

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 this Draft Environmental Impact Statement (EIS); and the capital and operating costs of the alternatives under study.

2.1 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*. [This plan was recently updated to the *Centers, Corridors and Wedges Growth Framework, Draft January 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 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 Economic Development Office (EDO) 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 Draft*, January 2010. On October 28, 2009, the MTC adopted the proposed LPA as described and evaluated in this Draft EIS. The LPA includes 13 stations and is approximately 10.7 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 described.

2.1.1 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.

2.1.2 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 it was decided 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 more appropriate for longer distance trips (25 to 60 miles and beyond) with infrequent stops than for the kind of service needed in the Northeast Corridor.

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

Name	Transit Type	To/From	Via
NE-2 ¹	Baseline Alternative		
NE-3 ²	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: ¹Alternative 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. ²This 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.

2.1.3 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.

2.1.4 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.

2.1.5 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.

2.1.6 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 is represented in this document as the Light Rail Alternative and is based on *30% Preliminary Engineering Design Plans*, completed in March 2010.

As part of its adoption of the R-LPA in 2006, the MTC determined that a design option for the Sugar Creek area should be studied further. In 2008, CATS, in partnership with the Charlotte-Mecklenburg Planning Department and the City of Charlotte's 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 Alternative Analysis and additional detail on the potential environmental impacts, including costs, are provided throughout this Draft EIS. This information will document the examination of the design option and allow additional public comment.

The Light Rail Alternative and the Light Rail Alternative – Sugar Creek Design Option are fully described in Section 2.2.3.

2.2 Definition of Alternatives

The following alternatives are described in this section:

- 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 line 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.

It was determined that the TSM Alternative does not meet the Purpose and Need of the proposed project. Therefore, only the No-Build and Light Rail Alternatives are evaluated in this LYNX BLE Draft EIS. The TSM Alternative is used as a baseline alternative for comparison in Chapter 21.0 Evaluation of Alternatives, as required under the FTA's New Starts program.

2.2.1 No-Build Alternative

The No-Build Alternative includes: transit services; highway and transit facilities; and railroad improvements that are planned to exist in 2030. 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 *2030 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, including expansion of bus services in the other rapid transit corridors;
- New bus services to serve areas that would be developed by 2030; 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 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	30	30	45	Local	Increase peak frequency.
4-Country Club	20	30	45	Local	Increase peak and night frequency.
11-North Tryon	10	20	30	Local	No Change.
22-North Graham	35	35	45	Local	Increase peak and night frequency.
23-Shamrock	20	35	40	Local	Increase peak and night frequency.
29-UNC Charlotte*	60	60	60	Local	No change.
39-Eastway/UNC Charlotte	35	45	45	Local	Increase all frequency.
54x-URP Express	15	---	---	Express	No change.
80x-Concord	30	---	---	Express	Decrease peak frequency.
81x-Wachovia	60	60	---	Express	No change.
211-Hidden Valley	20	20	30	Local	Increase peak frequency.
360-City Boulevard/NC-49	30	40	60	Local	New route to provide service from UNC Charlotte to Cabarrus County along University City Blvd./NC-49.

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.

2.2.2 TSM Alternative

The TSM Alternative is a low 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 I-485/N. Tryon 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 seven new park-and-ride lots with pedestrian and bicycle facilities. Additionally, two signals would be installed at the University City Blvd. and I-485/N. Tryon Street 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 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	15	30	45	Local	No change.
4–Country Club	15	30	45	Local	Rerouted to serve areas near North Graham Street, as well provide transfer options to Skip Stop service on North Tryon Street.
11–North Tryon	15	20	30	Local	Decrease peak frequency.
22–North Graham	30	35	40	Local	Streamline route along North Graham Street.
23–Shamrock	15	30	40	Local	No change.
29–UNC Charlotte*	15	30	60	Local	Improve peak and midday frequency.
39–Eastway/UNC Charlotte	30	30	30	Local	No change.
54x–URP Express	15	---	---	Express	No change.
80x–Concord	30	---	---	Express	No change.
81x–Wachovia	60	60	---	Express	No change.
110–Concord Mills Mall	30	30	60	Local	Improve midday frequency.
211–Hidden Valley	15	20	30	Local	No change.
360–City Boulevard/NC-49	30	40	60	Local	No change.
604–NE Skip Stop 1	6	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 2	6	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.
807–Old Concord Route	30	30	30	Local	New route along Old Concord Road to UNC Charlotte and skip-stop service.

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

**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
Tom Hunter	Tom Hunter Road and North Tryon Street/US-29
University City Blvd.	Rocky River Road and North Tryon Street/US-29
McCullough	McCullough Drive and North Tryon Street/US-29
Mallard Creek Church	Mallard Creek Church Road and North Tryon Street/US-29
I-485/N. Tryon	I-485 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 Light Rail Alternatives are further evaluated in this LYNX BLE Draft EIS. The TSM Alternative serves as a baseline alternative in Chapter 21.0 Evaluation of Alternatives, as required by the FTA New Starts program.

2.2.3 Light Rail Alternative

The proposed Light Rail Alternative would begin in Center City Charlotte at the terminus of the CATS' LYNX Blue Line light rail line near 7th Street and extend 10.7 miles northeast towards UNC Charlotte to I-485 near the Mecklenburg-Cabarrus County line (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 Light Rail Alternative and a design option called the Light Rail Alternative – Sugar Creek Design Option, are described in more detail in the following sections.

2.2.3.1 Alignment

The Light Rail Alternative alignment was identified by the MTC as the LPA, or preferred route, for the proposed project. One design option presented in this Draft EIS that deviates from the base alignment of the Light Rail Alternative is known as the Light Rail Alternative – Sugar Creek Design Option. This design option is described in more detail in Section 2.2.3.5. Figure 2-4 shows typical cross-sections for the alignment.

The proposed Light Rail Alternative 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.

A single track is located between 7th and 9th Street, and a 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 proposed Light Rail Alternative would eliminate the Trolley station at 9th Street.

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 proposed Light Rail 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 Vehicle Light Maintenance Facility (VLMF) 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 VLMF is described in more detail in Section 2.2.3.6.

The Light Rail 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 NCCR 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 proposed Light Rail 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.

NCRR and the NCDOT Rail Division plan to depress Sugar Creek Road under the existing freight tracks that are at street level due to safety concerns. CATS has worked with NCRR and NCDOT Rail to develop plans that also allow the light rail tracks to pass alongside the freight tracks on an adjacent bridge over 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.



Rendering of the proposed depression of Sugar Creek Road under the existing freight tracks and proposed Light Rail Alternative.

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 will begin in 2010.

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 JM 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/US29, 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 planned Toby Creek Greenway on a bridge and then travel along the northern side of Cameron Boulevard, across from the Laurel Hall dormitory.

The proposed alignment would then turn north and west to leave the campus and head towards Mallard Creek Church Road. The proposed alignment would cross an unnamed tributary to Mallard Creek on a bridge and head northeast towards Mallard Creek Church Road, crossing over Mallard Creek Church Road at-grade just east of a bridge crossing of Mallard Creek and just south of the Kirk Farm Fields Wetland Viewing area. The proposed alignment would turn north after the Mallard Creek Church Road Station and cross over Mallard Creek on a bridge and then turn northeast to parallel North Tryon Street/US-29 and continue along the eastern side of the roadway. The terminal station would be located approximately 1,400 feet south of the existing I-485 ramps.

2.2.3.2 Stations

The Light Rail Alternative would include 13 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 and Sugar Creek Stations would be located on a bridge structure that would support the station and light rail tracks while the respective roadways would be depressed underneath. In addition, the Sugar Creek Station Park-and-Ride (Option 2) and the I-485/N. Tryon Station would also be located on a bridge structure connected to the respective parking garage with direct access to the garage.

Platforms are planned to be 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.

Seven stations would have park-and-ride facilities with accessible parking for handicapped passengers. 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, “kiss-and-ride” areas for passenger pick-up and drop-off, as well as bus bays and bus stops, would be accommodated at select stations based on available land and projected demand. Parking garages are planned at Sugar Creek Station Park-and-Ride (Option 2) and the I-485/N. Tryon Station. All other parking would be provided at surface parking lots.

Table 2-5 summarizes the basic characteristics of the proposed stations for the Light Rail Alternative. Station site plans are included in Figures 2-6 through 2-19.

**Table 2-5
Proposed Stations for the Light Rail 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 Option 1 (Figure 2-10)	Park-and-ride	Center	899	3 Bays
Sugar Creek Station Park-and-Ride Option 2 (Figure 2-11)	Park-and-ride	Center	1,010	3 Bays
Old Concord Road Station (Figure 2-12)	Park-and-ride	Side	563	4 Bays
Tom Hunter Station (Figure 2-13)	Park-and-ride	Center	139	2 Stops
University City Blvd. Station (Figure 2-14)	Park-and-ride	Center	797	4 Bays
McCullough Station (Figure 2-15)	Park-and-ride	Center	151	2 Stops
JW Clay Blvd. Station (Figure 2-16)	Walk-up	Center	0	2 Bays
UNC Charlotte Station (Figure 2-17)	Walk-up	Side	0	2 Bays
Mallard Creek Church Station (Figure 2-18)	Park-and-ride	Side	156	3 Bays
I-485/N. Tryon Station (Figure 2-19)	Park-and-ride	Center	1,959	4 Bays

* Reflects the 30% Preliminary Engineering Design Plans (March 8, 2010).

2.2.3.3 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)
- Morningstar Place Drive at the proposed I-485/N. Tryon Street Station Park-and-Ride

2.2.3.4 Rail and Street Modifications

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

- 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 NCRRL, including construction of a sidewalk along 36th Street under the future freight and light rail bridges;
- A new signal is also proposed at Sugar Creek Road and North Davidson Street for traffic accessing the proposed Sugar Creek Station Park-and-Ride Option 2.
- 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.
- 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.

- The southern portion of US-29 Service Road/Morningstar Place Drive would be modified and a new signalized intersection would be added at North Tryon Street/US-29 as the primary entrance/exit for the I-485/N. Tryon Station park-and-ride. The current configuration is an unsignalized intersection with North Tryon Street/US-29. The road would continue through the park-and-ride and would turn to the north to reconnect with its current location just before Carnival Street. An additional un-signalized intersection (right-in/right-out with left-over) for the I-485/N. Tryon Station park-and-ride would be provided north of the proposed signalized intersection.
- All existing signalized intersections would remain and the proposed project would add six new signalized intersections along North Tryon Street/US-29 at Orr Road, Arrowhead Drive, Owen Boulevard, Orchard Trace Lane, University City Blvd. Station park-and-ride entrance, and Morningstar Place Drive.
- Existing median openings along North Tryon Street 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 Light Rail 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 Sugar Creek Road under the existing freight tracks and proposed light rail tracks.

2.2.3.5 Light Rail Alternative – Sugar Creek Design Option

The Light Rail Alternative – Sugar Creek Design Option (Figure 2-20) represents a change from the proposed Light Rail Alternative alignment described in Section 2.2.3.1 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 pass over Sugar Creek Road on a bridge. This bridge structure would be at the same elevation (at-grade) as the freight tracks and the existing roadway. Sugar Creek Road would also be depressed under the existing freight and the future proposed light rail tracks.

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 NCR 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.

Asymmetrical widening to the west side of North Tryon Street/US-29 from Dorton Street to Old Concord Road is proposed. The existing right-of-way along this portion of North Tryon Street/US-29 is 100 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. The proposed typical section along North Tryon Street would be the same as in the Light Rail Alternative. In addition, Dorton Street would be extended east to Raleigh Street to provide access to the park-and-ride lot. An at-grade crossing would also be provided where the light rail would cross Raleigh 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 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. Table 2-6 summarizes the basic characteristics of the proposed stations for the Light Rail Alternative – Sugar Creek Design Option. Station site plans for the Sugar Creek Station Light Rail Alternative – Sugar Creek Design Option and the Old Concord Road Station Light Rail Alternative – Sugar Creek Design Option are included in Figures 2-21 and 2-22.

**Table 2-6
Proposed Stations for the Light Rail Alternative – Sugar Creek Design Option**

Station	Access	Platform Type	Parking Spaces	Bus Bays
Sugar Creek Station, Sugar Creek Design Option (Figure 2-21)	Park-and-ride	Side	893	3
Old Concord Road Station, Sugar Creek Design Option (Figure 2-22)	Park-and-ride	Center	458	3

2.2.3.6 Vehicle Light Maintenance Facility (VLMF)

A VLMF and storage yard would be constructed on the existing Norfolk Southern Intermodal Facility that abuts North Brevard Street as part of the Light Rail Alternative as shown in Figure 2-23. The VLMF would include a maintenance building and a storage yard. The existing CATS Vehicle Maintenance Facility would need minor modifications to the Rail Operations Control Center. Light maintenance activities, those that could be done in less than 24 hours, would take place at this new facility; whereas heavy maintenance would take place at the existing South Boulevard Light Rail Facility. As noted in Section 2.2.3.1, Norfolk Southern plans to relocate the existing intermodal facility to the Charlotte-Douglas International Airport. In the unlikely event that the relocation project will not be complete prior to opening service of the proposed LYNX BLE, CATS has identified three alternate sites that could potentially accommodate the VLMF, if necessary. These sites are shown in Figure 2-24 and include, Option A, a location near to the South Boulevard Light Rail Facility; Option B, a location near to the North Tryon Street/US-29 and Eastway Drive intersection; and Option C, a location near to the proposed I-485/N. Tryon Station. As the existing NS Intermodal Facility is the preferred location of the proposed VLMF, potential environmental impacts associated with development of the alternate sites have not been evaluated and are not included in this Draft EIS. However, if it becomes apparent that the NS Intermodal Facility relocation will be delayed, detailed environmental analysis will be performed on the alternate sites to determine potential social, environmental and economic effects.

2.2.3.7 Ancillary Facilities

The Light Rail 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, eight 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. Eight 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



Typical LYNX Blue Line substation.



Typical LYNX Blue Line signal house.

signal houses is 800 feet, while the maximum distance between signal houses is 16,000 feet.

2.2.3.8 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 proposed Light Rail 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 proposed Light Rail 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.



Typical Light Rail Vehicle

The proposed Light Rail 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, radios and Automatic Passenger Counters (APC). Each vehicle would be manually operated and would generally operate at a maximum speed of 55 miles per hour.

