

## 2.0 ALTERNATIVES CONSIDERED

This chapter focuses on the development and evaluation of alternatives considered for a transportation investment in the Northeast Corridor; the definition of the alternatives assessed in the Draft Environmental Impact Statement (EIS) (August 2010) and carried forward in this Final EIS; and the capital and operating costs of the Preferred Alternative.

### 2.1 Changes to this Chapter since the Draft EIS

The following sections have been added since the Draft EIS (August 2010) to describe new details about the proposed project and to identify the selection of the Preferred Alternative evaluated in this Final EIS:

- Section 2.2.7 Alternatives Considered in the Draft EIS
- Section 2.2.8 Scope Reduction
- Section 2.2.9 Selection of the Preferred Alternative

Since the Draft EIS, design of the LYNX BLE has been refined and is described in this chapter. Information has also been added to address comments on the Draft EIS (August 2010) and agency coordination, particularly relative to selection of the Preferred Alternative. Capital costs and operating and maintenance costs have also been updated based on recent project changes.

### 2.2 Screening, Selection and Refinement Process

In 1994, the Charlotte-Mecklenburg Planning Commission adopted the *Centers and Corridors Concept Plan*, a vision to modify the region's existing growth patterns by concentrating development and redevelopment in five radial corridors extending from Center City Charlotte out to the Mecklenburg County line: South, North, Northeast, Southeast and West Corridors. The overall goal was to make the best use of existing and future infrastructure investments by focusing growth. The plan identified a county-wide rapid transit system that included rapid transit service in each of the identified corridors where existing interstate infrastructure is already present and where growth should be focused. The Northeast Corridor is one of the corridors identified in the *Centers and Corridors Concept Plan* and in the updated *Centers, Corridors and Wedges Growth Framework* (August 2010).

In 1998, the *2025 Integrated Transit/Land Use Plan* advanced the *Centers and Corridors Concept Plan* a step further by evaluating specific transit options (alignment/mode) and outlined land use initiatives that were intended to promote the focusing of development in the transit emphasis corridors. The guiding principle for plan implementation was a mutually supportive strategy linking transit and land use decisions. The plan recommended rail in the South and North corridors and Bus Rapid Transit (BRT) in the Northeast, Southeast and West corridors. This plan was the basis for a public referendum for implementing a ½-percent sales tax increase to fund the plan's transit/land use concepts. Although the *2025 Integrated Transit/Land Use Plan* identified a preferred strategy for each of the five corridors, it was recommended that the final alignment and a modal technology be determined through a more detailed Major Investment Study (MIS) process for each corridor. In 1999, Charlotte Area Transit System (CATS) initiated their first MIS on the South Corridor to begin implementation of the *2025 Integrated Transit/Land Use Plan*.

The South Corridor MIS was completed in 2000 resulting in the selection of a light rail transit alignment as the Locally Preferred Alternative (LPA). That project, now called the LYNX Blue Line, began revenue service in November 2007.

Between 2000 and 2002, CATS completed MIS documents for the North, Northeast, Southeast and West corridors to examine a full range of transportation alternatives. The LPA selected for the Northeast Corridor at the conclusion of the MIS was light rail between Center City Charlotte and the University of North Carolina at Charlotte (UNC Charlotte) to Interstate 485 (I-485) and BRT between the University Area to Concord. The results of the Northeast Corridor MIS, along with the other corridor MIS documents, were incorporated into the regional long-range transportation planning process and adopted in the *2025 Corridor System Plan*.

In 2004, CATS moved forward with the conceptual engineering of the light rail element of the MIS LPA. This phase allowed for a more detailed analysis of the Light Rail Alternative and resulted in refinements to the proposed alignment and station locations. During this time, CATS, along with the Charlotte Department of Transportation (CDOT), City of Charlotte Engineering & Property Management (E&PM), City of Charlotte Neighborhood and Business Services, Economic Development Office and the Charlotte-Mecklenburg Planning Department (Planning), worked to refine the alignment and identify station locations for the proposed LYNX Blue Line Extension Northeast Corridor Light Rail Project (LYNX BLE).

A Refined Locally Preferred Alternative (R-LPA) was adopted by CATS' governing board, the Metropolitan Transit Commission (MTC), in June 2006. The R-LPA incorporated alignment refinements that occurred between 2004 and 2006, prior to the adoption of the updated *2030 Transit Corridor System Plan* in November 2006. The updated plan remains consistent with the land use plans and policies set forth in the *Centers and Corridors Concept Plan* as well as the *2025 Integrated Transit/Land Use Plan*.

In November 2007, CATS received Federal Transit Administration (FTA) approval to initiate the next phase of project development, Preliminary Engineering. As part of the Preliminary Engineering phase, further refinements were made to the LPA. The plans continue to be consistent with the recently updated *Centers, Corridors and Wedges Growth Framework*, August 2010. On October 28, 2009, the MTC adopted the proposed LPA as described and evaluated in the Draft EIS (August 2010). The LPA included 13 stations and was approximately 10.7 miles long.

In November 2010, subsequent to the circulation of the Draft EIS (August 2010), the MTC received a report on the financial capacity of CATS and its ability to deliver the *2030 Transit System Plan*. The financial capacity study recommended a reduction in the projected capital and operating costs of the proposed project. In order to advance the proposed LPA, the MTC directed CATS staff to reduce the project scope by approximately 20 percent. Extensive coordination was undertaken and on January 26, 2011, the MTC approved a revised LPA alignment and station locations for the proposed project. Light rail between Center City Charlotte and UNC Charlotte was selected as the revised LPA, eliminating the section between the UNC Charlotte Station and the I-485/N. Tryon Station. This alternative was also selected as the National Environmental Policy Act (NEPA) Preferred Alternative. The Preferred Alternative includes 11 stations and is approximately 9.4 miles long.

The following sections describe the process of identifying, evaluating and refining alternatives for the LYNX BLE in previous studies. The selection of the LPA by the MTC and the refinement of the LPA in subsequent engineering phases are also described. Additional detail regarding the revised LPA and the selection of the Preferred Alternative is also provided.

### 2.2.1 Early Alternatives Considered in the 2025 Integrated Transit/Land Use Plan

The *2025 Integrated Transit/Land Use Plan*, completed in 1998, involved an initial study of rapid transit improvements for all of the corridors identified in the *Centers and Corridors Concept Plan*. Initially, a full range of alternatives was developed for each corridor and these alternatives were based on field work, professional assessments of appropriate technologies and alignments and community input. The number and type of modes and alignments were then narrowed to one rail option and one BRT option for each corridor. The selection of the two options was based on an evaluation of each candidate's potential to shape future growth, capital cost, ease of implementation and potential environmental or social fatal flaws.

For the Northeast Corridor (called the University Corridor in the *2025 Integrated Transit/Land Use Plan*), the following BRT and rail options were selected:

- BRT Alternative: Center City Charlotte to UNC Charlotte via Graham Street, I-85 and Mallard Creek Church Road.
- Rail Alternative: Center City Charlotte to UNC Charlotte via the Norfolk Southern "O" line to Derita, the IBM rail spur to University Research Park and a new alignment extending east to the UNC Charlotte campus.

The initial range of alternatives included: BRT options that used W.T. Harris Boulevard; University City Blvd./NC-49; North Tryon Street/US-29; the IBM rail spur rail options that used the North Carolina Railroad (NCRR); and University City Blvd./NC-49. These options were not considered promising for the Northeast Corridor.

The rail and BRT options selected for each corridor were refined and subjected to additional evaluation. Measures included potential job and household growth for each option, capital cost, capital cost-per-mile, ridership, long-term need for congestion relief and long-term land use opportunities. Following the evaluation, a single conceptual alternative was recommended for each corridor based on what would best support focused development in the region.

In the Northeast Corridor, the plan recommended BRT as an efficient and cost effective option for serving existing centers and supporting future development opportunities in the corridor. A more detailed MIS was recommended to study both BRT and rail alternatives for the corridor.

### 2.2.2 Alternatives Considered in the Northeast Corridor Major Investment Study

The Northeast Corridor Major Investment (MIS) Study was initiated in 2000 to advance the recommendations of the *2025 Integrated Transit/Land Use Plan* and the *Centers and Corridors Concept Plan* and to conduct a more detailed study of rail transit and modal alternatives for the Northeast Corridor. A Notice of Intent to Prepare an EIS was published by the FTA on September 29, 2000. A comprehensive range of rail/transit modes was considered for the study, including BRT, light rail, streetcar and commuter rail.

Alternatives were initially developed based on recommendations from the *2025 Integrated Transit/Land Use Plan* and suggestions made during the scoping process initiated at the beginning of the study. The initial list of alternatives was screened to eliminate those alternatives that were fatally flawed from an engineering or environmental perspective or would be unlikely to meet project goals and objectives. The remaining alternatives were carried forward for more detailed evaluation in the MIS.

The alternatives carried forward for detailed evaluation after the initial screening are listed in Table 2-1. Three modal alternatives – BRT, light rail and streetcar – were included. Some of these modes were considered on different alignments (see Figures 2-1a and 2-1b). The commuter rail alternative was eliminated from further consideration because the mode could not adequately serve the current and future planned activity centers in the Northeast Corridor; the right-of-way available for commuter rail service is located at the eastern edge of the corridor and is heavily used by existing freight and passenger services. Moreover, commuter rail technology is considered more appropriate for longer distance trips (25 to 60 miles and beyond) with infrequent stops, which is different than the kind of service identified as necessary for the Northeast Corridor.

**Table 2-1  
Alternatives Studied in Detail in MIS**

Name	Transit Type	To/From	Via
NE-2 <sup>1</sup>	Baseline Alternative		
NE-3 <sup>2</sup>	BRT	Center City Charlotte to Concord Mills	Statesville Avenue, Asbury Avenue, North Graham Street, I-85
NE-4	LRT	Center City Charlotte to I-485	NCRR, Brevard Street, North Tryon Street/US-29
NE-5	LRT	Center City Charlotte to I-485	North Tryon Street/US-29
NE-6	Streetcar	Center City Charlotte to US-29/NC-49 “weave”	North Tryon Street/US-29
	BRT (branch 1)	Center City Charlotte to Concord Mills	same as NE-3
	BRT (branch 2)	University Research Park to I-485	North Tryon Street/US-29, Salome Church Road
NE-7	LRT	Center City Charlotte to UNC Charlotte	same as NE-4
	BRT (loop)	University Research Park to Concord Mills	I-85, new Busway, University City Blvd./NC-49, North Tryon Street/US-29, Mallard Creek Church Road

Notes: <sup>1</sup> Alternative numbering begins with NE-2, because the initial list of alternatives included a No-Build Alternative (NE-1) and a Transportation System Management (TSM) Alternative (NE-2). During FTA coordination, it was agreed that the No-Build and TSM alternatives would be replaced by a single Baseline Alternative for the Northeast Corridor MIS. <sup>2</sup>This alternative is a modified version of the BRT alternative recommended in the *2025 Integrated Transit/Land Use Plan*. Source: *Northeast Corridor Major Investment Study*, 2002.

Alternatives were evaluated to determine how well each supported regional land use, mobility, environmental, financial and system development goals. Prime considerations included the following:

- Support for existing land use patterns;
- Potential for future transit-oriented development;
- Estimated ridership;
- Travel time savings;
- Connections to activity centers and event sites;
- Support for regional air quality goals;
- Potential for effects on the built and natural environments;
- Capital and operating costs;
- The ability to function as part of an overall regional system; and,
- Engineering feasibility and equity of service.

The detailed evaluation results showed that the key differences between alternatives were a function of support for future development patterns, anticipated ridership and costs. Environmental and system development considerations were not differentiators because all alternatives would have minimal to no affect on the built and natural environments, as well as comparable air quality and system development benefits.

The BRT alternatives would serve existing land use patterns better than the light rail alternatives, but light rail would have more potential to support the desired shape of future development called for in the *2025 Integrated Transit/Land Use Plan*. The BRT alternatives would have more total available land to develop but less transit-oriented development potential. The light rail alternatives, on the other hand, would yield more land use and economic development advantages because they would have better pedestrian access, a better mix of uses and more transit-oriented development potential. The relative costs of alternatives were varied but the multi-modal alternatives were generally more expensive to build and operate. All alternatives were found to have similar order-of-magnitude costs.

### 2.2.3 Selection of a Locally Preferred Alternative and Adoption of a Transit Corridor System Plan

Guided by the Northeast Corridor MIS findings and the land use, mobility, environment, financial, and system development goals, the MTC selected an LPA for high capacity transit in the Northeast Corridor (Figure 2-1b) on November 20, 2002. The LPA combined light rail and BRT elements studied in the MIS. The light rail portion of the LPA (Alignment NE-4 in the MIS) would extend the LYNX Blue Line light rail from Center City Charlotte to the I-485 vicinity near the county line. The BRT portion was planned to serve the University Research Park and Concord Mills, connecting to the light rail line at UNC Charlotte. To lower capital costs, the BRT portion of the LPA was a reduced version of what was considered in the MIS. Together, the light rail and BRT elements were planned to serve the multiple markets in the Northeast Corridor.

The primary purpose of the LPA and the regional transit system defined in the adopted *2025 Corridor System Plan* was to promote the *Centers and Corridors Concept Plan* vision of corridor-focused development and provide an alternative to driving. The intention of the selected LPA is to enrich key activity centers and leverage investments in the transportation system. Light rail was selected as the primary component of the LPA because it has more potential for transit oriented development in the Northeast Corridor than BRT. Therefore, light rail would better support the region's *Centers and Corridors Concept Plan* vision and implement the *2025 Integrated Transit/Land Use Plan*. A light rail extension would also improve the operational effectiveness of the existing LYNX Blue Line light rail service in the South Corridor and leverage the investment already made by CATS.

### 2.2.4 Conceptual Engineering LPA Refinements

In the summer of 2004, the light rail component of the LPA was advanced to a conceptual engineering phase, based on a Memorandum of Understanding between CATS and FTA. This advancement of the proposed project allowed CATS to achieve the following:

- Obtain more detail-oriented level engineering mapping;
- Identify specific station locations and provide for greater transit-oriented station area development;
- Continue public involvement efforts and refine the alignment based on further public and agency comment; and,
- Minimize or avoid environmental impacts along the corridor.

As more planning, environmental and engineering data was developed, it was necessary to make refinements to the alignment to reflect updated conditions and to identify the best project alignment to advance into future phases of project development. Representatives from CATS, their engineering consultants, City Departments, and the City's station area planning consultants worked collaboratively to identify the best station locations and refine the alignment. The refinements included the addition of a light rail station that would directly serve the UNC Charlotte campus and terminating the line south of I-485. Details of alignment refinements can be found in the *Refined LPA Report* (August 2007).

In addition to the internal coordination that occurred within the City Departments, CATS continuously solicited public input on each station location and alignment refinement as the design progressed. See Chapter 22.0: Public Involvement and Agency Coordination for additional detail.

### 2.2.5 Adoption of a R-LPA and an Updated Transit Corridor System Plan

On June 28, 2006, the MTC adopted the R-LPA for the Northeast Corridor as identified in Figure 2-1b. This R-LPA, along with the refined LPA's for the other corridors being studied by CATS, was incorporated into the agency's *2030 Transit Corridor System Plan* that was adopted by the MTC on November 15, 2006. The *2030 Transit Corridor System Plan* includes the prioritization of the region's transit projects, a plan for implementation based on updated capital cost estimates and the source of funding for each transit corridor.

### 2.2.6 Preliminary Engineering LPA Refinements

In November 2007, the FTA approved CATS' application to enter into the Preliminary Engineering phase of project development and these activities started immediately thereafter. Due to the overwhelming success of the LYNX Blue Line light rail, it was apparent that the proposed LYNX BLE project needed to re-examine some key design decisions in order to accommodate higher projected ridership, and to reflect new projects in the area. These considerations, as well as input received during public meetings and in coordination with North Carolina Department of Transportation (NCDOT), NCRR, Carolinas Medical Center–University, UNC Charlotte and Norfolk Southern (NS), led to additional refinements of the alignment and station locations during preliminary engineering. These refinements are described in the supporting *Refinement of Alternatives Report* (July 2010), and were adopted by the MTC on April 22, 2009 and October 28, 2009. Following public input, refinements to the LPA remained consistent with CATS' adopted *2030 Transit Corridor System Plan*. The LPA was represented in the Draft EIS (August 2010) as the Light Rail Alternative and was based on *30% Preliminary Engineering Design Plans*, completed in March 2010.

