade Street is four-lanes with no median. There are some street trees, sidewalks on both sides of the road, and above-ground utilities.



Beatties Ford Road near Johnson C Smith University

Bruns Avenue to Wesley Heights Way

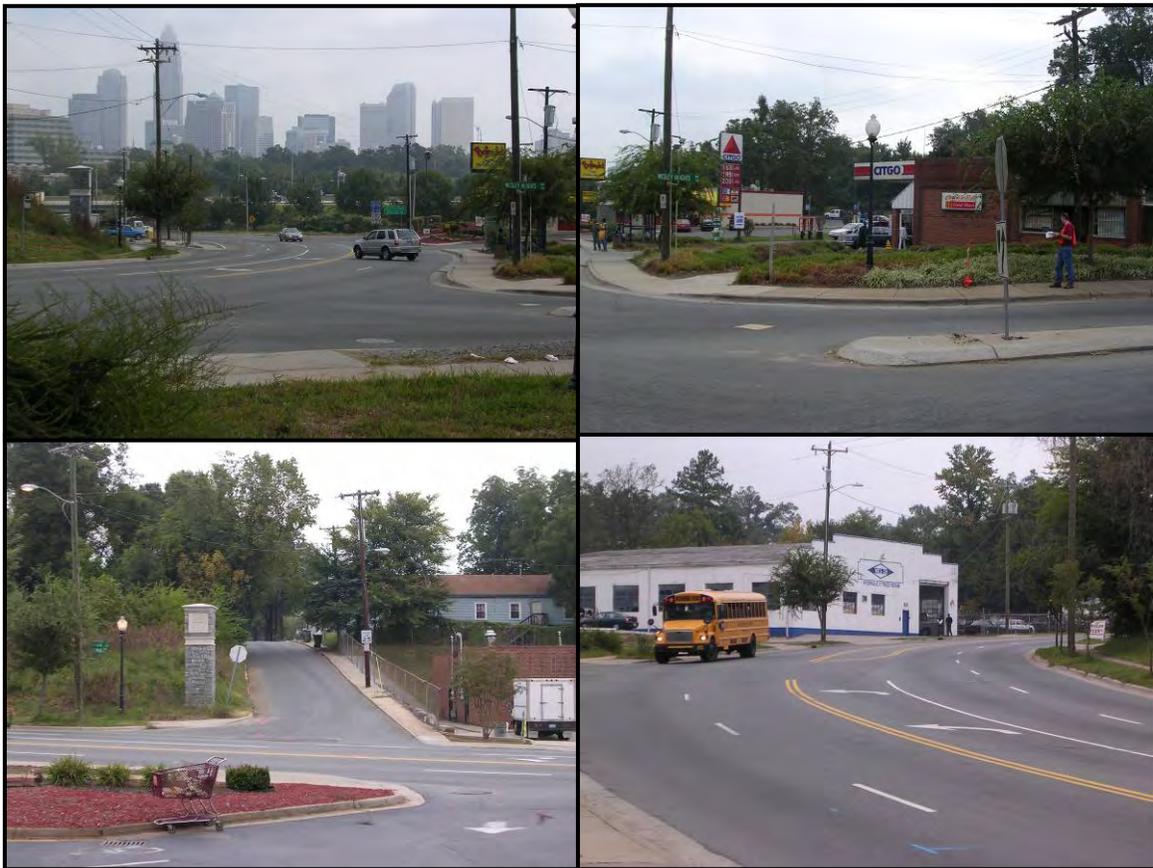
While landscaping is not organized, this stretch of Trade Street is characterized by a fair scattering of mature trees. There are several gas stations and some low-end commercial buildings as well as expansive surface parking lots. There are also stretches of chain-link fence, giving the area a general look as if it is in need of care. Toward Wesley Heights Way, several low-rise buildings are occupied by industrial uses such as auto service shops. This stretch of Trade Street has sidewalks, is four lanes with no median and utilities are above-ground.



Trade Street near Wesley Heights Way

Wesley Heights Way to Frazier Avenue

The first good view of high-rises in the skyline is afforded at Wesley Heights Way. This area is characterized by commercial uses such as gas stations and fast food restaurants in low-rise buildings in the foreground with mature trees in the background. Features include a view of high-rises in the skyline and two small stone towers marking the entryway to the West End historic district and neighborhood. This stretch of Trade Street is four lanes or four lanes with a center turn lane in some places. There are sidewalks, there is no median, and utilities are above-ground.



Trade Street near Frazier Avenue

Frazier Avenue to Interstate 77 to Johnson and Wales Way

In this area there is a transition to slightly increased density of buildings and a feeling as though one is entering the city. Near I-77, views are auto-centered with ramps for I-77 and the I-77 overpass. There are low-rise buildings with light-industrial uses transitioning to a close-view of mid-rises. While there is no median and no landscaped barrier between the road and sidewalks, there are some landscaped areas surrounding the interchange. This stretch of Trade Street is four lanes with a center turn lane. Approaching Johnson and Wales Way there are mid-rises and a view of high-rises. While there are fewer trees, they are more orderly. Trade Street is five lanes and six lanes in some places with no median, creating a view of an expansive roadway. There are sidewalks with street trees between the sidewalk and the street.



Trade Street at I-77

Johnson and Wales Way to Irwin Avenue to Cedar Street

This area is the entry into the city, which is clearly indicated by “Welcome to Uptown” signs. There is a view of mid-rises transitioning to high-rises. There is a well-defined streetscape and pedscape with a landscaped median with flowers and trees, and a landscaped buffer with street trees and unique street lighting between the road and the sidewalk. Sidewalks are wide with some detailed brick work. There is homogeneity among buildings that are part of Gateway Village and Johnson and Wales University. The buildings are mostly cement and glass with some interesting detail work around doors and windows, as well as some coordinated awnings. While buildings are densely spaced, there is a greenspace between two buildings with a terraced flower garden, water feature and benches. Utilities are buried so they do not interfere with the orderly view. Trade Street is four lanes, but there is on-street parking. Combined with the density and height of buildings, landscaping and trees, the area has an enclosed urban feel.



Trade Street at Gateway

### Cedar Street to Graham Street

This area is somewhat less orderly and homogenous. Utilities are above-ground and are standard in nature with large telephone style poles. A large church surrounded by open space as well as surface parking lots provide a less dense, more open feel. Street trees are more mature and there is a median with plantings but there is no detailed brick work to provide added interest in the streetscape. There are some sidewalk cafes, a view of the overpass and high-rises, as well as a view of the Bank of America football stadium down Graham Street. Some of the buildings are older and appear to be in need of, or are undergoing, repair. There is also a standalone concentration of new commercial development, including a restaurant with a rooftop patio.



Trade Street between Cedar Street and Graham Street

Graham Street to Pine Street to Church Street

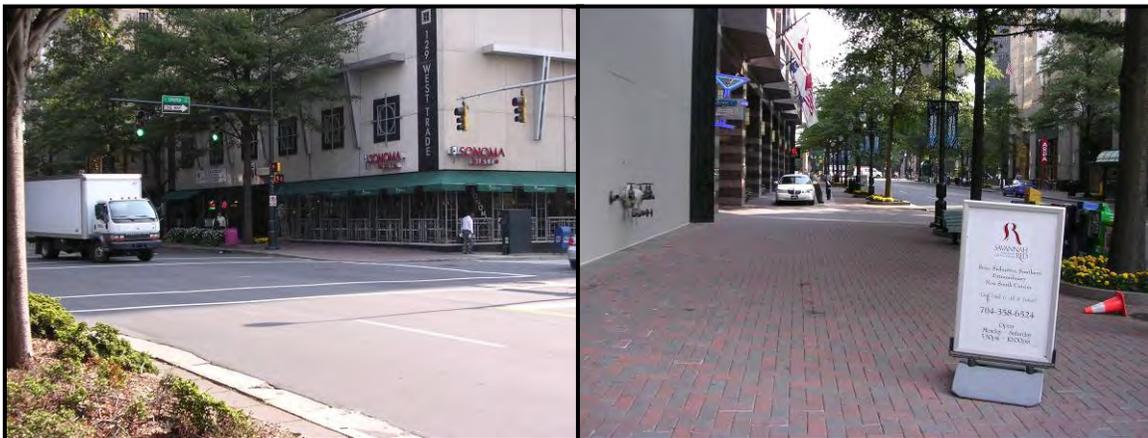
In this area there is a transition back into mid-rises and government buildings and eventually into some high-rise buildings. There are barriers on the street in front of government buildings. Landscaping is well-manicured and there is public art in planted medians. Utilities are underground, but lighting is standard. There is an overpass bridge for a railroad crossing.



Trade Street between Graham Street and Church Street

### Church Street to Tryon Street

Several features give this area a homogenous aesthetic. Awnings are used on several buildings, giving a street-level appeal to the high-rises. There is use of brick inlays in sidewalks and flower boxes around street trees. Matching black traffic signals, unique black street lighting and black iron trash receptacles give the area a coordinated look.



Trade Street near Tryon Street

### Tryon Street to College Street

The distinct feature in this section is public art – several large statues dot the area. Other features are several enclosed pedestrian bridges and a terraced water feature. There is a continuation of detailed brick work in sidewalks, and use of coordinated black traffic signals and street lighting, blending this section with the area from Church Street to Tryon Street. While there is no planted median, planted flower beds surround street trees. There are also several benches.



Trade Street near Tryon Street

### College Street to Brevard Street

In this area sidewalks are wide, there are street trees, benches and overhead enclosed pedestrian bridges. Lighting is standard but utilities are underground. Features include the NBA sports arena, the Blue Line (LRT) overpass, and the colorful multi-modal center. Construction has begun on the new Epicenter, a large mixed use high-rise development that includes condominiums, a Ritz-Carlton Hotel and retail.



Trade Street near the Charlotte Transit Center

Brevard Street to McDowell Street

The combination of mid- to low-rise buildings and fewer street trees in this area, lends to a less enclosed feeling. While the building density decreases in this area, there are several construction projects underway. Some public art projects, the old Charlotte City Hall and the old Mecklenburg county courthouse stand out as visual features.



Trade Street near the Arena and Government Center

McDowell Street to Kings Street to Independence Boulevard

In the northwestern-most section of this area there is a sense of exiting downtown. There is some open space that is NCDOT property, the overpass dominates the view, there are no medians, no on-street parking and above-ground utilities.

Where Trade Street becomes Elizabeth Avenue there are several low-rise community college buildings. The area appears to be in transition as there are signs of construction everywhere, including unfinished buildings, temporary fencing, and scaffolding. Utilities are above-ground and appear to be disproportionately massive. There is no median and no street trees, but there is some greenspace. There are some mature trees and raised-bed landscaping around some buildings, but overall the area appears to be disorganized. Pedestrian activity and a view of high-rises in the skyline are other visual features of this area.



Elizabeth Avenue near Kings Drive

Independence Boulevard to Hawthorne Lane

There is an increase in the amount of trees in this area. The red-brick building of Presbyterian Hospital and surrounding landscaping are the dominating features.



Elizabeth Avenue near Presbyterian Hospital

Along Hawthorne Lane

At Hawthorne Lane and Elizabeth Avenue, the large red brick buildings of the Presbyterian Hospital complex dominate the viewshed. The area is surrounded by large shade trees. Utilities are above ground and the road is four lanes with no median. Moving toward Central Avenue, the greenspace of Independence Park is the visual feature. Past the park there are mostly one and two story buildings in a low-density pattern. There are some surface parking lots. There is an absence of billboards, and, while there are a few commercial signs, they are discrete. Approaching Central Avenue, the I-74 overpass is the dominating visual feature. Buildings transition into low-rise, multi-family housing.



Hawthorne Lane near Presbyterian Hospital

**Central Avenue Sub-area**

**Pecan Avenue to Nandina Street**

Between Pecan Avenue and Thomas Avenue on Central Avenue there is some brick-work in the sidewalks. There is a row of commercial store fronts and a mix of unique and standard lighting. There is some public artwork at the intersection of Central and Thomas avenues. Toward The Plaza, there is a continuation of some of the unique features of the previous block, but buildings become more disjointed. In the vicinity of Nandina Street, the brick and glass multi-story building of the public library stands out as a visual feature. While utilities are still above ground, an increase in street trees and unique lighting masks them from view.



Central Avenue at Plaza

**Nandina Street to Masonic Drive**

In this area there are scattered, disjointed buildings for commercial use. There is an increase in surface parking lots and there is less landscaping. Sidewalks are cement, without brick detail. Overall there is a less organized appearance. Veteran's Park is a visual feature in the vicinity of Landis Avenue.



Central Avenue near Masonic Drive

Masonic Drive to Cyrus Drive

Between Masonic and Cyrus drives, there is a decrease in commercial buildings and billboards, which are replaced by multi-family housing removed from the road-fronting parcels. While above-ground utilities still stand out in the view, there is an increase in trees and landscaping. There is a raised median and there are street trees between the road and sidewalk. In several areas there is a brick retaining wall between the sidewalk and fronting properties.



Central Avenue between Masonic Drive and Cyrus Drive

Cyrus Drive to Medallion Drive

Between Cyrus and Eastway Drives on this portion of Central Avenue, there is an increase in commercial buildings with businesses fronting the road. There are fewer street trees and above-ground utilities dominate the view. Beyond Eastway Drive there is a return to residential buildings. There is no barrier between the sidewalk and road but there is a raised grassy median. There is an increase in the number of trees, but they are not planted in an orderly fashion.



Central Avenue between Cyrus Drive and Medallion Drive

### Medallion Drive to North Sharon Amity Road

Strip commercial establishments dominate this area. There are very few trees around the street. Near North Sharon Amity Road, the six-lane portion of Central Avenue and sprawling boxes of Eastland Mall dominate the viewshed.



Central Avenue near Eastland Mall

#### 3.5.3.2 Visually Sensitive Resources

There are historic resources in the vicinity of the streetcar. These resources and potential visual impacts to these resources are addressed in Section 3.11, Historic, Archaeological, and Cultural Impacts. Other visually sensitive resources are concentrated in the Center City sub-area 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 greenspace of Independence Park along Hawthorne Lane in the Central Avenue sub-area is another visually sensitive resource.

#### 3.5.4 Environmental Impacts and Benefits

##### 3.5.4.1 Long-term Impacts and Benefits

#### No-Build and TSM Alternatives

If the No-Build or the TSM Alternative were selected, the existing conditions described in the previous section would remain and there would be no long-term impact.

#### Build Alternative

In the following sections, the potential visual impacts that would occur as a result of building and operating the Build Alternative are analyzed. In general, the Center City Streetcar 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, which is within existing road right-of-way through an urban area. 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, vacant areas, parking lots and parkland and some public art.

The specific impacts associated with the overhead catenary system, platforms, vehicle maintenance facility and substations at the corridor level are described in the remainder of this section.