2.2.3.9 Operating Characteristics

The operations plan for the proposed Light Rail Alternative includes light rail service and feeder bus service. Since the proposed Light Rail Alternative would be an extension of the existing LYNX Blue Line, service frequency in the Northeast Corridor 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 South Corridor line and the I-485/N. Tryon Station near the Mecklenburg-Cabarrus County line. 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. 6:00 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 six minutes by the year 2030.
- 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 2030, 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. Six-minute headways were analyzed in this Draft EIS to represent a worst case traffic and noise scenario. As ridership projections are refined, a final operating plan will be determined and presented in the Final EIS.

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 proposed Light Rail 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 2-7. Figure 2-25 shows bus service in the Northeast Corridor under the Light Rail Alternative.

**Table 2-7
Bus Service in Northeast Corridor for Light Rail Alternative**

Routes	Frequency			Type	Light Rail Station Served
	Peak	Midday	Night		
3-The Plaza	15	30	45	Local	36th Street
4-Country Club	15	30	45	Local	Sugar Creek Station Park-and-Ride Options 1 and 2
11-North Tryon	15	30	30	Local	Old Concord Road, Tom Hunter, University City Blvd.
22-North Graham	30	35	40	Local	Not applicable
23-Shamrock	15	30	40	Local	Parkwood, 36th Street
29-UNC Charlotte*	15	30	60	Local	Mallard Creek Church
39-Eastway /UNC Charlotte	30	30	30	Local	Sugar Creek Station Park-and-Ride Options 1 and 2
54x-URP	15	---	---	Express	University City Blvd., JW Clay Blvd
80x-Concord	30	---	---	Express	I-485/N. Tryon
81x-Wachovia	15	30	---	Express	University City Blvd., JW Clay Blvd.
110-Concord Mills Mall	30	30	60	Local	Mallard Creek Church
211-Hidden Valley	15	20	30	Local	Sugar Creek Station Park-and-Ride Options 1 and 2, Tom Hunter
360-City Boulevard/NC-49	30	40	60	Local	Mallard Creek Church
807-Old Concord Route	30	30	30	Local	Old Concord Road, Mallard Creek Church

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.

Fare Collection

Fare collection for the Light Rail 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.

2.2.4 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 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. To operate 2 car train sets at 6-minute headways, three additional substations are needed. These improvements are not included in the proposed project at this time. The potential impacts of the improvements are described in 19.0 Secondary and Cumulative Effects.

2.2.5 Capital Costs

The estimated capital costs for the proposed Light Rail Alternative and the Light Rail Alternative – Sugar Creek Design Option are shown in Table 2-8.

**Table 2-8
Capital Costs for the Light Rail Alternative
and the Light Rail Alternative – Sugar Creek Design Option, 2009**

Cost Category ¹	Light Rail Alternative (\$ millions, 2009)	Change in Cost for Sugar Creek Design Option (\$ millions, 2009)
Guideway and Track Elements	\$167.06	+\$1.35
Stations	\$42.40	-\$0.08
Support Facilities: Yards, Shops, Admin. Bldgs	\$43.11 ²	No change
Site work and Special Conditions	\$120.29	+\$6.06
Systems	\$93.46	No Change
Right-of-way, Land, Existing Improvements	\$111.99	+\$42.81
Vehicles	\$122.88	No Change
Professional Services	\$161.1 ²	+\$2.49
Unallocated Contingency	\$86.23 ²	+\$5.26
Grand Total	\$948.56³	+\$57.89

Notes: ¹List of Cost Categories based on FTA's "Standard Cost Categories for Major Capital Projects." ²Includes the addition of the VLMF order-of-magnitude cost estimate. ³ Does not include Finance Charges.
Source: *Revised 15 Percent Cost Estimate*, July 2009, STV Incorporated.

2.2.6 Operating and Maintenance Costs

System-wide operating and maintenance costs (O&M) for the No-Build Alternative and the Light Rail Alternative are included in Table 2-9. These numbers reflect system-wide bus and light rail O&M costs for CATS. There would be no difference in O&M costs between the Light Rail Alternative and the Light Rail Alternative – Sugar Creek Design Option.

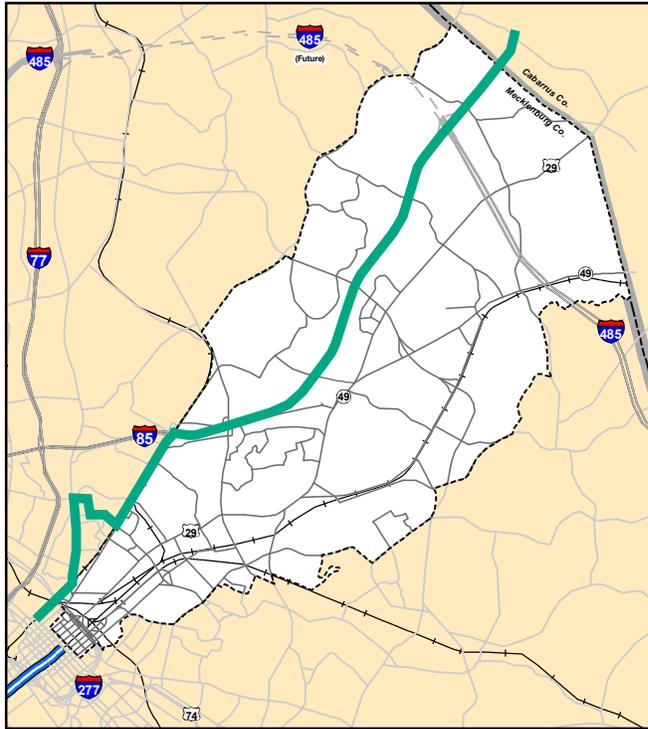
**Table 2-9
Summary of System-wide Operating and Maintenance Costs**

Alternative	Annual O&M Costs (\$ millions)	Incremental O&M Cost over the No-Build Alternative (\$ millions)
No-Build Alternative	\$95.72	--
Light Rail Alternative	\$112.73	+\$17.01

