



**LYNX Blue Line Extension  
(Northeast Corridor)  
Light Rail Project  
Contract #: 08-477  
WBS #: 5.00 & 5.09**

## Refinement of Alternatives

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**Project #: 2513745  
July 23, 2010**

**Rev. 00**

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## 1.0 INTRODUCTION

### 1.1 Purpose of Report

In 2002, the Charlotte Area Transit System (CATS) completed a Major Investment Study (MIS) for the Northeast Corridor. After carefully considering a variety of alignment and modal options, the Metropolitan Transit Commission (MTC), the policy board for CATS, adopted the MIS Locally Preferred Alternative (MIS LPA) and directed CATS to move forward with the implementation of a combined light rail and bus rapid transit solution for the Northeast Corridor. In 2004, CATS moved forward with the continued planning, design and environmental analysis of the light rail element of the MIS LPA. Between 2004 and 2006, 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 Northeast Corridor Light Rail Project. A refined alignment was adopted by the MTC in June 2006 as the Refined LPA, and then subsequently incorporated into CATS' *2030 Transit Corridor System Plan* adopted by the MTC on November 15, 2006. Details of those alignment refinements can be found in the *Refined LPA Report* (August 2007). In November 2007, CATS received Federal Transit Administration (FTA) approval to initiate the next phase of project development, Preliminary Engineering. This report describes further refinements to the LPA, as part of the development of the Draft Environmental Impact Statement (EIS) and 15% and 30% Preliminary Engineering Design Plans for the LYNX Blue Line Extension Northeast Corridor Light Rail Project (LYNX BLE).

This report is organized as follows:

- Section 1 provides an overview of the report and LYNX BLE.
- Section 2 explains the framework for refinements to the Light Rail Alternative and the methodology and process undertaken for alignment refinements.
- Section 3 outlines in detail the alignment and station refinements along the LYNX BLE. It also describes the engineering design challenges at various locations, and the station platform types and lengths.
- Section 4 describes the refined Light Rail Alternative Design Options.
- Section 5 describes the Locally Preferred Alternative.

### 1.2 Review of LYNX BLE Corridor

The LYNX BLE extends approximately 11 miles from Center City Charlotte to I-485 near the border of Mecklenburg County and Cabarrus County (Figure 1-1). The corridor consists of mostly urban and suburban development within the corporate limits and land use jurisdiction of the City of Charlotte.

The alignment is an extension of the existing LYNX Blue Line (South Corridor) and would extend from 7th Street in Center City Charlotte, through the North Charlotte Historic District, through a suburban commercial area to University City, past Carolinas Medical Center – University (CMC – University), onto the University of North Carolina at Charlotte (UNC Charlotte) campus, terminating at a park-and-ride lot just south of the I-485/US-29 (North Tryon Street) interchange.

## 2.0 FRAMEWORK FOR REFINEMENTS TO LIGHT RAIL ALTERNATIVE

### 2.1 Need to Evaluate Draft Environmental Impact Statement Alignment

The first step at the beginning of preliminary engineering was to evaluate and confirm the alignment and station locations to be evaluated in the Draft EIS. In addition, as part of the adoption of the Refined LPA in 2006, the MTC directed CATS to further evaluate the Sugar Creek Design Option. This evaluation included station planning workshops, the Sugar Creek / North Tryon Study, and the development and approval of the alignment, profile and typical section to be used in the 15% preliminary engineering design plans.

The No-Build Alternative and Transportation System Management (TSM) Alternative are also under evaluation as part of the Draft EIS, but are not included in this Refinement of Alternatives document.

### 2.2 Development, Analysis & Evaluation of Alignment & Station refinements

The development, analysis and evaluation of alignment refinements is a process to develop a qualitative and quantitative measure for refining the alignment and developing a consensus on a locally preferred alignment. Evaluation factors for the development of the alternatives included:

- Examination of neighborhood plans, land use plans, small area plans and other plans for the corridor;
- Review of existing land uses and zoning along the corridor;
- Public and stakeholders input;
- Land development investment proposals and opportunities; and,
- Stakeholder improvements along the corridor (e.g. North Carolina Railroad designing Sugar Creek Road to be grade separated).

An analysis of development opportunities, coupled with operational and site design considerations helped to refine the station locations to parcel-specific sites. The following operational and spatial measures were considered:

- **Engineering Requirements:** These measures included both transit alignment (horizontal and vertical) and affected adjacent and intersecting roadway geometries.
- **Ridership:** Ridership data from the latest Metrolina Regional Travel Demand Model were noted for each station in order to adequately size the station and its facility needs.
- **Station Program and Functional Requirements:** Station typologies and ridership information were used to determine the necessary parcel size needed for each station. Potential land use parcels were evaluated for their ability to accommodate each station's programmed uses as well as each station's TOD needs and requirements.
- **Public and Stakeholders Input:** The public involvement process gathered input on general station locations, consideration between alternative locations and specific placement within a given site.

Understanding the importance of public involvement, the CATS planning process includes public review of all alignment and/or station location refinements. Following is a description of public involvement meetings that have been held since the MTC directed CATS to further

evaluate the Sugar Creek Design Option and proceed with station planning and 15% preliminary engineering design plans:

- Preliminary Engineering Kick-Off Meetings: CATS held kick-off meetings on March 3 and 4, 2008 to provide an update on the preliminary engineering efforts that had taken place and to initiate community dialogue about the project. Progress to date, including key issues identified during preliminary engineering, station area and land use planning and growth strategies were summarized.
- UNC Charlotte Public Forum: CATS held a public forum on April 29, 2008 on the UNC Charlotte campus. The purpose of the meeting was to present how the LYNX Blue Line Extension would serve the UNC Charlotte campus, based on a mutually beneficial approach for transit service and campus expansion. Input from attendees was requested and received.
- Station Locations and Alignment Alternatives: CATS held public workshops on July 10 and 15, 2008 to provide a project progress update, including station and alignment updates and an update of the Sugar Creek/NCRR Alternatives being considered. The presentation given at the public workshop addressed evaluation criteria, key issues and impacts identified thus far with possible mitigation measures. Details on the coordination effort with neighborhoods, local corporate and business groups, UNC Charlotte, Cabarrus County, the State Historic Preservation Office (SHPO), the North Carolina Department of Transportation (NCDOT), and North Carolina Railroad (NCRR) were reviewed.
- Station Site Plans and Sugar Creek/NCRR Alignment Alternative Study Results: CATS held public workshops on January 13 and 15, 2009 to provide a project update and review recent changes or refinements to the project. The meeting included an overview of platform types, station site plans and the Sugar Creek and NCRR Study results. Project elements such as asymmetric widening of North Tryon Street/US-29 and various grade separations (including at 36th Street and at the UNC Charlotte campus) were also presented to the public.
- Project Update: Additional public meetings were held on September 29 and 30, 2009 to present information on refinements to the project and solicit public comments on the proposed changes.
- Throughout this timeframe, CATS has attended numerous smaller group meetings (e.g., Historic North Charlotte Neighborhood Association, University City Partners) to explain the project, review options and solicit input.

Figure 1-1 depicts the Light Rail Alternative and Sugar Creek Design Option.

### **2.2.1 Evaluation methodology**

The goals and evaluation measures set forth in Planning and CATS' Draft *Regional Goals and Objectives and Corridor Evaluation Framework* were used to evaluate alignment refinements and station locations throughout the preliminary engineering efforts. These goals and evaluation measures are identified in Table 2-1.

**Table 2-1  
Goals and Evaluation Measures**

<b>Goals</b>	<b>Evaluation Measures</b>
Land Use <ul style="list-style-type: none"> <li>• Support the region's Centers and Corridors vision</li> </ul>	<ul style="list-style-type: none"> <li>• Support for existing and planned land uses</li> <li>• TOD potential</li> <li>• Market readiness</li> <li>• Connections to transit supportive areas</li> </ul>
Mobility <ul style="list-style-type: none"> <li>• Improve access and mobility in the corridor and throughout the region; increase transit ridership</li> </ul>	<ul style="list-style-type: none"> <li>• Ridership</li> <li>• Access to stations</li> <li>• Service for transit dependent populations</li> <li>• Connections to activity centers, special event sites</li> <li>• Convenience and reliability</li> </ul>
Environment <ul style="list-style-type: none"> <li>• Preserve and protect the environment</li> </ul>	<ul style="list-style-type: none"> <li>• Effects on area communities</li> <li>• Effects on natural resources</li> <li>• Effects on cultural resources</li> </ul>
Financial <ul style="list-style-type: none"> <li>• Develop affordable, cost-effective transportation solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Relative effects on costs</li> </ul>
System Integration <ul style="list-style-type: none"> <li>• Develop transportation improvements that function as part of the larger transportation system</li> </ul>	<ul style="list-style-type: none"> <li>• Consistency with existing/planned infrastructure</li> <li>• Quality of connections to other transit corridors</li> </ul>

Source: CATS Northeast Corridor Refined Locally Preferred Alternative (R-LPA) Report, August 10, 2007.

### 2.2.2 Evaluation process

CATS and the City of Charlotte have developed an integrated and coordinated approach to provide oversight and management of the LYNX BLE. A Project Management Plan (PMP) has been developed to assist with the management of all elements of the LYNX BLE. It provides an overview of the management requirements and programs that are needed to implement an efficient and cost-effective light rail system. The PMP coordinates the schedule, budget, and various challenges including environmental, social, and engineering. To accomplish this, three teams have been formed:

- Growth Strategy Steering Team (GSST);
- Corridor Collaboration Team (CCT); and,
- Blue Line Extension Project Team (BLE Project Team).

The GSST, chaired by the Assistant City Manager, is comprised of Key Business Executives (i.e., Department heads), and Deputy Directors from CATS, E&PM, Planning, CDOT, Economic Development, Neighborhood Development and Corporate Communications. The GSST provides oversight and policy direction for growth strategy initiatives in all corridors, including the LYNX BLE. The GSST discusses the LYNX BLE on an as-needed basis at their regular meetings which are held twice a month.

The CCT facilitates proactive collaboration among the various city departments that have active projects within the LYNX BLE corridor. Members of the CCT come from E&PM, CATS, Planning, CDOT, Neighborhood and Economic Development, Charlotte-Mecklenburg Utilities and Mecklenburg County Parks and Recreation. These members are responsible for program/project development and implementation, including land use planning, economic

development opportunities, transit projects, station area infrastructure initiatives and corridor infrastructure initiatives. The CCT meets monthly.

The LYNX BLE Project Team is an interdepartmental team with members from all CATS divisions, and other City and County departments involved in the planning and design of the project, including Planning, CDOT, E&PM, Neighborhood and Economic Development, Charlotte-Mecklenburg Utilities and Mecklenburg County Parks and Recreation. The LYNX BLE Project Team meets bi-weekly and reviews project status, discusses issues, and reviews and approves the project scope.

In addition to a collaborative project management process, a key element to successful completion of the LYNX BLE is public involvement. CATS has continued the public involvement work that began during the MIS and conceptual engineering. A detailed Public Involvement Plan has been developed to actively seek input from the public throughout the planning, design and construction phases of the project. The program informs citizens of study activities and milestones and identifies forums and tools for public participation.

### **3.0 ALIGNMENT AND STATION PLANNING**

The LYNX BLE Light Rail Alternative extends approximately 11 miles from Center City Charlotte to I-485 near the border of Mecklenburg County and Cabarrus County. The Light Rail Alternative would include 13 stations, as well as a feeder bus system to support the light rail system. Stations would be configured with center or side platforms, depending on the available site conditions, and all stations would be located at existing ground or street level with the exception of the 36th Street Station, Sugar Creek Station and the I-485/N. Tryon station. These three stations would extend across bridge structures that would support the end of the station and light rail tracks above the respective roadways.

#### **3.1 Alignment and Station Refinements**

##### **3.1.1 9th Street Station and Storage Tracks**

Changes to the 9th Street Station and Storage Track (Pocket Track) north of the station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Shifting the station slightly north to a mid-block location between 9th Street and proposed 10th Street.
- Eliminating the pocket track north of the station.