### Overhead Catenary System

The streetcar would be electrically powered by an overhead catenary system (OCS) that requires the placement of poles along the streetcar alignment to support overhead wires. Depending on its design and the surroundings, an OCS can have an intrusive impact to the surrounding visual environment. The presence of these wires and poles would have less of a visual impact in areas where utilities are above-ground. In areas where utilities are buried, such as between Johnson and Wales Way to Cedar Street and from Graham Street to Pine Street to Church Street in the Center City sub-area, the OCS would be a more noticeable change. The OCS will also have less of a visual impact in areas where there are surrounding high-rise buildings that are proportional to the height of the poles and wires, such as in the Center City sub-area. Most of the visually sensitive resources are concentrated in this sub-area and the high-rises will minimize the visual impact of the OCS. In portions of the Beatties Ford Road and Central Avenue sub-areas where buildings are less dense and not as high, the OCS will stand out. Several examples of OCS are shown in Figure 3-28. Methods that can be used to mitigate the negative visual impact of the OCS are described in Section 3.5.5.

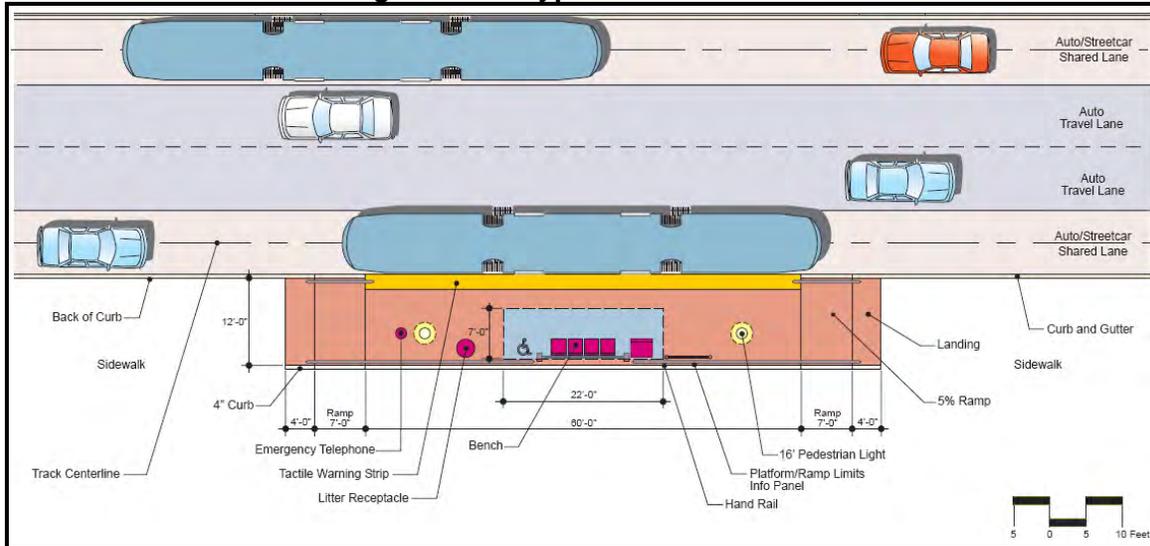
**Figure 3-28: Examples of Overhead Catenary Systems**



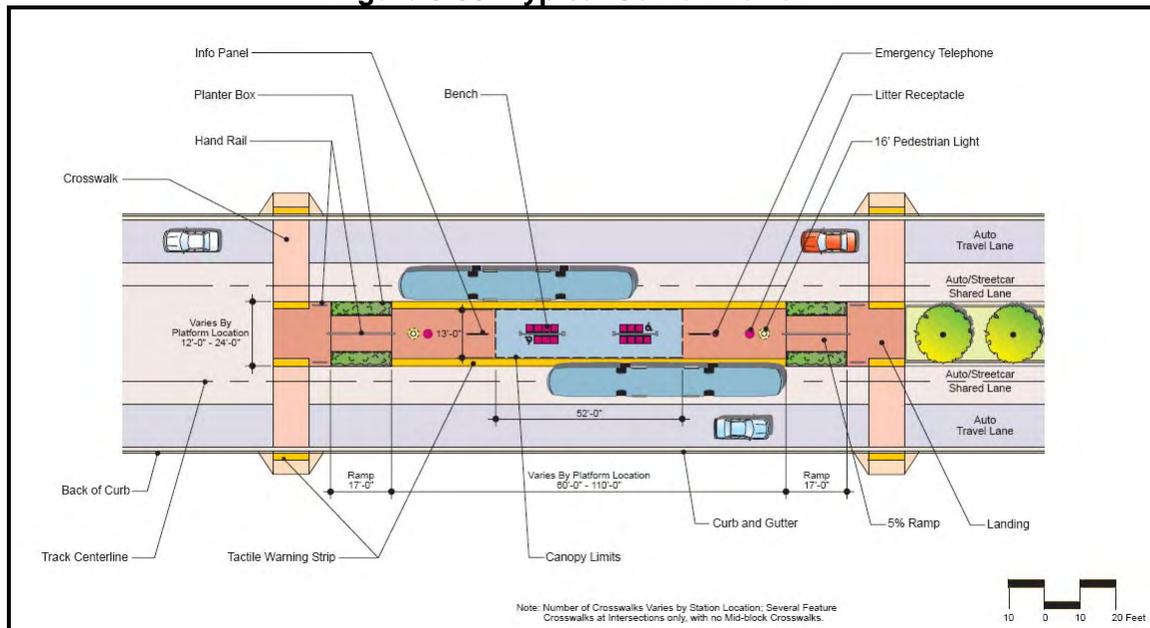
**Platforms**

Two concepts have been designed for platforms, or streetcar stops. The side platform would be 60 feet long and 12 feet wide. The design of a typical side platform is shown in Figure 3-29. The median platform would be between 60 to 110 feet long and between 12 and 24 feet wide. The design of a typical center platform is shown in Figure 3-30. Streetcar platforms appear similar to bus stops and generally fit into the urban and transportation oriented land uses surrounding the streetcar alignment. While platforms will change the visual environment along the streetcar alignment, they are not expected to have a substantial negative impact.

**Figure 3-29: Typical Side Platform**



**Figure 3-30: Typical Center Platform**



Note: Number of Crosswalks Varies by Station Location. Several Feature Crosswalks at Intersections only, with no Mid-block Crosswalks.

### Vehicle Maintenance Facility

Two potential sites have been identified for the vehicle maintenance facility (VMF). One site would be located on the border of the Beatties Ford Road and Center City sub-areas, between Beatties Ford Road, French Street and the CSX Railroad (see Figure 3-31). An alternative second site would be located on the border of the Center City and Central Avenue sub-areas between Hawthorne Lane, Clement Avenue, just north of the CSX Railroad on the Barnhardt Manufacturing facility (see Figure 3-32).

**Figure 3-31: Beatties Ford Road Vehicle Maintenance Facility**



Views around the Beatties Ford Road site (Figure 3-31) are mainly of vacant, commercial, and office land uses. However, there are also residential land uses adjacent to this site. The site is currently being used as a pipe storage facility by the Charlotte/Mecklenburg Utilities Department. The transition to the industrial, clad-brick building and tracks associated with the VMF, as well as lighting associated with a 24-hour-per-day operation would present a minimal negative visual impact to these residences because of the significant grade change between the VMF and the adjacent land uses. The zoning of the parcels composing the site are for general industrial and general business uses, would be consistent with the intended use.

Views around the Barnhardt Manufacturing facility (Figure 3-32) are mainly of industrial, commercial and vacant land uses, which are consistent with the clad brick, industrial building and tracks associated with the VMF. However, there are some single-family residential parcels adjacent to this site that would have a view of the VMF and lighting associated with 24 hour-per-day operations at the VMF. While the VMF would cause a minimal negative visual impact to the adjacent homes; the current land use is for a warehouse and zoning is industrial, which is consistent with the VMF.

**Figure 3-32: Barnhardt Manufacturing Facility Vehicle Maintenance Facility**



### Substations

Approximately seventeen electric traction power substations (TPSS) would be located along the alignment to provide electricity to the system. Substations house electric equipment and basically consist of a metal box, with approximate dimensions of 11 feet wide by 20 feet long, by 12 feet tall. Siting of the substations depends on many factors, but can be somewhat flexible to avoid and minimize impacts to visually sensitive resources. In general, substations will present a minimal visual impact to the surrounding environment, as they are generally consistent with the surrounding urban and transportation land uses. Visual impacts, however, are a primary concern regarding effects to historic and cultural resources and are discussed in further detail in Section 3.11, Historic, Archaeological, and Cultural Impacts. Where possible substation will be hidden or disguised from view. Mitigation measures described in Section 3.5.5 will help to minimize the potential for negative impacts.

#### 3.5.4.2 Short-term Impacts and Benefits

In the short-term, construction of the OCS, platforms, VMF and substations associated with the streetcar would disrupt the views surrounding the streetcar alignment and the VMF site. The impact would mainly be a disorderly appearance associated with construction equipment and torn up roads and some sidewalk area to build the streetcar. Impacts would be confined to the immediate construction area, which would take place in phases.

#### 3.5.4.3 Long-term Impacts and Benefits

Altered views associated with the streetcar itself, will be confined to the streetcar corridor. It is expected that the streetcar will support an increase in the density of

development in the study area. Increased density of development would result in a view of more buildings, signs, and lighting associated with urban areas. This is consistent with plans for the study area and is not considered a negative impact.

### **3.5.5 Mitigation**

#### **3.5.5.1 No-Build and TSM Alternatives**

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

#### **3.5.5.2 Build Alternative**

The following section contains measures to mitigate the potential visual impacts that will occur as a result of implementing the Build Alternative.

##### **Mitigation of Short-term Impacts**

The area affected by construction activities would be contained and minimized to the degree possible relative to the safe and practical requirements of the construction process. Construction easements on parcels outside the right-of-way, where required, would be managed to minimize potential visual impacts. Following construction, ground cover, landscaping, or related materials would be utilized, as appropriate, to restore or enhance areas to pre-construction conditions or better.

##### **Mitigation of Long-term Impacts**

###### **Overhead Catenary System**

The most substantial visual impact associated with the Build Alternative will most likely be 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 Catenary Systems* will be used.<sup>32</sup> 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 both for the OCS and street lighting or traffic signals) 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.

###### **Platforms**

The platforms associated with the project will be similar to those used for buses and will not present a substantial visual impact. In order 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 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. Streetcar stop Workshops will be held during final design to elicit input from residents and businesses on the visual design of platforms.

###### **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 at both candidate sites.

###### **Substations**

Visual and aesthetic impacts will be taken into consideration in the siting of the substations. Efforts will be made to locate substations out of view where possible or to blend them into the existing visual environment through landscaping and architectural

treatments. These measures will be used to mask the substations where visual effects are a concern.

### **3.6 AIR QUALITY**

This section documents the potential air quality impacts associated with the No-Build and Build Alternatives with regard to national and state ambient air quality standards. The purpose of the analysis is to estimate the future air quality conditions in the study area without and with the project alternatives, to identify potential effects on regional and local air quality and mitigation measures, and to address conformity with regional air quality implementation plans.

#### **3.6.1 Legal and Regulatory Framework**

##### **3.6.1.1 Clean Air Act**

The Clean Air Act includes a provision to ensure that transportation projects conform to a state's plan for meeting federal air quality standards. The transportation conformity regulations first issued in 1993 provide a detailed process for transportation agencies to demonstrate and ensure that air pollutant emissions from transportation sources are consistent with air quality goals. Transportation projects funded or approved by the Federal Transit Administration (FTA) that are in areas that do not meet air quality standards are subject to conformity requirements.

Federal criteria that determine if a proposed transportation project in a non-attainment area conforms to the applicable State Implementation Plan (SIP) are as follows:

- The project must not cause or contribute to any new violation of any National Ambient Air Quality Standard in the project vicinity;
- The project must not increase the frequency or severity of any existing violation of any National Ambient Air Quality Standard in the project vicinity; and
- The project must not delay timely attainment of any National Ambient Air Quality Standard or any required interim emission reductions or other milestones.

Mecklenburg County does not meet air quality standards for eight-hour ozone and is designated as a maintenance area (meaning it previously did not meet standards) for carbon monoxide. According to guidance issued by the Federal Highway Administration (FHWA), "A conformity determination is a demonstration that the emissions from travel on an area's transportation system are consistent with goals for air quality found in the SIP." Projects must be listed in a transportation plan that has undergone a conformity determination by FHWA and FTA. Additional analysis may be necessary for certain areas, such as maintenance areas for carbon monoxide.<sup>33</sup>

##### **3.6.1.2 Local Plans and Goals**

According to the 2030 LRTP, "Ensuring that transportation sources contribute to attainment of clean air in the Mecklenburg-Union urban area and surrounding counties is one of the highest goals of MUMPO." Mecklenburg County is currently designated as a maintenance area for ozone and carbon monoxide, and compliance with ozone standards is considered a particular challenge. According to the plan, major commitments to improve air quality include the construction of major rapid transit projects, extensive expansion of local and express transit services, the construction of managed lanes, and continued integration of land use and transportation planning.<sup>34</sup> The importance of transit is also stressed in the *Center City 2010 Vision Plan*. According to the plan, "Transit is a major tool because of the emissions generated by each vehicle. One bus can remove up to 40 automobiles from the streets. One train may

remove more than 150 vehicles. Although these shifts do not come easily because of the convenience of the single occupant vehicle, transportation policy must continue to support aggressive transit initiatives.”<sup>35</sup> National and North Carolina air quality standards are listed in Table 3-11.

**Table 3-11: State and National Ambient Air Quality Standards**

Pollutant	Averaging Period	North Carolina Standards	National Standards	
		Primary	Primary	Secondary
<b>Carbon Monoxide (CO)</b>	<b>8 hour</b>	10 mg/m <sup>3</sup> (9 ppm)	10 mg/m <sup>3</sup> (9 ppm)	-
	<b>1 hour</b>	40 mg/m <sup>3</sup> (35 ppm)	40 mg/m <sup>3</sup> (35 ppm)	-
<b>Inhalable Particulates (PM<sub>10</sub>)</b>	<b>24 hour</b>	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	Same as primary
<b>Inhalable Particulates (PM<sub>2.5</sub>)</b>	<b>Annual geometric mean</b>	15 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>	Same as primary
	<b>24 hour</b>	65 µg/m <sup>3</sup>	35 µg/m <sup>3</sup>	Same as primary
<b>Ozone (O<sub>3</sub>)</b>	<b>1 hour</b>	0.08 ppm (160 g/m <sup>3</sup> )	0.12 ppm (235 g/m <sup>3</sup> )	Same as primary
	<b>8-hour</b>	N.A.	0.08 ppm (235 g/m <sup>3</sup> )	Same as primary

Source: Mecklenburg County Air Pollution Control Ordinance: November 15, 2005

### 3.6.2 Method for Regional Air Quality

For the purposes of this analysis, air quality impacts are defined as the incremental change in Year 2030 regional emissions of CO and NOX under the Build Alternative relative to the No-Build Alternative. Furthermore, relative differences in regional pollutant levels among the alternatives are attributed entirely to changes in daily vehicular emissions. Differences in vehicular emissions are a direct function of the change in daily vehicle-miles traveled (VMT) and pollutant emission rates.

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 NOX.
- 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.

### 3.6.3 Environmental Impacts and Benefits

The net reductions in regional VMT for the Build Alternative was derived from ridership forecasts based on ridership results from Spring 2006. Comparing the highway network assignments of the No-Build and Build Alternatives provided an estimate of the reduction in regional VMT due to mode shift. The resulting net VMT reductions were used as the basis of the regional air quality analysis.

