

CATS BLUE LINE
EXTENSION
**SUGAR CREEK AND NORTH
CAROLINA RAILROAD**
ALIGNMENT
ALTERNATIVES STUDY

March 25, 2009

The CATS Blue Line Extension Sugar Creek & North Carolina Railroad Alternatives

In June 2006, the Metropolitan Transit Commission (MTC) adopted a locally preferred alternative for the Northeast Corridor that included an alignment along the North Carolina Railroad between Sugar Creek and Old Concord Road. However, the MTC recommended further study of the two alignment options. The alternative alignments are described as the Sugar Creek Alternative, which is generally north toward Tryon and west and north on Tryon to Old Concord Road (shown in yellow) and the North Carolina Railroad Alternative, which is east and north along the NCRR corridor, tying into Tryon near Old Concord Road (shown in gray).

Each alternative will include two stations: Sugar Creek (generally in the vicinity of Sugar Creek Road) and Old Concord (generally in the vicinity of North Tryon and Old Concord Road). In order to inform the selection of a preferred alternative, this planning process will refine each alternative alignment and associated station locations, describe the current and anticipated future real estate market conditions, develop a land use and transportation vision for the station areas and North Tryon Street in each alternative, and evaluate the associated costs and benefits of each alternative.

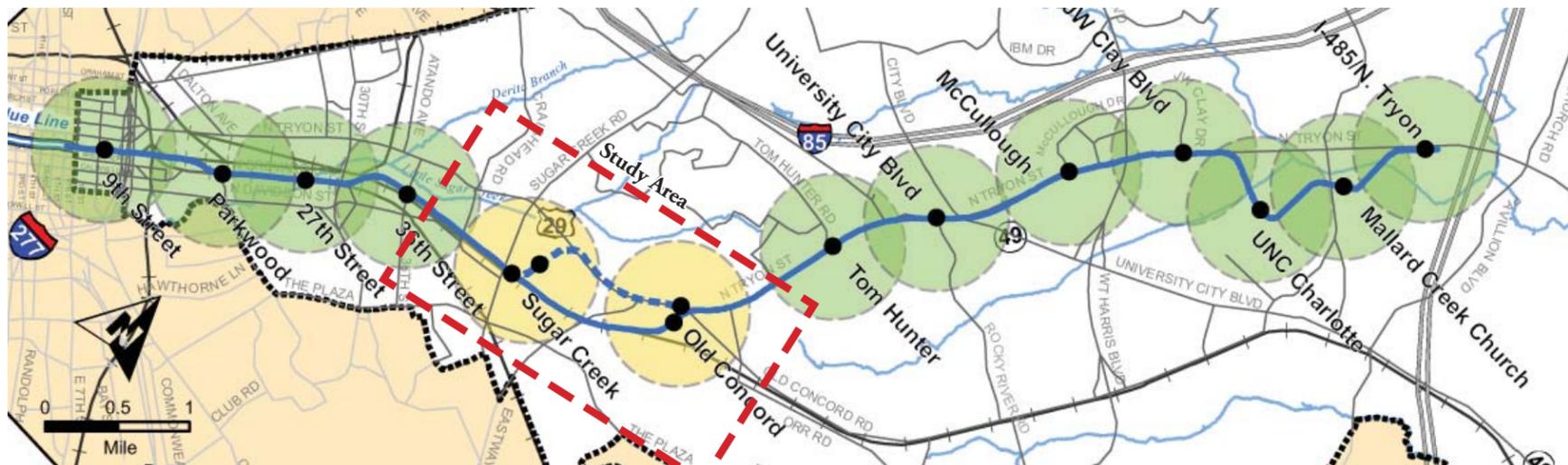
This report documents the analysis undertaken during 2008 and completed in January 2009. The first section of this report is organized around the two potential station areas, and outlines the refining of the two alignments and captures the outcomes from a series of work sessions held in April and May 2008 with representatives from key City departments, including Planning, CATS, CDOT, and Economic Development, to outline the issues and opportunities surrounding the alternative alignments and station locations. Its conclusion is two alignments and associated station locations that are analyzed in the second section of the report. The conclusion of the second section is a recommendation of one alignment to advance to the next stage of engineering.



The Study Area



Sugar Creek Station Area - Existing Character

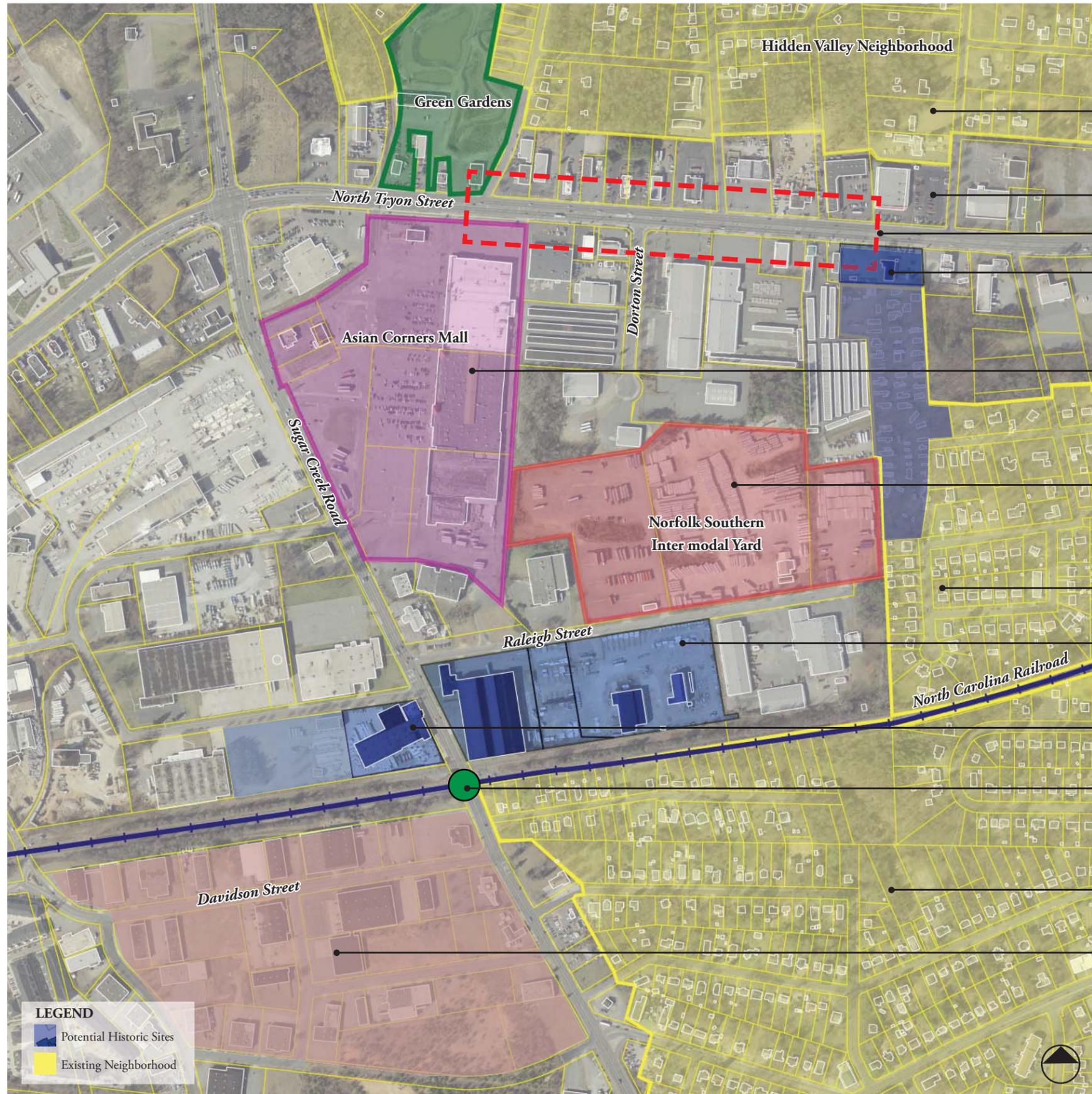


The Northeast Corridor



Old Concord Station Area - Existing character

Sugar Creek Station Area Issues and Opportunities



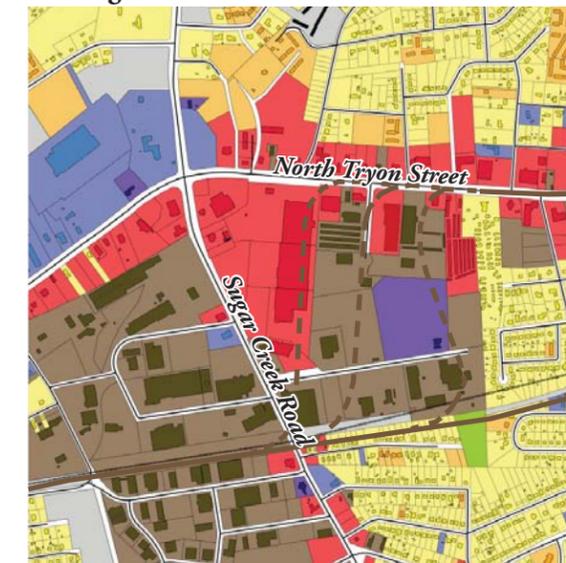
- **Hidden Valley Neighborhood-** Opportunity exists to provide and enhance pedestrian connections across North Tryon Street to existing neighborhood with high transit ridership
- **North Tryon Street-** characterized by strip commercial development
- **Future rail line entrance onto North Tryon-** Must be grade separated
- **Potential Historic Site-** Building and site potentially eligible for the National Register of Historic Places (determined not to be eligible per SHPO letter of 13 January 2009)
- **Asian Corners Mall-** This property may be a potential redevelopment site with or without proximity to transit
- **Norfolk Southern Storage Site-** This property may be surplused in coming years pending status of airport intermodal facility
- **Environmental Justice neighborhood-** Existing neighborhood should be protected and pedestrian and/or vehicular access to the station should be encouraged
- **Republic Steel Corporation Plant-** Entire site eligible for the National Register of Historic Places
- **Standard Chemical Products Plant-** Main building is eligible for the National Register of Historic Places, impact of NCRR Sugar Creek bridge construction is unclear
- **Planned grade separation-** NCRR at Sugar Creek Road; As part of NCRR's grade separation project, Sugar Creek will be taken below rail, which remains at-grade.
- **Environmental Justice neighborhood-** existing neighborhood should be protected and pedestrian access and enhancement under the planned NCRR bridge should be encouraged
- **Industrial/Commerical Area-** Area north of NODA is in continuing phases of redevelopment

Sugar Creek Station Area Potential Alignment Options

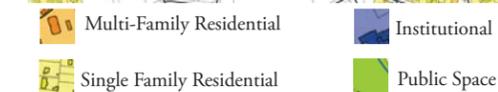
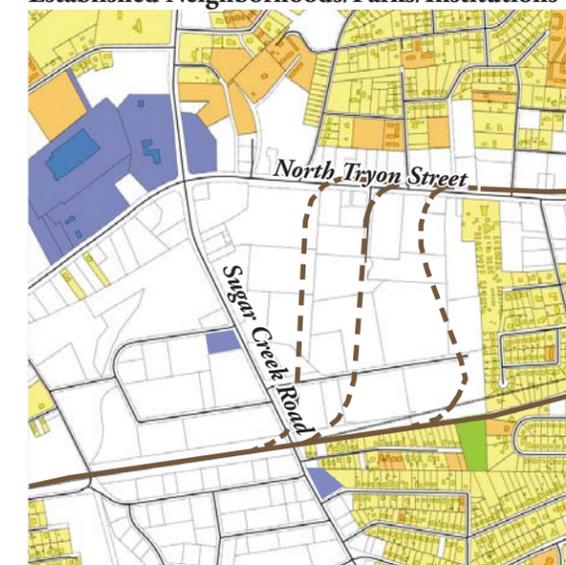
The team evaluated several potential options for both the Sugar Creek Alignment and the NCRR Alignment and their associated station locations. Three Sugar Creek Alignment options were examined that left the NCRR right-of-way in the vicinity of Sugar Creek Road and entered North Tryon Street near Dorton Street. The NCRR Alignment in this area will remain parallel to the rail line, with a station adjacent to Sugar Creek Road. These alternatives are shown on the map to the left and described on the next page.



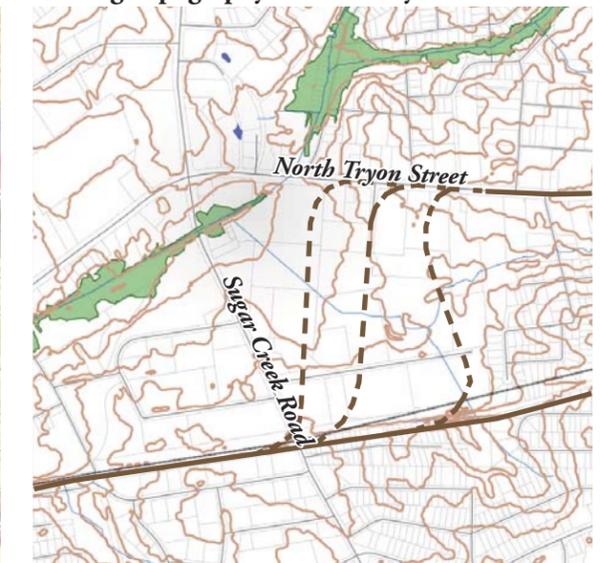
Existing Land Use



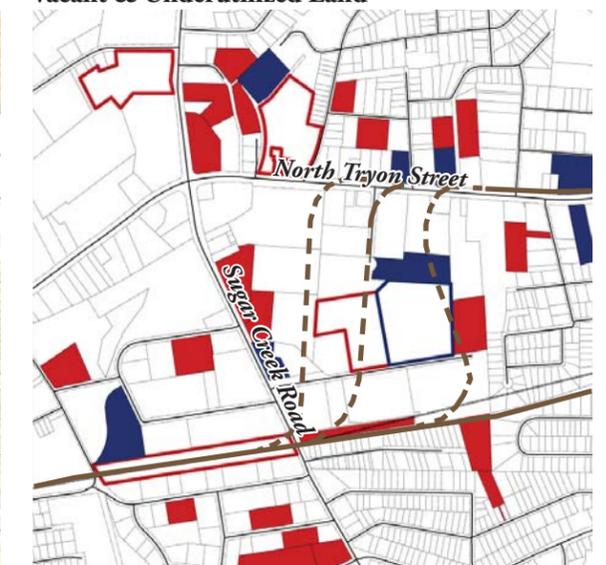
Established Neighborhoods/Parks/Institutions

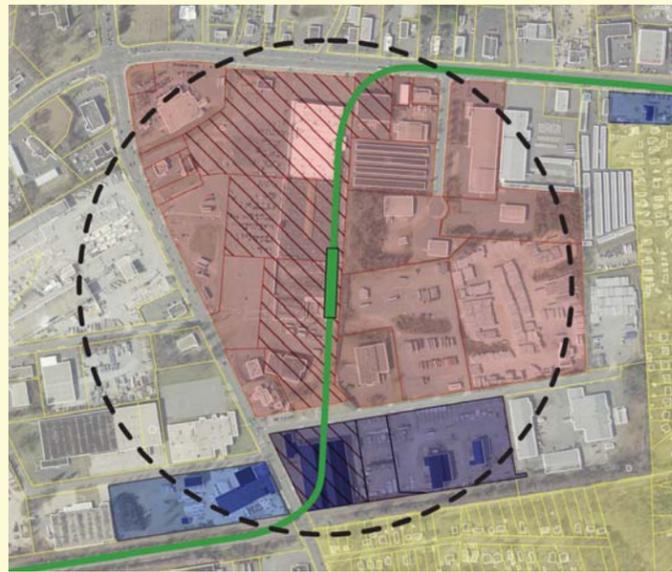


Existing Topography & Greenways



Vacant & Underutilized Land





**Sugar Creek Alignment
Asian Corners Option**

Overview:

The Asian Corners Option would depart the NCRR alignment near the proposed Sugar Creek Road underpass, requiring a separate bridge. The alignment would pass north through the Asian Corners Shopping Center, which could potentially be acquired for the location of the station and park and ride facility. Based on initial traffic study results, a grade separated entry into the median of North Tryon Street would be required to maintain acceptable intersection operations at the Sugar Creek/North Tryon intersection.