Development potential and planned development near the 9th Street Station resulted in a shift of the platform to a location between 9th Street and the proposed 10th Street Extension (which will be built as part of planned development). Additionally, development plans (by others) will result in the addition of Market Street, which will parallel the light rail tracks to the west and will necessitate modifications to the 9th Street intersection. The mid-block location facilitates the proposed street improvements and access to the station from both 9th Street and proposed 10th Street.

Additional considerations at the 9th Street Station location during conceptual engineering included the addition of a third track to allow for storage of light rail vehicles. This single-ended

pocket track was located between the main light rail tracks from 10th Street to 12th Street. During 15% preliminary engineering, it was determined that a double-ended pocket track would be more beneficial, which would require a center platform at 9th Street. However, the Norfolk Southern intermodal yard, located between 16th Street and 27th Street, is being relocated. One suggestion from the March 2009 APTA Peer Review was to accommodate the functions of the pocket track on an additional track(s) at the intermodal yard, assuming it becomes available. This has been evaluated and the pocket track north of 9th Street Station was eliminated during 30% preliminary engineering because the intermodal yard site can accommodate the needed light rail storage.

The 9th Street Station would be designed as an urban station with side platforms (instead of a center platform as previously proposed with the double-ended pocket track), walk-up access and eight bicycle parking spaces. Sidewalks, like those placed next to the LYNX Blue Line light rail tracks within the Center City, would extend between 9th and 12th Streets. A side platform would be utilized at 9th Street Station for the following reasons:

- Light rail track spacing would not have to be widened to accommodate the third pocket track.
- The side platform allows the tracks to maintain the 14-foot centers approaching and leaving the station, thereby reducing right-of-way requirements beyond the station.
- Side platforms improve pedestrian access and are more conducive to the surrounding existing and future commercial and residential land uses.

The revised design at the 9th Street Station was reviewed throughout its development with the City team reviewing the proposed adjacent development, the BLE Project Team and the CCT. The design was confirmed by the BLE Project Team at a station review meeting in August 2009 and presented to the public in the September 2009 Public Meetings.

### 3.1.2 16th Street (Parkwood) and 27th Street Stations and the Intermodal Yard

Changes to the 16th Street (Parkwood) and 27th Street Stations since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Moving 16th Street Station 1,000 feet north to Parkwood Avenue and renaming the station to Parkwood Station;
- Moving 27th Street Station to 25th Street and renaming the station to 25th Street Station; and
- Norfolk Southern's decision to relocate the intermodal yard and the City's subsequent decision to acquire the property. CATS is planning to use a portion of the site for a Vehicle Light Maintenance Facility (VLMF) and Storage Yard for light rail vehicles.



Initial Relocation of 16 Street Station to Parkwood Avenue

As a result of discussions with the railroads and further preliminary engineering analysis, the design in this area has gone through several iterations. Initially, in an effort to minimize potential

impacts to the Norfolk Southern (NS) intermodal yard (which the railroad indicated could not be disturbed), the light rail was realigned as far as practical to the southwest corner of the site. Concurrent with this, the CCT evaluated the station location and determined that moving the 16th Street Station approximately 1,000 feet north to the intersection of Parkwood Avenue and North Brevard Street would enhance visibility and facilitate a better pedestrian connection. The station was then renamed to Parkwood Station, which would be designed as a neighborhood, walk-up station with eight kiss-and-ride spaces and 16 bicycle parking spaces. A small landscaped esplanade would be located in front of the station, and there would be direct access to residential neighborhoods fronting Parkwood Avenue. A side loaded platform would be utilized for the following reasons:

- The side platform allows the tracks to maintain the 14-foot centers approaching and leaving the station. Fourteen-foot center tracks minimize right-of-way impacts to the intermodal yard and North Brevard Street.
- Side platforms improve pedestrian access from the surrounding existing neighborhoods.
- Side platforms improve access to potential re-development adjacent to the NS intermodal yard, which could be redeveloped through the City of Charlotte Brownfield Redevelopment program if the site becomes available.

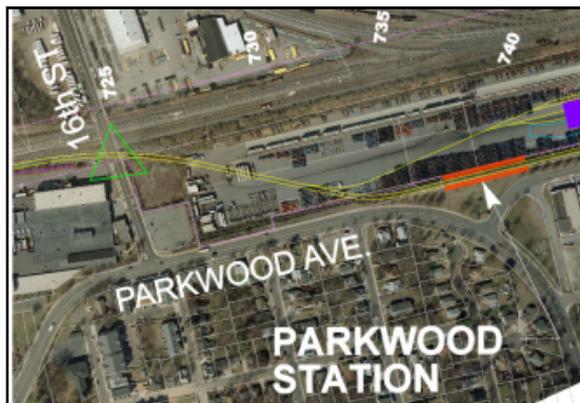
This concept was confirmed by the BLE Project Team in October 2008 and the GSST in October 2008, and the MTC in April 2009. It was used for development of the 15% Preliminary Engineering plans and presented to the public in September 2009.

Following development of the 15% Preliminary Engineering plans, NS confirmed plans to relocate their intermodal yard to an area near the Charlotte-Douglas International Airport. As part of the project the City intends to acquire the existing intermodal yard property. Another suggestion from the March 2009 APTA Peer Review was to consider using the NS Intermodal yard for a VLMF and light rail vehicle storage yard. Further refinement of the ridership modeling and headway options indicated that more light rail vehicles would be required than originally planned for when the existing South Corridor Vehicle Maintenance Facility (VMF) and adjacent yard were built. Expanding these existing facilities is problematic due to space constraints at the site and concerns with being able to maintain ongoing operations during construction of any expansion. As a result, a VLMF and storage yard is now being planned for the NS Intermodal Yard side. This use is consistent with the adjacent railroad switching yard and is supported by the railroads. Since the entire site is not needed for the proposed light rail facilities, portions not used would be conducive to a future redevelopment opportunity. Since the need to minimize encroachment on the intermodal yard no longer exists, the alignment from 16th Street to near 20th Street has been re-evaluated. As a result of numerous CCT meetings, including a July 2009 field site assessment, an alternate concept was developed that shifts the light rail alignment transition across the NS Intermodal Yard site further north. This would create an approximately 11 acre site for potential redevelopment at the corner of 16th Street and Parkwood Avenue. This site is east of the light rail tracks, further away from the freight yard and across the street from the residential redevelopment that is occurring east of Parkwood Avenue.



Location of 16th Street Station Option

Alignment constraints associated with track crossovers and lead track to the storage yard result in an alternate station site at 16th Street that is called the 16th Street Station Option. With redevelopment of the intermodal yard, a station at 16th Street would serve surrounding residential areas, potentially serve redevelopment along 16th Street, provide connectivity to North Tryon Street/US-29, and provide better spacing between the 25th Street Station (formerly 27th Street Station – see below). As a result of right of way discussions with the railroads, concern over the timing of the relocation of the NS Intermodal facility, and no clear preference between the 16th Street and Parkwood station locations, the BLE Project Team decided in September/October 2009 to eliminate from further consideration the 16th Street station location and the corresponding more-northern realignment across the NS Intermodal facility.



Revised Alignment to Parkwood Station

A further refinement in the light rail alignment has been made south of 16th Street where the alignment has been shifted slightly west. This was done to avoid potential impacts to Highland Mills which is an operating light industrial facility.

The Refined LPA identified a station close to 27th Street. Initial analysis of the 27th Street Station location has since revealed topographic and environmental constraints. Shifting the alignment to accommodate topographic challenges and to avoid disturbance to Little Sugar Creek and its floodway resulted in a location slightly north near an existing power substation. This location was used for the 15% Preliminary Engineering Plans.

Meetings with Duke Power in late 2008/early 2009 revealed that significant modifications would need to be made to the power lines emanating from the substation, including the possible need to locate major power lines underground at a cost of several million dollars. The combination of topographical, environmental, and utility constraints resulted in the 27th Street Station location not being viable. The station location has been moved to 25th Street, an area that has greater redevelopment potential and sufficient space to accommodate topographical challenges. By locating the station mid-way between 25th Street and 26th Street, the switchback ramps up to the platform level can be easily accessed from either street. This site was confirmed as part of the CCT July 2009 field site assessment.

The station would be a neighborhood, walk-up station with 16 bicycle parking spaces. A center platform will be utilized for the following reasons:

- The platform can be elevated on fill (with retaining walls) with a center platform.
- Constructing one elevated platform is more cost effective than constructing two elevated platforms, which would be required for a side loaded platform.
- Side loaded platforms would require a minor relocation of Brevard Street to accommodate the wider overall footprint that side loaded platforms required.
- The western-most light rail tracks would provide patrons a buffer between the proposed light rail storage yard.

This concept was confirmed by the BLE Project Team at a station review meeting in August

2009 and presented to the public in September 2009. The MTC adopted the change from 27th Street to 25th Street in October 2009.

### 3.1.3 Alignment from Matheson Avenue to Craighead Road, including the 36th Street Station

Changes to the alignment from Matheson Avenue to Craighead Road and the 36th Street Station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Grade separation of 36th Street by depressing it below the rail tracks;
- Placement of station platform on a structure above 36th Street; and
- Revisions to the light rail alignment to accommodate the NCDOT Rail Division's Charlotte Rail Improvement and Safety Project (CRISP).

36th Street at its intersection with the North Carolina Railroad (NCRR) is within the North Charlotte Historic District. It is surrounded primarily by industrial uses and multi-family residential uses, and was previously identified as a station location site to serve the North Charlotte Historic District along North Davidson Street known as the NoDa community.

Currently, 36th Street is at-grade with the existing freight rail tracks, which carry NS's mainline traffic of 30 to 40 trains per day. Projections indicate as many as six tracks may be required in the future to accommodate growing freight traffic and expanded Amtrak services, including the Southeast High Speed Rail Corridor. The number of existing and proposed tracks and frequency of trains would create a challenging at-grade crossing for pedestrians, bicyclists and vehicles. Freight trains, additional Amtrak trains, and light rail trains at six to ten minute headways mean that an at-grade crossing is effectively closed to vehicular traffic much of the time. Freight trains sitting on the tracks as they are prepared for switching moves at the intermodal yard were also of key concern, particularly as it relates to pedestrians going to and coming from the 36th Street Station.



An engineering analysis was conducted to assess the possibility of grade-separating 36th Street and the rail tracks to create a safer and more efficient crossing. The analysis revealed that 36th Street could be depressed beneath both the freight and light rail tracks and that the tracks could be raised six to eight feet to achieve this goal. Feedback from the railroads operating within the corridor strongly supported this grade separation. Therefore, grade-separating 36th Street by depressing it below the rail tracks became part of the proposed Light Rail Alternative.

The Refined LPA depicted a light rail alignment along the east side of the freight tracks to Sugar Creek Road where the alignment shifted to the west side, crossing over the freight tracks on a large S-shaped bridge. The freight track corridor is owned by NCR. Freight trains are operated by NS and passenger trains are operated by Amtrak as the Rail Division of the North Carolina Department of Transportation (NCDOT Rail). Through a series of meetings in the second half of 2008, it was determined that it would be prudent for the light rail alignment to cross the freight tracks immediately upon entering the railroad right-of-way north of Matheson Avenue and run along the west side throughout. By avoiding “switching sides” of the corridor, the railroads would have greater flexibility in making these future improvements, which had not yet been designed. In addition, the close proximity of historic buildings on the east side of the corridor near 36th Street creates a greater challenge for locating the Light Rail Alternative alignment on that side. Specifically, the distance between the existing tracks and historic buildings creates limited space to build two light rail tracks, to maintain required buffers (a minimum of 40 feet) between freight and light rail tracks, and to accommodate a station platform and pedestrian access. Therefore, locating the Light Rail Alternative alignment on the west side of the existing freight tracks was selected. This approach was confirmed by the BLE Project Team and GSST in October 2008 and included in the 15% Preliminary Engineering Plans.