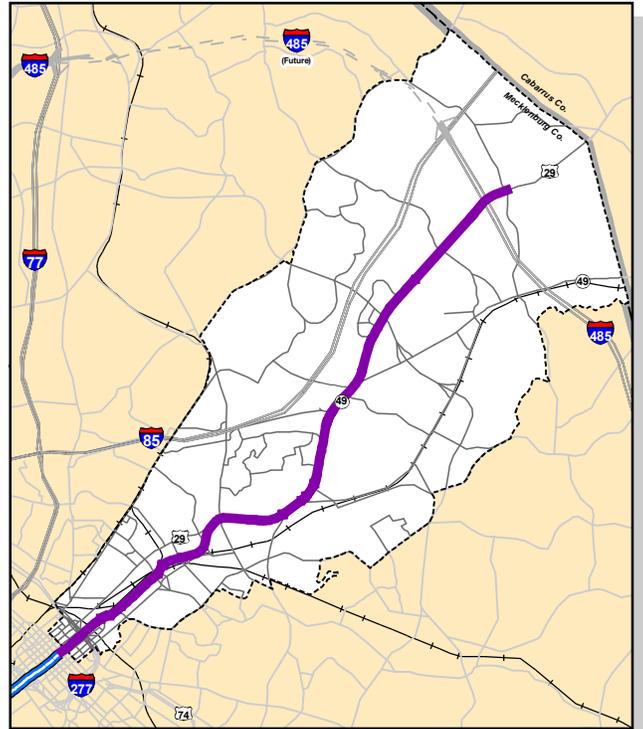
Note: "--" Not applicable; 2009 Dollars

Previously Considered Alignment Alternatives

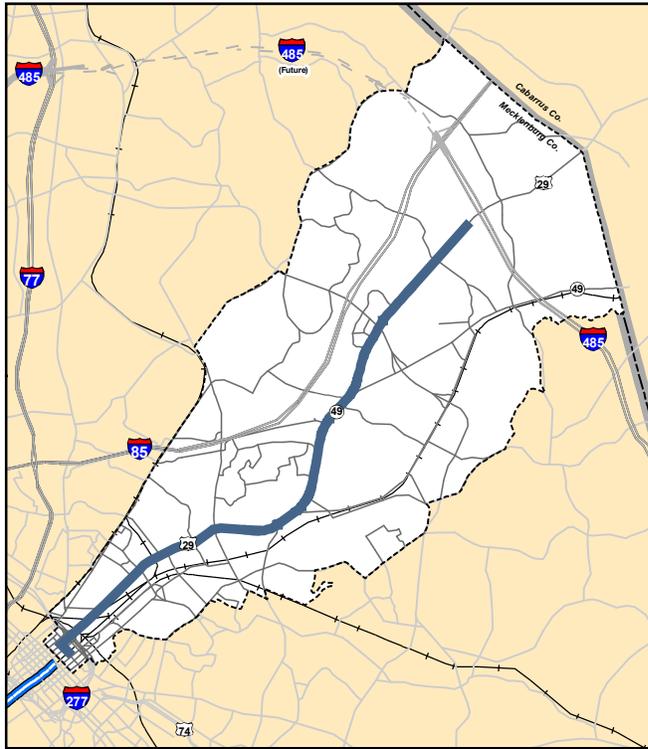
MIS Alignment NE-3



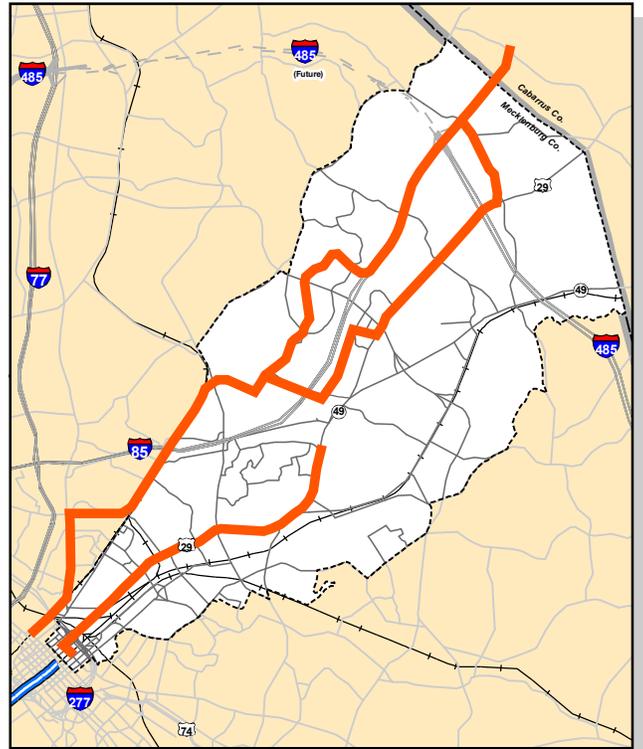
MIS Alignment NE-4



MIS Alignment NE-5



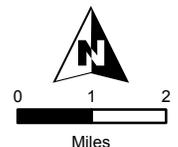
MIS Alignment NE-6



Project_Alternatives_Figure_2-1a_CB_033010.pdf

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

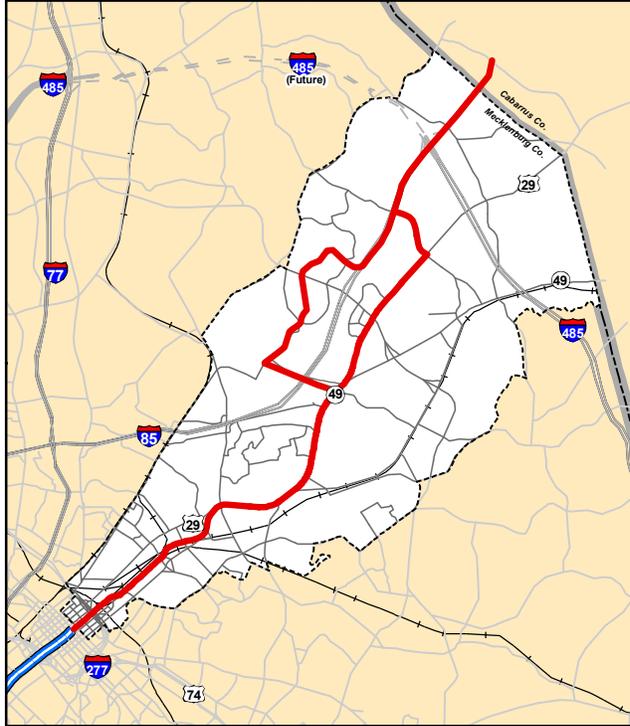


Data Source:
CATS, RWA/STV/City of Charlotte GIS, and
Mecklenburg County GIS

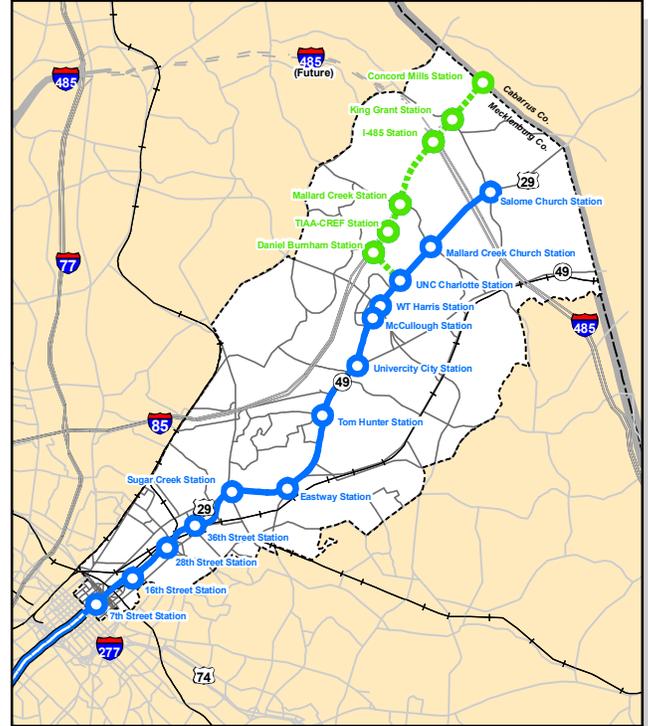
03/30/10

Previously Considered Alignment Alternatives

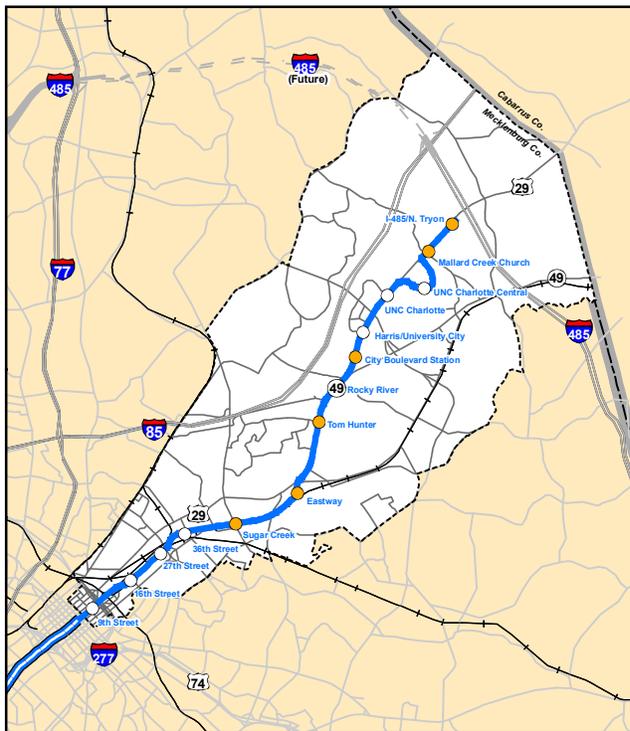
MIS Alignment NE-7



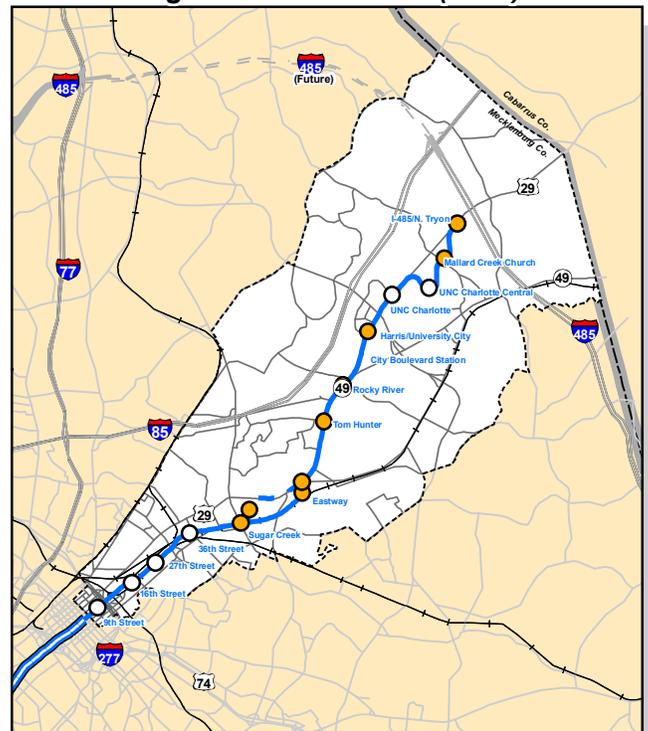
MIS Locally Preferred Alternative (2002)



Conceptual Engineering - Refined Locally Preferred Alternative (2006)

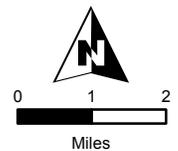


Locally Preferred Alternative / Light Rail Alternative (2009)

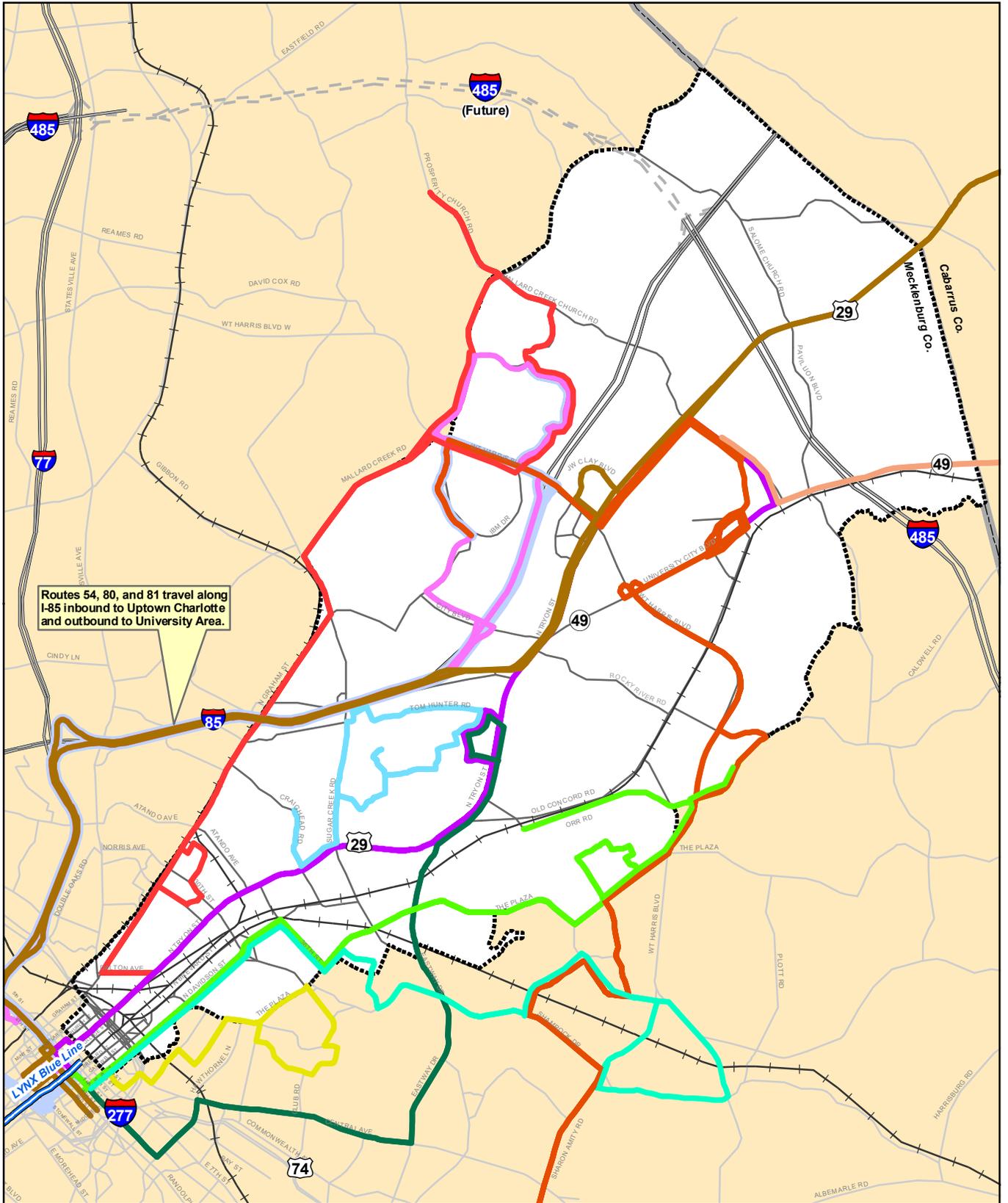


Legend

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

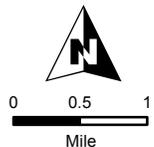


Data Source:
CATS, RWA/STV/City of Charlotte GIS, and
Mecklenburg County GIS



Routes 54, 80, and 81 travel along I-85 inbound to Uptown Charlotte and outbound to University Area.

Legend	
	Northeast Corridor Limits
	LYNX Existing Light Rail Transit
	Railroads
	Highway
	Major Roads
	Highway (Future)
	County Line
	29 UNCC / SouthPark
	39 Eastway
	4 Country Club
	11 North Tryon
	22 Graham St
	23 Shamrock
	54 54x URP Express
	80 80x Concord Express
	81 81x Wachovia CIC Express
	211 Hidden Valley
	360 NC49 / City Blvd

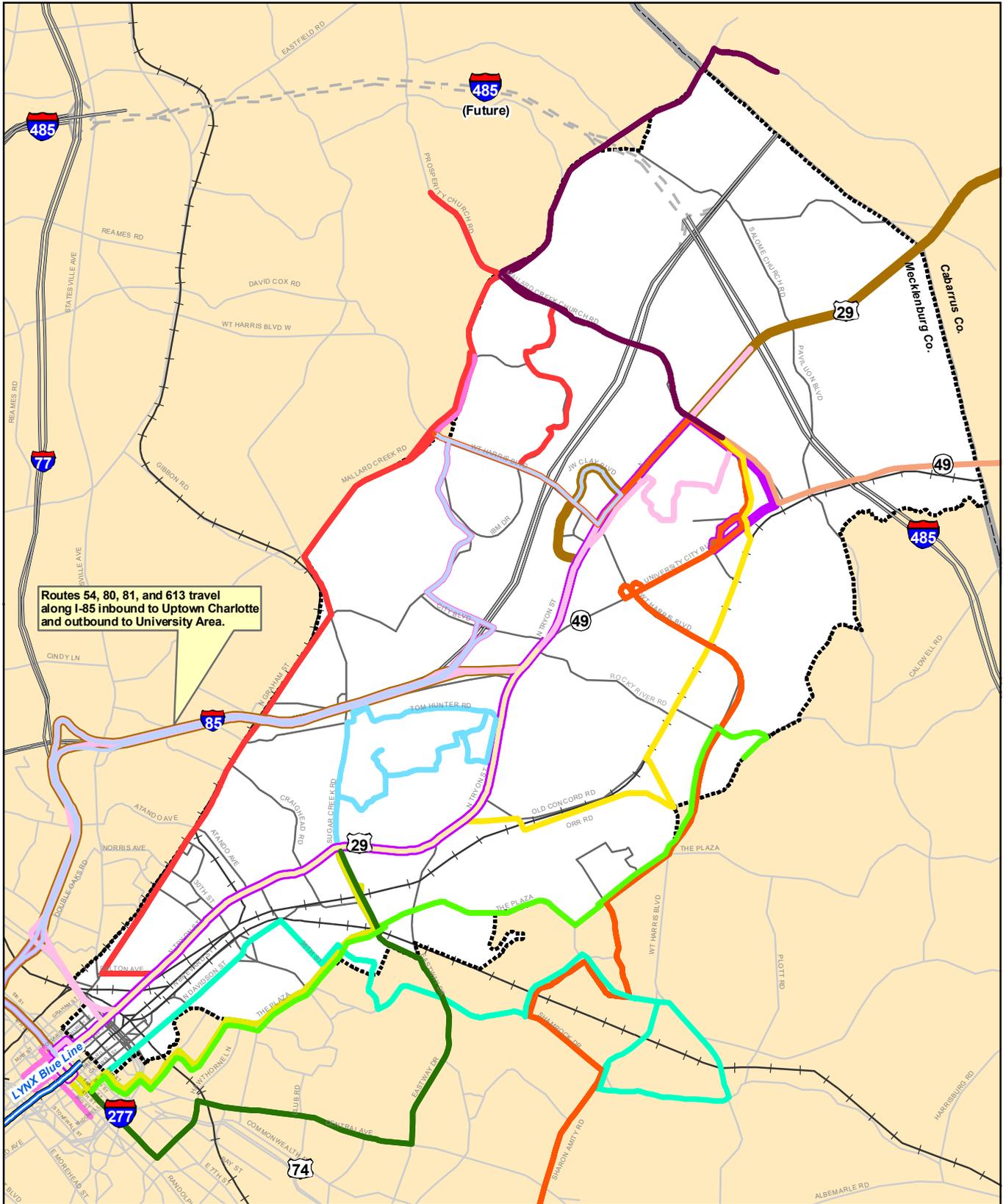


Data Source:
CATS, City of Charlotte GIS, and Mecklenburg County GIS

BLE_NoBuildBus3-10.pdf

03_16_10

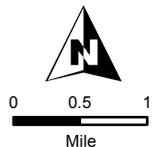
Northeast Corridor - 2030 TSM Bus Network



Routes 54, 80, 81, and 613 travel along I-85 inbound to Uptown Charlotte and outbound to University Area.

Legend

- | | | | |
|---------------------------|----------------------------------|--------------------------|--------------------|
| Northeast Corridor Limits | LYNX Existing Light Rail Transit | UNCC / SouthPark | Hidden Valley |
| Railroads | The Plaza | Eastway | NC49 / City Blvd |
| Highway | Country Club | 54x URP Express | 613 NE Skip Stop 2 |
| Major Roads | North Tryon | 80x Concord Express | 604 NE Skip Stop 1 |
| Highway (Future) | Graham St | 81x Wachovia CIC Express | 807 Old Concord Rd |
| County Line | Shamrock | 110 Concord Mills Mall | |