Analysis:

The alignment would impact the main building at the Republic Steel Corporation site. According to the State Historic Preservation Office (SHPO), this entire site is eligible for inclusion on the National Register of Historic Places. Based on an initial review by the SHPO, any alignment that takes one of the buildings on this site would be an “adverse effect.”

The alignment would create the opportunity for a station that is visible and accessible from both Sugar Creek Road and North Tryon Street. The station would predominantly serve areas north of the NCRR line. Because of the required grade-separated entrance to North Tryon Street, an at-grade station must be at least 600’ from North Tryon Street to allow a return to grade. The retaining wall and bridge section will act as a barrier to cars and pedestrians, and could limit the development potential of the northern section of the station area. Due to the configuration of the existing buildings and parcels, the area immediately around the station and park and ride facility could potentially be the location of several joint development parcels and the catalyst for the creation of a walkable set of development blocks in the station area.



Selected for Station Analysis
**Sugar Creek Alignment
Norfolk Southern Option**

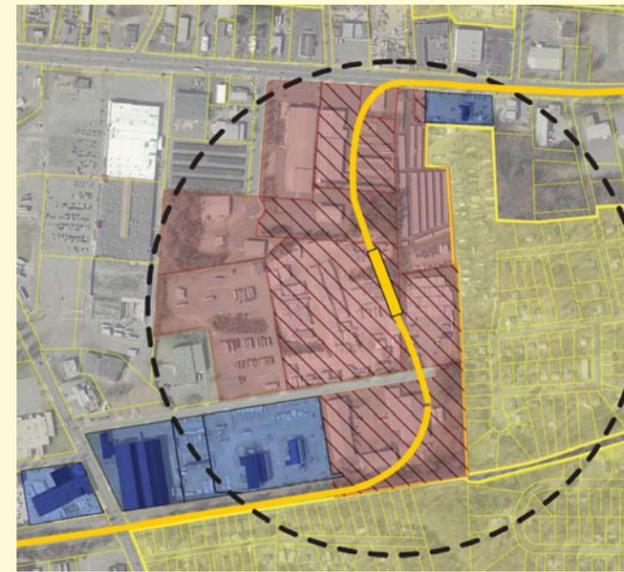
Overview:

The Norfolk Southern Option would depart the NCRR alignment east of the Republic Steel Corporation office, threading its way through the parking lot without directly impacting any structures. The alignment would pass north through the current site of the Norfolk Southern storage site, which would be necessary to acquire as the location of the station and park and ride facility, and continue north to Dorton Street. A grade separated entry into the median of North Tryon Street would be required to maintain acceptable intersection operations at the Sugar Creek/North Tryon intersection.

Analysis:

According to the State Historic Preservation Office (SHPO), the entire Republic Steel Corporation site is eligible for inclusion on the National Register of Historic Places. Based on an initial review by the SHPO, having a track go through the middle of the property is not in itself an adverse effect because it is not uncharacteristic with the existing environment and industrial use. The alignment could be found to have “no adverse effect” if the project is designed specifically to create “no adverse effect.” The SHPO described those design qualities as avoiding the buildings by keeping the rail right-of-way at least 5’ from the building and maintain access to the buildings in order to maintain their viability.

The station in this option is placed in a position that is not highly visible from either Sugar Creek Road or North Tryon Street, but could be connected via new streets to both major roadways. This location can help structure the redevelopment of the Norfolk Southern property and catalyze infrastructure, streets, and development blocks for the eventual redevelopment of Asian Corners. The station would predominantly serve areas west of the NCRR line. The retaining wall and bridge section associated with the entry into North Tryon Street will act as a barrier to cars and pedestrians, and could limit the development potential of the northern section of the station area.



**Sugar Creek Alignment
Avoidance Option**

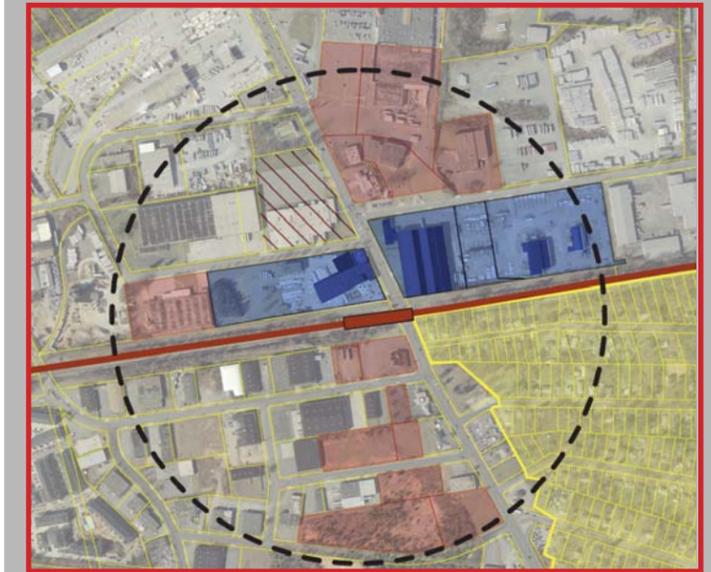
Overview:

The Avoidance Option would depart the NCRR alignment to the east of the Republic Steel Corporation site and curve south to place a station on the site of the current Norfolk Southern Intermodal Yard, which would be necessary to acquire as the location of the station and park and ride facility. From this point, the alignment would turn north to avoid impact to the potentially historic trailer park on North Tryon Street. As with the other Sugar Creek Alignment options, a grade separated entry into the median of North Tryon Street would be required to maintain acceptable intersection operations at the Sugar Creek/North Tryon intersection.

Analysis:

The alignment would avoid any impact, and therefore “adverse effects,” on potentially historic properties. However, this alignment would impact several active industrial uses, both along the rail line and along North Tryon Street. Additionally, the geometry of the curved alignment would create multiple “remainder” properties with less than desirable parcel configurations. The geometry of the alignment is also undesirable from an engineering and operational perspective.

The alignment would create a station with limited visibility from North Tryon Street that would predominantly serve areas west of the NCRR line. While access to the station could be created from Raleigh Street, additional transportation infrastructure to access the station from North Tryon Street would be required. Because of the required grade-separated entrance to North Tryon Street, an at-grade station must be at least 600’ from North Tryon Street to allow a return to grade. The retaining wall and bridge section will act as a barrier to cars and pedestrians, and could limit the development potential of the northern section of the station area.



Selected for Station Analysis
NCRR Alignment

Overview:

The NCRR Alignment through the Sugar Creek Station Area would require a station located above Sugar Creek Road, as part of a planned rail bridge over the road, with access to potential park and ride lots located south of Sugar Creek Road, either adjacent to Davidson Street or Raleigh Street.

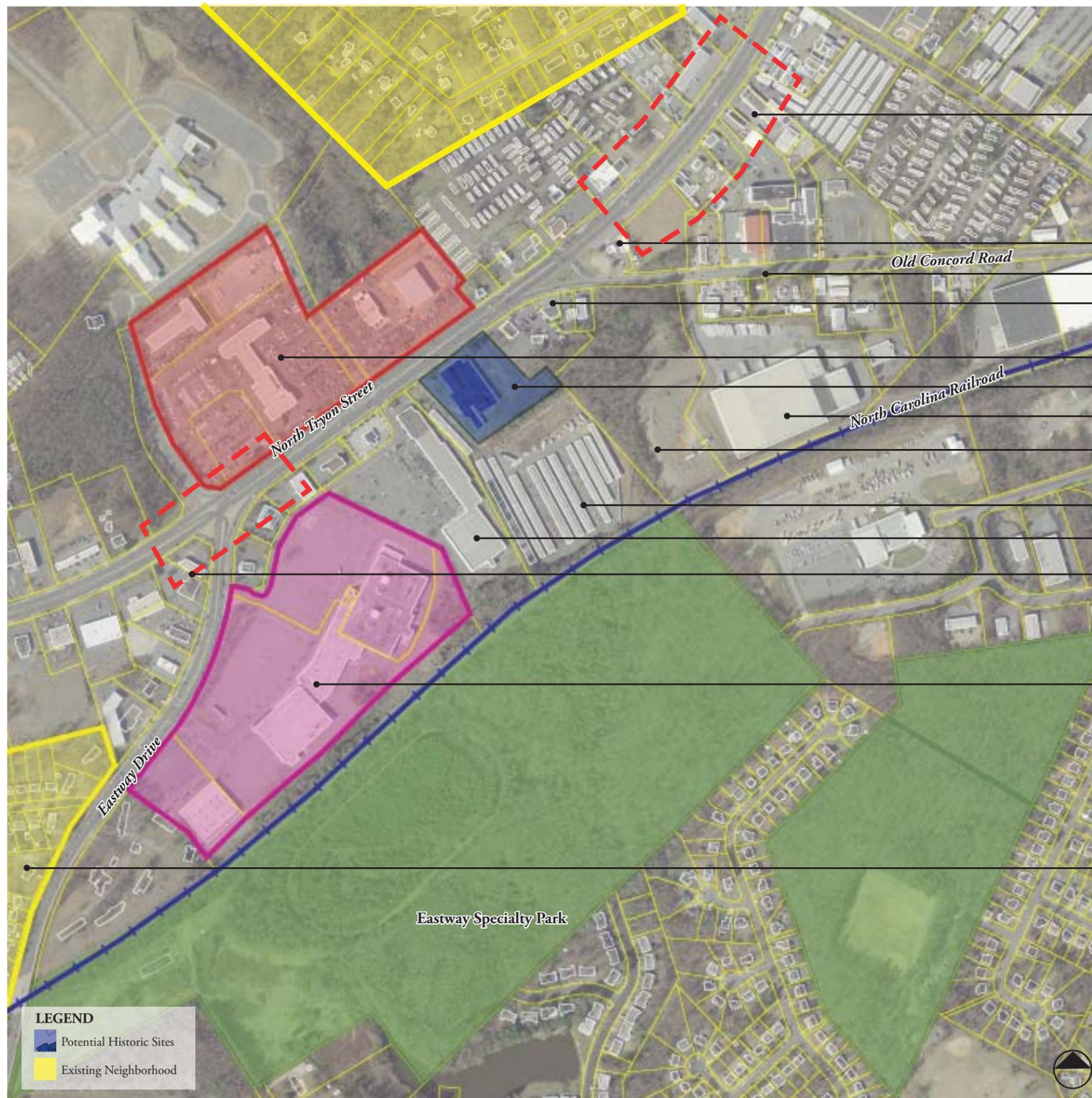
Analysis:

Based on an initial review by the SHPO, this alignment would have “no adverse effect” on the potentially historic structures in the vicinity. Parcel acquisition for this station would be limited to only those parcels necessary for parking and bus drop-off. The station on this alignment would have no presence on North Tryon Street, but would be very visible from Sugar Creek Road and would serve areas on both sides of the NCRR line. Pedestrian access from Sugar Creek Road would require significant improvement to the currently planned sidewalks included in the NCRR plan for grade separation. The station would be positioned to serve potential transit-oriented development south of the rail line.

LEGEND

- 1/4 Mile
- Potential Historic Sites
- Existing Neighborhood
- Parcels to be Acquired
- Potential TOD

Old Concord Station Area Issues and Opportunities



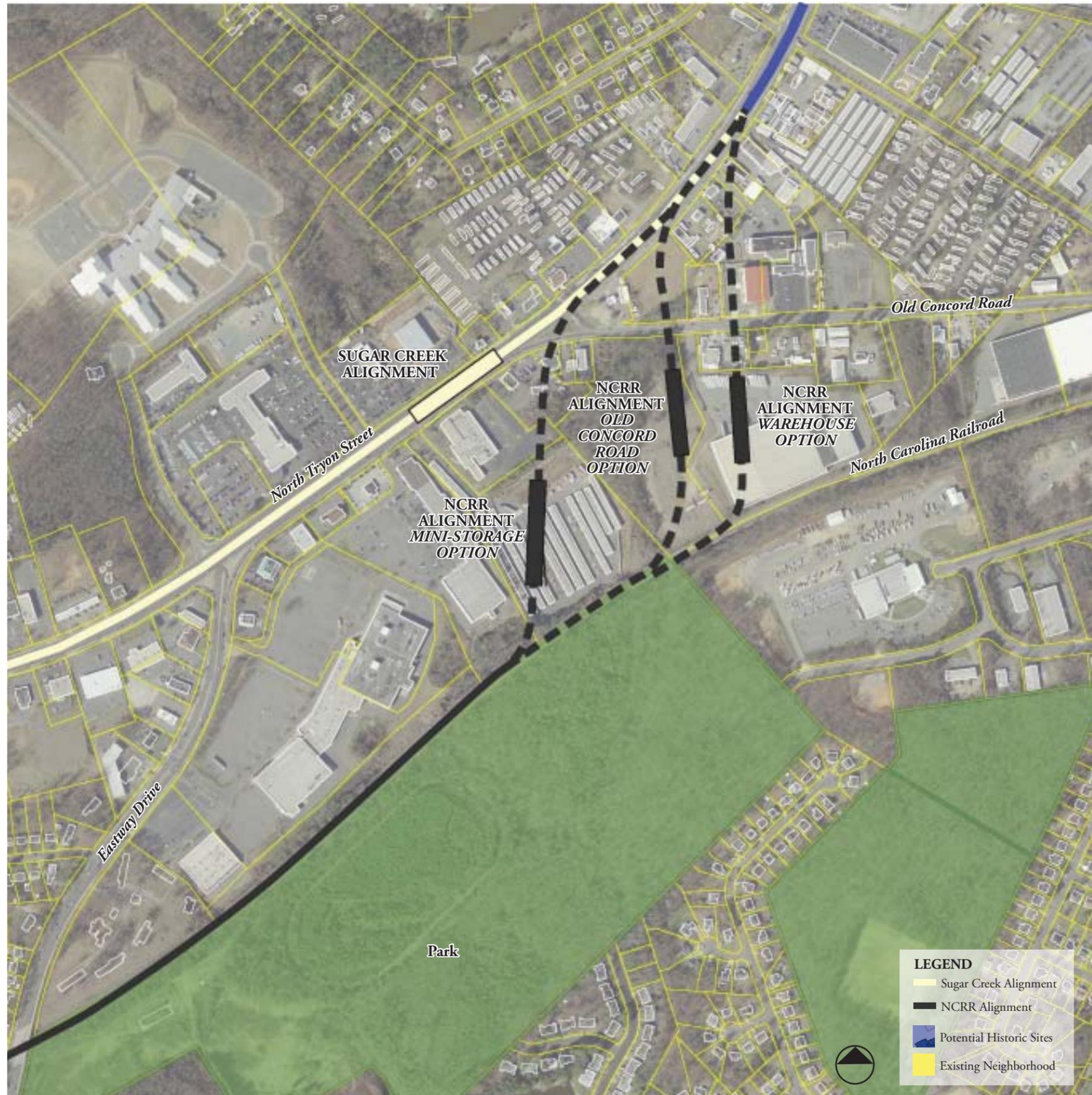
- Future rail entry into North Tryon-** Must be grade separated for the NCRR Alignment Option
- Filling station** - Identified as potential historic site during initial analysis, determined not to be eligible after definition of alignments
- Old Concord Road-** Grade separation likely required due to intersection operation issues
- North Tryon/Old Concord Road Intersection-** Pedestrian improvements necessary to allow crossing at intersection
- Car dealerships-** May not be redevelopment targets
- Charter school-** Potentially eligible for National Register of Historic Places
- Active warehouse with rail access-** City policies have favored maintaining industrial
- Area of steep slopes**
- Mini warehouse**
- Active shopping center**
- Grade separation-** Eastway intersection must be grade separated for the Sugar Creek Alignment Option
- North Park Mall-** Low occupancy rates, potential transit-oriented redevelopment site
- Environmental Justice neighborhood-** Existing neighborhood should be protected and pedestrian and/or vehicular access to the station should be encouraged

