



**LYNX Blue Line Extension  
(Northeast Corridor)  
Light Rail Project  
Contract #: 08-477  
WBS #: 6.12**

## **Noise and Vibration Technical Report Addendum #2**

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**TABLE OF CONTENTS**

**1.0 INTRODUCTION ..... 1**

**2.0 EXISTING NOISE CONDITIONS ..... 2**

**2.1 Existing Conditions of Noise Sensitive Receptors ..... 3**

**3.0 NOISE IMPACT ASSESSMENT ..... 4**

**3.1 Noise Screening ..... 4**

**3.2 Noise Assessment..... 4**

**4.0 CONCLUSION ..... 7**

**Tables**

Table 1: Noise Monitoring Results ..... 3

Table 2: Light Rail Alternative – University City Boulevard Station  
 Noise Impact General Assessment (2009) Category 2 Land Uses ..... 5

Table 3: Light Rail Alternative – I-485/North Tryon Park-and-Ride Noise Impact General  
 Assessment (2009) Category 2 Land Uses ..... 5

Table 4: Light Rail Alternative – Vehicle Light Maintenance Facility  
 Vibration Impact General Assessment (2009) Category 2 & 3 Land Uses ..... 6

Table 5: Light Rail Alternative – At-Grade Crossing at Ken Hoffman Drive  
 Vibration Impact General Assessment (2009) Category 2 Land Uses ..... 6

Table 6: Light Rail Alternative – At-Grade Crossing at JM Keynes Drive  
 Vibration Impact General Assessment (2009) Category 2 Land Uses ..... 7

**Figures**

- Figure 1: InTown Suites - Light Rail Alternative: Noise Impact
- Figure 2: Residence Inn by Marriott and Hampton Inn - Light Rail Alternative: Noise Impact
- Figure 3: Carolinas Medical Center - University - Light Rail Alternative: Noise Impact

## 1.0 INTRODUCTION

This report is the second addendum to the *Lynx Blue Line Extension (LYNX BLE) - Noise and Vibration Technical Report*, prepared for the City of Charlotte – Charlotte Area Transit System (CATS). It incorporates the following design changes which have occurred following the agency circulation of the 15 percent preliminary engineering design plans. Six changes are described in this technical report addendum.

- Addition of a Vehicle Light Maintenance Facility (VLMF). The VLMF is planned to provide light maintenance, repair, interior cleaning, and inspection of light rail vehicles. The VLMF will comprise of the following basic components: (1) the Site and Yard, (2) the VLMF Building and within the building, (3) Rail Car Services and (4) Rail Car Operations. The facility would be located within the existing Norfolk Southern Intermodal Yard located just northeast of Brevard Street. The site is approximately 20 acres.
- Design changes to the University City Blvd. Station Park-and-Ride. This park-and-ride was expanded by adding three additional parcels on Stetson Avenue and further to the west in order to accommodate an increased ridership demand. The design change also includes a relocated entrance with an at-grade traffic signal and a road network connecting the park-and-ride to the west with the IKEA Drive, and to the north and south to roads planned for future private development by others.
- Design changes to the I-485 Park-and-Ride. This park-and-ride was expanded to the south and west. The entrance of the park-and-ride was also shifted southwest on North Tryon Street thus changing the locations of access roads.
- Adding an option for the Sugar Creek Station Park-and-Ride. This design change includes adding a park-and-ride option for the Sugar Creek Station. This park-and-ride would include a five-story, 1,000 space parking garage to be located on the parcels bound by Sugar Creek Road, the NCRR, and North Davidson Street.
- Adding five at-grade intersections. At-grade signalized intersections would be added at Orr Road, Orchard Trace, Owen, JM Keynes, and Ken Hoffman. These intersections, which were previously planned to be closed to traffic with the exception of right-in and right-out movements, will now include crossing bells and gates. However, of these five intersections, only two (JM Keynes Drive and Ken Hoffman Drive) would result in a potential for impact at noise sensitive properties. The remaining three would not result in any noise increases at noise sensitive properties either because they are too far from sensitive receptors (Orr Road and Owen Road) or there are no sensitive receptors in the vicinity of the intersection (Orchard Trace).