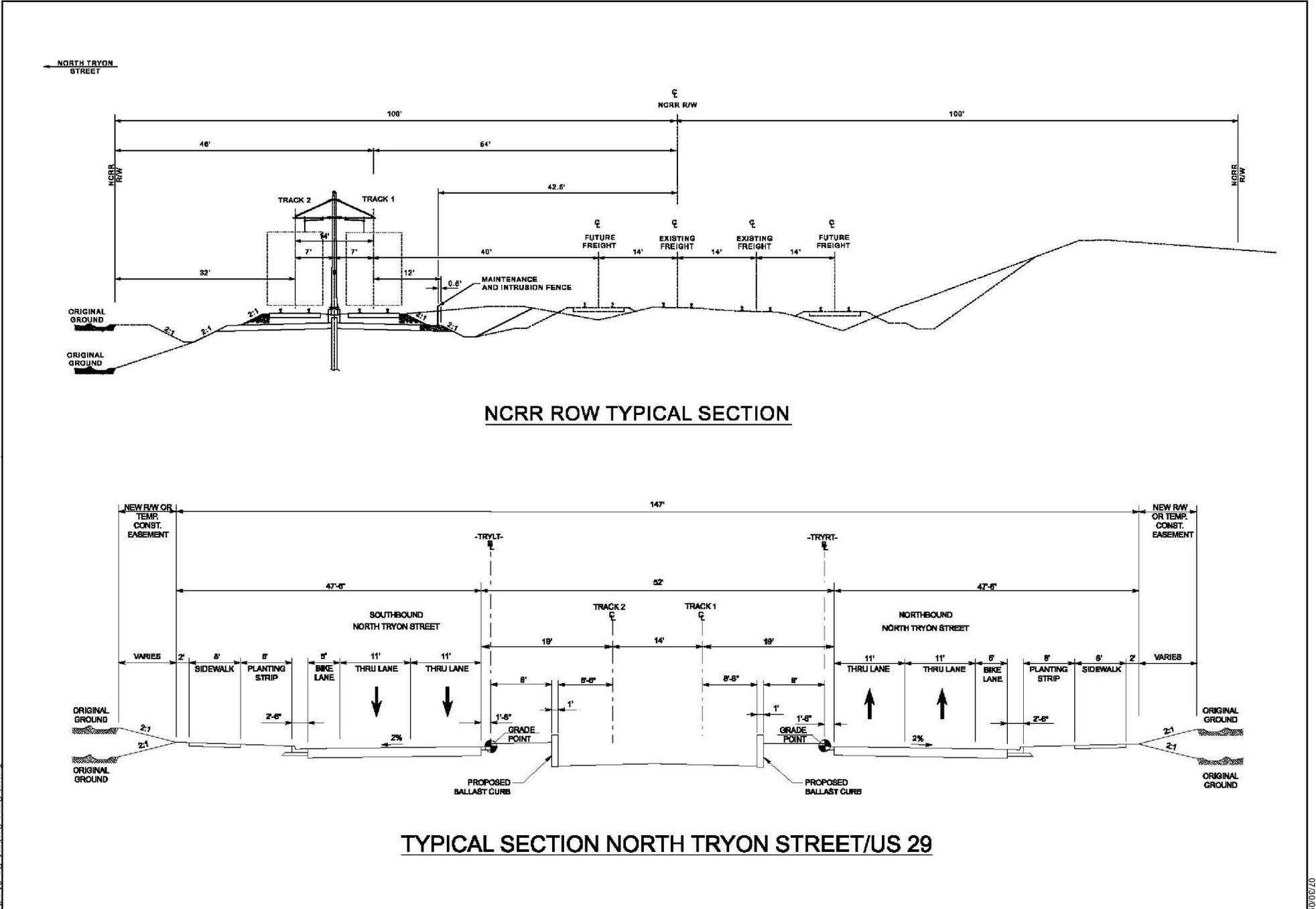


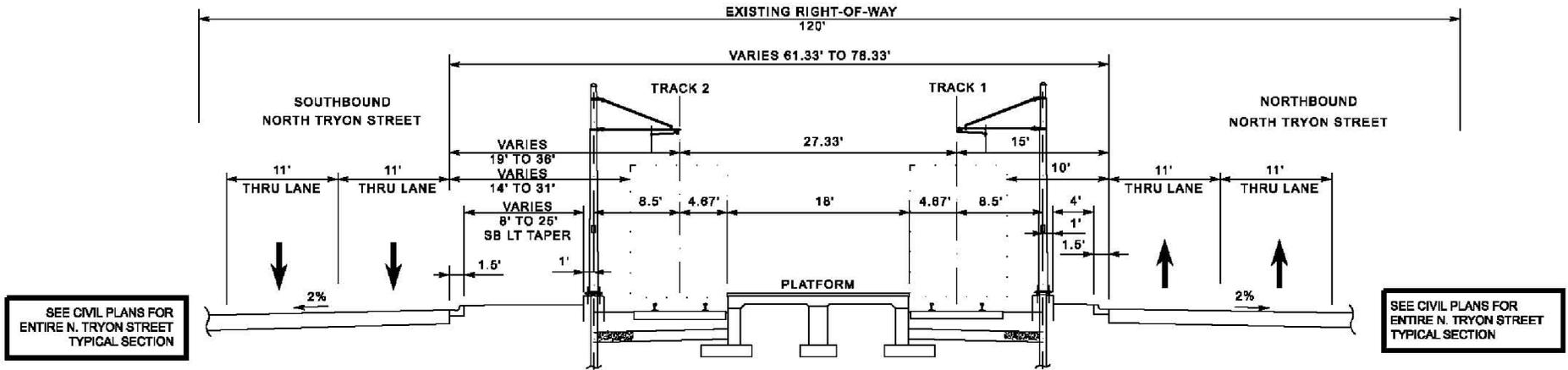
Data Source: CATS, City of Charlotte GIS, and Mecklenburg County GIS

BLE_TSM_Bus3-10.pdf

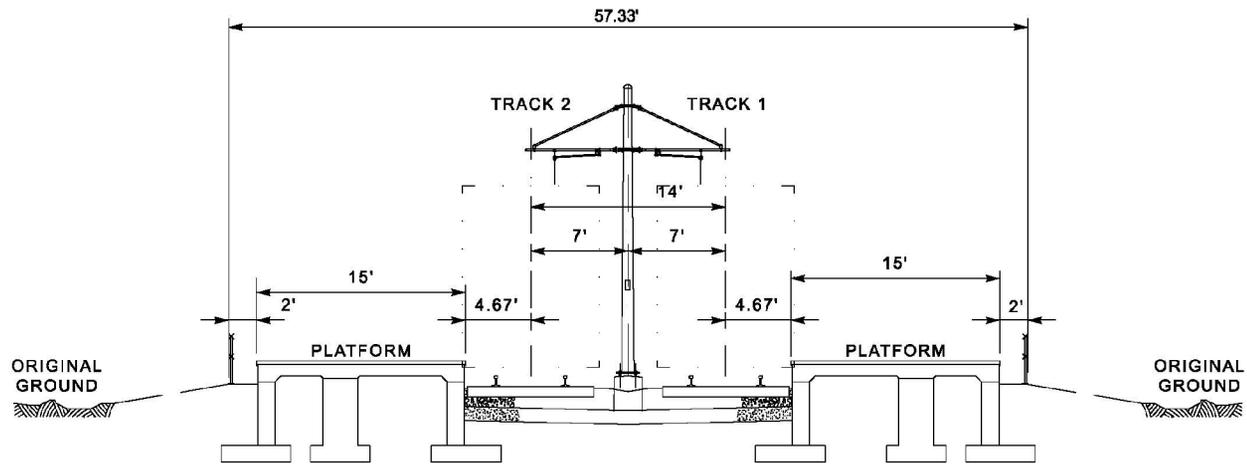
03_16_10

Figure 2-4
Typical Cross Sections with NCRROW & median of North Tryon Street/US-29

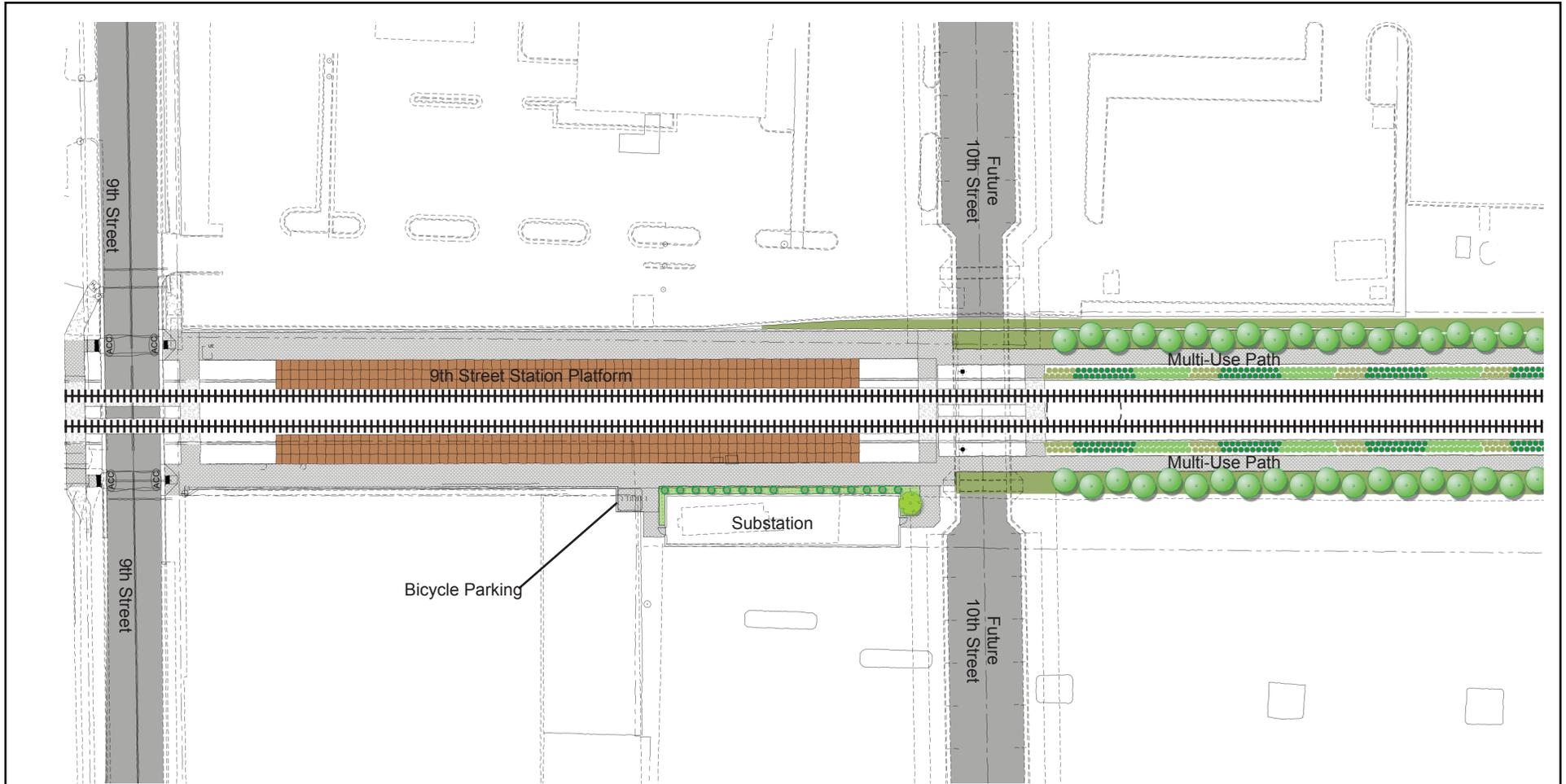




TYPICAL SECTION CENTER PLATFORM

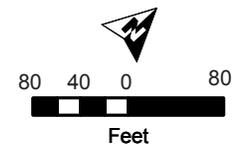


TYPICAL SECTION SIDE PLATFORM

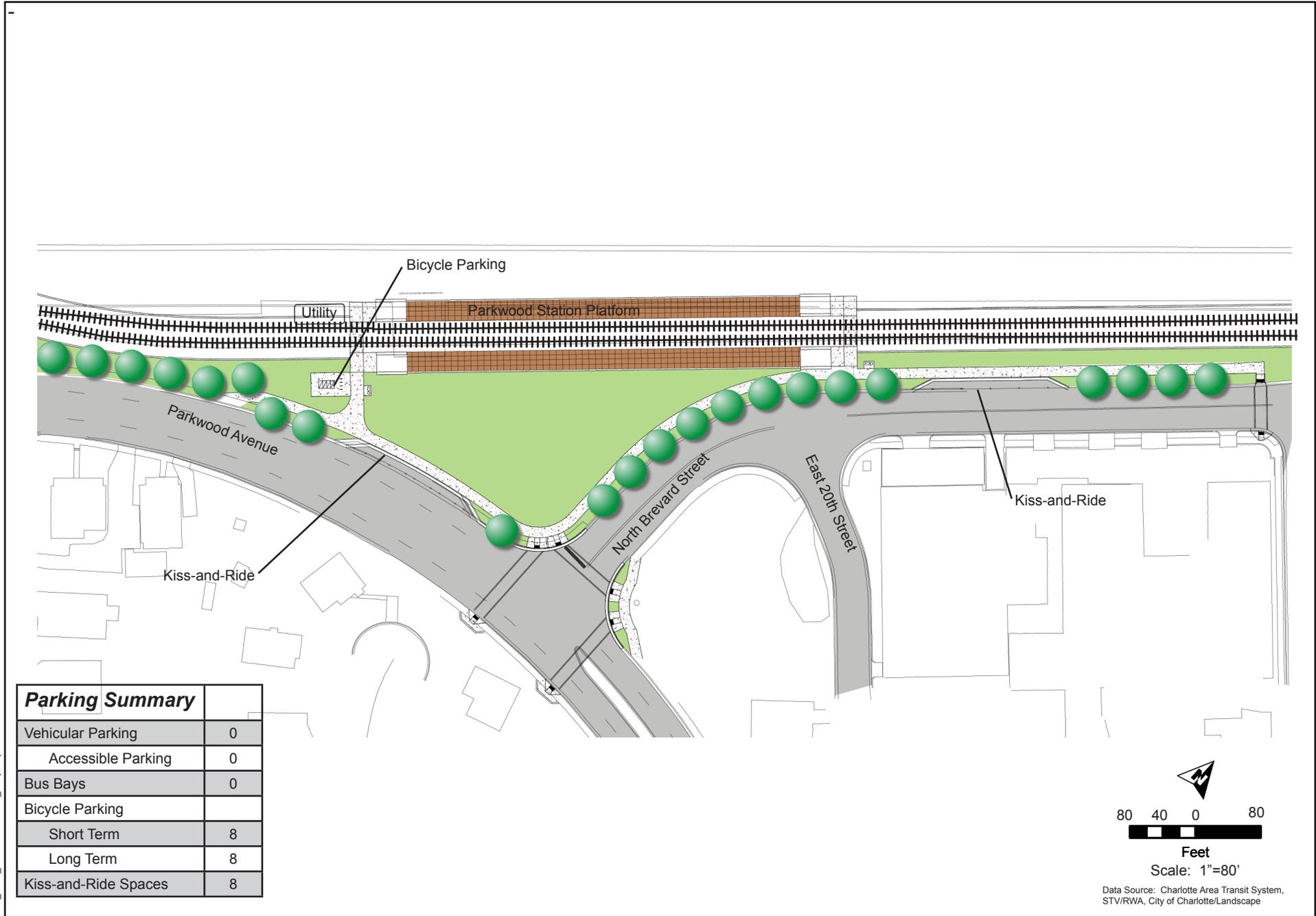


Parking Summary

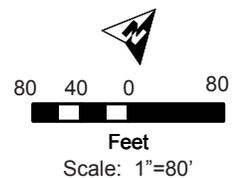
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	0
Kiss-and-Ride Spaces	0