Year 2030 emission rates for CO and NOX were estimated using the EPA MOBILE6.2 model with selected parameters adjusted to reflect assumed conditions in the study area. Mobile emission rates were obtained from the North Carolina Department of Environment and Natural Resources, Division of Air Quality.

Table 3-12 summarizes the results of the Year 2030 regional air quality analysis for the No-Build and Build Alternatives. The project includes a TSM alternative; however, at the time of this analysis, the TSM alternative was being revised. The analysis shows the net reduction in regional VMT for the Build Alternative relative to the No-Build Alternatives, along with the estimated pollutant emission factors and the corresponding differences in regional emissions.

**Table 3-12: 2030 Regional Air Quality Impact Analysis and Results**

Project Alternative	Daily VMT Reduction <sup>1</sup> (veh-mi)	Carbon Monoxide (CO)		Nitrogen Oxides (NOx)	
		Emission Factor (g/veh-mi)	Emission Reduction (kg/day)	Emission Factor (g/veh-mi)	Emission Reduction (kg/day)
No-Build	0.00	7.3	0.00	0.7	0.00
TSM <sup>2</sup>	-	7.3	-	0.7	-
Build	119,603	7.3	873.10	0.7	83.72

Source: URS Corp., October 2006

- Notes: 1. Net reduction in VMT relative to the No-Build Alternative.  
 2. TSM Alternative VMT assessment not available during analysis.

### 3.6.4 Mitigation

As the results in Table 3-12 indicate, the Build Alternative is expected to reduce the amount of regional vehicular travel relative to the TSM and No-Build Alternatives. A net reduction in VMT would result in lower emissions of CO, the ozone precursor (NOX) and greenhouse gases. Based upon this analysis the Build Alternative would not have an adverse effect on the regional air quality. Furthermore, by providing an alternative to single-occupant vehicle travel, implementation of the Build Alternative would support the attainment and maintenance of air quality standards in the region.

### 3.6.5 Method for Microscale Air Quality

Vehicular traffic is the most significant source of CO emissions in the region. Because CO emissions dissipate rapidly with increasing distance from the source, the highest concentrations are likely to occur in the vicinity of congested roadway intersections or other locations where motor vehicles tend to idle for a period of time. The local air quality analysis consists of a microscale “hot spot” investigation for potential violations of the ambient air quality standards for CO.

The methodology for identifying potential local air quality impacts follows the EPA-recommended procedure for CO microscale impact analysis. The general evaluation procedure, outlined in the *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (EPA, 1992), includes a multiple intersection screening process, followed by microscale CO analysis with the CAL3QHC line-source dispersion model.

The multiple intersection screening analysis is used to identify study area locations requiring further analysis for CO hot spots. The intersection screening process includes the following steps:

- Identify and rank the top 12 signalized intersections in the study area with LOS D, E, or F by peak hour traffic volumes that are affected by the proposed project.
- From those 12 intersections, select the three highest volume locations and the three highest delay locations for further analysis. The total may be less than six if one or more study area intersections meet both selection criteria.

The selected intersections then are evaluated for each alternative using a microscale analysis procedure. The procedure is used to estimate maximum 1-hour and 8-hour CO concentrations in the vicinity of each intersection for comparison with the NAAQS. It is assumed that if microscale analysis does not identify significant local air quality impacts at the selected intersections, then impacts would be unlikely at any other study area location.

The microscale air quality analysis procedure includes the following steps:

- Assemble the required data for the analysis, including meteorological conditions, site characteristics, traffic parameters, and emission variables.
- Estimate the future background CO concentration based on monitoring data and the expected change in regional emissions.
- Identify receptor locations near the intersection for simulation of future ambient CO concentrations.
- Compute the worst-case 1-hour CO concentration using CAL3QHC.
- Estimate the worst-case 8-hour CO concentration by applying a suitable persistence factor to the computed 1-hour concentration. The use of a persistence factor is intended to reflect the relationship between 1-hour and 8-hour traffic and meteorological conditions.
- Compare the results with the ambient air quality standards to identify adverse impacts, including new or aggravated violations.

### **3.6.6 Environmental Impacts and Benefits**

Based on the traffic analysis conducted for the Center City Streetcar Project, the Build Alternative would affect traffic operations at one signalized intersection. The intersection data is listed in Table 3-13.

**Table 3-13: Intersection Screening Results**

Project Study Area Intersections by Volume	Year 2030 PM Peak Hour Traffic					
	Volume <sup>a</sup>		Delay <sup>b</sup>		LOS <sup>c</sup>	
	No Build	Build	No Build	Build	No Build	Build
Hawthorne Lane & Elizabeth Avenue	2,120	2,120	19.0	37.3	B	D

Source: URS Corp., October 2006

Notes: <sup>a</sup> Year 2030 combined intersection approach volume, in vehicles per hour.

<sup>b</sup> Total delay in seconds per rider in 2030.

<sup>c</sup> Estimated intersection level-of-service based on average delay in 2030.

The microscale modeling process requires a number of parameters and assumptions. The model inputs listed below are consistent with current EPA recommendations, and are intended to represent reasonable worst-case scenarios at the selected intersection.

- Meteorological Characteristics
  - Averaging Time: 60 minutes
  - Surface Roughness: 108 cm
  - Settling Velocity: 0 cm/sec
  - Deposition Velocity: 0 cm/sec
  - Wind Speed: 1.0 m/sec
  - Stability Class: D
  - Mixing Height: 1,000 meters
- Traffic Characteristics
  - Lane configuration, link volume, signal cycle length, red time, and lost time were taken from the Travel Analysis Report, April 2006.
- Site Characteristics
  - Intersection layouts and roadway link coordinates were determined the City of Charlotte design drawings for the future (No-Build) intersection improvements.
- Emission Characteristics
  - Running emission rates at 25 mph and idle emission rates at 2.5 mph were generated with MOBILE6.2, obtained from the North Carolina Department of Environment and Natural Resources, Division of Air Quality. The average free flow speed was assumed to be 25 mph on all roadway links.
  - The EPA-recommended default persistence factor for urban areas of 0.7 was used to estimate 8-hour CO concentrations.

The Year 2030 background CO concentration was estimated using a 2005 monitored level, and factoring to the Year 2030 using the following steps:

Change in Average CO Emission Rates

Average CO emission rates in the region are expected to decrease because of emission controls and turnover in the vehicle fleet. The change in average CO emission rates will tend to decrease background CO concentrations. Average CO emission rates for Year 2005 and Year 2030 were generated using MOBILE6.2, with an average speed of 25 mph. The ratio of the Year 2030 rate to the Year 2005 rate was used to adjust the background CO level.

Change in Annual Traffic Growth

As travel in the region increases, it will tend to increase background CO levels. Based on the EPA Non Attainment Area database, vehicle miles traveled in the Mecklenburg County is expected to grow by 47.3 percent between 2007 and 2030. The resulting value was used to adjust the background CO level.

The computation of the Year 2030 background CO levels is summarized in Table 3-14.

**Table 3-14: Year 2030 Background CO Level Computation**

Factors	Garinger High School	
	1-hour	8-hour
Monitored Background CO Level for 2006	2.3*	1.3
MOBILE6.2 Emission Factor for 2005	16.0	16.0
MOBILE6.2 Emission Factor for 2030	7.3	7.3
Adjustment for Emission Reduction (2005 to 2030)	0.46	0.46
Adjustment for Traffic Growth per year (2005 to 2030)	1.47	1.47
Estimated CO Level for 2030	1.55	0.87

<sup>1</sup>Source: URS Corp October 2006

Notes: \* 2006 air monitoring did not monitor 1-hour levels. As such, a conservative multiplier of 1.8 was applied to the 8 – hour average to determine 1-hour.

Receptors at each intersection were defined where the public is likely to have access and potential long-term exposure to the ambient CO concentrations.

The sidewalk averaging method, recommended by the U.S. EPA, was used for the micro-scale intersections. In this method, the receptors are located along each sidewalk or side of the intersecting streets at approximately 10 meters and 50 meters from the edge of the intersecting roadway. The CO concentration at each of the receptors was modeled. The highest or worst case, average CO concentrations for each receptor site was then calculated. The sidewalk averaging method results in higher predicted CO concentrations than would be expected at nearby receptors. CO concentrations diminish rapidly at greater distances from the sidewalks.

After all the necessary parameters and assumptions had been defined for the selected intersections, the CAL3QHC model was run for the No Build and Build Alternatives. The results of the CO microscale modeling are summarized in Table 3-15. The table shows the highest predicted 1-hour and 8-hour CO concentrations under each of the project alternatives.

**Table 3-15: Year 2021 Maximum Predicted CO Concentrations**

Intersection	Averaging Period	Maximum Concentration (ppm)	Maximum Concentration (ppm)
		No Build Alternative	Build Alternative
Hawthorne Lane & Elizabeth Avenue	1-hour	2.05	2.05
	8-hour	1.22	1.22

Source: URS Corp., October 2006

Notes: 1 hour calculation = Cal3qhc output + background.  
 8-hour calculation = (Cal3qhc output X 0.7) + background  
 The applicable ambient CO standards for the 1-hour and 8-hour averaging periods are 35 ppm and 9 ppm, respectively.

**3.6.7 Mitigation**

As the results in Table 3-15 indicate, no violations of the current CO standards are projected for the project alternatives. There is no difference in emissions output between the No Build and Build Alternatives. This study identified no adverse regional or local air quality impacts associated with the proposed Build Alternative, therefore, no specific mitigation plan is recommended.

**3.6.8 Conformity**

Because the proposed project is located in a non-attainment area for Ozone, federal and state air quality regulations require that a project-level conformity analysis be conducted. A conformity analysis is used to determine if a transportation activity (plan, program, or project) conforms to the purpose of the State Implementation Plan (SIP) of achieving and maintaining the applicable air quality standards. As indicated previously, the criteria for conformity specify that a transportation activity cannot:

- 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.

**3.7 NOISE AND VIBRATION**

**3.7.1 Noise**

**3.7.1.1 Legal and Regulatory Framework**

**City of Charlotte Noise Ordinance**

The City Code of Charlotte, Chapter 15 Offenses and Miscellaneous Provision, Article III Noise, establishes local noise ordinances for sounds impacting residential life, amplified sound, animals, motor vehicles, and permits and enforcement. The following sections apply to the construction and operation of the streetcar project:

Sec. 15-68. Sounds impacting residential life.

- (a) It shall be unlawful to carry on the following activities in any residentially zoned area of the city or within three hundred (300) feet of any residentially occupied structure in any zone of the city:
- (1) Operate a front-end loader for refuse collection between the hours of 9:00 p.m. and 7:00 a.m.

- (2) Operate construction machinery between the hours of 9:00 p.m. and 7:00 a.m.
  - (3) Operate garage machinery between the hours of 9:00 p.m. and 7:00 a.m.
  - (4) Operate lawn mowers and other domestic tools out-of-doors between 9:00 p.m. and 7:00 a.m.
  - (5) Any mechanical noise which registers more than sixty (60) db(A) at the nearest complainant's property line will be probable cause for a violation.
- (b) This section shall not apply to operations which are carried on in such a manner or in such a location as not to create sounds exceeding sixty (60) db(A) and shall not apply to emergency operations designed to protect the public health and safety.

### **Federal Transit Administration Guidelines**

The Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment, April 1995*, (FTA Guidance Manual) guidelines were followed to conduct the noise screening and detailed assessments. The following sections describe noise and the effects of noise on surrounding land uses, as defined in the FTA guidance.

"Noise" is defined as "unwanted sound." Sounds are described as noise if they interfere with an activity or disturb the person hearing them. Sound is measured in a logarithmic unit called a decibel (dB). Since the human ear is more sensitive to middle and high-frequency sounds than it is to low frequency sounds, sound levels are weighted to reflect human perceptions more closely. These "A-weighted" sounds are measured using the decibel unit dBA. Noise that is transmitted through the air is referred to as "airborne noise." Likewise, noise that is transmitted through the ground is referred to as "ground-borne noise". Ground-borne noise is discussed in Section 3.7.2.

Sound levels fluctuate with time depending on the sources of the sound audible at a specific location. In addition, the degree of annoyance associated with certain sounds can vary by time of day, depending on other ambient sounds affecting the listener and the activities of the listener. Because the time-varying fluctuations in sound levels at a fixed location can be quite complex, they typically are reported using statistical or mathematical descriptors that are a function of sound intensity and time. A commonly used descriptor of noise is the  $L_{eq}$ , which represents the equivalent of a steady, unvarying level over a defined period of time containing the same level of sound energy as the time varying noise environment. In areas where sleep activity takes place, the  $L_{dn}$ , which measures an average "day-night" sound, is the most commonly used measure. The  $L_{dn}$  is a 24-hour  $L_{eq}$  average calculated from hourly  $L_{eq}$  measurements, with a 10 dBA added to nighttime levels to account for heightened noise-sensitivity at night.

### **Transit Noise**

Transit noise not only includes noise from moving vehicles, but also supporting services such as maintenance facilities. The perceptible transit noise generated from the proposed streetcar system includes: (1) streetcar operations, and (2) a Vehicle Maintenance Facility (VMF) location. Table 3-16 identifies some of the most common noises generated from streetcar operations. The intensity of the noise event varies due to a number of factors. Examples include the distance of the receiver from the tracks or the station locations, presence of intervening terrain or buildings, and specific train related parameters such as vehicle speed, vehicle length, vehicle equipment (i.e. air conditioning systems) and the type and condition of the running surfaces (i.e. rails and wheels). In addition, the guideway structure can also radiate noise as it vibrates in

response to dynamic loading of the vehicle. Stationary vehicles generate noise as well. Auxiliary equipment, such as cooling fans, radiator fans, and air-conditioning pumps, often continue to run after vehicles have stopped. Because many of these conditions concerning receiver location and streetcar vehicle operation vary throughout the corridor, the noise impacts can be expected to vary.

**Table 3-16: Sources of Transit Noise for Streetcar**

Transit Component	Source of Noise	Comments
Streetcar Vehicle in motion	Wheel rolling on rail	Increases with speed. Depends upon condition of wheels and rails. Can be controlled by regular system maintenance.
	Vehicle propulsion system	Increases somewhat while accelerating and at higher speeds. Can be controlled by vehicle procurement specification. Force ventilated system generally quieter than self-ventilated system when operating on embedded track.
	Auxiliary equipment for vehicle and ventilation	Usually not significant source of noise. Can be controlled by vehicle procurement specification.
	Wheel Squeal	Can occur on tight curves of less than 1000 feet radii. Can be controlled by wheel and rail treatments.
	Special trackwork	Impact noises are when wheels encounter discontinuity in tracks such as rail joints, turnouts, or switches used at crossovers.
	Brakes	Occasional squeal when stopping.
	Horns and whistles	Used infrequently as warning device for pedestrians and at intersections.
Streetcar Vehicle stopped	Auxiliary equipment for vehicle and ventilation	Dominant source for stationary vehicle. Controlled by vehicle procurement specification.
Traction power substation	Transformers	Usually not significant source of noise for Streetcar.