The remaining proposed design change includes:

- Relocating the 27th Street Station to 25th Street. This change results in a shift of the proposed 27th Street to the south between 25th and 26th Streets. The station name also changes to the 25th Street Station.

However, this design change would not result in any potential impacts since there are no noise sensitive receptors nearby. With respect to potential impacts from vibration, because none of the six design changes would result in an alteration of the proposed light rail alignment or would

result in additional rail vehicles close by vibration sensitive receptors, no impacts are expected to result.

This report assesses the potential impacts of these design changes on noise sensitive properties. The same basic methodology and assumptions described in the *LYNX BLE - Noise and Vibration Technical Report* is used here for noise impact predictions. The basic background information for noise fundamentals are also provided in *LYNX BLE - Noise and Vibration Technical Report* and is therefore not repeated here. Vibration sensitive properties would not be affected by the propose design changes, therefore potential vibration impacts were not studied.

## **2.0 EXISTING NOISE CONDITIONS**

Noise sensitive land uses were identified by screening GIS data for buildings with residential or institutional uses nearby the proposed project design changes. Relevant field observations were made by STV incorporated in 2008, to identify and confirm sensitive land use locations within the larger study area.

### Vehicle Light Maintenance Facility (VLMF)

The proposed VLMF facility would be located within the existing Norfolk Southern Intermodal Yard located just northeast of Brevard Street. Along Parkwood Avenue, one multi-family and several single-family residences are located between 17th Street and Brevard Street. The closest of these is approximately 500 feet from the proposed VLMF. On 21<sup>st</sup> and 22<sup>nd</sup> Streets just south of Brevard Street, there are two single-family residences. The closest is located approximately 340 feet from the proposed VLMF. All other properties near the VLMF are industrial or commercial in nature.

### Enlarged University City Blvd. Station Site Plan

On North Tryon Street/US-29, in the “weave” with Route 29 Bypass, the InTown Suites Hotel is approximately 1100 feet from the proposed new at-grade crossing created for the main access road to the proposed University City Blvd. Station Park-and-Ride lot. The Camino Del Rey church is approximately 50 feet from a roadway segment within the proposed University City Blvd. Station Park-and-Ride that would be primarily used by buses .

### The Expanded I-485/North Tryon Park-and-Ride

On North Tryon Street/US-29 between I-485 and the northern terminus of the proposed project, the Queen’s Grant Mobile Home Park exists approximately 400 feet to the south of the alignment. One of the access roads to the reconfigured park-and-ride would be located approximately 75 feet from the Queen’s Grant Mobile Home Park.

### The Sugar Creek Station Park-and-Ride Option 2

There are several single-family residences on Bearwood Avenue close to the proposed Sugar Creek Park-and-Ride garage. The closest residence, located at the corner of Sugar Creek and Bearwood Avenue, would be approximately 214 feet from the garage. This residence is also located approximately 175 feet from the alignment.

### The Addition of At-Grade Crossings

For two North Tryon Street/US-29 intersections of concern at Ken Hoffman Drive and JM Keynes Drive, noise sensitive properties are located nearby. At Ken Hoffman Drive, there exist two hotels as close as 200 feet from the intersection. At JM Keynes Drive, the Carolinas Medical Center (CMC)-University is within 290 feet of the intersection.

## 2.1 Existing Conditions of Noise Sensitive Receptors

The existing noise conditions related to the proposed project design changes are shown for six locations in Table 1 and on Figures 6a and 6b in the *LYNX BLE - Noise and Vibration Technical Report*: All values represent monitored values with the exception of the noise level at noise site #3.

For Site #3, the existing noise exposure table contained in the Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, May 2006 was used. This table lists noise levels based on population density as well as the distance from a receiver to existing rail lines and roadways.

**Table 1**  
**Noise Monitoring Results <sup>1</sup>**

Site#	Monitoring Location Description	Date	Duration	Existing Noise Exposure	
				Ldn	Leq
1	House, 423 East 22nd Street <sup>2</sup>	10/01/08	1	60.1	56.0
2	InTown Suites, 110 Rocky River Road <sup>2</sup>	10/4/2005	1	62.0	64.0
3	House, 4031 Bearwood Avenue <sup>3</sup>	NA	NA	65.0	NA
4	Residence Inn @ Ken Hoffman Drive <sup>2</sup>	10/6/2008	1	66.1	66.4
5	CMC-University <sup>2</sup>	10/6/2008	1	58.1	60.1
6	Queen's Grant Mobile Homes, 124 Carnival Street <sup>2</sup>	10/06/08	1	55.4	52.5

<sup>1</sup> Only noise monitoring results relevant to this report are included here.