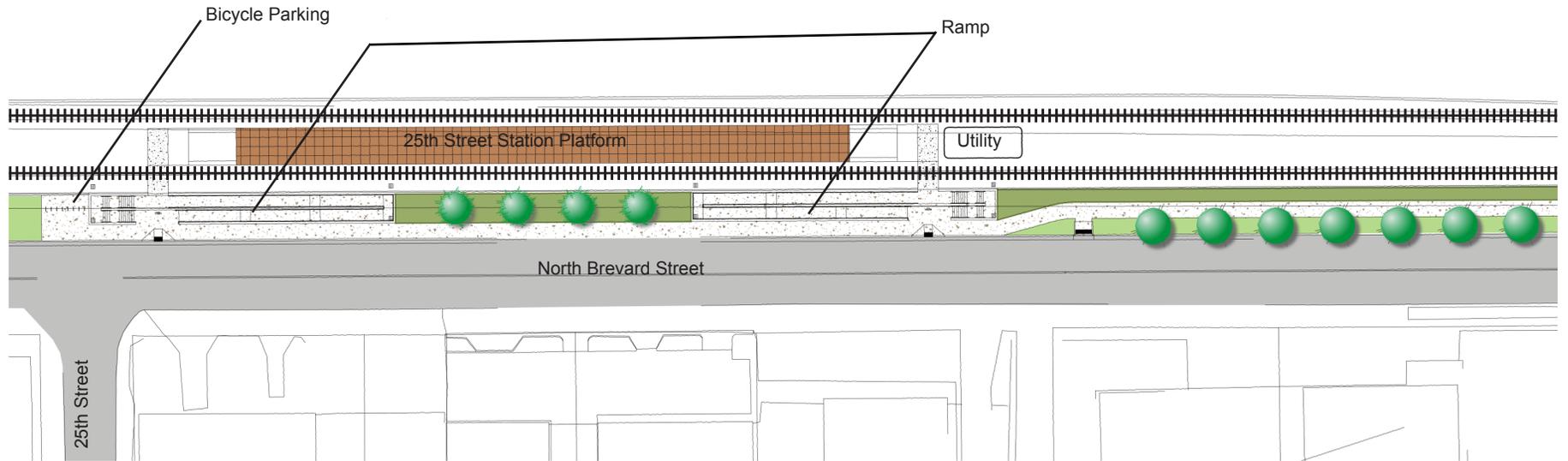
Data Source: Charlotte Area Transit System, STV/RWA,
 City of Charlotte/Landscape Management



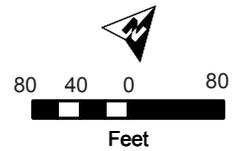
Parking Summary	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	8
Kiss-and-Ride Spaces	8



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

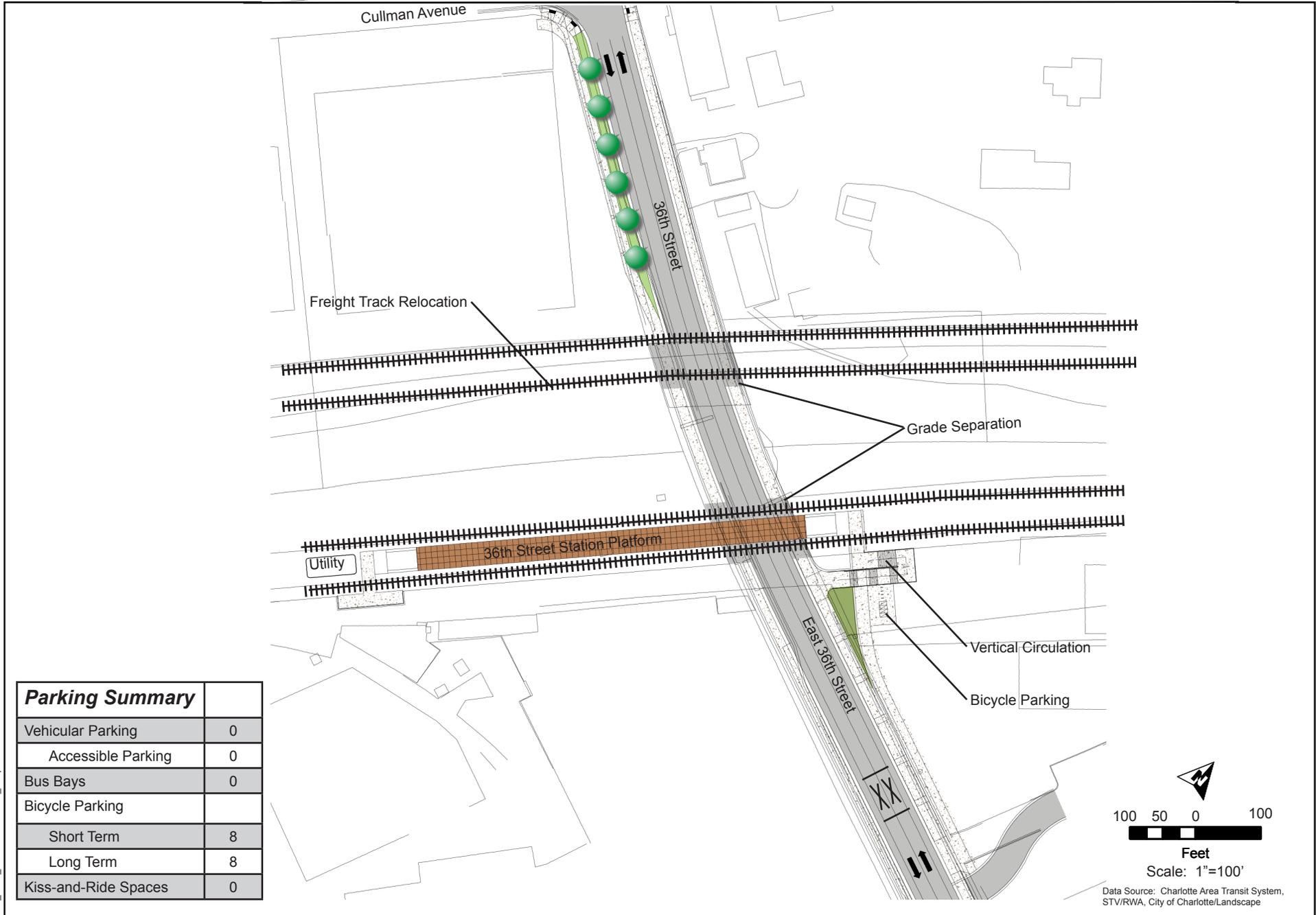


Parking Summary	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	0
Bicycle Parking	
Short Term	16
Long Term	0
Kiss-and-Ride Spaces	0

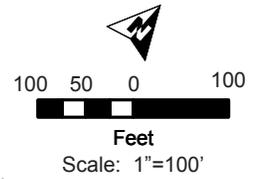


Data Source: Charlotte Area Transit System,
STV/RWA, City of Charlotte/Landscape

Figure 2-9
36th Street Station Site Plan



Parking Summary	
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

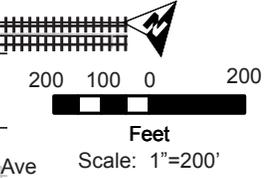
BLE_DEIS_36th Street Station_Siteplan.

03.08.2010

Figure 2-10
Sugar Creek Station Park-and-Ride Option 1 Site Plan

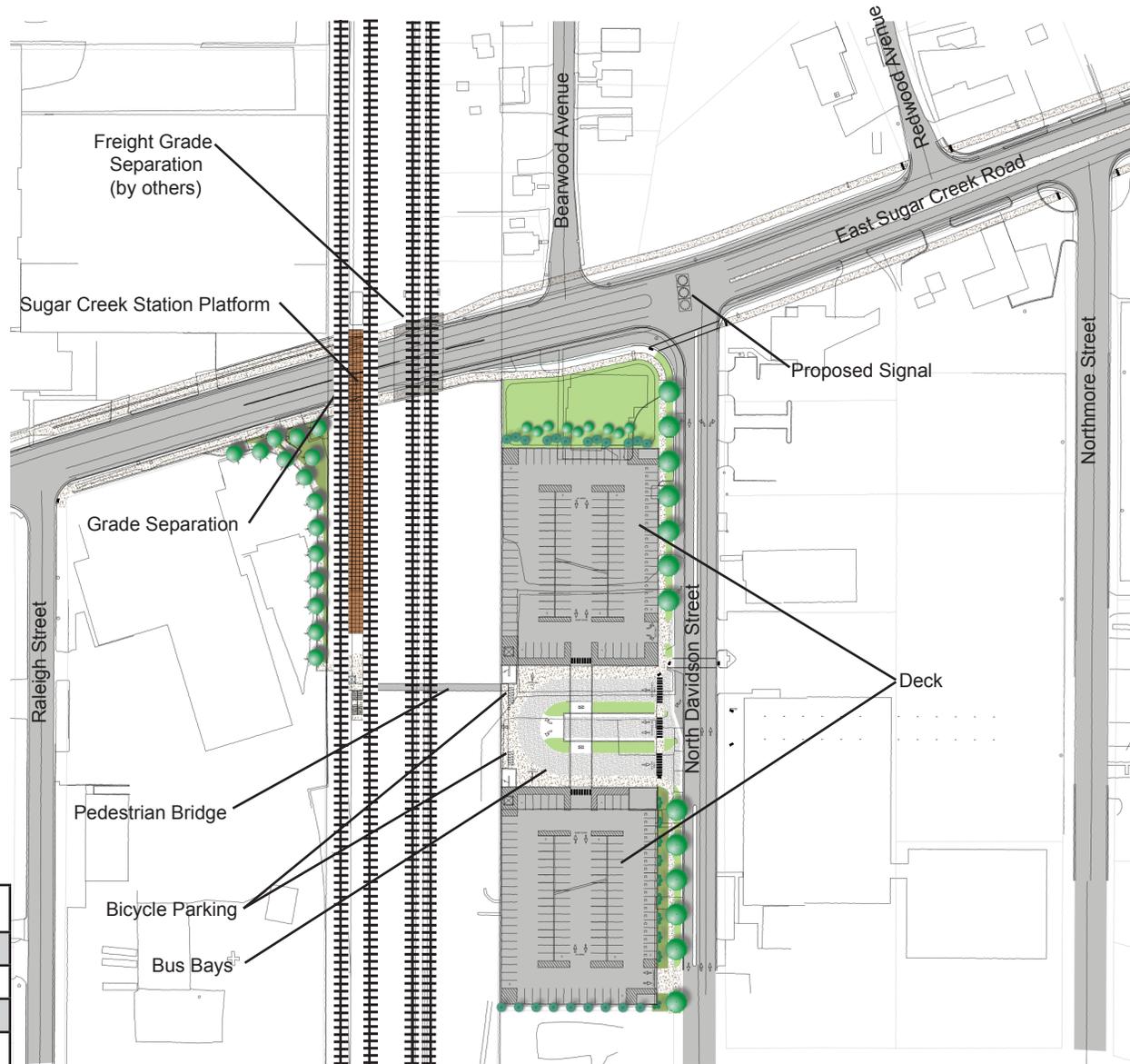


Parking Summary	
Vehicular Parking	899
Accessible Parking	18
Bus Bays	3
Bicycle Parking	
Short Term	6
Long Term	22
Kiss-and-Ride Spaces	4

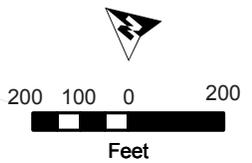


Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape

Sugar Creek Station Park-and-Ride Option 2 Site Plan



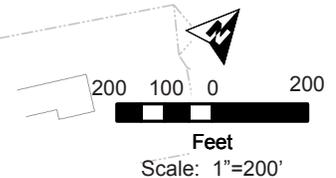
Parking Summary	
Vehicular Parking	1010
Accessible Parking	21
Bus Bays	3
Bicycle Parking	
Short Term	6
Long Term	22
Kiss-and-Ride Spaces	0



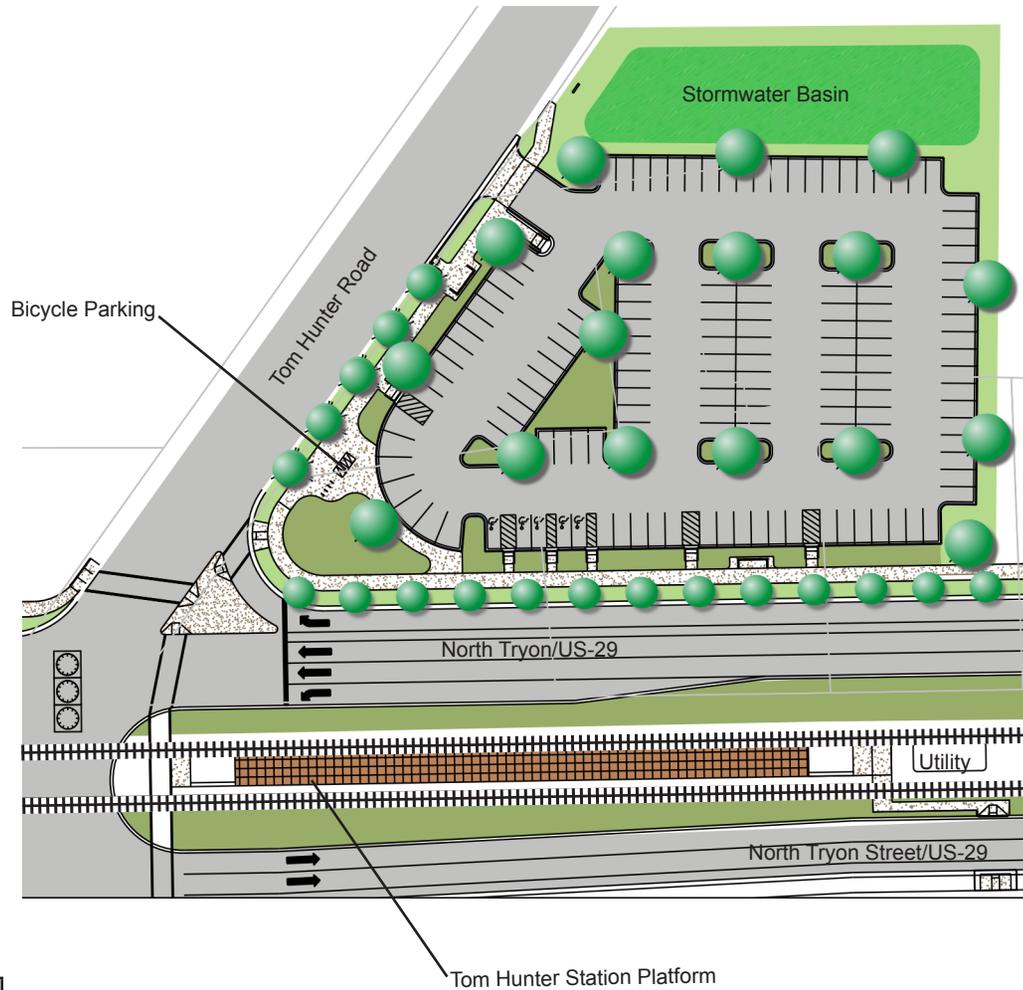
Scale: 1"=200'
 Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape



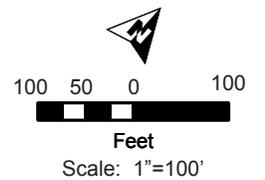
Parking Summary	
Vehicular Parking	563
Accessible Parking	11
Bus Bays	4
Bicycle Parking	
Short Term	8
Long Term	16
Kiss-and-Ride Spaces	0