### **Noise Impact Criteria**

FTA's noise impact criteria, shown in Table 3-17, are based on comparing the existing noise levels to future project-related noise levels. The criteria are defined by two curves, which designate different levels of project noise which result in "no impact", "impact", and "severe impact" conditions. According to the FTA Guidance Manual, mitigation should be considered if the project falls within an "impact" range and should be implemented if the project would result in a severe impact. The basis of noise impact criteria is the percentage of people that would be highly annoyed by measured noise levels in their living environment. As a result, criteria reflect a range of annoyance associated with different human activities that occur in such areas as homes, businesses, and parks.

Criteria are applied to three categories of land use with varying degrees of sensitivity to noise. Generally, in evaluating the potential for a noise impact from a proposed project, the Leq is established for the peak traffic hour when noise levels are expected to be the highest. Where there is nighttime occupancy of noise sensitive buildings such as residences, hotels and hospitals, the "Day-Night" sound level (Ldn) is more appropriate for assessing noise impacts than the peak hour Leq.

The noise criteria and descriptors used in impact analysis depend on whether the land use is designated within Category 1, 2 or 3. A description of the categories of noise-sensitive land uses for which those noise criteria apply is presented in the remainder of this section.

#### **Category 1**

This category includes buildings and parks where quiet is an essential element in their intended purpose. Land uses include open space set aside for serenity and quiet (i.e., wilderness areas) and areas for outdoor concert pavilions.

#### **Category 2**

This category includes residences and buildings where people normally sleep. Land uses include homes, hospitals, nursing homes and hotels where nighttime sensitivity to noise is assumed to be of utmost importance.

#### **Category 3**

This category includes institutional land uses with primary daytime and evening use. Land uses include schools, libraries, places of worship, museums, historically significant sites, and active parks where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. For Category 3 uses, however, the entire use may not be designated as a sensitive receptor; rather, only those areas typically used for quiet activities are designated as sensitive receptor areas. Buildings with interior spaces where quiet is important, such as medical offices and conference rooms, recording studios and concert halls are also included in this category.

The criteria do not apply to most commercial and industrial uses because these activities generally are compatible with higher noise levels. They do apply to business uses that depend on quiet as an important part of operations, such as sound and motion picture recording studios.

**Table 3-17: Noise Levels Defining Impact for Transit Projects**

Existing Ambient Noise Level L <sub>eq</sub> or L <sub>dn</sub> (dBA)	PROJECT NOISE IMPACT LEVELS L <sub>eq</sub> or L <sub>dn</sub> (dBA)					
	Category 1 or 2 Sites			Category 3 Sites		
	No Impact	Impact	Severe Impact	No Impact	Impact	Severe Impact
<43	<(Amb.+10)	Ambient + 10 to 15	>(Amb.+15)	<(Amb.+15)	Ambient + 15 to 20	>(Amb.+20)
43	<52	52-58	>58	<57	57-63	>63
44	<52	52-58	>58	<57	57-63	>63
45	<52	52-58	>58	<57	57-63	>63
46	<53	53-59	>59	<58	58-64	>64
47	<53	53-59	>59	<58	58-64	>64
48	<53	53-59	>59	<58	58-64	>64
49	<54	54-59	>59	<59	59-64	>64
50	<54	54-59	>59	<59	59-64	>64
51	<54	54-60	>60	<59	59-65	>65
52	<55	55-60	>60	<60	60-65	>65
53	<55	55-60	>60	<60	60-65	>65
54	<55	55-61	>61	<60	60-66	>66
55	<56	56-61	>61	<61	61-66	>66
56	<56	56-62	>62	<61	61-67	>67
57	<57	57-62	>62	<62	62-67	>67
58	<57	57-62	>62	<62	62-67	>67
59	<58	58-63	>63	<63	63-68	>68
60	<58	58-63	>63	<63	63-68	>68
61	<59	59-64	>64	<64	64-69	>69
62	<59	59-64	>64	<64	64-69	>69
63	<60	60-65	>65	<65	65-70	>70
64	<61	61-65	>65	<66	66-70	>70
65	<61	61-66	>66	<66	66-71	>71
66	<62	62-67	>67	<67	67-72	>72
67	<63	63-67	>67	<68	68-72	>72
68	<63	63-68	>68	<68	68-73	>73
69	<64	64-69	>69	<69	69-74	>74
70	<65	65-69	>69	<70	70-74	>74
71	<66	66-70	>70	<71	71-75	>75
72	<66	66-71	>71	<71	71-76	>76
73	<66	66-71	>71	<71	71-76	>76
74	<66	66-72	>72	<71	71-77	>77
75	<66	66-73	>73	<71	71-78	>78
76	<66	66-74	>74	<71	71-79	>79
77	<66	66-74	>74	<71	71-79	>79
>77	<66	66-75	>75	<71	71-80	>80

Note: L<sub>dn</sub> is used for land uses where nighttime sensitivity is a factor.

L<sub>eq</sub> is used during the noisiest transit-related hour for land use involving only daytime activities.

Source: FTA Transit Noise & Vibration Impact Assessment, U.S. DOT, April 1995

### 3.7.2 Ground-Borne Noise and Vibration

Transit systems can sometimes create ground-borne noise and vibration impacts. In contrast to airborne noise, ground-borne vibration is not a common environmental issue. "Ground-borne vibration" is the transmission of energy through the earth. It is also quantified using a decibel unit of measure. However, noise and vibration decibels are unrelated. Ground-borne vibration, if strong enough to be perceptible, is sensed as motion of the floors or walls inside a building. The low-pitched, rumbling noise that can result from ground-borne vibration is called "ground-borne noise" and can only occur inside a building. Ground-borne noise impacts usually occur for subway (underground) transit operations or in situations where the affected building is specially designed and constructed to be isolated from the exterior ambient noise environment such as a concert hall or recording studio.

The vertical motion due to ground-borne vibration is described in terms of vibration velocity levels, measured in vibration decibels (VdB), dB re (relative to) 10<sup>-6</sup> in/sec (2.6 x 10<sup>-8</sup> m/sec). Like sound, vibration is expressed in decibels and identified with the abbreviation of VdB. The threshold of human perception for vibration is on the order of 60 to 70 VdB. Ground-borne noise, the noise within a building produced by external vibration, is measured in dBA.

Problems with ground-borne noise and vibration from streetcar operations are highly dependent on local geology and structural details of associated buildings. When streetcar vehicle speeds are moderate, less than 30 mph, vibration impacts are usually limited to buildings within 50 feet of the streetcar. When vehicle speeds are higher, the zone of ground-borne noise and vibration impacts may extend further. The Center City Streetcar is expected to operate at 30-35 miles per hour or less. A significant percentage of complaints about both ground-borne vibration and noise can be attributed to the proximity of switches, rough or corrugated track or wheel flats.

The effects of various levels of ground-borne vibration differ among vibration sensitive activities. The land uses that are most sensitive to vibration include those which conduct precision research and manufacturing, hospitals with highly sensitive equipment and university research operations. Residential land uses and buildings where people sleep, like hotels and hospitals, are also a concern, more than schools and other institutions.

#### 3.7.2.1 Applicable Legal Authority

The Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment, April 1995, guidelines were followed to conduct the vibration screening assessments. The following sections describe ground-borne noise and vibration and their effects on surrounding land uses, as defined in the FTA guidance.

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.

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 and 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.

Table 3-18 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 Guidance 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" are 65 VdB, 72 VdB and 75 VdB for land use categories 1, 2 and 3, respectively.

**Table 3-18: 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, 1995

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

### 3.7.2.2 Impact Evaluation Procedure

Vibration impacts for this project were determined using a two tiered approach: the Vibration Screening Procedure and the General Vibration Assessment.

Vibration Screening Procedure

Ground vibration is generated by the wheel/rail interface and is influenced by wheel/rail roughness, transit vehicle suspension, train speed, track construction, location of switches and crossovers and the geologic strata underlying the track. The vibration levels likely to be generated by the project are based on data contained in the FTA Guidance Manual, Figure 10-1, *Generalized Ground Surface Vibration Curves*. Vibration from a passing streetcar moves through the geologic strata into building foundations, causing the building to vibrate. The main concerns are annoyance to building occupants and interference with vibration-sensitive operations/equipment. Any damage to buildings from the streetcar from ground vibration, including cosmetic damage to buildings, is highly unlikely.

The FTA vibration propagation data provide an estimate of vibration levels as a function of distance from the tracks. The FTA screening procedure distance criteria are shown in Table 3-19. No adjustments were utilized in the screening procedure. The screening criteria are very conservative and will be used to identify land uses that will not be impacted and should be removed from further analysis.

**Table 3-19: Distance Criteria for Vibration Screening Procedure**

Type of Project	Critical Distance from Track to Structure for Land Use		
	Category 1	Category 2	Category 3
Streetcar Rail Transit	Within 450 feet	Within 150 feet	Within 100 feet

Source: FTA Transit Noise and Vibration Impact Assessment, 1995

For potentially affected sensitive land uses located within the screening procedure criteria distance, FTA’s more detailed, second tier General Vibration Assessment will be performed. In this analysis, adjustments to the impact criteria (level vs. distance) are used to account for vehicle speed, soil type, building/foundation type and track characteristics. Further adjustments of the criteria distances may be made based on proposed vibration abatement or mitigation measures.

Vibration General Assessment

The general assessment procedure is intended to provide more specific estimates of potential vibration impacts at sensitive locations by incorporating project-specific information. The basic approach for the general assessment is to define a base curve that relates overall ground-borne vibration to distance from the source, then apply adjustments to the curve to account for other factors such as vehicle speed and track conditions. Using the base curve, the ground-borne vibration and noise due to the project are then estimated for sensitive land use locations in the corridor. After the forecasts are developed for each location, they are compared to the existing vibration levels and the applicable criteria to evaluate the level of impact. Due to the significant number of receptors in this corridor, the General Assessment has been separated into two stages of analysis. In the first stage, the base curve provided in the FTA Guidance Manual was used with no adjustments used to lower vibration levels. In the second stage, the receptors that are identified as potential impacts are reevaluated with adjustments specific to each receptor.

### Stage 1 General Assessment

The base curve provided in the FTA Guidance Manual was used to determine if nearby sensitive areas have the potential to be impacted by the Build Alternative. To provide the most conservative estimate of impacts, no adjustments were made to the base curve during the general assessment. As defined by the base curve, a potential for vibration impact could occur within 125 feet for Category 1 land uses, 60 feet for Category 2 land uses, and 38 feet for Category 3 land uses.

### Stage 2 General Assessment

The second stage of the General Assessment procedure is intended to provide more specific estimates of vibration impacts at sensitive locations by incorporating more detailed project and receptor specific adjustments such as soil type, building/foundation type, train characteristics and track characteristics. The adjustments are discussed in the following sections.

#### Average Daily Train Trips

The number of average daily train trips, computed from the operating plan results in an average of 196 trips per day, including both directions of travel. Because this figure is more than 70 trips per day, the analysis assumes the impact criteria for “frequent” events, as defined in Table 3-18.

#### Speed

FTA guidelines call for an adjustment of 6 VdB per doubling (or halving) of speed relative to 50 mph for transit trains. The speeds used in the vibration analysis are consistent with the operating plan – average vehicle speeds of 13 mph with a maximum speed of 25 mph. Near proposed station stops, an acceleration and deceleration rate of 3 mph per second was used to compute the speed.

#### Soil Type

The vibration propagation characteristics used in this analysis are based on the data presented in the FTA Guidance Manual. The ability of the soil to propagate vibration is classified as being either efficient or non-efficient. Our classification of propagation was based on FTA guidelines and a brief analysis of the geotechnical data. FTA guidelines state that shallow bedrock (within 30 feet of the surface) is likely to have efficient vibration propagation and stiff clayey soils have sometimes been associated with efficient vibration propagation. Soil with efficient vibration propagation can increase train vibration levels up to 10 VdB.

Based on the geotechnical data obtained for this project, bedrock is on average 25 feet below the surface in the study area. As a result, soils within the project corridor were determined to have efficient vibration propagation characteristics for all vibration sensitive receptors.

Related to soil type is the peak frequency of the vibration associated with the generation and estimation of ground-borne noise. FTA guidelines for the general vibration assessment provide three vibration frequency ranges: low (less than 30 Hz), typical

(between 30 and 60 Hz) and high (greater than 60 Hz). Low-frequency vibration characteristics can be assumed for non-efficient soils. "Typical" vibration characteristics can be assumed for efficient soils. As the vibration analysis assumes the presence of bedrock within 30 feet of the surface, the "typical" frequency range was used.

#### Building/Foundation Type

FTA guidelines allow for reduction of train vibration levels by 5 VdB, 7 VdB and 10 VdB for wood-frame construction, one to two story commercial construction and large masonry construction on piles, respectively. All single-family residential receptors were conservatively assumed to have wood-frame construction and residential apartments were identified as brick/masonry structures.

#### Train and Track Characteristics

The train was assumed to have 'soft' primary suspension with wheels in 'good' condition. No special features/procedures such as floating slab trackbeds or ballast mats were assumed. The track was assumed to be continuously welded and in good condition. Although portions of the track would be elevated or depressed, the track would primarily be at-grade with ballasted trackbed and with stiffly supported ties of low resilience. The streetcar would have no elevated track sections.

Crossovers ("frogs") are specified in the design of the streetcar alignment near the maintenance facility options and in the downtown area near the arena. Frogs and other special trackwork add up to 10 VdB to overall train vibration levels per FTA guidelines. However, the FTA qualitatively states that the increase would be less at greater distances from the track. For the purposes of the EA, it was assumed that the 10 VdB penalty would not apply for distances beyond 200 feet.

### **3.7.3 Existing Conditions and Resources**

#### **3.7.3.1 Noise**

The project corridor currently experiences high levels of existing noise due to traffic on I-77, Beatties Ford Road, Trade Street and Central Avenue and typical noise levels associated with downtown regions.

#### General Noise Screening Analysis

Table 3-20 and Table 3-21 list the noise sensitive receptors within the noise screening distances. Table 3-20 identifies the street limits with the location of the streetcar track, a land use description, the corresponding land use category, and the distance of the sensitive areas to the streetcar tracks and stations. The number of housing units within each noise sensitive area is also provided. Where apartments are identified, only the number of buildings is provided.

Currently, there are two site options for the VMF.

Table 3-21 identifies each noise sensitive area, provides a land use description, the corresponding land use category, and the distance of the sensitive areas to each of the VMF sites in Figure 3-33 presents the study area with the noise impact screening areas. These areas represent the area of potential impact as a result of project-related noise.