<sup>2</sup> Source: STV Incorporated, 2008

<sup>3</sup> This noise level was obtained from Table 5-7 of the Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

Below are descriptions for the noise measurement program related to receptors located nearby proposed design changes:

Short-term Site 1 was located along the proposed alignment at 423 East 22nd Street. The site contains a single-family residence. The microphone was located along the front yard of the property. Traffic noise from adjacent East 22nd Street is extremely light, but traffic from nearby Parkwood Avenue contributed to the noise environment. Utilizing FTA guidelines, the calculated Ldn at this site was 60.1 dBA. This monitoring location is representative of the row of private homes and along East 22nd Street and East 21st Street nearest to the proposed alignment.

Short-term Site 2 was located along the proposed alignment at the InTown Suites at 110 Rocky River Road. Monitoring was conducted for one hour during peak morning traffic conditions between 8:41 a.m. and 9:41 a.m. The measured one-hour Leq at this site was 64 dBA. This monitoring location is representative of other motels located near the "weave" portion of North Tryon Street/US-29 where North Tryon Street/US-29 and Route 29 Bypass merge. An Ldn of 62 dBA has been calculated from this peak-hour measurement using FTA guidelines.

Short-term Site 4 was located along the proposed alignment at the Residence Inn by Marriott at 8503 North Tryon Street/US-29. The site contains several multi-unit buildings that are a part of the hotel complex. The microphone was located in the front yard of the property along North Tryon Street/US-29. Traffic noise from nearby North Tryon Street/US-29 contributed greatly to the noise environment. Utilizing FTA guidelines, the calculated Ldn at this site was 66.1 dBA. This monitoring location is also representative of a large apartment complex neighboring the site.

Short-term Site 5 was located along the proposed alignment at the Carolinas Medical Center-University at 8800 North Tryon Street/US-29 near Harris Boulevard. The site contains a large medical complex and a parking lot. The microphone was located in the front of the medical center along North Tryon Street/US-29. Traffic noise from nearby North Tryon Street/US-29 and W.T. Harris Boulevard contributed greatly to the noise environment. Utilizing FTA guidelines, the calculated Ldn at this site was 58.1 dBA.

Short-term Site 6 was located along the proposed alignment along North Tryon Street/US-29 near Desire Street. The site contains a large mobile home community known as the Queen's Grant Mobile Home Park. The microphone was located in the front edge of the property. Traffic noise from nearby North Tryon Street/US-29 along with background noise from I-485 contributed to the noise environment. Utilizing FTA guidelines, the calculated Ldn at this site was 55.4 dBA. This monitoring location is representative of the rows of mobile homes nearest to the proposed alignment and parking garage.

### **3.0 NOISE IMPACT ASSESSMENT**

#### **3.1 Noise Screening**

For park-and-ride facilities, the Federal Transit Administration (FTA) - defined noise screening distance for locations with an unobstructed view is 125 feet. Therefore, since the closest noise sensitive receptor to the proposed Sugar Creek Station Park-and-Ride Option 2 would be located approximately 215 feet away, noise impacts are not expected to result. For both the University City Blvd. Park-and-Ride and the Expanded I-485/North Tryon Park-and-Ride, sensitive noise receptors would be located at distances well beyond the FTA screening criteria. Therefore, noise impacts are also not expected to result.

#### **3.2 Noise Assessment**

The prediction of noise impacts involves a determination of project-related noise levels at identified noise sensitive receptors and then comparing them to applicable FTA noise criteria shown on Figure 5 and in Table 2 of the *LYNX BLE - Noise and Vibration Technical Report*. To assess the design changes, the potential impacts related to the Enlarged University City Blvd. Plan, the Expanded I-485/North Tryon Park-and-Ride and the VLMF were examined using FTA general assessment guidelines. Tables 2 through 4 show the resulting impact assessment performed for noise category 2 land uses.