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



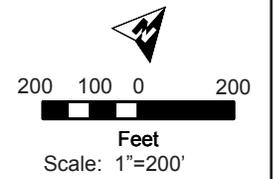
Parking Summary	
Vehicular Parking	139
Accessible Parking	5
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	8
Kiss-and-Ride Spaces	0



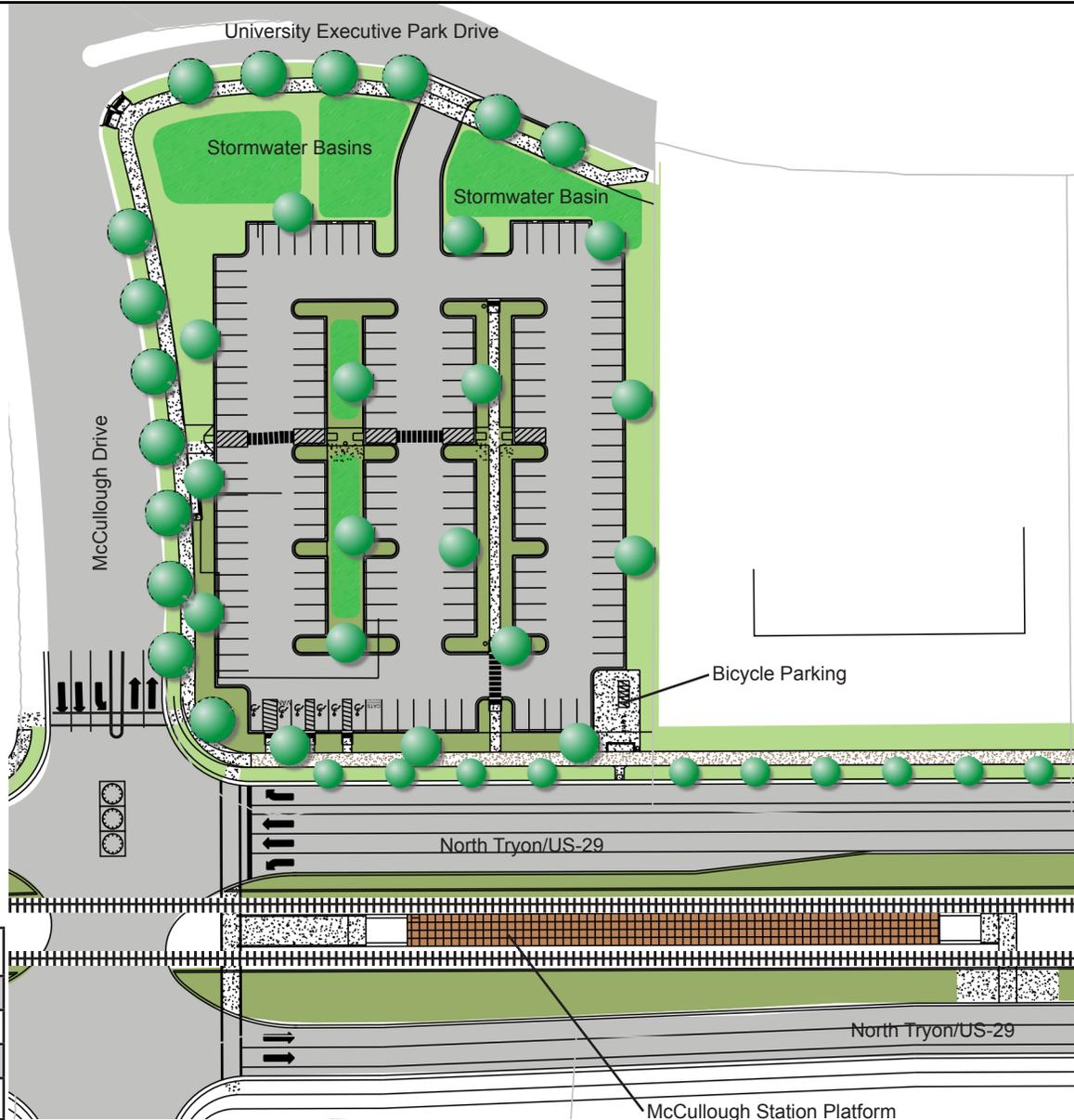
Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape



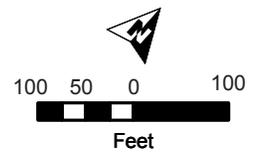
Parking Summary	
Vehicular Parking	797
Accessible Parking	16
Bus Bays	4
Bicycle Parking	
Short Term	6
Long Term	18
Kiss-and-Ride Spaces	0



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



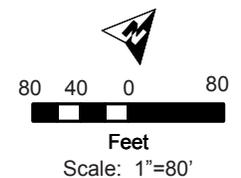
Parking Summary	
Vehicular Parking	151
Accessible Parking	6
Bus Bays	0
Bicycle Parking	
Short Term	8
Long Term	10
Kiss-and-Ride Spaces	0



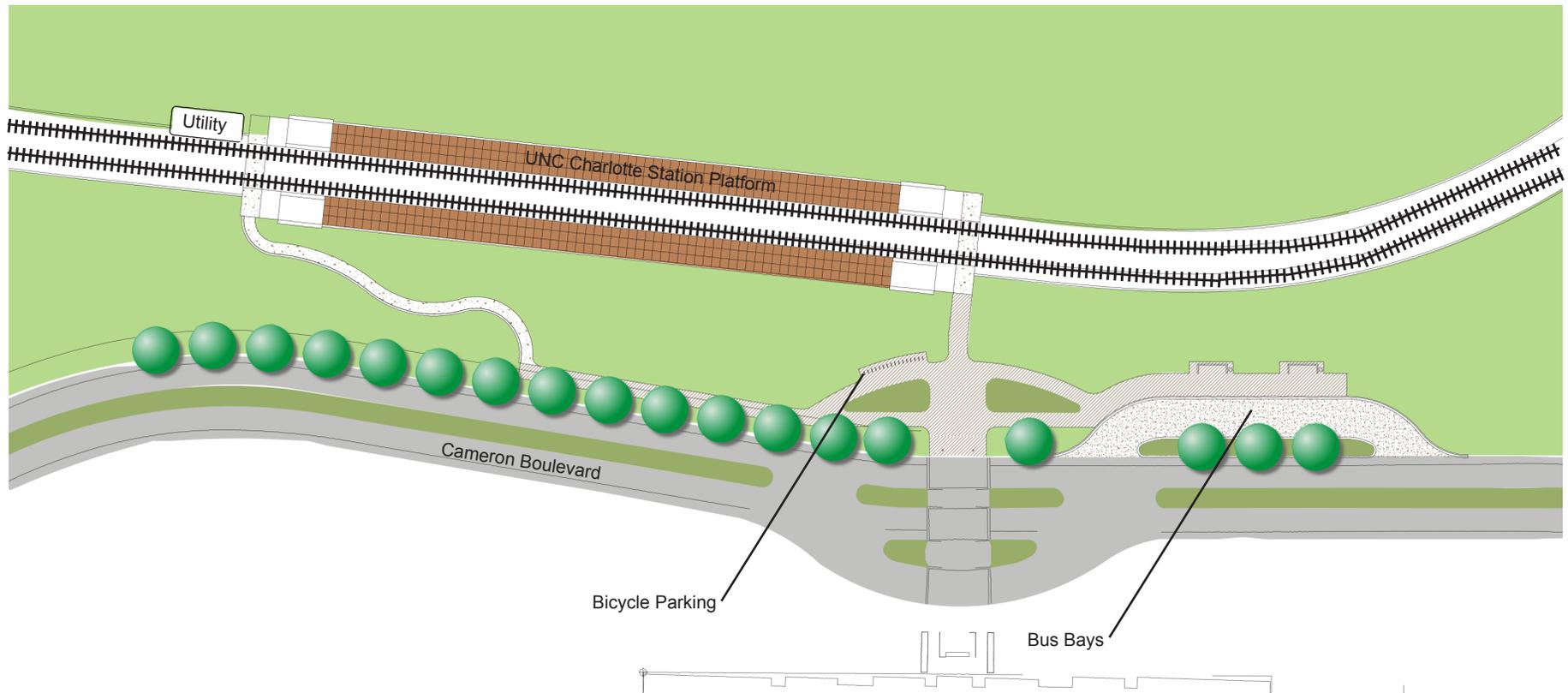
Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape



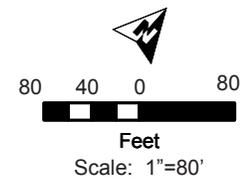
Parking Summary	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	2
Bicycle Parking	
Short Term	8
Long Term	8
Kiss-and-Ride Spaces	0



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

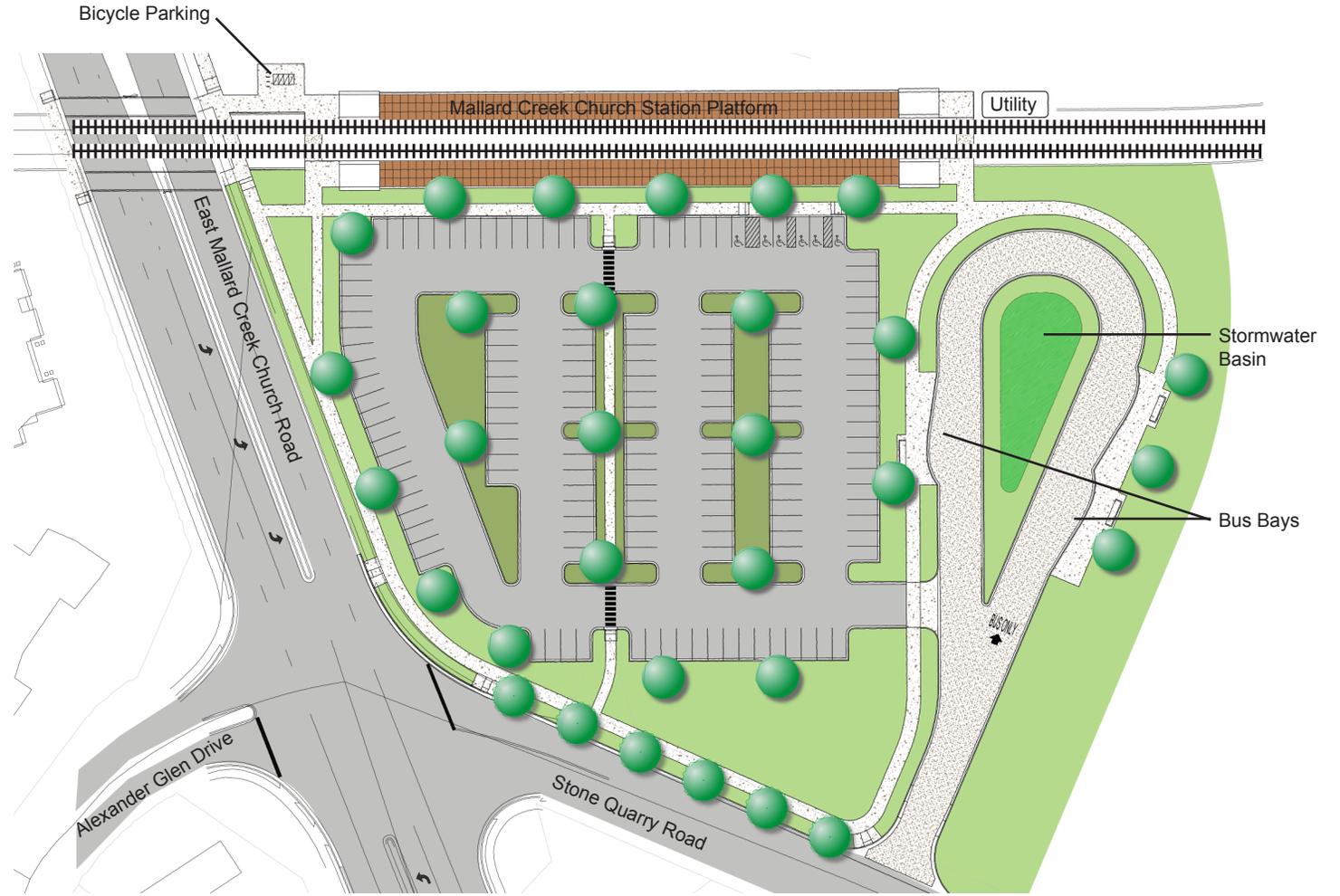


Parking Summary	
Vehicular Parking	0
Accessible Parking	0
Bus Bays	2
Bicycle Parking	
Short Term	32
Long Term	0
Kiss-and-Ride Spaces	0

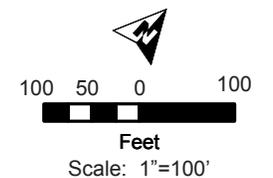


Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape

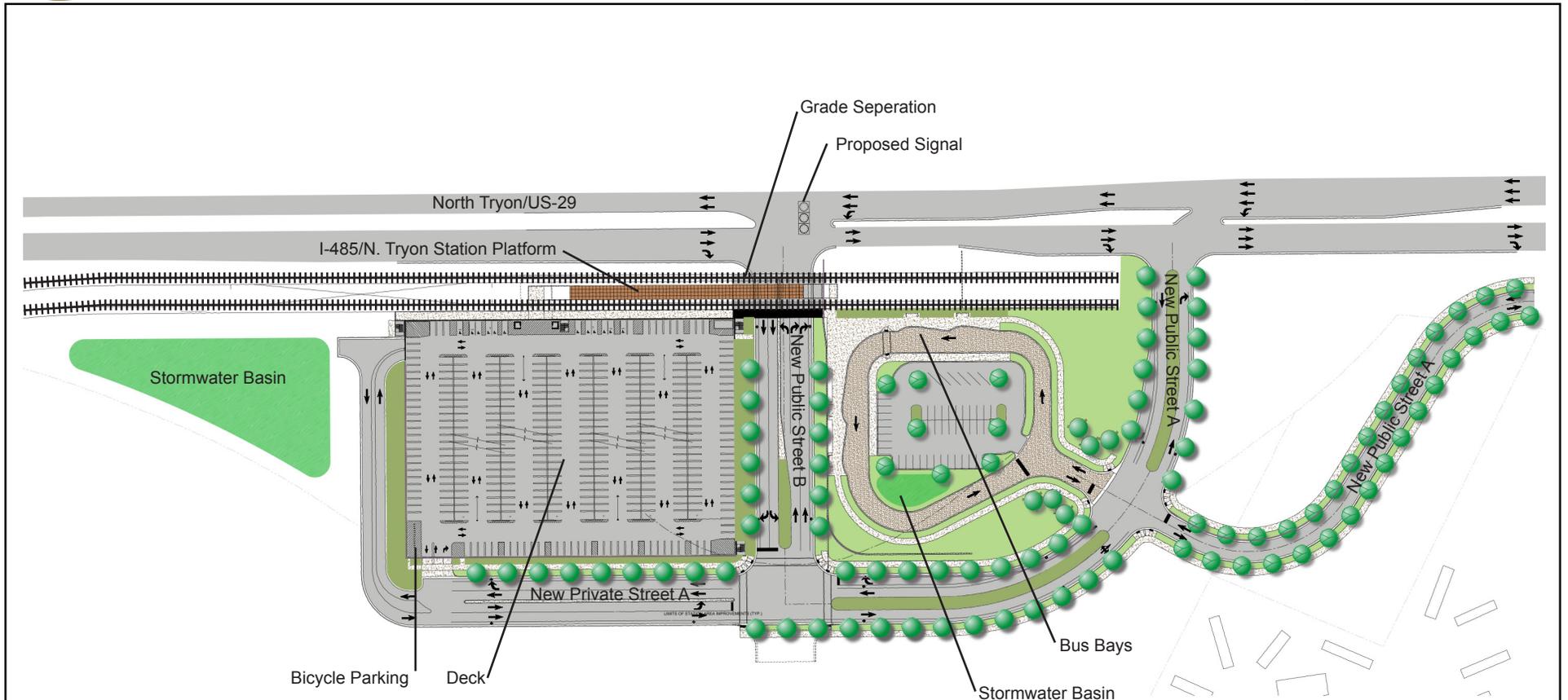
Figure 2-18
Mallard Creek Church Station Site Plan