As part of the adoption of the R-LPA in 2006, the MTC determined that a design option for the Sugar Creek area should be further studied. In 2008, CATS, in partnership with the Charlotte-Mecklenburg Planning Department and the City of Charlotte's NBS Economic Development Office, conducted an Alternatives Analysis on the Light Rail Alternative – Sugar Creek Design Option. This study is available under separate cover as the *CATS Blue Line Extension Sugar Creek and North Carolina Railroad Alignment Alternatives Study* (February 2009). In late 2008, CATS presented the study findings to public and the MTC. The results of this Alternatives study and additional detail on the potential environmental impacts, including costs, were provided throughout the Draft EIS (August 2010). This documented the examination of the design option and allowed for additional public comment.

As previously mentioned, the Light Rail Alternative and the Light Rail Alternative – Sugar Creek Design Option were evaluated in the Draft EIS and are described in Section 2.2.7.

### 2.2.7 Alternatives Considered in the Draft Environmental Impact Statement

Four alternatives were evaluated in the Draft EIS (August 2010). They included:

- The No-Build Alternative, in which no changes to transportation service or facilities would be implemented in the corridor beyond already committed projects;
- The TSM Alternative, in which low to medium cost improvements to the operations of the CATS local bus service would be implemented, in addition to the currently planned transportation improvements in the corridor;
- The Light Rail Alternative, in which light rail would be constructed between Center City Charlotte and I-485 near the Mecklenburg-Cabarrus County line, primarily using existing railroad rights-of-way and North Tryon Street/US-29. The Light Rail Alternative included 13 stations, including 7 with park-and-ride facilities, would be constructed as an extension of the existing LYNX Blue Line light rail line; and
- The Light Rail Alternative – Sugar Creek Design Option, a design option for the light rail alignment between Sugar Creek Road and Old Concord Road and the two stations located in this segment.

The Light Rail Alternative – Sugar Creek Design Option represents a change from the proposed Light Rail Alternative alignment between Sugar Creek Road and Old Concord Road, and a change in the locations for the station platforms and park-and-ride locations for the Sugar Creek and Old Concord Road Stations. The proposed Light Rail Alternative alignment and stations leading up to and departing from the area of the Light Rail Alternative – Sugar Creek Design Option would not change under this design option.

The alignment would divert from the Light Rail Alternative just after it passes Sugar Creek Road. Like the Light Rail Alternative, the alignment for the proposed Light Rail Alternative – Sugar Creek Design Option would be grade-separated from the roadway.

The Light Rail Alternative – Sugar Creek Design Option light rail alignment would turn north towards North Tryon Street/US-29 approximately 200 feet north and east of Sugar Creek Road, rather than continuing along the NCCR right-of-way to north of Eastway Drive, like is proposed under the Light Rail Alternative. This design option alignment would then go up and over the northbound travel lanes of North Tryon Street/US-29 approximately 800 feet north of Dorton Street and then return to street level in the median of North Tryon Street/US-29 approximately 160 feet north of Bennett Street.

The Light Rail Alternative – Sugar Creek Design Option would continue north and east in the median of North Tryon Street/US-29. A retaining wall would begin approximately 712 feet south of Eastway Drive and continue to a bridge to cross over Eastway Drive. The light rail would descend on a retaining wall for another 750 feet to Northchase Drive. The design option would continue at street level through the intersection at Old Concord Road, to the point where the alignment merges with the Light Rail Alternative alignment at Austin Drive.



Light Rail Alternative – Sugar Creek Design Option

### 2.2.8 Scope Reduction

In November 2010, subsequent to the circulation of the Draft EIS (August 2010), the MTC received a report on the financial capacity of CATS and its ability to deliver the 2030 Transit System Plan. Based on the analysis presented, it was determined that the LYNX BLE proposal could not be achieved due to financial constraints. In order to advance the LYNX BLE, the financial capacity study recommended a reduction in the projected capital and operating costs of the proposed project. The MTC directed CATS staff to reduce the project scope by 20 percent and reduce the operating and maintenance costs by approximately 6.5 percent. It was determined that additional cost savings could also be captured by accelerating the project schedule to begin revenue service in 2016.

Extensive coordination was undertaken with partner departments, UNC Charlotte, NCDOT and the FTA. In order to reduce the capital and operating costs, the following changes were recommended:

- Reduce project length by 1.2 miles, terminating at the UNC Charlotte Station and eliminating the Mallard Creek Church Road Station and I-485/N. Tryon Station (yielding lower capital costs)
- Reduce service frequency by operating 2-car trains every 7.5 minutes initially and 3-car trains every 10 minutes by 2035 (yielding lower operating and maintenance costs)
- Reduce number of vehicles to be purchased from 26 to 18 (yielding lower capital costs and lower operating and maintenance costs; feasible by reduction of the project length and change in operating plan, which reduces the vehicle requirement)
- Eliminate the Vehicle Light Maintenance Facility at the existing Norfolk Southern Intermodal Yard; construct a storage yard only at the existing Norfolk Southern Intermodal Yard and make minor improvements to the existing South Boulevard Light Rail Facility (yielding lower capital costs)
- Construct surface lots at the Sugar Creek Station instead of a parking garage (yielding lower capital costs)
- Eliminate park-and-ride facilities at Tom Hunter Station (a Value Engineering recommendation made in July 2010) and McCullough Station (yielding lower capital costs)

Terminating the proposed project at the UNC Charlotte Station would result in an estimated \$92 million in net savings. A large part of the savings is attributed to the elimination of approximately 1.1 miles of mostly bridge structure that crosses wetlands/streams and a grade separation of Mallard Creek Church Road. In addition, the changes at the Sugar Creek Station result in an estimated net savings of \$9 million. The reduction in vehicle fleet size results in a savings of approximately \$38 million, with a savings of \$26 million attributed to the reduction in the Vehicle Light Maintenance Facility needs. The overall net savings resulting from the listed changes is approximately \$165 million. By shortening the project, CATS is able to

keep key project elements that ensure a high quality system, reliable service, and safe and secure operations. Despite elimination of the 2,000 space parking garage at the I-485/N. Tryon Station, it was determined that approximately 90 percent of ridership would be retained and that most of the ridership would redistribute to other nearby stations, namely the JW Clay Blvd. Station and the University City Blvd. Station. To accommodate increased ridership at these two stations, the proposed project now includes increased parking (approximately 1,510 spaces) in a parking deck at the University City Blvd. Station and the addition of a parking deck (approximately 690 spaces) at the JW Clay Blvd. Station. Approximately \$40 million in budget was retained to replace the parking previously proposed for the I-485/N. Tryon Station. Additionally, a right/through lane along North Tryon Street/US-29 from Orchard Trace to Shopping Center Drive has been added to accommodate the additional traffic that would result from the University City Blvd. Station park-and-ride facility.

A public meeting was held on January 12, 2011 at the Oasis Shriner's Center to review these proposed changes and gather input from the public (see Chapter 22.0: Public Involvement and Agency Coordination for additional detail). The proposed project changes were generally accepted by the public, and on January 26, 2011 the MTC approved a revised LPA alignment and station locations for the proposed LYNX BLE. Based on this approval, the proposed project would now terminate at the UNC Charlotte Station rather than at I-485/N. Tryon Station, removing approximately 1.2 miles of the alignment and two stations.

### 2.2.9 Selection of the Preferred Alternative

Following circulation of the Draft EIS (August 2010) and the MTC's approval of the revised LPA, a NEPA Preferred Alternative was selected. The revised LPA, as described in Section 2.2.8, is the NEPA preferred alternative. The NEPA Preferred Alternative is that which causes the least damage to the biological and physical environment, while best protecting, preserving and enhancing historic, cultural and natural resources.

It was determined that the Light Rail Alternative – Sugar Creek Design Option would result in less impact on jurisdictional streams (approximately 1,113 linear feet less) than the Light Rail Alternative, and would avoid noise and vibration impacts to properties along Leafmore Drive and St. Anne's Place. However, the Light Rail Alternative – Sugar Creek Design Option would result in additional impacts to several other resources, including:

- **Historic resources:** The Light Rail Alternative – Sugar Creek Design Option would directly impact the Republic Steel Corporation property, which is eligible for the National Register of Historic Places.
- **Human resources:** The Light Rail Alternative – Sugar Creek Design Option would require significantly more acquisitions and displacement of businesses. Approximately 10 more business displacements, 19 more partial acquisitions and six more full acquisitions than the Light Rail Alternative would result.
- **Visual resources:** The Light Rail Alternative – Sugar Creek Design Option would result in two more potential visual and aesthetic impacts than the Light Rail Alternative. Specifically, there would be greater visual impacts along North Tryon Street/US-29 from Dorton Street to Old Concord Road; and there would be a greater negative visual impact to the Republic Steel Corporation property.
- **Financial resources:** Capital costs for the Light Rail Alternative – Sugar Creek Design Option would be greater than for the Light Rail Alternative. The 15 Percent Cost Estimate indicated that the Light Rail Alternative – Sugar Creek Design Option would be approximately \$57.9 million greater than the Light Rail Alternative due to the grade separation required over Eastway Drive and the additional right-of-way acquisition and relocations.

Therefore, it was determined that the Light Rail Alternative – Sugar Creek Design Option would be eliminated from further consideration and that the revised LPA would carry forward as the NEPA Preferred Alternative. As such, only the revised LPA is evaluated in this LYNX BLE Final EIS and will henceforth be referred to as the Preferred Alternative.

## 2.3 Alternatives Considered in the Final EIS

The following alternatives are included in this Final EIS:

- The No-Build Alternative, in which no changes to transportation service or facilities would be implemented in the corridor beyond already committed projects;
- The TSM Alternative, in which low to medium cost improvements to the operations of the CATS local bus service would be implemented, in addition to the currently planned transportation improvements in the corridor; and
- The Preferred Alternative, in which light rail would be constructed between Center City Charlotte and UNC Charlotte, primarily using existing railroad rights-of-way and North Tryon Street/US-29. The light rail line would be constructed as an extension of the existing LYNX Blue Line light rail line.

The TSM Alternative was used in the Draft EIS (August 2010) as a baseline alternative for comparison in Chapter 21.0: Evaluation of Alternatives, as required under the FTA's New Starts program, and is also used in this Final EIS for the same purpose. It was determined in the Draft EIS (August 2010) that the TSM Alternative does not meet the Purpose and Need of the proposed project. Therefore, only the No-Build and Preferred Alternatives are evaluated in this Final EIS.

### 2.3.1 No-Build Alternative

The No-Build Alternative includes: transit services; highway and transit facilities; and railroad improvements that are planned to exist in 2035. The No-Build Alternative provides the underlying foundation for comparing the travel benefits and environmental impacts of the other alternatives. The No-Build Alternative includes:

- The existing highway network;
- Highway improvements that NCDOT has scheduled in the State Transportation Improvement Program (STIP);
- Highway improvements from the financially constrained *2035 Long Range Transportation Plan*;
- Roadway improvements in the *City of Charlotte's 25-year Transportation Action Plan*;
- Existing transit routes and schedules as of January 2009;
- Other new bus services to which CATS has committed; and
- Routine replacement of existing transit facilities and equipment at the end of their useful life.

The transit component of the No-Build Alternative includes the existing light rail and bus service expansion. Transit services under the No-Build Alternative represent the existing transit services, planned expansion of existing bus services, plus more frequent light rail service in the South Corridor. For the No-Build Alternative, one new route would add service in the Northeast Corridor. Several other existing routes in the corridor would have more frequent service. Table 2-2 and Figure 2-2 show the bus service operating in the Northeast Corridor for the No-Build Alternative.

**Table 2-2  
Bus Service in Northeast Corridor for No-Build Alternative**

Routes	Frequency			Type	Change from Existing
	Peak	Midday	Night		
3-The Plaza	20	30	45	Local	Increase peak frequency.
4-Country Club	30	30	45	Local	No Change
11-North Tryon	10	10	30	Local	No Change
13-Nevin Rd.	30	30	30	Local	No Change.
22-North Graham St.	30	30	40	Local	No Change
23-Shamrock	15	30	45	Local	Increase peak frequency.
29-UNC Charlotte/South Park*	45	45	---	Local	No Change
39-Eastway	35	45	45	Local	No Change
54x-URP Express	12	---	---	Express	No Change
80x-Concord	20	---	---	Express	No Change
204-Lasalle	30	30	60	Local	No Change
211-Hidden Valley	20	20	30	Local	No Change

Note: “---” refers to no service being operated during those frequencies.

\* Existing UNC Charlotte shuttle routes would also be operated, but are not modeled in the travel demand model.

Source: AECOM Metrolina Travel Demand Model, 2011.

### 2.3.2 TSM Alternative

The TSM Alternative is a lower capital cost approach for addressing the need for transit improvements in the Northeast Corridor. Under federal guidelines, it provides the baseline for evaluating the cost-effectiveness of the build alternatives. The TSM Alternative includes the highway and transit improvements associated with the No-Build Alternative in the Northeast Corridor, along with additional service and facilities to improve service along the Northeast Corridor to Center City Charlotte and University City. These improvements include two skip-stop bus routes. Skip-stop services operate with fewer stops than local routes to minimize travel times. One skip-stop service route would deviate from North Tryon Street/US-29 and follow I-85 into Center City Charlotte. The second skip-stop service route would begin at the UNC Charlotte Station and travel along North Tryon Street/US-29 into Center City Charlotte. Skip-stop bus service improvements include revisions or additions to the existing bus service, upgraded stops with ticket vending machines and closed circuit televisions, bus queue jumpers at select intersections (including signal prioritization), and the construction of four new park-and-ride lots with pedestrian and bicycle facilities. Additionally, a signal would be installed at the University City Blvd. park-and-ride lots. This alternative also assumes the procurement of hybrid buses to reduce air quality emissions, as well as upgrades to the existing CATS South Tryon Street Bus Maintenance Facility to provide space for the additional bus fleet. No changes to transit service outside the corridor would be made. Table 2-3 and Table 2-4 and Figure 2-3 show the proposed bus service improvements and park-and-ride locations for the TSM Alternative.

**Table 2-3  
Bus Service in Northeast Corridor for TSM Alternative**

Routes	Frequency			Type	Change from No-Build
	Peak	Midday	Night		
3-The Plaza	20	30	45	Local	Reroute to provide more direct service along The Plaza
4-Country Club	30	30	45	Local	Remove open loop to better serve the NoDa community and provide transfer to 604 Skip Stop 2
11-North Tryon	20	20	30	Local	Decrease peak frequency
13-Nevin Rd.	30	30	30	Local	Extend route to serve areas previously served by No Build Rt 22-Graham as well as to provide transfer to skip stop services 604-2 and 613x
22- Graham St.	30	30	40	Local	Rerouted to provide transfer to 604-NE Skip Stop 2
23-Shamrock	15	30	45	Local	Increase peak frequency
29-UNC Charlotte/South Park*	40	40	---	Local	Streamline route for more efficient service as well to provide transfer to 613-NE Skip Stop Express
39-Eastway	30	30	30	Local	Route becomes a crosstown service, providing transfer to skip stop services 604-1 and 613x as well as serving social services and medical facilities
54x-URP Express	12	---	---	Express	No change.
80x-Concord	20	---	---	Express	No change.
110-Concord Mills Mall	30	30	60	Local	New route providing service to Concord Mills Mall and Mallard Creek Church Rd and transfer to 613-NE Skip Stop X
125-Derita/Prosperity Church	30	30	40	Local	New route developed from No Build Rt. 22-Graham St that provides service to Prosperity Church Rd, Mallard Creek Rd, and the Derita Community, as well as transfer to skip stop services 604-2 and 613x
204-Lasalle	30	30	60	Local	No Change
211-Hidden Valley	20	20	30	Local	Streamline route through the Hidden Valley Community in order to provide more efficient transfer to 604-NE Skip Stop 2
604-NE Skip Stop 2	10	15	20	Local	New route to provide skip-stop service along North Tryon Street/US-29 from City Boulevard to Center City Charlotte.
613-NE Skip Stop Express	10	15	20	Local	New route to provide skip-stop service along North Tryon Street/US-29 from I-485 to University City Blvd./NC-49, then non-stop on I-85 to Center City Charlotte

Note: "---" refers to no service being operated during those frequencies.

\* Existing UNC Charlotte shuttle routes would also be operated, but are not modeled in the travel demand model.

Source: AECOM and the Metrolina Travel Demand Model, 2011.

**Table 2-4  
Park-and-Rides in Northeast Corridor for TSM Alternative**

Park-and-Ride	Location
Sugar Creek	Sugar Creek Road and North Tryon Street/US-29
Old Concord Road	Old Concord Road and North Tryon Street/US-29
University City Blvd.	Rocky River Road and North Tryon Street/US-29
JW Clay Blvd.	JW Clay Blvd. and North Tryon Street/US-29

As noted, the TSM Alternative does not meet the Purpose and Need of the proposed project. Therefore, only the No-Build and Preferred Alternative are further evaluated in this Final EIS. The TSM Alternative serves as a baseline alternative in Chapter 21.0: Evaluation of Alternatives, as required by the FTA New Starts program.