Each of the noise sensitive receptors examined could either be uniquely affected by the proposed project or representative of a cluster of potentially impacted noise sensitive properties. Only receptors that would be affected by the proposed design changes are considered in the assessment. When a receptor would be affected by more than one project-related noise source, the noise levels of the different sources are combined to predict the total noise impact level at

that receptor. The tables present the levels of impact as a function of a site's distance from the track and the light rail vehicle speed.

#### Enlarged University City Blvd. Station Site Plan

The InTown Suites Hotel adjacent to North Tryon Street/US-29 could be potentially affected by elements of this design change. Table 2 represents the study of one category 2 site. A moderate impact is predicted to occur at this receptor. However, although the proposed design change would include a new at-grade crossing, the critical components of the impact appear to be the receptors proximity to the proposed rail line and the location of the proposed substation (TPSS# 16).

**Table 2**  
**Light Rail Alternative – University City Boulevard Station**  
**Noise Impact General Assessment (2009) Category 2 Land Uses**

Description	Land Use	Existing Ldn (dBA)	LRT Speed (mph)	Distance to Grade Crossing (feet)	Impact Thresholds		Project - Related Prediction Ldn (dBA)	Type of Impact
					Impact	Severe		
InTown Suites, 110 Rocky River Road <sup>2</sup>	Hotel	62	40	1100	59	64	59.6	Moderate

SFR = Single-family Residential, MFR = Multi-family Residential, MU = Mixed Use, SFU = Single-family Unit, MFU = Multi-family Unit

Source: STV Incorporated, 2009

#### Reconfigured I-485/North Tryon Park-and-Ride

Although the design change would bring an access road closer to the Queen's Grant Mobile homes, Table 3 shows that no impacts would be predicted to occur at the noise sensitive receptor.

**Table 3**  
**Light Rail Alternative – I-485/North Tryon Park-and-Ride**  
**Noise Impact General Assessment (2009) Category 2 Land Uses (Access Roads)\***

Description	Land Use	Existing Ldn or Leq (dBA)	Speed (mph)	Distance to Access Road (feet)	Impact Thresholds		Project-Related Prediction Ldn or Leq (dBA)	Type of Impact
					Impact	Severe		
Queen's Grant Mobile Homes, 124 Carnival Street	SFR	55	25	75	55	61	53	None

SFR = Single-family Residential, MFR = Multi-family Residential, MU = Mixed Use, SFU = Single-family Unit, MFU = Multi-family Unit

\* Assessment was performed for noise sensitive locations which could be affected by parking area access roads only.

Source: STV Incorporated, 2009

#### Vehicle Light Maintenance Facility

For the VLMF, detailed information about the operational schedule of vehicle storage and maintenance is not available at this time. Therefore, based on the configuration of the proposed

facility, the following conservative assumptions were made in order to conduct the noise assessment.

- Thirty light rail vehicles (LRV's) would be exiting the facility during the morning peak periods,
- Thirty LRV's would be entering the facility at the end of the day,
- Four LRV's are either maintained or cleaned per day (2 during the daytime hours and 2 during the nighttime hours),
- Within the facility, LRV's move at approximately ten miles per hour.

As shown in Table 4, the VLMF would not result in any impacts at noise sensitive receptors.

**Table 4**  
**Light Rail Alternative – Vehicle Light Maintenance Facility**  
**Noise Impact General Assessment (2009) Category 2 Land Uses**

Description	Land Use	Existing Ldn (dBA)	Distance to VLMF (feet)	Impact Thresholds		Project - Related Prediction Ldn (dBA)	Type of Impact
				Impact	Severe		
House, 423 East 22nd Street	SFR	60.1	330	58	63	51.9	None

SFR = Single-family Residential, MFR = Multi-family Residential, MU = Mixed Use, SFU = Single-family Unit, MFU = Multi-family Unit

Source: STV Incorporated, 2009

#### Additional At-Grade Intersection Crossings

An assessment was conducted to determine the potential impact that the addition of at-grade crossings along North Tryon Street/US-29 at Ken Hoffman Drive and JM Keynes Drive would have on nearby noise sensitive properties. As shown below in Tables 5 and 6, both at-grade crossings would result in moderate impacts at nearby noise sensitive properties. For the at-grade crossing at Ken Hoffman Drive, a predicted moderate impact at the Residence Inn by Marriott would occur. The impact assessment for the Residence Inn by Marriott is representative of the predicted moderate noise impact at the Hampton Inn located approximately 235 feet from the at-grade crossing at 8419 North Tryon Street/US-29.