LEGEND

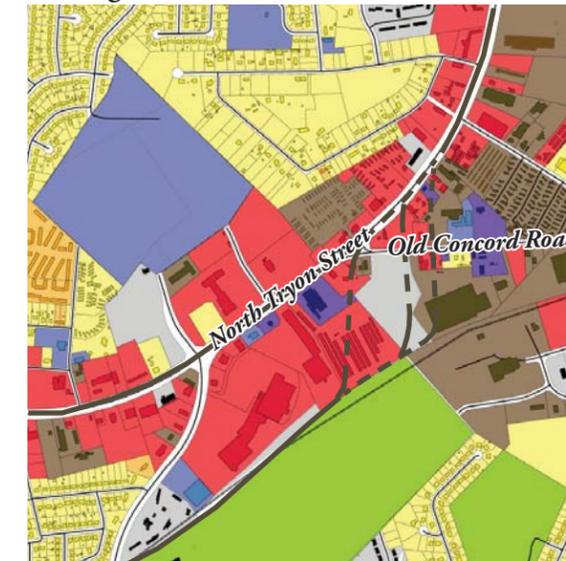
- Potential Historic Sites
- Existing Neighborhood

Old Concord Station Area Potential Alignment Options

In the Old Concord Station Area, the team evaluated several potential options for the NCRR Alignment and one option for the Sugar Creek Alignment. Based on initial evaluations during the workshops, the station option at Eastway Drive was eliminated because of its significant overlap with a Sugar Creek station and lack of access from either North Tryon Street or Old Concord Road. Three NCRR Alignment options were examined that left the NCRR right-of-way just north of the North Park Mall and entered North Tryon Street in the vicinity of Old Concord Road. The Sugar Creek Alignment in this area will remain within the right-of-way of North Tryon Street with a station located near Old Concord Road. These alternatives are shown on the map to the left and described on the next page.

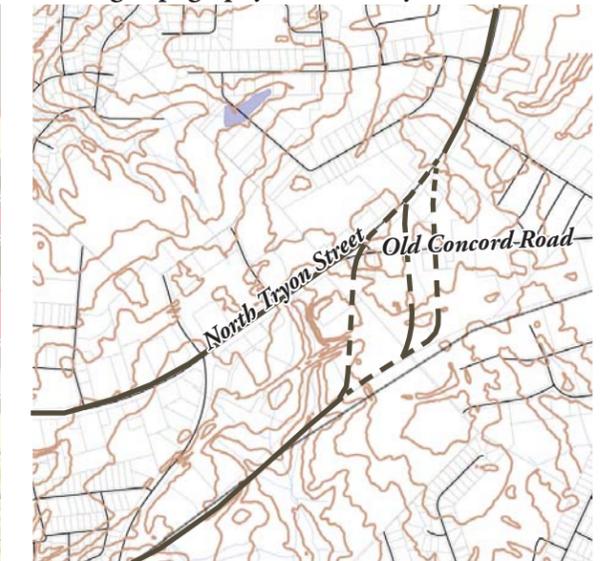


Existing Land Uses



- Single Family Residential
- Multi-Family Residential
- Commercial
- Institutional
- Office
- Warehouse / Industrial
- Vacant
- Public Space

Existing Topography & Greenways

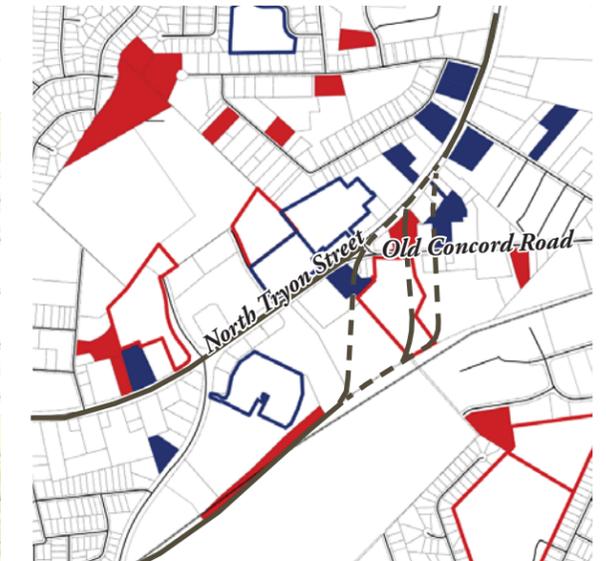


Established Neighborhoods/Parks/Institutions

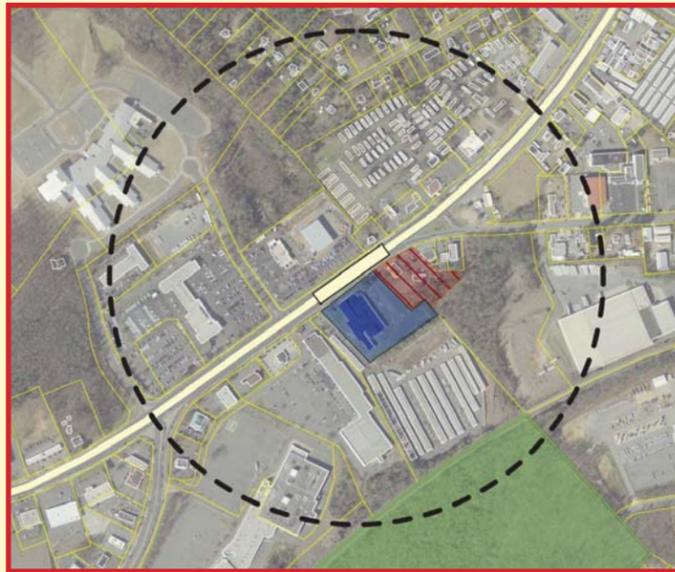


- Multi-Family Residential
- Single Family Residential
- Institutional
- Public Space

Vacant & Underutilized Land



- Vacant Land
- Underutilized Land
- Vacant Land Over 5 Acres
- Underutilized Land Over 5 Acres



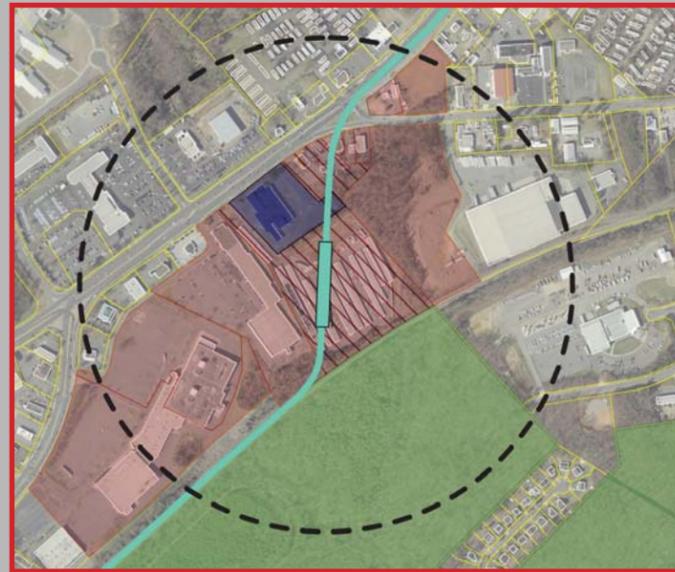
Selected for Station Analysis **Sugar Creek Alignment**

Overview:

The Sugar Creek Alignment would serve the Eastway Station Area with an at-grade station in the median of North Tryon Street at the intersection of Old Concord Road. A park and ride lot serving the station would be located south of Tryon and east of the charter school.

Analysis:

This station would serve the uses in the vicinity of the Old Concord Road intersection. Though its visibility is extremely high, without new street network, its catalytic effects on development appear to be limited. The perceived redevelopment opportunity in the area is the Northpark Mall, which is more than a 5-minute walk from the station. To improve automobile intersection operations, the LRT must be grade separated from the Eastway intersection with North Tryon Street, so a closer location at this point was discounted because of the cost and other concerns associated with an elevated station. The potential impact of this grade separation on businesses and the pedestrian environment will be evaluated further in the second stage of the study.



Selected for Station Analysis **NCRR Alignment Mini-Storage Option**

Overview:

The Mini-Storage Option departs the NCRR right-of-way at the north end of the Big Lots shopping center, angling toward North Tryon Street through a mini-storage complex. An at-grade station would be located at the current mini-storage parcel. North of the station, the alignment would begin a grade separation above the intersection of North Tryon Street and Old Concord Road and returning to grade in the median of Tryon to allow a median opening at the Orr Road intersection.

Analysis:

Access to the station would occur from Old Concord Road by way of a street which swings east to avoid the steepest portion of the undeveloped ravine north of the station and from a right in, right out driveway at North Tryon Street. Visibility from both of these main streets is limited by the “flag” nature of the station parcel and the surrounding buildings. The station is located to access future transit oriented development (TOD) opportunities at North Park Mall and along Old Concord Road, and the visibility and access characteristics of the station could be improved through design of the future adjacent TOD. The retaining wall and bridge section required for the grade-separation over the North Tryon Street/Old Concord Road intersection will act as a barrier to cars and pedestrians, and could limit the development potential of the northwestern section of the station area.



NCRR Alignment Old Concord Road Option

Overview:

The Old Concord Road Option departs the NCRR right-of-way north of the mini-storage complex, angling toward North Tryon Street through a vacant parcel extending from Old Concord Road to the NCRR line that would house the station. The alignment would be located east of the North Tryon Street/Old Concord Road intersection. Based on initial traffic study results, a grade separated entry into the median of North Tryon Street would be required to maintain acceptable intersection operations at the North Tryon Street/Old Concord Road intersection. The grade separation would require closing the median opening at Orr Road. Due its proximity, Old Concord Road would also be spanned by the LRT bridge, which would require an elevated station.

Analysis:

Preliminary topographical information indicates that a significant portion of the parcel contains steep, potentially un-buildable slopes, limiting its useable area, increasing the cost of station and park and ride development, and impacting its ability to provide joint development opportunities. The retaining wall and bridge section required for the elevated track section will act as a barrier to cars and pedestrians, and could limit potential street connections and the development potential of the northwestern section of the station area.



NCRR Alignment Warehouse Option

Overview:

The Warehouse Option departs the NCRR right-of-way east of the ravine, turning north through an active warehouse facility which would be the station location. The line would cross Old Concord Road and extend north to North Tryon Street through several commercial buildings. Based on initial traffic study results, a grade separated entry into the median of North Tryon Street would be required to maintain safe operations at the North Tryon Street/Old Concord Road intersection. The grade separation would require closing the median opening at Orr Road. Because of the distance from the intersection, the crossing of Old Concord Road at grade may be satisfactory.

Analysis:

The station would have very little visibility, and no direct access, from North Tryon Street, and is located further away from the area of Northpark Mall, which is perceived to be the chief redevelopment opportunity in the station area. Additionally, because of the relatively limited supply of in-town industrial land with rail access, City policies have typically favored retention of the industrial land use designation.

LEGEND
 --- 1/4 Mile Potential Historic Sites Existing Neighborhood Parcels to be Acquired Potential TOD

Sugar Creek and NCRR Alternatives for Further Analysis

Based on the comparisons of the options, the recommended alternatives are as follows:

For the NCRR Alignment, the Sugar Creek Station is incorporated into the rail bridge over Sugar Creek Road, with a potential park to be located north of Sugar Creek Road, adjacent to Raleigh Street. The alignment continues adjacent to the NCRR line approximately 1.2 miles, until it departs the rail right-of-way at the north end of the Big Lots shopping center, angling toward North Tryon Street through a mini-storage complex. An at-grade station would be located at the current mini-storage parcel. North of the station, the alignment would begin a grade separation above the intersection of North Tryon Street and Old Concord Road, minimizing impacts to intersection traffic operations and avoiding the gas station that was initially identified as a potential historic site and later determined not to be eligible. The alignment returns to grade in the median of North Tryon Street.

The recommended Sugar Creek Alignment would depart the NCRR alignment east of the Republic Steel Corporation office, threading its way through the parking lot without directly impacting any structures. The alignment would pass north through the current site of the Norfolk Southern Storage Site, which would be necessary to acquire as the location of the station and park and ride facility, and continue north to Dorton Street. A grade separated entry into the median of North Tryon Street would be required to maintain acceptable intersection operations at the Sugar Creek/North Tryon intersection. From this point, the alignment would be located in the median of North Tryon Street, with a grade separation over the Eastway intersection. The Old Concord Station Area would be served with an at-grade station in the median of North Tryon Street at the intersection of Old Concord Road. A park and ride lot serving the station would be located south of Tryon.