### 2.3.3 Preferred Alternative

The Preferred Alternative would begin in Center City Charlotte at the terminus of the CATS' LYNX Blue Line light rail line near 7th Street and extend 9.4 miles northeast towards UNC Charlotte, terminating on the UNC Charlotte campus (see Figure 1-2 in Chapter 1.0: Purpose and Need). The proposed Light Rail Alternative would include bus services to support and supplement the light rail system. The trackway would be configured with two tracks, one for northbound service and one for southbound service. The proposed project would generally exist within either existing railroad or roadway right-of-way. Some portions would be elevated up and over existing freight tracks, roads or other geographic constraints. In one location, the tracks would be depressed under an existing road. The Preferred Alternative is described in more detail in the following sections.

#### 2.3.3.1 Alignment

The Preferred Alternative alignment would begin at the northern terminus of the existing LYNX Blue Line light rail at 7th Street in Center City Charlotte and would follow the former railroad right-of-way north through Center City Charlotte. The right-of-way is owned by the City of Charlotte up to 12th Street and was purchased for transit use in 1998. The proposed Light Rail Alternative would then travel at the existing street level and gated light rail crossings would be used at 7th Street, 8th Street, 9th Street, the proposed 10th Street, and 12th Street. Figure 2-4 shows typical cross-sections for the alignment.

A single track is located between 7th and 9th Street, and a dormant Trolley station is located at 9th Street. The LYNX Blue Line provides light rail service to the 7th Street Station but utilizes the track between 7th and 9th Street to stage extra vehicles for special events. The Preferred Alternative would eliminate the dormant Trolley station at 9th Street, and replace it with a Light Rail Station.

North of 12th Street, the proposed alignment would transition up a retaining wall and onto a bridge in order to pass over the existing CSX Corporation (CSX) rail line, and then return to ground level just before 16th Street. The Preferred Alternative would cross 16th Street at the existing street level with a gated light rail crossing. The alignment would then shift south and run between the southern edge of the Norfolk Southern Intermodal Facility and the northern side of North Brevard Street. A proposed storage yard would be located on the site of the Norfolk Southern Intermodal Facility, which NS plans to relocate to the Charlotte-Douglas International Airport as a separate project. The storage yard is described in more detail in Section 2.2.3.5.

The Preferred Alternative would continue along the northern edge of North Brevard Street and cross over Little Sugar Creek on a bridge and then under the 30th Street Bridge. No changes to Brevard Street would occur. Just beyond 30th Street, the alignment would ascend up a retaining wall and over a bridge to pass over the existing Aberdeen, Carolina & Western Railway Company (AC&W) rail line. The proposed alignment would return to ground level and run parallel to the existing freight tracks on the south side of the NCR right-of-way until Craighead Road.

A new access road for the Duke Energy Substation would be constructed off of North Brevard Street, north of the existing driveway, since the proposed light rail alignment would be located where the existing

entrance is located. The new access road would go under the light rail bridge to provide an entrance to the electrical substation from the west side, as well as to provide access to a proposed signal house for the light rail, and potentially provide additional access to an adjacent parcel. Between 30th Street and Old Concord Road, the light rail would operate in the NCRR right-of-way.



Proposed Duke Energy Substation access road.

NS operates the existing freight service that is active in this segment of the corridor. The Preferred Alternative would include a separation of approximately 54 feet between the freight tracks and the proposed light rail track.

At 36th Street, the proposed light rail would travel within the NCRR right-of-way on the southeast side of the existing freight tracks. Existing 36th Street would be depressed under the existing freight and proposed light rail tracks to alleviate traffic and pedestrian safety and traffic delay concerns and to improve freight operations. The existing freight tracks would be shifted to the north, and the freight tracks and the proposed light rail tracks would be placed on a bridge structure to allow the road to be constructed as an underpass. Just south of Craighead Road, the proposed alignment would go up and over Craighead Road, crossing over the existing freight tracks on a bridge and then return back to ground level on the western side and continue to the northeast.

NCDOT plans to grade separate Sugar Creek Road with either an underpass (depression) or overpass (bridge) with the existing freight tracks that are currently at street level due to safety concerns. CATS has worked with NCRR and NCDOT Rail to develop plans that allow the light rail tracks to be constructed adjacent to the freight tracks, also grade separated from the road. The current design of the LYNX BLE Preferred Alternative assumes that Sugar Creek Road would be depressed under the railroad. Due to the fact that the horizontal and vertical alignment of the LYNX BLE Preferred Alternative would be the same in either case, the impacts of the LYNX BLE Preferred Alternative are not expected to be significantly different.



Rendering of the current LYNX BLE Preferred Alternative design; illustrating the depression of Sugar Creek Road under the existing freight tracks and LYNX BLE Preferred Alternative.

After Sugar Creek Road, the alignment would continue along the northwest side of the existing NS tracks within the NCRR right-of-way. At Eastway Drive, the proposed alignment would go under the existing roadway bridge that carries vehicular traffic as the existing freight tracks do today. The Eastway Drive roadway bridge would be lengthened to accommodate the proposed light rail tracks.

Approximately 2,600 feet north of Eastway Drive, the alignment would depart from the NCRR right-of-way and turn northwest towards the intersection of Old Concord Road and North Tryon Street/US-29 through private property. Due to high traffic volumes, vehicular safety concerns (for motorists and light rail vehicles), and traffic operations at this location, a bridge would be constructed to take the light rail up and over Old Concord Road and the outbound travel lanes of North Tryon Street/US-29. The proposed light rail would return to street level approximately 1,000 feet north of the North Tryon Street/US-29 - Old Concord Road intersection and continue in the median to just north of JW Clay Boulevard and the entrance to the Charlotte Research Institute.

Where North Tryon Street/US-29 meets University City Blvd./NC-49, commonly referred to as the

“weave”, NCDOT and CDOT have designed safety improvements that convert the weave configuration into two at-grade, signalized intersections. Construction of the improved intersections is currently underway.

To pass through the reconfigured intersections, the proposed light rail alignment would begin to ascend onto a bridge structure to pass over the realigned I-85 Connector Road - North Tryon Street/US-29 intersection. The alignment would return to street level south of the University City Blvd. Station park-and-ride entrance, where there would be a signalized intersection provided to access the park-and-ride lot. Beyond Stetson Drive, the alignment would again ascend to an aerial structure and pass over the realigned University City Blvd./NC-49 and City Boulevard intersection and return to street level just north of Brookside Lane.

The proposed alignment would continue at street level in the median of North Tryon Street/US-29, past McCullough Drive. Just north of Ken Hoffman Drive, the alignment would transition to an aerial structure, crossing over W.T. Harris Boulevard and returning to street level just south of J.M. Keynes Drive/Hospital Drive.

After the proposed light rail alignment passes through the intersection of North Tryon Street/US-29 and UNC Charlotte Research Drive, the alignment would begin to descend below the existing street elevation of North Tryon Street/US-29. The alignment would then turn to the southeast towards the UNC Charlotte campus, crossing under the northbound travel lanes of North Tryon Street/US-29, continuing to turn southeast, bringing the light rail alignment onto the campus of UNC Charlotte. The alignment would continue towards the northeastern edge of the existing Charlotte Research Institute buildings. The alignment would cross over Toby Creek and the Toby Creek Greenway on a bridge and then travel along the northern side of Cameron Boulevard, across from the Laurel Hall dormitory. The terminal station would be located directly across from the Laurel Hall dormitory.

### 2.3.3.2 Stations

The Preferred Alternative would include 11 stations, as well as a feeder bus system to support the light rail system. Passengers would board or alight the light rail vehicles at stations. Stations would be configured with center or side platforms, depending on the available site conditions, and most stations would be located at existing ground or street level. All stations would have level boarding to be ADA accessible. The 36th Street Station would be located on a bridge structure that would support the station and light rail tracks while the respective roadway would be depressed underneath.

Platforms are planned to be approximately 300 feet long to accommodate a three-car train consist. Typical center and side platform station layouts are shown in Figure 2-5. Along North Tryon Street/US-29, stations would be located in the median with pedestrian access via crosswalks. All stations would include facilities for bicyclists, such as bike racks or bike lockers. All stations would include:

- Shelters, garbage cans and benches;
- Lighting;
- Self-serve ticket-vending machines (TVM);
- Closed Circuit Television cameras (CCTV);
- Passenger Assistance Telephones (PAT);
- Variable Message Signs (VMS);
- Public Address System (PA);
- Blue light emergency phones; and,
- Customer information, such as maps and schedules for the light rail line and connecting bus routes.

In the more urban areas of the corridor, access to stations would primarily consist of pedestrians, bicyclists, or passengers transferring from bus services; otherwise known as “walk-up” customers. Walk-up stations are more conducive to urban environments where higher land densities exist. Automobile parking would not be provided at walk-up stations; therefore less land acquisition would be required for walk-up stations. On-street bus transfers would take place in proximity to the station locations to facilitate mobility between bus service and the light rail.

Four stations would have park-and-ride facilities with Americans with Disabilities (ADA) accessible parking. The park-and-ride facilities would vary in size based on projected ridership and available land. Park-and-ride facilities have been designed to accommodate access by bus, automobile, bicyclists and pedestrians. Additionally, bus bays and bus stops, would be accommodated at select stations based on available land and projected demand. Parking garages are planned at the University City Blvd. and JW Clay Blvd. Stations. All other parking would be provided at surface parking lots.

Table 2-5 summarizes the basic characteristics of the proposed stations for the Preferred Alternative. Station site plans are included in Figures 2-6 through 2-16.

**Table 2-5  
Proposed Stations for the Preferred Alternative**

Station	Access	Platform Type	Parking Spaces*	Bus Bays/stops*
9th Street Station (Figure 2-6)	Walk-up	Side	0	None
Parkwood Street Station (Figure 2-7)	Walk-up	Side	0	None
25th Street Station (Figure 2-8)	Walk-up	Center	0	None
36th Street Station (Figure 2-9)	Walk-up	Center	0	2 Stops
Sugar Creek Station Park-and-Ride (Figure 2-10)	Park-and-ride	Center	665	3 Bays
Old Concord Road Station (Figure 2-11)	Park-and-ride	Side	330	2 Bays
Tom Hunter Station (Figure 2-12)	Walk-up	Center	0	2 Stops
University City Blvd. Station (Figure 2-13)	Park-and-ride	Center	1,510	3 Bays
McCullough Station (Figure 2-14)	Walk-up	Center	0	2 Stops
JW Clay Blvd. Station (Figure 2-15)	Park-and-ride	Center	690	2 Bays
UNC Charlotte Station (Figure 2-16)	Walk-up	Center	0	2 Bays

\* Reflects the *Project Layout Approved for Development of 65% Design and the FEIS*, March 21, 2011.

**2.3.3.3 Grade Separations**

Based on an evaluation of safety and projected traffic volumes and delays, grade separations are proposed as part of the project to provide safe operations reduce delay to vehicles at intersections through the corridor. The locations of the proposed grade separations are:

- 11th Street (existing)
- I-277 (existing)
- CSX Railroad tracks between I-277 and 16th Street
- AC&W railroad tracks just north of 30th Street/Duke Energy access road
- 36th Street
- E. Craighead Road
- Sugar Creek Road
- Eastway Drive (existing)
- North Tryon Street/US-29 northbound lanes (entrance to median)
- I-85 Connector Road
- University City Blvd./NC-49
- W.T. Harris Boulevard
- Northbound lanes of North Tryon Street/US-29 just north of Grove Lake Dr. (underpass/median exit)

**2.3.3.4 Rail and Street Modifications**

Modifications that would need to occur to existing infrastructure that would result directly from the Preferred Alternative include:

- Addition of a traffic signal at the intersection of Parkwood Avenue and North Brevard Street to provide pedestrian access to the proposed station.
- Construction of a new access driveway off of North Brevard Street for access to the existing Duke Energy substation;
- Grade separation of 36th Street and the NCCR, including construction of a sidewalk along 36th Street under the future freight and light rail bridges;
- Modifications to North Tryon Street to accommodate light rail in the median, described below.

#### North Tryon Street Modifications

The existing right-of-way along most of North Tryon Street/US-29 where the proposed light rail would be located is 120 feet. The required right-of-way width for incorporating light rail into the median is 147 feet plus additional width at intersections to accommodate turn lanes and in station locations. The typical section would include: two 11-foot through travel lanes for northbound and southbound directions; 11-foot turn lanes at intersections; two light rail tracks within the median; five foot bicycle lanes; two foot – six inch curb and gutters on both sides; eight foot planting strips; and six to eight foot sidewalks on both sides (see Figure 2-4).

- Along North Tryon Street/US-29 between Old Concord Road and “the weave,” asymmetrical widening is proposed. Along this section of North Tryon Street/US-29, the intent would be to acquire additional right-of-way primarily on the west side of North Tryon Street/US-29. To accommodate light rail in the median, North Tryon Street/US-29 would be re-built so that the proposed edge of pavement on the east side would be located approximately 10 feet to the east of existing edge of pavement for the north-bound lanes of North Tryon Street/US-29, and the proposed edge of pavement on the west side would be approximately 30 feet to the west of the existing edge of pavement of the south-bound lanes of North Tryon Street/US-29.
- Due to the new terminus at the UNC Charlotte Station, the additional parking needs at University City Blvd. Station results in increased traffic to the area. As such, additional lanes in “the weave” are necessary. A six-lane typical section, with turn lanes is proposed under the LYNX BLE light rail project. The southbound North Tryon Street/US-29 movement would have a three-lane segment from Shopping Center Drive to the I-85 Connector and the northbound North Tryon Street/US-29 movement would have a three-lane segment from Orchard Trace Lane to University City Boulevard/NC-49.
- North of the “the weave” to UNC Charlotte Research Drive (also known as Institute Circle), symmetrical widening of North Tryon Street/US-29 is proposed. This would require approximately the same amount of additional right-of-way on both sides. Along both sides of North Tryon Street/US-29, the proposed edge of pavement would be located approximately 30 feet from the existing edge of pavement.
- Additional widening, along the entire stretch of North Tryon Street/US-29 for both the asymmetrical and symmetrical widening, of approximately ten to 20 feet would be required to accommodate the left/right turn lanes at signalized intersections. The proposed number of turn lanes at each intersection is based on the traffic analysis documented in Chapter 3.0: Transportation. Additional widening would likely be required at the signalized intersections to provide sufficient pedestrian refuge in the median.
- The existing intersection of North Tryon Street/US-29 and Old Concord Road would be modified. The existing skewed intersection would be realigned to a 90-degree intersection by eliminating the free-flow right turn movement from north-bound North Tryon Street/US-29 onto Old Concord Road.
- Signalized intersections would provide vehicular and pedestrian crossings across the light rail tracks.
- All existing signalized intersections would remain and the proposed project would add five new signalized intersections along North Tryon Street/US-29 at Orr Road, Arrowhead Drive, Owen Boulevard, Orchard Trace Lane, and the University City Blvd. Station park-and-ride entrance.
- Existing median openings along North Tryon Street/US-29 where vehicles can currently make a left turn would be closed at: Austin Drive, Heathway Drive, Kemp Street, Stetson Drive, and Clark Boulevard. Side streets and driveways between signalized intersections would be right-in/right-out only and would require vehicles to make left or u-turns at signalized intersections.

### Other Projects

Two projects being undertaken by others have influenced the design of the Preferred Alternative:

- The City's reconfiguration of the North Tryon Street/US-29 and University City Blvd./NC-49 intersections which will result in two at-grade intersections to improve the existing safety conditions of the area referred to as "the weave;" and,
- The NCR and NCDOT Rail Division's plan to grade separate Sugar Creek Road by depressing or elevating Sugar Creek Road under or over the existing freight tracks and proposed light rail tracks.

### 2.3.3.5 Vehicle Storage Yard and Dispatch Facility

As part of the Light Rail Alternative described in the Draft EIS (August 2010), a Vehicle Light Maintenance Facility (VLMF) and storage yard was proposed to be constructed on the existing Norfolk Southern Intermodal Facility that abuts North Brevard Street. Due to the reduction in the number of vehicles required for the proposed project, as described in Section 2.2.8, it was determined that improvements could be made to the existing South Boulevard Light Rail Facility to provide additional capacity to perform vehicle maintenance for the Preferred Alternative. As such, the Preferred Alternative has been revised to eliminate the previously proposed VLMF. The Preferred Alternative will modify the existing South Boulevard Light Rail Facility to provide additional storage and maintenance capacity within the existing SBLRF site, and include a storage yard and dispatch facility at the existing Norfolk Southern Intermodal Facility (Figure 2-17). As noted in Section 2.2.3.1, as a separate project, Norfolk Southern plans to relocate the existing intermodal facility to the Charlotte-Douglas International Airport.

