

# **WHITE PAPER: Evaluation of the Impacts of the Norfolk Southern Passenger Rail Policy on the LYNX Red Line Corridor**

---

**North Carolina Department of Transportation  
Rail Division**

**Charlotte Area Transit System (CATS)**

**May 2014**



## EXECUTIVE SUMMARY

The North Corridor Commuter Rail (LYNX Red Line) project, sponsored by the Charlotte Area Transit System (CATS), is a proposed commuter rail line connecting Uptown Charlotte to the northern communities located along the existing Norfolk Southern Railway Company (NSR) O-Line between Charlotte and Mooresville in North Carolina.

The original basis of design assumed freight and commuter service could jointly utilize the existing tracks. CATS and NSR could both operate on the corridor, utilizing temporal separation to clearly facilitate both freight and commuter rail service. NSR now considers this foundational assumption of temporal separation and joint use of tracks no longer valid. Additionally, NSR also considers the O-Line a strategic reserve to their organization. NSR believes that:

- The O-Line is the most viable alternate route to the North Carolina Railroad (NCRR) corridor between Charlotte and Greensboro, NC, and therefore,
- NSR will protect the O-Line until permanence – a permanent mainline solution – is achieved.

This stance represents a fundamental shift in project approach from the original LYNX Red Line project concept. Potential solutions addressing this fundamental change in project approach include a possible parallel system adjacent to, but separate from, the O-Line system. Challenges to this approach include:

- Implementing the LYNX Red Line infrastructure on one side of the NSR tracks while maintaining “transparency” with the existing and future O-Line,
- The need for a new LYNX Red Line environmental document to meet the requirements of the National Environmental Policy Act, resulting from a fundamental shift in the project approach,
- Realignment and reconstruction of adjacent roadways and driveways,
- Substantial increases to design and construction costs, right-of-way impacts, and project schedule,
- Multiple disruptions to adjacent communities resulting from the new commuter rail alignment, and
- Increased system maintenance costs.



## TABLE OF CONTENTS

Executive Summary.....	i
Purpose: .....	1
Background: .....	1
Description of revised analysis assumptions: .....	3
Definition of Project Limits: .....	5
Description of Scenarios: .....	5
Roadway.....	6
Right-of-Way Acquisitions.....	8
Track Alignment/Constructability Factors .....	9
Community Factors.....	9
Environmental Consequences .....	10
Summary .....	10
Cost Factors for the LYNX Red Line Scenario – West Alignment .....	10
Track Alignment Impacts: .....	10
Right-of-Way Impacts: .....	12
Environmental and Community Impacts: .....	14
Structural Impacts:.....	19
Grade Crossing Impacts: .....	21
Other Considerations .....	23
Conclusion:.....	27
Appendix A – Norfolk Southern Railroad Policies	
Appendix B – Conceptual Plan View Graphics – East vs. West	
Appendix C – Visualizations of the Potential New Configuration	
Appendix D – Potential Parcel Acquisition Listing	
Appendix E – Relative Potential Impacts of LYNX Red Line Track Orientation to Roadways	
Appendix F – LYNX Red Line Corridor map – Charlotte impacted parcels	



## LIST OF FIGURES

Figure 1 - CATS North Corridor .....	1
Figure 2 - Red Line at 40' offset from NSR.....	4
Figure 3 - Option A – CATS to acquire 20’ LYNX Red Line right-of-way .....	12
Figure 4 – Option B – CATS to acquire 50’ LYNX Red Line ROW .....	13
Figure 5 - Existing and potential rail bridge location at I-85 .....	23

## LIST OF TABLES

Table 1 –Comparison of potential impacts of LYNX Red Line track orientation.....	6
Table 2 – Community facilities potentially impacted .....	9
Table 3 – Estimate costs per mile of track, new alignment, and construction.....	11
Table 4 – Estimated ROW costs for the LYNX Red Line (per affected county) .....	14
Table 5 – Summary of cost implications .....	14
Table 6 – Relative impacts of each alignment option.....	15
Table 8 - Summary of conceptual structure cost estimates .....	21
Table 9 – CATS North Corridor grade crossings summary .....	22
Table 10 – Summary of cost implications due to new policies.....	26

## Purpose:

The North Corridor Commuter Rail (North Corridor) project, sponsored by the Charlotte Area Transit System (CATS), originally proposed joint use of commuter rail service and freight rail operations within the seldom-used O-Line corridor owned by Norfolk Southern Railway Company (NSR) between Charlotte and Mooresville in North Carolina, utilizing the existing single track and temporal separation of service types. Based on newly provided policy promulgated by NSR with the intent of preserving the O-Line corridor for future freight rail use, it is believed that the fundamental assumption of excess capacity in the corridor is no longer valid and therefore, sharing the track with commuter rail operations would no longer be feasible. This white paper is intended to evaluate and present the potential cost implications that would result from changes to the North Corridor project, also known as the LYNX Red Line, as required to comply with recent changes in NSR policies, which now preclude the sharing of NSR freight tracks with commuter rail transit service.

## Background:

In 2006, the City of Charlotte (City) and the Metropolitan Transit Commission (MTC) adopted the 2030 Transit Corridor System Plan, which identified multiple rapid transit improvements in five corridors

**Figure 1 - CATS North Corridor**



radiating out from the central business district. One of these adopted corridors is the North Corridor Commuter Rail Project, also known as the LYNX Red Line, which would offer commuter rail service to communities north of Charlotte. The plan envisioned commuter rail service operating on the existing, seldom-used O-Line track owned by NSR. The corridor begins in uptown Charlotte at the future site of the Charlotte Gateway Station, and heads north, generally paralleling Graham Street and NC 115 (Old Statesville Road) through the northern portions of the City before travelling through the downtown areas of Huntersville, Cornelius, Davidson, and Mooresville.

The use of the existing O-Line corridor and tracks was one of the original base assumptions made by the CATS in identifying a financially feasible and constructible LYNX Red Line project. The primary assumption, made in the development stages of the current LYNX Red Line design, is that CATS commuter trains could operate cooperatively with NSR freight service on the O-Line track. This approach to the corridor included upgrades to existing NSR facilities, potential installation of select sidings and passing tracks, and safety improvements to at-grade crossings. Also included in this base assumption was an understanding that NSR would adjust freight train service scheduling to accommodate CATS commuter rail service operations in the morning and evening peak travel times. It is understood that the idea of temporal separation being



an acceptable solution to joint use of the existing O-Line track was developed and agreed to by both NSR and CATS during previous phases of the CATS LYNX Red Line Project. A draft “term sheet” was developed; however, no formal agreement confirming these discussions has been executed.

*The O-Line is of strategic importance to long-term NSR operations... [it] represents a potential alternative ...alignment to the current (NCRR) main line corridor.*

At this time, and based on recent events and discussions between NSR, the North Carolina Department of Transportation (NCDOT) – Rail Division, and CATS, it appears that these base project assumptions must be revisited. NSR has indicated that the O-Line is of strategic importance to long-term NSR operations, and firmly believes that the integrity of the corridor must be preserved in the event that it becomes the main line freight track through this area of North Carolina. This O-Line corridor, in conjunction with other NSR-owned lines elsewhere in North Carolina, represents a potential alternative freight railroad alignment to the current main line corridor owned by the North Carolina Railroad (NCRR) and leased by Norfolk Southern. It is understood that until NSR obtains a permanent solution to the NCRR corridor, the O-Line will continue to be held in strategic reserve.

NSR has updated and issued two policies specifically applicable to the LYNX Red Line. The “Norfolk Southern Passenger Station Requirements as Revised December 15, 2011” document (see appendix A) defines required clearances and dimensions around potential commuter stations within NSR right-of-way (ROW). One requirement of this policy is an “in-depth train capacity study...to assess passenger service impacts to the existing and future freight operations. Impacts to NSR freight business must be fully mitigated and that may involve constructing additional tracks, upgraded signal systems or other infrastructure improvements as specified by NSR.”

NSR also issued the “General Principles Guiding Norfolk Southern’s Evaluation of Intercity and Commuter Passenger Rail Proposals” policy (see appendix A) to the NCDOT Rail Division in June, 2013. This document describes the expectations of NSR with respect to entities operating commuter rail within the limits of their easements or right-of-way (ROW). Two items included in this policy impacting the proposed LYNX Red Line include:

- “The proposed passenger operation must create “transparency” in the affected rail system. Transparency is the capacity for passenger trains and freight trains to operate without delay, however minimal, to each other, while still allowing for route maintenance.”
- “Freight operations are long distance and customer-driven, which precludes “passenger only” operating windows and temporal separation such as night-time-only freight operations.

*Transparency is the capacity for passenger trains and freight trains to operate without delay, while still allowing for route maintenance.*

Incorporating these policies into the understanding of the North Corridor, the base assumption of the LYNX Red Line project has been altered significantly. Revised assumptions include the following:



- Commuter rail operations must operate “transparently” with freight rail operations, resulting in the need for a dedicated commuter track with passing tracks, located partially or wholly within the existing NSR easement and/or ROW.
- “Passenger Only” operating windows are no longer applicable.
- Due to the apparent strategic importance of the corridor to NSR operations, an ultimate build-out condition of the corridor likely includes a double-track condition for the NSR main line.

The newly revised assumptions above define a LYNX Red Line project much different from the originally envisioned corridor. The following analysis will describe some of the changes to the North Corridor design resulting from these new assumptions, as well as provide a conceptual level understanding of the cost implications to the project.

### **Description of revised analysis assumptions:**

To accommodate the changes to NSR policy discussed above, and for the purpose of this document, it is assumed that CATS will pursue a dedicated commuter track with passing tracks, located partially or wholly within the existing NSR easement and/or ROW. This assumption allows for transparency between LYNX Red Line commuter and NSR freight operations. The result of such transparency is that the potential for LYNX Red Line operations to impact future high-frequency, long-distance NSR freight operations is significantly reduced. In addition, CATS can preserve the ability to provide predictable, timely commuter rail service without the possibility of frequent freight operation delays. The resulting vision for the North Corridor could include either a two or three track configuration – one existing or upgraded NSR track along the current O-Line alignment, a second NSR freight track to potentially be installed in the future (if deemed necessary by NSR), and a third commuter rail track dedicated to the CATS LYNX Red Line, positioned to accommodate the future second NSR track.

While the three-track vision addresses many of the assumptions and policy requirements noted above, it also requires a series of subsequent assumptions specific to this configuration:

**Assumption #1: The commuter rail track will not cross the NSR freight main line.**

This assumption would require the LYNX Red Line track to be situated completely on either the east or west side of the NSR alignment for the length of the commuter rail project (22 mile corridor). To maintain both track transparency and all of the benefits realized by installing a track dedicated to the commuter rail line, the new commuter track cannot cross the NSR O-Line track(s) at-grade. To do so would bring the two lines into conflict and possibly disrupt the schedule of one or both services. The choice of east or west side of the existing NSR track is discussed in the Description of Scenarios section later in this chapter.

**Assumption #2: The existing NSR O-Line alignment will be maintained.**

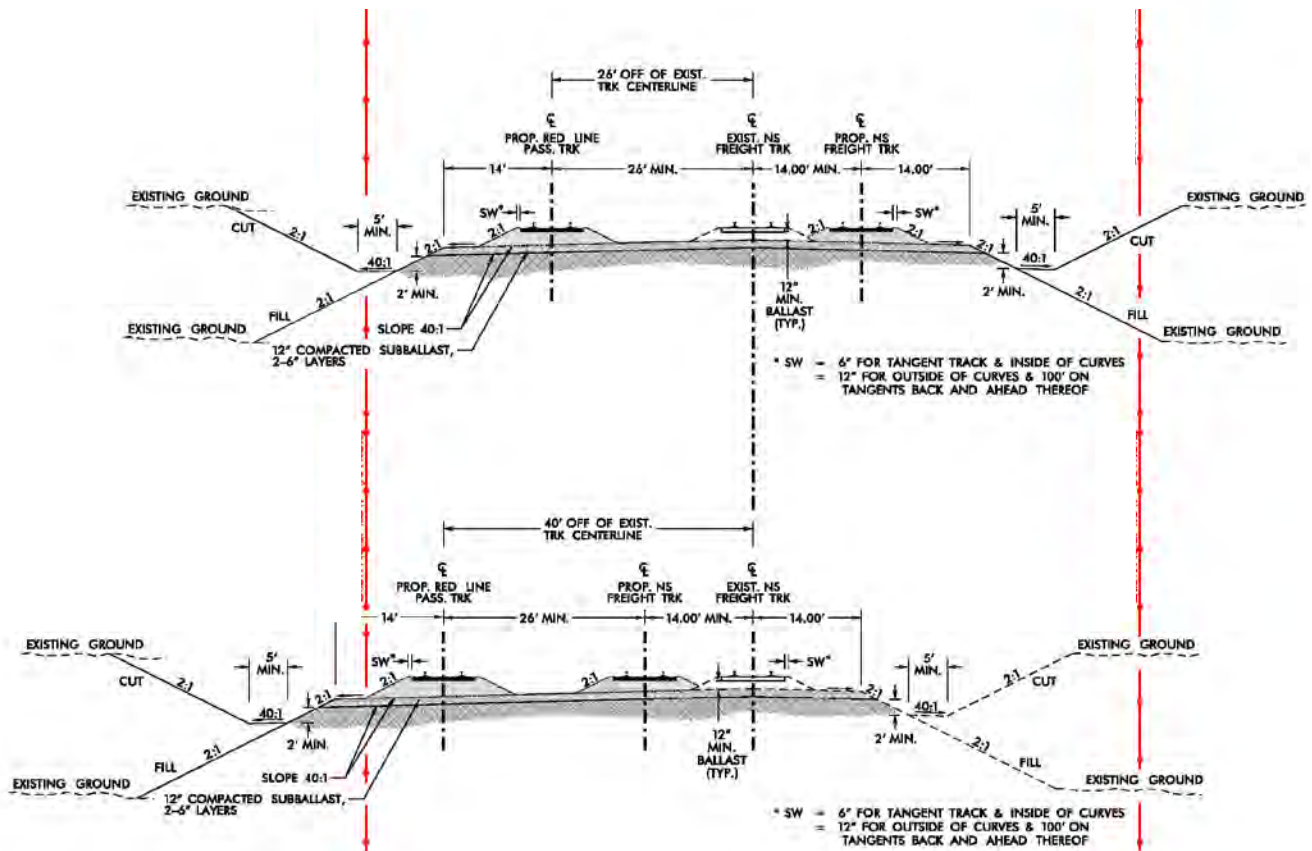
For the purposes of this study, it is assumed that the O-Line track remains in its current position within the NSR easement and/or ROW. The approach of keeping the current O-Line alignment in roughly its current location should allow NSR to maximize the use of the existing property, minimize freight corridor costs, and maintain service to existing customers on the corridor.

**Assumption #3: NSR can install the future second main line track on either side of the O-Line.**

NSR may elect to install the future second track on either the east or west side of their current O-Line alignment. With minor modifications to the existing track and with the addition of cross-over tracks, NSR could minimize their own cost of installing a second track by changing sides of the current alignment at key locations along the corridor. However, it is also possible that NSR could reconstruct segments of their existing track to utilize existing easement most efficiently.

For the purpose of this evaluation, it is assumed that NSR will install the future second freight track in a manner that will minimize the cost of the upgrade.

**Figure 2 - Red Line at 26' offset from NSR.** CATS will install a new, separate Red Line track located 26 feet (center to center) west of the existing O-Line track.



**Figure 2 - Red Line at 40' offset from NSR.** CATS will install a new, separate Red Line track located 26 or 40 feet (center to center) from the existing O-Line track, thus accommodating a second NSR track located 14 feet (center to center) west of the existing track.

To plan for this potential condition, the LYNX Red Line alignment will consider two options at selected locations – the CATS alignment could be located either next to the existing rail line (with the future track on the opposite side of the O-Line), or located next to the future second





track (if the track were installed on the same side of the O-Line track). The location of the second NSR track has a large impact on the location of the LYNX Red Line track, and thus a dramatic effect on the potential project costs. Figures of these scenarios are shown above and conform to NSR standards for track centerline offsets and track bed specifications.

Figures 2 and 3 depict a rail corridor easement of 100', shown in red. Figure 2 depicts the proposed LYNX Red Line located 26 feet (center to center) west of the existing O-Line track, while figure 3 shows the LYNX Red Line located a total of 40 feet (center to center) from the existing O-Line track and 26 feet from a proposed second NSR track that may be built to accommodate anticipated future demand for freight service in the corridor. These assumptions, while assisting in the definition of this study, may be revisited in future analyses due to some inherent cost implications.

### **Definition of Project Limits:**

For the purposes of this study, the project limits are slightly different from the currently defined LYNX Red Line Corridor, extending from the grade crossing at Atando Avenue in central Charlotte to the Mount Mourne station in Mooresville, North Carolina. This 22 mile corridor excludes short segments of the envisioned LYNX corridor because it is anticipated that both NSR and CATS will operate in this area. It is assumed that NSR would not utilize the O-Line corridor between uptown Charlotte and an existing wye connection to the NSR rail yard at the Atando Avenue and Graham Street grade crossings. Additionally, the minimum operating segment of the LYNX Red Line is defined as the connection between the Charlotte Gateway Station and the Mount Mourne station. Therefore, the two stations in Mooresville envisioned only in future system expansions are not included in this study.

### **Description of Scenarios:**

In order to comply with the transparency policy, it is understood that the additional LYNX Red Line track must be built on only one side of the existing O-Line current and future freight tracks. An evaluation was conducted to determine the most appropriate location for the LYNX Red Line, which would minimize potential impacts to the community while considering constructability, costs, and maintenance needs. The resulting conclusion of the evaluation was that the LYNX Red Line tracks will be located on the west side of the O-Line track because it was determined that fewer potential impacts would occur in this situation.

*...To comply with the transparency policy, it is understood that the additional LYNX Red Line track must be built on only one side of the existing O-Line...*

Factors considered included roadway impacts, ROW acquisitions, track alignment/constructability factors, community factors, and environmental consequences. Any cost implications estimated below represent 2013 values and are for the purposes of comparison only. Table 1 lists only those potential impacts that would be unique to the east vs. west location of the LYNX Red Line tracks. Further explanation of each evaluation area can be found below the table.



**Table 1 –Comparison of potential impacts of LYNX Red Line track orientation**

Impact Category	Location	Measurement of impact	Description	Cost Implications
Roadway	East	8 miles impacted	Graham Street in Charlotte	\$60 M
	West	7.5 miles impacted	Old Statesville Road (NC 115)	\$42 M
ROW acquisitions	East	113 acre acquisition area		\$8.57 M
	West	103 acre acquisition area		\$11.69M
Track alignment/ constructability concerns	East	1 site	I-85/Graham St. bridge complete reconstruction – road and rail	Min. \$20M additional
	West			none
Community factors	East	20 facilities	Variety of facilities including National Register Listed property and emergency response facility	Qualitative measures not available for cost estimates at this level of analysis
	West	24 facilities	Variety of facilities	
Environmental consequences	East	1 resource area	Water resource and potential wetland	
	West	0		

**Roadway**

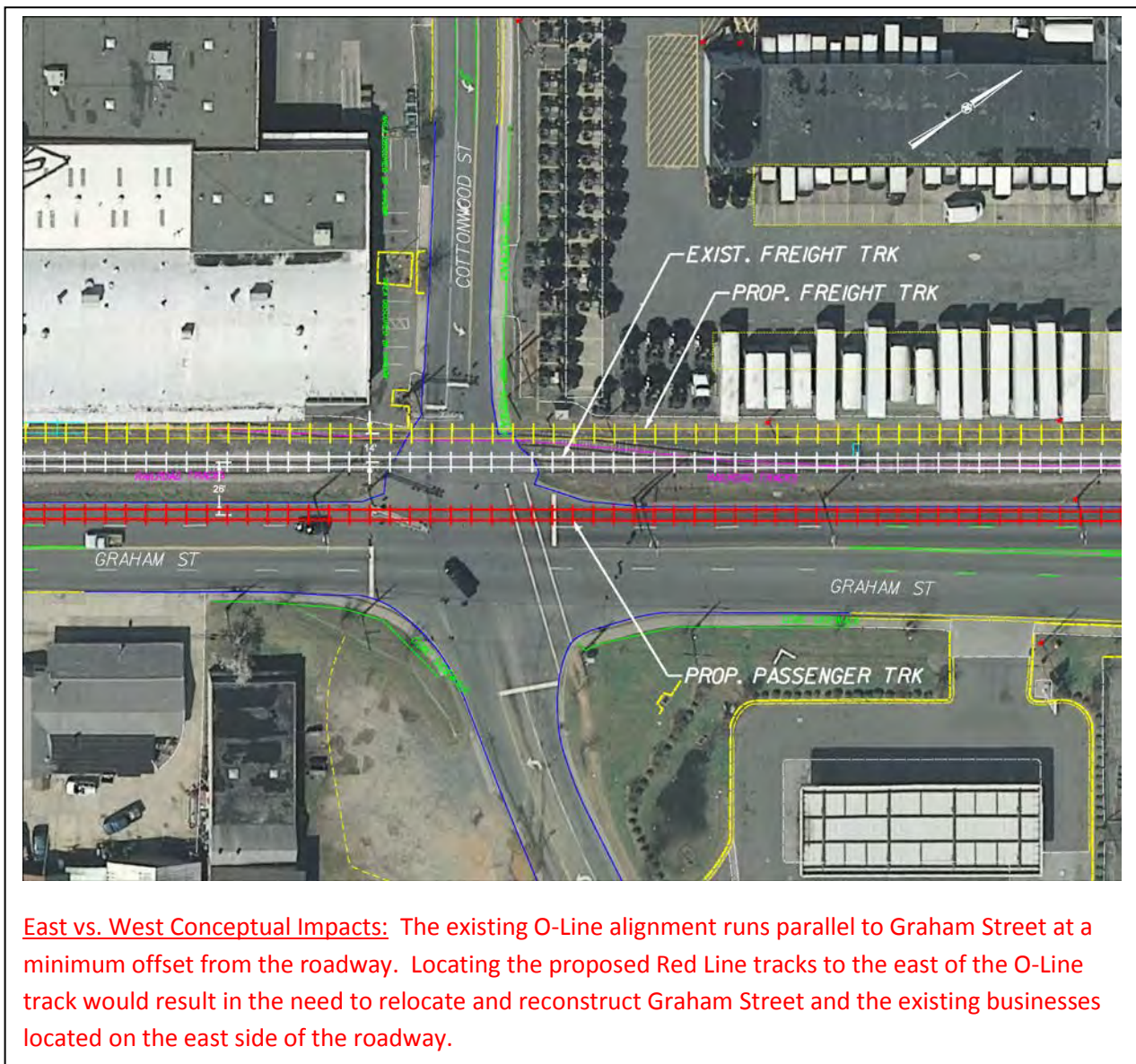
Over the course of the 22 mile LYNX Red Line alignment, roadways and buildings encroach on both sides of the existing approximate 100-foot O-Line corridor. For much of the corridor in Charlotte, the track runs immediately adjacent to the west side of Graham Street, however, for much of NC 115 north of Charlotte, the track runs immediately east of the roadway. **To hold the existing O-Line alignment while accommodating a future track and retaining the LYNX Red Line on only one side of the NSR alignment could result in the near-complete removal or relocation of several miles of one or both of these roadways.** Graphical representations of the potential impacts are shown in Appendix B and Appendix C, while estimates of these impacts are summarized in Appendix E. The results of this analysis reveal that roadway impacts based on placement of the LYNX Red Line corridor on the east or west sides of the O-Line corridor are similar in scale. Installation on the east side would result in over eight miles of roadway impacts, of which nearly five miles impact major roadways, including Graham Street in Charlotte. In this scenario, Graham Street would likely need to be reduced to a two-lane configuration between uptown and the intersection with Sugar Creek Road, or sufficient ROW purchased east of existing Graham Street to accommodate a revised roadway alignment.