Since then, NCDOT Rail, in conjunction with NS has undertaken studies to assess future freight and passenger rail in the NCR corridor. This resulted in the Mecklenburg Union Metropolitan Planning Organization (MUMPO) approving a Transportation Improvement Program (TIP) amendment in March 2009 for the Charlotte Rail Improvement and Safety Project (CRISP), which is intended to improve various rail operations in Charlotte. CRISP includes creating and/or maintaining accommodations for the proposed Southeast High Speed Rail (HSR) corridor. As conceptualized in completed feasibility studies, the HSR corridor would utilize the west side of the existing freight tracks along the corridor that encompasses 36th Street. Space constraints would not allow for the Light Rail Alternative to be located on the west side of the existing freight tracks with the HSR. Therefore, the BLE Project Team determined in late March 2009 that the Light Rail Alternative alignment should be revised to parallel the existing freight tracks on the east side. Coordination efforts continued with NCDOT Rail, NS and NCR throughout the spring of 2009. Following several iterations, a light rail alignment that was acceptable to CATS and preserved the future CRISP project option to the satisfaction of the railroads was agreed to in a series of several meetings throughout the summer of 2009. The current light rail alignment runs along the east side of the existing freight tracks from north of Matheson Avenue to Craighead Avenue where it shifts to the west side, crossing over the freight tracks on a large s-shaped bridge.

Included in this revised design is the shifting of the freight tracks to the west at 36th Street to accommodate both the proposed CRISP project and to allow adequate separation between the freight and light rail tracks while preserving the historic buildings along the east side of the corridor. In addition, NCDOT Rail has indicated that the AC&W connector track to NS will need to shift to the vicinity of Craighead Avenue as part of the CRISP project from its current location north of Matheson Avenue. If this occurs, the light rail bridge over the current A&W connector track would no longer be needed. This will continue to be evaluated, including the possibility of an interim solution with an at-grade crossing diamond of the light rail and AC&W freights tracks.

The revised LYNX BLE design accommodates the AC&W connector track in either its current location or the proposed future location at Craighead Avenue.

Potential impacts to historic properties have been considered in the alignment revision and minimized to the extent practicable. The freight track realignment to the west side of the corridor resulted in somewhat more potential impact to the parcel on the northwest quadrant, but the previous concerns with potential impacts to historic properties on the east side have been mitigated.

The north end of the station platform would be located on a structure above 36th Street, with pedestrian access via stairs and elevator circulation from the north side of 36th Street. The station would be designed as a neighborhood station, with walkup access and 16 bicycle parking spaces. The need for elevators has been eliminated by including ramp access in addition to stairs. 36th Street would be depressed under the freight tracks and light rail tracks, with a platform located on the bridge structure spanning across the depressed 36th Street. A center platform will be utilized for the following reasons:

- Constructing one elevated platform and stairs for vertical circulation is more cost effective than constructing two elevated platforms.
- Center platform provides minimal amount of disturbance to the existing physical environmental constraints (existing railroad right-of-way) at the station area.
- The western-most light rail tracks would provide patrons a buffer between the adjacent freight railroad track.

An additional at-grade alternative, called the Light Rail Alternative – 36th Street Design Option, was also evaluated for this station location. It is described in further detail in Section 4.1.

This concept was confirmed by the BLE Project Team at a station review meeting in June 2009 and reviewed with the Historic North Charlotte Neighborhood Association meetings in May 2009 and presented to the public in September 2009.

#### **3.1.4 Sugar Creek Station and Grade Separation Project**

Changes to the Sugar Creek Station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Grade separation of Sugar Creek Road by NCR, which includes depressing Sugar Creek Road under the existing and proposed railroad tracks; and,
- Relocation of park-and-ride lots and addition of a park-and-ride lot for a total of three park-and-ride lots.

Thirty to 40 freight trains currently cross the NCR/Sugar Creek Road intersection daily, in addition to six Amtrak passenger trains. The number of trains is expected to increase as NCDOT Rail Division plans to add two additional passenger trains to this corridor in the future, and the corridor has been targeted by Amtrak and NCDOT Rail Division as a vital component of the proposed Southeast HSR Corridor. An increase in freight traffic is also expected, resulting in the need for as many as six additional tracks to accommodate the aforementioned passenger service and the expected expansion to freight service. The addition of the proposed Light Rail Alternative would add additional train traffic to this crossing. Furthermore, CDOT estimates that approximately 23,400 vehicles per day currently cross the NCR corridor at Sugar Creek Road,

and this number will rise to more than 37,000 vehicles per day by 2030. The number of vehicles, coupled with the number of trains, makes the Sugar Creek Road at-grade crossing one of the busiest in the Southeast HSR Corridor, creating a high potential for train/vehicle collisions. As a result, NCRR initiated an engineering study to investigate grade separating this crossing.

NCRR evaluated various alternatives, including a road or rail overpass and a road underpass. It was determined that depressing Sugar Creek Road under the existing and proposed railroad tracks is the most feasible option. The NCRR feasibility study indicated that by depressing Sugar Creek Road a 4-lane cross section could be provided for Sugar Creek Road, including two 11-foot inside lanes and two 14-foot outside lanes that could accommodate vehicles and bicycles, two 5-foot sidewalks and two 2-foot paved buffer zones/utility area behind the sidewalks. The City and CATS are reviewing this cross section which does not appear to adequately accommodate pedestrians. The NCDOT Rail Division has included this proposed grade separation in the North Carolina State Transportation Improvement Plan (STIP) as U-5008. The environmental document began in late summer 2009. While it is preferred that this project be constructed prior to the proposed LYNX BLE Extension project, it appears that some construction activity may be underway concurrently.

CATS has worked with NCRR 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 station would be designed as a regional station. It would include three separate park-and-ride lots totaling approximately 950 spaces, three bus transfer bays, four kiss-and-ride spaces and 26 bicycle parking spaces. Vehicular access to the park-and-ride lot would be available from Raleigh Street and Sugar Creek Road. Stairs and ramps would be provided for pedestrian access, along with pedestrian walkways along both sides of Sugar Creek Road. The north end of the station may be located on the bridge and would utilize a center platform for the following reasons:



**Sugar Creek Station over Sugar Creek Road**

- Constructing one elevated platform and vertical circulation is more cost effective than constructing two elevated platforms.
- There is limited space to construct a platform at this station location due to the required offset between the existing freight tracks and light rail tracks.
- Creates a highly visible station from Sugar Creek Road due to the station being elevated above the roadway.
- The eastern-most light rail tracks would provide patrons a buffer between the adjacent freight railroad tracks.

This concept was last reviewed by the BLE Project Team at station review meetings in August and September 2009 and presented to the public in September 2009.

In September 2009, updated ridership projections indicated that twice the parking than

previously planned would be needed at the Sugar Creek Station. As of September 2009, a parking garage is being evaluated as a park-and-ride option to the three aforementioned surface parking lots. The parking garage location would be on a site south of the existing railroad tracks and west of Sugar Creek Road. The station platform would remain in the same location. This concept was presented to the public in September 2009.

### 3.1.5 Old Concord Road Station

Changes to the Old Concord Road Station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Alignment refined to transition Light Rail Alternative from NCRR right-of-way to the median of North Tryon Street/US-29; and,
- Station location refined.

The Refined LPA adopted by the MTC in November 2006 included an alignment along the NCRR between Sugar Creek Road and Old Concord Road. The alignment would continue along the northwest side of the existing railroad tracks within the NCRR right-of-way from Sugar Creek Road to approximately 2,600 feet north of Eastway Drive where 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. A station would be located between the NCRR ROW and Old Concord Road and would be called the Old Concord Road Station.

Three potential alignment options in the vicinity of the Old Concord Road Station area were evaluated to determine the best refined alignment for transitioning the Light Rail Alternative from the NCRR right-of-way to the median of North Tryon Street/US-29 and for refined station location. The three options evaluated are referred to as the Mini-Storage Option, the Old Concord Road Option, and the Warehouse Option. Each of these options is described in detail in the *CATS Blue Line Extension Sugar Creek and North Carolina Railroad Alignment Alternatives Study* (February 2009). As part of this process, the Mini-Storage Option was selected as it provides the most attributes in terms visibility and access characteristic potential for the station location. It is also compatible with CDOT's planning efforts to identify future parallel street network connecting Old Concord Road to Eastway Drive.

The station would function as a community station and would include a surface park-and-ride lot with approximately 500 spaces, four bus transfer bays, three kiss-and-ride spaces and 20 bicycle parking spaces. Access to the park-and-ride lot would be from Old Concord Road and North Tryon Street/US-29. Side loaded platforms would be utilized for the following reasons:

- A side loaded platform maintains a uniform 14' track centers approaching and leaving the station.



- 14' centers minimize the footprint for the retaining walls as the alignment begins to climb over Old Concord Road.
- Side loaded platforms are more conducive to adjacent redevelopment that may occur.

#### Transitioning to the median of North Tryon Street/US-29

The alignment was further analyzed to cross over Old Concord Road and enter the median of North Tryon Street/US-29 either at-grade or grade-separated. Due to the projected 2030 peak traffic volumes at the intersection of North Tryon Street/US-29 and Old Concord Road it was determined that grade separating the light rail crossing would be more beneficial. An at-grade crossing would result in an increase in traffic congestion, delay and queuing. Therefore, a grade separated bridge structure crossing over Old Concord Road and the northbound travel lanes of North Tryon Street/US-29 is recommended.

The March 2009 APTA Peer Review recommended revisiting this decision. A further at-grade option entering the intersection was also evaluated. The evaluation determined that, due to impacts to the intersection level of service and safety concerns, the intersection should remain grade separated.

### 3.1.6 North Tryon Street/US-29 design considerations

As the project moved into preliminary engineering, two particular considerations were analyzed for the alignment along North Tryon Street/US-29 to the UNC Charlotte campus; namely:

- Whether to utilize a median alignment or side alignment along North Tryon Street/US-29; and.
- Whether to widen North Tryon Street/US-29 symmetrically or asymmetrically.

#### 3.1.6.1 Side versus median alignment

From where the Light Rail Alternative enters North Tryon Street/US-29 and continues to the UNC Charlotte campus, median alignment and side alignment options were evaluated. Several factors were considered in comparing side-running and center-running alignments including impacts to businesses, capital costs, and impacts to land use along the largely commercial corridor. Of particular consideration within this segment is a project known as “the weave.” A separate City project is underway where North Tryon Street/US-29 meets NC-49 to convert “the weave” configuration into two at-grade signalized intersections at the I-85 Connector and University City Boulevard/NC-49. This realignment will be built prior to the Light Rail

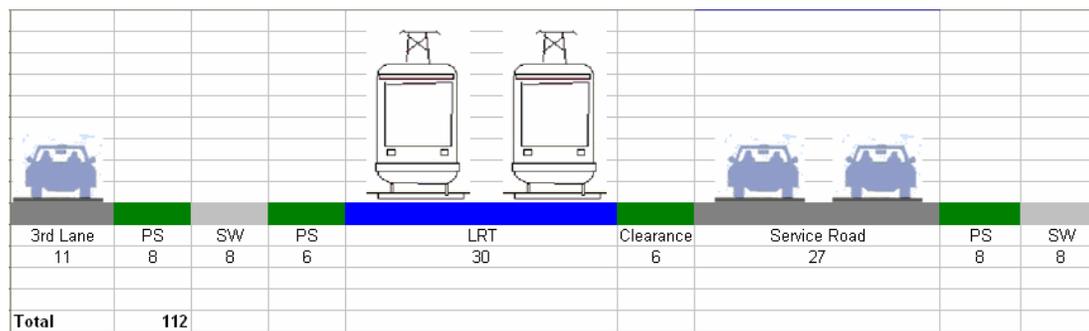


"The weave"

Alternative. As such, CATS and the City have negotiated a wider median section with NCDOT as part of “the weave” project to accommodate the Light Rail Alternative. The light rail line will bridge over these two major intersections due to projected traffic conditions. “The weave” is located approximately halfway along the portion of the Light Rail Alternative alignment that runs in North Tryon Street/US-29. Therefore, it is useful to divide the alignment analysis into two sections,

one on either side of “the weave”: 1) From Old Concord Road to “the weave” and 2) From “the weave” to the entrance onto UNC Charlotte.