### 2.3.3.6 Ancillary Facilities

The Preferred Alternative would also include ancillary facilities, such as electric substations and signal control houses. To provide electricity along the line for the light rail vehicles, seven traction power substations would be located along the alignment. Substations require approximately 40 feet by 60 feet sites with access driveways. A typical substation would be constructed of steel housing and depending on the location, could be surrounded by fencing, a brick wall, landscaping or other forms of aesthetic barriers. Substations would be spaced along the alignment, approximately one-mile apart. Final substation locations would be determined during 65 percent engineering for the proposed project.

The signal control house contains the signaling control system, circuits and equipment required for safe vehicle operation. Seven signal houses are planned along the alignment. The distances between the signal houses vary and are related to the location of the crossover tracks where light rail vehicles can cross between one track and another. The minimum distance between signal houses is 800 feet, while the maximum distance between signal houses is 16,000 feet.



Typical LYNX Blue Line substation.



Typical LYNX Blue Line signal house.

### 2.3.3.7 Technology Characteristics

Light rail is a transit technology that operates on fixed steel rails and is typically powered by an overhead electrical system, although diesel-powered systems also exist. The Preferred Alternative vehicles would be electrically powered by an Overhead Catenary System (OCS) of wires supported by poles. The design of the light rail OCS would utilize either a center pole configuration or side pole configuration along the corridor.

For the Preferred Alternative light rail would operate in dedicated right-of-way; although autos would be able to cross the tracks at select intersections. Grade crossing gates and lights would be placed at these

intersections for safety.

The Preferred Alternative would utilize similar vehicles to the vehicles used for the existing LYNX Blue Line light rail. The light rail vehicles would have a partial low floor (75 percent) and articulation. The cars would be capable of multiple unit bi-directional operation and consist of 1, 2 or 3-car sets with a minimum of 68 seats per car. Each vehicle would be fully compliant with the American with Disabilities Act (ADA), with sufficient space to accommodate a minimum of four wheelchairs. The vehicles would also include racks to carry up to four bicycles and Automatic Passenger Counters (APC). Each vehicle would be manually operated and would generally operate at a maximum speed of 55 miles per hour.



Typical Light Rail Vehicle

### 2.3.3.8 Operating Characteristics

The operations plan for the Preferred Alternative includes light rail service and feeder bus service. Since the Preferred Alternative would be an extension of the existing LYNX Blue Line, service frequency for the LYNX BLE would be the same as that for the existing LYNX Blue Line.

#### Light Rail Service

Light rail service would operate between the I-485/South Boulevard Station at the southern terminus of the existing South Corridor LYNX Blue Line and the UNC Charlotte Station on the UNC Charlotte campus. Trains would operate in 1, 2 or 3-car sets, seven days a week from 5:00 a.m. to 1:00 a.m. The service would generally operate on the following frequencies:

- Weekday peak-period service (i.e. 6:30 a.m. to 9:30 a.m. and 4:00 p.m. to 7:00 p.m.) would be every 7.5 minutes for initial operations and every ten minutes by the year 2035.
- Weekday off-peak service would be 15 minutes during the early morning, mid-day, and evening periods (i.e. 5:00 a.m. to 6:30 a.m. and 9:30 a.m. to 4:00 p.m.) and 20 minutes during the evening/night period (i.e. 7:00 p.m. to 1:00 a.m.).
- Saturday service would be every 15 minutes from 10:00 a.m. to 5:00 p.m.; every 20 minutes from 7:00 a.m. to 10 a.m. and 5:00 p.m. to 10:00 p.m.; and, every 30 minutes from 6:00 a.m. to 7:00 a.m. and 10:00 p.m. to 1:00 a.m.
- Sunday service would be every 15 minutes from 11:00 a.m. to 5:00 p.m.; every 20 minutes from 9:00 a.m. to 11:00 a.m. and 5 p.m. to 10:00 p.m.; and every 30 minutes from 6:00 a.m. to 9:00 a.m. and 10:00 p.m. to 1:00 a.m.

The operating analysis indicated that to meet the projected peak period demand in 2035, two operating scenarios would provide sufficient capacity. The first operating scenario is two car trains with 6-minute headways. The second operating scenario is 3-car trains with 10-minute headways. Ten-minute headways were analyzed in this Final EIS to represent the future traffic and noise scenario.

Additional light rail service would be provided to meet the demand produced by special events. The service plan would vary depending on the size and type of special event. The plan may include more frequent service, additional hours of service, or additional vehicles added to the light rail service and supporting bus services for special events such as sporting events, concerts, shows, or festivals. Venues in Center City Charlotte that may require special event service include: Bank of America Stadium, Time Warner Cable Arena, the Blumenthal Performing Arts Center, the NASCAR Hall of Fame and a future baseball stadium. Outside of Center City Charlotte, events at Memorial Stadium, Central Piedmont Community College, UNC Charlotte, Verizon Wireless Amphitheatre and Charlotte Motor Speedway may also require special event service.

#### Feeder Bus Service

The light rail service would be augmented by feeder bus service that would include local and express bus service. Bus-to-rail transfers would occur at most station locations. To provide feeder bus service for the

Preferred Alternative, the existing CATS corridor bus service would be modified to move passengers to and from proposed light rail stations. In total, fourteen routes are planned for the corridor and three of these routes would be new services. Several existing routes would be re-aligned and some route frequencies would be modified to minimize waiting time for transfers to or from light rail. Specific route changes are described in detail in the *CATS Bus/Rail Operating Plan* and summarized in Table 2-6. Figure 2-18 shows bus service in the Northeast Corridor under the Preferred Alternative.

**Table 2-6  
Bus Service in Northeast Corridor for Preferred Alternative**

Routes	Frequency			Type	Light Rail Station Served
	Peak	Midday	Night		
3-The Plaza	20	30	40	Local	Sugar Creek
4-Country Club	30	30	40	Local	Sugar Creek
11-North Tryon	20	20	40	Local	Old Concord Road
13-Nevin Rd.	30	30	30	Local	University City Blvd.
22- Graham St.	30	30	40	Local	Sugar Creek
23-Shamrock	20	30	40	Local	36th Street
29-UNC Charlotte/South Park*	40	40	---	Local	JW Clay Blvd.
39-Eastway	30	30	30	Local	Old Concord Rd., Tom Hunter and University City Blvd.
54-URP	30	60	---	Local	University City Blvd.
80x-Concord	20	---	---	Express	JW Clay Blvd.
110-Concord Mills Mall	30	30	60	Local	JW Clay Blvd.
125-Derita/Prosperity Church	30	30	40	Local	University City Blvd
204-Lasalle**	---	----	---	---	---
211-Hidden Valley	20	20	40	Local	Sugar Creek and Tom Hunter

Note: “---” refers to no service being operated during those frequencies.

\* Existing UNC Charlotte shuttle routes would also be operated, but are not modeled in the travel demand model.

\*\* Route 204-Lasalle is combined with a truncated 23-Shamrock Dr in order to provide a crosstown route serving the 36th Street Station

### Fare Collection

Fare collection for the Preferred Alternative would be the same as the existing LYNX Blue Line; a barrier-free, proof-of-payment method of fare collection, otherwise known as the “honor” system. CATS would utilize fare inspectors and police officers to check tickets and passes aboard the light rail vehicles. This is the same method of fare collection and enforcement that CATS currently performs on the existing LYNX Blue Line.

Light rail patrons would buy tickets and passes from the self-serve ticket vending machines (TVMs) located at the stations, or otherwise in advance at an authorized CATS pass outlet or through the CATS website. The TVMs located at the stations would have the capability to dispense one-way, round-trip, weekly and day pass tickets, reduced-fare tickets for qualified persons (seniors, handicapped, etc.) and print receipts for credit/debit transactions. The fare media would be paper-based, magnetically encoded, and compatible with the existing bus magnetic ticketing system.

### 2.3.4 LYNX Blue Line Light Rail (South Corridor) Improvements

The LYNX BLE creates projected ridership loads that require either the operation of ten-minute headways with 3 car trains or six-minute headways with 2 car trains. Both of these scenarios require improvements to the existing Blue Line light rail (*South Corridor Improvements*, STV Inc., 2009). The LYNX Blue Line (South Corridor Light Rail Project) was originally designed with 3 car platforms and additional substations, but these improvements were cut during Final Design. To operate 3 car train sets in the future, CATS would need to extend the length of the existing 2-car platforms at each of the 15 LYNX Blue Line stations in the South Corridor and add four additional substations to meet the traction power requirements.

Improvements to the LYNX Blue Line to operate 3 car train sets would be a separate future project. The potential impacts of the improvements are described in 19.0 Secondary and Cumulative Effects.

**2.3.5 Capital Costs**

The estimated capital costs for the Preferred Alternative are shown in Table 2-7.

**Table 2-7  
Capital Costs for the Preferred Alternative, 2010**

Cost Category <sup>1</sup>	Preferred Alternative (\$ millions, 2010)
Guideway and Track Elements	\$137.65
Stations	\$45.96
Support Facilities: Yards, Shops, Admin. Bldgs	\$8.51
Site work and Special Conditions	\$107.88
Systems	\$113.09
Right-of-way, Land, Existing Improvements	\$106.50
Vehicles	\$87.02
Professional Services	\$149.26
Unallocated Contingency	\$75.59
<b>Grand Total</b>	<b>\$831.43<sup>2</sup></b>

Notes: <sup>1</sup>List of Cost Categories based on FTA’s “Standard Cost Categories for Major Capital Projects.”

<sup>2</sup> Does not include Finance Charges.

Source: *30 Percent Cost Estimate*, Rev. 02, STV Inc. (2011).

**2.3.6 Operating and Maintenance Costs**

System-wide operating and maintenance costs (O&M) for the No-Build Alternative and the Preferred Alternative are included in Table 2-8 These numbers reflect system-wide bus and light rail O&M costs for CATS.

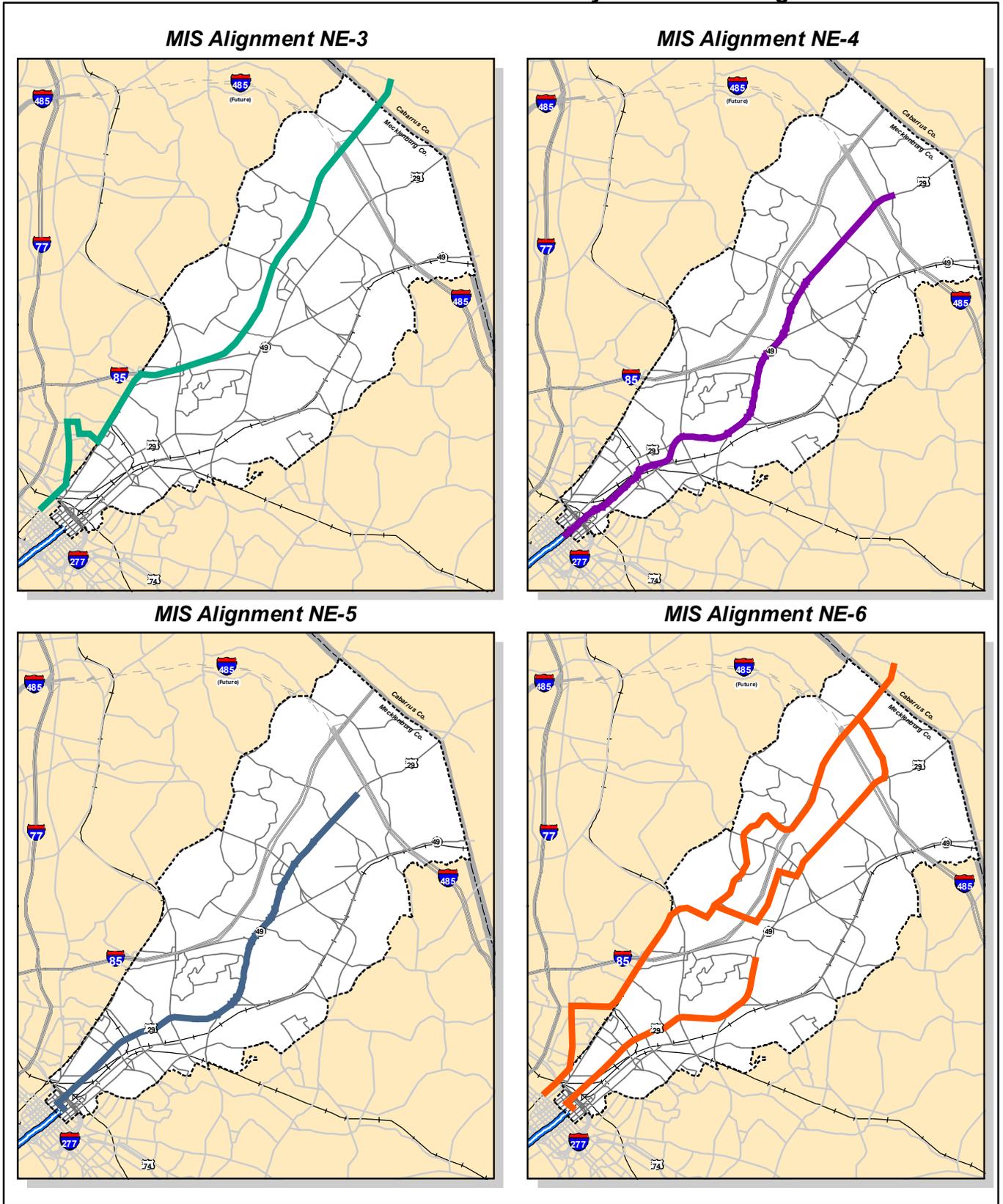
**Table 2-8  
Summary of System-wide Operating and Maintenance Costs**

Alternative	Annual O&M Costs (\$ millions)	Incremental O&M Cost over the No-Build Alternative (\$ millions)
No-Build Alternative	\$82.28	--
Light Rail Alternative	\$92.24	+\$9.96

Note: "--" Not applicable; 2010 Dollars

Source: *Operations and Maintenance Quantities and Costs – Bus*, Rev. 05 (2011); and *Operations and Maintenance Quantities and Costs – Rail*, Rev. 02, STV Inc. (2011)

Previously Considered Alignment Alternatives



**Legend**

- MIS Alignment NE-3
- MIS Alignment NE-4
- MIS Alignment NE-5
- MIS Alignment NE-6
- LYNX Existing Light Rail Transit
- Northeast Corridor Limits
- Highway
- Major Roads
- Highway (Future)
- County Line
- Railroads

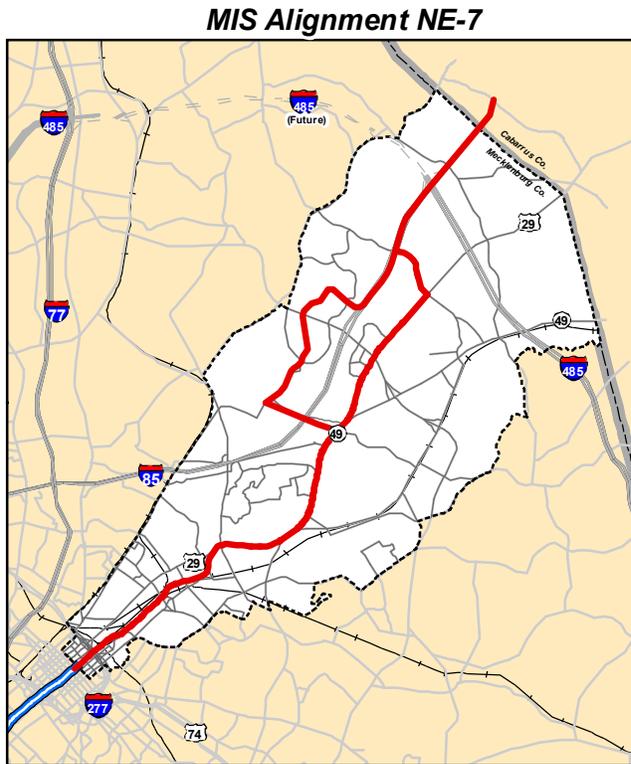
  
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 Miles

Data Source:  
 CATS, RWA/STV, City of Charlotte GIS, and  
 Mecklenburg County GIS