**Table 5**  
**Light Rail Alternative – At-Grade Crossing @ Ken Hoffman Drive**  
**Noise Impact General Assessment (2009) Category 2 Land Uses**

Description	Land Use	Existing Ldn (dBA)	LRT Speed (mph)	Distance to Grade Crossing (feet)	Impact Thresholds		Project - Related Prediction Ldn (dBA)	Type of Impact
					Impact	Severe		
Residence Inn by Marriott, 8503 North Tryon Street @ Ken Hoffman	Hotel	66	35	200	61	67	61.6	Moderate

SFR = Single-family Residential, MFR = Multi-family Residential, MU = Mixed Use, SFU = Single-family Unit, MFU = Multi-family Unit

Source: STV Incorporated, 2009

**Table 6  
Light Rail Alternative – At-Grade Crossing @ JM Keynes Drive  
Noise Impact General Assessment (2009) Category 2 Land Uses**

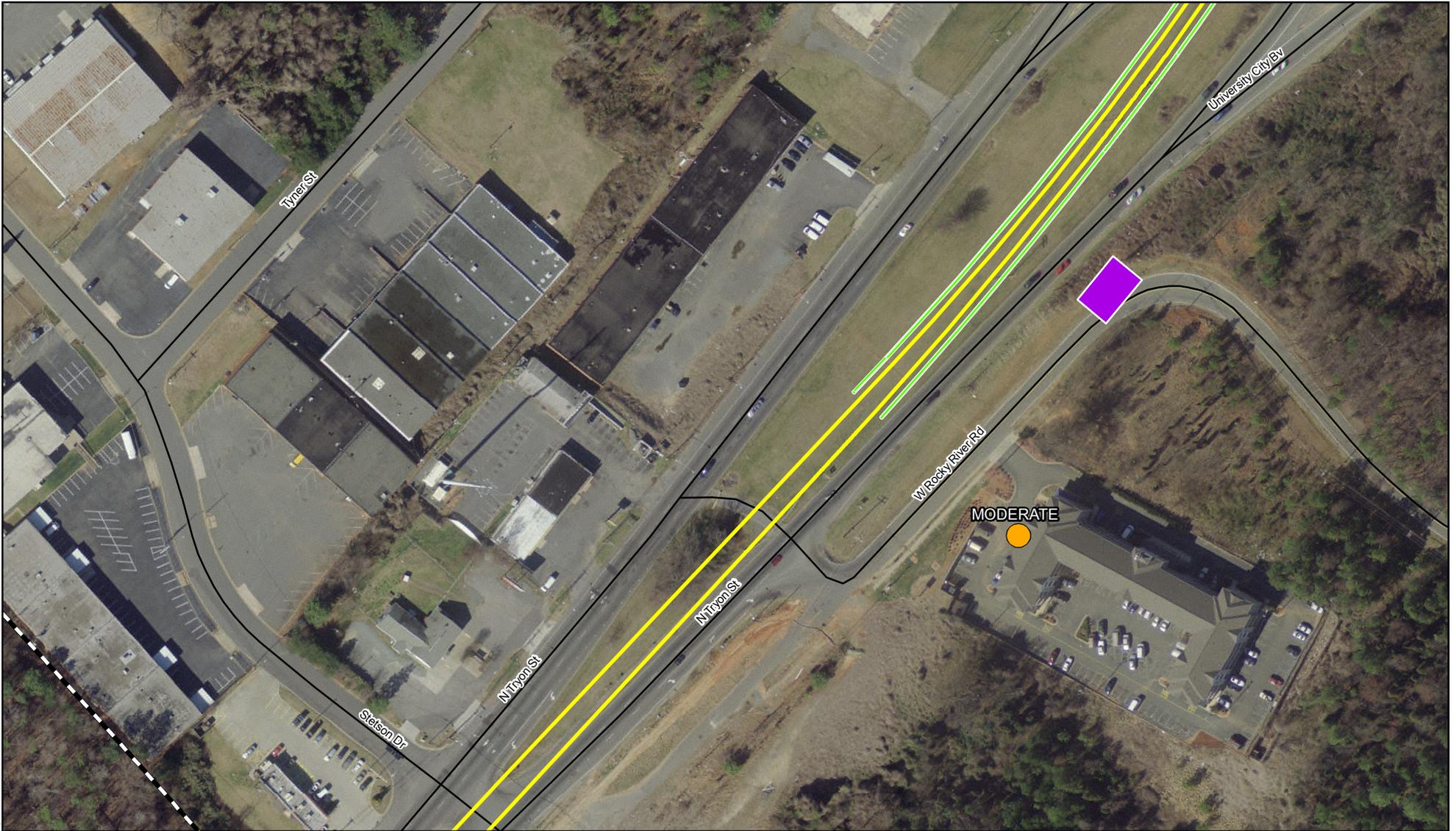
Description	Land Use	Existing Ldn (dBA)	LRT Speed (mph)	Distance to Grade Crossing (feet)	Impact Thresholds		Project - Related Prediction Ldn (dBA)	Type of Impact
					Impact	Severe		
Carolinas Medical Center-University, 8800 North Tryon Street	Hosp	58	35	290	57	62	58.0	Moderate