The large number of commercial driveways and minor roads that exist along the North Tryon Street/US-29 corridor was a significant consideration in evaluating a side-running alignment. There are approximately 37 driveways or minor roads located between Old Concord Road and “the weave” and 20 driveways or minor roads located between “the weave” and UNC Charlotte. To reduce the potential for conflict between light rail vehicles and local traffic under the side-running concept, consolidation of driveways to service roads would be necessary to direct traffic to controlled signalized points. A conceptual cross-section revealed that an additional 112 feet of right-of-way width would be required to accommodate an extra travel lane on North Tryon Street/US-29, pedestrian amenities, clearances, light rail vehicles and service roads for the side-running concept.



**Side-running Conceptual Section**

In comparison, a center-running alignment assumes symmetrical widening, largely within the existing 120-foot ROW. Conceptual drawings indicate that an additional 16 feet of ROW would be needed to accommodate the corridor. Thus, a side-running alignment (and its additional 112 feet of ROW needs) would require significantly more real estate acquisition than would be required for a center-running alignment. Variations in the side-running verses center-running alignments were analyzed and order-of-magnitude real estate costs were estimated (Table 3-1).

**Table 3-1  
Estimated Real Estate Costs**

<b>North Tryon Street/US-29 (from Old Concord Road to UNC Charlotte)</b>	<b>Order of Magnitude Real Estate Cost including FTA Contingency (millions)*</b>
Entirely Center Running (Light Rail Alternative)	\$18
Side-Running South of Weave - Center Running North of Weave	\$35
Center Running South of Weave- Side Running North of Weave	\$95
Side Running (entirely side running except at Weave Section)	\$111

\*Based on 2007 estimates. Does not include relocation costs.

Under the side-running concept, direct impact to North Tryon Street/US-29 would be less, resulting in less significant costs to rebuild North Tryon Street/US-29. However, costs associated with constructing an access road and mitigating impacts to existing business parking lots (Cost-to-Cure) would likely offset this savings. In addition, the side-running section would

limit access to properties and decrease the developable footprint. As such, the side-running alignment could lessen market demand for impacted parcels, resulting in negative development patterns and negative impacts to existing businesses.

For these reasons, the BLE Project Team identified the median as the preferred location for the Light Rail Alternative between Old Concord Road and the UNC Charlotte campus. Table 3-2 summarizes the factors that were considered to reach this decision. The GSST reviewed and approved this preferred location in February 2008. NCDOT has indicated it is agreeable to this location and will work with CATS and the City of Charlotte as the project progresses.

**Table 3-2**  
**Land Use Benefits/Impacts**

<b>Center Running Alignment</b>	<b>Pro:</b>	<b>Con:</b>
	Equal access/impact to customers and adjacent land uses on both sides of street.	Left turns would need to be consolidated and controlled.
	Light rail becomes integrated into street network.	Requires higher amount of NCDOT coordination.
<b>Side Running Alignment</b>	<b>Pro:</b>	<b>Con:</b>
	No access impacts to properties on one side of the street.	Access to properties on one side would be severely impacted.
	More property acquired to be redeveloped by City of Charlotte.	High capital cost and diminished developable footprint along one side. Future land value and development potentially diminished
	Less street reconstruction/NCDOT coordination.	Consolidation of driveways requires service road and relocation of private parking facilities.

### 3.1.6.2 Asymmetrical versus symmetrical widening

Currently, North Tryon Street/US-29 varies between a four-lane and a five-lane cross-section with a continuous left turn or dedicated left turn at certain intersections throughout the corridor. The existing right-of-way along North Tryon Street/US-29 varies along most of the corridor, mainly between Sugar Creek Road and Tom Hunter Road. In August and September 2008, the BLE Project Team evaluated options to widen North Tryon Street/US-29 symmetrically or asymmetrically. The evaluation included input from the CCT and City departments, including Real Estate, CDOT, and CMU. A Project Team workshop in October 2008 to review designs for both symmetrical and asymmetrical widening options revealed:

- No apparent advantage to asymmetrical widening north of “the weave”;
- That asymmetrical widening on the west side of North Tryon Street/US 29 south of “the weave” should be evaluated;
- That asymmetrical widening south of “the weave” could result in fewer real estate impacts, with a potential financial savings;

- That asymmetrical widening could result in fewer utility impacts, including to many of the overhead Duke Power lines along the east side of North Tryon Street/US-29 and to an existing 24-inch waterline along the east side of North Tryon Street/US-29; and
- That construction staging and maintenance of traffic would be simplified under an asymmetrical widening which would likely result in a construction cost savings.

Following the October 2008 workshop, the PMT approved the concept to widen North Tryon Street/US-29 asymmetrically to the west between Sugar Creek Road and “the weave”, then widen symmetrically from “the weave” to the entrance onto UNC Charlotte. The 15% Preliminary Engineering plans were developed accordingly. As the real estate cost estimate was being developed, City Real Estate determined that any impact to parcels along the east side of North Tryon Street/US-29 from Old Concord Road and “the weave”, including temporary construction easements, would trigger damages that lead to significant right-of-way costs. Since the 15% Preliminary Engineering plans did not shift the alignment far enough west to avoid slope and temporary construction easements, significant right-of-way costs were included in the 15% right-of-way estimate for properties along the east side of North Tryon Street/US-29. Following completion of the property and right-of-way surveys, the asymmetrical widening between Old Concord Road and “the weave” was revisited. Additional engineering analysis revealed that the alignment would have to shift approximately 20 feet northwest to avoid all property and easement acquisitions along the east side. This then resulted in significant impacts to over ten properties along the west side of North Tryon Street/US-29. A real estate evaluation in September 2009 revealed that the right-of-way costs for this approach were \$500,000 to \$1 million more than the 15% Preliminary Engineering alignment. As a result, the BLE project team, in conjunction with City Real Estate, determined that the 15% Preliminary Engineering alignment is appropriate.

### 3.1.6.3 Typical section refinement

At the start of preliminary engineering, the BLE Project Team reviewed the typical section along Tryon Street/US-29 and determined in June 2008 that a 135-foot typical section would be recommended. The GSST approved the 135-foot typical section in July 2008. However, further review and discussion with NCDOT revealed that a greater horizontal separation between roadway travel lanes and the light rail vehicles would be required. This change, along with a recommendation to increase the width of planting strips and sidewalks, resulted in a 147-foot cross section. Specifically, the roadway and light rail corridor offset was increased from ten feet to 14 feet and 2-foot utility strips were added outside the sidewalks. Overall, this section would provide for 14 feet track centers, 14 feet clear from the light rail vehicle to the travel lane, two 11 foot travel lanes, a 5 foot bike lane, an 8 foot planting strip, and an 8 foot sidewalk and 2 foot utility strips (Figure 3-1). Turn lanes, if required, will also be 11 feet wide. The GSST approved the 147-foot typical section in September 2008.

### 3.1.7 Tom Hunter Station

Changes to the Tom Hunter Station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include relocation of the proposed park-and-ride, which is now located directly across North Tryon Street/US-29 in the northwest quadrant of the North Tryon Street/US-29 and Tom Hunter Road intersection. As previously proposed, the station would be located directly north of Tom Hunter Road in the median of North Tryon Street/US-29. The station would be a community station, with a surface park-and-ride lot with approximately 150 spaces, two bus transfer bays and 16 bicycle parking spaces. Access would be available from North Tryon Street/US-29. A center platform would be utilized as a center platform located

north of the existing intersection accommodates the potential realignment of Tom Hunter Road across the north end of the platforms, and provides direct access to bus connections.

### 3.1.8 University City Boulevard Station

Changes to the University City Boulevard Station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Refinement of alignment and profile through “the weave”; and,
- Rocky River Station moved approximately 200 feet south of Stetson Drive to a proposed new street and renamed to University City Blvd. Station (see Section 3.2.9).

In order to pass through the reconfigured intersections of “the weave” (to be completed by others and built prior to the Light Rail Alternative), the light rail would begin to ascend onto a bridge structure to pass over the realigned I-85 Connector Road-North Tryon Street/US-29 intersection. The proposed Light Rail Alternative alignment would return to street level north of the intersection. North of Stetson Drive, the light rail would again ascend to an aerial structure and pass over the realigned University City Boulevard/NC-49 and City Boulevard intersection, and return to street level just north of Brookside Lane where it would continue at street level in the median to the north.

The University City Blvd. Station is located in the median of North Tryon Street/US-29 within “the weave” between the I-85 Connector Road, North Tryon Street/US-29 and University City Boulevard/NC-49 intersection. This station is proposed as a regional station with a surface park-and-ride lot with approximately 650 spaces on the west side of North Tryon Street/US-29, along with four bus transfer bays, one kiss-and-ride space and 22 bicycle parking spaces. The park-and-ride lot will be accessed via a new connection road running from a proposed signalized intersection at North Tryon Street/US-29 to a proposed extension of Ikea Boulevard to the west. A center platform will be used for the following reasons:

- The outside light rail tracks provide a buffer between patrons and the vehicular travel lanes on North Tryon Street/US-29.
- A center platform can be easily accommodated within the median space being preserved for light rail through “the weave.”
- Center platform will provide a convenient opportunity to connect to future development on both sides of North Tryon Street/US-29. There are large parcels of land that will become available for future development through the area of “the weave” project.

The location and access for the University City Blvd. station park-and-ride lot was confirmed by the BLE Project Team at a station review meeting in August 2009. Further refinements to locate the bus bays along the connector road and to the configuration of the park-and-ride lots will be pursued during 30% Preliminary Engineering.

### 3.1.9 McCullough Station Location

Two stations were originally proposed north of “the weave” near Shopping Center Drive at the Clark Boulevard/North Tryon Street/US-29 intersection and at Ken Hoffman Drive, just south of the North Tryon Street/US-29 and W.T. Harris Boulevard intersection. However, the light rail grade separation over W.T. Harris Boulevard, the walking distances across the major W.T. Harris Boulevard/North Tryon Street/US-29 intersection and the possibility that this intersection

may someday be converted to an interchange meant that pedestrian and vehicular access to the Ken Hoffman station would be difficult at best. Therefore, the proposed Ken Hoffman Station was moved south to McCullough Drive and was subsequently renamed McCullough Station. An additional benefit of locating the station at McCullough Drive is circulation. Specifically, McCullough Drive's connectivity to W.T. Harris Boulevard and subsequently JW Clay Boulevard provide greater flexibility to bus service. McCullough Station would be located directly north of McCullough Drive within the median of North Tryon Street/US-29. The station would be designed as a community station, with a surface park-and-ride lot with 250 spaces, two bus transfer bays and 18 bicycle parking spaces. The park-and-ride lot would be located on the west side of North Tryon Street/US-29 at McCullough Drive. Access to the park-and-ride facility would be available from McCullough Drive. A center platform would be utilized because of space constraints in this section of North Tryon Street/US-29.

Relocating Ken Hoffman Station to McCullough Drive put McCullough Station in close proximity to the City Boulevard Station. As a result, these two stations would have overlapping service areas and compete for ridership, resulting in inefficiencies. Therefore, the City Boulevard Station was eliminated by combining it into the McCullough Station.

This decision was confirmed by the BLE Project Team in May 2008, approved by the GSST in May 2008, reviewed with University City Partners in May 2008, presented to the public at the July 2008 public meeting and incorporated into the 15% Preliminary Engineering plans.