If the LYNX Red Line were to be installed on the west side of the existing O-Line, while Graham Street would largely be unaffected, approximately 7.5 miles of the two lane Old Statesville Road (NC115) would experience

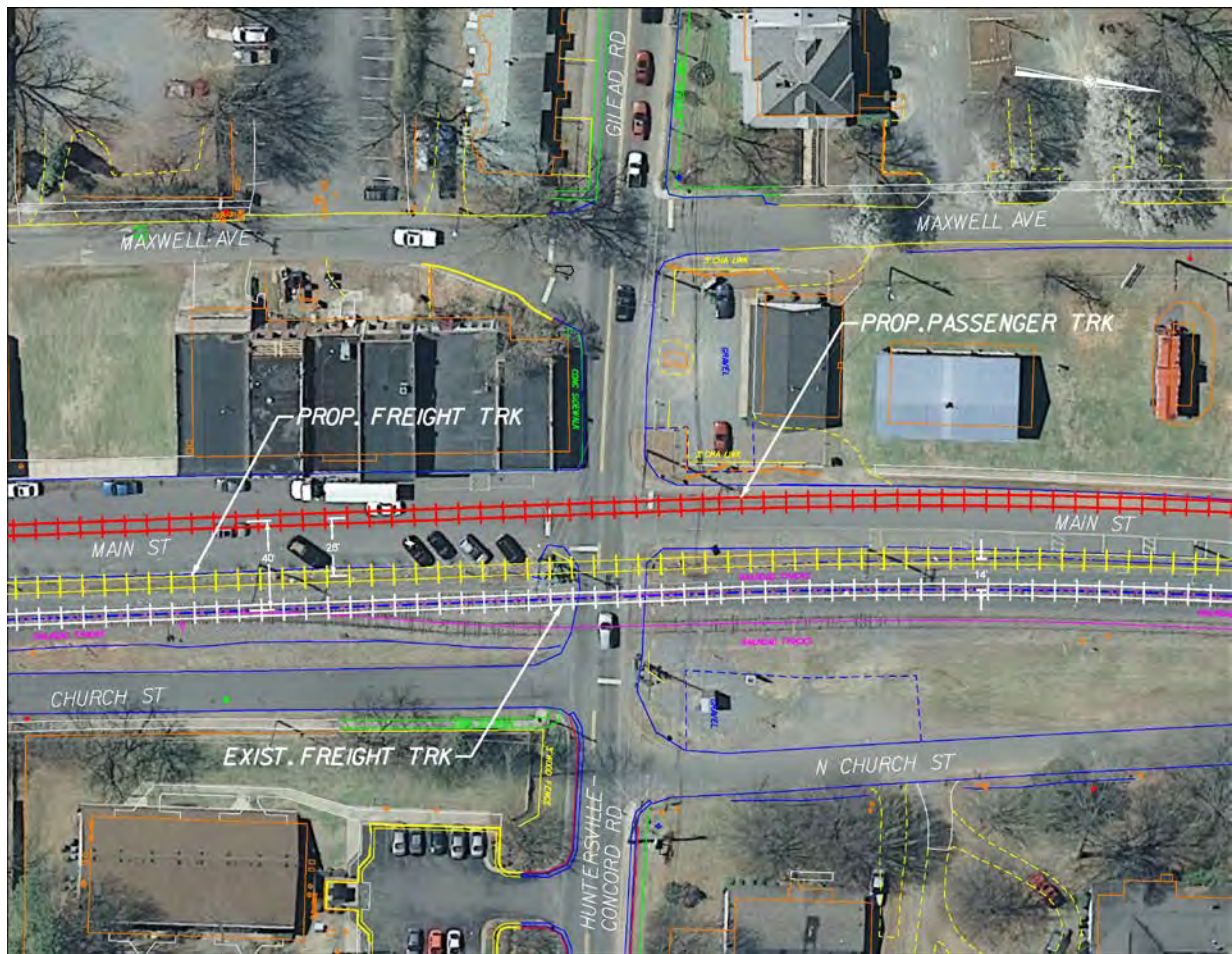
*Retaining the LYNX Red Line on only one side of the NSR alignment could result in the near-complete removal or relocation of several miles of ...roadways.*

direct longitudinal impacts, of which over five miles would be considered requiring partial or complete relocation. Included in the estimate above, this impact to NC-115 is expected to average nearly \$5.5 million per mile of roadway, with likely additional costs for private utility relocation and secondary ROW costs compounding that effort.

Note that current ongoing efforts to widen NC-115 from two to four lanes are not included in this study, but will need to be analyzed further in future studies. Also not quantified or reviewed here are impacts to intersections and side streets. It is assumed that these impacts will be similar for both the east and west scenarios, pending further future study.



**East vs. West Conceptual Impacts:** The existing O-Line alignment runs parallel to Graham Street at a minimum offset from the roadway. Locating the proposed Red Line tracks to the east of the O-Line track would result in the need to relocate and reconstruct Graham Street and the existing businesses located on the east side of the roadway.



**East vs. West Conceptual Impacts:** The O-Line is located through the center of Huntersville and other communities north of Charlotte. In the scenario shown above, Main Street may need to be removed completely in some areas if the proposed Red Line tracks were located to the west of the existing and future O-Line track alignments.

### **Right-of-Way Acquisitions**

In order to accommodate the additional ROW required, the agency would need to acquire portions of numerous properties. Geographic information system (GIS) mapping was utilized to identify the affected parcels and calculate the land area within the estimated future ROW. It was assumed that only the portion of the parcel within the ROW would be acquired. Additional property needs for adjacent roadway or access drive reconstruction due to displacements were not considered in this level of analysis.

To calculate the costs associated for property acquisition, the appraised values of each affected parcel was divided by the percentage of the parcel intended for acquisition.



**Track Alignment/Constructability Factors**

One major consideration occurs at the grade separated intersection of I-85 and Graham Street. If the new LYNX Red Line track is located to the west of the current O-Line track, a new grade separated rail bridge would be constructed which could be accomplished with no impact to the existing Graham Street roadway bridge. However, a new LYNX Red Line bridge to the east of the O-Line track would require significant modification or reconstruction of the Graham Street roadway bridge. In addition, a LYNX Red Line rail bridge to the west could also be constructed with enough horizontal separation as to avoid conflict when the future O-Line bridge is upgraded to double track.

**Community Factors**

A number of residential communities are located adjacent to the existing O-Line track. While built with the knowledge of the existing freight track, the O-Line has not been heavily used in recent times. The frequency changes resulting from the addition of commuter rail service, and/or additional freight service, would contribute to a change in the noise levels and privacy concerns for those residents. While a linear measurement was not taken, communities adjacent to the corridor were counted for this analysis. It is assumed that each of these communities would request some level of noise mitigation or other screening betterments.

The George Houston House is listed on the National Register of Historic Places and located adjacent to the ROW to the east. Access to the property, a portion of the grounds, and mature plantings would be displaced by the LYNX Red Line rail bed and tracks.

Another potential issue would occur at the intersection of the rail ROW and Bailey Road. Immediately south of the intersection is an area of steep slopes adjacent to Bailey Road Park in Cornelius. To accommodate the ROW expansion and the grading potentially required, a portion of the park property would be required and could impact both passive and active recreation facilities at the park including baseball fields, walking trails, and a playground area.

**Table 2 – Community facilities potentially impacted**

Type	East	West
Place of worship	3	6
Cemetery	3	2
School	1	1
Emergency facility	1	0
Residential community	11	15
Historic property	1	0
Public park/recreational facilities	1	0

In addition, a number of community facilities, as described in Table 3, would potentially be impacted by expansion of the rail ROW and/or the associated roadway access limitations and reconstruction. The majority of these potential impacts is due to the elimination of primary access drives to their properties and could be mitigated by additional property acquisition to construct alternate access drives or new frontage on adjacent roadways.



### Environmental Consequences

While most environmental impacts occur perpendicular to a linear corridor, such as the LYNX Red Line, one water resource was identified that may be impacted if the LYNX Red Line is constructed to the east of the O-Line. The resource is Griffin Lake, located at the east side of Henderson Road near 7700 Old Statesville Road in Charlotte. This impact would not occur by addition of rail lines to the west of the O-Line.

### Summary

For the purposes of this study, it is assumed that the LYNX Red Line will be implemented on the west side of the existing NSR O-Line. This approach will avoid severe impacts to Graham Street while requiring reconstruction of several miles of NC-115. Similar ROW, business, and community impacts, as well as constructability considerations, will be encountered in either scenario.

### **Cost Factors for the LYNX Red Line Scenario – West Alignment**

Several cost factors are evaluated in this white paper for the purpose of determining the cost implications to the LYNX Red Line resulting from the revised project base assumptions. These factors include the following:

- Track alignment impacts
- ROW impacts
- Environmental and community impacts
- Structural impacts
- Grade crossing impacts

Cost considerations are typically approached from a conceptual level, however, costs that are quantified into unit and total costs apply only to 2013 values. No escalation values are represented in this white paper.

### **Track Alignment Impacts:**

The new scenarios being considered for the LYNX Red Line both include a proposed dedicated commuter rail track to the west of the existing NS track, as well as an estimated four miles of dedicated sidings and passing tracks. This condition will ultimately require CATS to construct over 26 miles of new track roadbed, ballast, ties, rails, and associated signaling equipment along the 22 mile corridor. In addition, this effort will include geotechnical investigations, revisions to drainage conditions, a number of retaining walls to minimize property impacts, fencing, and several other details that would be associated with the new track and track alignment. While it is understood that NSR would address all of the costs associated with upgrades to their current and future facilities, CATS would need to address the following for the LYNX Red Line track(s):

- **Roadbed construction** will be a significant cost to the project. Originally intending to utilize the existing tracks, the current LYNX Red Line design includes little grading, preparation of subgrade,



and installation of track roadbed. With varying geotechnical conditions, establishment of a stable, solid track foundation will represent a significant cost with a range of potential values.

- **New ballasted track** can utilize either concrete or wooden ties. Choice of tie material, whether wood or concrete or composite, can significantly affect the cost of the new LYNX Red Line track. NSR does not require the use of concrete ties; however, it is feasible that CATS would pursue use of concrete ties on the CATS-owned track.
- **Steel rail, clips, and tie plates** for the new CATS track would also be needed. Steel prices may fluctuate over the coming years, causing some uncertainty in the future cost of these items.
- **Grading and drainage** considerations, with respect to new or extended culverts, adjustments to ditch lines, and other minor structures would likely be included into the overall cost of the new ballasted track.

Grading and creative use of retaining walls and ballast curb along the length of the corridor will be essential in managing project costs. Assuming the 100' ROW is available for the project, the outside shoulder of the proposed track will be located outside of NSR ROW. **This means that between 10 and 25 feet of additional ROW will be necessary for installing any ditch lines, tying in slopes, and, if required, installing any kind of fencing along the corridor.** For the purposes of this study, it is assumed that the LYNX Red Line vertical profile will vary slightly from the O-Line profile to minimize these impacts, but it is also assumed that any vertical manipulations will be minor due to the small offset from the main line.

**Table 3 – Estimate costs per mile of track, new alignment, and construction**

Cost Per Mile Track	Ties	Drainage Modifications
\$1 million	Wood	Minor
\$1.3 million	Wood	Major
\$1.5 million	Concrete	Minor
\$1.7 million	Concrete	Major

High-level estimates for new track installation range from approximately \$1 million per mile to over \$1.7 million per mile, assuming new track roadbed, subballast, and ballast depths of one foot, respectively, and depending on the conditions and features of the corridor. For this evaluation, it is assumed that these estimates would be similar for both scenarios, as both require construction of a new track.

Utilizing this information with the following assumptions, a conceptual estimate can be derived for track costs for the LYNX Red Line. Governing assumptions for this cost are as follows:

- Ballasted commuter rail track (including roadbed, ties, rail, ballast, and other items) will extend for approximately 22 miles of the LYNX Red Line Corridor.
- Four passing tracks, located approximately every two or three stations, or every four and a half miles, will be necessary for desired CATS operations. Siding tracks will be approximately one mile in length, increasing the total length of the project to 26 miles of ballasted commuter rail track, which includes passing sidings.
- Cut and fill material will be relatively even for the extent of the corridor.
- Subsurface conditions will be relatively acceptable for a majority of the corridor.

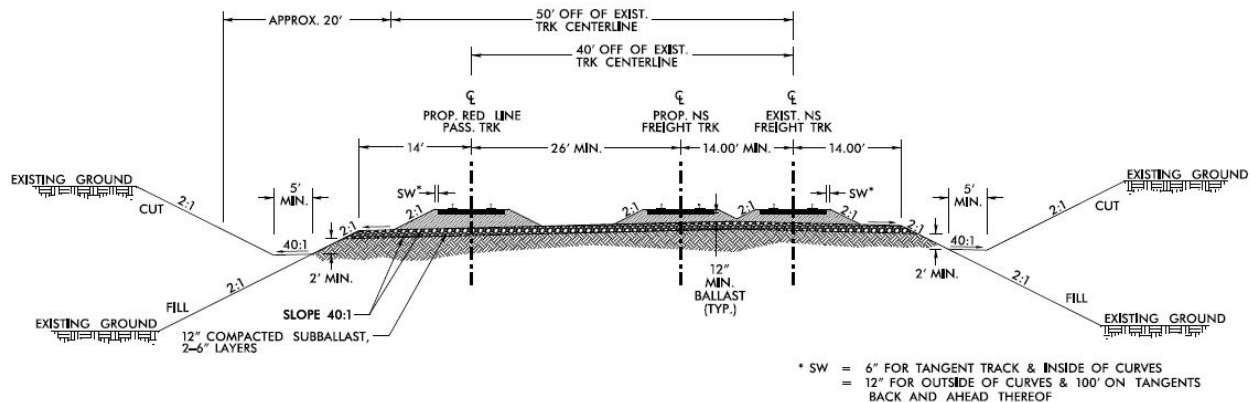
- Wooden ties would be used for the majority of or the entire corridor.
- Drainage concerns could be considerable. While culvert costs, headwalls, and other drainage items located on the rail right-of-way are included in the track alignment costs, secondary drainage costs up- and downstream of the line are not.
- Roadway impacts, such as impacts to Graham Street and NC-115, are not included here.

For the purposes of this analysis, a Cost per Mile of Track is assumed to be \$1.3 million.

### Right-of-Way Impacts:

In a slightly different approach from the scenarios discussed above, two options were defined and compared above for conceptual level cost implications from a construction standpoint. Right-of-way impacts with respect to the NSR corridor require a modified approach for relative estimation of potential ROW cost estimates. A fundamental assumption of this study is that NSR claims a 100-foot easement along the O-Line corridor. However, as a worst-case scenario from a cost estimating perspective, NSR may only actively maintain approximately a minimum 40-foot width of this corridor, as demonstrated in tie replacement and roadbed maintenance activities observed on the corridor in late 2013. Two options shown below, different from scenarios 1 and 2 discussed above, have been developed for the purposes of ROW cost relating to CATS. Therefore, ROW costs were investigated in an attempt to quantify this potential cost discrepancy, based on the following two potential configurations:

**Option A:** Half of the 100-foot NSR easement is used to accommodate the LYNX Red Line. CATS would likely acquire an additional 20-foot of ROW (on average) for the length of the project to have sufficient space for operations, maintenance, and drainage concerns.



**Figure 3 - Option A – CATS to acquire 20' LYNX Red Line right-of-way**







**Table 4 – Estimated ROW costs for the LYNX Red Line**

Buffer Type	Number Parcels Affected	Total Area (acres)	Total Costs (\$)
Option A - 50' easement with 20' buffer	434	34.51	\$ 4,415,212.44
Option B - 20' easement with 50' buffer	504	103.60	\$ 11,689,630.16

Similarly, a buffer using 100-foot offset from the existing O-Line was reviewed to quantify potential “total take” parcels. It is assumed that structures found to be within this buffer, which is 30-foot from the new CATS ROW line, would no longer be viable as a business or residence, and therefore CATS would likely acquire the parcel in its entirety. A listing of these parcels can be found in appendix D - Potential Parcel Acquisition Listing. Per current GIS Data, the value of the 160 impacted parcels total \$52,966,200. Several factors should be considered with respect to this value:

**Table 5 – Summary of cost implications**

Item	Value
ROW or easement purchase (not “total takes”)	\$11,689,462
“Total take” parcels	\$52,966,200
30% Increase in value accounting for 2013 property values	\$68,856,060
25% Increase in value accounting for property owner relocation costs	\$86,070,075
<b>Total real estate estimate (ROW and inflated “total take” values)</b>	<b>\$97,759,537</b>

- Approximately 160 parcels were identified in this study. One or more structures on these 160 parcels fell within the 100-foot buffer dimension.
- A portion of this “total take” value is likely captured in the ROW costs captured in the values shown in Table 6. This amount is likely minimal and therefore not considered for this study.
- Many of the property sales data included in this “total take” list are several years old. For the purposes of this study, a 30% increase is included to account for recent increases in property costs in the region.
- Resident and business relocation costs should also be included in this number. Therefore, an additional 25% is included.

### **Environmental and Community Impacts:**

A screening of potential environmental and community impacts was conducted in consideration of both options. This evaluation is not a substitute for evaluation of the project under either the National Environmental Policy Act (NEPA) or the State of North Carolina Environmental Policy Act (SEPA). The evaluation methodology included review of the LYNX Red Line Draft Environmental Assessment (2008) and desktop evaluation of the corridor using Google Earth aerial imagery and readily available GIS data.



A traffic study was provided for and as part of the original LYNX Red Line commuter. This study only evaluates the additional of commuter rail service; freight traffic is not included in this review. **If freight service changes are made in the O-Line corridor, it is anticipated additional impacts would result from that action by NSR and will require additional evaluations and potential mitigation.**

*If freight service changes are made in the O-Line corridor, ...additional impacts ...will require additional evaluations and potential mitigation.*

United States Geologic Survey (USGS) topographic mapping, National Wetland Inventory (NWI) Maps, and Mecklenburg and Iredell County data were reviewed for the presence of topographic features and potential water resources such as wetlands and streams. Data from the North Carolina Department of Transportation (NCDOT) and the State Historic Preservation Office (SHPO) were reviewed for the presence of historic resources. Qualitative impacts were carefully reviewed by technical staff and determined based on professional judgment. In a number of areas, the work previously completed as part of the 2008 Environmental Assessment encompassed the area necessary for either scenario – a new track facility located at a 26’ or 40’ offset from the existing O-Line.

The following table shows the relative impacts of 40-foot offset scenario, as compared to the original LYNX Red Line Locally Preferred Alternative (LPA).

**Table 6 – Relative impacts of each alignment option**

IMPACT AREAS	Commuter Rail LPA <sup>1</sup>	Second Track (40-ft offset) <sup>2</sup>
<b>NOISE AND VIBRATION</b>		
Noise without horn (# sites)	0-16 severe impacts	No Change
Noise with horn (# sites)	1,328-1,329 severe impacts	No Change
Vibration (# sites)	95	No Change
<b>ECOSYSTEMS, FARMALNDS, T&amp;E SPECIES</b>		
Endangered species (acres)		
Schweinitz’s sunflower	0.09-0.10	TBD
Michaux’s sumac	0.21-0.30	
Smooth coneflower	0.17-0.26	
Farmlands (acres)	4.9-6.0	89.0
Terrestrial plant communities	3.05-4.62	TBD
<b>DISPLACEMENTS</b>		
	Low	High
<b>CONSTRUCTION IMPACTS</b>		
	Low	Medium

1. Impacts from CATS Preliminary Draft Report, April 2008

2. All Impacts were calculated using the 40-foot offset scenario with a 50-foot right of way to the west of the existing O-Line rail alignment

\* Assumes same surface water and wetland features impacted by the commuter rail LPA. No additional features were identified on the available mapping.



The following evaluation categories were assessed:

### **Traffic**

The original traffic study identified a number of intersections that would be degraded, operating at a level of service (LOS) E/F. As the two scenarios would operate on parallel tracks to the LPA, the number of intersection operating at LOS E/F would likely be identical. For this study, the original Environmental Assessment (EA) was used with respect to the effects of commuter rail trains on vehicular traffic. No future NSR freight train traffic is considered in this work, however, additional freight service including transforming the O-Line into an NSR mainline would result in its own number of environmental and community impacts.

### **Land Use Plans and Policies**

Given that the separation distance between the existing O-Line and a new location facility is minimal (26' and 40') with respect to overarching land use plans and policies, and that all alignments would serve the same developments and station areas, both scenarios considered in this white paper would be consistent with the land use plans and policies previously established in the region.

However, current land uses would be impacted within the 'town center' areas of communities along the corridor. This includes impacts to Huntersville, Cornelius, Davidson, and Mooresville. As noted in the displacements section below, many existing structures would no longer be viable for their current purposes. If the NSR main line was moved to the O Line

### **Displacements**

The original Draft EA document of the "North Corridor Commuter Rail" project identified six residential and six business displacements as part of the project. Using the worst case scenario identified in this study, including 50-feet of needed ROW and a 40-foot separation from the existing O-Line track, **the Red**

*50-feet of right-of-way and 40-foot of separation from the O-Line would impact structures on 160 parcels throughout the study corridor.*

**Line would impact structures on 160 parcels throughout the study corridor.** While it is likely that not all of these parcels would be considered displacements as the impacted structure could be an outbuilding rather than a dwelling or business, it should be noted that there are several more parcels affected by the corridor that do not have impacted structures (see Table 4). These locations are not concentrated in any one particular location along the corridor, but rather individual resources along the length of the corridor. Maps presented in appendix F show parcels affected. It is likely that this number would increase significantly if the NSR mainline were moved to the O-Line corridor, however, the potential extent of this impact is not known at this time.



### **Community Services**

Aside from temporary impacts resulting from construction of a new alignment (26' or 40'), there are no anticipated long term adverse impacts to access of community services or for emergency service operations. Reduction in congestion and vehicle miles traveled (VMT) in the region as a result of the project would likely have positive effects on access and emergency service operations. Furthermore, all existing and new crossings of roadways and other access points would be controlled with a combination of signals and crossing gates.

### **Environmental Justice**

The project is not likely to have disproportionately adverse effects to environmental justice populations (i.e. low income and minority populations). Positive impacts to these populations as a result of this project could include improved mobility through the region as well as the creation of new access to employment. It is determined that these impacts would outweigh any potential negative impacts resulting from the project.

It is understood that there are Environmental Justice populations on the corridor, such as the Greenville and Derita neighborhoods in Charlotte, and a minority community in Davidson. It is likely that these impacts will be similar to those identified in the originally provided EA, however any additional impacts would require more detailed analysis in future studies.

### **Population and Employment**

The population and employment projections for 2030 analyzed the area within ½ mile of the station locations. As the two scenarios under consideration would utilize the same station areas, serve the same destinations, and would use parallel tracks, it can be assumed that the population and employment projects would be similar.