**Table 3-20: Noise Sensitive Receptors Streetcar Tracks and Stations**

Receiver Site	Land Use	# Residential Units	FTA Noise Category	Distance to Centerline (feet)
<b>N. Hoskin Rd. – La Salle St. (Curb Running Track)</b>				
	Residence	1	2	170
	Residence	1	2	200
	Church	-	3	40
	Church	-	3	110
<b>La Salle St. – Celia St. (Curb Running Track)</b>				
	Residence	21	2	50
	Residence	25	2	60
	School	-	3	80
<b>Celia Ave. – Brookshire Freeway (Curb Running Track)</b>				
	Day Care	-	3	90
	Residence	12	2	40
	Residence	5	2	25
	Residence	1	2	130
	Residential	1	2	200
<b>Brookshire Fwy. – Dixon Street (Curb Running Track)</b>				
	Residential	1	2	130
	Residential	1	2	200
	Church	-	3	75
	Residential	7	2	50
	Residential	1	2	25
Johnson C. Smith University	Residence Hall	1	2	90
	Residence Hall	1	2	120
<b>Dixon St. – I-77 (Center running track)</b>				
Johnson C. Smith University	Residence Hall	1	2	180
	Residential	1	2	65
	Residential	1	2	80
	Residence	1	2	200
	Apartments*	1	2	220
	Church	-	3	65

**Table 3-20: Noise Sensitive Receptors Streetcar Tracks and Stations (continued)**

Receiver Site	Land Use	# Residential Units	FTA Noise Category	Distance to Centerline (feet)
<b>I-77 – N. Graham St. (Center running track)</b>				
Irwin Creek Greenway (below grade)	Park	-	3	45
Sycamore St.	Apartments	1	2	45
Trade / 4 <sup>th</sup> Connector	Apartments	1	2	45
N. Cedar St	Apartments	1	2	70
	Church	-	3	100
Johnson & Wales Univ.	Residence Hall	1	2	65
<b>N. Graham St. – Hawthorn Lane (Center running track)</b>				
Presbyterian Church	Playground	-	3	100
Church Street	Park/Plaza	-	3	60
YMCA	Child Care	-	3	40
Little Sugar Creek Greenway**	Park	-	3	Crosses track
<b>Hawthorn/Elizabeth – US 74 (Curb running track)</b>				
Presbyterian Hospital	Hospital*	-	2	350
St. Johns Church	Church	-	3	100
	Church*	-	3	950
Independence Park	Park	-	3	55
	Residential	13	2	50
	Apartments	4	2	50
	Church	-	3	60
<b>Alignment Option US-74 Central Ave. @ Plaza</b>				
Hawthorn	Apartments	2	2	52
Hawthorn	Residential	16	2	55
Clement Ave	Residential	5	2	40
Clement Ave	Residential	1	2	40
Central Ave.	Library	-	3	50
<b>The Plaza – Morningside Drive (Curb running track)</b>				
Central Ave.	Residential	1	2	30
	Residential	2	2	40
	Residential	1	2	50

**Table 3-20: Noise Sensitive Receptors Streetcar Tracks and Stations (continued)**

Receiver Site	Land Use	# Residential Units	FTA Noise Category	Distance to Centerline (feet)
<b>The Plaza – Morningside Drive (Curb running track) continued</b>				
	Residential	1	2	60
	Residential	4	2	70
	Residential	2	2	100***
Veterans Park – Disk Golf Course	Park	-	3	45
<b>Morningside Drive – Briar Creek Road (Curb running track)</b>				
Briar Creek Greenway**	Park	-	3	Crosses alignment
	Residential	3	2	100
	Apartments	3	2	100
	Residential	1	2	150
	Apartments	2	2	150
	Apartments	1	2	180
	Apartments	1	2	200
<b>Briar Creek Road – Eastway Drive (Curb running track)</b>				
	Apartments	2	2	120
	Residential	6	2	140
	Residential	8	2	100
	Church	-	3	130
	Residential	4	2	80
<b>Eastway Drive – Killbourne Dr./Norland Rd. (Curb running track)</b>				
	Residential	22	2	110
	Church	-	3	130
	Church	-	3	90
<b>Killbourne Dr./Norland Rd. – End of Line (Curb running track)</b>				
Evergreen Cemetery - bench	Park	-	3	200
	Apartment	1	2	60
	Residential	2	2	110
	Apartments	4	2	90
	Apartments	2	2	80
	Residential	3	2	80

**Table 3-20: Noise Sensitive Receptors Streetcar Tracks and Stations (continued)**

Receiver Site	Land Use	# Residential Units	FTA Noise Category	Distance to Centerline (feet)
	Apartments	2	2	120
<b>Killbourne Dr./Norland Rd. – End of Line (Curb running track) continued</b>				
	Apartments	6	2	90
	Residential	4	2	70

Source: URS January 2006

Notes:\* Receptor located out of 200 foot distance because of proximity to wheel squeal noise

\*\* At grade Greenway planned but not constructed

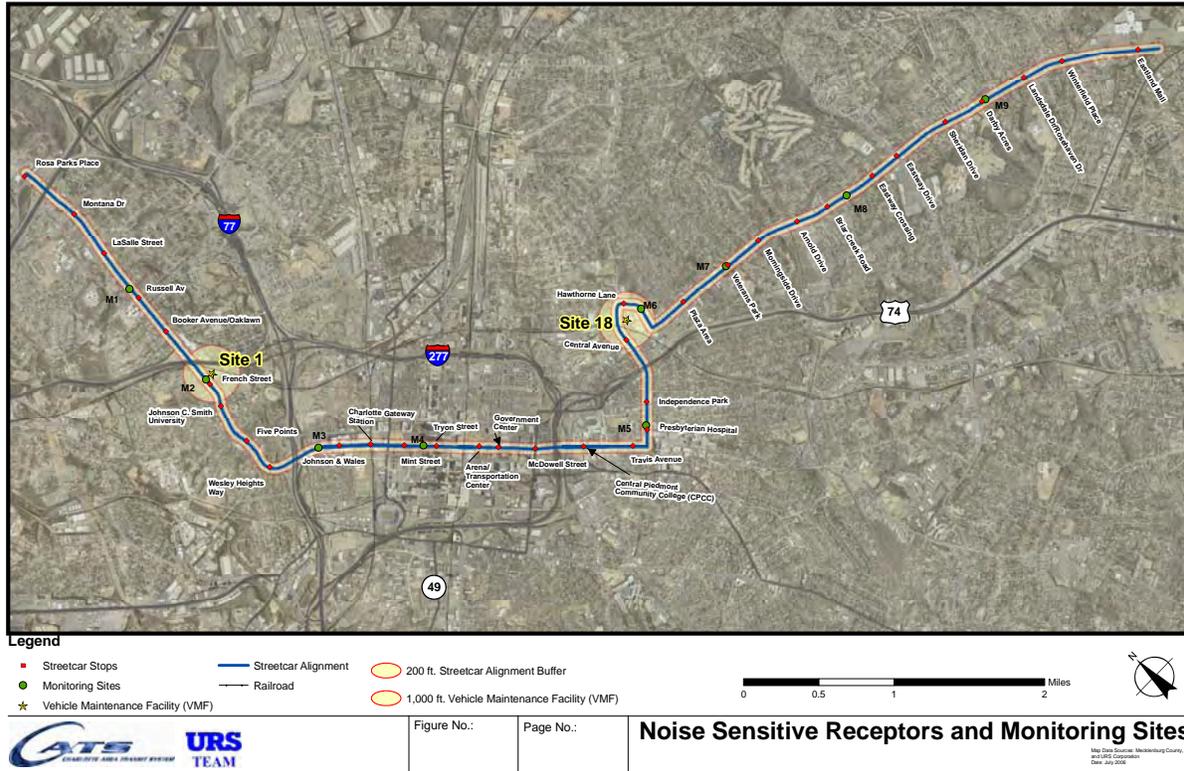
\*\*\* Receptor located with 1 row of buildings between streetcars

**Table 3-21: Noise Sensitive Receptors  
 Operations & Maintenance Facility Site Options**

Receiver Site	Land Use	# Residential Units	FTA Noise Category	Distance to Centerline (feet)
<b>French Street</b>				
Johnson C. Smith University	Residence Hall	1	2	660
	Residence Hall	1	2	720
	Residence	2	2	250
	Church	-	3	450
	Residence	13	2	800
	Residence	4	2	550
	Residence	3	2	750
<b>Hawthorn Lane</b>				
Clement Ave	Residential	5	2	50
Clement Ave	Residential	1	2	50

Source: URS July 2006

**Figure 3-33: Noise Sensitive Receptors & Monitoring Sites**



Ambient Noise Conditions

The monitored existing noise levels are shown in Table 3-22. Monitor location 4 identified midday noise levels only because noise receptors only include daytime parks.

**Table 3-22: Monitored Existing Noise Levels (dBA)**

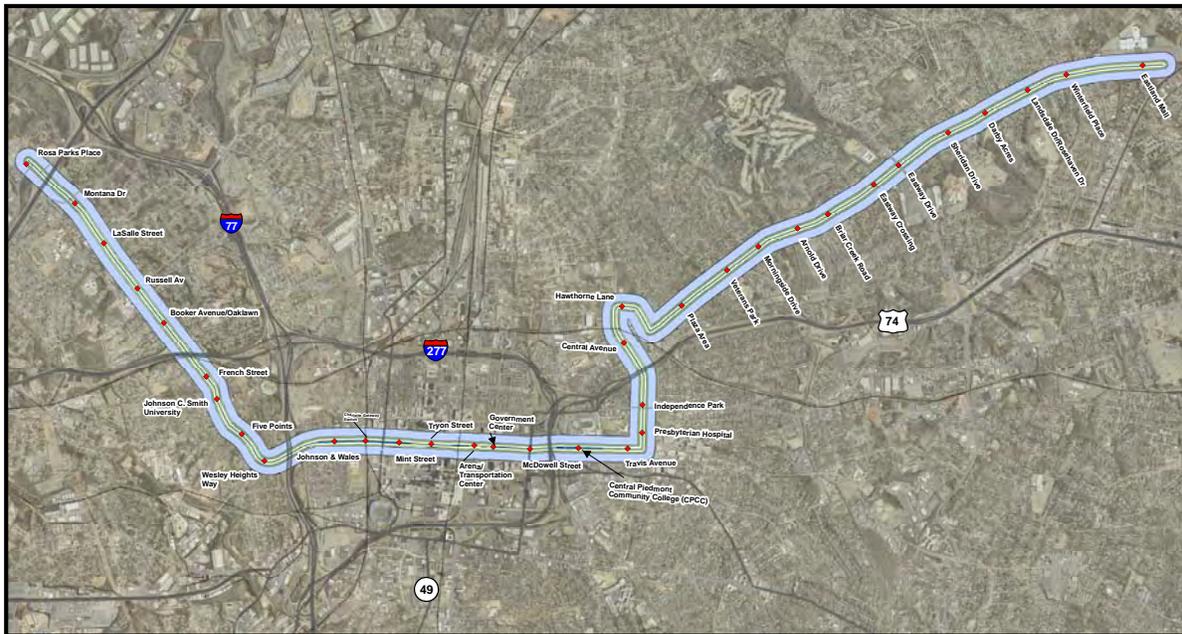
Monitoring Location	MID	PM	NITE	24-hour	Primary Noise Sources
	L <sub>eq</sub>	L <sub>eq</sub>	L <sub>eq</sub>	L <sub>dn</sub>	
1. Beatties Ford Rd./Estelle Street	63.6	65.2	62.4	67.1	Cars/Trucks/Planes
2. Beatties Ford Rd./French St.	60.8	65.0	61.9	66.3	Cars/Trucks
3. W. Trade St./N. Sycamore St.	70.0	69.9	65.9	71.2	Highway
4. Church Street Park	68.5	N/A*	N/A	N/A	Cars/Buses
5. Independence Park/Hawthorne Ln	60.3	52.9	57.4	62.2	Cars/Trucks
6. Clement Ave. (by VSMF)	59.8	56.9	55.8	60.9	Cars/Trucks
7. Veterans Park	59.8	66.9	63.6	67.9	Cars/Trucks
8. Central Ave. & Flywood Dr.	58.9	61.9	58.7	63.3	Cars/Trucks
9. Evergreen Cemetery	66.6	64.1	62.0	67.3	Cars/Trucks

\*N/A – Not applicable. Monitor site 4 identified midday noise levels only because noise receptors only included daytime parks.

3.7.3.2 Ground-Borne Noise and Vibration

Figure 3-34 shows the area of potential vibration impacts. Table 3-23 lists the sensitive receptor sites within the screening distances described under Stage 1 of the general assessment (Section 0). Potentially affected land uses include residential, day care, churches and schools. There are no Category 1 land uses within the applicable screening distance.

**Figure 3-34: Vibration Impact Screening Area**



- Legend**
- Streetcar Stops
  - Streetcar Alignment
  - Railroad
  - 100 ft. CAT. 1 Vibration Buffer
  - 150 ft. CAT. 2 Vibration Buffer
  - 450 ft. CAT. 1 Vibration Buffer



Figure No.:

Page No.:

**Vibration Impact Screening Area**

Map Data Source: Mecklenburg County, NC  
 and GIS Corporation  
 Date: July 2016

**Table 3-23: Vibration Sensitive Receptors**

Receiver Site	Land Use	# Residential Units	FTA Vibration Category	Distance to Centerline (feet)
<b>N. Hoskin Rd. – La Salle St. (Curb Running Track)</b>				
	Church	-	3	40
<b>La Salle St. – Celia St. (Curb Running Track)</b>				
	Residence	21	2	50
	Residence	25	2	60
	School	-	3	80
<b>Celia Ave. – Brookshire Freeway (Curb Running Track)</b>				
	Day Care	-	3	90
	Residence	12	2	40
	Residence	5	2	30
	Residence	1	2	130
<b>Brookshire Fwy. – Dixon Street (Curb Running Track)</b>				
	Residential	1	2	130
	Church	-	3	75
	Residential	7	2	50
	Residential	1	2	30
Johnson C. Smith University	Residence Hall	1	2	90
	Residence Hall	1	2	120
<b>Dixon St. – I-77 (Center running track)</b>				
	Residential	1	2	65
	Residential	1	2	80
	Church	-	3	65
<b>I-77 – N. Graham St. (Center running track)</b>				
Sycamore St.	Apartments	1	2	45
Trade / 4 <sup>th</sup> Connector	Apartments	1	2	45
N. Cedar St	Apartments	1	2	70
	Church	-	3	100
Johnson & Wales Univ.	Residence Hall	1	2	65
<b>N. Graham St. – Hawthorn Lane (Center running track)</b>				
YMCA	Child Care	-	3	40
<b>Hawthorn/Elizabeth – US 74 (Curb running track)</b>				
St. Johns Church	Church	-	3	100
	Residential	13	2	50
	Apartments	4	2	50

**Table 3-23: Vibration Sensitive Receptors (continued)**

Receiver Site	Land Use	# Residential Units	FTA Vibration Category	Distance to Centerline (feet)
<b>Hawthorn/Elizabeth – US 74 (Curb running track) continued</b>				
	Church	-	3	60
<b>Northern Option: Hawthorn @ US 74 – Central &amp; Plaza</b>				
Hawthorn & US 74	Apartments	2	2	40
Hawthorn Lane	Residential	14	2	52
Clement Ave	Residential	6	2	50
Central	Library	-	3	50
<b>Morningside Drive – Briar Creek Road (Curb running track)</b>				
	Residential	3	2	100
	Apartments	3	2	100
	Residential	1	2	150
	Apartments	2	2	150
<b>Briar Creek Road – Eastway Drive (Curb running track)</b>				
	Apartments	2	2	120
	Residential	6	2	140
	Residential	8	2	100
	Residential	4	2	80
<b>Eastway Drive – Killbourne Dr./Norland Rd. (Curb running track)</b>				
	Residential	22	2	110
	Church	-	3	90
<b>Killbourne Dr./Norland Rd. – End of Line (Curb running track)</b>				
	Apartment	1	2	60
	Residential	2	2	110
	Apartments	4	2	90
	Apartments	2	2	80
	Residential	3	2	80
	Apartments	2	2	120
	Apartments	6	2	90
	Residential	4	2	70