LEGEND	
	Sugar Creek Alignment
	NCRR Alignment
	1/4 Mile Station Radius



SUGAR CREEK
ALIGNMENT
ANALYSIS

Sugar Creek Alignment

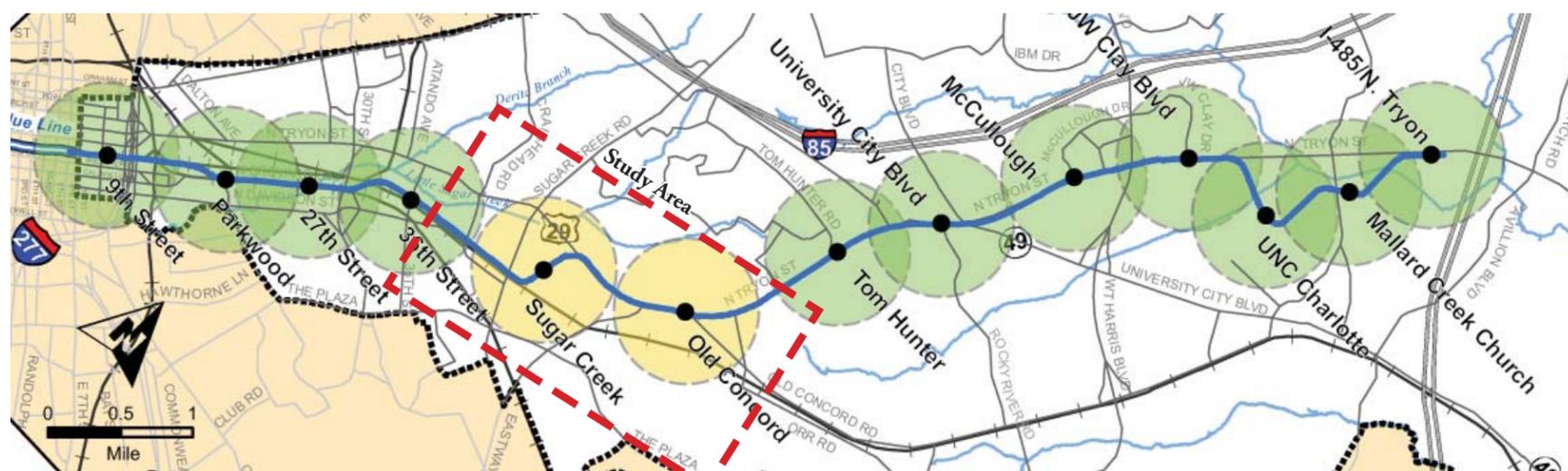


The Sugar Creek Alignment

The Sugar Creek Alignment would depart the North Carolina Railroad (NCRR) alignment through the Republic Steel Corporation property and continue to an at-grade station adjacent to the Norfolk Southern storage site. The alignment will then bridge over North Tryon and continues northward in a center median toward an at-grade station at the intersection of Old Concord Road.



Potential Sugar Creek Station Location



The Northeast Corridor



Potential Old Concord Station Location

Sugar Creek Alignment Environmental Analysis



potential vibration impact for buildings located within this distance. There are no vibration impacts along the Sugar Creek Alignment.

Historic Resources

National Register Listed and Eligible Properties as agreed upon by the State Historic Preservation Office (SHPO) on January 13, 2009, were used as the basis of determination for the presence of historic properties. National Register Listed (NRL) properties are listed in the National Register of Historic Places (NRHP) whereas National Register Eligible (NRE) properties are identified as eligible for listing in the NRHP. Eligible properties receive the same regulatory protection under Section 106 of the National Historic Preservation Act and Section 4(f) of the US DOT regulations.

Three impacts were identified for the Sugar Creek Alignment:

- Republic Steel Corporation Plant (NRE) – a direct impact would result from the crossing through the property. The introduction of a new visual element could result in an indirect impact on this resource.
- Standard Chemical Products Plant (NRE) - indirect impacts are likely as a new visual element would be introduced within the freight right-of-way.
- General Motors Training Center/Charter School (NRE) – would result in a potential indirect impact due to introduction of a new visual element.

Elmore Trailer Sales was initially identified as a potentially NRE property affected by the introduction of a new visual element (light rail bridge) in North Tryon. However, the site was determined not to be eligible per SHPO letter of 13 January 2009.

Environmental Screening Factors

Legend

- Proposed Light Rail Alternative
- Design Option
- Proposed Station Platforms
- Proposed Park-and-Ride Facilities
- Proposed Structures
- Proposed Retaining Walls
- Historic Sites
- NCCRR Right-of-Way
- EJ Community
- Vibration Monitoring Sites
- Streams
- Roads
- Lakes and Ponds
- Mecklenburg Wetlands
- FEMA Floodway Encroachment Area
- Community Floodplain Encroachment Area
- Community Floodplain Area
- Parcels

Environmental Overview

The following factors, Environmental and Transportation, were analyzed in order to develop a qualitative and quantitative analysis of the alignment option. The analysis factors have been developed to provide impacts to the environmental elements and transportation characteristics along North Tryon Street/US-29.

Acquisitions & Displacements

The Sugar Creek Alignment requires 16 total property acquisitions (14 total business property acquisitions and two vacant property acquisitions), 55 partial property acquisitions (54 partial business property acquisitions and one partial residential property acquisition), and 20 business relocations.

Noise

Buildings closest to the light rail tracks would have the greatest potential to experience a noise impact. Therefore, the FTA has identified screening distances that identify buildings that need to be considered when conducting a noise analysis. Sensitive Receptors located within the FTA screening distances of 350' unobstructed and 175' for obstructed were assessed for potential noise impacts:

Due to high existing noise levels associated with freight activity, it is not expected that any noise impacts would result from either option. There are no noise impacts along the Sugar Creek Alignment.

Vibration

Sensitive sites within 63 feet were identified to determine if impact from vibration is possible. The distance of 63 feet is the distance that has been identified for this portion of the rail alignment that could result in a

Parklands

There are no parks within 500 feet of the Sugar Creek Alignment.

Wetlands

On the Sugar Creek Alignment, 400 linear feet of stream and 21,000 square feet of SWIM buffers are likely to have a direct impact from the location of the Sugar Creek Station park-and-ride.

Visual & Aesthetic

Several new bridges and retaining walls along or within street rights-of-way are required for the Sugar Creek Alignment. These include:

- A total of 737.1 feet of bridge structures
 - Light Rail and Station Bridge over Sugar Creek Road = 90.4 feet
 - Light Rail Bridge over North Tryon Street/US-29 = 457feet
 - Light Rail Bridge over Eastway Drive = 189.7 feet
- A total of 3,090 feet of MSE walls
 - North Tryon Street/US-29 entrance into median MSE walls = 850 feet
 - Eastway Drive MSE walls = 2,240 feet

Environmental Justice

The Hidden Valley Neighborhood (EJ Community with “Threatened” status) is located to the north of the alignment. No direct impacts would result and noise and vibration impacts are unlikely. This neighborhood would have improved access to transit service as a result of the project.

Transportation Overview

Travel Time – Non Transit Vehicles

Vissim traffic modeling software was used to determine the how long it will take for a vehicle to travel along North Tryon Street/US-29 from just south of Sugar Creek Road to just north of Orr Road during the AM and PM peak travel periods of 2030. Travel times will be longer when traffic congestion is higher. Traffic was modeled in fifteen-minute intervals starting at the beginning of the peak hour and ending two hours later. The resulting fifteen-minute interval travel times and numbers of vehicles were averaged.

For Northbound Tryon, a distance of 1.9 miles, average travel time will be 9 minutes in the AM (56 vehicles) and 20 minutes in the PM (134 vehicles). For Southbound Tryon, a distance of 1.81 miles, average travel time will be 9 minutes in the AM (160 vehicles) and 11 minutes in the PM (84 vehicles).

Speed

The average vehicle speed (measured in miles per hour) during a fifteen-minute interval was calculated based on the average travel time and distance traveled along North Tryon Street/US-29 from just south of Sugar Creek Road to just north of Orr Road. Speeds will be higher when traffic congestion is lower.

For Northbound Tryon, a distance of 1.9 miles, average speed will be 14 mph in the AM (56 vehicles) and 6 mph in the PM (134 vehicles). For Southbound Tryon, a distance of 1.81 miles, average speed will be 13 minutes in the AM (160 vehicles) and 13 mph in the PM (84 vehicles).

Intersection Delay

Intersection delay (measured in minutes) is calculated by taking a volume weighted average of the individual turn movement delays at an intersection. Delays will be higher when traffic congestion is higher. As stated before, Vissim was used to model traffic in fifteen-minute intervals. Vissim calculated the intersection delay based on the turn movement volumes of an intersection. The intersection delays recorded during each 15-minute interval of the peak hour were averaged.

For intersections along North Tryon Street/US 29, average peak hour delay in the AM will be 2.0 minutes at Sugar Creek, 1.1 minutes at Eastway, 0.8 minutes at Old Concord, 0.1 minutes at Northchase, 1.3 minutes at Wellingford, 0.4 minutes at Mellow, 0.0 minutes at Bingham, 0.1 minutes at Lambeth, and 0.0 minutes at Orr. The average peak hour delay in the PM will be 3.9 minutes at Sugar Creek, 1.2 minutes at Eastway, 0.7 minutes at Old Concord, 0.1 minutes at Northchase, 1.3 minutes at Wellingford, 1.6 minutes at Mellow, 1.5 minutes at Bingham, 0.8 minutes at Lambeth, and 0.2 minutes at Orr.

Intersection Level of Service (LOS)

Intersection delay can be converted to a level of service (LOS). The LOS is an important measure of roadway congestion. The LOS is determined by calculating the delay for the intersection and converting it to a letter. The LOS ranges from A (no congestion) to F (severe congestion). The LOS criteria for signalized and un-signalized intersections are shown in the table at left.

For intersections along North Tryon Street/US 29, LOS in the AM will be F at Sugar Creek, E at Eastway, D at Old Concord, A at Northchase, F at Wellingford, C at Mellow, A at Bingham, A at Lambeth, and A at Orr. The LOS in the PM will be F at Sugar Creek, E at Eastway, D at Old Concord, A at Northchase, F at Wellingford, F at Mellow, F at Bingham, F at Lambeth, and B at Orr.

Intersection Volume to Capacity (V/C)

The V/C ratio is the demand volume divided by the capacity volume of the intersection. V/C ratios range from 0.00 to 1.00. A V/C ratio of 0.00 represents an intersection with no demand volume while a V/C ratio of 1.00 represents an intersection operating at capacity. A V/C ratio greater than 1.00 implies that the capacity of an intersection is not high enough to carry the demand volume.

V/C ratios at nine intersections were determined based on Synchro models. Four intersections had a V/C greater than 1.00 during the AM peak hour, Sugar Creek Road, Eastway Drive, Old Concord Road, and Lambeth Drive. Seven intersections had a V/C greater than 1.00 during the PM peak hour, Sugar Creek Road, Eastway Drive, Old Concord Road, Mellow Drive, Bingham Drive, Lambeth Drive, and Orr Road.

Bike Ped LOS

The existing bike/ped LOS was analyzed at the three signalized intersections (Sugar Creek Road, Eastway Drive and Old Concord Road) within the study area. For Bike LOS, all three intersections are at a LOS F. For Ped LOS, one intersection is at LOS F and the other two intersections are at LOS E.

Left Turn Access on North Tryon Street/US-29

Due to the light rail alignment in the median of the street, 85 driveway cuts would not have Left Turn access, and 6 intersections would become Right-Ins/Right-Out.

U-Turn Locations

U-turns would be allowed at four intersections, Sugar Creek Road, Eastway Drive, Old Concord Road, and Lambeth Drive.

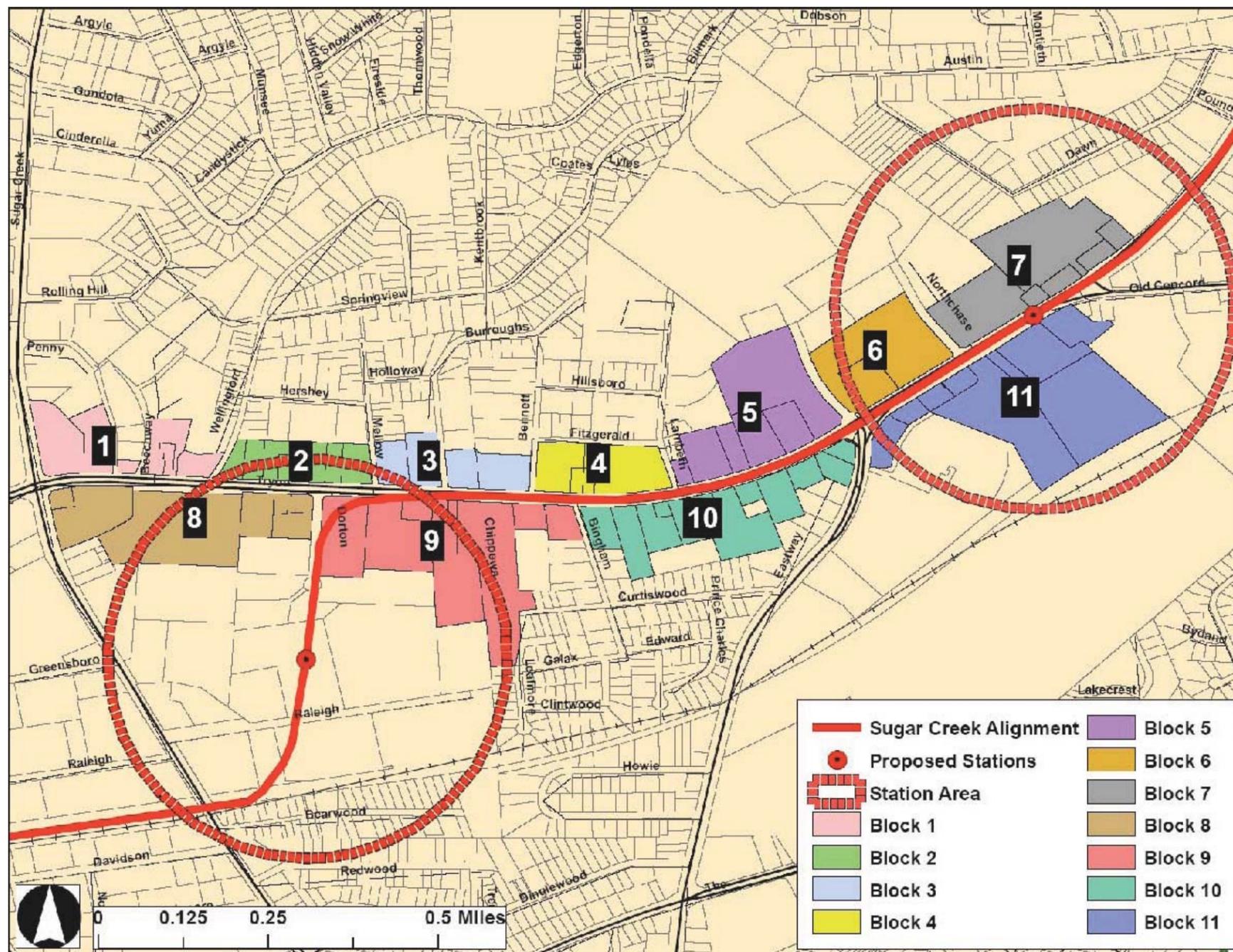
Rail Transit Service

CATS determined that there would be no appreciable difference between alignments in the light rail ridership or travel time because of the similar station locations and economic development impacts. Northbound travel time for the light rail vehicle along the Sugar Creek Design Option would take approximately 24 minutes from 7th Street to I-485. Total daily boardings are estimated to be 21,600, and hours of travel time savings are estimated to be similar to the NCCR Alignment. The alignment has four conflict points (street crossings of rail), two at the Sugar Creek Station, one at Lambeth and Tryon, and one at Old Concord Road.