### **Visual and Aesthetics**

The existing O-Line currently runs a number of freight trains and has been in operation for years; thus the character and nature of the corridor would not be impacted by the addition of either tracks or rail vehicles. Potential impacts could occur with the introduction of additional rail vehicles, however, given the frequency of trains (30 min peak hour headway, 1 hour off-peak) impacts are anticipated to be minimal.

If the NSR mainline were moved to the O-Line corridor, the single-track (with sidings) scenario existing today would be replaced with a two- or three-track condition, significantly impacting the downtown areas in communities along the corridor.



## **Air Quality**

Given the original LPA alignment was in conformance with the Regional Air Quality Plan, it is assumed that either scenario (26' or 40') would still be in conformance. In addition, the technology and number of vehicles would be identical, thus would not create any carbon monoxide (CO) hot spots. Finally, being a high-capacity transit project, either scenario would result in the reduction of VMT, which in turn would provide a positive benefit to air quality in the region.

## **Noise and Vibration**

Both noise and vibration impacts were calculated assuming commuter trains in the AM and PM hours integrated with freight traffic. New plans include additional freight traffic on the NSR mainline, with the additional commuter rail trains. It is anticipated that the number of sites for both noise and vibration impacts would be similar, however additional analysis based on the revised plan would be necessary to determine the exact number of sites that would be impacted. Additional analysis would also be necessary to determine if any additional sites would be impacted by vibration.

## **Ecosystems, Farmlands, Protected/Endangered Species**

As part of the original project, the acreage of several endangered species, terrestrial plant communities, and farmlands were calculated. As there are no accurate GIS data layers for endangered species and terrestrial plant communities, field investigation will be necessary to determine whether the presence of any of these resources are located along the corridor. An initial assessment of the corridor did identify a substantial number of acres of farmland along the corridor. However, as the corridor is highly developed and a significant portion is urban, the presence of protected or endangered species resources is unlikely.

## **Water Resources**

The original study identified several hundred linear feet of stream impacts and just over one tenth of an acre of wetlands. Revised calculations did not identify the presence of any water resources, as the rail line runs between two watersheds, along high elevation. Culvert extensions would likely be required where existing culverts cross the rail line.

## **Historical and Archaeological Resources**

The areas of potential effects for both historical and archaeological resources established for the previous EA extended further than the proposed 26' and 40' scenarios. There were six to seven historical sites either listed or eligible during the original assessment and thus no potential impacts to additional resources are anticipated. The identified resources include the Croft Historic District, Davidson Historic District (with three contributing resources), the George Houston House, and the Stough House. In addition, there were no archaeological sites or potential for sites identified during the original assessment, thus no potential impacts are anticipated. As the 26' and 40' scenarios would require new construction, technical resources from the State Archaeology Office will be available for consultation during construction. Section 4f parcels were not reviewed.



## **Parklands**

Bailey Road Park is the only park located adjacent or within the proposed ROW for the two scenarios and is located to the east of the existing rail line. A “de minimis” determination was made during the original assessment and as the two scenarios propose adding capacity to the west, adverse impacts to Bailey Road Park are unlikely, thus a second “de minimis” determination is expected.

## **Hazardous Materials**

A Phase I Environmental Assessment was conducted as part of the original project and identified a number of sites that could be impacted. As per American Society for Testing and Materials (ASTM) standards, the standard search radius would have been inclusive of the proposed ROW for a 26’ and 40’ track separation. As such, the impacts calculated as part of the LPA selection would likely be the same for the two scenarios. Phase II testing would be conducted as part of either scenario and would occur prior to construction for any potential site.

## **Construction Impacts**

The LYNX Red Line commuter rail project, as defined in the previously provided EA and the 2006 Systems Plan, was assumed to share facilities with the existing O-Line. As a result, the Construction Impacts were originally categorized as low, as the vast majority of construction activities would be restricted to the existing NSR easement limits. The change in approach described in this paper, which describes the construction of a new parallel LYNX Red Line, results in potential for increased construction impacts and potential disruption to downtown centers, traffic congestion, business and residence access, and possibly temporary closures and detours. Depending on the scenario selected and implemented (the 26’ or 40’ separation), construction impacts may be somewhat mitigated by reduced or confined project impacts. However project construction elements, including possible crossing closures, roadway realignments and crossing safety items, will disrupt traffic during construction and likely alter normal traffic patterns in the final condition. Construction of new alignment should require the original assumption of “low” impacts to be increased to a “medium” categorization. As construction will be occurring largely in already developed areas and primarily adjacent to an existing rail corridor, impacts were determined not to be “high.” Upon future investigation, it is possible that impacts to adjacent roadways, town center areas, and local vehicular traffic may warrant a “high” categorization.

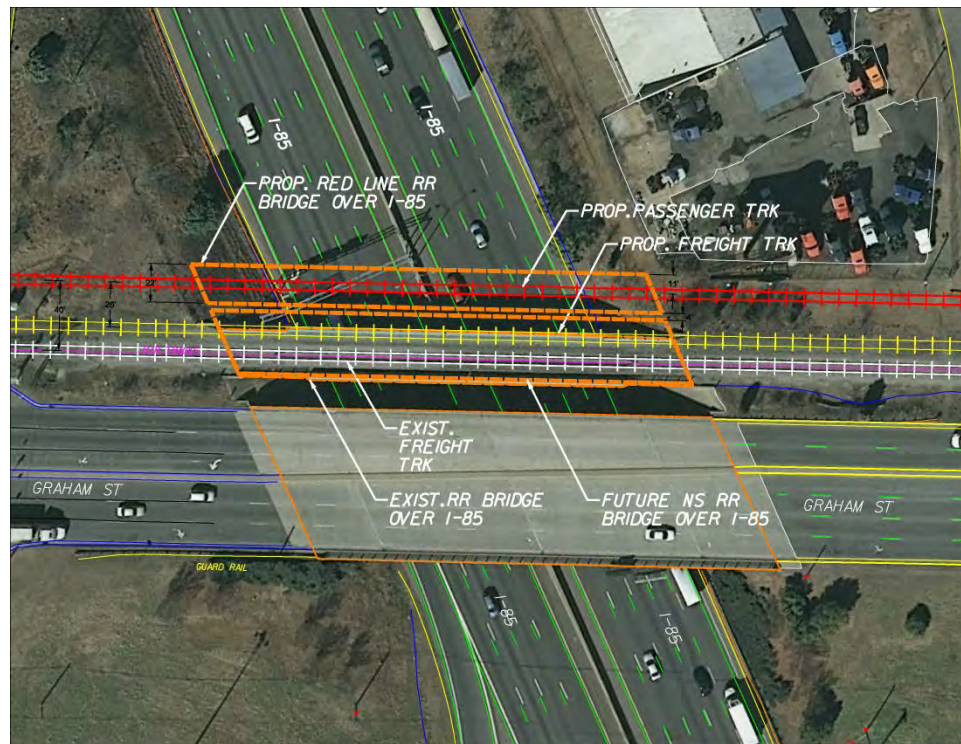
## **Structural Impacts:**

Three rail bridge structures are anticipated to be required for the LYNX Red Line corridor. These bridges are located where the LYNX Red Line crosses I-85, W. T. Harris Boulevard, and Main Street. The Main Street crossing is located in Davidson, while the other two crossings are located within the city limits of Charlotte. Note that three bridges in uptown Charlotte on the LYNX Red Line project but outside the limits of this study are not considered here, as it is assumed that that bridge would be necessary regardless of the recently changed NSR policies.

To quantify the potential impacts of the structures not originally included in the LYNX Red Line design, some base assumptions have been developed for governing the concept development and cost estimation:

- For maintenance and other reasons, NSR and CATS will require two independently owned rail bridge structures.
- Additional longitudinal impacts to the track alignment and NSR ROW will be incurred up- and down-station of the bridge structures as a result of the two-bridge scenario.
- The existing NSR bridge over I-85 would likely be widened to west to avoid reconstruction of Graham street bridge, pushing the CATS bridge farther to the west and increasing property impacts along the alignment.

**Figure 5 - Existing and potential rail bridge location at I-85**



- The current design includes Red Line trains utilizing an existing single track NSR bridge over W.T. Harris Boulevard. To accommodate the future conditions, installation of a new CATS-only rail bridge over W.T. Harris Boulevard will push the LYNX Red Line tracks very close to or even into Old Statesville Road north of the bridge. This pinch point immediately north of W.T. Harris Boulevard will also create a new conflict between the LYNX Red Line and an existing active NSR siding track into the Ameristeel plant – an active customer on the current O-Line freight service. It is assumed that an at-grade crossing of the LYNX Red Line at W.T. Harris Boulevard would not





be a prudent solution, and may prove to be infeasible from a cost and engineering perspective. (See appendix D.)

- Main Street is a narrow bridge over NC 115 on the border between Cornelius and Davidson. A new adjacent structure would cross NC 115 at a skew, in the same manner as the existing rail bridge, likely resulting in a reconfiguration of many of the adjacent roadways.

A bridge width of 22 feet has been assumed for each new CATS bridge based on the requirement of 10' horizontal clearance from the centerline of track to the inside of the barrier on each side of the track. The bridge length has been estimated based on the approximate length of the existing Norfolk Southern bridges at these locations. The following table summarizes the cost estimates for the three bridges considered. Bridge costs are assumed to be within the range of \$500 to \$750 per square foot. The costs shown in the table are based on \$750 per square foot, with 25% contingency included for a total cost of \$1000 per square foot.

**Table 8 - Summary of conceptual structure cost estimates**

Location	No. of Spans	Length ft	Width ft	Area Sq. Ft.	Bridge Cost (millions)
I-85	4	260	22	5720	\$5.7
W.T. Harris	4	180	22	3960	\$4.0
Main Street	3	130	22	2860	\$2.9
<b>Total</b>					<b>\$12.5</b>

### Grade Crossing Impacts:

Implementation of the LYNX Red Line has always envisioned improvements to grade crossing safety in response to the projected increased speeds of the proposed commuter rail service. Improvements to grade crossing gates, traffic signage, pavement striping, signal detection, and signal houses were included in the original cost estimates, along with multiple crossing closures for the desired improvements to safety. It is assumed that new grade crossing safety equipment, similar to or greater than those originally designed, will be required at every roadway grade crossing, in accordance with NSR policies and current Federal Railroad Administration (FRA) guidelines.

With the installation of a new CATS track west of the existing O-Line, the amount of safety equipment and overall cost implications will grow considerably. It is believed that several skewed grade crossings will require realignment of adjacent roadways or driveways to provide necessary clearances to gate arms. In areas where the existing track is immediately adjacent to the roadway, such as on Graham Street or portions of NC-115, expansion to the west will move these arms and the advanced warning signs beyond driveway or roadway boundaries. Installation of this infrastructure may result in the relocation of significant lengths of underground and overhead utility lines that currently parallel the NSR tracks.



It is anticipated that utility impacts resulting from widened or expanded grade crossings will have a significant negative impact on existing utilities along the corridor. Widening of the corridor will likely require modifications to parallel facilities such as telecommunication companies and power transmission / distribution lines. Increased width of the grade crossing areas, accompanied by additional grade crossing safety measures, will likely result in the reconstruction of multiple perpendicular utility crossings, including the adjustment and relocation of water valves, sewer manholes, and natural gas connections. Adjustments to the existing roadway grades will require reevaluation and possible reconstruction of gravity systems such as sewer and stormwater facilities. While not quantified in this study, these impacts to roadway infrastructure, sidewalks, and traffic control systems could be significant to the overall cost of the project and should be studied in detail in the future.

To quantify the potential impacts to the system resulting from an additional NSR track and the LYNX Red Line, a series of assumptions have been made:

**Assumption #1:** New gates and crossing safety equipment will be required.

It is expected that the number of maintained rail crossings and grade crossing closures per section of the LYNX Red Line remain approximately the same as they were for the original design. However, with increased safety requirements and the three track scenario, major crossing upgrades will be required at half of all crossings on the corridor.

**Table 9 – CATS North Corridor grade crossings summary**

Segment of Corridor	Closed Crossings	Major Crossing Upgrades	Minor Crossing Upgrades	Total Crossings
Charlotte	14	14	14	42
Huntersville	5	7	7	19
Cornelius	4	4	4	12
Davidson	1	2	2	5
Iredell	0	4	5	9
<b>Total</b>	<b>24</b>	<b>31</b>	<b>32</b>	<b>87</b>

**Assumption #2:** New gates and crossing safety equipment will be required.

It is assumed that enhanced grade crossing safety will be required for much of the entire project corridor. Given the three track scenario (two freight and one commuter rail), it is assumed that four gates (possibly two crossing gates and two pedestrian gates), two cantilevers, and a number of signals and signs will be required at every maintained crossing.

**Assumption #3:** Roadway improvements will increase based on widened and improved grade crossings.



Detailed roadway improvement plans are included with the current North Corridor Project. These drawings depict the minimum roadway improvements to mitigate the rail impacts. It is anticipated that these impact will greatly increase as a result of the three track scenario. Inclusion of three tracks will affect roadway horizontal alignments and vertical profiles, curb return radii at intersections near the tracks, driveway locations, and guardrail placement. Additionally, the potential need for increased total parcel acquisition due to private crossing closures may result in additional frontage road improvements, as a result of the future three track scenario as compared to a single track today.

As stated earlier in the report, widening of the rail corridor to the west will benefit Graham Street at the south end of the corridor, to the detriment of Old Statesville Road through the northern segments of the corridor. When combined with the roadway impacts and improvements required as part of Grade Crossing installation, it is anticipated that roadway work is greatly increased from the original LYNX Red Line design.

### **Other Considerations**

With the change in the nature of the project, several items previously not included on the North Corridor project must now be considered. The three track design configuration, as described in the scenarios and options herein, assumes an independent commuter rail track operating parallel to an active freight line; a scenario that likely necessitates several items previously assumed to be addressed by NSR or deemed not necessary for the LYNX Red Line project. Some of these items are discussed below.

**Maintenance-of-Way Building and Fleet:** While not previously considered for a variety of reasons, a maintenance-of-way (MOW) building and associated vehicles and staff will be necessary to maintain the new LYNX Red Line Corridor. CATS will own and operate an independent ballasted heavy rail track parallel to an active NSR line. It is anticipated that CATS may coordinate maintenance equipment and procedures with NSR, as they would be located on an adjacent corridor for the length of the commuter line, however, it is also anticipated that CATS will typically need to maintain their own track and facilities. It is assumed that the maintenance structure with associated machines and tools will cost approximately \$5 million, while the fleet of equipment necessary to maintain approximately 26 miles of ballasted track will also cost approximately \$5 million.

*...a maintenance-of-way (MOW) building and associated vehicles and staff will be necessary to maintain the new LYNX Red Line Corridor.*

**Communications and Central Control:** It is assumed that central control of the commuter rail line, accompanied by a modern communications system, will be necessary for the future LYNX Red Line. It is unclear whether CATS would prefer to house this facility at the vehicle maintenance facility (VMF), proposed MOW building, or at the South Boulevard light rail facility. Regardless, it is believed that the system will likely be required to have positive train control. The cost of these systems is not included elsewhere in this study as it would likely have been required for both the original and future project designs.



**Increased Station Costs:** The NSR policy changes require the LYNX Red Line station platforms to be located on the outside of the track ROW. It is therefore assumed that all of the current station area designs would require revisions to comply with this policy. New platforms would need to be designed to current standards and comply with policy requirements. The resulting side platform design configuration could be problematic to install at many project locations. In addition, the following is stated in the Norfolk Southern Passenger Station Requirements:

*In the event that proposed station parking lots and parking garages are located across the tracks from a station platform, overhead bridges or under grade tunnels will be required. Pedestrian crossing at grade will not be permitted. This requirement is intended to ensure the maximum amount of safety for passengers and station patrons, especially along our busiest main line corridors.*

It is anticipated that the addition of tunnels, bridges, fencing, and other safety features will noticeably increase project costs, and will require a fresh look at the configurations and designs of all project stations. Some station locations may need to be shifted to new locations better oriented to accommodate parking and the platform on one side of the track in order to minimize these costs.

For cost estimating purposes, it is assumed that half of the stations will need to be redesigned to include improvements to accommodate the current policies. As part of the redesign of these facilities, it is assumed that only two of the stations would require a pedestrian bridge or tunnel. An average cost of \$2 million per station is used in this study.

**Train Capacity Study:** New documents need to be developed for the corridor as a result of the NSR policies. As stated in the following from the Norfolk Southern Passenger Station Requirements document:

*In the situation where a passenger/commuter service is proposed for sharing NSR tracks or Branch lines, a complete in-depth train capacity study must be undertaken at the expense of the passenger/commuter entity to assess passenger service impacts to the existing and future freight operations.*

With the revised approach to the corridor, and with the LYNX Red Line and the O-Line, while functioning transparently, are operating on the same corridor, it is anticipated that a new Train Capacity Study will be warranted and required. This model should be based on a future, newly adopted LPA. After completion of the LPA and the train capacity study, an agreement for joint use of the corridor can be pursued by CATS and NSR.

**Project Schedule Implications:** The sizable planning and design efforts associated with the scenarios considered in this study would affect the current Red Line schedule. The Draft Environmental Assessment would need to be redeveloped in its entirety, reassessing the corridor for the new conditions. Also, the current design would no longer be viable and a new project plan set would need to



be developed, reviewed, and approved, while other permitting processes would have to start from the beginning.

Beyond the public involvement and project design efforts, the new construction schedule would also significantly lengthen. The installation of new tracks, demolition of existing roadways, and installation of extensive civil infrastructure beyond the original intent of the Red Line project would increase construction durations. This longer schedule would conflict with current CATS plans, as could result in additional project costs when accounting for inflation for the new year of expenditure.

**Cost Considerations:** Compliance with the new policies creates additional capital costs. These costs are listed in table 10.



**Table 10 – Summary of cost implications due to new policies**

Item	Qty	Cost Each	Value
<b>Guideway and track elements</b>			
New structure needs	3	n/a	\$12.5M
Grade crossing modifications	87	Unknown. Further analysis required to determine typical costs.	
New track installation (new track roadbed, sub-ballast, and ballast with Wood Ties and major drainage modifications), including 4 miles of sidings	26 miles	\$1.3M/mi	\$33.8M
Public and private utilities, including adjustments and relocations to accommodate track, roadway, and drainage needs	Unknown	Unknown. Further analysis required to determine typical costs.	
<b>Stations/Stops</b>			
Stations, shelters, parking	6	\$2M	\$12M
Grade separated pedestrian access (tunnel or overpass)	2	Unknown. Further analysis required to determine typical costs.	
<b>Sitework &amp; Special Conditions</b>			
Environmental mitigation (wetlands, cultural resources, etc)		Unknown. Further analysis required to determine typical costs.	
Site structures including betterments		Unknown. Further analysis required to determine typical costs.	
<b>Systems</b>			
Communications, Train Control, and Grade Crossings ( <i>does not include Positive Train Control</i> )	22 miles (mainline)	Unknown. Further analysis required to determine typical costs. Conceptual estimate assumed to be \$1.3 million / mile.	
<b>ROW, Land, Existing Improvements</b>			
Displaced roadway reconstruction costs (does not include costs for private utility relocation and secondary ROW costs)	7.5 miles	\$6.5M/mi	\$48.75M
Cost for new ROW needed (worst case scenario)			\$11.7M
Cost for acquisitions/displacements (total take parcels)			\$86M
Operation and maintenance related costs (equipment and fleet)			\$10M



## **Conclusion:**

The implementation of the new NSR policies have fundamentally changed the assumptions for the existing LYNX Red Line project and changed the project understanding such that a new alternatives analysis study is warranted. The policies could alter the project enough to result in potential changes to environmental, physical, and community impacts along the length of the corridor. A supplemental EA, or complete re-evaluation of the corridor resulting in new NEPA documents, should be pursued moving forward.

Further analysis and evaluation should be conducted to alter the proposed alternative to attempt to lessen or avoid impacts. This may be best achieved by utilizing a portion of the corridor to the west and a portion to the east; however that would create other challenges to operating transparently and may require grade separated crossings of the NSR corridor to adhere to the policy for transparency.

A more financially acceptable solution for both parties may be needed to jointly plan the three tracks, station areas, existing or anticipated industrial service sidings, and other elements within the existing NSR easement. Due to the introduction of additional tracks on the corridor, project costs will increase with the potential rise in impacts to the surrounding communities and inherently require additional physical infrastructure. By modifying the existing O-Line track when necessary, and in order to utilize the existing O-Line easement to the extent possible, it appears possible to significantly reduce ROW, roadway, utility, and other property impacts while targeting ROW purchases to maximize benefits for identified necessary combined needs. To accomplish these goals, while keeping the strategic reserve nature of the O-Line intact, additional coordination between NSR and CATS is required to clarify the full requirements of the new policies, and to discuss future opportunities to improve the use of the corridor for the benefit of both parties.



## Appendix A

### *Norfolk Southern Railroad Policies*

1. Norfolk Southern Passenger Station Requirements
2. General Principles Guiding Norfolk Southern's Evaluation of Intercity and Commuter Passenger Rail Proposals





## **SUBJECT: Norfolk Southern Passenger Station Requirements**

In Norfolk Southern Railway Company's (NSR) policy statement dated June 15, 2005, Norfolk Southern set forth the conditions for permitting new or additional passenger rail service on our tracks. In that paper, NSR identified the principles intended to protect NSR-owned or dispatched rail lines and right of way. This policy stipulates that passenger operations must be "transparent" to our freight operations, and delay to freight trains by passenger trains, however minimal, is unacceptable. New services must pay fully allocated costs for access to the existing freight corridor, and there must be adequate liability protection as defined by NSR.

In the situation where a passenger/commuter service is proposed for sharing NSR tracks or Branch lines, a complete in-depth train capacity study must be undertaken at the expense of the passenger/commuter entity to assess passenger service impacts to the existing and future freight operations. Impacts to NSR freight business must be fully mitigated and that may involve constructing additional tracks, upgraded signal systems or other infrastructure improvements as specified by NSR.

In the situation where a passenger/commuter service is proposed for sharing only NSR ROW and not including NSR tracks, the adjacent passenger tracks must be separated by a minimum of 26 foot track centers to the NSR track and a barrier fence shall be installed between the two rail lines.

The NSR Standard platform clearance criteria for NSR territory for approved joint use tracks will be a low level platform located 5'-4" from centerline of track, and 0'-8" above top of rail.

Accordingly, any new passenger/commuter service using NSR tracks shall be limited to Gallery type passenger cars that are used by METRA (Chicago) and VRE (Washington, DC) that have on-board lift ramps to accommodate level board loading requirements established by the ADA.

NSR will only consider the use of High passenger platforms when the passenger/commuter service is prepared to construct dedicated station tracks.

In the event that proposed station parking lots and parking garages are located across the tracks from a station platform, overhead bridges or under grade tunnels will be required. Pedestrian crossing at grade will not be permitted. This

requirement is intended to ensure the maximum amount of safety for passengers and station patrons, especially along our busiest main line corridors.

In the event that the Federal government mandates station designs different than noted above, the passenger service will incur all costs to incorporate station infrastructure changes. NSR will expect that the freight operations, capacity, and maintenance obligations not be hindered due to such future mandates.

In the past, passenger facilities, including stations, were approved on a case-by-case basis, as we had no standard design criteria. In those instances, we provided guidelines, but made explicitly clear that NSR reserved the right to require more restrictive guidelines, as we deemed necessary. As requests for passenger service on our lines increase, we believe that it is practical to set forth our facility design requirements for constructing new passenger stations or to rehabilitate existing ones. In setting these standards, our paramount concern is safety, and we will not approve any design that increases risk to passengers and railroad employees, or subject NSR to additional liability exposure.