### **3.1.10 Future interchange accommodation at North Tryon Street/US-29 and W.T. Harris Boulevard intersection**

Details of the future interchange accommodation at North Tryon Street/US-29 and W.T. Harris Boulevard intersection was not included in conceptual engineering or the Refined LPA in 2006. Since that time, CDOT has initiated an interchange analysis for the existing intersection of North Tryon Street/US-29 and W. T. Harris Boulevard. The intent is to improve the traffic flow through this intersection as it is one of the worst operational intersections in Charlotte. The study revealed that W.T. Harris Boulevard could be depressed beneath North Tryon Street/US-29 and that compact urban diamond interchange ramps could be constructed to provide access to both thoroughfares. While this scenario is proposed as part of the 2004 Mecklenburg-Union Metropolitan Planning Organization Thoroughfare Plan, a timeline has not been established indicating when this modification would occur. Nonetheless, a future interchange at this location has been accommodated as part of the Light Rail Alternative alignment analysis by setting the piers for the light rail bridge back to allow greater room to construct a future interchange.



While this scenario is proposed as part of the 2004 Mecklenburg-Union Metropolitan Planning Organization Thoroughfare Plan, a timeline has not been established indicating when this modification would occur. Nonetheless, a future interchange at this location has been accommodated as part of the Light Rail Alternative alignment analysis by setting the piers for the light rail bridge back to allow greater room to construct a future interchange.

A future interchange, coupled with full geometrical build-out, expected growth and increasing congestion, necessitates a grade separation of the existing intersection and Light Rail Alternative. In addition, safety and traffic movements would be compromised if the intersection and Light Rail Alternative alignment were not grade separated. This approach was tested against an at-grade, non-preemptive (i.e. light rail moving with the traffic signal) operation of the light rail through the intersection. While the variable normal operational delay would have been tolerable, the frequent, irregular emergency vehicle preemption associated with the nearby

hospital and fire station would have been too disruptive to light rail operations. The grade separation was confirmed in July 2009.

### 3.1.10.1 Bridge versus underpass evaluation at North Tryon Street/US-29 and W.T. Harris Boulevard intersection

A bridge or underpass would be required to cross the North Tryon Street/US-29 and W.T. Harris Boulevard intersection. Since an interchange design is being studied by the City of Charlotte, an analysis was completed by the BLE Project Team to determine whether the Light Rail Alternative would traverse over or under the proposed interchange.

Depressing the Light Rail Alternative beneath the existing intersection of North Tryon Street/US-29 and W.T. Harris Boulevard is not a viable alternative since the preferred interchange concept is to depress W.T. Harris Boulevard beneath North Tryon Street/US-29. This would require that the light rail be depressed under two roadways. In order for the light rail to pass beneath these two roadways, the track profile would decrease and increase much farther from the intersection, which would require a long underground structure. Depressing the Light Rail Alternative beneath the existing intersection would be cost prohibitive and would result in additional impacts. Therefore, this option was eliminated from further consideration.

Subsequently, two options for carrying the Light Rail Alternative over the North Tryon Street/US-29 and W.T. Harris Boulevard intersection were evaluated. Under these options, the proposed design accommodates the future interchange design by incorporating bridge spans that would accommodate the existing intersection and future interchange. One of the main concerns in constructing a bridge at this location is the potential impacts to access to CMC – University hospital, located in the northeast quadrant of this intersection. Retaining wall placement was of particular concern as retaining walls could limit access to the hospital from North Tryon Street/US-29 and could create a visual barrier. Initial designs carried retaining walls approximately 600 feet north of the W.T. Harris Boulevard intersection. In doing so, southbound left turns into and out of CMC – University’s North Tryon Street/US-29 access driveway at the JM Keynes Drive intersection would be eliminated, resulting in impacts to emergency vehicles and other hospital users. The BLE Project Team addressed this issue in the 15% Preliminary Engineering plans by including a new hospital access drive opposite JW Clay Boulevard approximately 1,100 feet north of the existing access drive.



**New Hospital Access Drive Considered**

As part of CATS ongoing outreach effort, a follow-up meeting was held with hospital representatives in April 2009. In response to their concerns with impacts to hospital access, including emergency vehicles, a further engineering evaluation of this area was undertaken. By reducing the light rail design speed to 35 mph, the profile of the approaches to the bridge over W.T. Harris Boulevard

could be adjusted to allow the JM Keynes intersection to remain open. This offers the following advantages:

- Access to the CMC – University Hospital is unchanged.
- The additional intersection allows left turning movements that would otherwise shift to the adjacent busy intersection at W. T. Harris Boulevard and J.W. Clay Boulevard.
- The profile adjustments also allow the at-grade intersection at Ken Hoffman Drive, south of W. T. Harris Boulevard, to also remain open, which offers similar access as left turn benefits.

This refinement was approved by the BLE Project Team in July 2009 and presented to the public in September 2009.

### **3.1.10.2 Side versus median alignment at North Tryon Street/US-29 and W.T. Harris Boulevard intersection**

As part of the evaluation of the light rail bridge over W.T. Harris Boulevard, whether to locate the alignment along the east side of North Tryon Street/US-29 or within the median was analyzed. The side alignment would necessitate the use of longer bridge spans to accommodate a transition of the alignment from the median to the side in addition to crossing over W.T. Harris Boulevard. The side alignment would also result in an at-grade crossing with the existing Hospital Drive entrance, which is used by emergency vehicles and the entrance(s) to the UNC Charlotte campus. For these reasons, it was determined that the median alignment would result in the least amount of impact.

### **3.1.11 JW Clay Blvd. Station**

The JW Clay Blvd. Station would be located south of JW Clay Boulevard in the median of North Tryon Street/US-29. The station would be designed as a neighborhood station with walk-up access, 16 bicycle parking spaces, two bus transfer bays and three kiss-and-ride spaces. A center platform would be utilized as it is most suitable to existing topography considerations at this location, since the topography begins to slope downward as the alignment proceeds north. A center platform also integrates well with potential street networks, existing businesses and future development, and facilitates direct bus connections.

As part of the evaluation of the JM Keynes intersection (Section 3.1.10.1), alternate configurations for the JW Clay Blvd. station, including locations further south and north of the JW Clay Boulevard intersection were considered. As these other issues were resolved, the JW Clay Blvd. station remains in its original location.

This concept was confirmed by the BLE Project Team at a station review meeting in August 2009.

### 3.1.12 UNC Charlotte

Changes to the light rail alignment entering onto the campus of UNC Charlotte and the UNC Charlotte Station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Adjusting the light rail alignment on the UNC Charlotte campus, entering from North Tryon Street/US-29; and,
- Defining the station location on the UNC Charlotte campus.

Various alignments were analyzed to determine how to transition from the median of North Tryon Street/US-29 onto the campus of UNC Charlotte, then transition back to North Tryon Street/US-29 towards Mallard Creek Church Road and the I-485 terminus. A number of design considerations were crucial to the analysis, including:

- Curvature of tracks entering into UNC Charlotte campus, including the track superelevation/banking of curves
- Design speed of alignment
- Location and opportunity for tangent track between curves
- Crossing of streams
- Crossing of parklands
- Conflicts between traffic and the light rail

#### Entrance onto UNC Charlotte Campus

To enter the UNC Charlotte campus, the Light Rail Alternative would need to cross the northbound lanes of North Tryon Street/US-29. Considering engineering constraints and existing and future traffic volumes, at-grade and grade-separated options, including an overpass and an underpass, were evaluated to determine which would be the most beneficial and feasible.

A significant consideration relative to engineering constraints is topography. The topography drops downward towards Toby Creek through the area where the Light Rail Alternative would enter the UNC Charlotte campus. In order to cross North Tryon Street/US-29 at-grade, the roadway would have to be reconfigured to provide for a level elevation at which to cross. Changing the roadway configuration would be a costly option as it would require depressing North Tryon Street/US-29 in two locations. Traffic could also queue back to the at-grade crossing from the Mallard Creek Church Road intersection

In addition, experience has shown that long light rail grade crossings at flat angles for the roadway are less than desirable due to difficulty in placing flashing lights and gates and the probability of drivers to occasionally attempt to drive over the tracks. Also, NCDOT expressed a preference for a grade separation at this location.

Given the constraints that surfaced during evaluation of an at-grade crossing, grade separating the Light Rail Alternative from North Tryon Street/US-29 via an overpass was evaluated. Existing highway travel lanes follow the natural topography and slope downward towards the Mallard Creek bridge. Raising the roadway to pass over the light rail tracks was quickly eliminated due to access and visual impacts to North Tryon Street/US-29 and the fact that the

northern retaining walls would “chase the grade” down the hill and not tie into the existing roadway until just south of the bridge over Mallard Creek.

Likewise, raising the light rail tracks to pass over the northbound lanes of North Tryon Street/US-29 results in the light rail profile “chasing the grade” down the hill on the UNC Charlotte campus to Toby Creek. The entire section from south of the bridge over the northbound lanes to east of the light rail bridge over Toby Creek would be elevated, either on a bridge, retaining walls or embankment. This was costly and created a rail barrier, both via grade and visually, across the light rail corridor.

Since the elevation of the UNC Charlotte campus is lower than that of North Tryon Street/US-29, grade separating the Light Rail Alternative via an underpass was also evaluated. Engineering and traffic considerations, as well as consideration for future campus expansion plans, determined a feasible underpass location approximately 1,100 feet north of the entrance drive to the UNC Charlotte Research Campus. The alignment would begin to descend just north of the aforementioned entrance drive and would pass beneath the existing grade of North Tryon Street/US-29 as it turns towards the UNC Charlotte campus. Once the alignment exits the underpass, the alignment would meet the existing grade of the campus property, limiting the amount of retaining walls or side slopes needed.

The alignment entering onto campus used for the 15% Preliminary Engineering plans entered onto campus as soon as practical north of the existing buildings along North Tryon Street/US-29 at the Charlotte Research Institute (CRI) which is affiliated with UNC Charlotte. Vertical profile considerations of the light rail require the tracks to be depressed under both the entrance to the CRI and the northbound lanes of North Tryon Street/US-29 beginning to the south at J.W. Clay Boulevard. Throughout 2009, UNC Charlotte has been engaged in a process to update their campus master plan. In response to the 15% Preliminary Engineering plans and the future campus expansion plans, UNC Charlotte requested during an April 2009 coordination meeting with CATS that the alignment enter onto campus further north. Additional engineering studies indicated this could be done. However, the resulting longer alignment added track costs and required a longer light rail bridge over Toby Creek due to the angled crossing of the creek. Offset to this is a shortening of the length of the “trench-like” structure in the median of North Tryon Street/US-29 by leaving the crossing at the CRI entrance at-grade with the light rail tracks. The net offset of these changes is estimated to be cost savings to the project.

The revised alignment entering onto the UNC Charlotte campus approximately 800 feet north of the 15% Preliminary Engineering plans was reviewed with and acceptable to UNC Charlotte in May 2009. It will be used for development as the 30% Preliminary Engineering plans.

#### UNC Charlotte Station Location

Input from UNC Charlotte officials and participants at a public forum held at the UNC Charlotte campus, as well as consideration of the UNC Charlotte master plan confirmed the proposed location of the UNC Charlotte Station. The station would be located on campus opposite Squires Hall dormitory, parallel to Cameron Boulevard. The station would be designed for walk-up access, would accommodate two bus transfer bays, 32 bicycle parking spaces and connections to campus shuttle service. Side loaded platforms would be utilized as they would be best integrated into the future UNC Charlotte campus buildings and parking lots on both sides of station. Side loaded platforms additionally create a highly visible station from campus and Cameron Boulevard due to the two separate platform amenities.