*SFR = Single-family Residential, MFR = Multi-family Residential, MU = Mixed Use, SFU = Single-family Unit, MFU = Multi-family Unit, Hosp = Hospital  
Source: STV Incorporated, 2009*

#### **4.0 CONCLUSION**

The proposed design changes for the VLMF, the Enlarged University City Blvd. Station Site Plan, the Expanded I-485/North Tryon Park-and-Ride and the Sugar Creek Station Park-and-Ride Option 2 would not add to or modify any potential noise impact already predicted for the light rail alternative. The moderate impact predicted for the InTown Suites was also predicted for the light rail alternative. In addition, none of these proposed design changes would create any new noise impacts.

For the proposed design change related to the Addition of At-Grade Crossings, new moderate impacts are predicted to occur at the Residence Inn at Marriott, the Hampton Inn and the CMC-University. However, as shown in Tables 5 and 6, none of these moderate impacts would be more than 1dB above the FTA moderate impact threshold.



Proposed Light Rail Alternative	Railroads	Proposed Park-and-Ride Facilities
Design Option	Proposed Substation	Proposed Structures
Proposed Station Platform	Proposed Signal Houses	Moderate Noise Impact
Proposed Retaining Walls	Roads	Severe Noise Impact
Proposed ROW	Streams	

1 inch = 150 feet

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

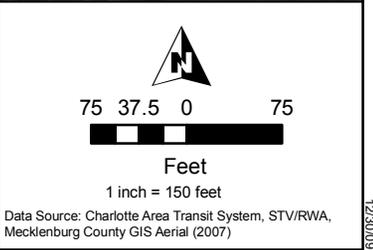
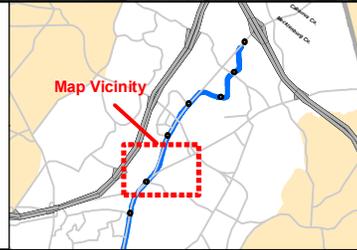
InTown\_Suites\_LRA\_Noise\_CB\_12/29/09.pdf