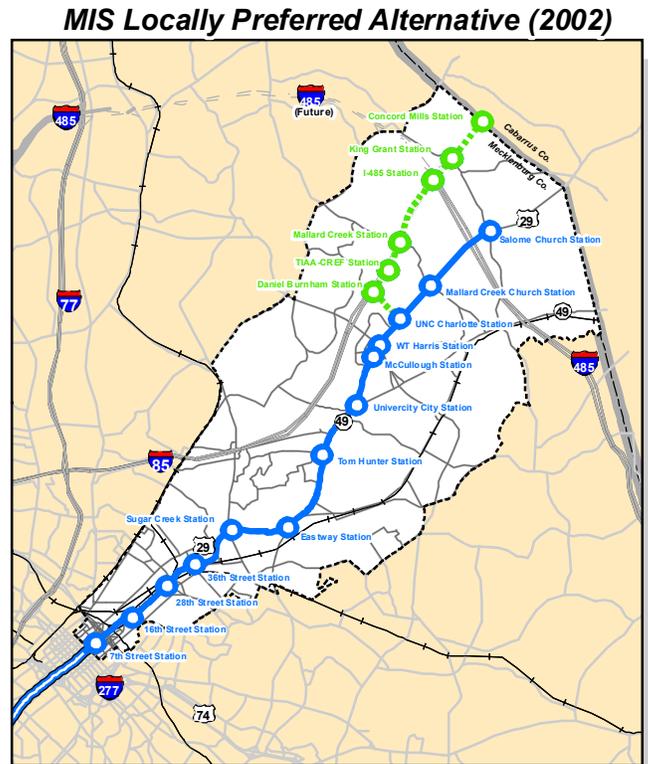
BUE EIS Figure 2-1a.pdf

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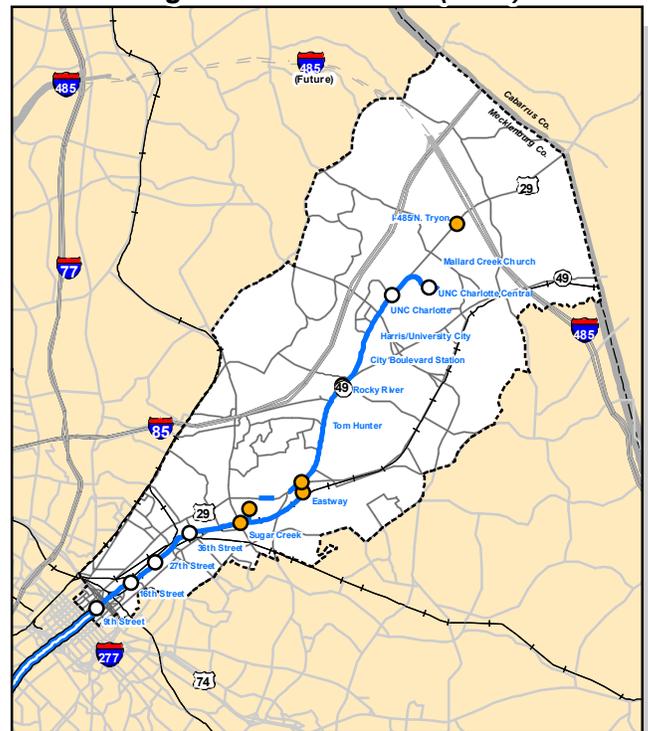
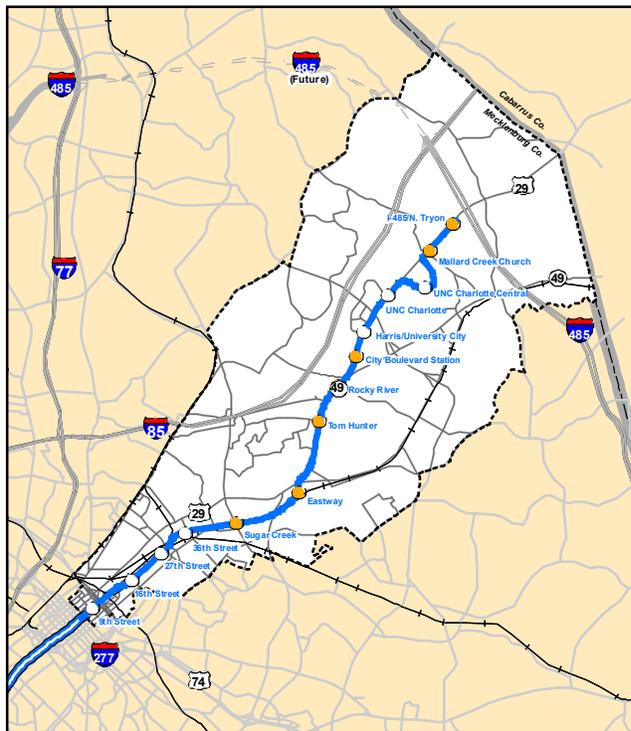
Previously Considered Alignment Alternatives



Conceptual Engineering - Refined Locally Preferred Alternative (2006)

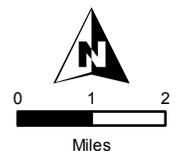


Locally Preferred Alternative / Light Rail Alternative (2009)



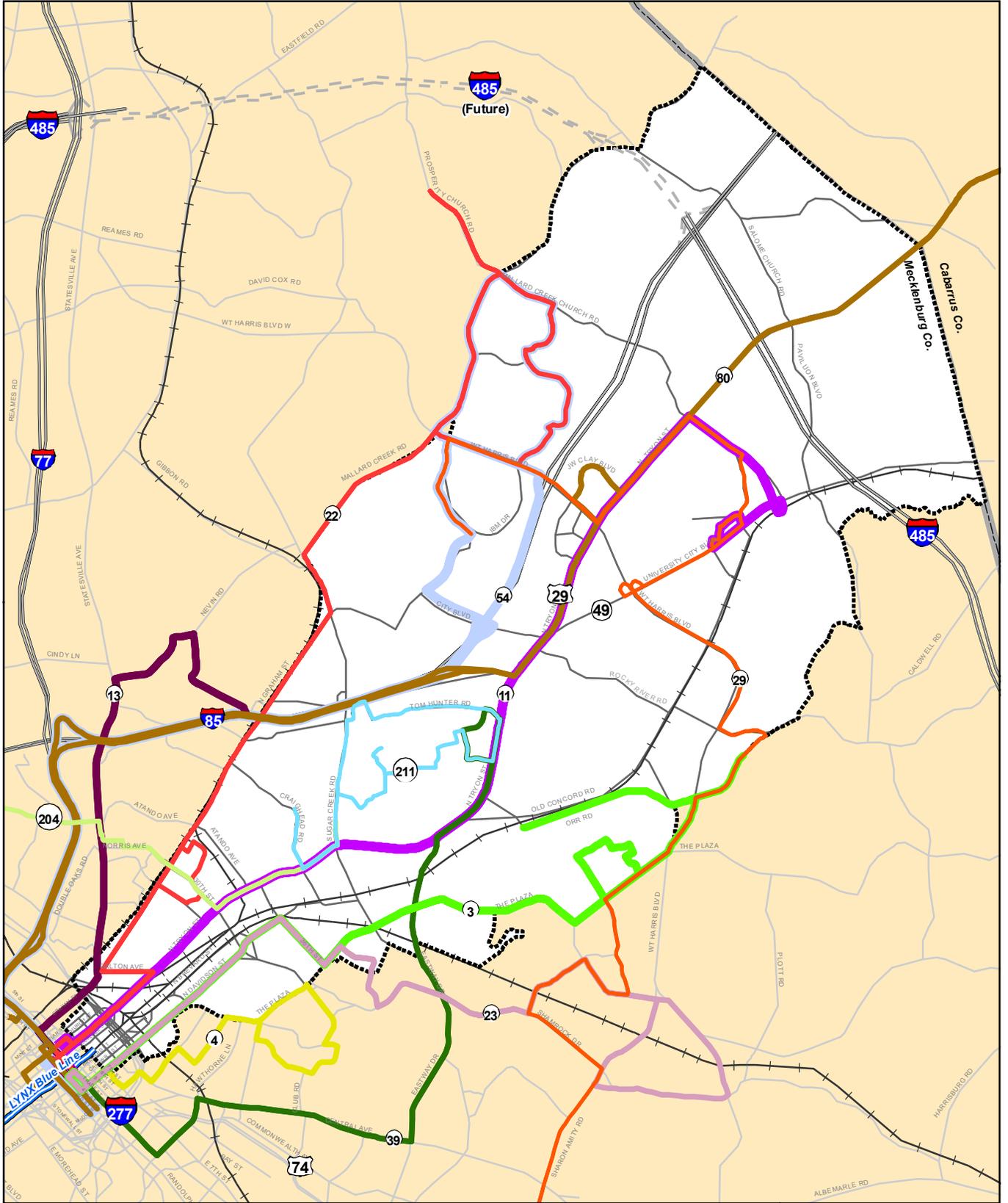
Legend

- MIS Alignment NE-7
- Light Rail Transit
- Light Rail Stations
- Bus Rapid Transit Station
- Bus Rapid Transit
- Proposed Stations
- Proposed Stations with Park-and-Ride
- LYNX Existing Light Rail Transit
- Northeast Corridor Limits
- Major Roads
- County Line
- Railroads
- Highway
- Highway (Future)



Data Source:  
CATS, RWA/STV, City of Charlotte GIS, and  
Mecklenburg County GIS

Northeast Corridor - 2035 No-Build Bus Network



Legend	
	Northeast Corridor Limits
	Railroads
	Highway
	Major Roads
	Highway (Future)
	County Line
	LYNX Existing Light Rail Transit
	The Plaza
	Country Club
	North Tryon
	Nevin Rd
	Graham St
	Shamrock
	UNCC / SouthPark
	Eastway
	54x URP Express
	80x Concord Express
	Hidden Valley
	LaSalle

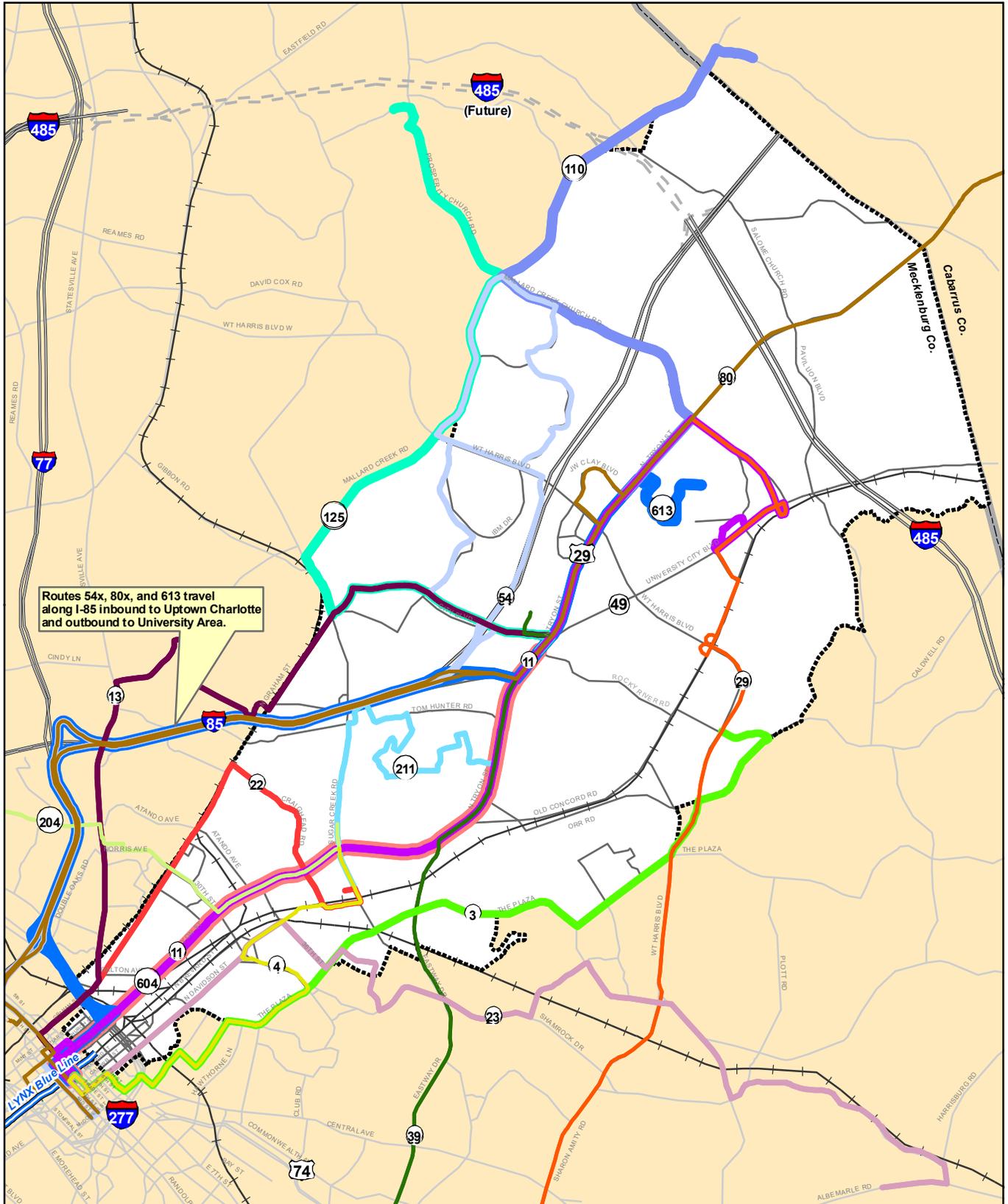
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Mile

Data Source:  
CATS, City of Charlotte GIS, and Mecklenburg County GIS

BLE FBS Figure 2-2.pdf

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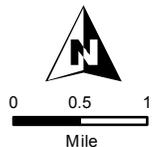
Northeast Corridor - 2035 TSM Bus Network



Routes 54x, 80x, and 613 travel along I-85 inbound to Uptown Charlotte and outbound to University Area.