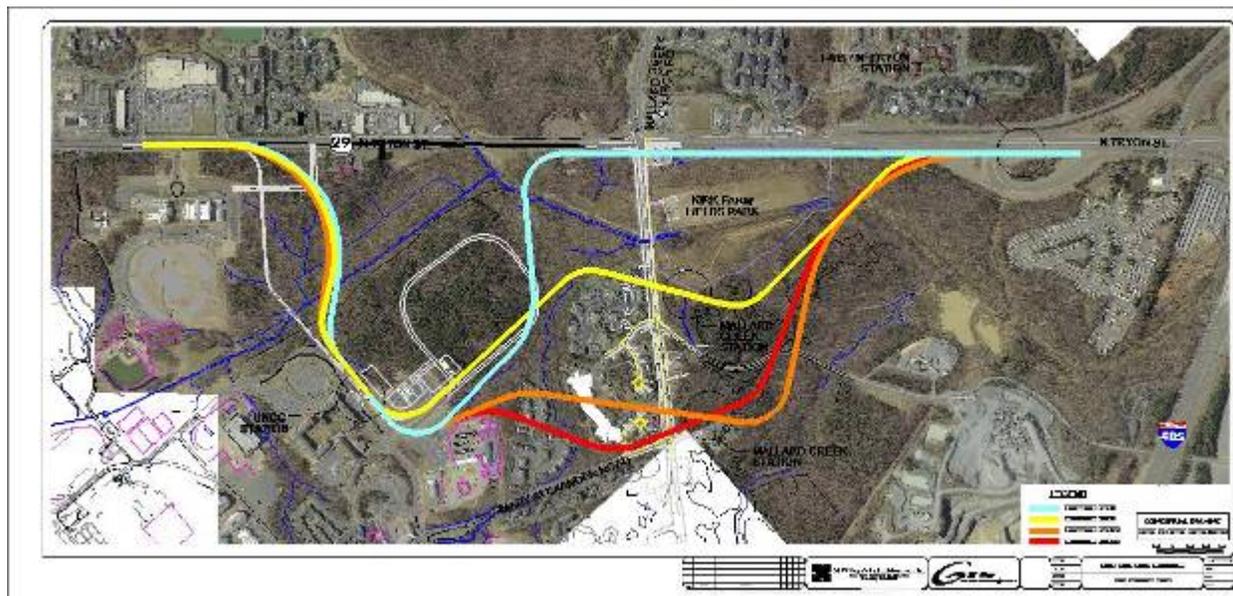
This concept was confirmed by the BLE Project Team at a station review meeting in August 2009. Coordination with UNC Charlotte will continue throughout further development of the plans.

### 3.1.13 Mallard Creek Church Station and Alignment Design Options

Changes to the Mallard Creek Church Station and Alignment since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Transitioning the alignment from UNC Charlotte approximately 1,300 feet east of the North Tryon Street/US-29 and Mallard Creek Church Road intersection;
- Moving the station location approximately 1,300 feet east of the North Tryon Street/US-29 and Mallard Creek Church Road intersection; and,
- Recommending a proposed park-and-ride adjacent to the revised station location.

Four options were analyzed to transition the Light Rail Alternative from the UNC Charlotte campus and ultimately terminate it at I-485/North Tryon Street. The first option, carried forward as part of the Refined LPA, was to head directly west from the UNC Charlotte station towards North Tryon Street/US-29, then parallel the northbound travel lanes to the I-485/N. Tryon Station (shown in light blue on the figure below). The other three alignment options (yellow, orange and red on the figure below) headed north towards Mallard Creek Church Road east of the intersection with North Tryon Street/US-29. Each of the options incorporates a station at or near Mallard Creek Church Road.



Transitioning the Light Rail Alternative from the UNC Charlotte campus.

Large developable parcels located in the northwest and southeast quadrants of this intersection could house future development activity that would be compatible with a station and park-and-ride lot at this intersection. However, this alignment provides extensive topography challenges that would necessitate large amounts of earthwork and grading. Potential development opportunities in both the southeast and southwest quadrants hamper the ability to construct a park-and-ride lot at this location. In addition, the adjacent Mallard Creek floodway limits the size of the park-and-ride lot and the opportunity for development adjacent to the station. Additionally,

a traffic analysis revealed that traffic movements would be compromised by an at-grade crossing at this intersection. Both AM and PM peak operations would be hampered by an at-grade crossing which would cause the intersection to operate with extreme congestion. Because of these challenges, the BLE Project Team began to evaluate other possible alignment options. This resulted in the assessment of three additional alignments (shown in yellow, orange and red on the previous figure).

Analysis data, coupled with input from UNC Charlotte, revealed that moving the alignment further east away from the North Tryon Street/US-29 and Mallard Creek Church Road intersection could be advantageous. UNC Charlotte master planning efforts include plans to expand the campus towards Mallard Creek Church Road and potential development of a large site the UNC Charlotte owns north of Mallard Creek Church Road. In May 2008, UNC Charlotte requested that CATS consider a station on the northern property boundary to serve UNC Charlotte property on Mallard Creek Church Road. The yellow alignment extends in a northwest direction away from the UNC Charlotte campus towards Mallard Creek Church Road. It turns north before Mallard Creek and crosses Mallard Creek Church Road approximately 400 feet east of the existing bridge over Mallard Creek. The yellow line alignment would pass through several buildings of an apartment complex property and then cross Mallard Creek Church Road at-grade. A park-and-ride lot would be located within the area bordering Mallard Creek Church Road, Stone Quarry Road and Kirk Farm Fields. From the station area, the alignment would go northwest towards North Tryon Street/US-29, crossing over Mallard Creek on a structure and would parallel North Tryon Street/US-29 to the I-485/N. Tryon Station location.

From the UNC Charlotte campus, the orange line alignment would extend north towards Mallard Creek Church Road, crossing a tributary of Mallard Creek, dividing an existing apartment complex and crossing Mallard Creek Church Road at-grade approximately 300 feet west of the Mallard Creek Church Road/Mary Alexander Road intersection. The topography along this alignment is extremely challenging. The alignment would then bend to the west, crossing Stone Quarry Road at-grade before tying into the yellow alignment location prior to crossing Mallard Creek on a structure to I-485/N. Tryon Station location.

Similar to the orange alignment, the red alignment would leave the UNC Charlotte campus and go north towards Mallard Creek Church Road. It would then veer to the east, crossing a tributary of Mallard Creek and paralleling Mary Alexander Road which would create access issues for the street network in this area. The red line alignment would then cross Mallard Creek Church Road at-grade along the western side of the Mallard Creek Church Road/Mary Alexander Road intersection. The red alignment would continue northwest crossing Stone Quarry Road further to the south than the orange line alignment, but tie into the yellow line alignment at approximately the same location prior to crossing Mallard Creek. There would be impacts to the apartment complex and the alignment would bisect UNC Charlotte property hindering the potential for future development.

Of the three alignments (yellow, orange and red), the yellow line alignment was determined to be the most feasible due primarily to better topography, less access impacts to developed property, less impact to potentially developable parcels on the north side of Mallard Creek Church Road, and minimal traffic impacts.

The station would be located on the north side of Mallard Creek Church, approximately 300 feet west of the Stone Quarry Road/Alexander Glen Drive intersection. The station would provide 12 bicycle parking spaces and a surface park-and-ride lot with 150 spaces. Vehicle access would be available from Stone Quarry Road. Side loaded platforms would be utilized.

This concept was endorsed by UNC Charlotte and confirmed by the BLE Project Team and the GSST in October 2008 for development as the 15% Preliminary Engineering plans.

### 3.1.14 I-485/N. Tryon Street Park-and-Ride Lot Access

Changes to the I-485/N. Tryon Street Station since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Transitioning the alignment back to North Tryon Street/US-29 from Mallard Creek Church Road;
- Refinement of the park-and-ride garage; and,
- Reconfiguring the entrance road to the site.

From the Mallard Creek Church Station, the alignment would turn northwest and would cross over Mallard Creek on a structure towards North Tryon Street/US-29. The alignment would then bend north to parallel the outbound travel lanes of North Tryon Street/US-29 towards the I-485/N. Tryon Station. The I-485/N. Tryon Station would be a regional station with a center platform. A multi-story park-and-ride garage is located to the east of North Tryon Street/US-29, just south of the I-485 ramps at the US-29 Service Road. In addition to the park-and-ride garage, the station would encompass a small surface parking lot, four bus transfer bays, seven kiss-and-ride spaces and 24 bicycle parking spaces. Approximately 2,100 parking spaces would be provided.



It was originally proposed that the I-485/North Tryon Street park-and-ride garage would be accessed via the existing US-29 Service Road. However, it was determined that, based in part on the experience of the South Corridor, one access point could not adequately serve such a large park-and-ride facility. An at-grade crossing of the entrance drive was of additional concern, particularly since the morning and evening peak travel times could result in traffic spillback issues.



Potential alternative evaluated for additional access point to I-485/N. Tryon Station.

One option to solve this issue was a re-configuration of the North Tryon Street/US-29 and I-485 intersection to include a fourth leg to provide a second access point to the US-29 Service Road via Morningstar Drive. This concept was developed into the 15% Preliminary Engineering plans.

However, further analysis of this option would result in substantial impacts to an existing residential neighborhood by introducing traffic and noise and potentially necessitating property acquisitions and displacements to reconfigure the street network. NCDOT also voiced reservations about adding this access to the existing interchange configuration. Therefore, this option was eliminated. Preliminary engineering and traffic studies indicated that minor improvements to the existing US-29 Service Road intersection, coupled with the addition of a second left-over access point to the north would accommodate transit patrons and alleviate traffic spillback concerns. Specifically, a traffic signal would be added to the existing US-29 Service Road intersection and a second access point would be constructed approximately 500 feet north of the existing access point. An existing median opening would allow access to both northbound and southbound traffic. Additionally, the station location and parking garage would be located to the south of the existing access point instead of to the north. To further enhance traffic flow into and out of the station, the light rail tracks are grade separated from the entrance road and an extensive access drive runs around three sides of the parking garage to allow ample room for queuing.

This concept was confirmed by the BLE Project Team at a station review meeting in August 2009 and presented to the public in September 2009.

## **4.0 REFINED LIGHT RAIL ALTERNATIVE DESIGN OPTIONS**

### **4.1 Light Rail Alternative – 36th Street Design Option**

Since the completion of conceptual engineering and adoption of the Refined LPA in 2006, a grade separation of the light rail and existing and proposed freight railroad tracks at 36th Street has been incorporated into the LYNX BLE project as described above in Section 3.1.3. At the same time, a design option for the 36th Street Station was considered, in which the same alignment as described for the Light Rail Alternative would be utilized. However, it would not include the depression of 36th Street under the existing freight tracks or the proposed light rail tracks. Essentially, this design option would be similar to what exists at this railroad crossing today, with the exception of the additional tracks for the proposed light rail.

The station would be located along the NCRR ROW, just to the south of 36th Street. The station would be designed as a neighborhood station, with walkup access and 16 bicycle parking spaces. A pedestrian bridge would be provided over all sets of light rail and freight tracks to provide for safe pedestrian movements. Stairs and elevators would be provided at each end of the pedestrian bridge. Sidewalks would be located along the south side of 36th Street leading up to the pedestrian bridge elevator and stair system.

At the same time that revisions were being incorporated relative to the NCDOT-Rail CRISP project, the BLE Project Team decided in May 2009 not to pursue an at-grade crossing at this location. The number of existing and proposed light rail and freight tracks (six total), coupled with the number of freight, Amtrak, and light rail trains, pose a safety concern for pedestrians, bicyclists, personal vehicles and train traffic at this at-grade crossing. In addition, the frequency of light rail trains coupled with the frequency and length of the freight trains would effectively close an at-grade crossing to vehicular traffic much of the time. For these reasons, the BLE Project Team, along with the railroad companies operating within the corridor, strongly support a grade-separated crossing. Therefore, the Light Rail Alternative – 36th Street Design Option has

been removed from further consideration and will not be evaluated as part of the Draft EIS. However, constructing the grade separation will require funding participation from third parties.

#### 4.2 Light Rail Alternative – Sugar Creek Design Option

Changes to the Light Rail Alternative – Sugar Creek Design Option since the completion of conceptual engineering and adoption of the Refined LPA in 2006 include the following:

- Alignment refined to transition Light Rail Alternative from NCRR right-of-way to the median of North Tryon Street/US-29;
- Sugar Creek Road Station location refined; and
- Old Concord Road Station location refined.