Source: URS July 2006

**Table 3-24: Results of Vibration General Assessment**

Receiver Site	# Residential Units	FTA Noise Category	Distance to Receiver (ft.)	Impact Distance	Potential Impact
<b>La Salle St. – Celia St.</b>					
Residence	21	2	50	60	<b>Impact</b>
Residence	25	2	60	60	<b>Impact</b>
<b>Celia Ave. – Brookshire Freeway (Curb Running Track)</b>					
Residence	12	2	40	60	<b>Impact</b>
Residence	5	2	30	60	<b>Impact</b>
<b>Brookshire Fwy. – Dixon Street (Curb Running Track)</b>					
Residence	7	2	50	60	<b>Impact</b>
Residence	1	2	45	60	<b>Impact</b>
<b>I-77 – N. Graham St. (Center running track)</b>					
Sycamore St. Apts.	1 Building	2	45	60	<b>Impact</b>
Trade / 4 <sup>th</sup> Connector Apts.	1 Building	2	45	60	<b>Impact</b>
<b>Hawthorn/Elizabeth – US 74 (Curb running track)</b>					
Residence	13	2	50	60	<b>Impact</b>
Apartments	4 Buildings	2	50	60	<b>Impact</b>
<b>Northern Option US-74 – Central</b>					
		2	35	60	<b>Impact</b>
Hawthorn Lane Apts.	2 Buildings	2	50	60	<b>Impact</b>
Clement Av Houses	6	2	50	60	<b>Impact</b>
<b>The Plaza – Morningside Drive (Curb running track)</b>					
Residence	1	2	30	60	<b>Impact</b>
Residence	2	2	40	60	<b>Impact</b>
Residence	1	2	50	60	<b>Impact</b>
Residence	1	2	60	60	<b>Impact</b>
<b>Killbourne Dr./Norland Rd. – End of Line (Curb running track)</b>					
Apts.	1 Building	2	60	60	<b>Impact</b>

Source: URS July 2006

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### **3.7.4 Environmental Impacts and Benefits**

#### **3.7.4.1 Noise**

A noise impact is assessed based on the comparison of the existing (ambient) noise levels and the predicted noise level at a given noise sensitive area in terms of either the  $L_{dn}$  or  $L_{eq}$  descriptors assigned for the appropriate land use category.

#### **Short-term Impacts and Benefits**

##### **No-Build Alternative**

The No-Build Alternative would have no short-term effects on noise levels in the area.

##### **TSM Alternative**

The TSM Alternative would have no short-term effects on noise levels in the area. Changes in bus operations would not significantly change existing noise levels.

##### **Build Alternative**

Construction of the Build Alternative would result in temporary increases in noise levels adjacent to project construction areas. Operation of construction equipment would be the primary factor in creating elevated noise levels. The rolling construction method proposed for the project would limit construction-related noise to immediate vicinity of construction. Construction activities would comply with the City of Charlotte noise ordinance.

#### **Long-term Impacts and Benefits**

##### **No-Build Alternative**

The No-Build Alternative would have no effect on noise levels in the area. Changes in traffic volumes and bus operations would not significantly change existing noise levels.

##### **TSM Alternative**

The TSM Alternative would have minimal effects on noise levels in the area. Changes in bus operations would not significantly change existing noise levels.

##### **Build Alternative**

Based on the potential for the Build Alternative to impact nearby noise sensitive areas, a detailed noise analysis was conducted using hourly operational schedules during day and night, plan and profiles of the guideway, and location of grade crossings, curved track data, and warning sound inputs.

Table 3-25 shows the results of the detailed noise analysis for the Build Alternative. To be consistent with the FTA methodology, the standard wheel squeal noise was included in the analysis. However, as a result of the vehicle specifications identified in the design reports, no noise impacts would result from wheel squeal.

The noise assessment included noise from the streetcar and the VMF. The assessment includes comparing the project-related noise levels to the existing noise levels in order to determine human reaction to the amount of change. There are three possible outcomes to the detailed noise assessment: no impact, impact and severe impact. Note that, for

each noise sensitive receptor, noise is generated by a combination of streetcar vehicle, station area bell noise, streetcar wheel squeal, and noise from the VMF car wash, with each noise event occurring at variable distances from the receptor.

Table 3-25 identifies the ambient noise levels, the future project-related noise levels, and whether an impact or severe impact was identified by using the noise impact criteria described above. The “impact range” indicates that the noise levels at a receptor would be 1 to 5 dBA over the acceptable level, as prescribed by the FTA methodology. The “severe impact” range indicates an increase of greater than 5 decibels. As noted in Table 3-25, the Build Alternative would have impacts to the Presbyterian Hospital, two apartment buildings on Hawthorne Lane and six houses on Clement Avenue.

**Table 3-25: Summary of Noise Impacts**

Site	Description	Noise Sources	Distance*	Combined Noise	Ambient Noise	Impact Range	Impact	Impact Source
<b>N. Hoskin Rd. – La Salle St.</b>								
1	Residence	Streetcar	170	37	67.1	63-67	No Impact	
2	Residence	Streetcar	200	36	67.1	63-67	No Impact	
3	Church	Streetcar	40	43	63.6	66-70	No Impact	
4	Church	Streetcar	110	39	63.6	66-70	No Impact	
<b>La Salle St. – Celia St.</b>								
5	Residence	Streetcar	50	42	67.1	63-67	No Impact	
6	Residence	Streetcar, Bell	60	59	67.1	63-67	No Impact	
7	School	Streetcar	80	40	63.6	66-70	No Impact	
<b>Celia Ave. – Brookshire Freeway</b>								
8	Day Care	Streetcar	90	39	63.6	66-70	No Impact	
9	Residence	Streetcar	40	43	67.1	63-67	No Impact	
10	Residence	Streetcar, Bell	25	59	67.1	63-67	No Impact	
11	Residence	Streetcar	130	38	67.1	63-67	No Impact	
12	Residential	Streetcar	200	36	67.1	63-67	No Impact	
<b>Brookshire Fwy. – Dixon Street</b>								
13	Residential	Streetcar	130	38	66.3	66-70	No Impact	
14	Residential	Streetcar	200	36	66.3	66-70	No Impact	
15	Church	Streetcar, Bell	75	58	60.8	64-69	No Impact	
16	Residential	Streetcar, Bell	50	60	66.3	66-70	No Impact	
17	Residential	Streetcar	25	45	66.3	66-70	No Impact	
18	Johnson C. Smith Univ. Residence Hall	Streetcar	90	39	66.3	66-70	No Impact	
19	Johnson C. Smith Univ. Residence Hall	Streetcar, Bell	120	56	66.3	66-70	No Impact	
<b>Dixon St. – I-77</b>								
20	Johnson & Wales Univ., Residence Hall	Streetcar	180	56	66.3	66-70	No Impact	

**Table 3-25: Summary of Noise Impacts (continued)**

Site	Description	Noise Sources	Distance*	Combined Noise	Ambient Noise	Impact Range	Impact	Impact Source
21	Residential	Streetcar, Bell	65	59	66.3	66-70	No Impact	
22	Residential	Streetcar	80	40	66.3	66-70	No Impact	
23	Residence	Streetcar, Bell	200	61	66.3	66-70	No Impact	
24	Apartments*	Streetcar, Squeal	220	63	66.3	66-70	No Impact	
25	Church	Streetcar	65	41	60.8	64-69	No Impact	
	<b>I-77 – N. Graham St.</b>							
26	Irwin Creek Greenway	Streetcar	45	42	70.0	70-74	No Impact	
27	Sycamore St. Apartments	Streetcar, Bell	45	61	71.2	66-70	No Impact	
28	Trade / 4 <sup>th</sup> Connector Apartments	Streetcar	45	42	71.2	66-70	No Impact	
29	N. Cedar St Apartments	Streetcar, Bell	70	59	71.2	66-70	No Impact	
30	Church	Streetcar	100	39	70.0	70-74	No Impact	
31	Johnson & Wales Univ., Residence Hall	Streetcar, Bell	65	59	71.2	66-70	No Impact	
	<b>N. Graham St. – Hawthorn Lane</b>							
32	Presbyterian Church playground	Streetcar	100	39	68.5	68-75	No Impact	
33	Church Street Park/Plaza	Streetcar	60	41	68.5	68-75	No Impact	
34	YMCA Child Care	Streetcar, Bell	40	61	68.5	68-75	No Impact	
35	Little Sugar Creek Greenway (Future)	Streetcar	5	54	68.5	68-75	No Impact	
	<b>Hawthorn/Elizabeth – US 74</b>							
36	Presbyterian Hospital	Streetcar, Squeal	350	64	52.9	60-65	<b>Impact</b>	Squeal
37	St. Johns Church	Streetcar, Squeal	100	59	52.9	60-65	No Impact	
38	Church	Streetcar, Bell	950	47	52.9	60-65	No Impact	
39	Independence Park	Streetcar, Bell	55	59	52.9	60-65	No Impact	
40	Residential	Streetcar	50	42	62.2	59-64	No Impact	
41	Apartments	Streetcar	50	42	62.2	59-64	No Impact	
42	Church	Streetcar	60	41	52.9	60-65	No Impact	

**Table 3-25: Summary of Noise Impacts (continued)**

Site	Description	Noise Sources	Distance*	Combined Noise	Ambient Noise	Impact Range	Impact	Impact Source
	<b>Northern Option: Hawthorne @ US 74 - Central &amp; Plaza</b>							
43	2 Apartments Hawthorn / 74	Streetcar, Bell, Squeal	35	77	60.9	59-64	<b>Severe</b>	Squeal
44	16 houses Hawthorn	Streetcar	50	42	60.9	59-64	No Impact	
45	5 Clement Ave Houses (Historic)	Streetcar, Squeal, VMF	50	67	60.9	59-64	<b>Severe</b>	Squeal
46	1 Clement Ave Houses (Historic)	Streetcar, Squeal, VMF	60	61	60.9	59-64	<b>Impact</b>	Squeal
47	Library	Streetcar, Bell	50	60	59.8	63-68	No Impact	
	<b>The Plaza – Morningside Drive</b>							
48	Residential	Streetcar, Bell	30	62	67.9	63-68	No Impact	
49	Residential	Streetcar, Bell	40	61	67.9	63-68	No Impact	
50	Residential	Streetcar, Bell	50	60	67.9	63-68	No Impact	
51	Residential	Streetcar	60	41	67.9	63-68	No Impact	
52	Residential	Streetcar	70	41	67.9	63-68	No Impact	
53	Residential	Streetcar	100	39	67.9	63-68	No Impact	
54	Veterans Park	Streetcar, Bell	45	61	59.8	63-68	No Impact	
	<b>Morningside Drive – Briar Creek Road</b>							
55	Briar Creek Greenway (future)	Streetcar	5	59	59.8	63-68	No Impact	
56	Residential	Streetcar	100	39	67.9	63-68	No Impact	
57	Apartments	Streetcar	100	39	67.9	63-68	No Impact	
58	Residential	Streetcar	150	37	67.9	63-68	No Impact	
59	Apartments	Streetcar	150	37	67.9	63-68	No Impact	
60	Apartments	Streetcar, Bell	180	55	67.9	63-68	No Impact	
61	Apartments	Streetcar, Bell	200	54	67.9	63-68	No Impact	
	<b>Briar Creek Road – Eastway Drive</b>							
62	Apartments	Streetcar, Bell	120	56	63.3	60-65	No Impact	

**Table 3-25: Summary of Noise Impacts (continued)**

Site	Description	Noise Sources	Distance*	Combined Noise	Ambient Noise	Impact Range	Impact	Impact Source
63	Residential	Streetcar	140	38	63.3	60-65	No Impact	
64	Residential	Streetcar	100	39	63.3	60-65	No Impact	
65	Church	Streetcar, Bell	130	56	58.9	63-68	No Impact	
66	Residential	Streetcar, Bell	80	58	63.3	60-65	No Impact	
	<b>Eastway Dr.–Killbourne Dr./Norland Rd.</b>							
67	Residential	Streetcar, Bell	110	57	67.3	63-67	No Impact	
68	Church	Streetcar	130	38	66.6	68-72	No Impact	
69	Church	Streetcar, Bell	90	58	66.6	68-72	No Impact	
	<b>Killbourne Dr./Norland Rd.–End of Line</b>							
70	Evergreen Cemetery Bench	Streetcar, Bell	200	54	66.6	68-72	No Impact	
71	Apartment	Streetcar, Bell	60	59	67.3	63-67	No Impact	
72	Residential	Streetcar	110	39	67.3	63-67	No Impact	
73	Apartments	Streetcar	90	39	67.3	63-67	No Impact	
74	Apartments	Streetcar	80	40	67.3	63-67	No Impact	
75	Residential	Streetcar	80	40	67.3	63-67	No Impact	
76	Apartments	Streetcar	120	38	67.3	63-67	No Impact	
77	Apartments	Streetcar, Bell	90	58	67.3	63-67	No Impact	
78	Residential	Streetcar, Bell	70	59	67.3	63-67	No Impact	

**Table 3-25: Summary of Noise Impacts (continued)**

Comparison of VMF Site Options		Noise Source	Distance **	Combined Noise	Ambient Noise	Impact Range	Impact	Impact Source
<b>VMF Beatties Ford Road Site</b>								
79	Johnson C. Smith Univ. Residence Hall	VMF, Streetcar	660	48	67.1	63-67	No Impact	
80	Johnson C. Smith Univ. Residence Hall	VMF, Streetcar	720	48	67.1	63-67	No Impact	
81	Residence	VMF, Streetcar	250	52	67.1	63-67	No Impact	
82	Church	VMF, Streetcar	450	50	63.6	66-70	No Impact	
83	Residence	VMF, Streetcar	800	47	67.1	63-67	No Impact	
84	Residence	VMF, Streetcar	550	49	67.1	63-67	No Impact	
85	Residence	VMF, Streetcar	750	47	67.1	63-67	No Impact	
<b>VMF Barnhardt Manufacturing Facility Site</b>								
86	5 Houses Clement Ave. (Historic)	VMF, Streetcar, Squeal	50	67	60.9	59-64	<b>Severe</b>	Squeal
87	1 Houses Clement Ave. (Historic)	VMF, Streetcar, Squeal	50	64	60.9	59-64	<b>Impact</b>	Squeal

Source: URS Corp. July 2006

Notes: \* Distance refers to the distance between the streetcar track centerline and receptor.

\*\* Distance refers to the distance between the VMF vehicle washing facility and receptor.

Distances for other noise sources (bell and squeal) are provided in the Noise and Vibration Technical Appendix.

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### 3.7.4.2 Ground-Borne Noise and Vibration

#### **Short-term Impacts**

##### **No-Build Alternative**

The No-Build Alternative would have no short-term effect on vibration levels in the area. Changes in traffic volumes and bus operations would not change existing vibration levels.

##### **TSM Alternative**

The TSM Alternative would have no short-term effect on vibration levels in the area. Changes in traffic volumes and bus operations would not change existing vibration levels.

##### **Build Alternative**

Construction of the Build Alternative could result in short-term increases in vibration levels adjacent to project construction areas. Operation of construction equipment and construction activities, such as pneumatic hammering, grading, and removal of pavement, would be the primary source of ground-borne vibration. The rolling construction method proposed for the project would limit the duration of construction-related vibration.