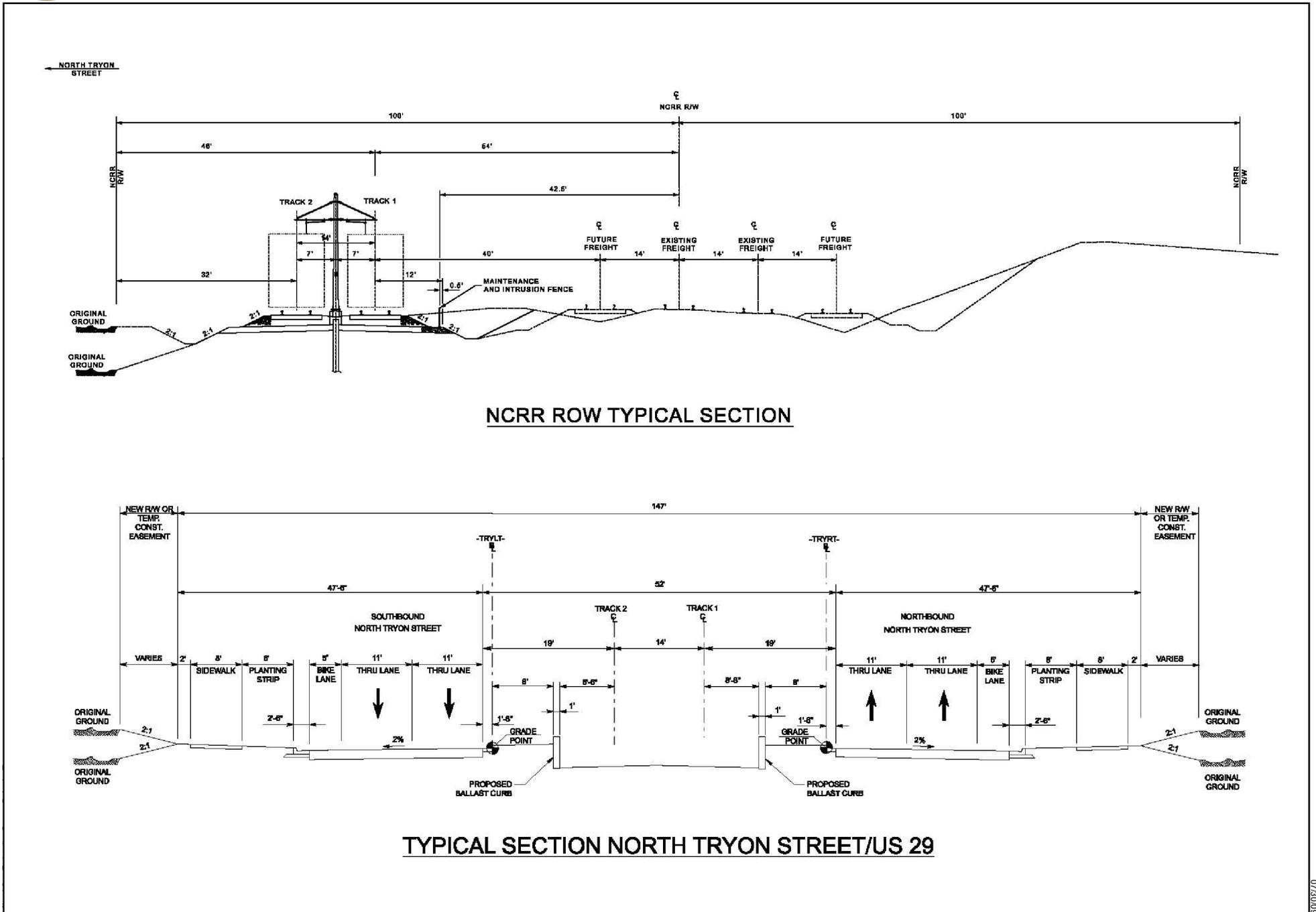
**Legend**

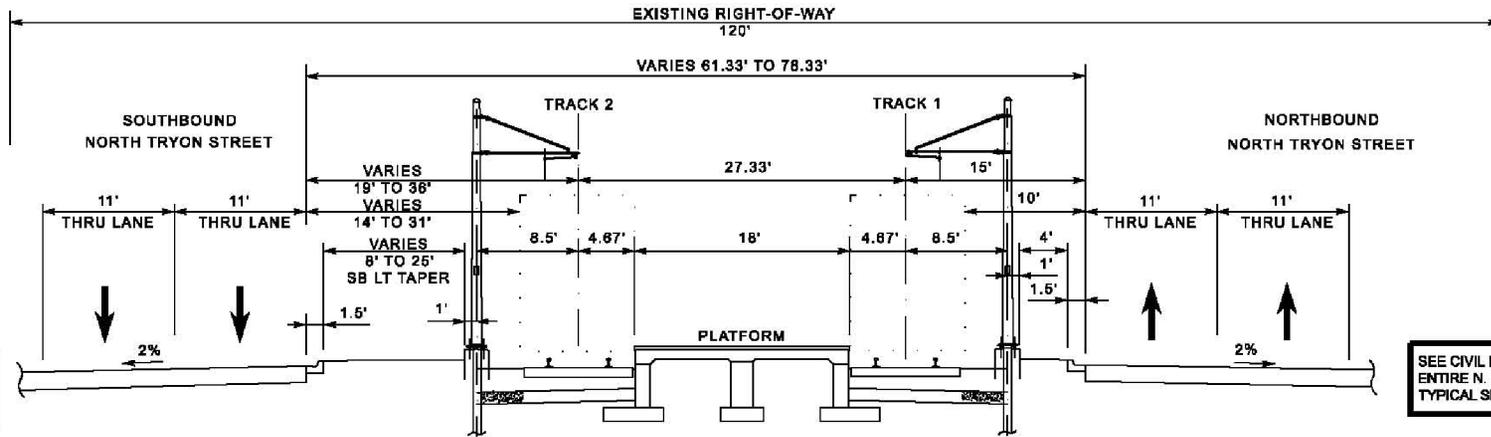
- |                           |                                  |                        |                              |
|---------------------------|----------------------------------|------------------------|------------------------------|
| Northeast Corridor Limits | LYNX Existing Light Rail Transit | 23 Shamrock            | 204 LaSalle                  |
| Railroads                 | 3 The Plaza                      | 29 UNCC / SouthPark    | 211 Hidden Valley            |
| Highway                   | 4 Country Club                   | 39 Eastway             | 125 Derita/Prosperity Church |
| Major Roads               | 11 North Tryon                   | 54 54x URP Express     | 604 NE Skip Stop 1           |
| Highway (Future)          | 13 Nevin Rd                      | 80 80x Concord Express | 613 NE Skip Stop 2           |
| County Line               | 22 Graham St                     | 110 Concord Mills Mall |                              |



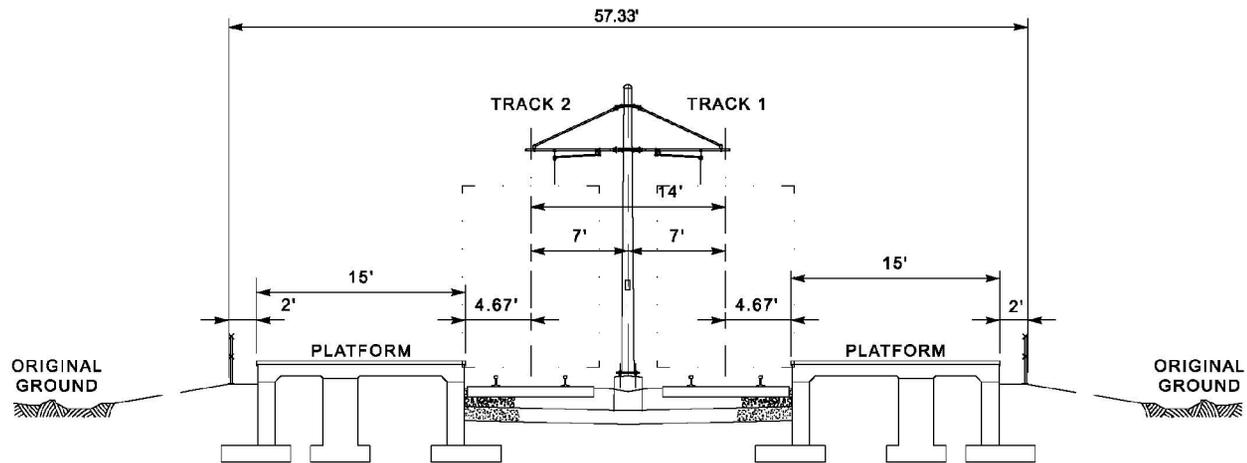
Data Source:  
CATS, City of Charlotte GIS, and Mecklenburg County GIS

Typical Cross Sections with NCRR ROW & median of North Tryon Street/US-29

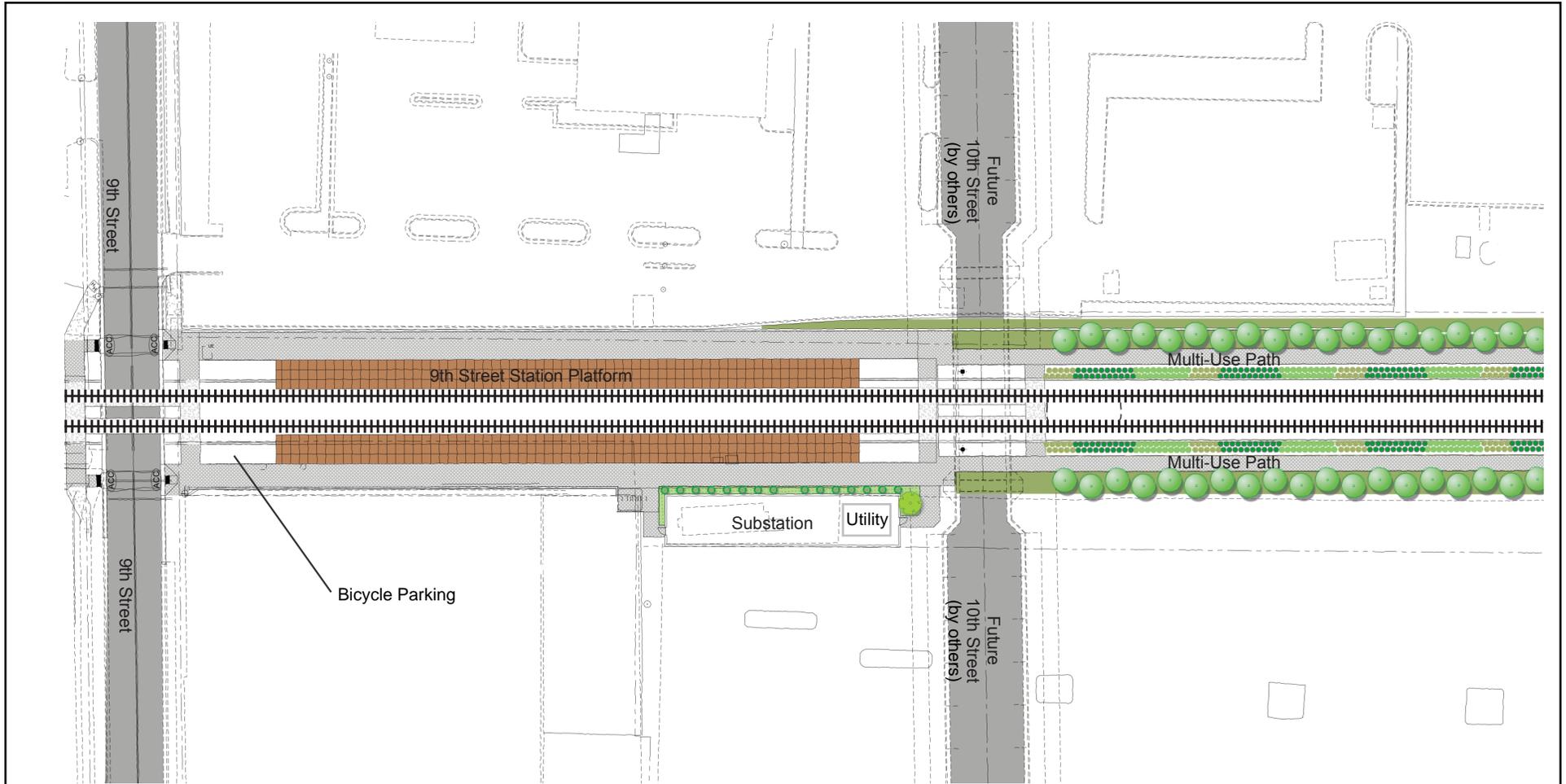




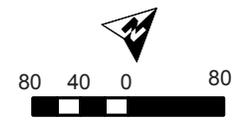
**TYPICAL SECTION CENTER PLATFORM**



**TYPICAL SECTION SIDE PLATFORM**

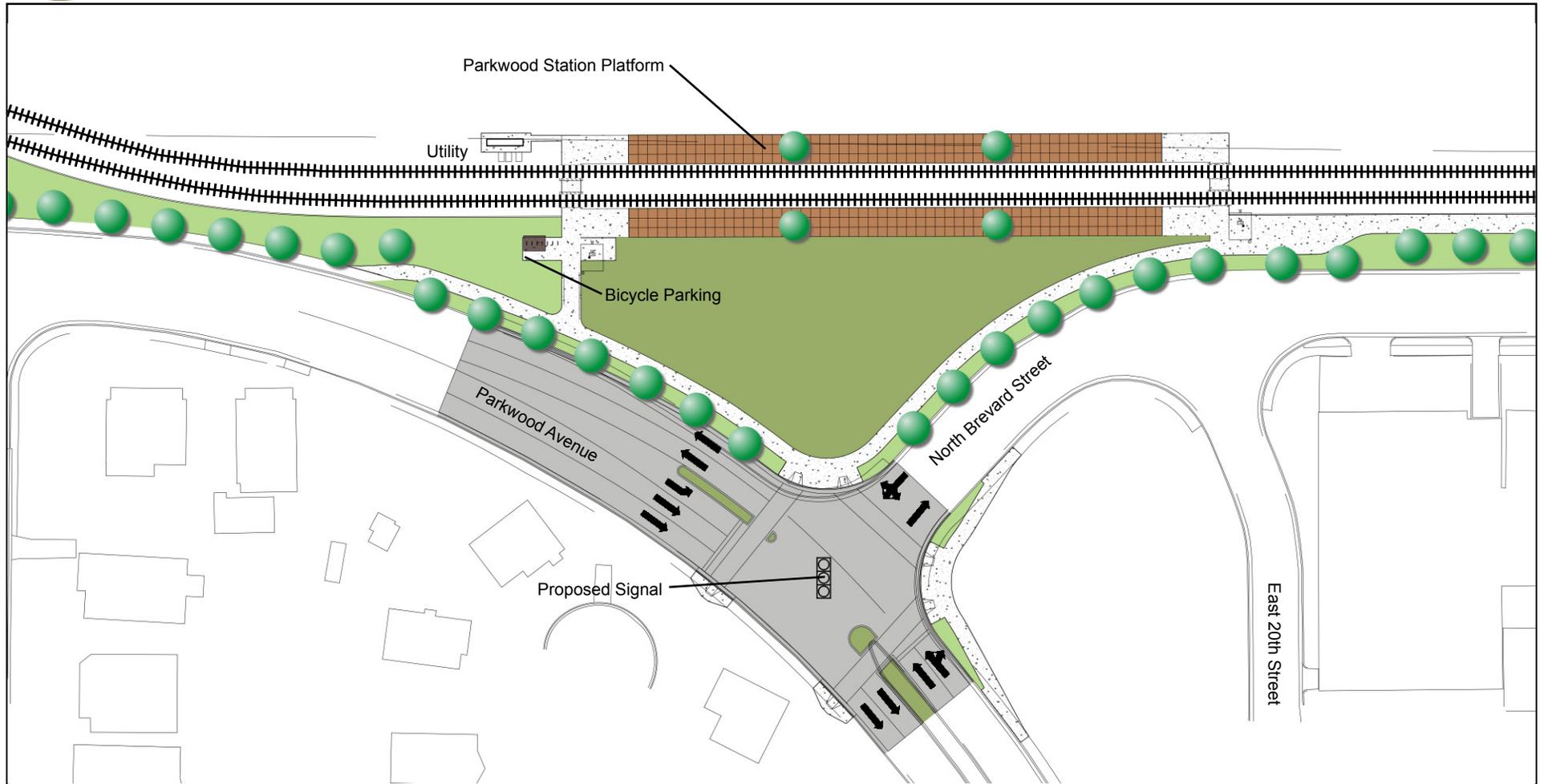


<b>Parking Summary</b>	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	0
Kiss-and-Ride Spaces	0



Feet  
Scale: 1"=80'

Data Source: Charlotte Area Transit System, STV/RWA,  
City of Charlotte/Landscape Management



<b>Parking Summary</b>	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	8
Kiss-and-Ride Spaces	0



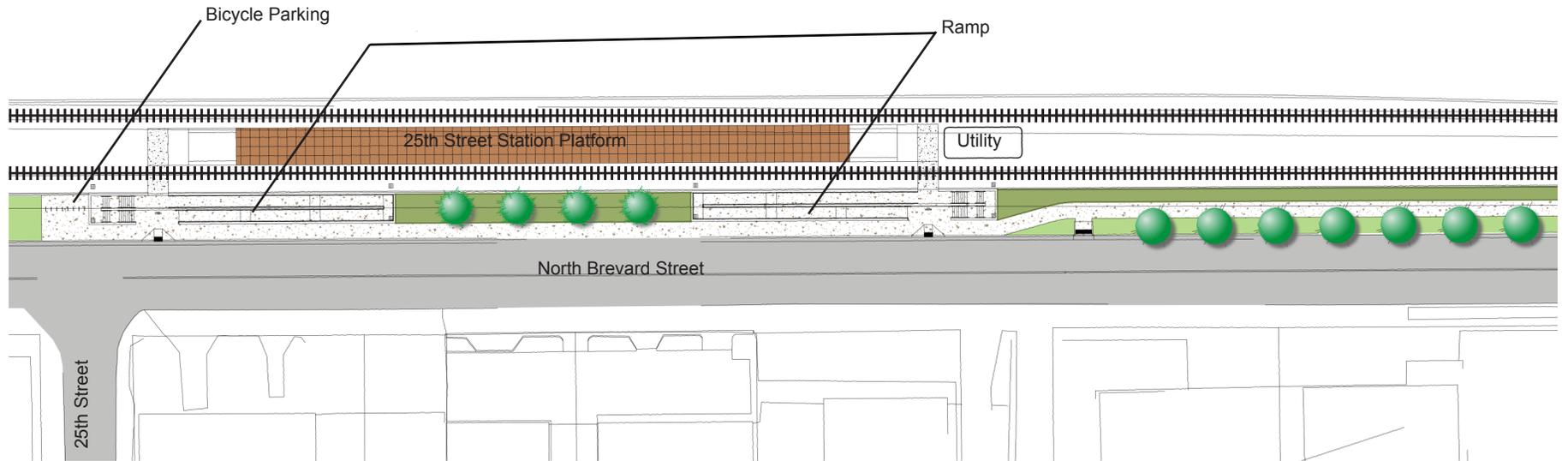
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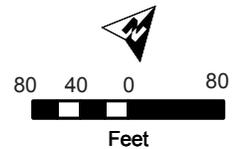
Feet

Scale: 1"=80'