This memorandum is intended to outline our requirements for constructing new stations or rehabilitating existing ones on our lines.

### ***Station Requirements***

The following requirements should be followed in designing stations:

- Stations should have dual track access with ingress and egress under or over the right-of-way. At-grade pedestrian crossings are not permitted.
- Full-length high-level platforms may only be placed adjacent to tracks used exclusively by passenger trains. ***High platforms are not allowed adjacent to freight tracks.***
- Mini-high-level platforms may be constructed with the platform edge no closer than 8'-6" from the centerline of the adjacent track, if the track is shared with freight trains. Any considerations needed for gap reduction between the passenger car vestibule and platform edge shall be addressed with manually or mechanical means that does not reduce the minimum 8'-6" horizontal clearance requirement.

### ***Single track -***

Single-track platforms may be permitted in single-track territory subject to the requirements set forth herein with the stipulation that, in the event that the line is double-tracked the passenger/commuter authority or station owner will bear the full cost of construction for dual track access.

**Multiple tracks** - Side Platforms:

1. Platforms will be adjacent to each outside main line.
2. Pedestrian designated walkways to crossing tracks must be ADA compliant overpass or underpass (ramp or elevator equipped).
3. Track side platforms shall **NOT** be located near public at-grade crossings as this may encourage passenger/commuter station patrons to cross tracks other than at the designated overpass or underpass.

**Center Track Fences** -

In the situation where underpass and/or overpass facilities are provided for approved dual track platforms and a patron trespass potential across the tracks is foreseen or occurs on a repeated bases, NSR will require the passenger service operators or stations owners to fund the installation and maintenance costs of center track fencing or other type of station fencing.

In the situation where the installation of any needed fencing including center track fences are required (at locations determined by NSR), any costs associated with altering track centers to better facilitate efficient movement of wide and standard sized freight car movements, shall be borne by the passenger/commuter operators or station owners.

**Multiple Tracks** - Center Platform:

1. Center track platforms may be workable provided that alternate footpaths are sealed off so that patrons only use the designated overpass or underpass access.

**Low Platforms** - General Guidelines

1. Dimensions for center, low platforms –
  - a. 22'-0" minimum width (track centers for tangent track would be 32'-8")
  - b. 26'-0" desirable width (track centers for tangent track would be 36'-8")
  - c. 32'-0" extremely desirable width (track centers for tangent track would be 42'-8")
2. Dimensions for side, low platforms –
  - a. 12'-0" minimum width
  - b. 16'-0" desirable width
3. Clearances for low platforms –
  - a. 5'-4" center of track to face of platform (minimum)
  - b. 0'-8" height of platform above top of rail (maximum)

### **Canopies –**

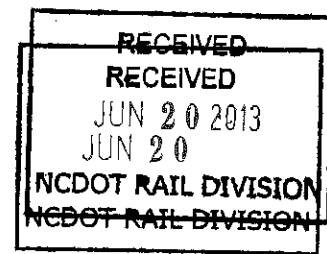
Gutterless canopies shall be used and shall slope away from track. Side clearance shall be 9'-0" (minimum) on tangent track.

### **Horizontal Clearance Adjustments –**

Adjustments to the minimum horizontal clearance will be made for any portion of the platform that is not located in tangent track. The adjustment for curvature shall be made as outlined below, and shall not be the larger measurement, but rather a cumulative adjustment;

1. Side clearance shall be increase 1-1/2" per degree of curvature in curved track.
2. At a height of 16'2" above top of rail, the side clearance shall be increased 3.5 inches per inch of super elevation where the cars lean into the canopy (canopy on inside of curve)

[End of Document]



Norfolk Southern Corporation  
Strategic Planning  
Three Commercial Place  
Norfolk, VA 23510

**John V. Edwards**  
General Director Passenger Policy  
757-629-2838  
757-533-4884 – Fax  
John.Edwards@nscorp.com

June 14, 2013

Rail Division Director Paul Worley  
North Carolina Department of Transportation  
1553 Mail Service Center  
Raleigh, NC 27699-1553

Re: Proposed Passenger Projects

Dear Paul:

My colleagues at Norfolk Southern and I look forward to working with you regarding continued State and Federal government interest in passenger rail initiatives.

We have taken a fresh look at our passenger planning policy, and the principles set forth in the attachment will guide our perspective. They protect the safety of NS employees and communities, service to our freight customers, and the right-of-way and land needed to fulfill our freight transportation mission.

Please distribute this document to those who may be involved in progressing passenger initiatives in North Carolina. (We will provide a separate policy that applies to the design and construction of passenger stations, should that be relevant.)

Three primary conditions must be satisfied for NS to consider a passenger project. First, public and employee safety must be maintained or improved. Second, NS must model the configuration and effects of the proposed project, a process that can take several years. And third, any project – like our freight business -- must provide a return for our stockholders. It is helpful to understand that the availability of project funding and an operational feasibility study are not the end of the discussion, but rather the beginning. Therefore, we urge you to begin planning well in advance of when funding could become available.

Thank you for your attention to our guidelines and principles. NS stands ready to discuss new passenger rail proposals your department may have.

Sincerely,

A handwritten signature in black ink, appearing to be "John Edwards", written over a horizontal line.

John Edwards  
General Director, Passenger Policy

GENERAL PRINCIPLES GUIDING  
NORFOLK SOUTHERN'S EVALUATION OF  
INTERCITY AND COMMUTER PASSENGER RAIL  
PROPOSALS

The following principles are a guide for planners of intercity and commuter rail proposals when working with Norfolk Southern. Of course, each proposal necessarily is unique, and NS' application of the principles to particular proposals will often be unique as well.

Safety is our paramount concern. Design, maintenance practices, and operating patterns always will emphasize safety.

An operational feasibility study is necessary to fully understand all potential impacts.

- The proposed passenger operation must create “transparency” in the affected rail system. Transparency is the capacity for passenger trains and freight trains to operate without delay, however minimal, to each other, while still allowing for route maintenance.
  - Passenger projects are meant to be successful, so the study will focus on the proposal's full-build scenario versus any interim plan. Along the same lines, freight volumes will grow, so any study will anticipate future freight levels.
  - Freight operations are long distance and customer-driven, which precludes “passenger only” operating windows and temporal separation such as night-time-only freight operations.
  - Passenger projects might cause “network effects” on the NS system that are broader than the project area. Often, the studied geographic scope will have to be larger than the passenger project area in order to identify and address these effects.
  - Project costs associated with compliance with Federal Railroad Administration regulations are the responsibility of the project sponsor.
- The rail environment changes. Conditions attached to various forms of funding differ. Therefore, until funding is available, any passenger study is necessarily hypothetical.
  - A completed operational feasibility study by NS is a prerequisite to progress a project. NS will support only passenger project requests that have been fully studied and modeled.
  - As the transportation industry is dynamic, any proposal that does not secure funding cannot be shelved for future use – each proposal is unique, requiring its own up-to-date study.
  - Sometimes public funding comes with special conditions and requirements (including so-called “service outcome requirements”), which represent additional costs. Just as NS does not customarily agree to similar guarantees with our freight customers, the public sponsor will be responsible for any passenger guarantees.
  - It is possible that public funding may be taxable to Norfolk Southern, so the public sponsor must indemnify Norfolk Southern for any income taxes paid or incurred as a result of the receipt of public funding.

- NS will coordinate the operational feasibility study. The cost of the study (including NS' time) is the responsibility by the sponsoring public agency. For planning purposes, NS can estimate study costs in advance. Studies are detailed and specific and take a year, and often longer, to complete.

NS will receive fair compensation for use of its transportation corridors.

- NS' corridors consist of track and right-of-way that might, or might not, be fully utilized at any given time. As rail traffic flows change over time, this capacity, and the flexibility and potential it represents, is a key NS asset.
- Amtrak has certain statutory intercity passenger service access rights and therefore is not a good example to use in determining the fair and commercial price for use of NS assets.
- In determining a fair price for use of assets, NS will factor in any new equipment (including Positive Train Control) and costs, as well as additional property and other taxes, that would not be incurred absent passenger service.

New and expanded passenger operations require adequate liability protection.

- Passenger operators must compensate or indemnify NS for additional risk created by passenger projects, and any such indemnification needs to be backed up by an adequate level of insurance.
- Liability issues can create major hurdles. Often, sovereign immunity issues must be overcome. The cost to the passenger carrier for insurance and indemnification is substantial, as borne out by our experience with commuter authorities.

Special considerations are necessary for high speed rail service and corridors.

- Norfolk Southern is pleased to assist states planning for dedicated HSR and will work with planners to insulate those corridors from interference with and from NS freight corridors.
- Passenger trains operating in excess of 79 mph require their own dedicated tracks. Passenger trains operating in excess of 90 mph require their own private right-of-way.
- Where higher-speed trains share tracks with conventional freight trains, they will be able to reach 79 mph maximum. Where shared track is concerned, higher-speed trains must meet the same safety standards as conventional trains.

Special considerations are necessary for light rail service.

- Light rail service involves use of equipment that is not appropriate for use on NS tracks. Physical separation is required.
- Proposals for operating "non-compliant" passenger equipment (equipment that does not meet Federal Railway Administration standards) are not viable.
- Light-rail and non-compliant project sponsors should approach NS early in the process, and so that NS can advise if any of the project elements are compatible with freight trains and track.



## Appendix B

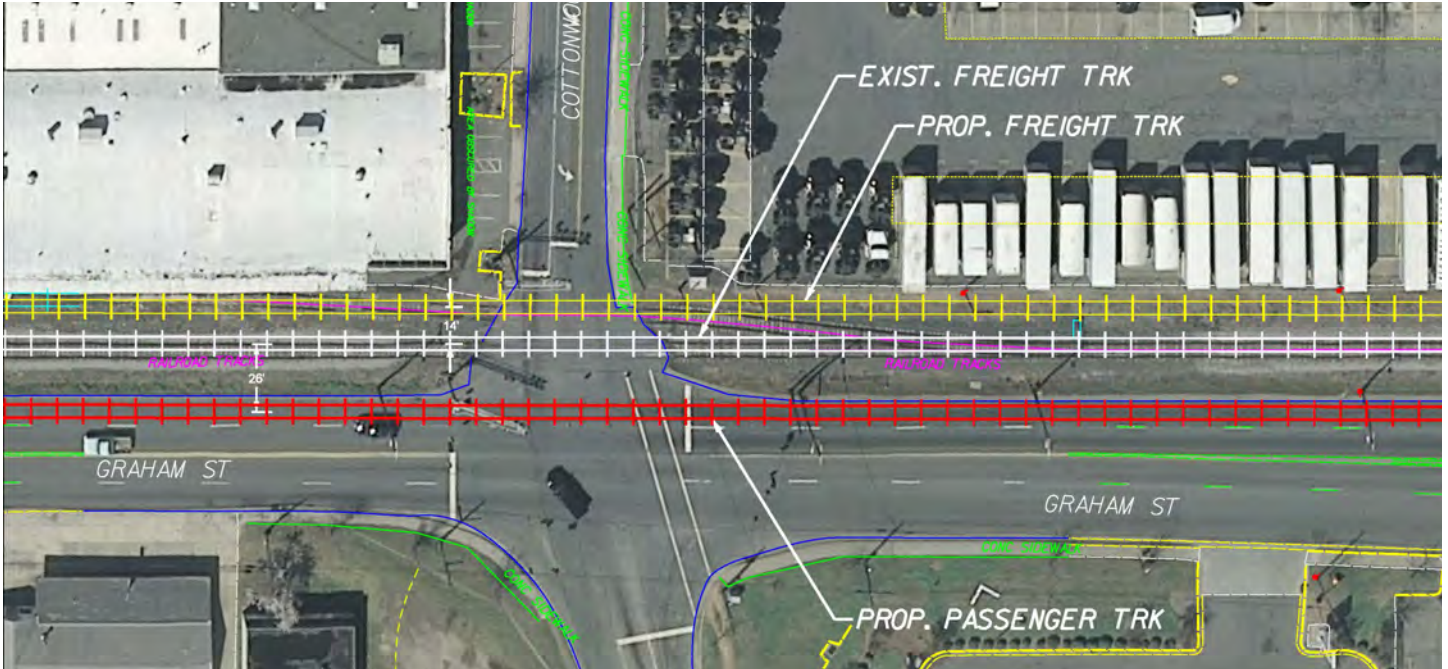
*Conceptual Plan View Graphics – East vs. West*



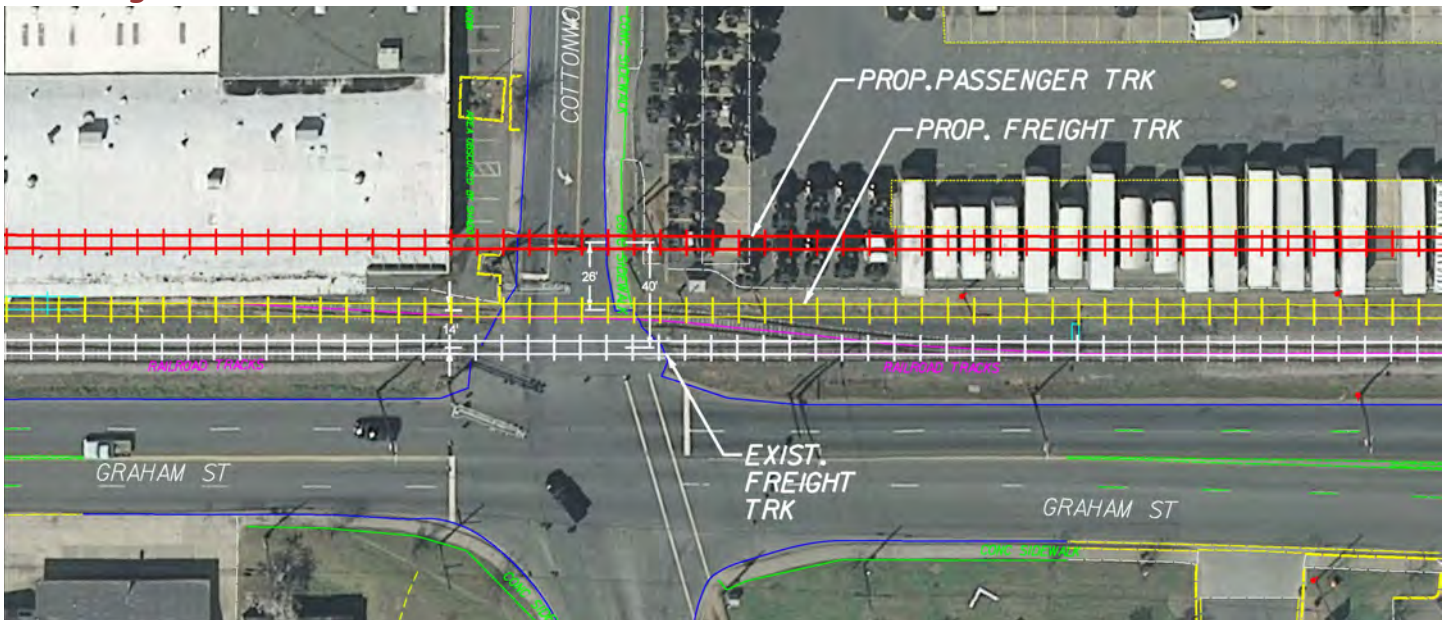


Cottonwood & Graham Streets, Charlotte, NC

**East Alignment**



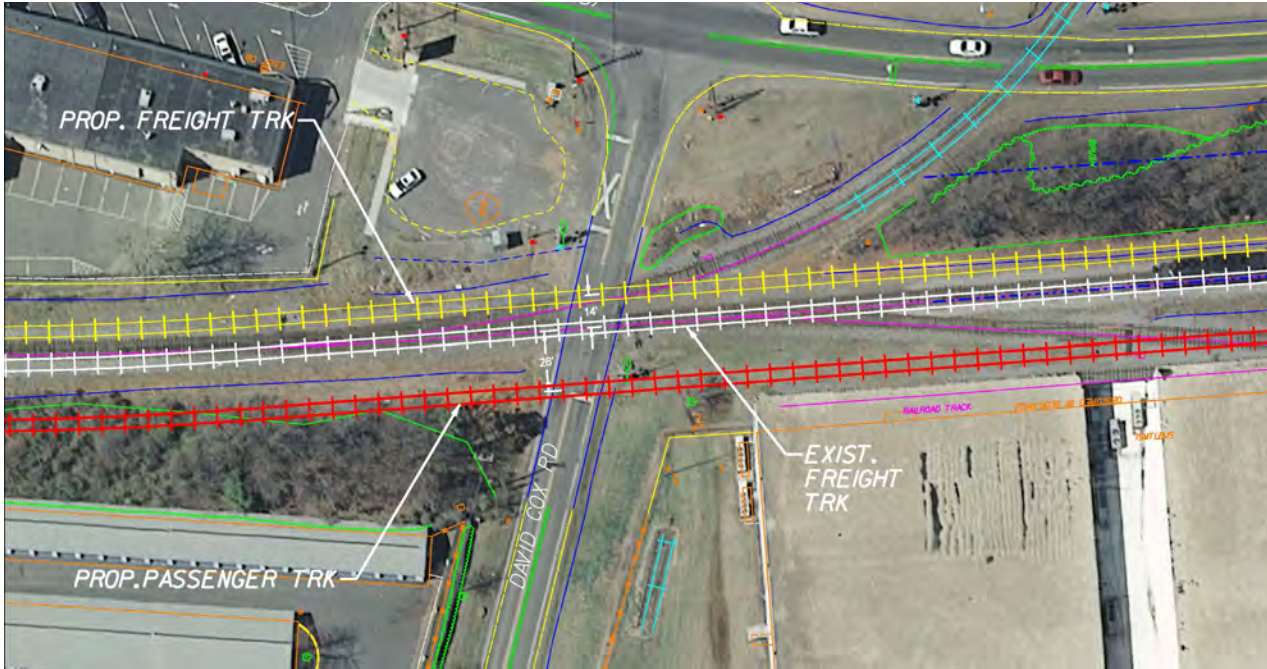
**West Alignment**



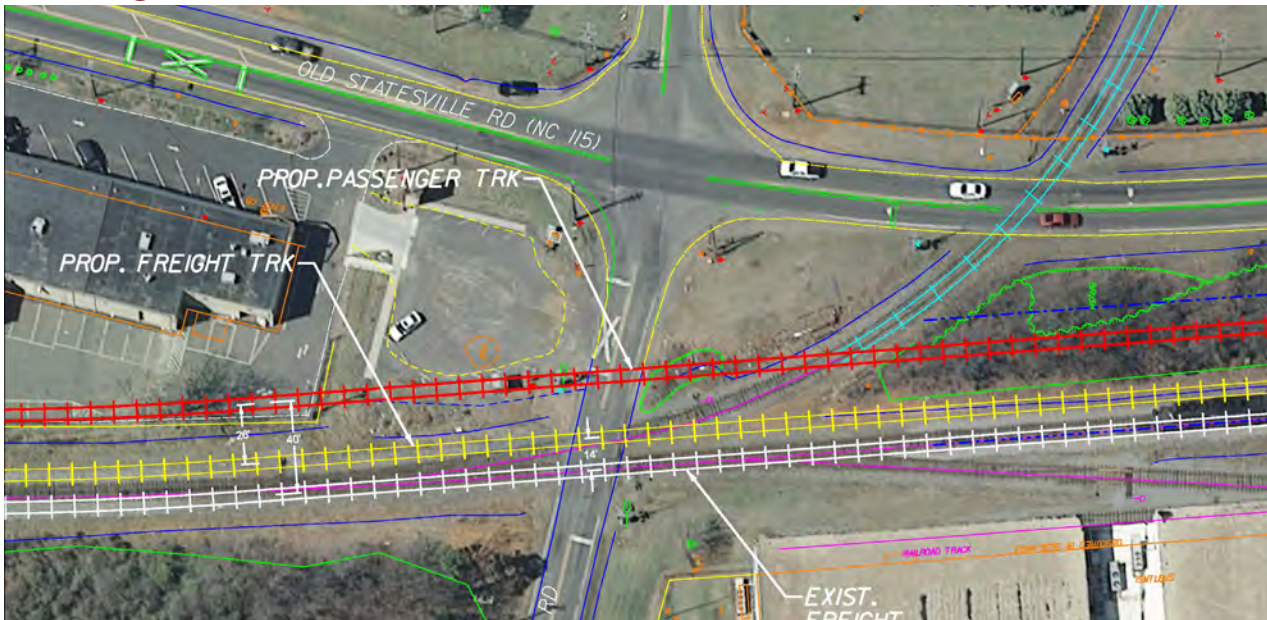


David Cox Road

**East Alignment**



**West Alignment**



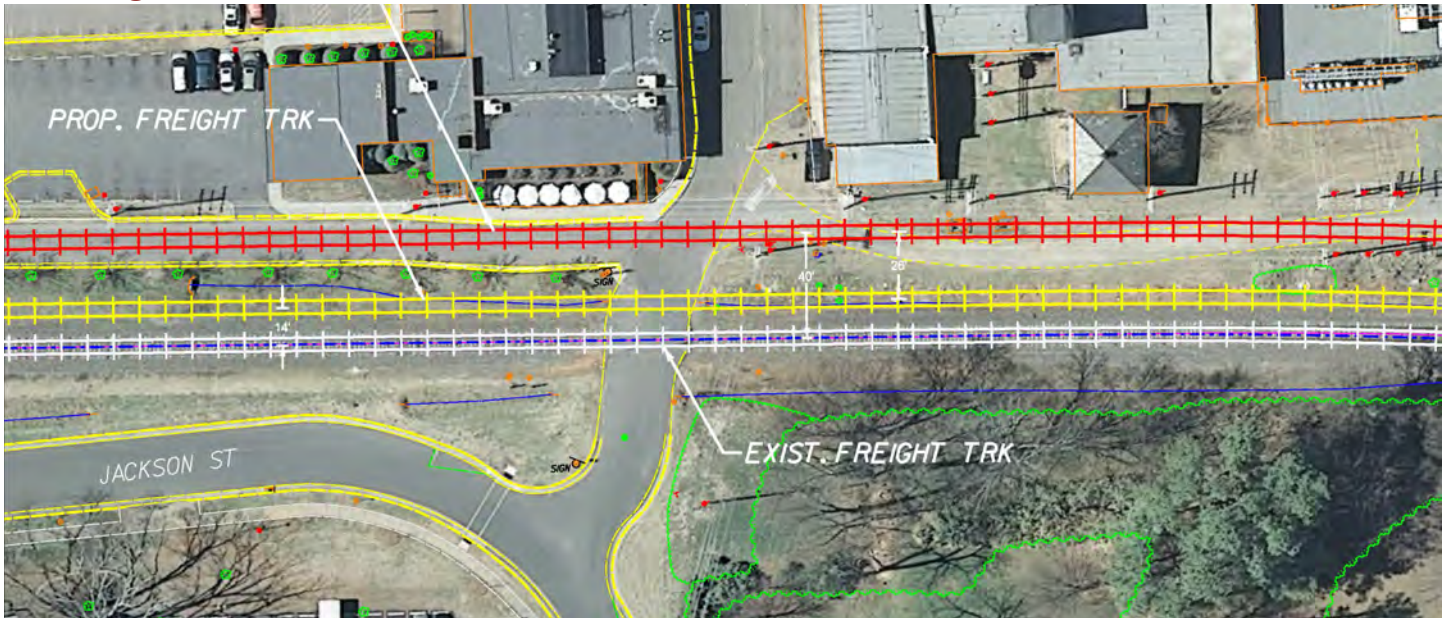


**Delburg Street**

**East Alignment**



**West Alignment**





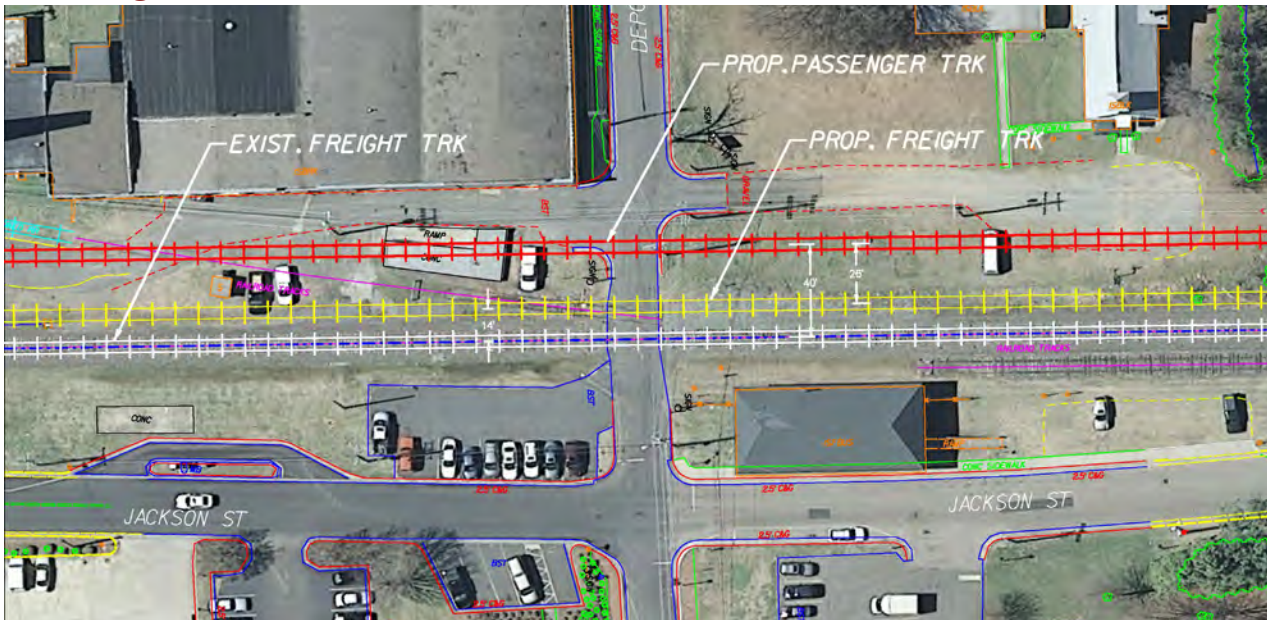
# Evaluation of CATS Red Line Corridor in Charlotte: North Carolina Department of Transportation