When the MTC adopted the locally preferred alternative in 2006, it included an alignment along the NCRR between Sugar Road and Old Concord Road. However, the MTC recommended additional analysis of the Sugar Creek alternative. The Sugar Creek alternative, known as the Light Rail Alternative - Sugar Creek Design Option, would transition the alignment to North Tryon Street/US-29 from the NCRR ROW just north of the Sugar Creek Road crossing; whereas the NCRR alignment, known as the Light Rail Alternative, would transition to North Tryon Street/US-29 just before Old Concord Road. Each alternative includes two stations, namely the Sugar Creek Station located near to Sugar Creek Road, and Old Concord Road Station, located near to Old Concord Road. A planning process was subsequently developed to refine each alternative alignment and station locations through an analysis of a variety of environmental and transportation factors (Table 4-1).

**Table 4-1  
Analysis Factors**

Human and Natural Environment	Engineering and Transportation	Market Overview
Acquisitions and Displacements	Grade separations	Retail space
Noise Receivers	Bridge construction	Office space
Vibration Receivers	Travel time – non transit vehicles and light rail vehicles	Industrial space
Historic Resources	Delay	Residential space
Archaeological Resources	Speed	Acres for Transit-oriented development
Parklands	Intersection level of service	Overall connectivity analysis
Wetlands and Streams	Intersection Volume to Capacity	
Visual and Aesthetic	Bicycle/Pedestrian level of service	
Environmental Justice	Left-turn access	
	U-turn locations	

Through this analysis, documented in the *CATS Blue Line Extension Sugar Creek and North Carolina Railroad Alignment Alternatives Study* (February 2009), it was determined that both alignments are similar with regards to ridership generation, environmental impacts, travel time impacts to major roadways and economic development impacts. However, the NCRR alignment proved to be less costly, would result in fewer business impacts along North Tryon Street/US-29 and would result in fewer negative visual impacts. Based on these results, it was recommended

that the NCRR alignment be advanced to the next state of engineering. This recommendation was presented to and approved by the MTC and the Charlotte City Council in December 2008 and January 2009, respectively. The findings of the analysis and recommendation were subsequently presented to the public in January 2009. A summary of the review elements and considerations for the Light Rail Alternative – Sugar Creek Design Option is included in the following sections.

#### Transitioning from NCRR Right-of-Way

Under the Light Rail Alternative – Sugar Creek Design Option the alignment would transition to North Tryon Street/US-29 approximately one mile south of the proposed alignment for the Light Rail Alternative. Previous planning efforts revealed that an alignment behind the existing Asian Corners mall was the preferred option for transitioning the alignment to North Tryon Street/US-29. A series of subsequent work sessions with CATS and City staff resulted in three possible alignments that leave the NCRR ROW in the vicinity of Sugar Creek Road and enter North Tryon Street. These three design options, each providing various pros and cons, are referred to as the Asian Corners Option, the Norfolk Southern Option, and the Avoidance Option. Each of these options is described in detail in the *CATS Blue Line Extension Sugar Creek and North Carolina Railroad Alignment Alternatives Study* (February 2009). Of the three options the Norfolk Southern Option was selected as the preferred alternative and is carried through for further analysis in the Draft EIS. The Norfolk Southern Option does not impact historic structures and supports redevelopment potential. The Asian Corners Option impacted a NRHP-eligible property, was not conducive to traffic and pedestrian movement, or to redevelopment potential. Likewise, the Avoidance Option would result in negative impacts to traffic and pedestrian movement and would limit redevelopment potential in the station area.



#### Sugar Creek Station - Sugar Creek Design Option

Under the Light Rail Alternative – Sugar Creek Design Option, the station would be located along Dorton Street, near Raleigh Street. The station would include a surface park-and-ride lot with approximately 900 spaces, three bus transfer bays, four kiss-and-ride spaces and 26 bicycle parking spaces. Access to the park-and-ride lot would be available from Dorton Street and Raleigh Street. Side loaded platforms would be utilized to minimize the footprint for retaining walls.

Transitioning to the median of North Tryon Street/US-29

Under the Light Rail Alternative – Sugar Creek Design Option, the alignment was analyzed to enter the median of North Tryon Street/US-29 just north of Dorton Street either at-grade or grade separated. AM and PM Peak traffic volumes and intersection operations (Peak direction along North Tryon Street/US-29) were analyzed for the year 2030, utilizing growth rates provided by CDOT. Projected traffic volumes revealed that the North Tryon Street/US-29 and Sugar Creek Road intersection would operate with extreme congestion, with and without light rail. Delay times for future traffic were also evaluated and revealed that the intersection would operate below standards, with and without light rail. Traffic analysis revealed that that an at-grade crossing would be subject to queue spillback from the Eastway Drive intersection, located 2,500 feet to the north.

An at-grade transition into the median of North Tryon Street/US-29 would cross the northbound travel lanes on a skew. This would create a longer travel time for the light rail vehicles to cross the northbound lanes, and the skewed crossing introduces geometric concerns with placement of flashing lights and gates and creates a safety issue to vehicles and pedestrians.



Ultimately, due both to traffic considerations and safety considerations, it was determined that the light rail alignment would be grade separated while entering into the median of North Tryon Street/US-29.

Crossing Eastway Drive

The North Tryon Street/US-29 and Eastway Drive intersection accommodates high traffic volumes and was thus analyzed for an at-grade and grade-separated crossing. Under an at-grade crossing scenario, the intersection would operate with extreme congestion during AM and PM Peak times, respectively utilizing projected 2030 traffic volumes. In comparison, if providing a grade separated structure over Eastway Drive, the AM Peak would still operate with severe congestion, but the PM Peak would operate with severe congestion instead of extreme. Since an at-grade crossing would contribute to poor traffic service and would also pose a safety risk for vehicles and pedestrians, it was determined that the Eastway Drive crossing would be grade separated with a bridge structure to provide a safer crossing.



Eastway Drive and North Tryon Street/US-29

Old Concord Road Station – Sugar Creek Design Option

Under the Light Rail Alternative – Sugar Creek Design Option, the station platform would be located in the median of North Tryon Street/US-29, directly south of the Old Concord Road

intersection. A center platform would be utilized, and the station would include a surface park-and-ride lot east of North Tryon Street/US-29 with approximately 450 spaces, three bus transfer bays and 20 bicycle parking spaces. Access to the park-and-ride lot would be available from North Tryon Street/US-29 and Old Concord Road. The park-and-ride lot would be in a similar location as the park-and-ride facility for the Light Rail Alternative Old Concord Road Station.

## 5.0 SELECTION OF LOCALLY PREFERRED ALTERNATIVE

On April 22, 2009, the MTC adopted the proposed Locally Preferred Alternative as described in the preceding sections as the Light Rail Alternative, and adopted subsequent revisions, such as the shift in station location from 27th Street to 25th Street, on October 28, 2009. The Locally Preferred Alternative does not include the Light Rail Alternative – Sugar Creek Design Option, but rather utilizes the NCCR right-of-way between Sugar Creek Road and Old Concord Road. The Light Rail Alternative – 36th Street Design Option is also not included as part of the Locally Preferred Alternative.

The proposed project would extend the existing LYNX Blue Line light rail system by approximately 10.6 miles and provide 13 transit stations, including six walk-up stations and seven park-and-ride facilities. The proposed alignment would begin at the existing LYNX Blue Line 7th Street Station and travel along CATS-owned right-of-way until north of 12th Street where it would bridge over the CSXT freight rail tracks, continue adjacent to North Brevard Street, and then enter the existing North Carolina Railroad (railroad) rights-of-way to the mid-point of the alignment, near Old Concord Road, where it would then transition into the median of North Tryon Street/US-29. The line would remain in the median until north of W.T. Harris Boulevard, where it would turn east crossing under the existing northbound travel lanes of North Tryon Street/US-29, entering the UNC Charlotte campus before returning to the east side of North Tryon Street/US-29 to a terminus just south of I-485.

The project would be designed to accommodate two light rail tracks, one for northbound service and one for southbound service. In general, the tracks would be located at-grade. Some portions would be elevated to go over existing freight tracks, water features or roads. The proposed Light Rail Alternative would include the depression of 36th Street under the existing railroad freight tracks and the proposed light rail tracks. A depression of the light rail tracks under the existing northbound travel lanes of North Tryon Street/US-29 would also occur where the alignment turns east to enter the UNC Charlotte campus. Sugar Creek Road would be depressed under the existing railroad tracks as planned and undertaken as a separate project by other third parties. The proposed Light Rail Alternative would be constructed over a depressed Sugar Creek Road on a bridge adjacent to the freight railroad .

The proposed project would accommodate local, neighborhood circulator and express bus services to connect the light rail service with the CATS regional bus system. The project also includes ancillary facilities such as traction power substations, signal houses, and crossing gates. The proposed project assumes that the existing South Boulevard Light Rail Vehicle Maintenance Facility (VMF) would be used for heavy maintenance and that a new Vehicle Light Maintenance Facility (VLMF) and storage yard would be built on the existing NS Intermodal site along North Brevard Street.

Along North Tryon Street/US-29 north of Old Concord Road, where the proposed alignment would be in the median, station platforms 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, lighting, benches, trash cans, self-serve ticket-vending machines and CATS customer information, such as maps and schedules for the light rail line and connecting bus routes. Park-and-ride facilities would be provided at each station north of the Sugar Creek Road Station, with the exception of the proposed JW Clay Blvd. and UNC Charlotte Stations. The park-and-ride facility at the terminal station located at I-485 would include a five-story parking garage.

### Summary of Refinements

In November 2006, the FTA approved CATS' application to enter into the Preliminary Engineering phase of FTA 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 LYNX Blue Line extension needed to re-examine some key design decisions in order to accommodate the combined future ridership potential and the potential need for more frequent service headways. These considerations, as well as input received during public meetings and in coordination with NCDOT, the NCRR, CMC –University, UNC Charlotte and NS led to additional refinements of the alignment and station locations during preliminary engineering. These refinements included:

- Elimination of storage tracks near 9th Street Station.
- Shifting the proposed location of the 16th Street Station north, to Parkwood Avenue and Brevard Street, to provide better visibility and improved access to the neighborhoods nearby such as Villa Heights.
- Shifting the proposed location of the 27th Street Station to 25th Street to minimize utility impacts and better serve future development opportunities, and renaming the station to 25th Street Station.
- Development of a light rail facility for vehicle light maintenance, storage tracks and operations near the Parkwood and 25th Street Stations at the existing NS intermodal site.
- Grade separating 36th Street and the railroad by depressing 36th Street under the existing freight tracks and the proposed light rail tracks, to improve safety conditions and vehicular, pedestrian and bicycle access to the station.
- Shifting the grade separation to cross from the east to the west side of the NCRR ROW from Sugar Creek Road to Craighead Road.
- Based on NCRR's Sugar Creek Road grade separation project, shifting the proposed location of the Sugar Creek Station to the bridge over Sugar Creek Road to improve visibility and access. Changing the proposed location of the Sugar Creek Station park-and-ride lot to avoid impacts to historic resources.
- Adding a park-and-ride option at the Sugar Creek Station (Sugar Creek Station Park-and-Ride Option 2) to construct a parking garage south of the existing railroad tracks and west of Sugar Creek Road.
- Adding a grade separation of the light rail alignment into the median of North Tryon Street/US-29 at Old Concord Road based on safety and traffic considerations.
- Combining the City Boulevard and Harris/North Tryon stations into a single station at McCullough Drive, because of overlapping service areas and station spacing considerations. Adding a park-and-ride lot to the McCullough Station based on projected demand.
- Grade separating the transition into the UNC Charlotte campus (under the northbound lanes of North Tryon Street/US-29) based on safety and traffic considerations.