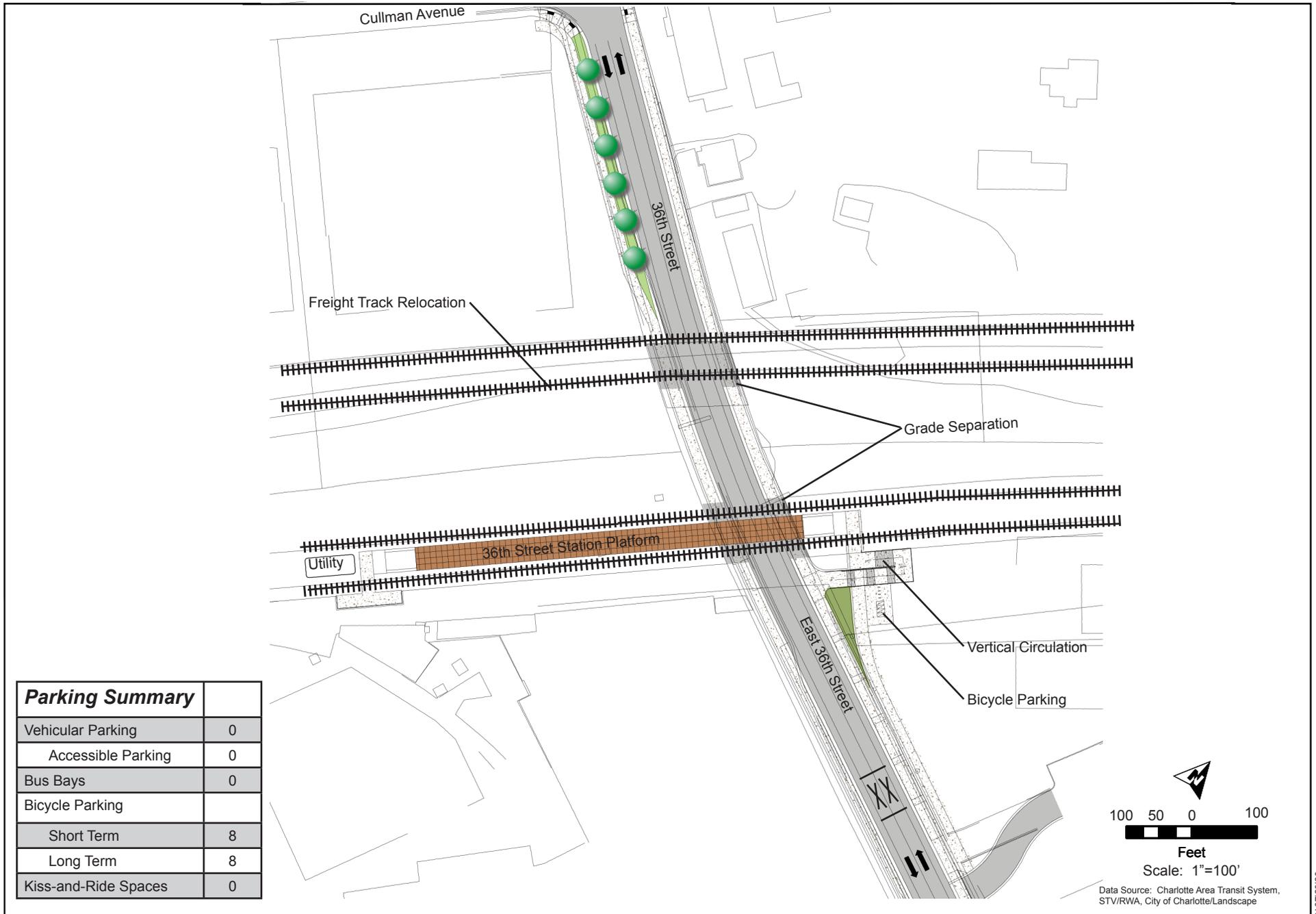
Data Source: Charlotte Area Transit System, STV/RWA,  
City of Charlotte/Landscape Management



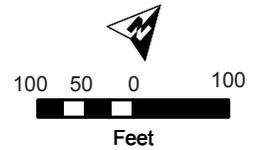
<b>Parking Summary</b>	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	16
Long Term	0
Kiss-and-Ride Spaces	0



Data Source: Charlotte Area Transit System,  
STV/RWA, City of Charlotte/Landscape



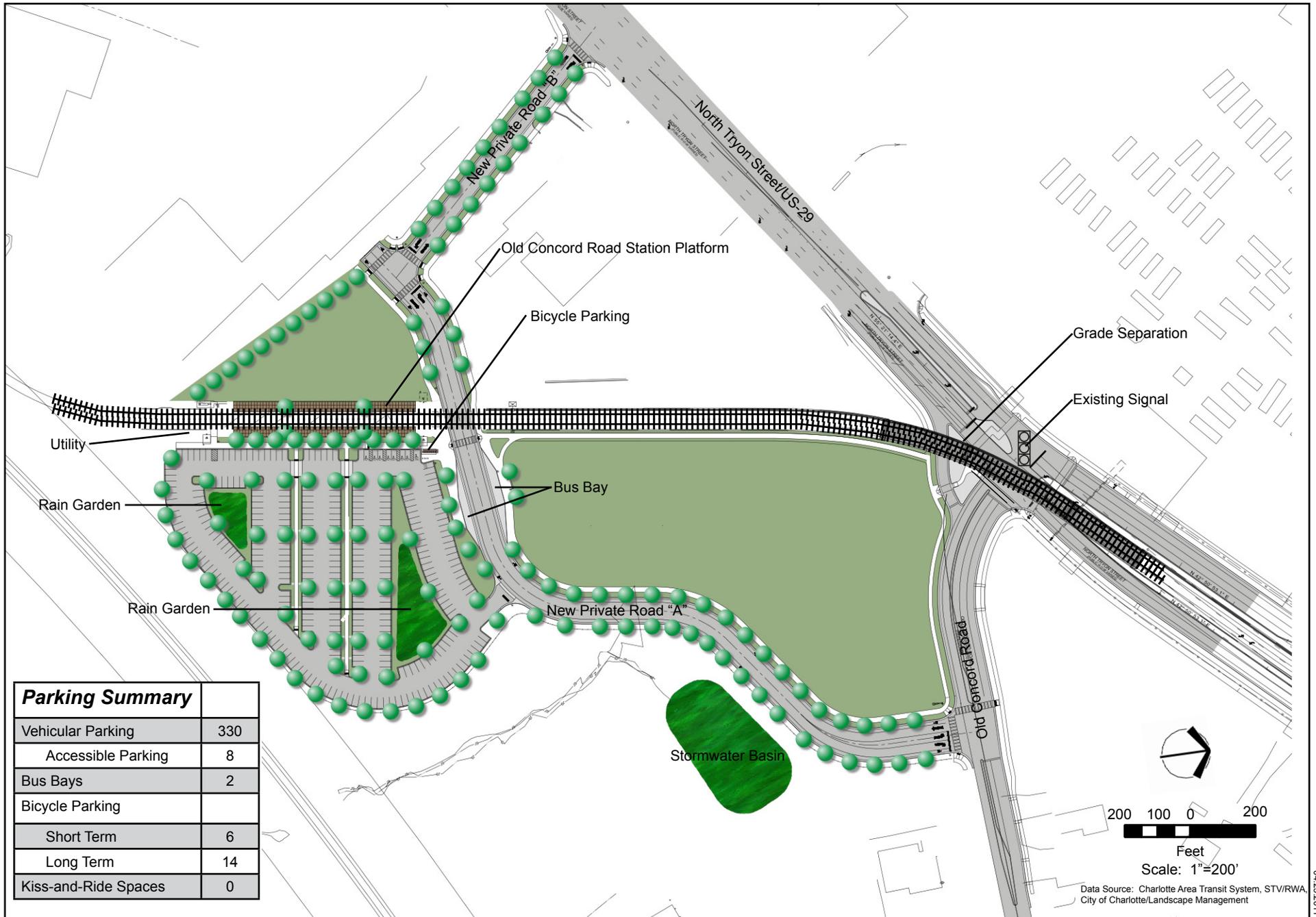
<b>Parking Summary</b>	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	8
Kiss-and-Ride Spaces	0



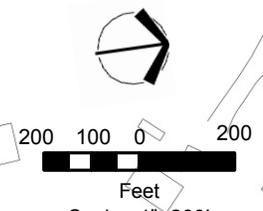
Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape

**Figure 2-10  
Sugar Creek Station Park-and-Ride Site Plan**

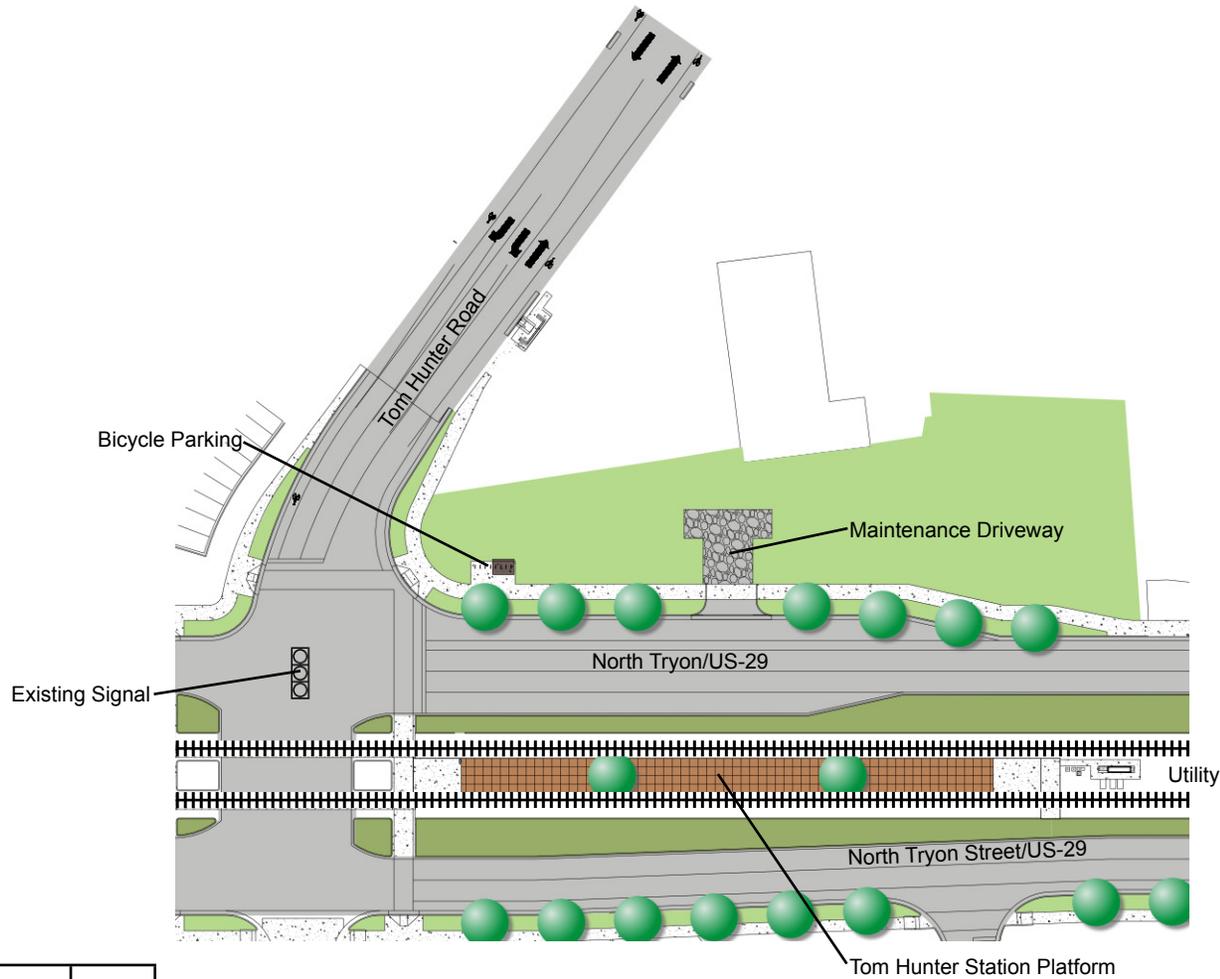




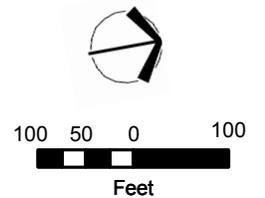
<b>Parking Summary</b>	
Vehicular Parking	330
Accessible Parking	8
Bus Bays	2
Bicycle Parking	
Short Term	6
Long Term	14
Kiss-and-Ride Spaces	0



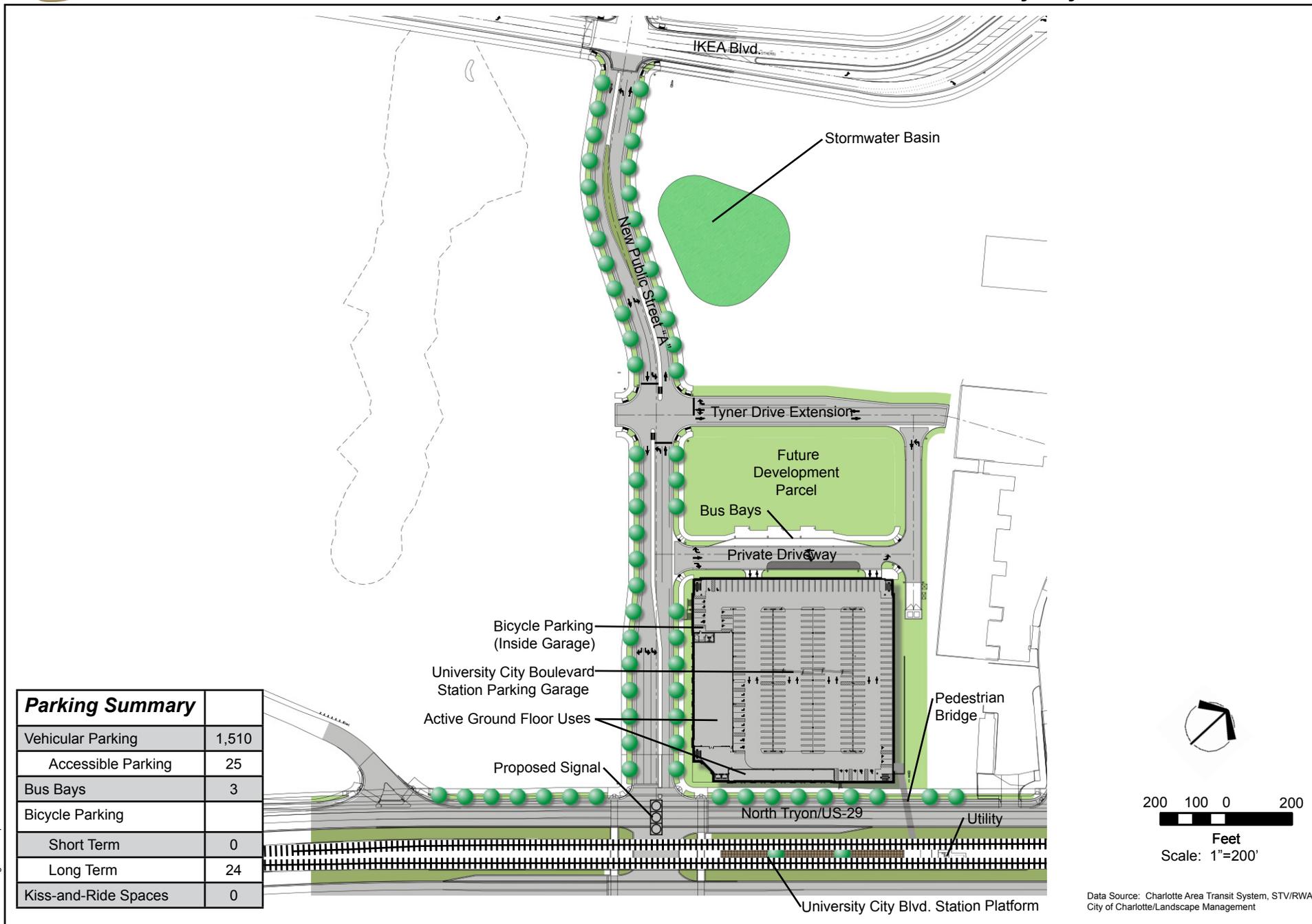
Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape Management



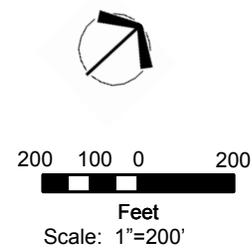
<b>Parking Summary</b>	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	8
Kiss-and-Ride Spaces	0



Data Source: Charlotte Area Transit System, STV/RWA,  
City of Charlotte/Landscape Management



<b>Parking Summary</b>	
Vehicular Parking	1,510
Accessible Parking	25
Bus Bays	3
Bicycle Parking	
Short Term	0
Long Term	24
Kiss-and-Ride Spaces	0