## Depot Street

### East Alignment



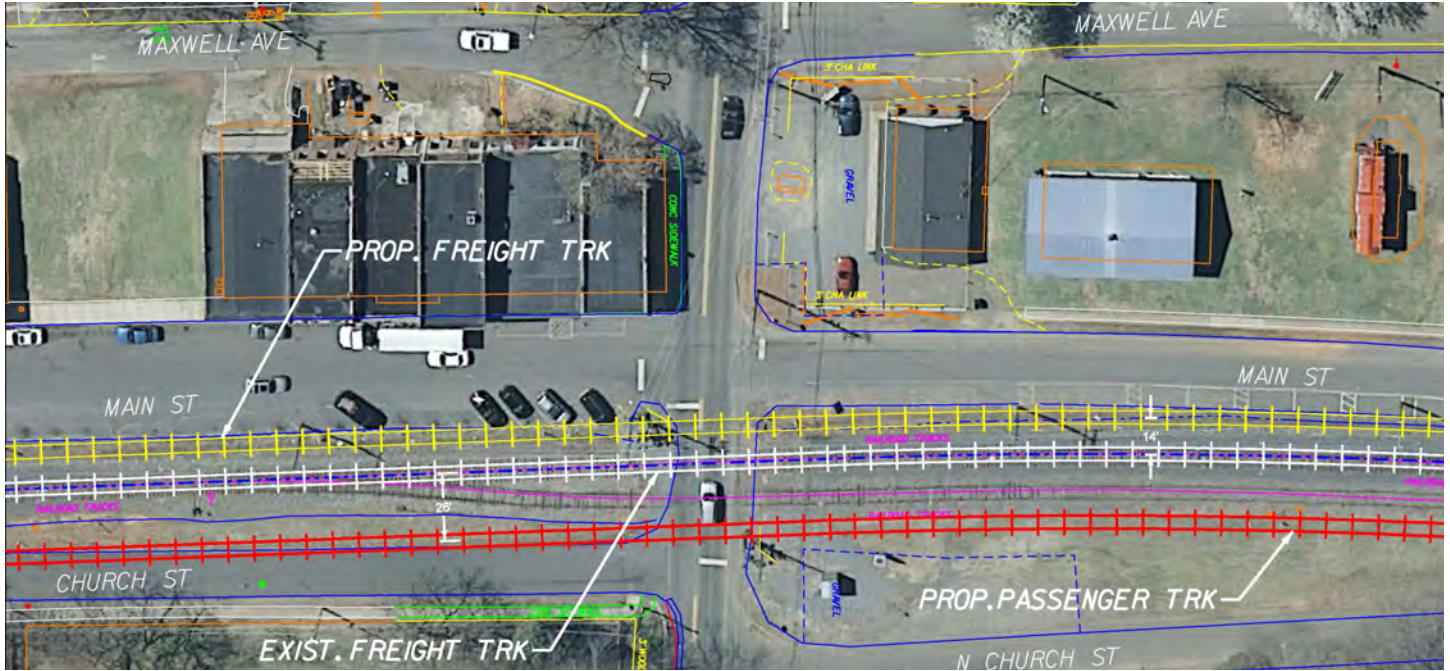
### West Alignment



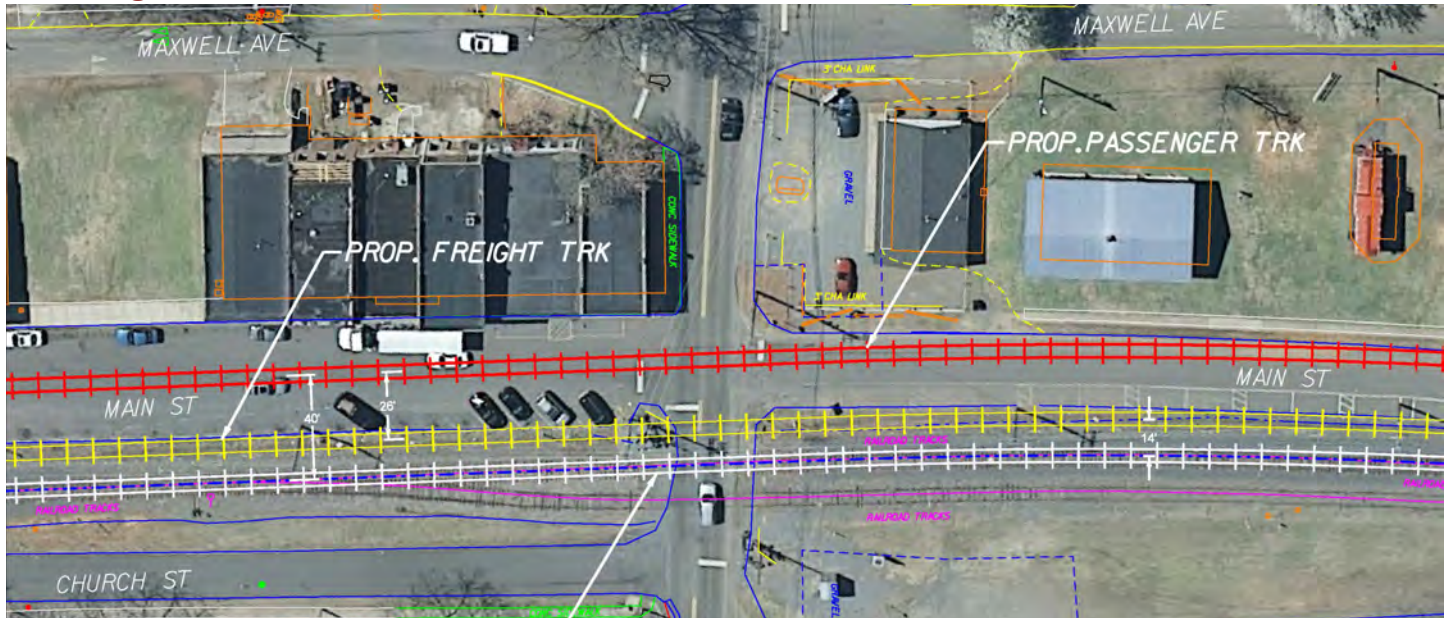


Huntersville-Concord Rd

**East Alignment**



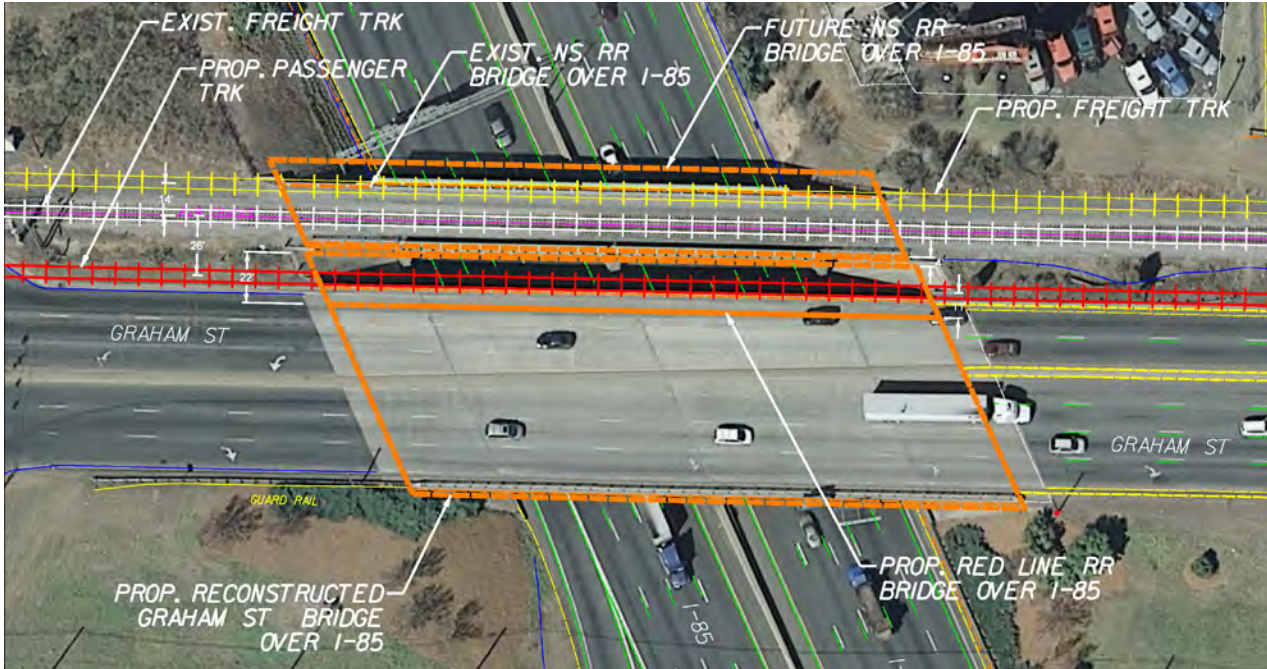
**West Alignment**



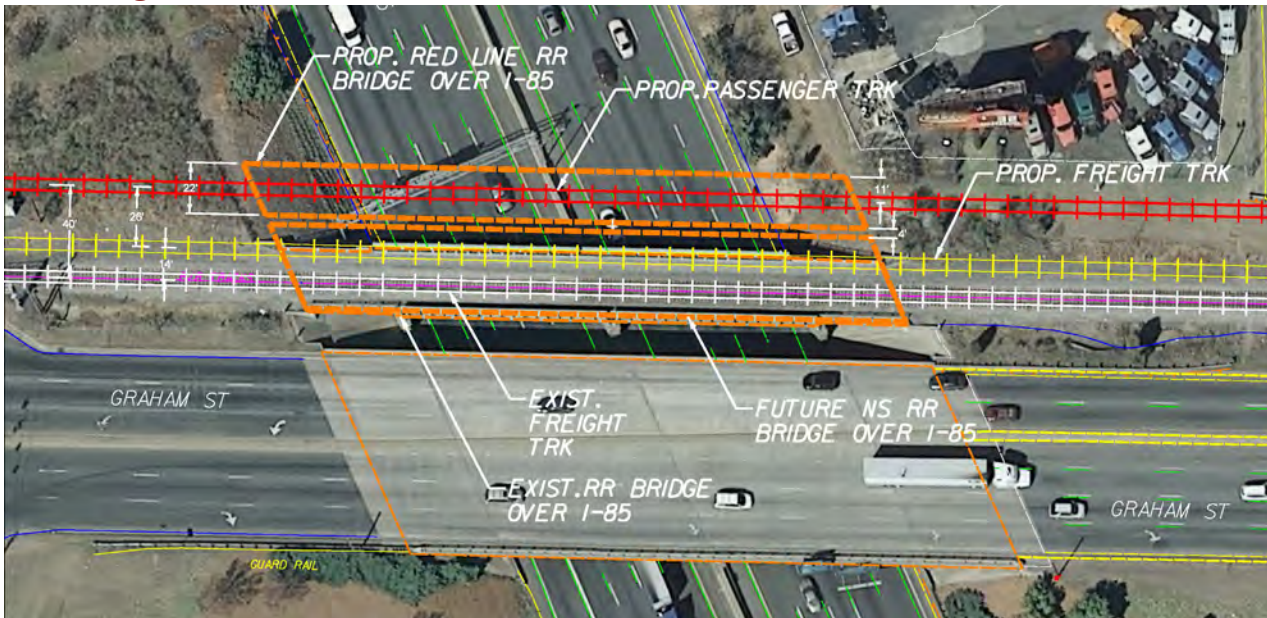


I-85

### East Alignment



### West Alignment



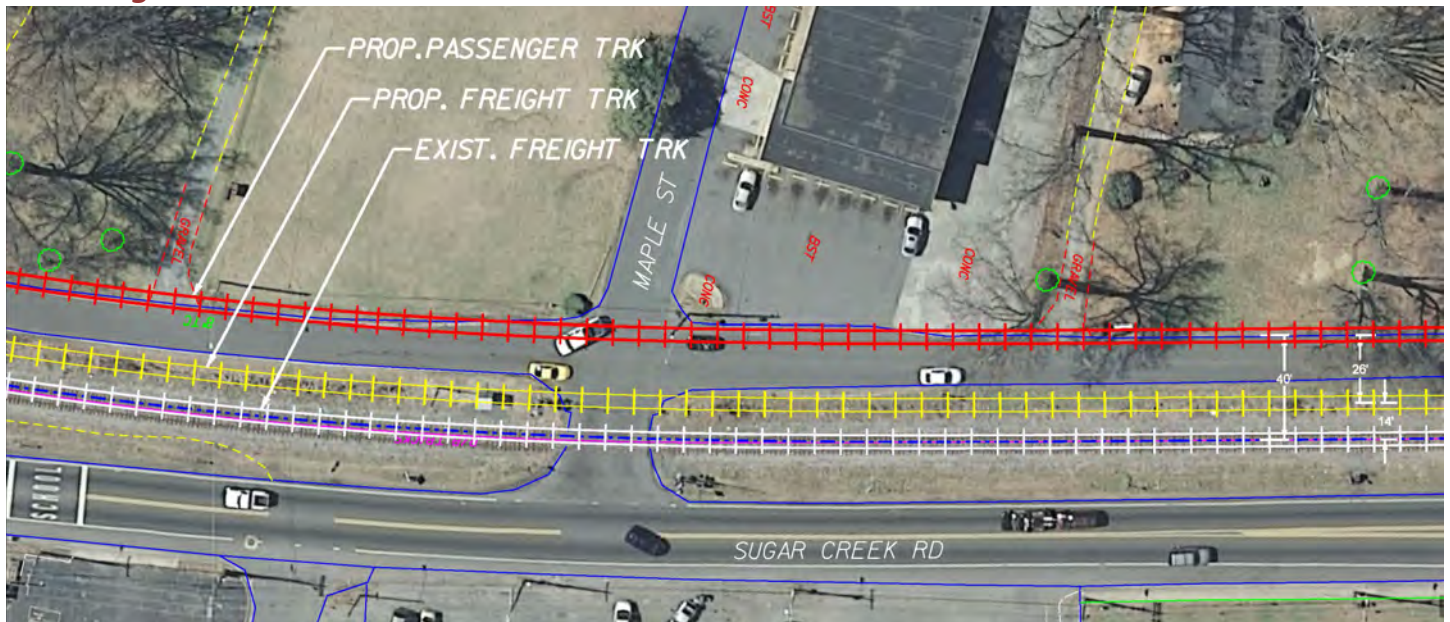


Maple Street

East Alignment



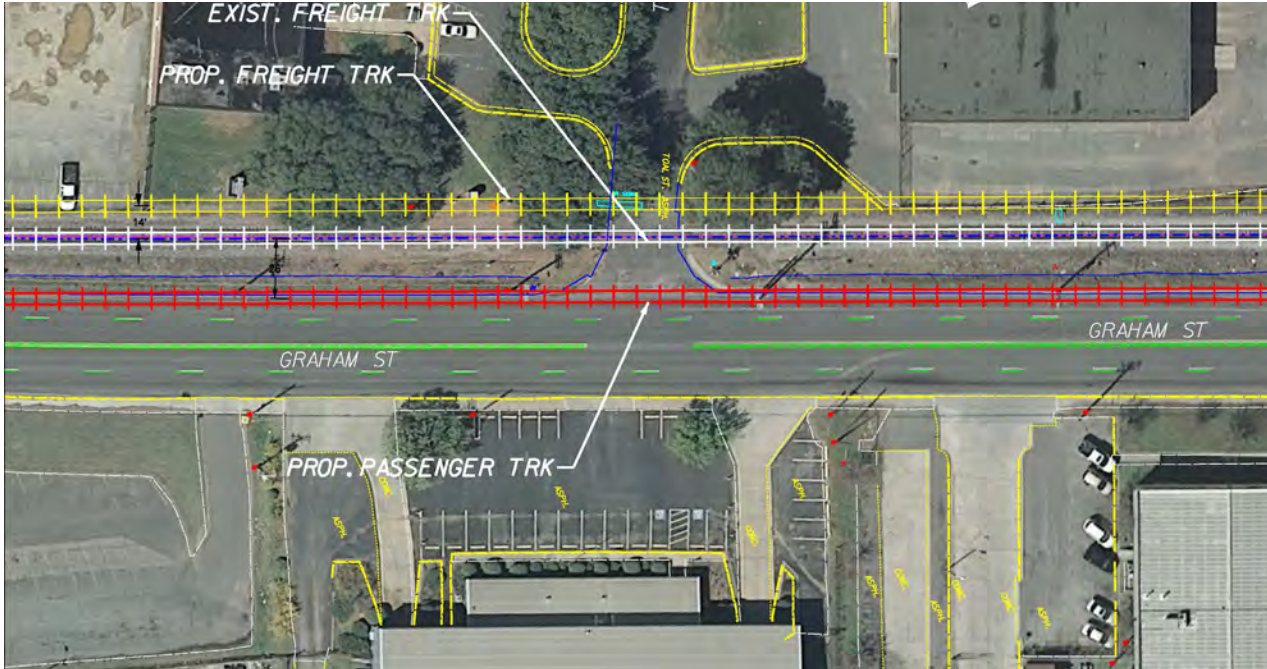
West Alignment





Toal Street

**East Alignment**



**West Alignment**



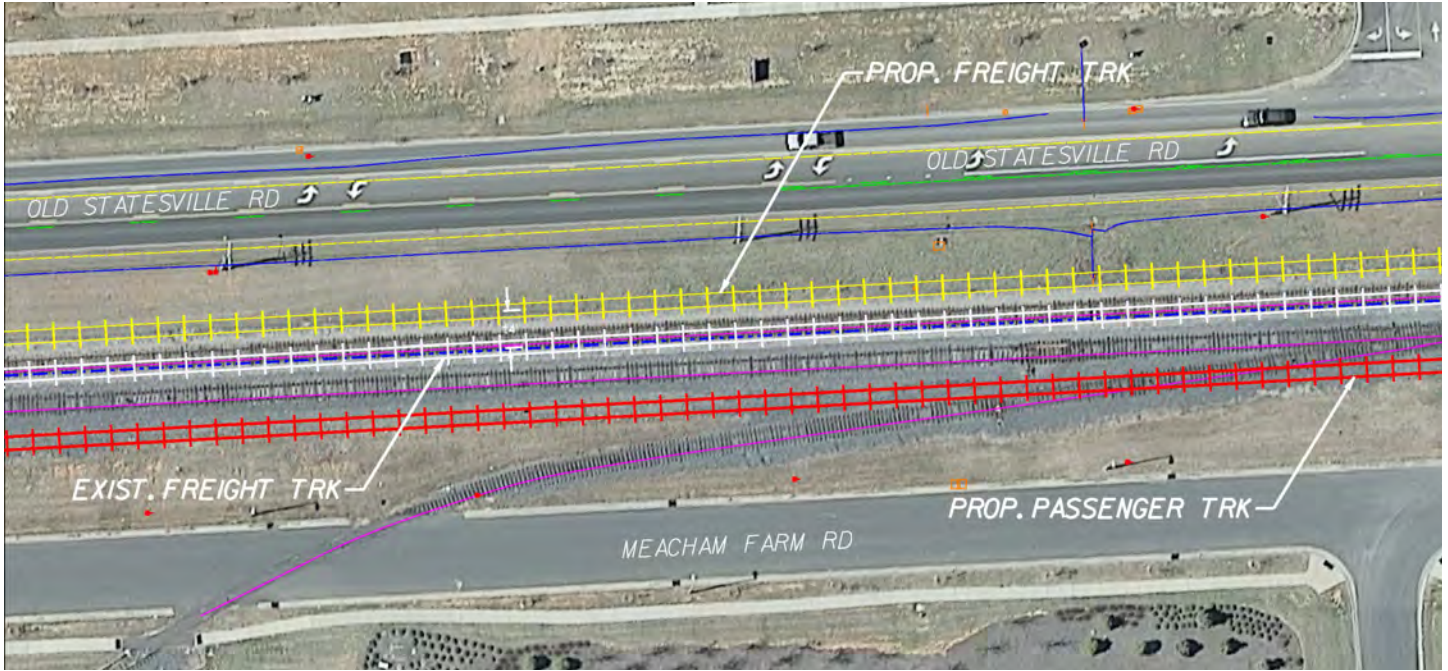




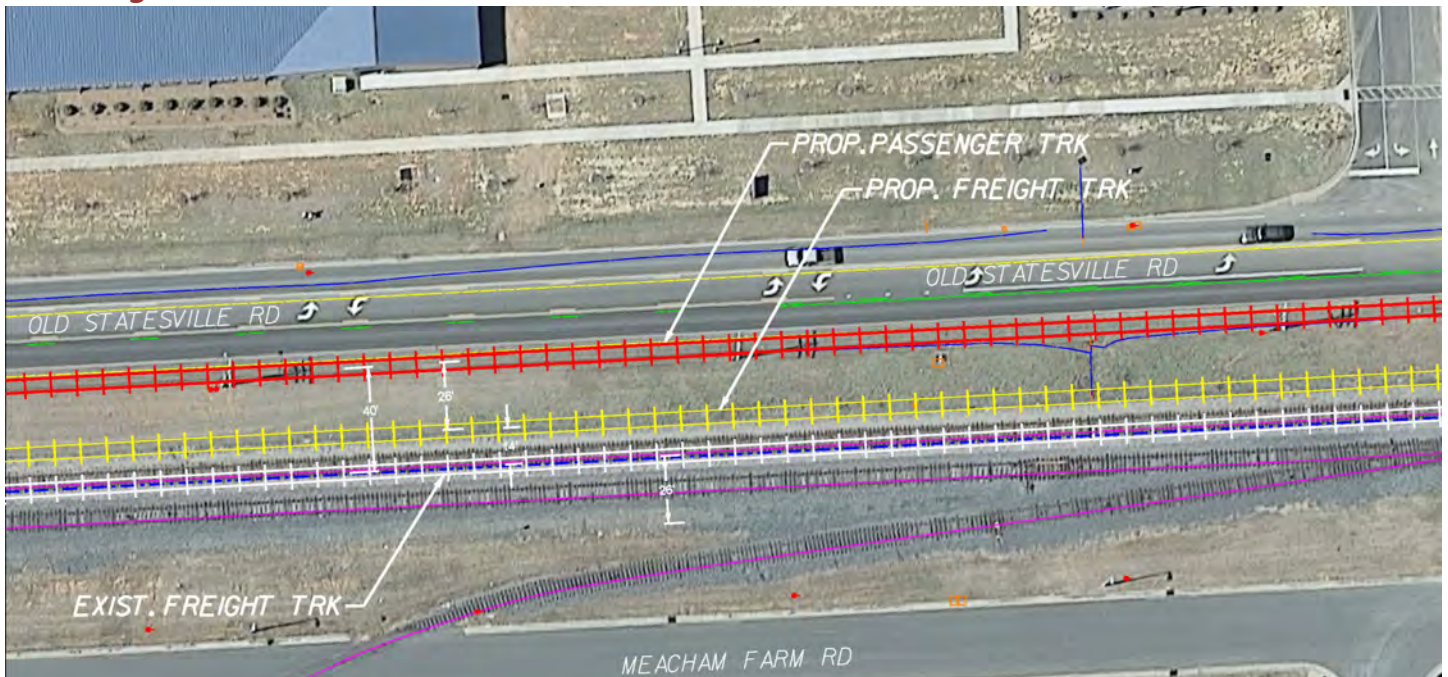
# Evaluation of CATS Red Line Corridor in Charlotte: North Carolina Department of Transportation