#### **Long-term Impacts**

##### **No-Build Alternative**

The No-Build Alternative would have no effect on vibration levels in the area. Changes in traffic volumes and bus operations would not change existing vibration levels.

##### **TSM Alternative**

The TSM Alternative would have no effect on vibration levels in the area. Changes in traffic volumes and bus operations would not change existing vibration levels.

##### **Build Alternative**

Table 3-26 provides the results of the general vibration analysis, including adjustments for project and receptor specific data. The resulting ground-borne vibration levels are then compared to the Criterion Impact Levels, identified in Table 3-26 resulting in three scenarios:

1. Projected vibration is below the impact threshold. Vibration impact is unlikely in this case.
2. Projected ground-borne vibration is 0 to 5 decibels greater than the impact threshold. In this range there is still a significant chance that actual ground-borne vibration levels will be below the impact threshold. In this case, the impact would be reported in the environmental document as exceeding the applicable threshold and a commitment would be made to conduct more detailed studies to refine the vibration impact analysis during final design and

determine appropriate mitigation, if necessary. A site-specific detailed analysis may show that vibration control measures are not needed.

3. Projected ground-borne vibration is 5 decibels or more greater than the impact threshold. Vibration impact is probable and detailed analysis will be needed during final design to help determine appropriate vibration control measures.

As shown in Table 3-26, only the six historic houses on Clement Avenue would be impacted by ground-borne vibration, due to the proximity of special trackwork associated with VMF site at the Barnhardt Manufacturing Facility. If the VMF site on Beatties Ford Road is selected, then the Build Alternative will have no vibration impacts.

**Table 3-26: Stage 2 Vibration Impact Results**

ID	Description	Vibration Land Use Category (1-3 or [S]pecial)	Distance	Speed (mph)	Crossovers w/in 200 ft.	Elevated Structure	Building Type	Criterion Impact Level	Estimated Vibration Level (VdB)	Ground-borne Vibration impact?	Ground-borne Noise impact?
1	LaSalle – Celia Residences 21	2	50	13	N	N	Wood frame	72	66.3	No	No
2	LaSalle – Celia Residences 25	2	60	13	N	N	Wood frame	72	65	No	No
3	Celia /Brookshire Residence 12	2	40	13	N	N	Wood frame	72	67.9	No	No
4	Celia /Brookshire Residence 5	2	30	13	N	N	Wood frame	72	69.8	No	No
5	Brookshire/Dixon Residence 7	2	50	13	N	N	Wood frame	72	66.3	No	No
6	I-77 – Graham Sycamore Apts.	2	45	13	N	N	6-10 Story Masonry	72	66.1	No	No
7	I-77 – Graham Trade Apts.	2	45	13	N	N	6-10 Story Masonry	72	66.1	No	No
8	Hawthorn – US 74 Residence 13	2	45	13	N	N	Wood frame	72	67.1	No	No
9	Hawthorn – US 74 Apts. 4	2	50	13	N	N	2-4 story masonry	72	61.3	No	No
10	Hawthorn Apts. 2	2	40	13	N	N	2-4 story masonry	72	62.9	No	No
11	Hawthorn Houses 14	2	52	13	N	N	Wood frame	72	66.1	No	No
12	Clement Av Houses 6	2	50	13	N	Y	Wood frame (Historic)		76.3		<b>Yes</b>

**Table 3-26: Stage 2 Vibration Impact Results (continued)**

ID	Description	Vibration Land Use Category (1-3 or [S]pecial)	Distance	Speed (mph)	Crossovers w/in 200 ft.	Elevated Structure	Building Type	Criterion Impact Level	Estimated Vibration Level (VdB)	Ground-borne Vibration impact?	Ground-borne Noise impact?
13	Morningside Residence A 1	2	30	13	N	N	Wood frame		69.8	No	No
14	Morningside Residence B 2	2	40	13	N	N	Wood frame	72	67.9	No	No
15	Morningside Residence C 1	2	50	13	N	N	Wood frame	72	66.3	No	No
16	Morningside Residence D 1	2	60	13	N	N	Wood frame	72	55	No	No
17	Norland Apts.	2	60	13	N	N	4-6 story masonry	72	50	No	No

Source: URS Corp. August 2006

### **3.7.5 Mitigation**

#### **3.7.5.1 Noise**

All affected properties would be impacted by wheel squeal on tight radius curves. Wheel squeal noise will be eliminated through a combination of a thinner wheel flange and a flange lubrication system, as defined in the vehicle design specifications.

#### **3.7.5.2 Vibration**

During final design, a site specific detailed analysis will be conducted at the six houses on Clement Avenue to refine the vibration impact analysis and determine appropriate mitigation, if necessary. The most effective vibration control measures would be to relocate the special trackwork to a less vibration-sensitive area. Sometimes this requires adjusting the location by several hundred feet and will not have a significant adverse impact on the operation plan for the system. Careful review of crossover and turnout locations during the preliminary engineering stage is an important step to minimizing potential for vibration impact. Another approach is to use special devices at turnouts and crossovers, or "frogs," that incorporate mechanisms to close the gaps between running rails. Frogs with spring-loaded mechanisms and frogs with movable points can significantly reduce vibration levels near crossovers.

## **3.8 ECOSYSTEMS**

### **3.8.1 Legal and Regulatory Framework**

#### **3.8.1.1 Farmland Protection Policy Act**

The *Farmland Protection Policy Act* (FPPA) of 1981 (7 CFR 658) requires all federal agencies to consider the impact of land acquisition and construction activities on prime, unique, statewide and locally important farmland soils, as defined by the U.S. Department of Agriculture (USDA) and the Natural Resources Conservation Service (NRCS) (Public Law 97-98, Subtitle 1, Section 1540). The NRCS, in cooperation with state and local agencies, developed a listing of Prime and Statewide Important Farmland of North Carolina.<sup>36</sup> "Prime farmland does not include land already in or committed to urban development or water storage" (7 CFR part 658.3). The entire project corridor is urbanized and no land is in use as farmland. Therefore, this project is not subject to the requirements of the FPPA.

#### **3.8.1.2 Federal Endangered Species Act**

The Fish and Wildlife Service (FWS) in the US Department of the Interior (DOI) and the National Marine Fisheries Service (NMFS) in the Department of Commerce (DOC) are responsible for administering the *Endangered Species Act* (ESA) of 1973 as amended (16 USC 1531 et. seq). Some of the principle provisions of the ESA, as amended in 1973, include the prohibition of federal agencies from "authorizing, funding, or carrying out any action that would jeopardize a listed species or destroy or modify its 'critical habitat'," and the introduction of broad taking prohibitions.<sup>37</sup> The reference to a taking includes activities that may result in incidental or indirect taking of endangered species through habitat modification. If a Federal agency action or activity is permitted,

funded, carried out, or conducted that might affect a listed species or designated critical habitat, the agency must consult with the Secretary of the Interior or the Secretary of Commerce. The ESA includes further provisions for consultation with the DOI and DOC and preparation of biological assessments.

#### 3.8.1.3 North Carolina Endangered Species Act

Species with the federal status of endangered (E), threatened (T), proposed endangered (PE), and proposed threatened (PT) are protected under provisions of the ESA. The ESA does not formally protect federal candidate species or state listed species. In North Carolina, certain species are granted limited protection under the North Carolina Endangered Species Act. The North Carolina Wildlife Resource Commission and the North Carolina Department of Agriculture are responsible for enforcing and administering species protection.

#### 3.8.1.4 North Carolina Plant Protection and Conservation Act of 1979

In this act procedures are established to protect and conserve plants of concern for the recreational needs of people, interests of science and the State's economy. One provision of the act makes it unlawful to disturb or remove any plant on a protected plant list without a written permit from the landowner except for incidental disturbance during development operations, agriculture or forestry if the plants are not collected for sale or commercial use.<sup>38</sup> This act is administered by the North Carolina Department of Agriculture.

#### 3.8.1.5 Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act (MBTA), it is unlawful to take any migratory bird, or nest or egg of any migratory bird except as permitted by regulations. This act applies to endangered bird species and waterfowl as well as birds thought to be common, such as robins and sparrows. Some courts have suggested transportation agencies seek permits when there is a mere possibility of a project causing a take. Other courts have interpreted the policy to apply only to activities such as poaching and hunting. Federal agencies that take actions likely to have a measurable negative impact on migratory bird populations are required by Executive Order to adopt a Memorandum of Understanding with FWS to promote the conservation of migratory birds.<sup>39</sup>

### 3.8.2 Method

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, soil survey mapping of Mecklenburg County, FWS National Wetland Inventory (NWI) mapping of Charlotte East and Derita Quadrangles, the FWS and North Carolina Natural Heritage Program (NCNHP) Endangered, Threatened, Proposed and Candidate Species for the project region.<sup>40, 41, 42, 43, 44, 45</sup>

Field investigations were conducted on October 19, 2004 by URS Corporation – North Carolina (URS) to identify the natural elements in the project corridor. Visual observations were made as necessary to ensure adequate coverage and characterization of the project corridor. 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 land surrounding the project corridor

is urban and suburban, and consequently, wooded communities are highly disturbed and cannot be classified according to the Classification of the Natural Communities of North Carolina.<sup>46</sup> Dominant plant species were identified for all plant communities encountered. The observed vegetative communities are identified for this document as Urban/Disturbed and Riparian Disturbed. Observations of wildlife and signs of wildlife were noted during field investigations. Wildlife identification involved visual observations and noting characteristic signs of wildlife such as vocalizations, scat, tracks, and burrows.

**3.8.3 Existing Conditions and Resources**

The project corridor is highly urbanized. Mecklenburg County falls within the southeastern portion of the Southern Outer Piedmont ecoregion of the Central Piedmont physiographic province.<sup>47</sup> Mecklenburg County is characterized by broad, gently rolling interstream areas with steeper slopes along the drainageways. Approximately three-quarters of the county, including the entire project corridor, are drained by the Catawba River. No prominent hills stand out above the generally level uplands.<sup>48</sup> Elevations in the project area range from approximately 650 feet above Mean Sea Level (MSL) to 780 feet MSL on the Charlotte East and Derita topographic maps.<sup>49</sup>

**3.8.3.1 Geology**

The greater Charlotte metropolitan area lies within the Charlotte Belt, which is dominantly plutonic and consists mostly of igneous rocks such as granite, diorite and gabbro, 300-500 million years old. The majority of Mecklenburg County is comprised of intrusive rocks; metamorphosed granite rocks, foliated to weakly foliated and locally migmatitic, of the Late Proterozoic to the Middle Paleozoic Era.<sup>50</sup>

**3.8.3.2 Soils**

The project corridor is highly disturbed and urbanized. The majority of the soils in the project corridor are classified as Urban Lands or as an Urban Land Complex. Soils located within the project corridor and in the vicinity of the project were identified from The Soil Survey of Mecklenburg County, North Carolina.<sup>51</sup> Soils within the project corridor are identified in Table 3-27.

**Table 3-27: Soils Mapped in the Project Corridor**

Soil Series	Mapping Unit	Soil Phase
Cecil sandy clay loam <sup>a</sup>	CeB2	2 to 8 percent slopes, eroded
Cecil-Urban land complex	CuD	8 to 15 percent slopes
Cecil-Urban land complex	CuB	2 to 8 percent slopes
Helena sandy loam	HeB	2 to 8 percent slopes
Mecklenburg-Urban land complex	MkB	2 to 8 percent slopes
Monacan soils and Arents	MS	No individual phase identified
Urban land	Ur	No individual phase identified

<sup>a</sup> Indicates soils listed as Prime Farmland and soils of State and Local Importance in Mecklenburg County Sources: U.S. Department of Agriculture (USDA). 1978. Technical Guide, Section IIc. Soil Conservation Service. Mecklenburg County, North Carolina.

Source: U.S. Department of Agriculture (USDA). 2001. Prime Farmland List of Mecklenburg County, North Carolina. Soil Conservation Service.

Cecil sandy clay loam is well drained upland soils on broad, smooth ridges. Permeability is moderate, available water capacity is medium, shrink-swell potential is moderate, and the surface runoff is medium. Depth to bedrock is more than 60 inches and the water table is below 6 feet. These soils are only found in a small area along the southern most section of the alignment.

Cecil-Urban land complex consists of Cecil soils and areas of urban land primarily in the suburban areas of Charlotte. Permeability is moderate, available water capacity is medium, shrink-swell potential is moderate, and surface runoff is medium. Depth to bedrock is more than 60 inches and the water table is below 6 feet. The Urban land of this unit supports residential and commercial development, infrastructure, and other impervious surfaces such as parking lots. In disturbed areas, erosion rates may be high due to steep gradients and large stormwater volume. These soils are found along approximately half of the alignment.

The Helena series consists of very deep, moderately well drained, slowly permeable soils on broad ridges and toeslopes of Piedmont uplands. Slopes are typically between 2 to 10 percent but may range from 0 to 15 percent. This soil type occurs in one location along the alignment, under the Hawthorne Lane stop.

Mecklenburg-Urban land soils consist of areas of Mecklenburg soils and areas of Urban land primarily in the suburban areas of Charlotte. Permeability is slow, available water capacity is medium, shrink-swell potential is moderate, and surface runoff is medium. Depth to bedrock ranges from 48-60 inches and the water table is below 6 feet. This mapping unit is developed mostly with closely spaced houses, streets, parking lots, commercial buildings, or the land is covered with more than 20 inches of fill material. Erosion is a hazard due to the slope and runoff as well as paved surfaces that can cause an increased hazard of flooding. These soils are found along a small portion of the northern section of the alignment.

Monacan soils and Arents consist of nearly level, low lying areas along major drainageways. The Monacan soil is somewhat poorly drained and is found on floodplains. Arents soil is found in areas where the natural soils have been altered by the addition of fill material. The main hazards are flooding, wetness, settling of fill areas, and the sediment damage to streams from erosion of the fill material. These soils are found in the section of the alignment that crosses Little Sugar Creek.

Urban land consists of areas where more than 85 percent of the surface area is covered with asphalt, concrete, buildings, or other impervious cover. Most of the soil material has been cut, filled, and graded, altering or destroying the natural characteristics. The remaining native soil is occupied by small lawns or shrub gardens near buildings, sidewalks, and parking lots. Impervious surfaces in Urban land areas generate very high volumes of stormwater and surface flow, often causing flooding in low-lying areas downstream. Approximately half of the alignment crosses Urban land soils.

The Natural Resources Conservation Service (NRCS) did not identify areas of hydric soils within the project corridor.<sup>52</sup> Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation and are associated with wetlands.<sup>53</sup>

### 3.8.3.3 Biotic Resources

#### **Plant Communities**

##### **Urban/Disturbed Vegetative Communities**

The majority of land in the project corridor was classified as Urban/Disturbed, which includes commercial, office, and industrial developments, residential areas, existing roads, and other natural areas that have been cleared for development. Most of the vegetation in these areas has been removed or altered by human activity. Maintained grasses and ornamental landscape plantings adjacent to residential houses, businesses and industrial areas, and roadside rights-of-way are included in this category. Tree species identified within the project corridor are dominated by sweet gum (*Liquidambar styraciflua*), willow oak (*Quercus phellos*), white oak (*Quercus alba*), flowering dogwood (*Cornus florida*), tulip poplar (*Liriodendron tulipifera*), and red maple (*Acer rubrum*).