Intersection Level of Service

LOS	Signalized	Unsignalized
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

as measured by delay per vehicle (seconds)



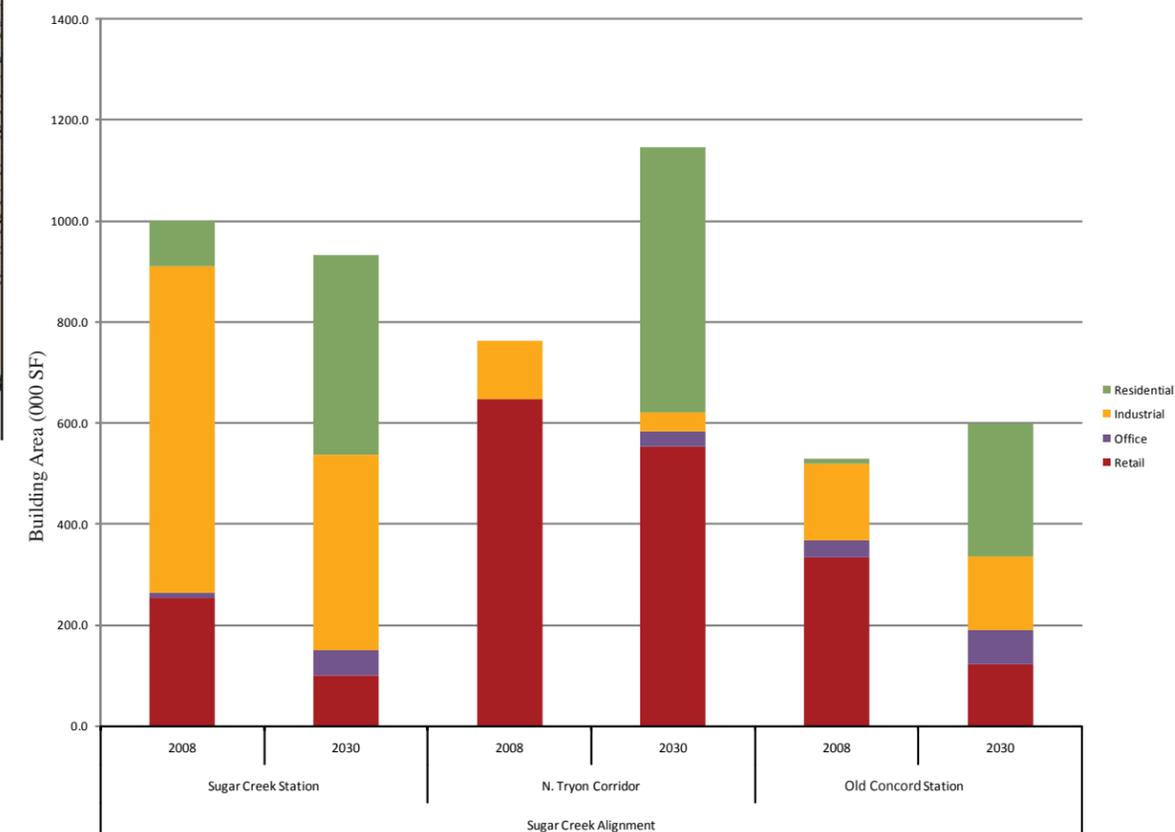
Market Overview

The introduction of the light rail system along North Tryon Street would greatly impact the existing and future potential of businesses and neighborhoods. Through a market potential analysis performed by Warren Associates, each of the proposed station areas, as well as the portion of North Tryon Street between stations, was carefully evaluated for future market potential.

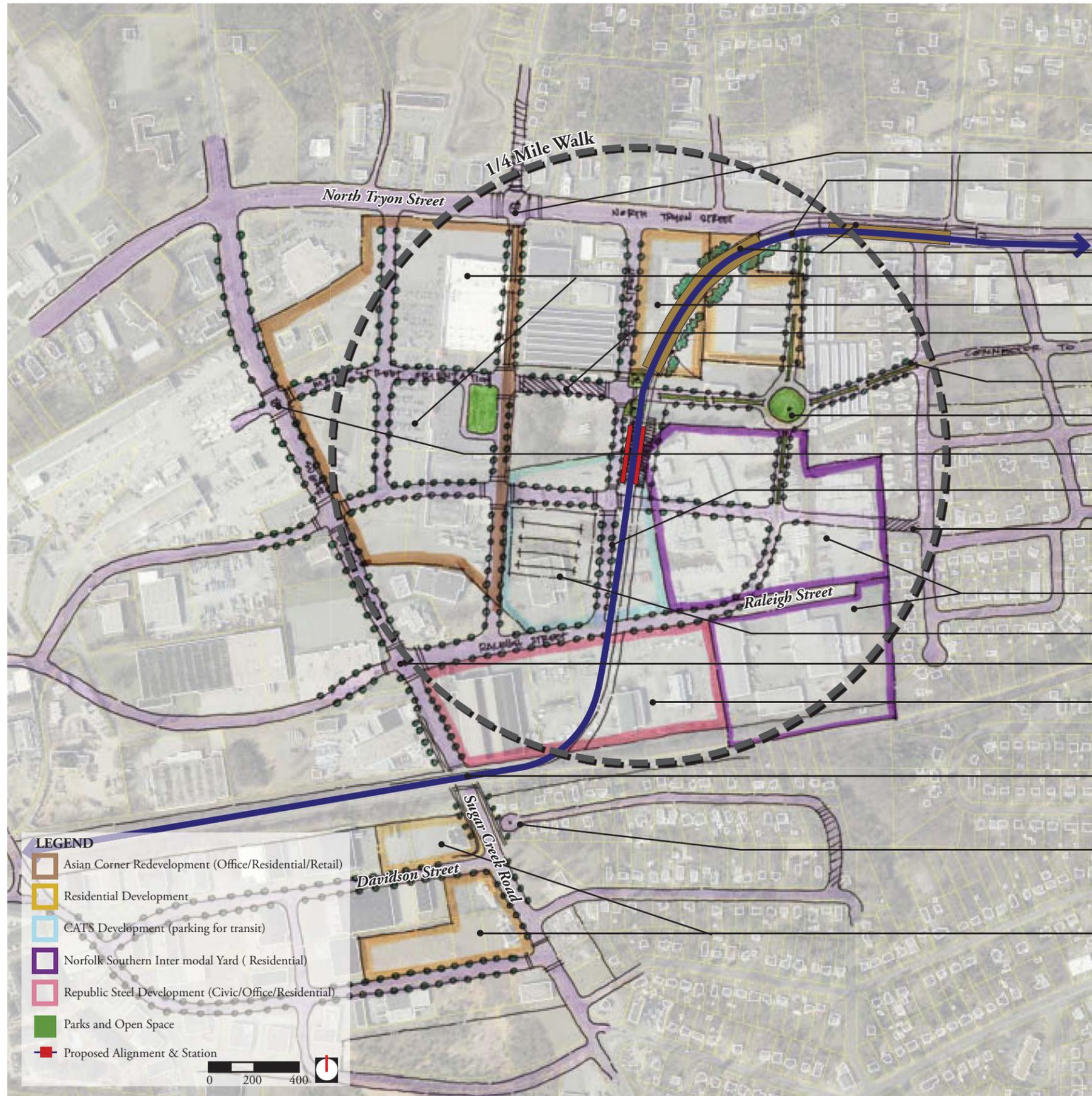
The Sugar Creek Station area benefits from the existence of several large vacant and/or underutilized parcels, parcels which make it very desirable and competitive for redevelopment. The potential for redevelopment within the Old Concord Station is less than the former, primarily due to the distance to downtown Charlotte, large number of individual property owners, and the presence of existing viable land uses.

The Sugar Creek Alignment is forecast to add 222,925 net square feet for all land uses between 2008 and 2030, including any demolition that would occur. The graph below demonstrates existing land use mixes contrasted against future predictions. As shown, industrial and retail square footage will experience a net decrease, while residential and office square footage will have a net increase. Along the corridor outside the station areas, commercial increases are forecast in Blocks 1, 4, and 8, while the lone residential potential is seen in Block 5. Throughout the 22 year forecast period, a significant amount of demolition is expected to occur. However, the total building inventory for this alignment is expected to increase from 2 million square feet to over 2.1 million square feet in 2030.

(Please see Appendix for complete report)



Sugar Creek Alignment Sugar Creek Station Future Land Use Concept



- New intersection on North Tryon Street
 - Transit Bridge over North Tryon, with retaining walls
 - Transit bridge over North Tryon
 - Potential residential, retail, and office development
 - Potential retail/residential development
 - Key connection between potential development of the station area and the redevelopment of Asian Corners
 - New parallel connection to North Tryon
 - New roundabout
 - New traffic signal
 - Extend Dorton Street to Raleigh Street to access future park and ride
 - Potential connection between existing neighborhood and future TOD development
 - Potential moderate-density residential
 - Park and ride lot (future structured parking)
 - New traffic signal
 - Potential civic/office/high density residential
 - Planned Grade Separation-** NCRR at Sugar Creek Road; As part of NCRR's grade separation project, Sugar Creek will be taken below rail which remains at-grade. Retaining walls along roadway will create unsatisfactory pedestrian environment.
 - Bearwood Avenue-** existing entrance to Bearwood Avenue would be compromised due to Sugar Creek Road tunnelling under NCRR rail. Need to find alternative connection
 - "NoDa" Expansion-** encourage the expansion of the NoDa area to Sugar Creek Road
- The Sugar Creek Station Land Use Concept focuses on the redevelopment of Asian Corners in a multi-use fashion. The introduction of new residential, retail, office, and civic uses can potentially surround the transit station and activate the area, providing a strong live-work, transit-oriented neighborhood. New network connections and well-placed parking facilitate efficient movement beyond the light rail line.

**Sugar Creek Alignment
Old Concord Station Future Land Use Concept**



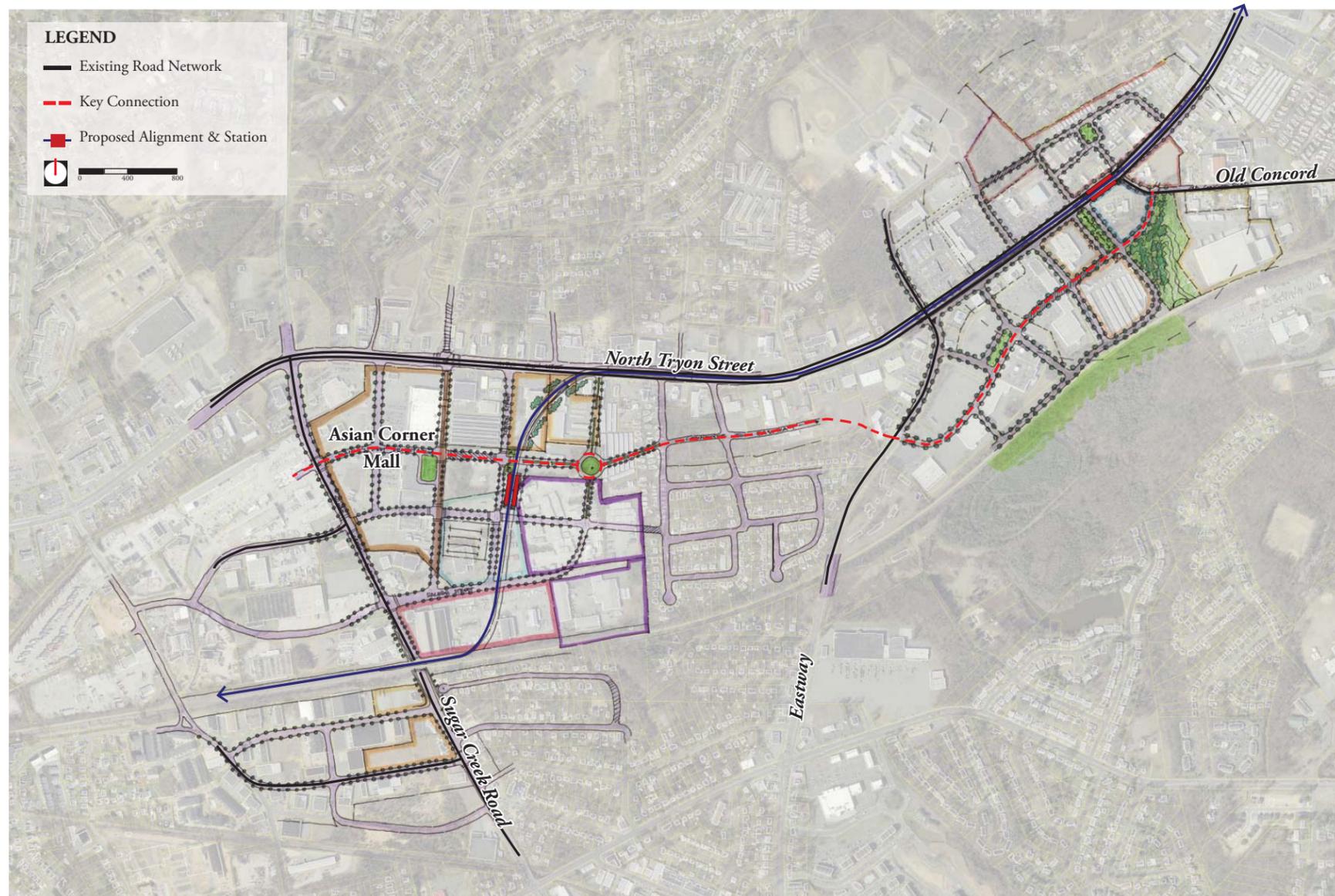
- Potential for moderate density residential
- Intersection modifications
- Potential commercial/office and/or residential
- New connection to access park and ride
- Park-and-ride lot
- Potential moderate density residential
- Key connection
- Potential long-term residential development that fronts open space
- Provide new street connection along park edge
- Potential for pedestrian connection over rail to park and open space
- Potential moderate density residential
- Potential for North Park Mall to redevelop in the long-term
- Parallel connection to North Tryon - will link development in the Sugar Creek and Eastway station areas and provide relief to North Tryon

The Old Concord Station Land Use Concept sets up the redevelopment of North Park Mall through the introduction of the necessary transit-oriented residential stock to eventually support it. Blends of moderate density housing surround open green spaces, establishing the station area as a desirable location for expanding development.

Sugar Creek Alignment North Tryon Streetscape Concept



For the Sugar Creek Alignment, the North Tryon Street streetscape is anticipated to be consistent with the median-running LRT cross-section proposed for the remainder of the alignment. Based on the City's Urban Street Design Guideline Six-Step Process, the street is envisioned as a *BOULEVARD*. The preferred design speed of the street is 35 mph, though NCDOT may require 45 mph. The median will limit left turns to only a few intersections where grade separations are provided. To accommodate anticipated increases in pedestrian activity associated with LRT stations, the concept includes several cross-section elements intended to improve the pedestrian quality of the street. First a bike lane, in addition to providing a safer environment for cyclists, also separates moving traffic from pedestrians by an additional 5'. Next, an 8' planting strip separates the travelway from the 6' sidewalk. To make the planting strip as continuous as possible, several driveways have been identified for potential closure. No parcel will be denied access. However, several conditions exist that would allow the parcels to retain access without the identified driveways, such as parallel network, redundant driveways, access from secondary streets, combined driveways, or potential cross-access easements.