## Verhoeff Drive

### East Alignment



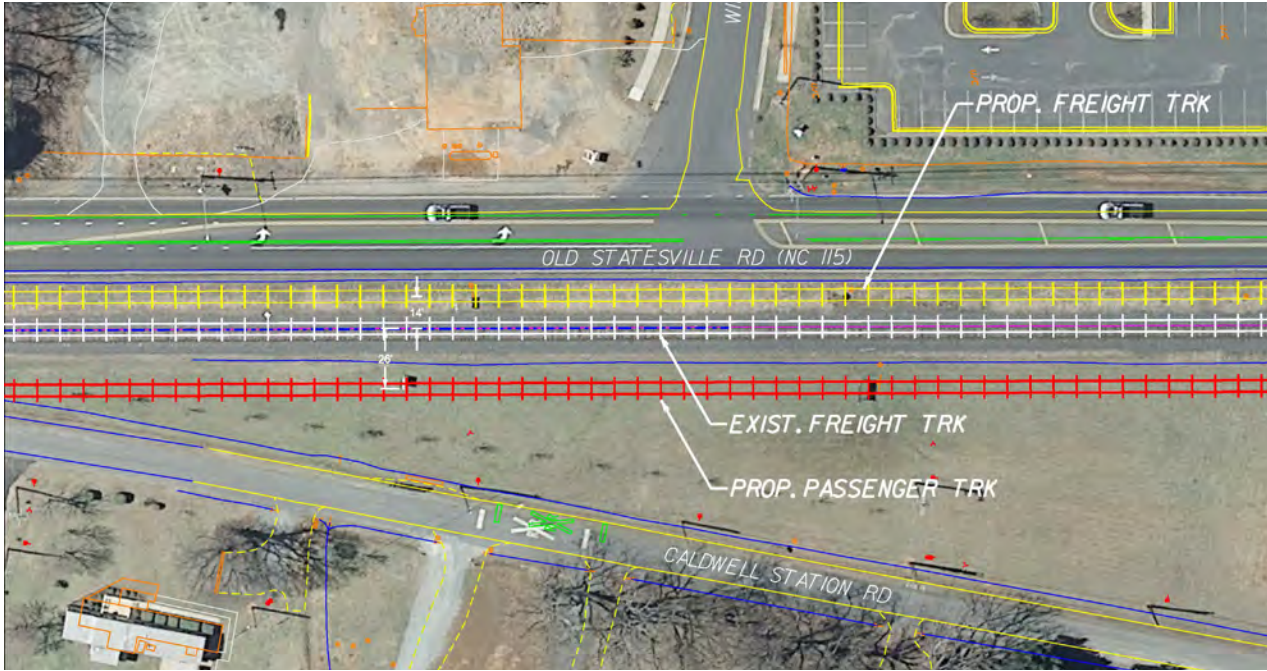
### West Alignment



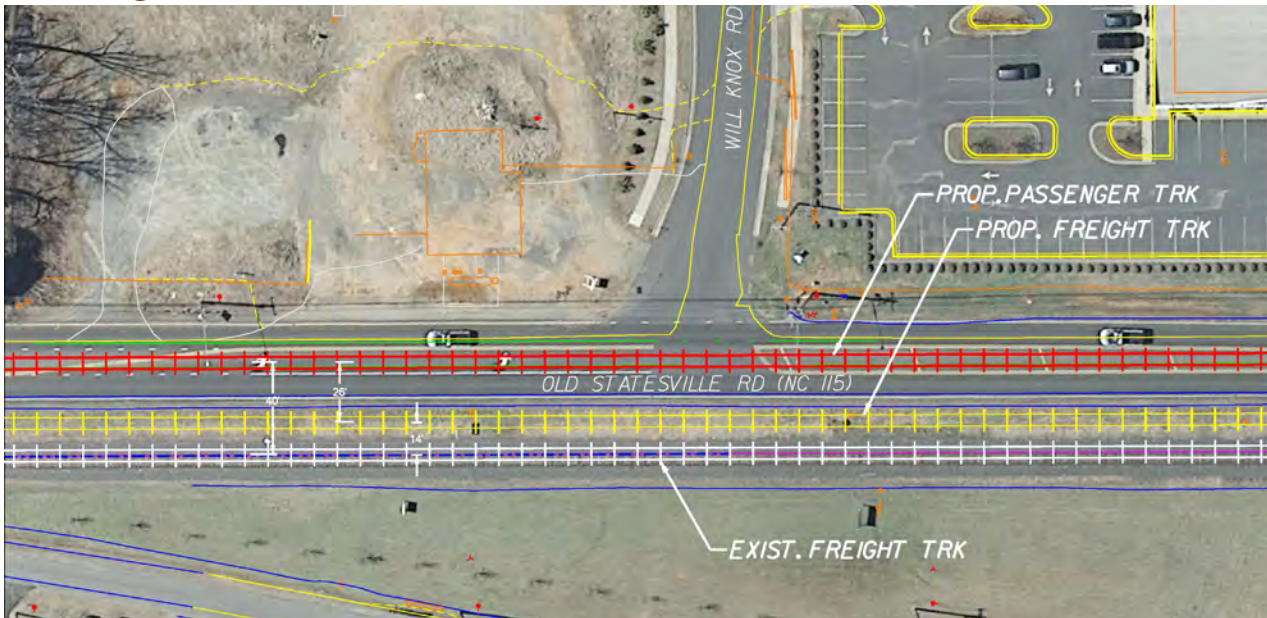


**Will Knox Road**

**East Alignment**



**West Alignment**





## Appendix C

*Visualizations of the Potentially New Configuration*



Maple Street, Derita Neighborhood, Charlotte, NC

**Existing Conditions**



The recently maintained “O” line track is in close proximity to the existing Sugar Creek Road. A number of train safety features, such as signage, gates, and signals, are already installed in this area. Like several crossings on the currently proposed Red Line corridor, the project already intended to close the Maple Street roadway crossing.

**Proposed Conditions**



Assuming that Sugar Creek Road and the existing “O” Line track will be maintained in place, it becomes apparent that Derita Avenue must be relocated to the west or removed completely, affecting residences and the post office on Maple Street.



## Evaluation of CATS Red Line Corridor in Charlotte: North Carolina Department of Transportation



Installation of a three track scenario through a suburban section of Charlotte will greatly change the character of the community.



The Red Line commuter rail will operate on the western-most track, closest to residences in the Derita area.



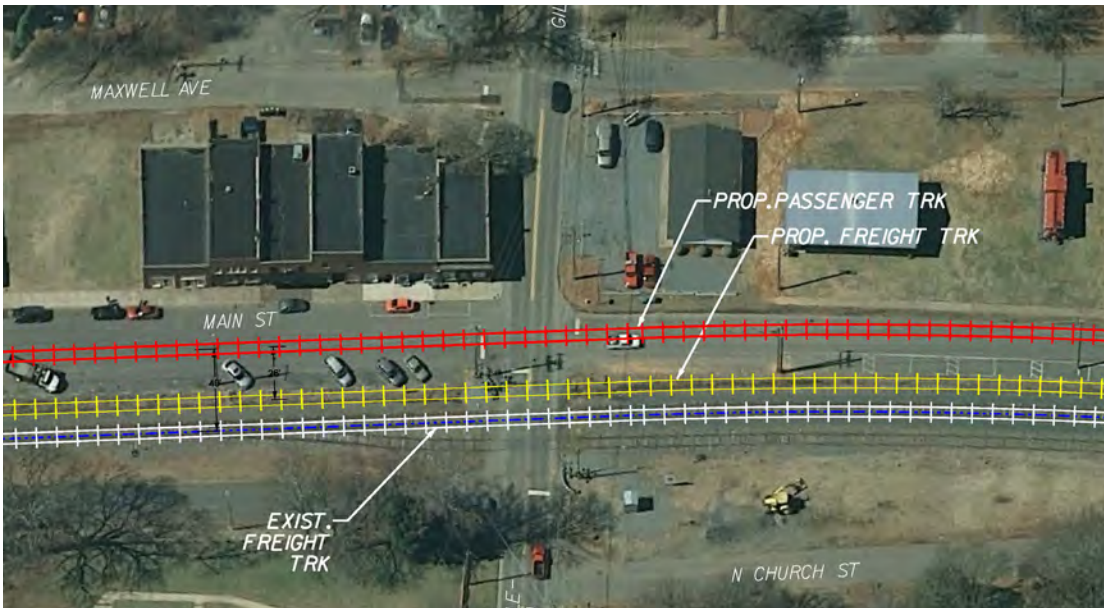
Huntersville-Concord Rd, near Old Stateville Rd (NC-115), Huntersville, NC

**Existing Conditions**



The existing Norfolk Southern “O” line runs north and south through downtown Huntersville. The existing track has a spur line, located east of the main line. The corridor is confined by Main Street and Church Street, as well as parallel underground and overhead utilities.

**Proposed Conditions**



Installation of the Red Line to the west of the “O” line would result in the loss of all on-street parking on Main Street. Track installation could also result in roadway realignment or a loss of a travel lane. Shifting the “O” Line and Red Line tracks to the east, and therefore skewing the three tracks within the existing Norfolk Southern easement, may alleviate some of the roadway and utility impacts through downtown Huntersville.



## Evaluation of CATS Red Line Corridor in Charlotte: North Carolina Department of Transportation



The proposed commuter rail line would operate in close proximity to existing businesses and homes in downtown Huntersville, reducing on-street parking and reducing or removing existing travel lanes. This scenario would require relocation of overhead and underground utilities.



Fence installation would be required to prevent pedestrians from crossing the Red Line and "O" line tracks if a station were incorporated into this area.



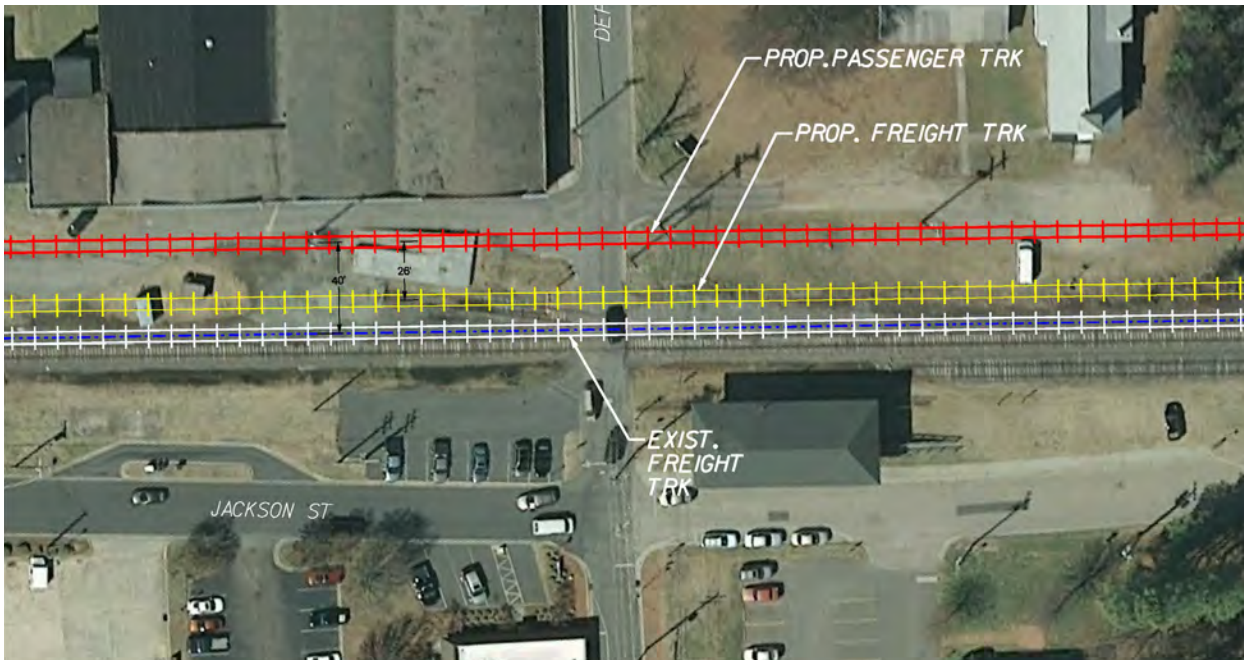
Depot Street, Davidson, NC

**Existing Conditions**



Parallel to Potts Road and Jackson Street through much of downtown Davidson, the “O” line is in close proximity to the historic Depot building as well as several businesses and community buildings

**Proposed Conditions**



Accounting for slopes and proximity of commuter rail operations to existing buildings, installing the Red Line and a second “O” Line track to the west of the existing rail line will have several impacts. The new track location would likely impact businesses and the church immediately west of the proposed Red Line track.





## Evaluation of CATS Red Line Corridor in Charlotte: North Carolina Department of Transportation



Red Line operations would provide service through the downtown Davidson area.



Pedestrian crossing safety, including gates and fencing, would be necessary and required for the new three-track corridor configuration.



## Appendix D

### *Potential Parcel Acquisition Listing*

Tax Parcel ID	Total Acreage	Owner (Last Name)	Number	Street Name	Municipality	Land Value	Net Building Value	Add'l. Value	Total Value	Deed Book	Page Number
01909503	0.000	WELLMAN	12810	OLD STATESVILLE	HUNTERSVILLE	\$ 37,800.00	\$ 32,700.00	\$ 1,300.00	\$ 71,800.00	12539	637
01901117	0.000	BRADFORD PROPERTIES	213	MAIN	HUNTERSVILLE	\$ 18,200.00	\$ 58,900.00	\$ -	\$ 77,100.00	10486	348
01901209	0.000	CAROLEEN TRADING CO INC	311	MAIN	HUNTERSVILLE	\$ 11,700.00	\$ 42,100.00	\$ -	\$ 53,800.00	05753	364
04513216	0.672	DERITA NC PROPERTIES LLC	2501	DERITA	CHARLOTTE	\$ 87,800.00	\$ 244,200.00	\$ 7,300.00	\$ 339,300.00	27265	207
01101221	0.313	C T ADAMS INVESTMENTS INC	15716	OLD STATESVILLE	HUNTERSVILLE	\$ 136,300.00	\$ 43,800.00	\$ 1,000.00	\$ 181,100.00	25310	311
01904508	0.822	GUIGNARD	404	S MAIN	HUNTERSVILLE	\$ 41,600.00	\$ 69,700.00	\$ -	\$ 111,300.00	25776	780
07709112	9.271	PATANDO LLC	3001	GRAHAM	CHARLOTTE	\$ 605,700.00	\$ 2,255,800.00	\$ 91,400.00	\$ 3,998,700.00		
00706109	0.736	OUR TOWNS OF NORTH MECKLENBURG	20310	MAIN	CORNELIUS	\$ 320,600.00	\$ 700,200.00	\$ 45,500.00	\$ 1,066,300.00	10313	955
04513509	0.000	SHIELDS	2709	DERITA	CHARLOTTE	\$ 23,900.00	\$ 59,900.00	\$ 1,700.00	\$ 85,500.00	05950	494
00706121	0.000	KNOX PROPERTIES LLC	20104	MAIN	CORNELIUS	\$ 15,700.00	\$ 48,200.00	\$ -	\$ 63,900.00	17080	590
00706131	0.116	KNOX	20245	RAILROAD	CORNELIUS	\$ 23,800.00	\$ 52,200.00	\$ -	\$ 76,000.00	12726	761
01101226	0.000	MARK OIL CO INC	15626	OLD STATESVILLE	HUNTERSVILLE	\$ 45,200.00	\$ 8,700.00	\$ -	\$ 53,900.00	02839	159
00328307	0.432	SARAH B AUSTIN LLC	926	SHEARER	DAVIDSON	\$ 21,000.00	\$ 99,400.00	\$ 800.00	\$ 121,200.00	17051	873
01904408	0.420	HUNTERSVILLE PRESBYTERIAN CHUR	302	S MAIN	HUNTERSVILLE	\$ 31,200.00	\$ 86,700.00	\$ 2,800.00	\$ 120,700.00	28623	302
01904415	0.064	RUTH	300	S MAIN	HUNTERSVILLE	\$ 26,000.00	\$ 120,100.00	\$ 500.00	\$ 146,600.00	11403	480
04325115	2.503	BAHABRI	3008	GIBBON	CHARLOTTE	\$ 218,100.00	\$ 3,200.00	\$ 12,400.00	\$ 305,400.00	10748	835
02719111	3.860	LEE'S LAND INVESTMENTS LLC		OLD STATESVILLE	CHARLOTTE	\$ 249,200.00	\$ 490,600.00	\$ 8,600.00	\$ 748,400.00	12612	530
01120118	0.712	MB CONSULTANTS LLC	15216	OLD STATESVILLE	HUNTERSVILLE	\$ 310,100.00	\$ 153,700.00	\$ 3,200.00	\$ 467,000.00	21566	294
01901115	0.000	NORTH MECKLENBURG PROPERTIES L	209	MAIN	HUNTERSVILLE	\$ 11,700.00	\$ 46,600.00	\$ -	\$ 58,300.00	28023	849
01101220	0.000	NTA BUILDING LLC	15800	OLD STATESVILLE	HUNTERSVILLE	\$ 231,300.00	\$ 99,600.00	\$ -	\$ 330,900.00	18826	927
04322202	3.033	TIMES OIL CORP	8400	OLD STATESVILLE	CHARLOTTE	\$ 1,715,800.00	\$ 299,300.00	\$ 43,800.00	\$ 2,486,100.00	26668	29
01901207	0.000	BERRYHILL	307	MAIN	HUNTERSVILLE	\$ 20,800.00	\$ 45,500.00	\$ 300.00	\$ 66,600.00	04990	191
00544331	1.720	YOCUM	17209	OLD STATESVILLE	HUNTERSVILLE	\$ 72,200.00	\$ 88,400.00	\$ -	\$ 160,600.00	08827	006
00325314	0.000	STUTTS	309	POTTS	DAVIDSON	\$ 33,300.00	\$ 32,400.00	\$ -	\$ 65,700.00	09983	792
01120108	0.408	LEE	15430	OLD STATESVILLE	HUNTERSVILLE	\$ 177,700.00	\$ 82,100.00	\$ 1,800.00	\$ 261,600.00	23290	527
00544335	0.390	WEBSTER	17417	OLD STATESVILLE	HUNTERSVILLE	\$ 32,500.00	\$ 50,300.00	\$ 2,500.00	\$ 85,300.00	10163	775
04512201	2.150	GAY	2235	SUGAR CREEK	CHARLOTTE	\$ 42,600.00	\$ 25,600.00	\$ 4,900.00	\$ 73,100.00	06468	118
00515124	0.307	HAYNES	10929	WASHAM POTTS	CORNELIUS	\$ 32,000.00	\$ 121,900.00	\$ 1,000.00	\$ 154,900.00	11257	423
04325110	2.473	CAN-AM INVESTMENTS LLC	3316	GIBBON	CHARLOTTE	\$ 215,400.00	\$ 327,900.00	\$ 29,200.00	\$ 572,500.00	16025	198
07713308	1.040	STEGALL HOLDINGS LLC	4020	JOE	CHARLOTTE	\$ 57,400.00	\$ 170,900.00	\$ 18,800.00	\$ 247,100.00	18989	45
00325506	3.710	SADLER SQUARE OF DAVIDSON LP	261	GRIFFITH	DAVIDSON	\$ 2,424,100.00	\$ 949,800.00	\$ 36,700.00	\$ 3,410,600.00	19798	920
01101212	0.000	KNOX	16112	OLD STATESVILLE	HUNTERSVILLE	\$ 106,500.00	\$ 110,400.00	\$ 100.00	\$ 304,500.00		
00320514	0.000	PENA	514	POTTS	DAVIDSON	\$ 171,000.00	\$ 116,800.00	\$ 500.00	\$ 288,300.00	05814	499
01120104	0.000	BLACK	15526	OLD STATESVILLE	HUNTERSVILLE	\$ 21,700.00	\$ 28,800.00	\$ -	\$ 50,500.00	26722	434
01120110	0.000	LEE	15336	OLD STATESVILLE	HUNTERSVILLE	\$ 246,300.00	\$ 59,900.00	\$ -	\$ 306,200.00	03238	544
01904510	0.427	JOHNSTON	400	S MAIN	HUNTERSVILLE	\$ 31,200.00	\$ 126,600.00	\$ 500.00	\$ 158,300.00	24532	473
01120114	0.000	HUNNICUTT	15302	OLD STATESVILLE	HUNTERSVILLE	\$ 108,300.00	\$ 53,300.00	\$ 500.00	\$ 162,100.00	13487	966
00705411	0.000	HANCOCK	20910	MAIN	CORNELIUS	\$ 229,300.00	\$ 22,700.00	\$ 3,800.00	\$ 312,400.00		
00325364	0.000	GREEN	135	POTTS	DAVIDSON	\$ 33,300.00	\$ 61,300.00	\$ -	\$ 94,600.00	07160	498
00326327	0.000	DAVIS	203	HOBBS	DAVIDSON	\$ 150,000.00	\$ 205,300.00	\$ 3,700.00	\$ 359,000.00	21428	587
04513308	0.000	HUNTER	2601	DERITA	CHARLOTTE	\$ 15,300.00	\$ 65,000.00	\$ 5,600.00	\$ 85,900.00	09314	094
00325359	0.000	PATTERSON	115	POTTS	DAVIDSON	\$ 33,300.00	\$ 67,500.00	\$ -	\$ 100,800.00	08039	063
01903201	0.505	HARGIS	119	MAIN	HUNTERSVILLE	\$ 33,800.00	\$ 94,200.00	\$ 3,500.00	\$ 131,500.00	04880	235
07713304	5.730	NEAL REALTY ASSOCIATES LIMITED	4200	JOE	CHARLOTTE	\$ 325,900.00	\$ 241,600.00	\$ 45,200.00	\$ 871,500.00	10126	415
00706119	0.190	CATTELL	20120	MAIN	CORNELIUS	\$ 47,500.00	\$ 45,400.00	\$ -	\$ 92,900.00	27958	309
01904406	0.122	PIERCE	109	GIBSON PARK	HUNTERSVILLE	\$ 26,000.00	\$ 86,900.00	\$ 3,900.00	\$ 116,800.00	26925	033