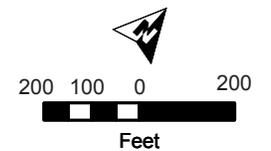
Parking Summary	
Vehicular Parking	156
Accessible Parking	6
Bus Bays	3
Bicycle Parking	
Short Term	8
Long Term	8
Kiss-and-Ride Spaces	0



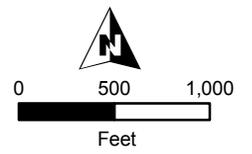
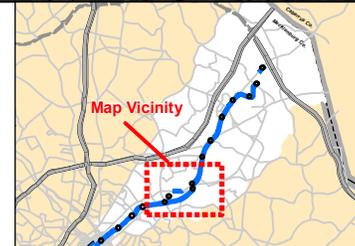
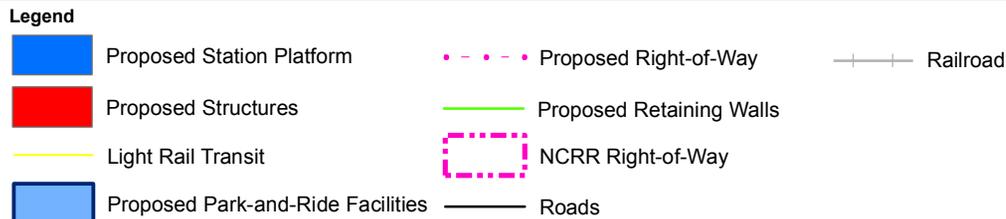
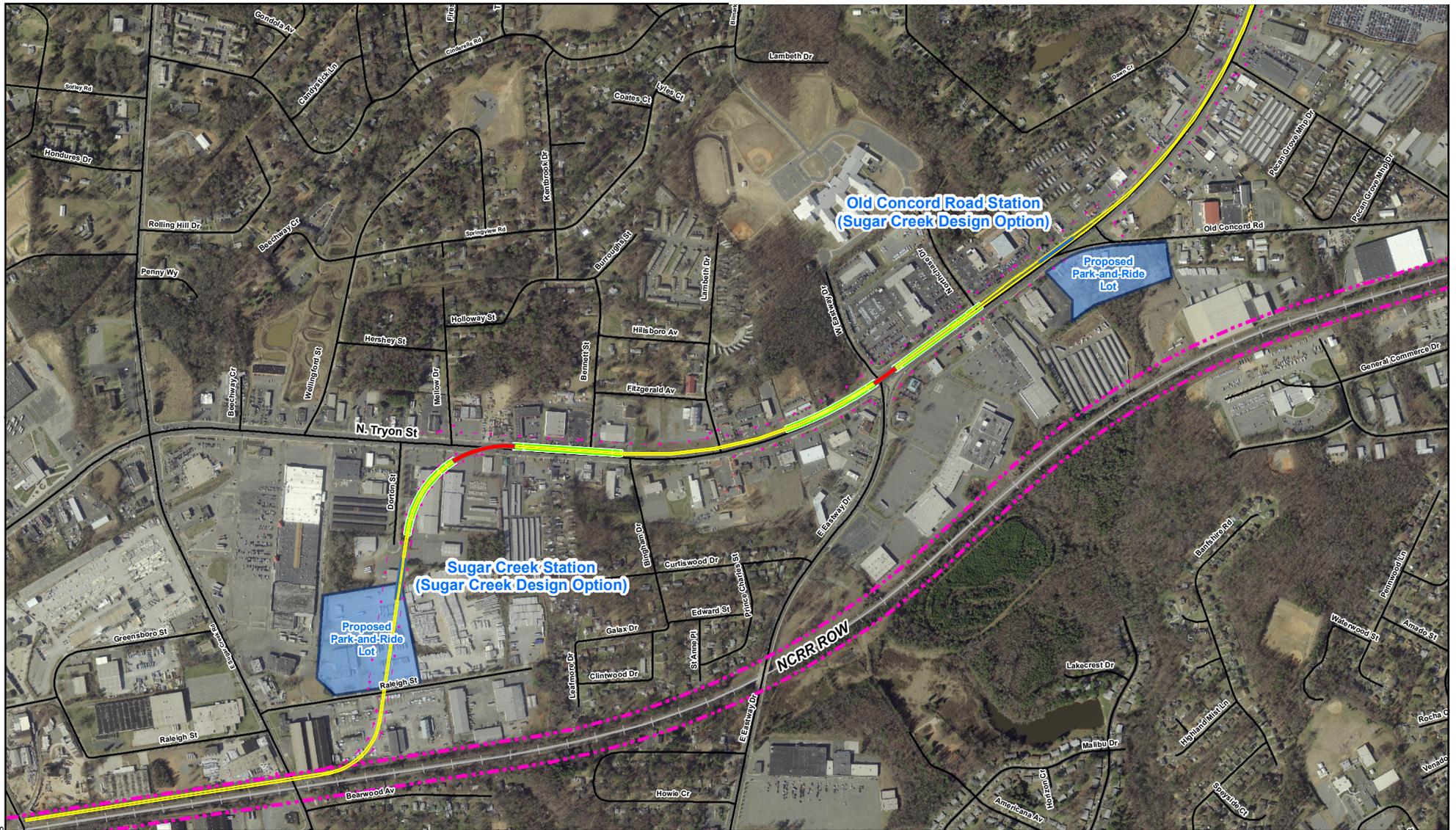
Data Source: Charlotte Area Transit System, STV/RWA, City of Charlotte/Landscape



Parking Summary	
Vehicular Parking	1959
Accessible Parking	30
Bus Bays	4
Bicycle Parking	
Short Term	24
Long Term	0
Kiss-and-Ride Spaces	7



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



Data Source: Charlotte Area Transit System, STV/RWA, Mecklenburg County GIS Aerial (2007)

Figure 2-21
Sugar Creek Station - Sugar Creek Design Option Station Site Plan

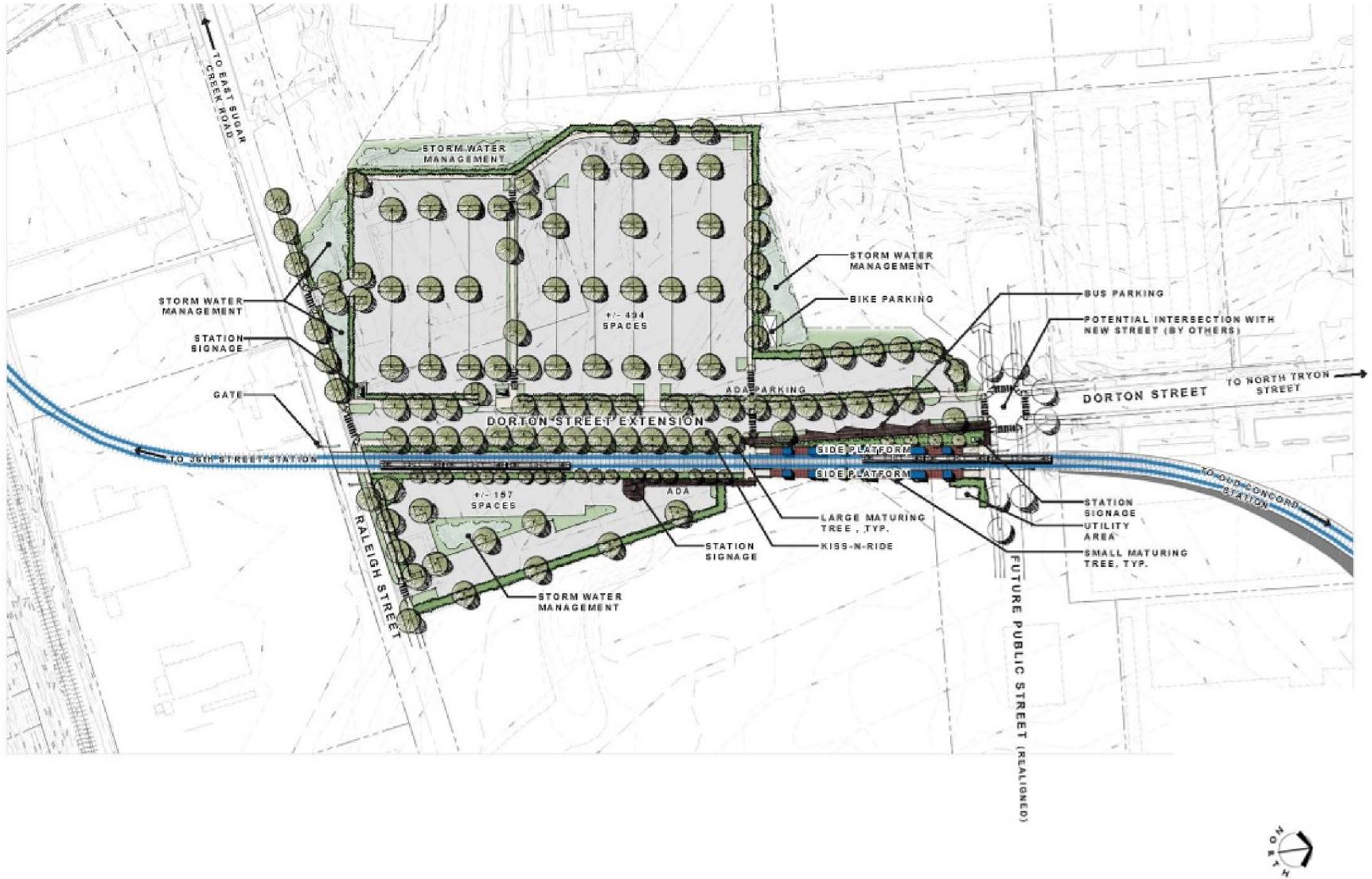
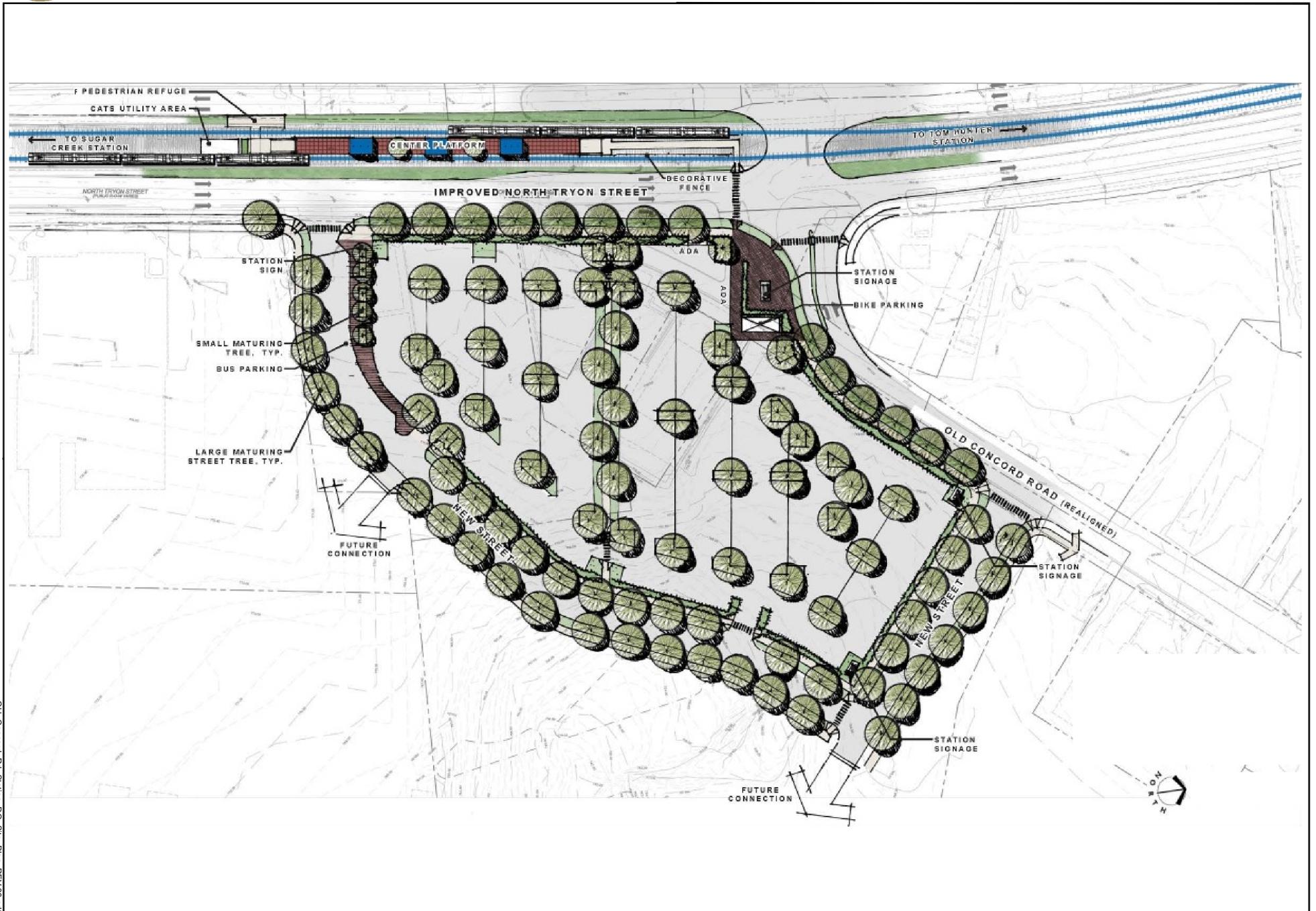
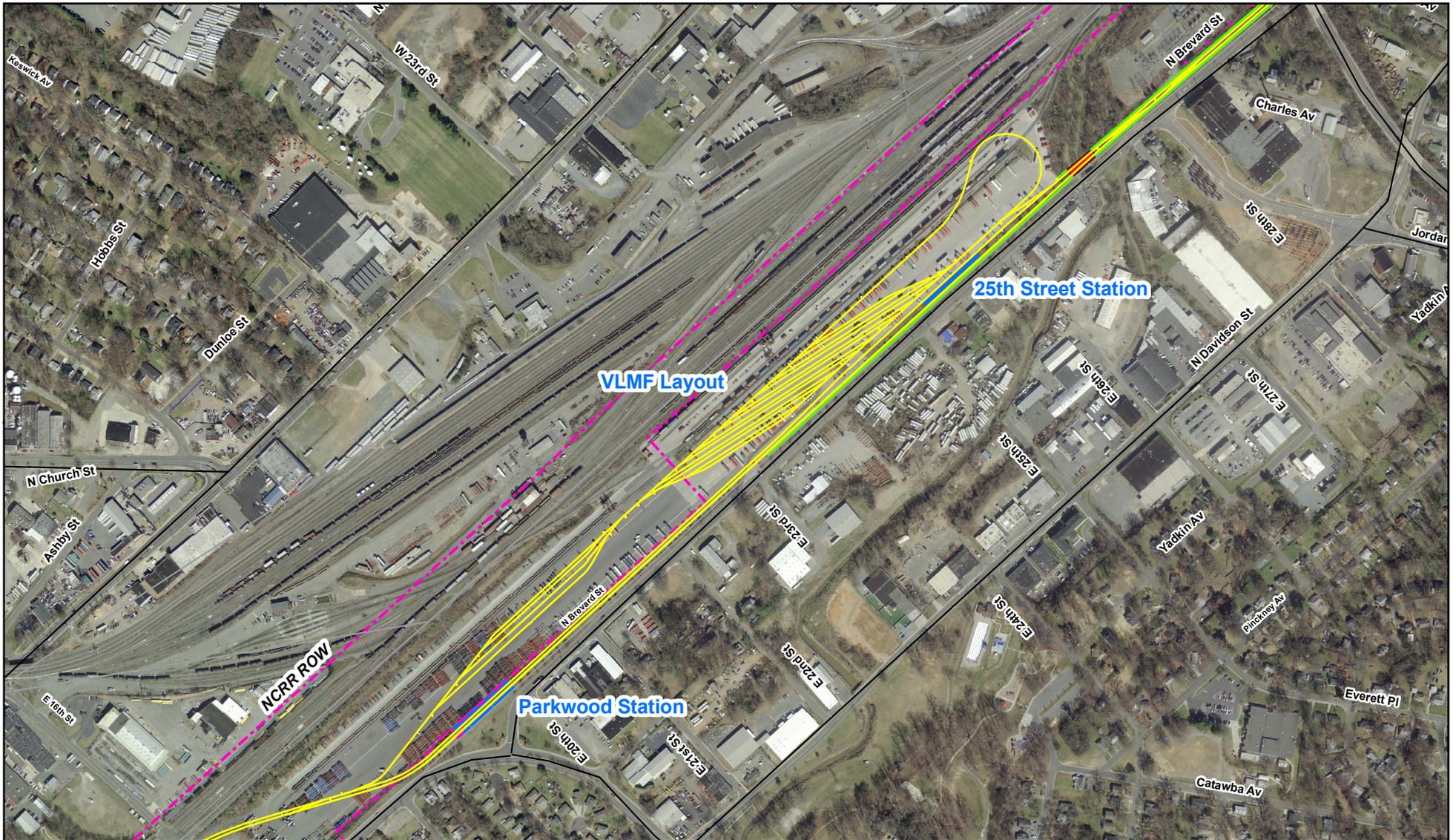
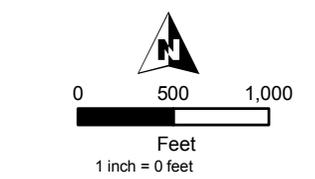
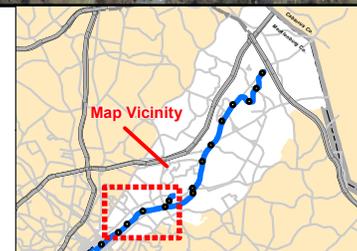