ANALYSIS FACTORS

LAND USE

Acres for TOD	165.5
Overall Connectivity Analysis	2.15 (Sugar Creek), 1.86 (Eastway)

ENVIRONMENTAL

Acquisitions and Displacements	16 Total Property Acquisitions, 55 Partial Property Acquisitions and 20 Business/Residential Relocations
Noise Receivers	No sites impacted by increased noise
Vibration Receivers	No sites impacted by vibration
Historic & Archaeological Properties	1 direct impact; 2 indirect impacts
Parklands adjacent to rail corridor	No parks within 500' of alternative
Wetlands	May potentially impact 400 linear feet of stream and 21,000 sf of SWIM buffers
Visual and Aesthetic	737' of Bridge Length (LR and Station bridge over Sugar Creek Road, LR bridge over North Tryon Street, LR bridge over Eastway Drive) & 3090' of MSE walls
Environmental Justice	1 adjacent EJ neighborhood with no direct impacts

TRANSPORTATION

	Sugar Creek Alignment	2030 No Build
Vehicle Travel Time (Minutes)		
AM	8.7 NB / 8.8 SB	4.9 NB / 10.0 SB
PM	19.9 NB / 11.1 SB	12.2 NB / 4.6 SB
Intersection Delay (Total Minutes)		
AM	5.9	5.8
PM	11.4	7.3
Vehicle Speed (mph)		
AM	14 NB / 13 SB	24 NB / 11 SB
PM	6 NB / 13 SB	10 NB / 25 SB
Intersection LOS		
AM	2 intersections at LOS F	3 intersections at LOS F
PM	5 intersections at LOS F	3 intersections at LOS F
Intersection Volume to Capacity		
AM	4 intersections > 1.00	5 intersections > 1.00
PM	7 intersections > 1.00	6 intersections > 1.00
Bike/Ped LOS	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E
Left Turn Access on N. Tryon Street	LT's restricted at 85 driveways and 6 intersections	Existing driveway access
U-Turn Locations	U-Turns allowed at Sugar Creek Rd, Eastway Dr, Old Concord Rd, and Lambeth Dr	U-turns allowed at all intersections
Ridership (Total Daily Boardings)	21,600	N/A
Transit Travel Time (7th Street to I-485)	24 minutes	N/A
Street Crossings of Rail	4	N/A



North Carolina Railroad
ALIGNMENT
ANALYSIS

NCRR Alignment

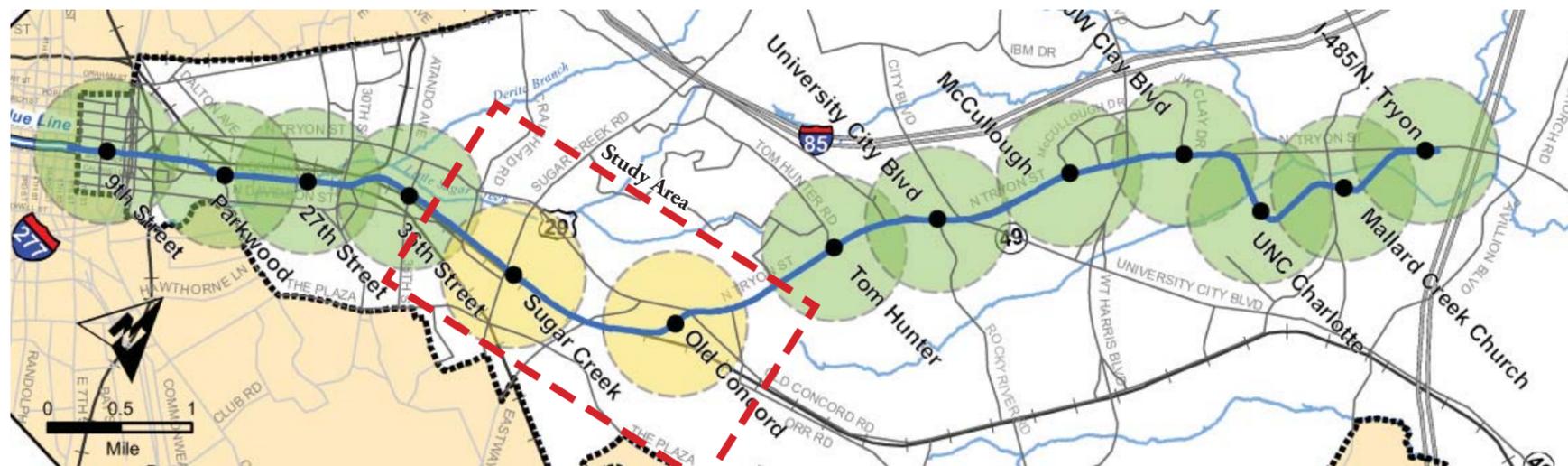


The NCRR Creek Alignment

The NCRR Alignment remains in the NCRR right-of-way past Eastway Road. The alignment would pull out of the right-of-way into an existing storage facility parcel and continue to an at-grade station. The alignment would continue over North Tryon and Old Concord Road with a grade-separated intersection. This alignment will take focus off of North Tryon as the major transit corridor in the area and push redevelopment along the NCRR right-of-way.



Potential Sugar Creek Station Location



The Northeast Corridor



Potential Old Concord Station Location

NCRR Alignment Environmental Analysis



Environmental Screening Factors

- Legend**
- Proposed Light Rail Alternative
 - Design Option
 - Proposed Station Platforms
 - Proposed Park-and-Ride Facilities
 - Proposed Structures
 - Proposed Retaining Walls
 - ★ Historic Sites
 - NCRR Right-of-Way
 - EJ Community
 - Vibration Monitoring Sites
 - ~ Streams
 - Roads
 - ~ Lakes and Ponds
 - Mecklenburg Wetlands
 - FEMA Floodway Encroachment Area
 - Community Floodplain Encroachment Area
 - Community Floodplain Area
 - Parcels

Environmental Overview

Acquisitions & Displacements

The NCRR Alignment (with Sugar Creek Park-and-Ride on the south side of Sugar Creek Road), requires 12 total property acquisitions (11 total business property acquisitions and one vacant property acquisition), 26 partial property acquisitions (22 partial business property acquisitions and four partial vacant property acquisitions), and 13 total business relocations.

Noise

Buildings closest to the light rail tracks would have the greatest potential to experience a noise impact. Therefore, the FTA has identified screening distances that identify buildings that need to be considered when conducting a noise analysis. Sensitive Receptors located within the FTA screening distances of 350' unobstructed and 175' for obstructed were assessed for potential noise impacts. Due to high existing noise levels associated with freight activity, it is not expected that any noise impacts would result from either option. There are no noise impacts along the NCRR Alignment.

Vibration

Sensitive sites within 63 feet were identified to determine if impact from vibration is possible. The distance of 63 feet is the distance that has been identified for this portion of the rail alignment that could result in a potential vibration impact for buildings located within this distance. Three residential properties would be impacted by vibration of light rail, 332 St. Anne's Place, 4948 Clintwood Drive, and 358 Leafmore Drive.

Historic Resources

National Register Listed and Eligible Properties as agreed upon by the State Historic Preservation Office (SHPO) on January 13, 2009, were used as the basis of determination for the presence of historic properties. National Register Listed (NRL) properties are listed in the National Register of Historic Places (NRHP)

whereas National Register Eligible (NRE) properties are identified as eligible for listing in the NRHP. Eligible properties receive the same regulatory protection under Section 106 of the National Historic Preservation Act and Section 4(f) of the US DOT regulations.

Three impacts were identified for the NCRR Alignment:

- Republic Steel (NRE) – indirect impacts are likely as a new visual element would be introduced within the freight right-of-way.
- Standard Chemical Building (NRE) - indirect impacts are likely as a new visual element would be introduced within the freight right-of-way.
- General Motors Training Center/Charter School (NRE) – – would result in a potential indirect impact due to introduction of new visual element.

Parklands

Howie Acres Park on Howie Circle (County neighborhood Park) is located approximately 500 feet south of the alignment and is located adjacent to the NCRR ROW. The NCRR freight tracks would be located between the light rail tracks and the park. Minimal indirect impacts would result. A new visual element, the light rail tracks and supporting catenary system would be introduced; however, vegetation currently screens the freight corridor and serves to buffer the visual element of the freight corridor. Potential noise/vibration impacts could result. No direct impacts would occur.

Eastway Specialty Park (total of 126 acres) is planned at 423 Eastway Drive and is located directly adjacent to the NCRR ROW. The NCRR freight tracks would be located between the light rail tracks and the park. A new visual element would be introduced however vegetation currently screens the freight corridor and serves to buffer the visual element of the freight corridor. Potential noise/vibration impacts could result. No direct impacts would occur.

Wetlands

On the NCRR Alignment, 930 linear feet of stream and 11,250 square feet of SWIM buffers are likely to have a direct impact from the location of the Old Concord Road Station park-and-ride. A population of a NC rare species (tree-foil birdfoot – *Lotus Helleri*) is located in the NCRR ROW; however, no protection for this species exists at the state or federal level so it can be easily relocated without impact.

Visual & Aesthetic

Several new bridges and retaining walls along or within street rights-of-way are required for the Sugar Creek Alignment. These include:

- A total of 625.5 feet of bridge structures
 - Light Rail and Station Bridge over Sugar Creek Road = 90.4 feet
 - Extending Eastway Drive ridge over Light Rail = 90.1 feet
 - Light Rail Bridge over Old Concord Road = 445 feet
- A total of 2,930 feet of MSE walls
 - Old Concord Road and North Tryon Street/US-29 MSE walls = 2,930 feet

Environmental Justice

Three separate residential neighborhoods highlighted as Environmental Justice/Threatened Communities are located along this alignment and include: North Charlotte, Howie Acres, and Hampshire Hills. Potential vibration impacts could occur at three residences located within the Howie Acres Neighborhood. It is possible that adverse impacts could result from potential vibration of the project to a few homes within the Howie Acres Neighborhood; however, mitigation could resolve these impacts and the impacts would no longer be considered adverse. Noise and vibration impacts are not likely within the North Charlotte or Hampshire Hills neighborhoods. These neighborhoods would have improved access to transit service as a result of the project.

Transportation Overview

Travel Time – Non Transit Vehicles

Vissim traffic modeling software was used to determine the how long it will take for a vehicle to travel along North Tryon Street/US-29 from just south of Sugar Creek Road to just north of Orr Road during the AM and PM peak travel periods of 2030. Travel times will be longer when traffic congestion is higher. Traffic was modeled in fifteen-minute intervals starting at the beginning of the peak hour and ending two hours later. The resulting fifteen-minute interval travel times and numbers of vehicles were averaged.

For Northbound Tryon, a distance of 1.9 miles, average travel time will be 17 minutes in the AM (61 vehicles) and 14 minutes in the PM (161 vehicles). For Southbound Tryon, a distance of 1.81 miles, average travel time will be 13 minutes in the AM (176 vehicles) and 12 minutes in the PM (110 vehicles).

Travel Time – Light Rail Vehicle

Northbound travel time for the light rail vehicle along the Sugar Creek Design Option would take approximately 24 minutes.

Speed

The average vehicle speed (measured in miles per hour) during a fifteen-minute interval was calculated based on the average travel time and distance traveled along North Tryon Street/US-29 from just south of Sugar Creek Road to just north of Orr Road. Speeds will be higher when traffic congestion is lower.

For Northbound Tryon, a distance of 1.9 miles, average speed will be 8 mph in the AM (61 vehicles) and 8 mph in the PM (161 vehicles). For Southbound Tryon, a distance of 1.81 miles, average speed will be 9 mph in the AM (176 vehicles) and 10 mph in the PM (110 vehicles).

Intersection Delay

Intersection delay (measured in minutes) is calculated by taking a volume weighted average of the individual turn movement delays at an intersection. Delays will be higher when traffic congestion is higher. As stated before, Vissim was used to model traffic in fifteen-minute intervals. Vissim calculated the intersection delay based on the turn movement volumes of an intersection. The intersection delays recorded during each 15-minute interval of the peak hour were averaged.

For intersections along North Tryon Street/US 29, average peak hour delay in the AM will be 1.9 minutes at Sugar Creek, 2.1 minutes at Eastway, 1.5 minutes at Old Concord, 0.5 minutes at Northchase, 0.7 minutes at Wellingford, 1.1 minutes at Mellow, 0.9 minutes at Bingham, 1.2 minutes at Lambeth, and 0.8 minutes at Orr. The average peak hour delay in the PM will be 3.4 minutes at Sugar Creek, 0.9 minutes at Eastway, 0.6 minutes at Old Concord, 0.4 minutes at Northchase, 1.2 minutes at Wellingford, 0.0 minutes at Mellow, 1.0 minutes at Bingham, 0.6 minutes at Lambeth, and 0.5 minutes at Orr.

Intersection Level of Service (LOS)

Intersection delay can be converted to a level of service (LOS). The LOS is an important measure of roadway congestion. The LOS is determined by calculating the delay for the intersection and converting it to a letter. The LOS ranges from A (no congestion) to F (severe congestion). The LOS criteria for signalized and un-signalized intersections are shown in the table at left.

For intersections along North Tryon Street/US 29, LOS in the AM will be F at Sugar Creek, F at Eastway, F at Old Concord, D at Northchase, E at Wellingford, F at Mellow, F at Bingham, F at Lambeth, and E at Orr. The LOS in the PM will be F at Sugar Creek, E at Eastway, D at Old Concord, C at Northchase, F at Wellingford, F at Mellow, F at Bingham, E at Lambeth, and D at Orr.

Intersection Volume to Capacity (V/C)

The V/C ratio is the demand volume divided by the capacity volume of the intersection. V/C ratios range from 0.00 to 1.00. A V/C ratio of 0.00 represents an intersection with no demand volume while a V/C ratio of 1.00 represents an intersection operating at capacity. A V/C ratio greater than 1.00 implies that the capacity of an intersection is not high enough to carry the demand volume.

V/C ratios at twelve intersections were determined based on Synchro models. Nine intersections had a v/c greater than 1.00 during the AM peak hour, Sugar Creek Road, Eastway Drive, Old Concord Road, Wellingford Street, Mellow Drive, Bingham Drive, Lambeth Drive, Northchase Drive, and Orr Road. The following nine intersections had a v/c greater than 1.00 during the PM peak hour, Sugar Creek Road, Eastway Drive, Old Concord Road, Wellingford Street, Mellow Drive, Bingham Drive, Lambeth Drive, Northchase Drive, and Orr Road.