00325363	0.000	HOUSTON	131	POTTS	DAVIDSON	\$ 26,100.00	\$ 70,000.00	\$ -	\$ 96,100.00	23468	243
07709116	1.500	BLYTHE INDUSTRIES INC	2997	GRAHAM	CHARLOTTE	\$ 98,000.00	\$ 54,300.00	\$ 22,400.00	\$ 174,700.00	03840	599
00326221	0.000	OFFSHORE TRADING LLC	203	ARMOUR	DAVIDSON	\$ 71,300.00	\$ 56,900.00	\$ 9,800.00	\$ 138,000.00	18465	511
02718122	1.660	DAVIS		ARTHUR DAVIS	UNINC	\$ 36,200.00	\$ 66,700.00	\$ 6,100.00	\$ 109,000.00	00000	000
00706126	0.000	DAVIS	20233	RAILROAD	CORNELIUS	\$ 23,800.00	\$ 38,600.00	\$ -	\$ 62,400.00	17273	493
01901116	0.000	NORDENSTAM	211	MAIN	HUNTERSVILLE	\$ 11,700.00	\$ 47,600.00	\$ -	\$ 59,300.00	22099	835
07710304	6.919	BEACON ATANDO LLC	3535	GRAHAM	CHARLOTTE	\$ 452,100.00	\$ 688,700.00	\$ 35,000.00	\$ 1,309,200.00		
01904507	0.980	GUIGNARD	406	S MAIN	HUNTERSVILLE	\$ 41,600.00	\$ 39,800.00	\$ 7,600.00	\$ 89,000.00	17489	813
04513512	0.000	TAYLOR FAMILY TRUST	2713	DERITA	CHARLOTTE	\$ 17,800.00	\$ 52,800.00	\$ 1,700.00	\$ 72,300.00	17586	607
00705417	2.040	HELMS INVESTMENTS, LLC	20700	MAIN	CORNELIUS	\$ 888,600.00	\$ 455,900.00	\$ 46,400.00	\$ 2,077,900.00	21038	961
01101222	0.290	CALDWELL	15708	OLD STATESVILLE	HUNTERSVILLE	\$ 22,300.00	\$ 76,000.00	\$ 200.00	\$ 98,500.00	02165	335
01901114	0.000	KENNERLY	207	MAIN	HUNTERSVILLE	\$ 18,200.00	\$ 82,600.00	\$ 100.00	\$ 100,900.00	28034	694
01907306	0.313	DEWESE	13404	OLD STATESVILLE	HUNTERSVILLE	\$ 40,900.00	\$ 49,700.00	\$ -	\$ 90,600.00	25556	988
01120106	0.000	LEE	15510	OLD STATESVILLE	HUNTERSVILLE	\$ 21,700.00	\$ 28,600.00	\$ 500.00	\$ 50,800.00	08216	209
01907205	0.320	AUTEN	504	S MAIN	HUNTERSVILLE	\$ 31,200.00	\$ 110,100.00	\$ -	\$ 141,300.00	13079	248
04325109	1.191	YOUNG	3332	GIBBON	CHARLOTTE	\$ 103,700.00	\$ 200,700.00	\$ 21,900.00	\$ 326,300.00	15660	898
01903213	0.560	TOWN OF HUNTERSVILLE	103	MAIN	HUNTERSVILLE	\$ 243,900.00	\$ -	\$ -	\$ 243,900.00	09053	148
01903213	0.560	TOWN OF HUNTERSVILLE	103	MAIN	HUNTERSVILLE	\$ 243,900.00	\$ -	\$ -	\$ 243,900.00	09053	148
00324102	0.000	HOUSTON	21210	POTTS	CORNELIUS	\$ 15,000.00	\$ 5,600.00	\$ -	\$ 20,600.00	03929	428
01907305	2.050	MONTGOMERY	13516	OLD STATESVILLE	HUNTERSVILLE	\$ 178,600.00	\$ 334,100.00	\$ 4,900.00	\$ 517,600.00	06403	187
00325350	0.000	GREEN	303	POTTS	DAVIDSON	\$ 33,300.00	\$ 46,900.00	\$ 2,600.00	\$ 82,800.00	05152	016
00325315	0.000	DAVIDSON COLLEGE TRUSTEES	403	POTTS	DAVIDSON	\$ 14,300.00	\$ -	\$ -	\$ 14,300.00	04954	957
00706106	0.000	CONARD	20420	MAIN	CORNELIUS	\$ 94,900.00	\$ 2,600.00	\$ -	\$ 97,500.00	05959	769
00326207	1.770	BRIDGEPORT FABRICS INC	210	DELBURG	DAVIDSON	\$ 154,200.00	\$ 455,600.00	\$ 18,800.00	\$ 628,600.00	01962	471
01901113	0.000	DAVIS	205	MAIN	HUNTERSVILLE	\$ 11,700.00	\$ 60,300.00	\$ -	\$ 72,000.00	21822	214
04518109	0.000	CARROLL	2415	ALLEN	CHARLOTTE	\$ 78,900.00	\$ 461,700.00	\$ 10,500.00	\$ 551,100.00	08040	096
00515118	0.275	SHERRILL	19701	MAIN	CORNELIUS	\$ 22,800.00	\$ 61,900.00	\$ 2,500.00	\$ 87,200.00	03007	039
04513510	0.000	TARRANT	2705	DERITA	CHARLOTTE	\$ 29,200.00	\$ 64,600.00	\$ -	\$ 93,800.00	01246	104
00706101	0.000	OMOHUNDRO	20532	MAIN	CORNELIUS	\$ 118,800.00	\$ 60,200.00	\$ 3,300.00	\$ 182,300.00	11541	001
00705418	0.000	LENTZ	20612	MAIN	CORNELIUS	\$ 142,500.00	\$ 54,400.00	\$ 3,600.00	\$ 200,500.00	00808	138
00510305	0.790	CASHION	19413	MAIN	CORNELIUS	\$ 48,700.00	\$ 87,400.00	\$ 1,800.00	\$ 137,900.00	09433	949
01101218	0.000	ROSCOE	15814	OLD STATESVILLE	HUNTERSVILLE	\$ 43,000.00	\$ 43,900.00	\$ -	\$ 86,900.00	04263	887
00328309	0.423	SARAH B AUSTIN LLC	942	SHEARER	DAVIDSON	\$ 21,000.00	\$ 99,400.00	\$ 800.00	\$ 121,200.00	17051	873
00515115	0.400	PARKER	19637	MAIN	CORNELIUS	\$ 22,800.00	\$ 66,500.00	\$ 2,000.00	\$ 91,300.00	08557	884
00510315	1.098	MAGEE	19309	OLD STATESVILLE	CORNELIUS	\$ 59,500.00	\$ 209,400.00	\$ 3,200.00	\$ 272,100.00	17584	439
01901205	0.510	GUIGNARD	303	MAIN	HUNTERSVILLE	\$ 32,500.00	\$ 78,800.00	\$ 3,100.00	\$ 114,400.00	23945	858
00325365	0.000	QIN	139	POTTS	DAVIDSON	\$ 26,100.00	\$ 67,100.00	\$ 200.00	\$ 93,400.00	27879	912
04305217	0.000	DOGGETT	4520	GIBBON	CHARLOTTE	\$ 96,800.00	\$ 35,700.00	\$ 600.00	\$ 133,100.00	18892	972
02504203	0.000	PENNINGER	9203	OLD STATESVILLE	CHARLOTTE	\$ 70,400.00	\$ 4,100.00	\$ 4,900.00	\$ 87,000.00	03678	763
00325360	0.000	LONG	119	POTTS	DAVIDSON	\$ 33,300.00	\$ 84,200.00	\$ 1,700.00	\$ 119,200.00	11015	417
07714104	15.493	UPS THRIFT PLAN CORP	1600	COTTONWOOD	CHARLOTTE	\$ 1,687,200.00	\$ 39,000.00	\$ 323,200.00	\$ 3,335,800.00		
04517220	1.800	STARNES COMMERCIAL PROPERTIES	5413	RACINE	CHARLOTTE	\$ 156,800.00	\$ 213,900.00	\$ -	\$ 465,300.00	26854	719
00502113	1.300	TILLMAN	18239	OLD STATESVILLE	UNINC	\$ 113,300.00	\$ 1,000.00	\$ -	\$ 114,300.00	07786	195
01101224	0.000	CARTNER	15700	OLD STATESVILLE	HUNTERSVILLE	\$ 196,000.00	\$ 74,200.00	\$ -	\$ 270,200.00	05922	626
04322201	2.820	HARRIS PROFESSIONAL BUILDING	8424	OLD STATESVILLE	CHARLOTTE	\$ 245,700.00	\$ 554,700.00	\$ 45,800.00	\$ 1,632,400.00	18966	924
00705416	0.502	NEELY	20722	MAIN	CORNELIUS	\$ 207,700.00	\$ 37,200.00	\$ 5,500.00	\$ 250,400.00	09186	719
00325352	0.312	TUTTLE	201	EDEN	DAVIDSON	\$ 4,800.00	\$ 26,800.00	\$ -	\$ 31,600.00	08488	707

00515119	0.204	GREYRON LLC	19707	MAIN	CORNELIUS	\$ 22,800.00	\$ 46,200.00	\$ 3,500.00	\$ 72,500.00	19192	406
01915113	1.410	KING	10540	ARTHUR DAVIS	UNINC	\$ 43,300.00	\$ 308,100.00	\$ 1,100.00	\$ 362,800.00	09977	032
01907315	1.200	BROWN	13516	OLD STATESVILLE	HUNTERSVILLE	\$ 104,500.00	\$ 62,700.00	\$ -	\$ 167,200.00	11061	862
01901307	0.000	CEPEDA	310	MAIN	HUNTERSVILLE	\$ 20,800.00	\$ -	\$ -	\$ 20,800.00	25339	050
01120107	0.000	KBR PROPERTIES LLC	15500	OLD STATESVILLE	HUNTERSVILLE	\$ 50,000.00	\$ 21,800.00	\$ -	\$ 71,800.00	20001	856
00706102	0.517	GRESTY	20528	MAIN	CORNELIUS	\$ 118,800.00	\$ 100,500.00	\$ -	\$ 265,200.00	22220	555
00706102	0.517	GRESTY	20528	MAIN	CORNELIUS	\$ 118,800.00	\$ 100,500.00	\$ -	\$ 265,200.00	22220	555
07712926	1.099	BEACON ATANDO LLC	3601	GRAHAM	CHARLOTTE	\$ 71,800.00	\$ 201,300.00	\$ 6,900.00	\$ 280,000.00		
01903215	0.252	DOWNTOWN PROPERTY LLC	201	HUNTERSVILLE-CONCORD	HUNTERSVILLE	\$ 109,800.00	\$ 48,000.00	\$ -	\$ 157,800.00	12144	048
01120116	0.000	PIERCE	15234	OLD STATESVILLE	HUNTERSVILLE	\$ 354,400.00	\$ 47,300.00	\$ 1,000.00	\$ 486,100.00	63341	319
00515116	0.126	PARKER	19641	MAIN	CORNELIUS	\$ 22,800.00	\$ 70,200.00	\$ 2,700.00	\$ 95,700.00	22751	310
00328401	0.000	SARAH B AUSTIN LLC	829	SHEARER	DAVIDSON	\$ 27,000.00	\$ 120,900.00	\$ -	\$ 147,900.00	17051	873
01903212	0.284	TOWN OF HUNTERSVILLE	105	MAIN	HUNTERSVILLE	\$ 435,600.00	\$ 22,800.00	\$ 1,400.00	\$ 459,800.00	09136	534
00706118	0.000	BROTHERTON	20126	MAIN	CORNELIUS	\$ 47,500.00	\$ 37,700.00	\$ -	\$ 85,200.00	02382	511
07712910	5.592	HOLDER	3637	GRAHAM	CHARLOTTE	\$ 365,300.00	\$ 122,100.00	\$ 8,200.00	\$ 845,600.00	21680	838
01120105	0.000	LEE	15518	OLD STATESVILLE	HUNTERSVILLE	\$ 21,100.00	\$ 30,100.00	\$ 200.00	\$ 51,400.00	19032	887
04513514	0.658	MCWHIRTER		DERITA	CHARLOTTE	\$ 86,000.00	\$ 69,500.00	\$ 5,600.00	\$ 161,100.00	09008	033
00510302	0.700	ROBINETTE	19325	MAIN	CORNELIUS	\$ 43,900.00	\$ 40,700.00	\$ 6,700.00	\$ 91,300.00	11064	936
01907206	1.241	DANCY	502	S MAIN	HUNTERSVILLE	\$ 50,700.00	\$ 98,900.00	\$ -	\$ 149,600.00	04164	467
01901208	0.000	CAROLEEN TRADING CO INC	309	MAIN	HUNTERSVILLE	\$ 11,700.00	\$ 39,300.00	\$ -	\$ 51,000.00	06224	395
04513309	0.000	CARTER	2605	DERITA	CHARLOTTE	\$ 17,600.00	\$ 47,800.00	\$ 300.00	\$ 65,700.00	06049	869
00705409	0.000	RSR PROPERTIES LLC	21020	MAIN	CORNELIUS	\$ 97,900.00	\$ 320,400.00	\$ -	\$ 418,300.00	26339	74
04325105	0.740	KING	3500	GIBBON	CHARLOTTE	\$ 65,000.00	\$ 7,400.00	\$ 1,200.00	\$ 73,600.00	22761	555
07713305	2.608	CSCR INVESTMENTS LLC	4227	GRAHAM	CHARLOTTE	\$ 177,200.00	\$ 764,500.00	\$ 55,700.00	\$ 997,400.00	20154	426
01101217	1.950	MCMURRAY DEVELOPMENT, INC	15906	OLD STATESVILLE	HUNTERSVILLE	\$ 424,700.00	\$ 836,900.00	\$ 5,600.00	\$ 1,267,200.00	21258	462
00515108	0.528	MCKINNEY	19601	MAIN	CORNELIUS	\$ 13,100.00	\$ 96,100.00	\$ 200.00	\$ 109,400.00	08194	079
00502111	0.000	BROWN		OLD STATESVILLE	UNINC	\$ 45,300.00	\$ 5,400.00	\$ -	\$ 50,700.00	02474	259
01901306	0.000	NEW FRIENDSHIP PRESBYTERIAN	504	OLD STATESVILLE	HUNTERSVILLE	\$ 11,700.00	\$ -	\$ -	\$ 11,700.00	09854	183
01907209	0.413	KEPPLE	506	S MAIN	HUNTERSVILLE	\$ 31,200.00	\$ 137,700.00	\$ 200.00	\$ 169,100.00	20579	315
01101208	2.998	DOVE	16220	OLD STATESVILLE	HUNTERSVILLE	\$ 1,305,900.00	\$ 106,100.00	\$ -	\$ 1,412,000.00	03623	025
04513506	3.022	KIRKLEY	2925	DERITA	CHARLOTTE	\$ 263,300.00	\$ 15,200.00	\$ 1,300.00	\$ 322,900.00		
07710302	2.458	BEACON ATANDO LLC	3401	GRAHAM	CHARLOTTE	\$ 128,500.00	\$ 544,400.00	\$ 21,900.00	\$ 694,800.00	14432	387
00502112	0.000	BROWN	18219	OLD STATESVILLE	UNINC	\$ 42,700.00	\$ 7,300.00	\$ 13,000.00	\$ 63,000.00	02474	253
01904509	0.670	THOMPSON	402	S MAIN	HUNTERSVILLE	\$ 41,600.00	\$ 222,100.00	\$ -	\$ 263,700.00	25905	110
01101223	0.485	SHEW	15704	OLD STATESVILLE	HUNTERSVILLE	\$ 27,800.00	\$ 59,400.00	\$ 10,700.00	\$ 97,900.00	08311	293
04325114	0.000	TAYLOR FAMILY TRUST	3020	GIBBON	CHARLOTTE	\$ 49,400.00	\$ 24,000.00	\$ 3,500.00	\$ 76,900.00	17586	607
04325103	0.000	BROWN	3540	GIBBON	CHARLOTTE	\$ 72,100.00	\$ 23,900.00	\$ -	\$ 114,900.00	05727	566
04325103	0.000	BROWN	3540	GIBBON	CHARLOTTE	\$ 72,100.00	\$ 23,900.00	\$ -	\$ 114,900.00	05727	566
00705412	0.000	SIBLEY FAMILY LLC	20902	MAIN	CORNELIUS	\$ 170,800.00	\$ -	\$ 10,100.00	\$ 433,700.00		
00751215	0.000	ROBB FINGER ENTERPRISES	19900	MAIN	CORNELIUS	\$ 37,500.00	\$ 136,400.00	\$ -	\$ 173,900.00	23699	74
01120103	0.000	TODD ABERNATHY CONSTRUCTION	15534	OLD STATESVILLE	HUNTERSVILLE	\$ 112,900.00	\$ 20,300.00	\$ -	\$ 133,200.00	24239	941
07710301	4.590	ATANDO INVESTMENTS LLC	900	ATANDO	CHARLOTTE	\$ 299,900.00	\$ 915,800.00	\$ 91,500.00	\$ 1,867,200.00	18864	411
00515137	0.578	JENNINGS	19631	MAIN	CORNELIUS	\$ 30,400.00	\$ 29,700.00	\$ -	\$ 60,100.00	22951	472
00706127	0.000	BURTON	20227	RAILROAD	CORNELIUS	\$ 17,500.00	\$ 28,700.00	\$ 2,500.00	\$ 48,700.00	14998	902
00325366	0.000	MCCAIN	143	POTTS	DAVIDSON	\$ 33,300.00	\$ 57,100.00	\$ -	\$ 90,400.00	06303	240
00325505	0.000	DAVIDSON PRESBYTERIAN	214	DEPOT	DAVIDSON	\$ 65,300.00	\$ 102,100.00	\$ -	\$ 238,100.00	02019	191
00325358	0.488	CARRIGAN	111	POTTS	DAVIDSON	\$ 26,100.00	\$ 68,400.00	\$ 10,000.00	\$ 104,500.00	25762	359

00544325	0.720	LOWRANCE	17501	OLD STATESVILLE	HUNTERSVILLE	\$ 44,700.00	\$ 106,700.00	\$ -	\$ 151,400.00	01469	248
01901204	0.000	TORRES	301	MAIN	HUNTERSVILLE	\$ 11,700.00	\$ 79,100.00	\$ -	\$ 90,800.00	19849	401
00706117	0.240	PYA PROPERTIES LLC	20132	MAIN	CORNELIUS	\$ 47,500.00	\$ 38,800.00	\$ -	\$ 86,300.00	17302	739
00751223	0.000	TANAGREY REVOCABLE TRUST	19806	MAIN	CORNELIUS	\$ 152,600.00	\$ 39,800.00	\$ 900.00	\$ 354,600.00	25127	436
00705413	0.402	WILLIAMS	20822	MAIN	CORNELIUS	\$ 175,100.00	\$ 60,200.00	\$ 3,300.00	\$ 238,600.00	28694	247
04325106	0.000	SHOOK	3424	GIBBON	CHARLOTTE	\$ 21,700.00	\$ 55,800.00	\$ 4,100.00	\$ 81,600.00		
01901112	0.000	CUMMINGS	203	MAIN	HUNTERSVILLE	\$ 11,700.00	\$ 48,400.00	\$ -	\$ 60,100.00	03545	343
07713307	2.080	BEACON ATANDO LLC	4112	JOE	CHARLOTTE	\$ 128,700.00	\$ 517,800.00	\$ 16,600.00	\$ 663,100.00	20354	275
04513507	1.695	JOHNSTON	2717	DERITA	CHARLOTTE	\$ 110,800.00	\$ 1,100.00	\$ 4,600.00	\$ 116,500.00		
04325104	0.630	ETIER	3520	GIBBON	CHARLOTTE	\$ 54,900.00	\$ 18,500.00	\$ 500.00	\$ 73,900.00	11720	522
04325113	0.000	GREASYS TRUCK REPAIR INC	3028	GIBBON	CHARLOTTE	\$ 49,400.00	\$ 44,100.00	\$ -	\$ 105,700.00		
01101215	0.000	JHG COMMERCIAL PROPERTIES LLC	16000	OLD STATESVILLE	HUNTERSVILLE	\$ 868,500.00	\$ 83,300.00	\$ 11,800.00	\$ 1,136,100.00		
01907301	0.430	OGLE'S HARDWOOD FLOORING INC	13532	OLD STATESVILLE	HUNTERSVILLE	\$ 37,500.00	\$ 46,300.00	\$ 1,100.00	\$ 84,900.00	27988	116
01102111	5.112	THOMAS CONCRETE OF CAROLINA	11531	MCCORD	HUNTERSVILLE	\$ 445,400.00	\$ 29,900.00	\$ 500.00	\$ 475,800.00	22042	848
00328306	0.420	SARAH B AUSTIN LLC	918	SHEARER	DAVIDSON	\$ 21,000.00	\$ 99,400.00	\$ 800.00	\$ 121,200.00	17051	873
00515112	0.570	MCKINNEY	19621	MAIN	CORNELIUS	\$ 30,400.00	\$ 85,400.00	\$ 1,800.00	\$ 117,600.00	06374	879
00544326	1.897	WOLF	17511	OLD STATESVILLE	HUNTERSVILLE	\$ 165,200.00	\$ 44,100.00	\$ -	\$ 209,300.00	13884	773
04325107	1.010	STEPHENS	3416	GIBBON	CHARLOTTE	\$ 25,200.00	\$ 55,400.00	\$ 2,000.00	\$ 82,600.00	05228	834
00515117	0.126	BAKER	19645	MAIN	CORNELIUS	\$ 22,800.00	\$ 42,100.00	\$ 3,800.00	\$ 68,700.00	07228	265