##### **Riparian Disturbed Vegetative Communities**

In most locations, urban development has occurred up to stream banks. Dominant riparian vegetation included box elder (*Acer negundo*), black willow (*Salix nigra*), sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), black cherry (*Prunus serotina*), black walnut (*Juglans nigra*), pecan (*Carya illinoensis*), sweet gum (*Liquidambar styraciflua*), giant cane (*Arundinaria gigantea*), and jewelweed (*Impatiens capensis*). Invasive species such as paper mulberry (*Broussonetia papyrifera*), Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), kudzu (*Pueraria lobata*), and several unidentified ornamental species were identified along riparian corridors.

#### **Wildlife**

##### **Birds**

Although highly disturbed, the project corridor provides habitat for some bird populations. Birds seen or heard during the field visits include; mockingbird (*Mimus polyglottos*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), common grackle (*Quiscalus quiscula*), European starling (*Sturnus vulgaris*), mourning dove (*Zenaidura macroura*), and eastern phoebe (*Sayornis phoebe*).

##### **Mammals**

Several mammals adaptable to urban areas can be expected to live in the project vicinity. These mammals include; white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), and eastern cottontail (*Sylvilagus floridanus*).

##### **Reptiles, Amphibians, and Other Aquatic Wildlife**

The riparian corridors identified within the project corridor, provide some habitat for many species of reptiles, amphibian, and aquatic wildlife common to urban areas. Asian clams (*Corbicula fluminea*) as well as many unidentified minnow species were observed in several perennial streams. Asian clams are exotic, invasive, small bivalves typically found at high densities and have a relatively high growth rate. Because of their reproductive success and high infestation, this species has become a serious pest throughout the United States. Concerns have been raised over the capacity of Asian clams to alter trophic and nutrient

dynamics of aquatic systems, and to displace native bivalves.<sup>54</sup> Other wildlife may include: salamanders, toads, tree frogs, true frogs, spiny lizards, skinks, and snakes.

### **Listed Species**

#### **Federally Listed Threatened or Endangered Species**

The FWS and NCNHP have identified the federally listed threatened or endangered species that occur in Mecklenburg County.<sup>55, 56</sup> Data available through NCNHP did not indicate known occurrences of federally protected threatened or endangered species within one mile of the project corridor. Protected species were not observed within the project corridor during field operations. The protected species listed in the county are listed in Table 3-28.

#### *Bald Eagle*

The bald eagle primarily occupies forested shoreline habitats. Nesting habitat is generally found within one half mile of bodies of water 40 acres or larger. The birds tend to build their nests at least 500 meters from any human disturbance including logging operations, roads, housing, commercial areas, or busy recreational areas.<sup>57,58</sup>

#### *Carolina Heelsplitter*

The Carolina Heelsplitter currently has a very fragmented, relict distribution but historically was known from several locations within the Catawba and Pee Dee River systems in North Carolina. Historically, the species was collected from the Catawba River, Mecklenburg County and several streams and ponds in the Catawba River system around the Charlotte area of Mecklenburg County. Recent collection records indicate that small remnant population occurs in North Carolina in the Catawba River system in Waxhaw Creek, tributary to the Catawba River, in Union County, and in a short stretch of Goose Creek, a tributary to the Rocky River in the Pee Dee River system.

#### *Smooth Coneflower*

The reported historical range of the smooth coneflower included Pennsylvania, Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, and Arkansas. The species is now known to survive only in Virginia, North Carolina, South Carolina, and Georgia. Six populations survive in North Carolina. The North Carolina populations are in Durham and Granville counties. This species has not been recorded in Mecklenburg County for over 50 years. The habitat of smooth coneflower is open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium- and calcium-rich soils.<sup>59</sup>

**Table 3-28: Federally Listed Species in Mecklenburg County**

Common Name	Scientific Name	Federal Status <sup>a</sup>	State Status <sup>b</sup>	County Status <sup>c</sup>
<b>Birds</b>				
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T (PD)	T	Current
<b>Invertebrates</b>				
Carolina heelsplitter	<i>Lasmigona decorata</i>	E	E	Historic
<b>Vascular Plants</b>				
Smooth coneflower	<i>Echinacea laevigata</i>	E	E-SC	Historic
Schweinitz's sunflower	<i>Helianthus schweinitzii</i>	E	E	Current
Michaux's sumac	<i>Rhus michauxii</i>	E	E-SC	Historic

Source: North Carolina Natural Heritage Program (NCNHP) 2006. 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 June 28, 2006].

<sup>a</sup> Federal Protection Status

- E: Endangered – A taxon in danger of extinction throughout all or a significant portion of its range.
- T: Threatened – A taxon likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- PD: Proposed de-listed – Species has been proposed for de-listing.

<sup>b</sup> State Protection Status

Animals:

- E: Endangered – Any native or once-native species of wild animal whose continued existence as a viable component of the State's fauna is determined by the Wildlife Resources Commission to be in jeopardy or any species of wild animal determined to be an 'endangered species' pursuant to the Endangered Species Act.
- T: Threatened – Any native or once-native species of wild animal which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, or one that is designated as a threatened species pursuant to the Endangered Species Act.

Plants:

- E: Endangered – Any species or higher taxon of plant whose continued existence as a viable component of the State's flora is determined to be in jeopardy. Endangered species may not be removed from the wild except when a permit is obtained for research, propagation, or rescue which will enhance the survival of the species.
- SC: Special Concern – Any species of plant in North Carolina which requires monitoring but which may be collected and sold under regulations adopted under the provisions of the Plant Protection and Conservation Act. Propagated material only of Special Concern species which are also listed as Endangered or Threatened may be traded or sold under specific regulations.

<sup>c</sup> USFWS historic species were last observed in the county more than 50 years ago. NCNHP historic species were last observed in the county more than 20 years ago.

*Schweinitz's Sunflower*

This species is currently known from Anson, Cabarrus, Davidson, Gaston, Mecklenburg, Montgomery, Randolph, Rowan, Stanly, Stokes, Surry and Union counties in North Carolina. Current habitats where this species is found include roadsides, power line clearings, old pastures, woodland openings and other sunny or semi-sunny situations. Schweinitz's sunflower is known from a variety of soil types but is generally found growing on shallow, poor, clayey and/or rocky soils, especially those derived from mafic rocks.<sup>60</sup>

*Michaux's Sumac*

Michaux's sumac is historically thought to be endemic to the coastal plain and piedmont of the Carolinas. Currently, the plant is documented in the following North Carolina counties: Richmond, Hoke, Moore, Scotland, Franklin, Davie, Robeson, and Wake. No known populations of Michaux's sumac occur in Mecklenburg County. This species has not been recorded in Mecklenburg County for over 50 years. Michaux's sumac grows in sandy or rocky open woods in association with basic soils. This plant survives best in areas where some form of disturbance has provided an open area.<sup>61</sup>

Federal Candidate Species and State Listed Species

No candidate or state listed species listed for Mecklenburg County (Table 3-29) were observed during field operations in October 2004.

**Table 3-29: Federal and State Listed Species in Mecklenburg County**

Common Name	Scientific Name	Federal Status <sup>a</sup>	State Status <sup>b</sup>	County Status <sup>c</sup>
<b>Invertebrates</b>				
Carolina creekshell	Villosa vaughaniana	FSC	E	Current
Creepers	Strophitus undulatus	--	T	Current
<b>Vascular Plants</b>				
Tall larkspur	Delphinium exaltatum	FSC	E-SC	Historic
Piedmont aster	Eurybia mirabilis	FSC	SR-T	Current
Georgia aster	Symphotrichum georgianum	C	T	Current

Source: North Carolina Natural Heritage Program (NCNHP) 2006. 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 June 28, 2006].

<sup>a</sup> Federal Protection Status

FSC: Federal species of concern – A Federal species of concern--a species that may or may not be listed in the future (formerly Candidate 2 (C2) species or species under consideration for listing for which there is insufficient information to support listing).

C: Candidate – A taxon under consideration for which there is sufficient information to support listing. This category was formerly designated as a Candidate 1 (C1) species.

<sup>b</sup> State Protection Status

Animals:

E: Endangered – Any native or once-native species of wild animal whose continued existence as a viable component of the State's fauna is determined by the Wildlife Resources Commission to be in jeopardy or any species of wild animal determined to be an 'endangered species' pursuant to the Endangered Species Act.

T: Threatened – Any native or once-native species of wild animal which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, or one that is designated as a threatened species pursuant to the Endangered Species Act.

SC: Special Concern – Any species of wild animal native or once-native to North Carolina which is determined by the Wildlife Resources Commission to require monitoring but which may be taken under regulations adopted under specific provisions.

Plants:

E: Endangered – Any species or higher taxon of plant whose continued existence as a viable component of the State's flora is determined to be in jeopardy. Endangered species may not be removed from the wild except when a permit is obtained for research, propagation, or rescue which will enhance the survival of the species.

T: Threatened – Any resident species of plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

SC: Special Concern – Any species of plant in North Carolina which requires monitoring but which may be collected and sold under regulations adopted under the provisions of the Plant Protection and Conservation Act. Propagated material only of Special Concern species which are also listed as Endangered or Threatened may be traded or sold under specific regulations.

SR: Significantly Rare – Species which are very rare in North Carolina, generally with 1-20 populations in the state, generally substantially reduced in numbers by habitat destruction. These species are generally more common somewhere else in their ranges, occurring in North Carolina peripherally to their main ranges, mostly in habitats which are unusual in North Carolina.

-L: Limited – The range of the species is limited to North Carolina and adjacent states (endemic or near endemic). These are species which may have 20-50 populations in North Carolina, but fewer than 50 populations rangewide.

-T: Throughout – These species are rare throughout their ranges (fewer than 100 populations total).

<sup>c</sup> USFWS historic species were last observed in the county more than 50 years ago. NCNHP historic species were last observed in the county more than 20 years ago.

### **3.8.4 Environmental Impacts and Benefits**

#### **3.8.4.1 Short-term Impacts and Benefits**

##### **No-Build Alternative**

The No-Build Alternative retains existing transit routes. Planned improvements to services will be implemented through existing scheduled projects independent of the streetcar project. No short term direct impacts to the geology, soils, or biotic resources of the region are predicted.

##### **Transportation System Management Alternative**

The TSM Alternative involves expanding the use of existing transit routes and no soil or natural resource disturbing activity will be required. No short term direct impacts to the geology, soils, or biotic resources of the region are predicted.

##### **Build Alternative**

Implementation of the project would occur primarily on existing pavement within the existing travel lanes. Minimal acquisition of additional right-of-way is anticipated only at specific streetcar stops and where traction power sub-stations cannot be incorporated into existing parking structures. All construction activities will be limited to within the travel lane.

##### **Geology**

No cuts or blasting will be required, therefore no substantial short term impacts to the geological resources of the region are predicted.

##### **Soils**

Soil disturbing activities will be temporary and minimal by nature, and will occur at locations currently covered by impervious surface. Potential short term limitations of the soil types identified within the construction limits are described in Section 3.8.3.2 and include erosion hazards, shrink/swell potential, differential settlement, and flood hazard. The topography of the region and soil properties underlying the alignment may lead to any or all of these issues. Short term impacts will be compensated for through proper engineering design and best management practices for erosion control during construction.

##### **Biotic Resources and Wildlife**

No disturbance or clearing of vegetated areas or disturbance in riparian zones will be required. No substantial short term impacts to the biotic resources of the region are predicted.

No short term impacts to the Federal listed, Federal candidate, and State listed species in the vicinity of the project corridor are expected. Findings are summarized in Table 3-30.

#### **3.8.4.2 Long-term Impacts and Benefits**

##### **No-Build Alternative**

Under the No-Build Alternative, existing transit routes would continue in service. Construction of transit centers, park and ride lots, and other transportation infrastructure improvements scheduled in the State Transportation Improvement Program (STIP) as adopted by the North Carolina Board of Transportation (BOT) and the Mecklenburg-Union Metropolitan Planning Organization (MUMPO) would be independent of any transit project for the streetcar corridor. No long-term

direct impacts to the geology, soils, or biotic resources of the region are predicted.

### **Transportation System Management Alternative**

The Transportation System Management (TSM) Alternative involves expanding the use of existing transit routes. No cuts, soil disturbing activity, clearing of forested areas, or disturbance in riparian zones will be required to implement the TSM Alternative. Therefore, no long-term direct impacts to the geology, soils, or biotic resources of the region are predicted.

### **Build Alternative**

The design of the project is on existing pavement within the existing travel lanes and construction activities will be limited to within the travel lane. Minimal right-of-way acquisition will occur at specific stops and for some traction power substations that cannot be incorporated into existing land uses.

#### **Geology**

No significant long term impacts to the geological resources of the region are predicted.

#### **Soils**

Soil disturbing activities will be temporary and minimal by nature. Soil properties can affect the engineering design of the final alignment. Potential long term limitations of the soil types identified within the construction limits of the project are described in Section 3.8.3.2 and include shrink/swell potential, differential settlement, and flood hazard.

#### **Biotic Resources and Wildlife**

No disturbance or clearing of vegetated areas or disturbance in riparian zones will be required. No significant 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. Findings are summarized in Table 3-30.

**Table 3-30: Anticipated Impact on Listed Species**

Species	Analysis	Status		Biological Conclusion
		Federal	State	
<b>Federally Listed Species</b>				
Bald eagle	Appropriate habitat for the bald eagle does not exist within the alignment and construction limits of the project corridor. No known occurrences of the species have been recorded within the project area and no bald eagles were observed during field investigations.	T	T	No Effect
Carolina heelsplitter	The project area does not provide suitable habitat for the Carolina heelsplitter. In addition, no individuals were observed during the field investigations.	E	E	No Effect
Smooth coneflower	Appropriate habitat for smooth coneflower does not exist within the alignment and construction limits of the project corridor. No known occurrences of the species have been recorded within the project area. In addition, no individuals were observed during the field investigation.	E	E-SC	No Effect
Schweinitz's sunflower	Appropriate habitat for Schweinitz's sunflower does not exist within the alignment and construction limits of the project corridor. No known occurrences of the species have been recorded within the project area. In addition, no individuals were observed during the field investigation.	E	E	No Effect
Michaux's sumac	Appropriate habitat for the Michaux's sumac does not exist within the alignment and construction limits of the project corridor. No individuals were observed during the field investigation.	E	E-SC	No Effect
<b>State Listed Species</b>				
Carolina creekshell	Appropriate habitat for the Carolina creekshell does not exist within the alignment and construction limits of the project corridor. No individuals were observed during the field investigation.	FSC	E	No Effect
Creeper	Appropriate habitat for the creeper does not exist within the alignment and construction limits of the project corridor. No individuals were observed during the field investigation.	None	T	No Effect
Tall larkspur	Appropriate habitat for the tall larkspur does not exist within the alignment and construction limits of the project corridor. No individuals were observed during the field investigation.	FSC	E-SC	No Effect
Georgia aster	Appropriate habitat for the Georgia aster does not exist within the alignment and construction limits of the project corridor. No individuals were observed during the field investigation.	C	T	No Effect