Bike Ped LOS

The existing bike/ped LOS was analyzed at the three signalized intersections (Sugar Creek Road, Eastway Drive and Old Concord Road) within the study area. For Bike LOS, all three intersections are at a LOS F. For Ped LOS, one intersection is at LOS F and the other two intersections are at LOS E.

Left Turn Access on North Tryon Street/US-29

Based on the streetscape concept on page 26, 31 driveway cuts would not have Left Turn access.

U-Turn Locations

U-turns would be allowed at all intersections.

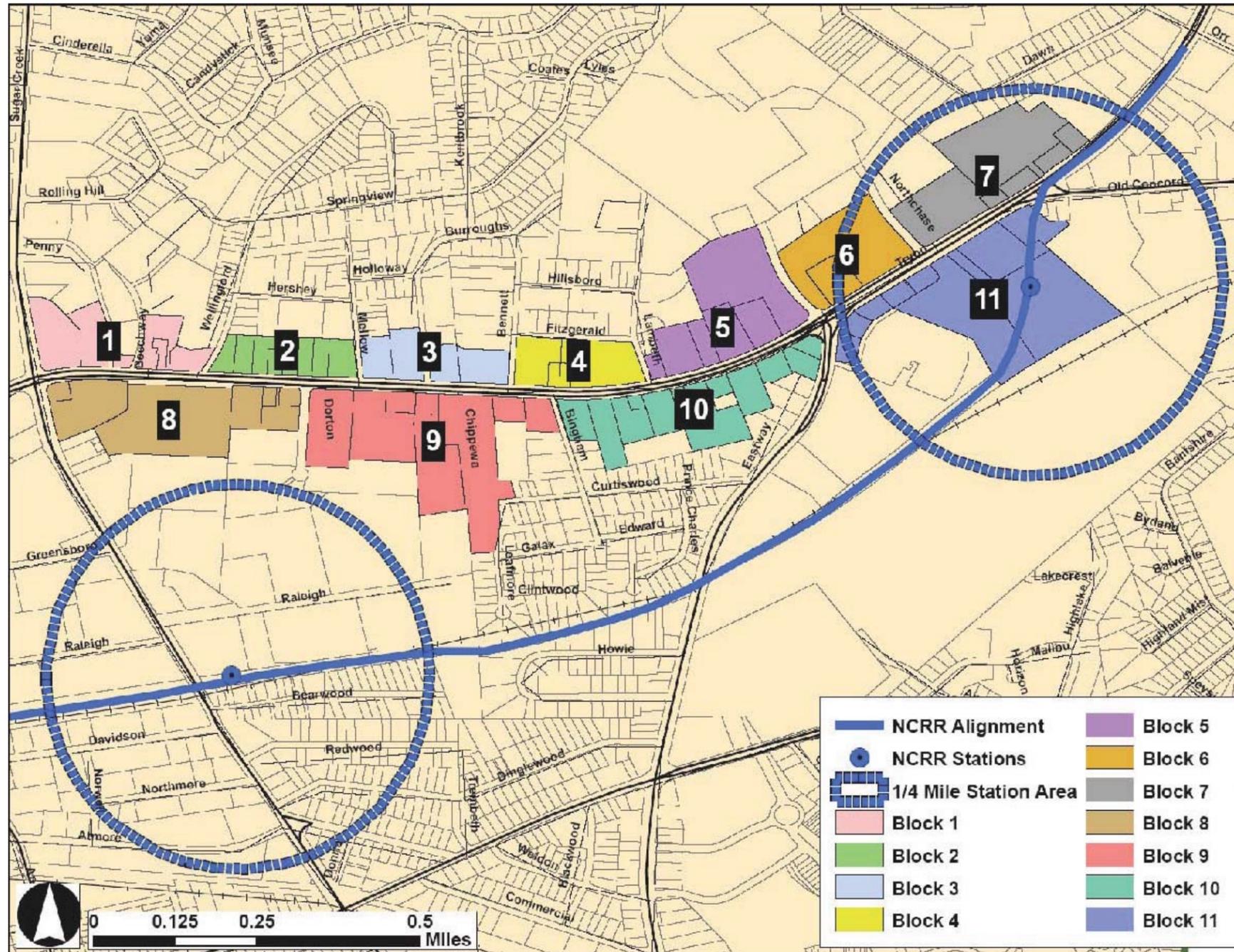
Rail Transit Service

CATS determined that there would be no appreciable difference between alignments in the light rail ridership or travel time because of the similar station locations and economic development impacts. Northbound travel time for the light rail vehicle along the NCRR Alignment would take approximately 24 minutes from 7th Street to I-485. Total daily boardings are estimated to be 21,600, and hours of travel time savings are estimated to be similar to the Sugar Creek Alignment. The alignment has one conflict point (street crossings of rail) at the Old Concord Station.

Intersection Level of Service

LOS	Signalized	Unsignalized
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

as measured by delay per vehicle (seconds)



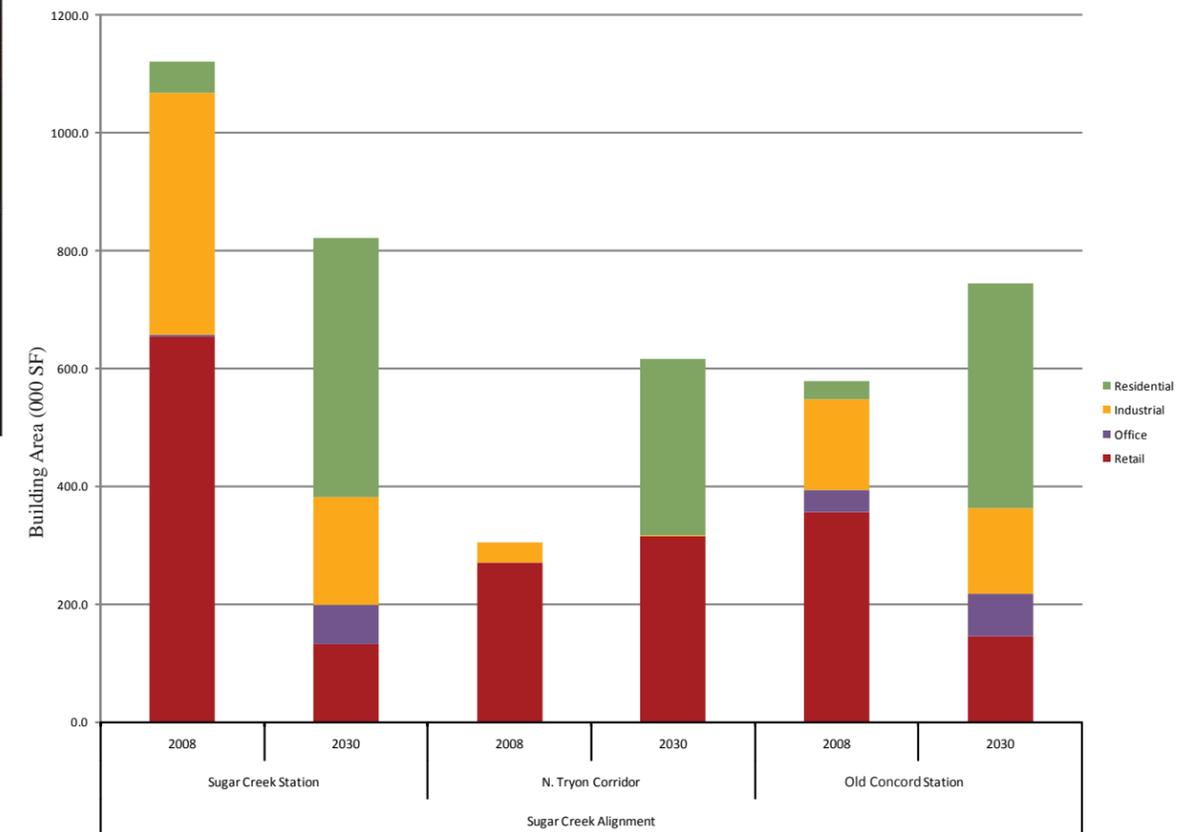
Market Overview

The introduction of the light rail system along the NCRR rail corridor would greatly impact the future potential of surrounding businesses and neighborhoods. Through a market potential analysis performed by Warren Associates each of the proposed station areas, as well as the portion of North Tryon Street between stations, was carefully evaluated for future market potential.

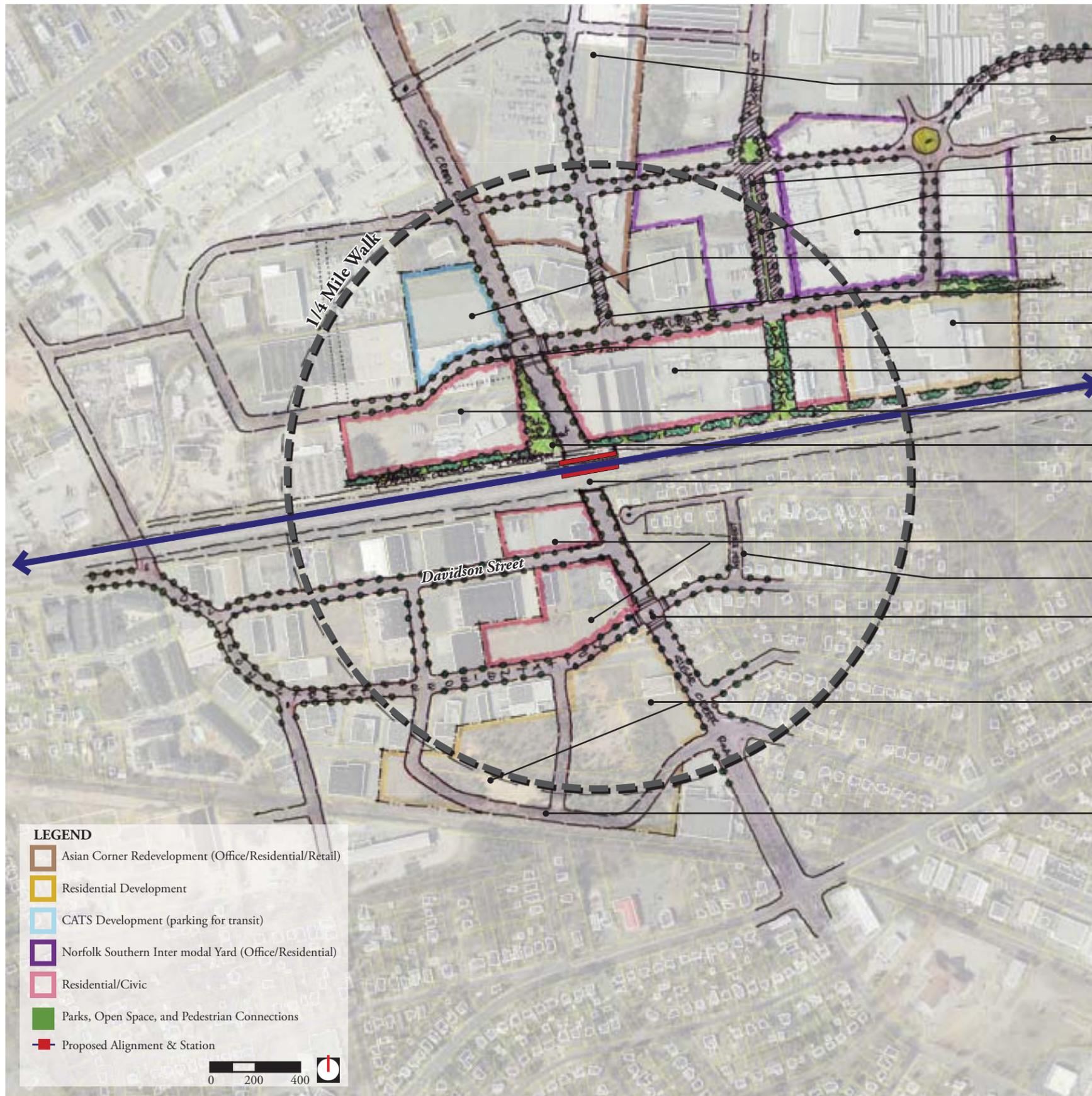
The NCRR Alignment is forecast to add 368,274 net square feet for all land uses between 2008 and 2030, including any demolition that would occur. The graph below demonstrates existing land use mixes contrasted against future predictions. As shown, industrial and retail square footage will experience a net decrease, while residential and office square footage will have a net increase. Though the alignment remains largely within the rail right-of-way, North Tryon Street is forecast to see significant commercial change, especially Blocks 1, 8, and 9, and residential growth in Blocks 5 and 9. Throughout the 22 year period a significant amount of demolition is expected to occur. However, the total inventory for this alignment is expected to increase from 2.3 million square feet to 2.6 million square feet in 2030. (CATS, 6)

The Sugar Creek Station Area benefits from the existence of many industrial and undeveloped parcels close to the proposed station. The proximity and significant parcel size makes it likely that these area will redevelop within the forecast period. Redevelopment of the Old Concord Station Area is more difficult, primarily due to the distance to downtown Charlotte, the need for additional road connections, and the necessary reconfiguration of existing retail buildings.