Figure 2-22
Old Concord Road Station - Sugar Creek Design Option Station Site Plan





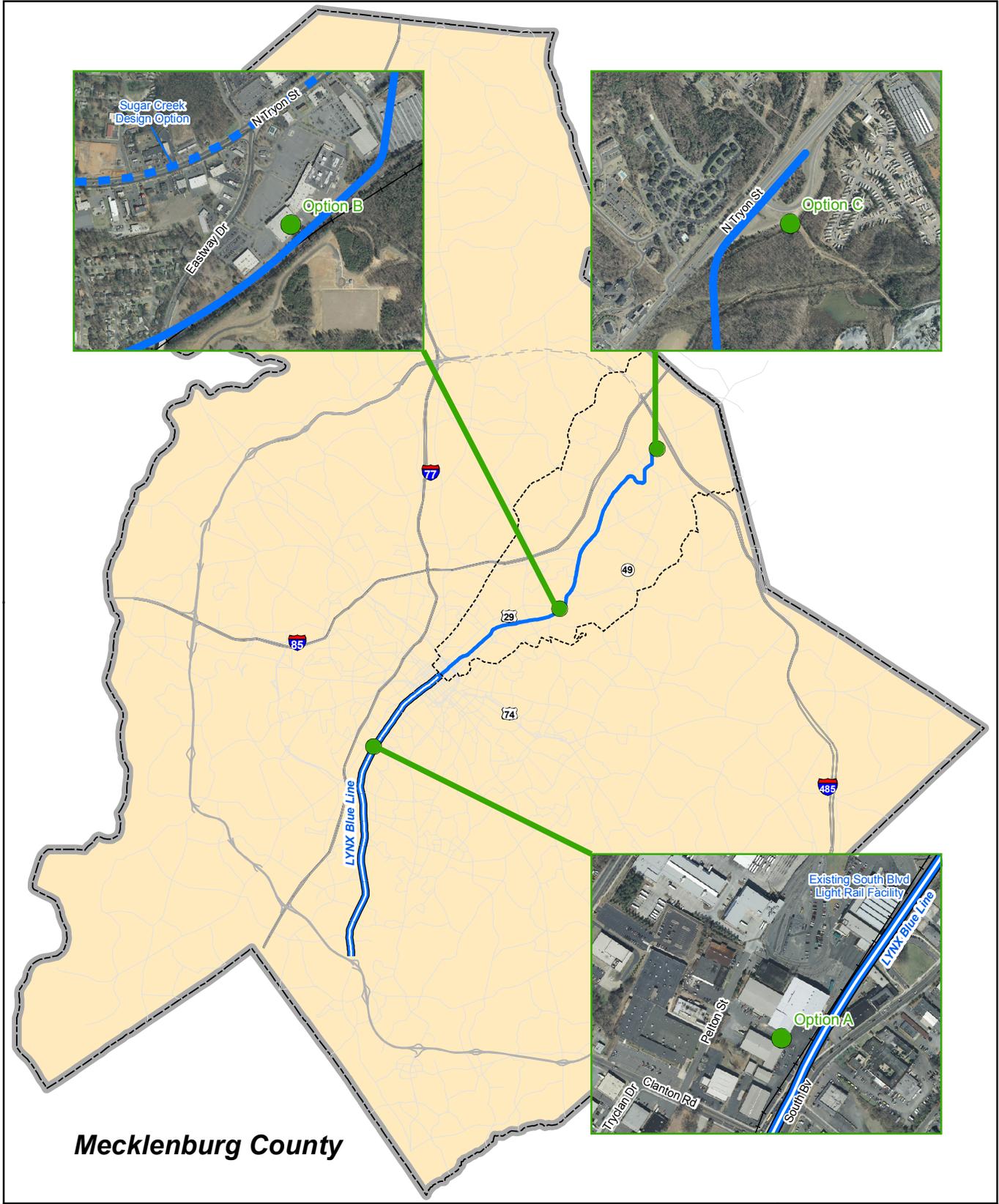
- Legend**
- Proposed Station Platform
 - Proposed Structures
 - Light Rail Transit
 - Proposed Park-and-Ride Facilities
 - Proposed Right-of-Way
 - Proposed Retaining Walls
 - NCRROW Right-of-Way
 - Roads
 - Railroad



Data Source: Charlotte Area Transit System, STV/RWA
 Mecklenburg County GIS Aerial (2007)

VLMF_Site_Plan_REV000.pdf

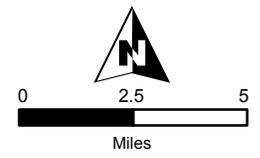
03.08.10



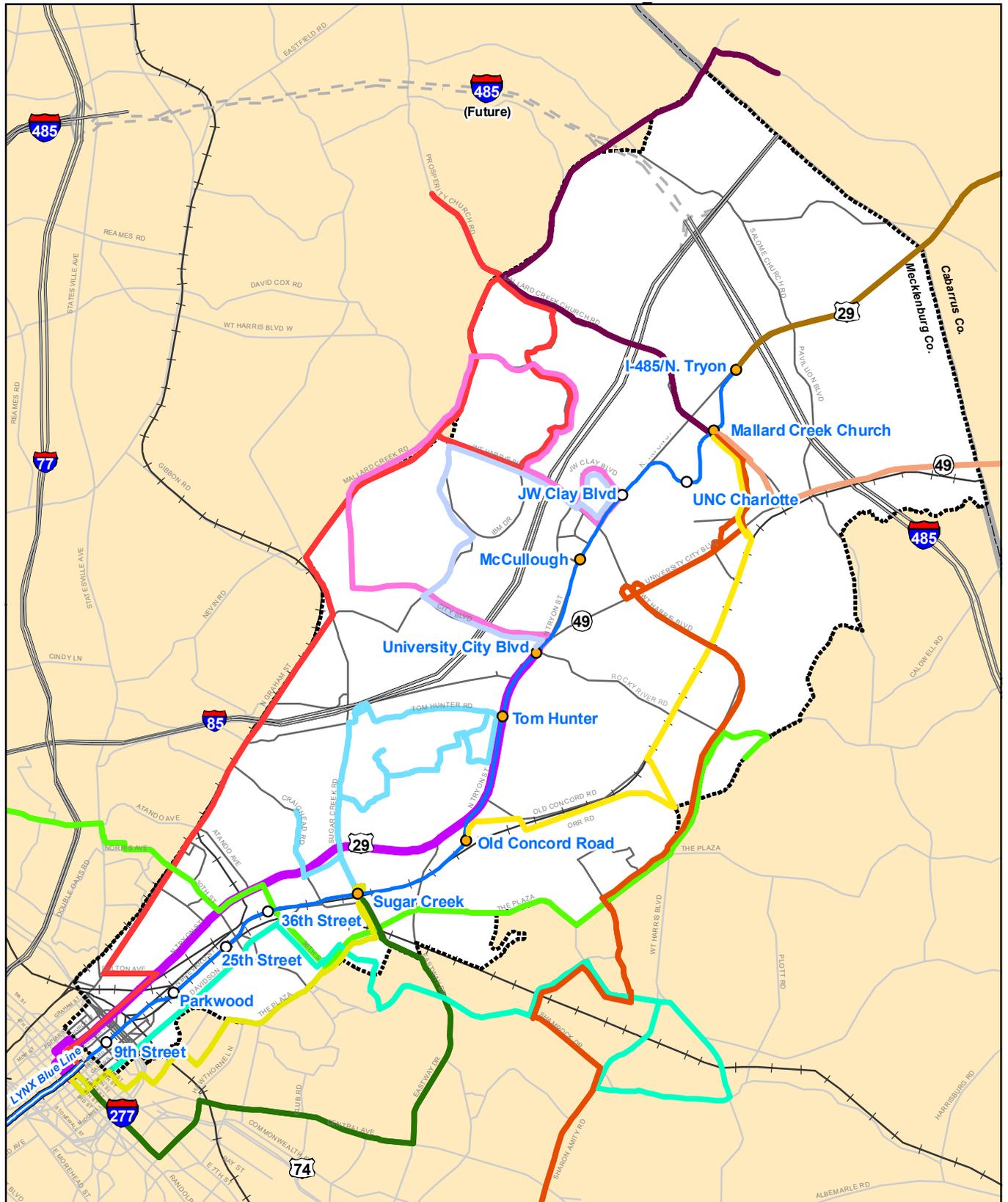
Mecklenburg County

Legend

-  LYNX Blue Line
-  Proposed Light Rail Alternative
-  Contingency VLMF Sites
-  Northeast Corridor Limits
-  Interstates
-  County Line

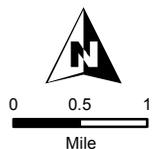


Data Source:
CATS, RWA/STV, City of Charlotte GIS, and
Mecklenburg County Aerials (2010)



Legend

- | | | | |
|---------------------------|--------------------------------------|------------------------|--------------------------|
| Northeast Corridor Limits | LYNX Existing Light Rail Transit | 22 Graham St | 81x Wachovia CIC Express |
| Railroads | Light Rail Transit | 23 Shamrock | 110 Concord Mills Mall |
| Highway | Proposed Stations | 29 UNCC / SouthPark | 211 Hidden Valley |
| Major Roads | Proposed Stations with Park-and-Ride | 39 Eastway | 360 NC49 / City Blvd |
| Highway (Future) | 3 The Plaza | 54 5x URP Express | 807 Old Concord Rd |
| County Line | 4 Country Club | 80 80x Concord Express | |
| | 11 North Tryon | | |



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

BL_E_Build_Bus3-10.pdf

03_16_10