<b>Total Value of Parcels</b>	<b>\$ 52,966,200.00</b>
-------------------------------	-------------------------

Adjustment to Current Property Values \$ 68,856,060.00

Relocation Costs (25%) \$ 17,214,015.00

\$ 86,070,075.00



## Appendix E

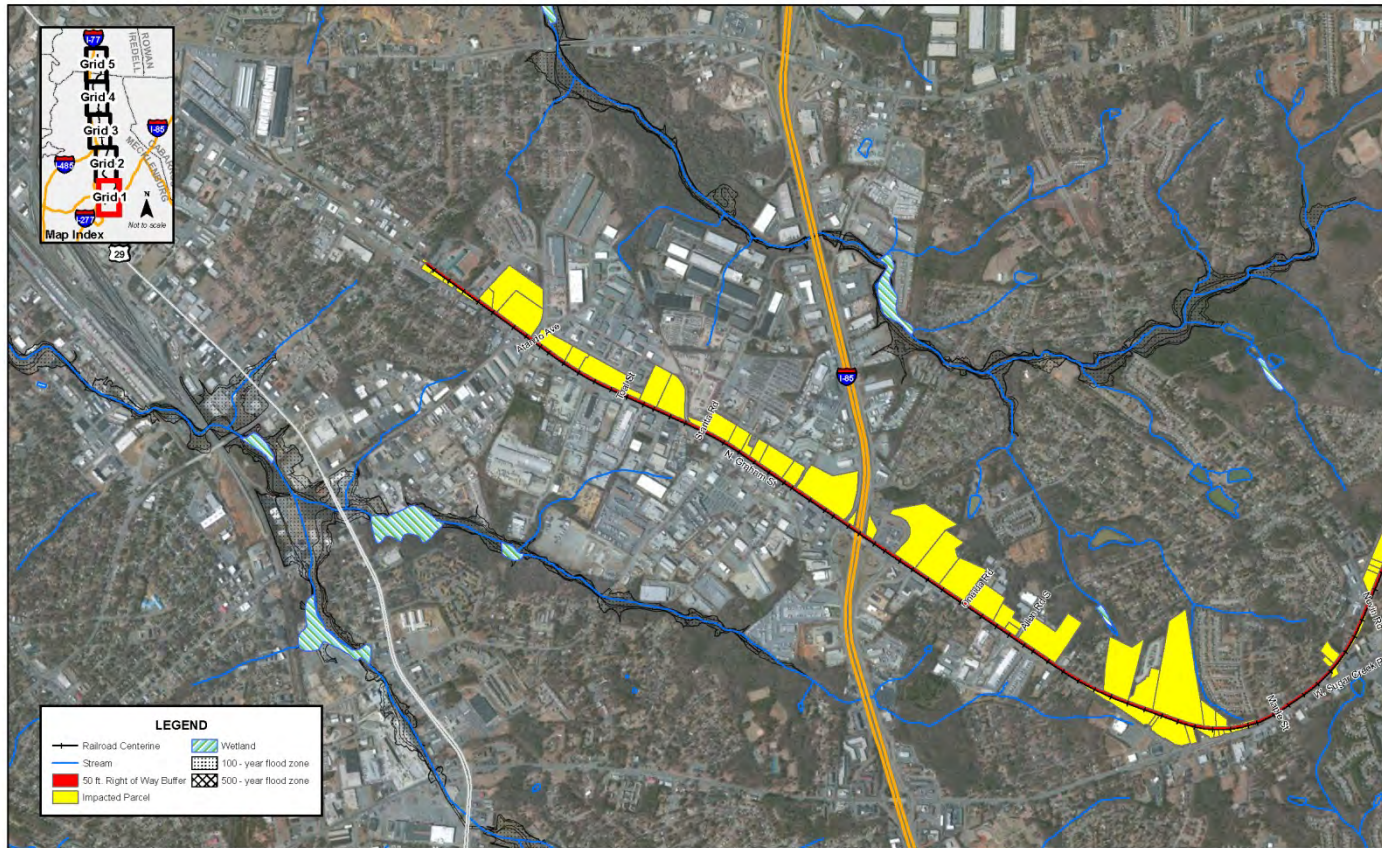
### Relative potential impacts of LYNX Red Line track orientation to roadways

Distance (miles)	East of Rail/ West of Rail	Impacted Roadway	Roadway Type	Roadway Laneage
2.39	East	N. Graham Street	State Road	4 lane roadway
0.27	East	W. Sugar Creek Road	State Road	3 lane roadway
0.57	West	Derita Avenue	Local Road	2 lanes unmarked
0.89	West	Gibbon Road	State Road	2 lanes
0.66	West	Old Statesville Road	State Road	2 lanes
0.47	East	Bob Beatty Road	Local Road	2 lanes unmarked
0.06	West	Alexanderana Drive (Dixon Farm Hill Road)	State Road	2 lanes
0.19	East	Keith Hills Road	Local Road	2 lanes unmarked
0.87	West	Old Statesville Road	State Road	2 lanes
0.36	East	Church Street (Meacham Farm Road)	Local Road	2 lanes unmarked
1.04	West	Main Street	Local Road	2 lanes unmarked
0.89	East	Church Street	Local Road	2 lanes unmarked
2.65	West	Old Statesville Road/ S. Main Street	State Road	2/3 lanes
0.06	East	Caldwell Station Road	Local Road	2 lanes unmarked
0.57	East	Zion Avenue	Local Road	2 lanes unmarked
0.25	East	Zion Avenue	Local Road	2 lanes unmarked
0.19	West	Railroad Street	Local Road	2 lanes unmarked
0.23	West	Pots Street	Local Road	2 lanes unmarked
0.45	East	Jackson Street	Local Road	2 lanes unmarked
0.11	West	Eden Street	Local Road	2 lanes unmarked
0.28	East	N. Main Street	State Road	2 lanes
1.93	East	N. Main Street	State Road	3 lanes
0.09	West	Mimi Lane	Local Road	2 lanes unmarked



## Appendix F

### LYNX Red Line Corridor map – Charlotte impacted parcels



Date Source: US Fish and Wildlife Service,  
NC Department of Transportation, Fredell  
and Mecklenburg GIS Departments, NC  
Flood Maps  
Date Created: November 15, 2013

**NORFOLK SOUTHERN "O" LINE CORRIDOR  
POTENTIAL CATS RED LINE CORRIDOR**



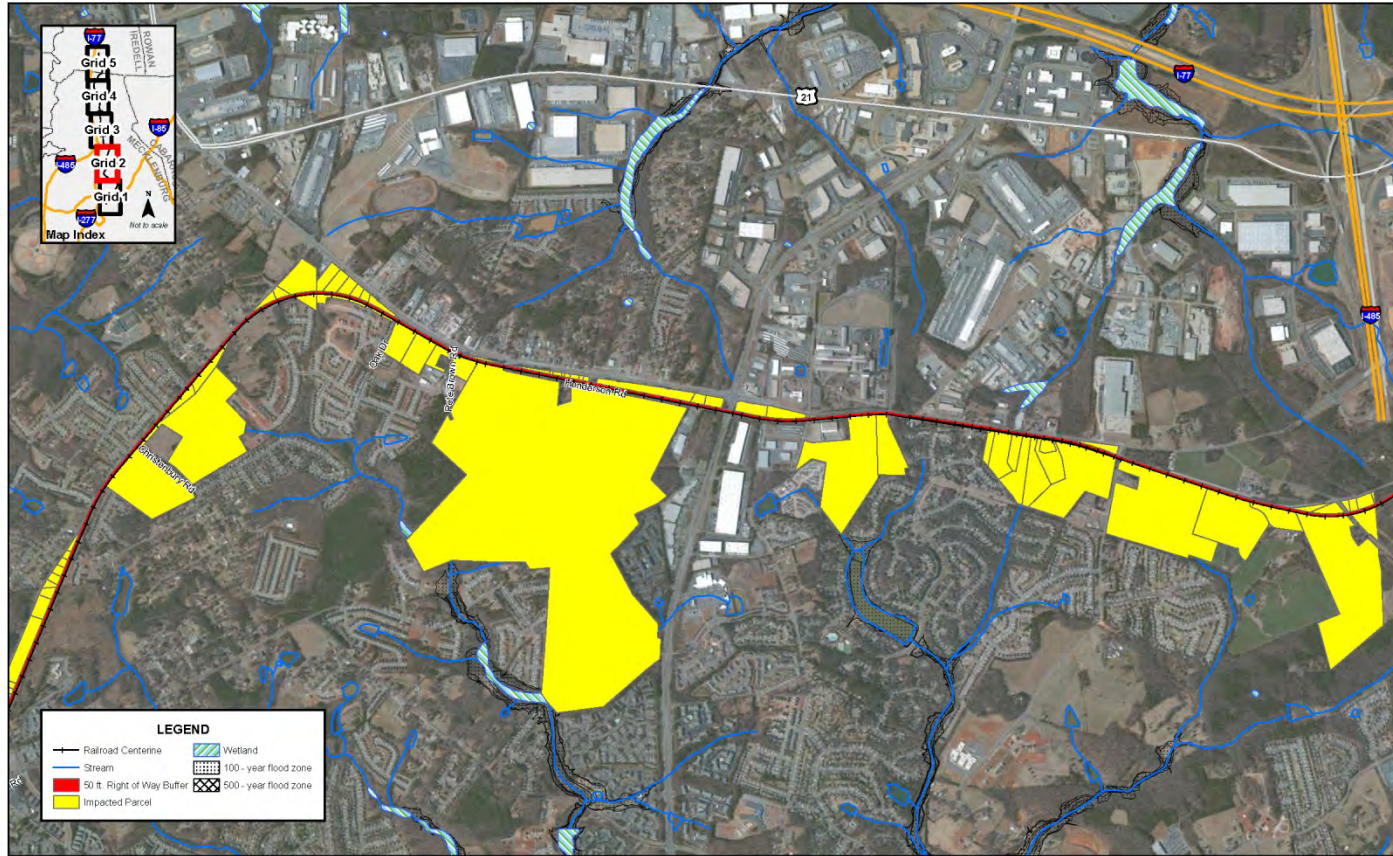
0 0.125 0.25 0.5 Miles  
—————|—————|—————|—————|

**MAP 1 of 5**





Figure 5 - LYNX Red Line Corridor map – North Charlotte impacted parcels



Date Source: US Fish and Wildlife Service,  
NC Department of Transportation, Inreidl  
and Mecklenburg GIS Departments, NC  
Flood Maps  
Date Created: November 15, 2013

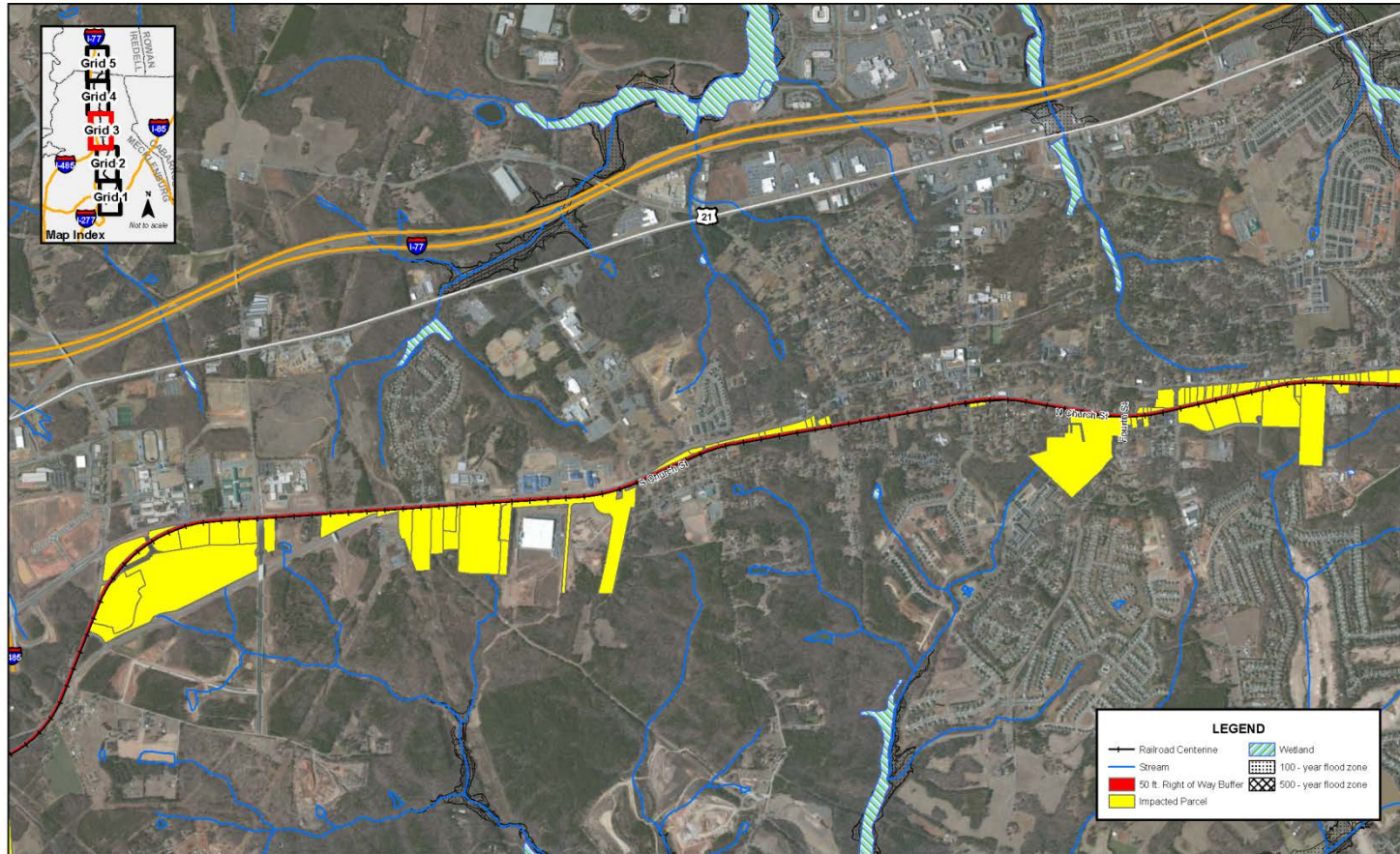
**NORFOLK SOUTHERN "O" LINE CORRIDOR  
POTENTIAL CATS RED LINE CORRIDOR**



0 0.125 0.25 0.5 Miles  
[Scale bar]

**MAP 2 of 5**

Figure 6 - LYNX Red Line Corridor map – Huntersville impacted parcels



Date Source: US Fish and Wildlife Service,  
NC Department of Transportation, Iredell  
and Mecklenburg GIS Departments, NC  
Flood Maps  
Date Created: November 15, 2013

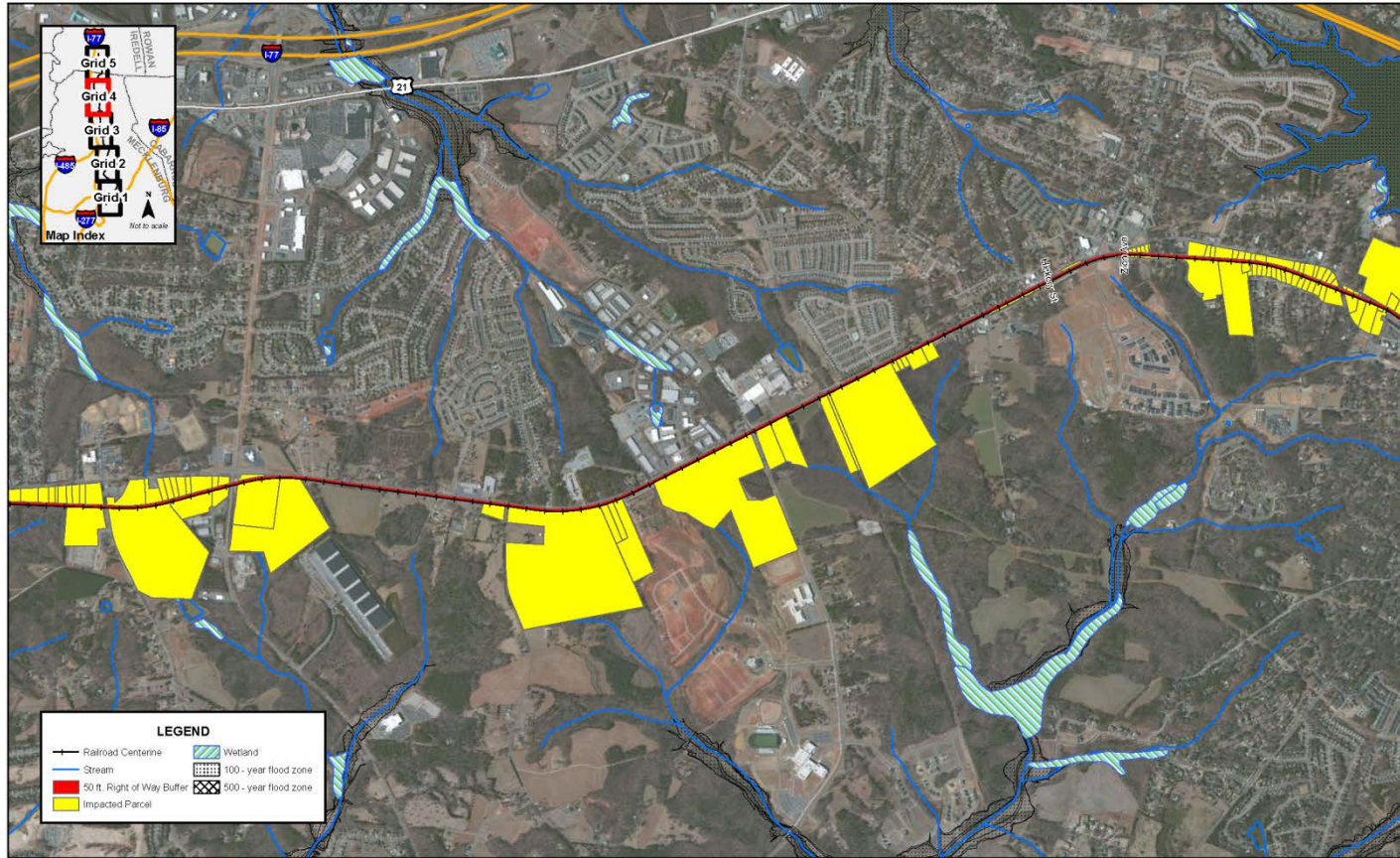
**NORFOLK SOUTHERN "O" LINE CORRIDOR  
POTENTIAL CATS RED LINE CORRIDOR**



0 0.125 0.25 0.5 Miles

**MAP 3 of 5**

**Figure 7 - LYNX Red Line Corridor map – Cornelius and Davidson impacted parcels**



Date Source: US Fish and Wildlife Service,  
N.C. Department of Transportation, Inzell  
and Mecklenburg GIS Departments, NC  
Flood Maps

Date Created: November 15, 2013

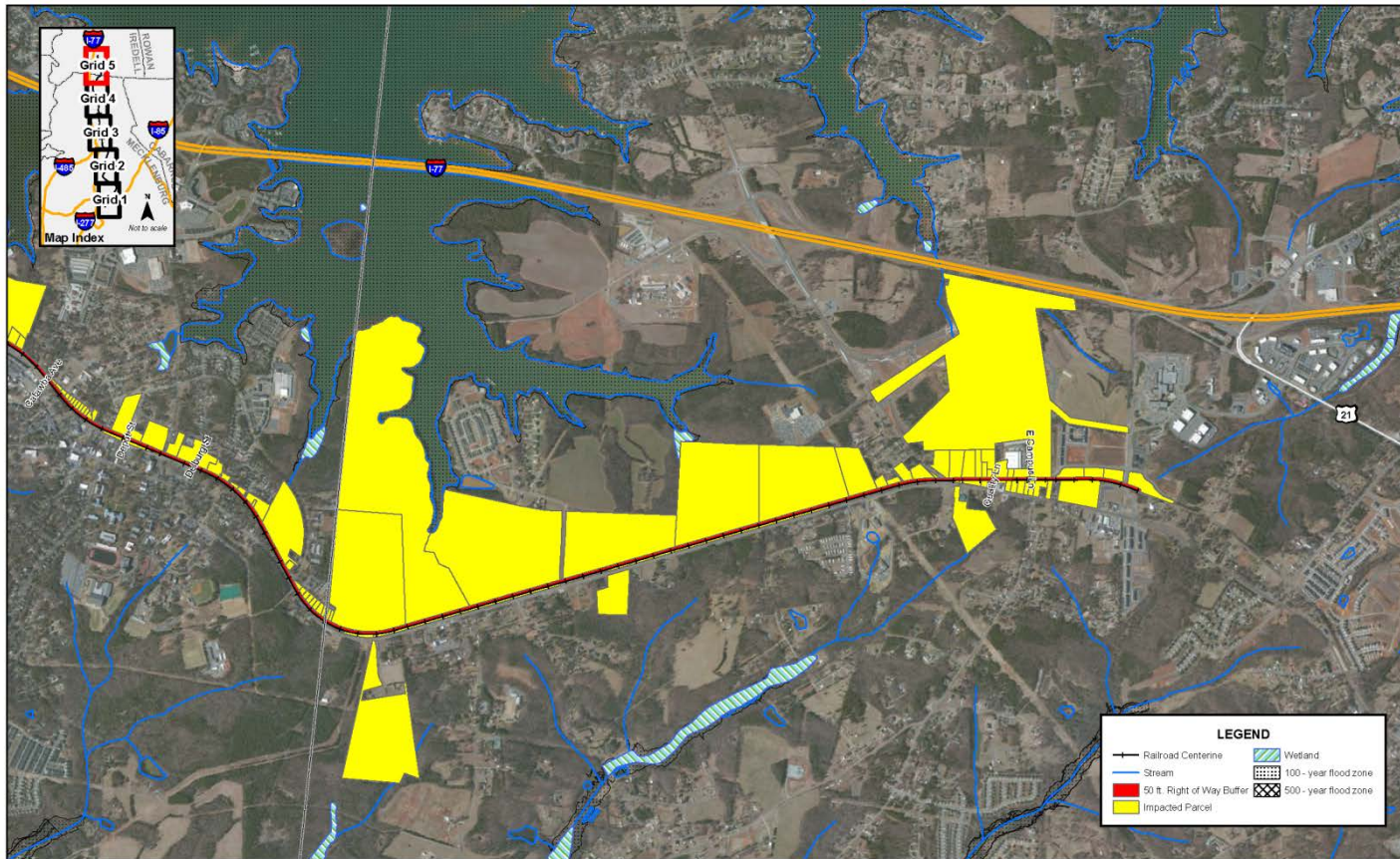
**NORFOLK SOUTHERN "O" LINE CORRIDOR  
POTENTIAL CATS RED LINE CORRIDOR**



0 0.125 0.25 0.5 Miles

**MAP 4 of 5**

Figure 8 - LYNX Red Line Corridor map – Iredell County impacted parcels



Date Source: US Fish and Wildlife Service,  
NC Department of Transportation, Iredell  
and Mecklenburg GIS Departments, NC  
Flood Maps  
Date Created: November 15, 2013

**NORFOLK SOUTHERN "O" LINE CORRIDOR  
POTENTIAL CATS RED LINE CORRIDOR**



0 0.125 0.25 0.5 Miles

**MAP 5 of 5**