(Please see Appendix for complete report)



NCRR Alignment Sugar Creek Station Future Land Use Concept



- Potential retail, office and/or residential- retail orientation toward Sugar Creek and North Tryon with connection to station.
- Potential connection to existing residential neighborhood
- Key connection
- Extend Dorton Street
- Potential moderate density residential development or consolidated office campus
- Park-and-ride lot
- Key connection to link station area development to Asian Corner redevelopment
- Potential moderate density residential
- Realign Raleigh Street
- Potential civic, office and/or high density residential
- Potential high density residential
- Vertical circulation for access to station platform
- Planned Grade Separation- NCRR at Sugar Creek Road; As part of NCRR's grade separation project, Sugar Creek will be taken below rail which remains at-grade. Retaining walls along roadway will create unsatisfactory pedestrian environment.
- Potential high density residential
- New connection to Bearwood Avenue. Access will be closed to grade separation of Sugar Creek and NCRR rail corridor
- New traffic signal and street realignment
- Potential medium density residential
- New connection to open development of vacant land

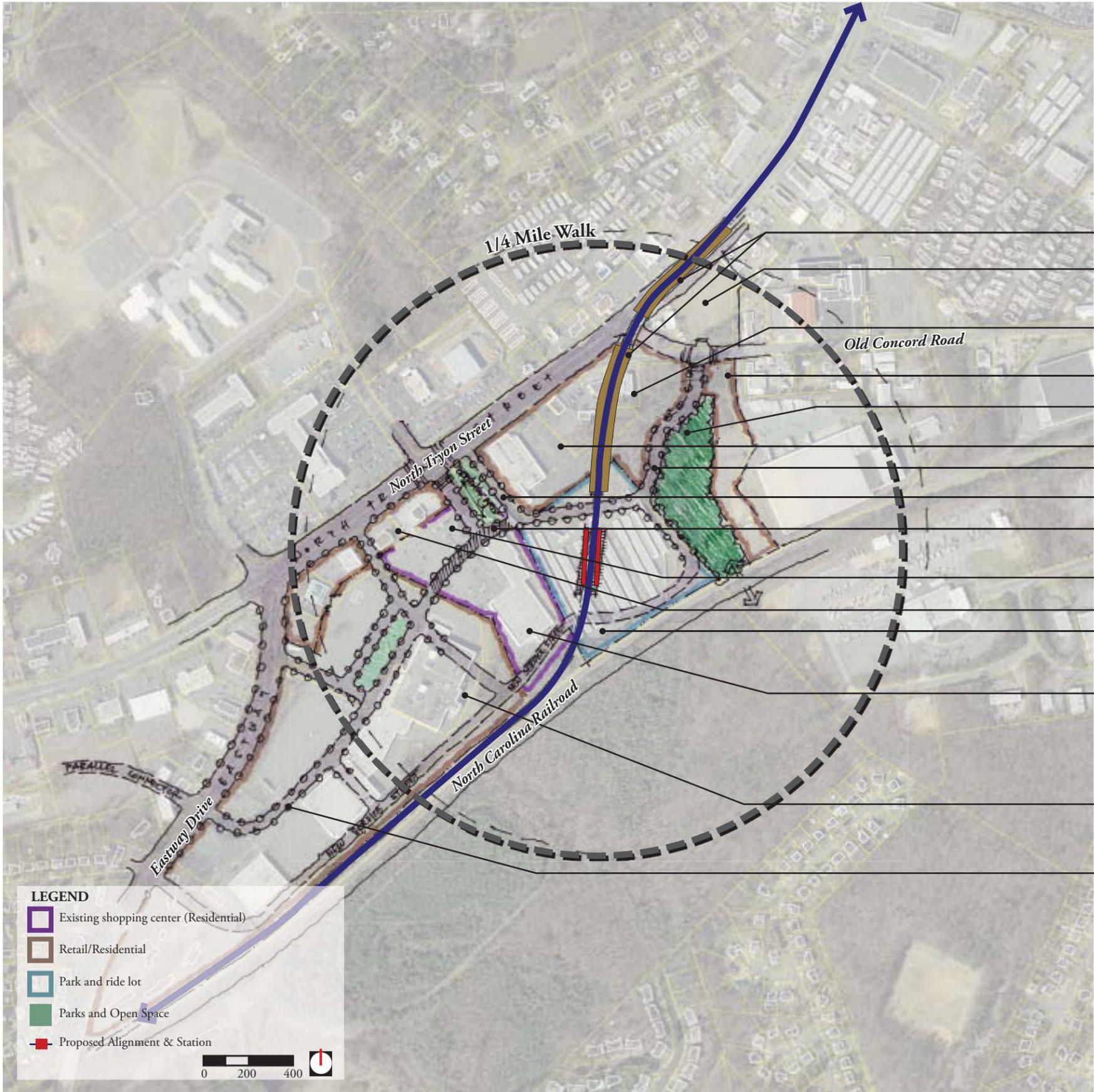
LEGEND

- Asian Corner Redevelopment (Office/Residential/Retail)
- Residential Development
- CATS Development (parking for transit)
- Norfolk Southern Inter modal Yard (Office/Residential)
- Residential/Civic
- Parks, Open Space, and Pedestrian Connections
- Proposed Alignment & Station

0 200 400

The Sugar Creek Station Land Use Concept capitalizes on the former industrial parcels and the expanding residential district of No-Da. Large parcels have the potential to redevelop into office, civic, or residential blocks while revised street connections and use patterns connect the station area to Asian Corners and its corresponding development.

**NCRR Alignment
Old Concord Station Future Land Use Concept**

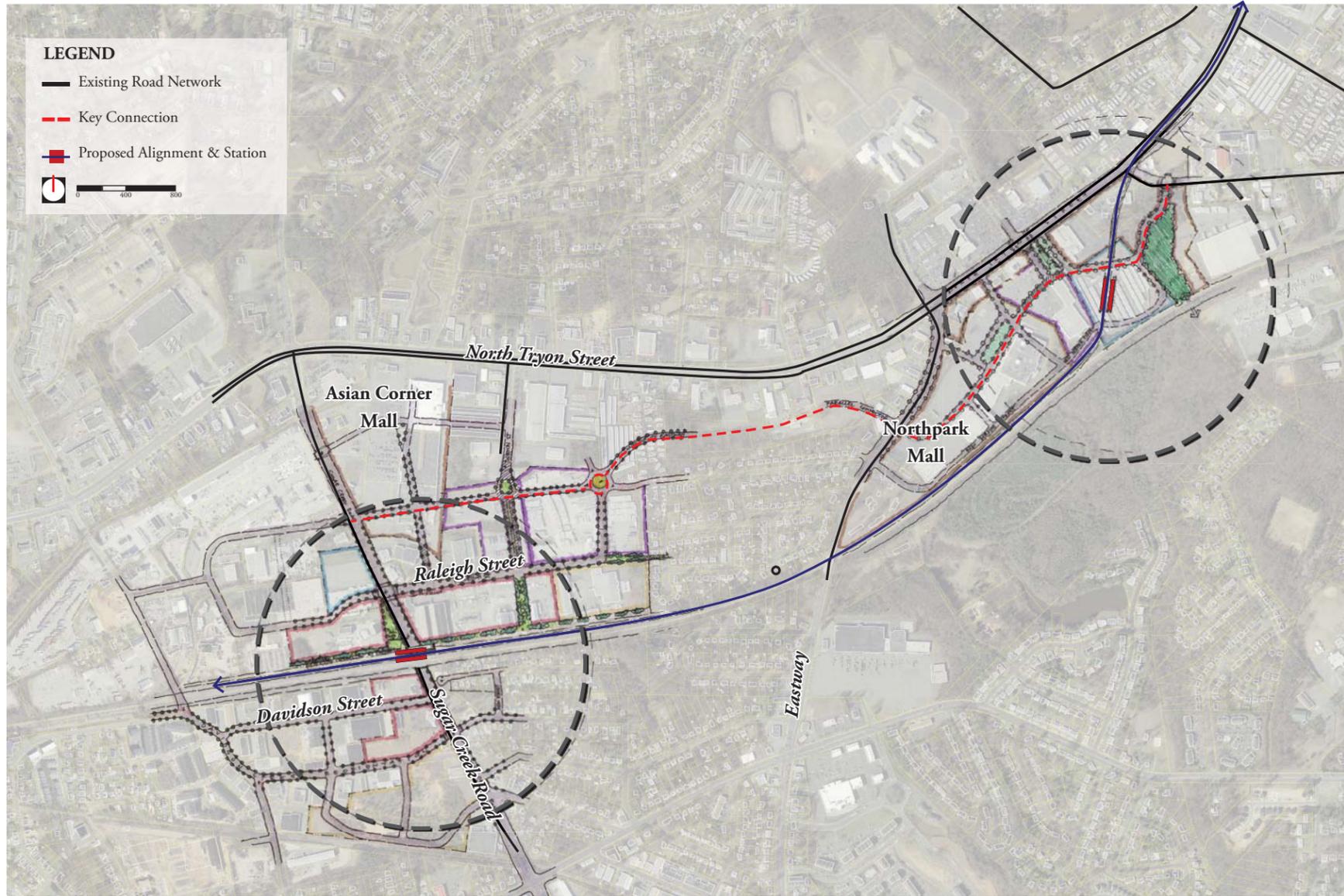


- Transit bridge over North Tryon
- Potential commercial
- Potential high density residential
- Potential high density residential- driven by connection to the natural amenity of the proposed park
- Potential park
- Potential retail and/or high density residential
- New road along the park that will also provide access to the park-and-ride from Old Concord Road
- New connection to park-and-ride
- Key connection
- Potential for retail and high density residential
- Potential retail
- Potential park and ride
- Potential high density residential
- Potential moderate density residential
- New connection with the potential to connect to the Sugar Creek station area

The Old Concord Station Land Use Concept has potential to catalyze the redevelopment of the North Park Mall, incorporating new moderate and high density residential spurred by the proposed park amenity. The expanding developments corresponds to potential connections to surrounding development and other transit stations.



For the NCRR Alignment, streetscape improvements to North Tryon Street could provide a means of visual improvement to the environment and, in concert with changes in building placement over time, would improve the pedestrian environment. Based on the City's Urban Street Design Guideline Six-Step Process, the street is envisioned as an *AVENUE*, with some *BOULEVARD* characteristics. The preferred design speed of the street is 35 mph, though NCDOT may require 45 mph. An intermittent median can be provided to maintain left turn access to as many businesses as possible along the corridor. Several cross-section elements are intended to improve the pedestrian quality of the street. First a bike lane, in addition to providing a safer environment for cyclists, also separates moving traffic from pedestrians by an additional 5'. Next, an 8' planting strip separates the travelway from the 6' sidewalk. To make the planting strip as continuous as possible, several driveways have been identified for potential closure. No parcel will be denied access. However, several conditions exist that would allow the parcels to retain access without the identified driveways, such as parallel network, redundant driveways, access from secondary streets, combined driveways, or potential cross-access easements.



ANALYSIS FACTORS

LAND USE

Acres for TOD 123.4
Overall Connectivity Analysis 2.17 (Sugar Creek), 1.8 (Eastway)

ENVIRONMENTAL

Acquisitions and Displacements 12 Total Property Acquisitions, 26 Partial Property Acquisitions, and 13 Business/Residential Relocations
Noise Receivers No sites impacted by increased noise
Vibration Receivers 3 residential sites impacted by vibration
Historic & Archaeological Properties 3 indirect impacts
Parklands adjacent to rail corridor 2 (Howie Acres Park and Eastway Specialty Park)
Wetlands May potentially impact 930 linear feet of stream and 11,250 sf of SWIM buffers
Visual and Aesthetic 626' of Bridge Length (LR and Station bridge over Sugar Creek Rd and LR bridge over Old Concord Rd) & 2930' of MSE walls
Environmental Justice 3 adjacent EJ neighborhoods with 3 residential properties having vibration impacts

TRANSPORTATION

	NCRR Alignment (w/ N Tryon Streetscape Improvements)	2030 No Build
Vehicle Travel Time (Minutes)		
AM	16.6 NB / 12.7 SB	4.9 NB / 10.0 SB
PM	13.7 NB / 12.2 SB	12.2 NB / 4.6 SB
Intersection Delay (Total Minutes)		
AM	10.6	5.8
PM	9.6	7.3
Vehicle Speed (mph)		
AM	8 NB / 9 SB	24 NB / 11 SB
PM	8 NB / 10 SB	10 NB / 25 SB
Intersection LOS		
AM	6 intersections at LOS F	3 intersections at LOS F
PM	4 intersections at LOS F	3 intersections at LOS F
Intersection Volume to Capacity		
AM	9 intersections > 1.00	5 intersections > 1.00
PM	9 intersections > 1.00	6 intersections > 1.00
Bike/Ped LOS	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E
Left Turn Access on N. Tryon Street	LT restricted at 31 driveways	Existing driveway access
U-Turn Locations	U-turns allowed at all intersections	U-turns allowed at all intersections
Ridership (Total Daily Boardings)	21,600	N/A
Transit Travel Time (7th Street to I-485)	24 minutes	N/A
Street Crossings of Rail	1	N/A



ANALYSIS and RECOMMENDATION

ANALYSIS FACTORS

	SUGAR CREEK ALIGNMENT	NCRR ALIGNMENT
LAND USE		
Acres for TOD	165.5	123.4
Overall Connectivity Analysis	2.15 (Sugar Creek), 1.86 (Eastway)	2.17 (Sugar Creek), 1.8 (Eastway)
ENVIRONMENTAL		
Acquisitions and Displacements	16 Total Property Acquisitions, 55 Partial Property Acquisitions and 20 Business/Residential Relocations	12 Total Property Acquisitions, 26 Partial Property Acquisitions, and 13 Business/Residential Relocations
Noise Receivers	No sites impacted by increased noise	No sites impacted by increased noise
Vibration Receivers	No sites impacted by vibration	3 residential sites impacted by vibration
Historic & Archaeological Properties	1 direct impact; 2 indirect impacts	3 indirect impacts
Parklands adjacent to rail corridor	No parks within 500' of alternative	2 (Howie Acres Park and Eastway Specialty Park)
Wetlands	May potentially impact 400 linear feet of stream and 21,000 sf of SWIM buffers	May potentially impact 930 linear feet of stream and 11,250 sf of SWIM buffers
Visual and Aesthetic	737' of Bridge Length (LR and Station bridge over Sugar Creek Road, LR bridge over North Tryon Street, LR bridge over Eastway Drive) & 3090' of MSE walls	626' of Bridge Length (LR and Station bridge over Sugar Creek Rd and LR bridge over Old Concord Rd) & 2930' of MSE walls
Environmental Justice	1 adjacent EJ neighborhood with no direct impacts	3 adjacent EJ neighborhoods with 3 residential properties having vibration impacts
TRANSPORTATION		
Vehicle Travel Time (Minutes)		
AM	8.7 NB / 8.8 SB	16.6 NB / 12.7 SB
PM	19.9 NB / 11.1 SB	13.7 NB / 12.2 SB
Intersection Delay (Total Minutes)		
AM	5.9	10.6
PM	11.4	9.6
Vehicle Speed (mph)		
AM	14 NB / 13 SB	8 NB / 9 SB
PM	6 NB / 13 SB	8 NB / 10 SB
Intersection LOS		
AM	2 intersections at LOS F	6 intersections at LOS F
PM	5 intersections at LOS F	4 intersections at LOS F
Intersection Volume to Capacity		
AM	4 intersections > 1.00	9 intersections > 1.00
PM	7 intersections > 1.00	9 intersections > 1.00
Bike/Ped LOS	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E
Left Turn Access on N. Tryon Street	LT's restricted at 85 driveways and 6 intersections	LT restricted at 31 driveways
U-Turn Locations	U-Turns allowed at Sugar Creek Rd, Eastway Dr, Old Concord Rd, and Lambeth Dr	U-turns allowed at all intersections
Ridership (Total Daily Boardings)	21,600	21,600
Transit Travel Time (7th Street to I-485)	24 minutes	24 minutes
Street Crossings of Rail	4	1

Analysis and Recommendation

Both alignments perform similarly in ridership generation, produce similar environmental impacts, have comparable travel time impacts on major roadways, produce similar transit ridership, and yield similar economic development impacts (both in the station areas and along North Tryon Street between stations). However, the NCRR Alignment is significantly less costly (approximately \$57 million based on current engineering cost estimates), maintains access to more businesses along North Tryon Street, and creates fewer negative visual impacts. Based on these factors, the NCRR Alignment is recommended for advancement. The streetscape improvements outlined in this report should be studied and pursued at a later date, when City funding becomes available.

ANALYSIS FACTORS (continued)

	SUGAR CREEK ALIGNMENT	NCRR ALIGNMENT	
MARKET (square feet in thousands)			
Sugar Creek Station	Retail	653.5	254.0
	Office	4.7	9.7
	Industrial	410.4	647.6
	Residential	52.0	90.0
Eastway Station Area	Retail	356.9	332.8
	Office	37.3	33.7
	Industrial	152.9	152.9
	Residential	32.0	10.0
North Tryon Corridor	Retail	270.8	647.3
	Office	0.0	0.0
	Industrial	33.6	115.7
	Residential	0.0	0.0