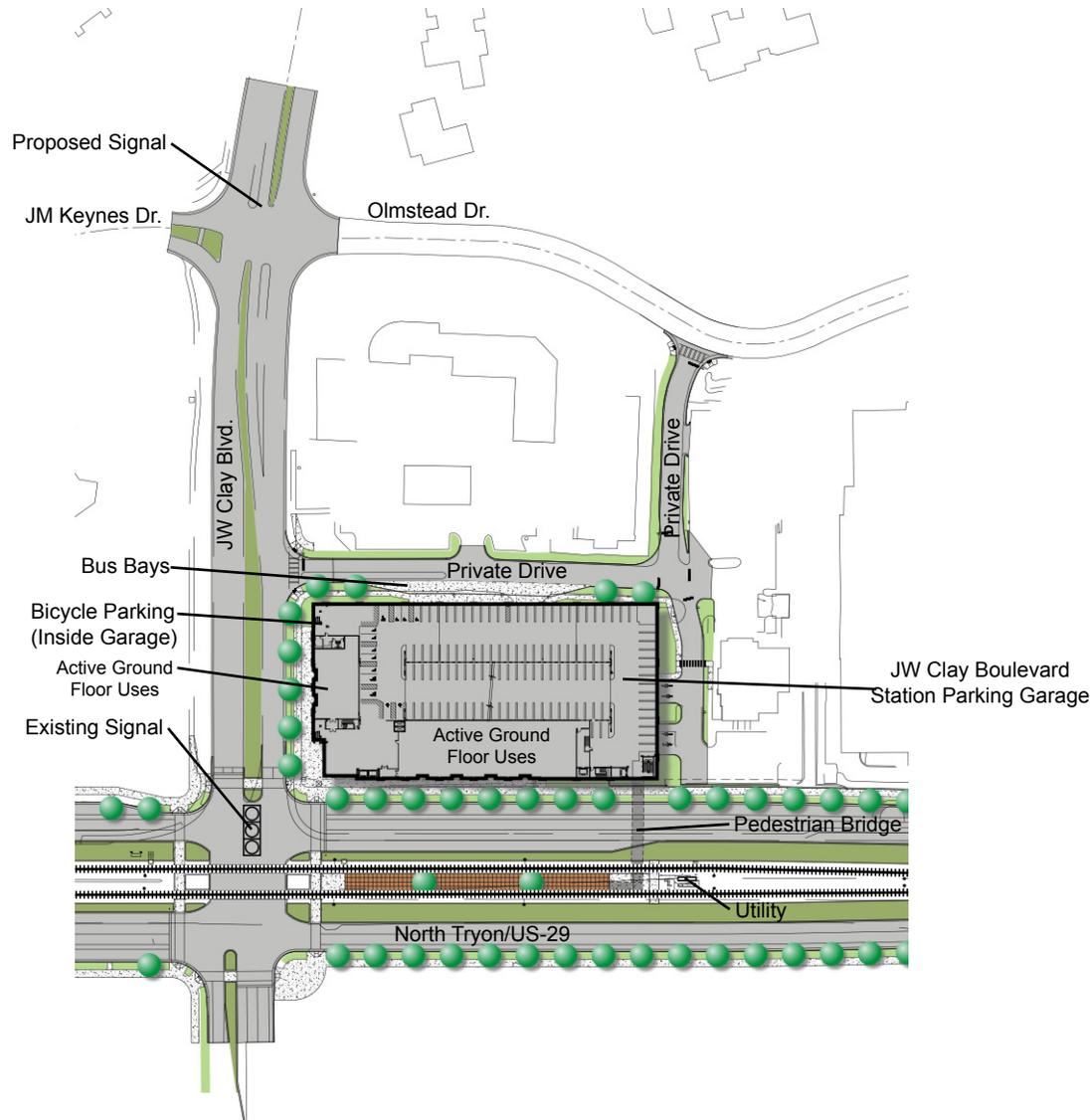


Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape Management

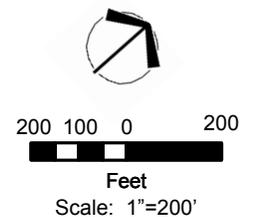
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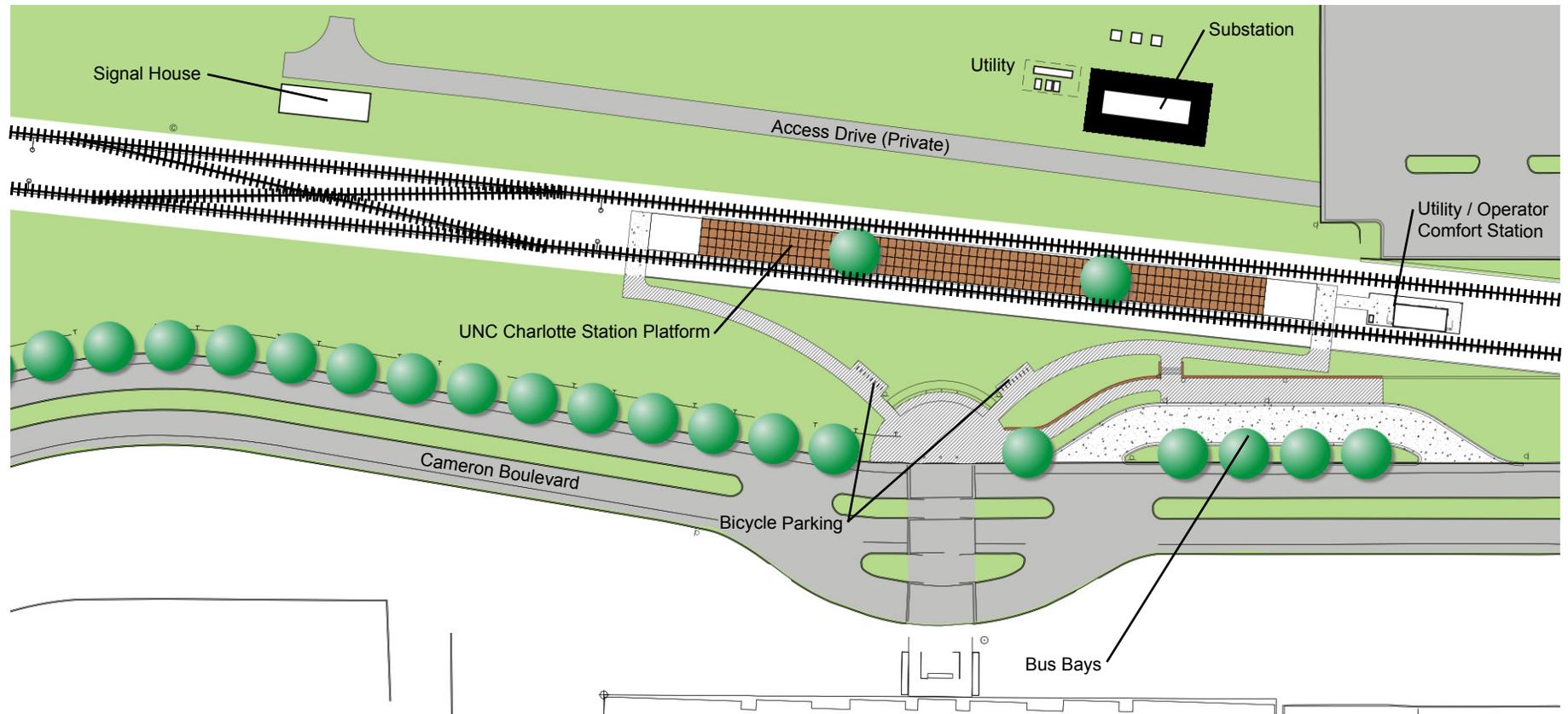




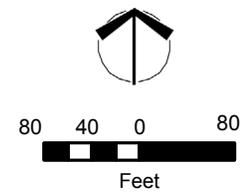
<b>Parking Summary</b>	
Vehicular Parking	690
Accessible Parking	13
Bus Bays	2
Bicycle Parking	
Short Term	8
Long Term	14
Kiss-and-Ride Spaces	0



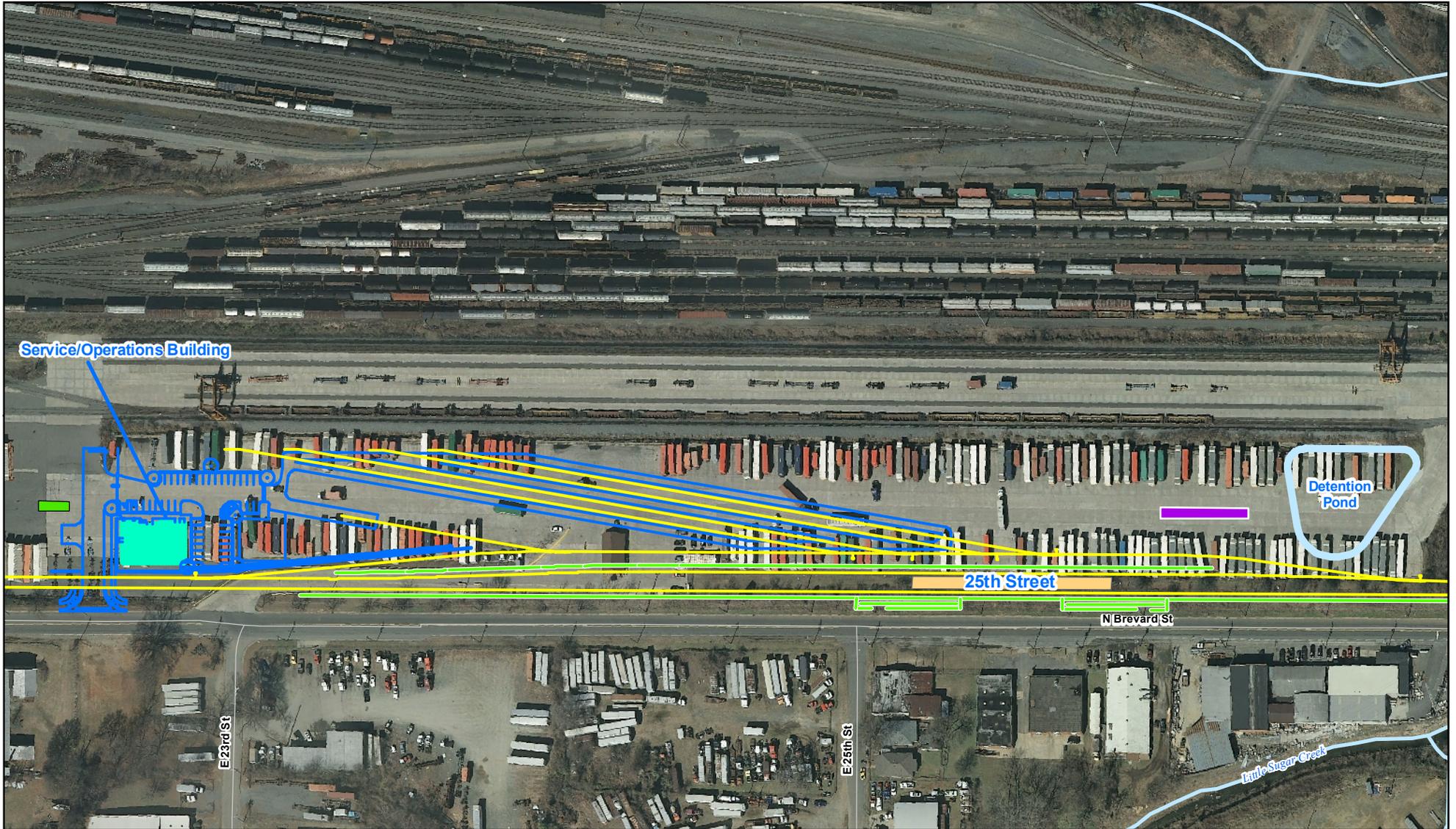
Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape Management



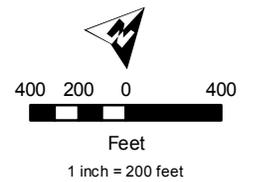
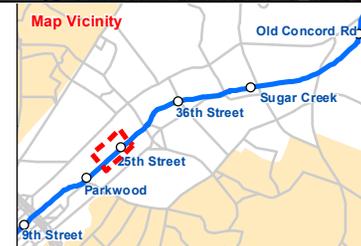
<b>Parking Summary</b>	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	2
Bicycle Parking	
Short Term	32
Long Term	0
Kiss-and-Ride Spaces	0



Data Source: Charlotte Area Transit System, STV/RWA,  
City of Charlotte/Landscape Management

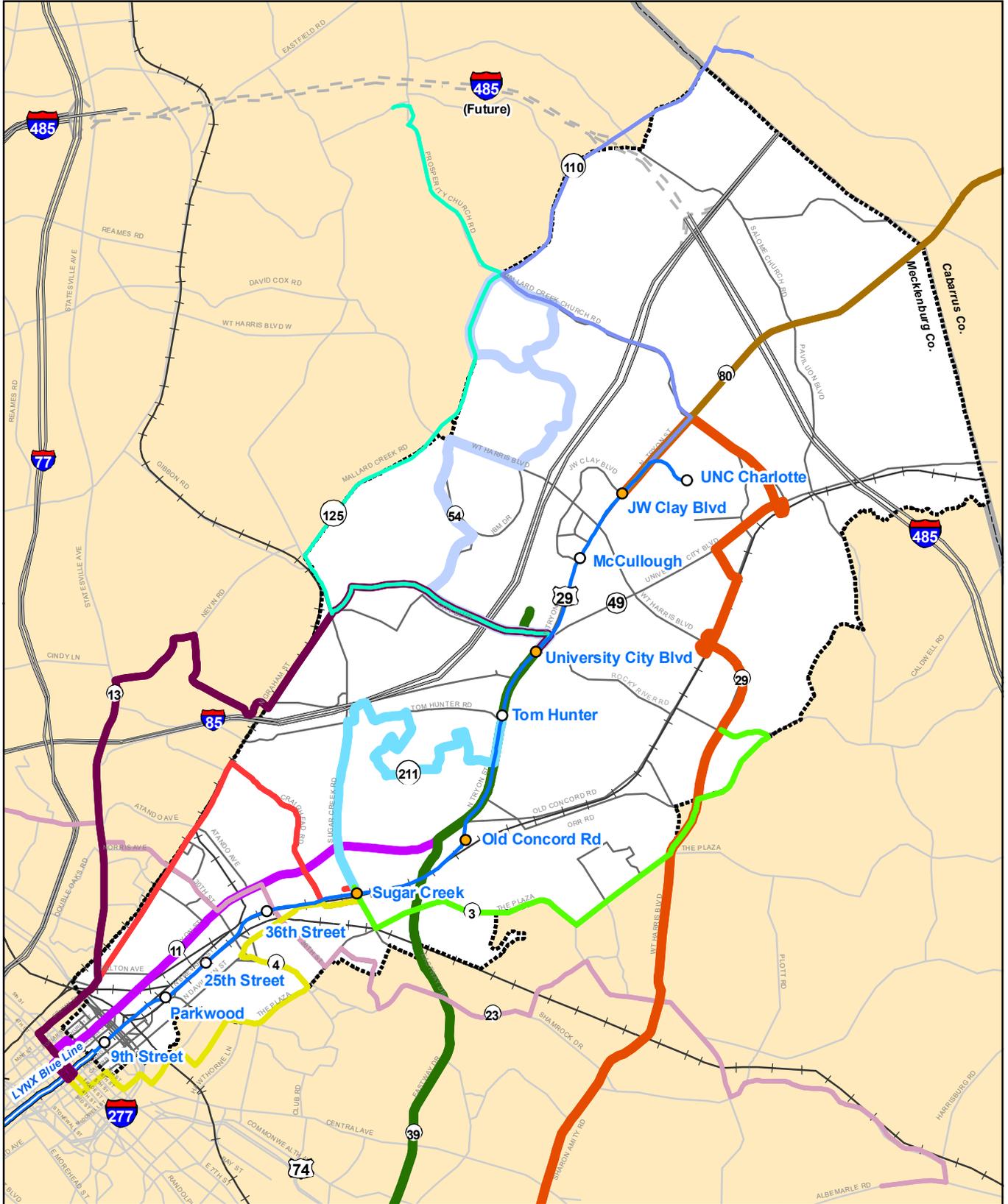


- Legend**
- Proposed Light Rail Alignment
  - Proposed Substation
  - Proposed Station Platform
  - Proposed Signal Houses
  - Proposed Retaining Walls
  - Proposed Structures
  - Roads
  - Streams



Source: Charlotte Area Transit System, STV/RWA, Mecklenburg County Aerial (2010)

Northeast Corridor - 2035 Preferred Alternative Bus Network



Legend			
	Northeast Corridor Limits		LYNX Existing Light Rail Transit
	Railroads		Proposed Light Rail Alignment
	Highway		Proposed Stations
	Major Roads		Proposed Stations with Park-and-Ride
	Highway (Future)		3 The Plaza
	County Line		4 Country Club
	11 North Tryon		22 Graham St
	13 Nevin Rd		23 Shamrock
	29 UNCC / SouthPark		39 Eastway
	54 54 URP		80 80x Concord Express
	110 Concord Mills Mall		125 Derita/Prosperity Church
	211 Hidden Valley		

0 0.5 1  
Mile

Data Source:  
CATS, City of Charlotte GIS, and Mecklenburg County GIS

DATE FIGS: Figure 2-18.pdf

07.08.11