- Revising the alignment exiting the UNC Charlotte campus and shifting the Mallard Creek Station to the university's property near the intersection of Mallard Creek Church Road and Stone Quarry Drive. The University requested that CATS consider locating a station at this site, to be incorporated into future university development. The previous proposed location at the intersection of Mallard Creek Road and North Tryon Street/US-29 was eliminated from further consideration based on imminent development of the property and the results of the traffic analysis, which indicated the alignment would need to be grade separated over Mallard Creek Church Road because of traffic and safety concerns.
- Revising the Sugar Creek Design Option alignment to avoid impacts to potential historic buildings.
- Renaming of the 16th Street Station to the Parkwood Station, the Eastway Station to the Old Concord Road Station, the Rocky River Station to the University City Blvd. Station, and the University City Station to the JW Clay Blvd. Station.
- The changes to the station locations from the Refined Locally Preferred Alternative are presented in Table 5-1.

**Table 5-1  
Summary of Station Location Changes**

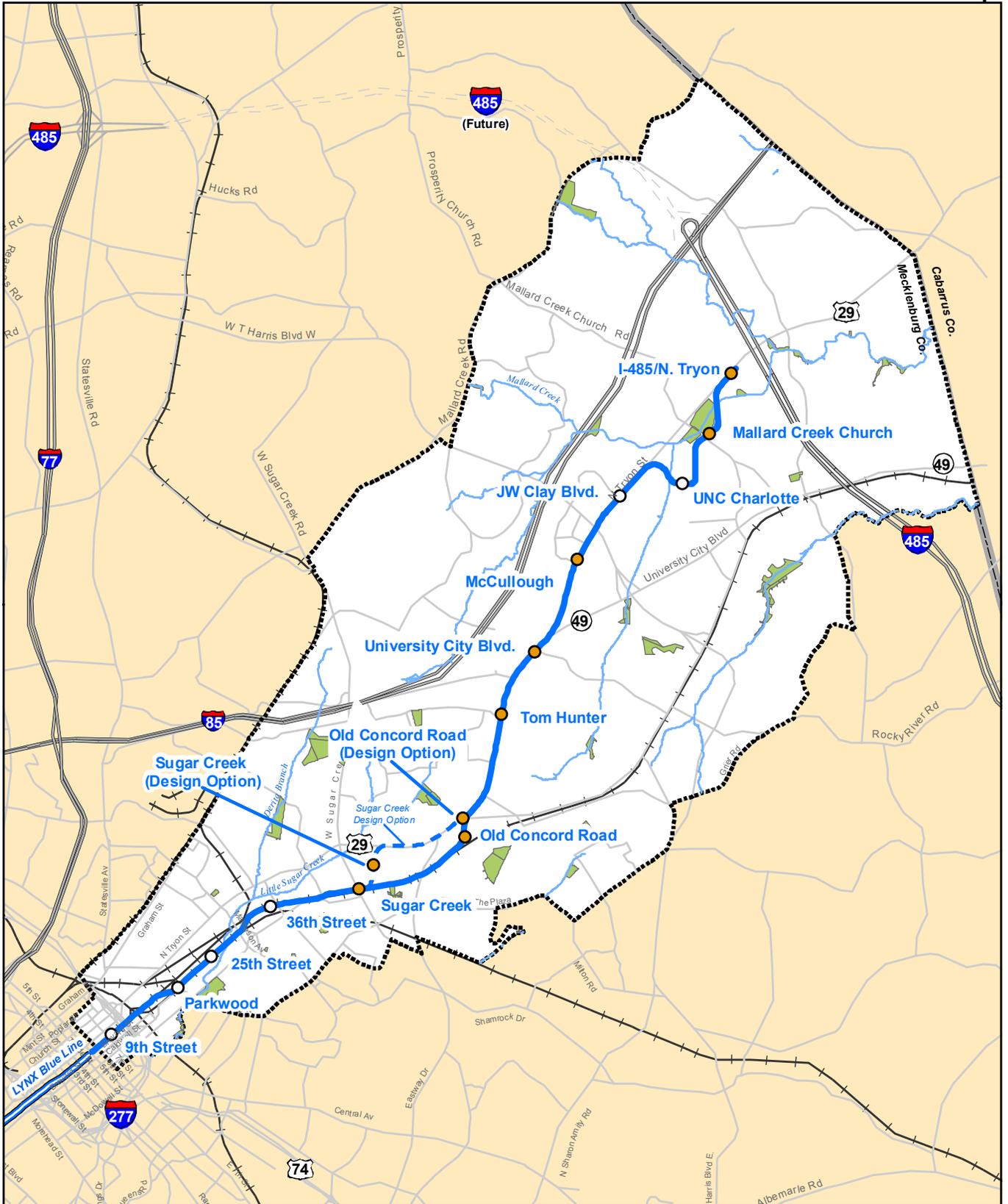
<b>Station</b>	<b>Description of Change from Refined Locally Preferred Alternative Station Location</b>
9th Street Station	Planned intersection modifications at 9th Street and a planned mixed-use development near the station, moved the station slightly north of 9th Street.
16th Street Station (Parkwood Station)	Shifted less than 1,000 feet north to Parkwood Avenue and Brevard Street. Renamed to Parkwood Station.
27th Street Station	Shifted to 25th Street and renamed to 25th Street Station.
36th Street Station	Depression of 36th Street under existing freight tracks and proposed light rail tracks.
Sugar Creek Station	Shifted the proposed location to the bridge over Sugar Creek Road. Changed the proposed location of the Sugar Creek Station park-and-ride lot to avoid impacts to historic resources and added an additional park-and-ride lot.
Sugar Creek Station – Sugar Creek Design Option	Station location refined to avoid impact to a building eligible for the National Register of Historic Places.
Eastway Station	Renamed to Old Concord Road Station. Added grade separation at Old Concord Road.
Eastway Station – Sugar Creek Design Option	Renamed to Old Concord Road Station – Sugar Creek Design Option.
Tom Hunter Station	No change.
Rocky River Station	Renamed to University City Blvd. Station.
City Boulevard Station	Combined with Harris Blvd. Station to become McCullough Station
McCullough Station	Added through combination of City Boulevard Station and Harris Blvd. Station.
Harris Blvd. Station	Combined with City Boulevard Station to become McCullough Station.
UNC Charlotte Station – North Tryon Option	Eliminated

**Table 5-1  
Summary of Station Location Changes (continued)**

UNC Charlotte Station	Added grade separation onto the UNC Charlotte campus.
Mallard Creek Church Station	Shifted to near intersection of Mallard Creek Road and Stone Quarry Drive. Eliminated previous consideration at North Tryon Street/US-29 and Mallard Creek Road intersection.
I-485/N. Tryon Street South Station	Revised to include a multi-level park-and-ride garage.
I-485/N. Tryon Street North Station	Eliminated

- Widening of North Tryon Street/US-29 asymmetrically (to the west) between Old Concord Road and “the weave.” The existing right-of-way along most of this portion of North Tryon Street/US-29 is 120 feet. The required right-of-way width for incorporating light rail into the median is 147 feet. Along the eastern side of North Tryon Street/US-29, the intent would be to hold the existing right-of-way where practical and design the typical section along the roadway to the west, which includes two 11-foot through travel lanes for northbound and southbound directions, two light rail tracks within the median, five foot bicycle lanes, two foot – six inch curb and gutters on both sides, and eight foot planting strips and six foot sidewalks on both sides. By holding the existing east side right-of-way, the proposed edge of pavement on the east side would be located approximately 10 feet from the existing edge of pavement for the northbound lanes of North Tryon Street/US-29, and the western edge of pavement would be located approximately 30 feet from the existing edge of pavement for the southbound lanes, to meet the required typical section;
- Widening of North Tryon Street/US-29 symmetrically between “the weave” and JW Clay Boulevard is proposed. 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, the typical section would include two 11-foot through travel lanes for northbound and southbound directions, two light rail tracks within the median, five foot bicycle lanes, two foot – six inch curb and gutters on both sides, and eight foot planting strips and sidewalks on both sides; and,
- 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 signalized intersections may not be identical in respect to the number of right and left turn lanes. The appropriate numbers of turn lanes would be derived from the traffic analysis. In all cases, the need to accommodate for turn lanes would require additional widening. Additional widening would likely be required at the signalized intersections to provide sufficient pedestrian refuge in the median.

Northeast Corridor Map



Legend

- |                                      |                                  |             |
|--------------------------------------|----------------------------------|-------------|
| Northeast Corridor Limits            | LYNX Existing Light Rail Transit | Railroads   |
| Proposed Light Rail Alternative      | Highway                          | Parks       |
| Design Option                        | Major Roads                      | County Line |
| Proposed Stations                    | Highway (Future)                 | Streams     |
| Proposed Stations with Park-and-Ride |                                  |             |

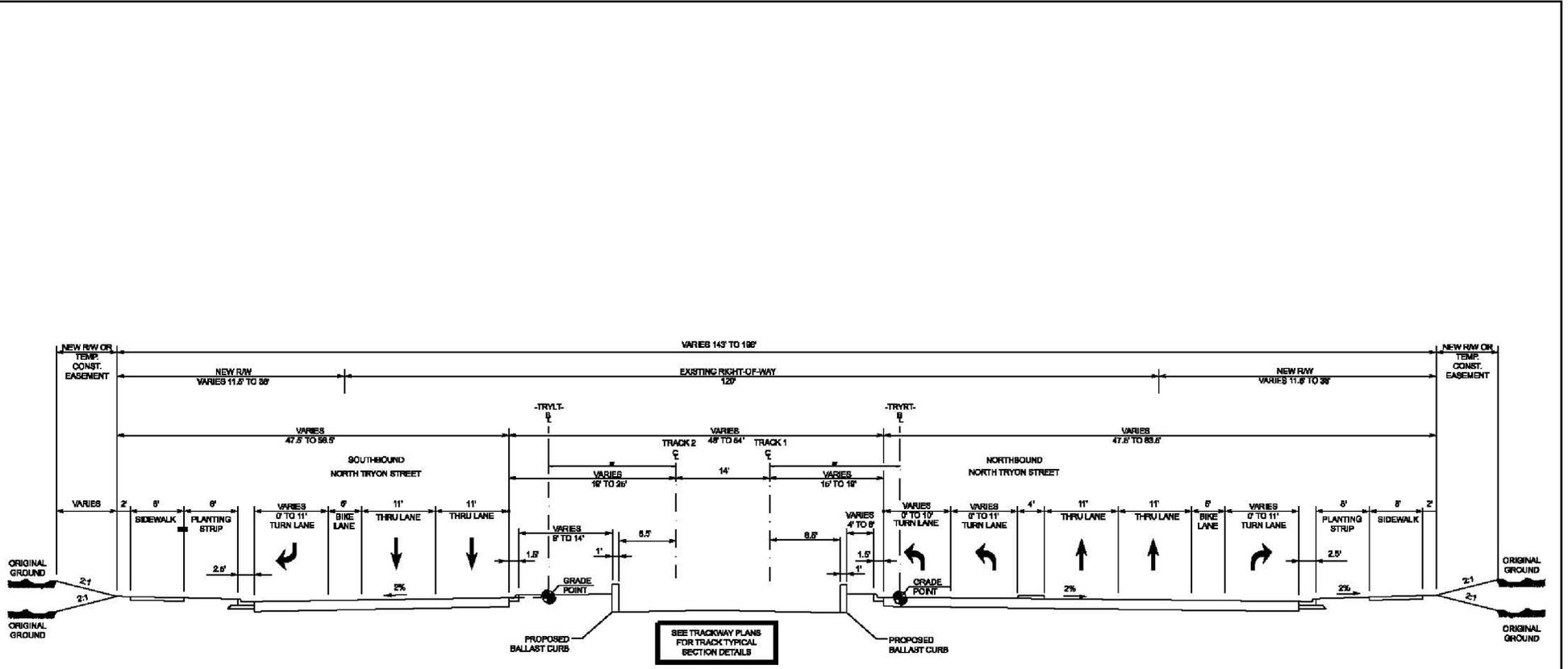


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Data Source:  
CATS, City of Charlotte GIS, and Mecklenburg County GIS

Corridor\_Base\_Map\_Rev01.pdf

10/18/09



**TYPICAL SECTION N. TRYON STREET / US-29**