12/29/09

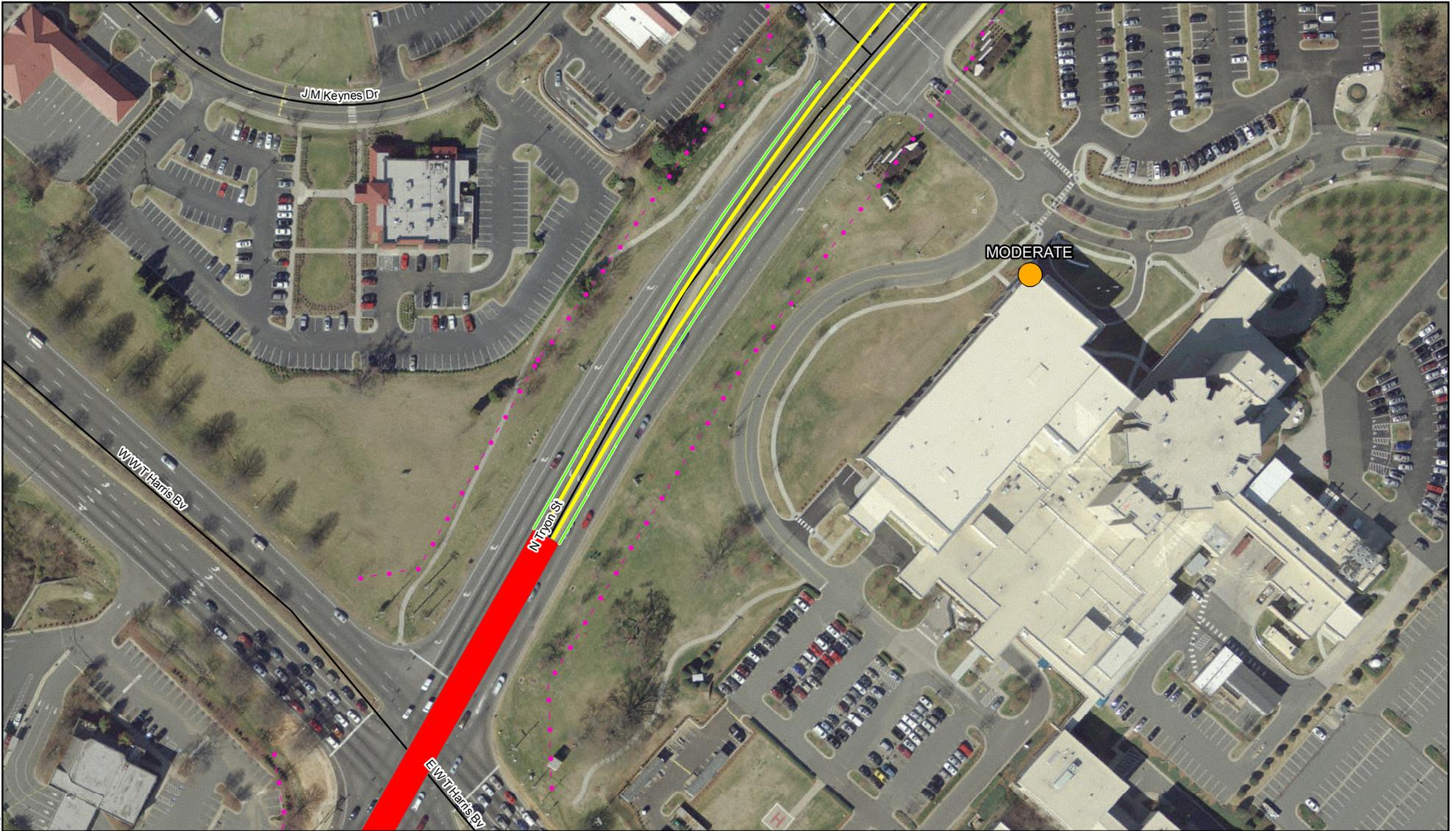
Residence Inn by Marriott and Hampton Inn - Light Rail Alternative: Noise Impact



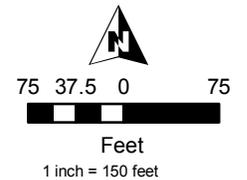
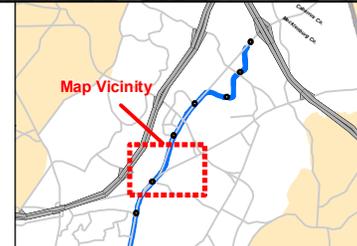
Legend	
	Proposed Light Rail Alternative
	Design Option
	Proposed Station Platform
	Proposed Retaining Walls
	Proposed ROW
	Railroads
	Proposed Substation
	Proposed Signal Houses
	Roads
	Streams
	Proposed Park-and-Ride Facilities
	Proposed Structures
	Moderate Noise Impact
	Severe Noise Impact



**Carolinas Medical Center - University - Light Rail Alternative: Noise Impact**



- Legend**
- Proposed Light Rail Alternative
  - Design Option
  - Proposed Station Platform
  - Proposed Retaining Walls
  - Proposed ROW
  - Railroads
  - Proposed Substation
  - Proposed Signal Houses
  - Roads
  - Streams
  - Proposed Park-and-Ride Facilities
  - Proposed Structures
  - Moderate Noise Impact
  - Severe Noise Impact



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