LYNX Blue Line Extension

(Northeast Corridor)

Light Rail Project

Contract #: 08-477

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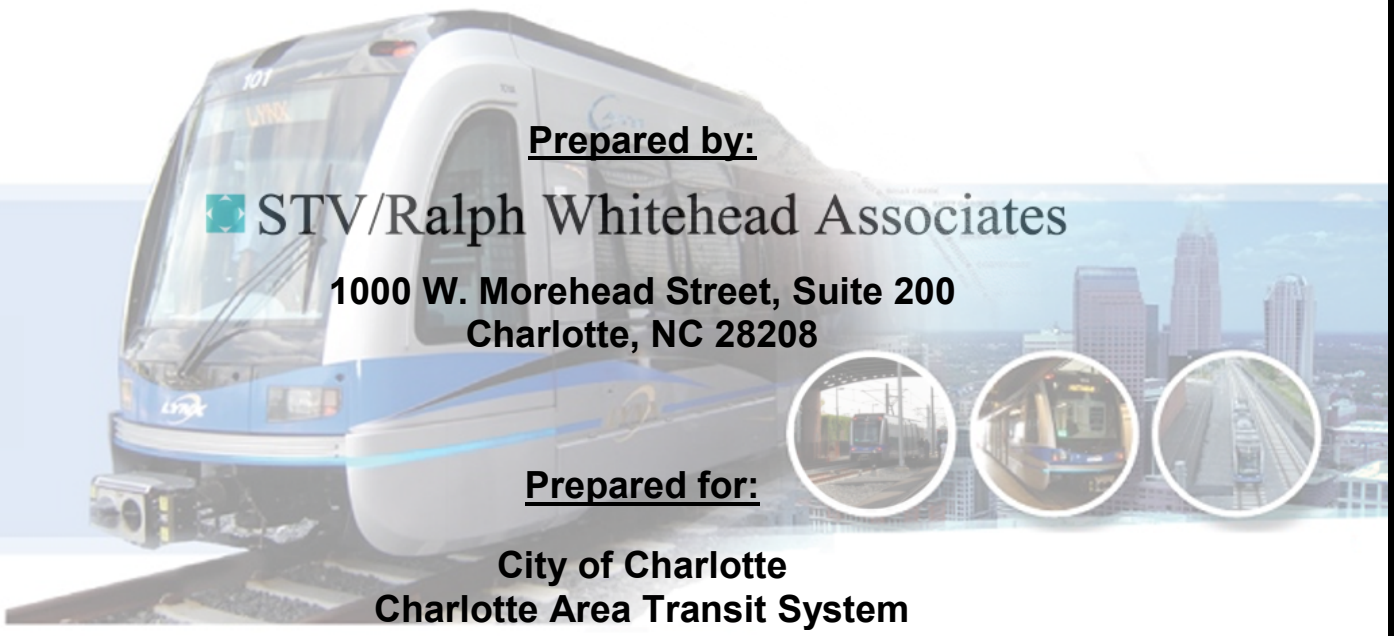
Air Quality Technical Report

Addendum #1



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1.0 INTRODUCTION

STV/Ralph Whitehead Associates, under contract with the City of Charlotte, prepared this report as an addendum to the *Air Quality Technical Report* (January 2010). This report examines the potential air quality effects associated with project changes resulting from the January 26, 2011, Metropolitan Transit Commission (MTC) approved, revised Locally Preferred Alternative (LPA) alignment and station locations for the proposed LYNX Blue Line Extension Northeast Corridor Light Rail Project (LYNX BLE).

The primary change analyzed in this report addendum is the addition of a parking garage at the University City Blvd. Station. The proposed addition of the parking garage at the University City Blvd. Station would involve a six-level, 1500 space parking garage on approximately nine acres of land adjacent to North Tryon Street/US-29 between Stetson Drive and the Interstate 85 (I-85) Connector. This report presents an assessment of the potential impact of this parking structure on sensitive air quality receptors. The same basic background information, methodology and assumptions for air quality fundamentals described in the *Air Quality Technical Report* (January 2010), is used in this report addendum to predict pollutant concentrations from the operation of this parking facility.

1.1 Project Description

The *LYNX BLE Draft Environmental Impact Statement (EIS)* (August 2010) and related *Air Quality Technical Report* (January 2010) was completed on the proposed light rail extension from Center City Charlotte to I-485 near the Mecklenburg-Cabarrus County line. Recently, several major changes were made to the scope of the proposed LYNX BLE, which would affect the previously identified potential air quality effects.

In November 2010, the Metropolitan Transit Commission (MTC) received a report on the financial capacity of CATS and its ability to deliver the 2030 Transit System Plan. Based on the analysis presented, it was determined that the current plan could not be completed as planned. In order to advance the LYNX BLE, the MTC directed CATS Staff to reduce the project scope by approximately 20 percent.

After the November meeting, CATS staff initiated extensive coordination with its partner departments, governing board, advisory committees and groups, the University of North Carolina Charlotte (UNC Charlotte), the North Carolina Department of Transportation (NCDOT), the Federal Transit Administration (FTA) and other project stakeholders, as well as with the members of the public. On December 15, 2010, CATS presented the LYNX BLE Proposed Scope Reductions as an information item to the MTC. On January 26, 2011, the MTC voted to adopt the following changes [relevant changes to this *Air Quality Technical Report Addendum #1* are described; however additional details may be found in the *LYNX BLE Scope Reduction* (April 2011) report, available under a separate cover]:

- Reduce service frequency by operating 2-car trains every 7.5 minutes initially, and 3-car trains every 10 minutes in the future;
- Eliminate the proposed Vehicle Light Maintenance Facility at the existing Norfolk Southern Intermodal Yard; construct a storage yard only at the existing Norfolk Southern Intermodal Yard and make minor improvements to the existing South Boulevard Light Rail Facility;

- Construct surface lots at the Sugar Creek Station instead of a parking garage;
- Eliminate park-and-ride facilities at Tom Hunter Station (consistent with a Value Engineering recommendation made in July 2010) and McCullough Station;
- Reduce project length by 1.2 miles, terminating at the UNC Charlotte Station and eliminating the Mallard Creek Church Road Station and I-485/N. Tryon Station, including parking;
- Provide additional parking at University City Blvd. Station (approximately 1,500 total spaces);
- Provide an additional right/through lane along North Tryon Street/US-29 from Orchard Trace to Shopping Center Drive to accommodate additional traffic from the University City Blvd. park and ride; and,
- Add a parking garage at JW Clay Blvd. Station (690 spaces).

As a result of these changes, namely elimination of the I-485/N. Tryon Station and its associated 2,000-space parking garage, the parking capacity at the University City Blvd. Station park-and-ride would need to be increased to accommodate for an increase in traffic volume expected at the station. The *LYNX BLE Air Quality Technical Report* (January 2010) report evaluated the University City Blvd. Station park-and-ride as previously proposed, including a surface parking lot with 774 spaces. In order to accommodate for an increase in traffic, a parking garage to accommodate approximately 1,485 spaces would be necessary. The parking garage would be located within the footprint of the previously-proposed surface parking lot.

2.0 METHODOLOGY

The following section describes the methodology related to the analyses air quality analyses for the project scope changes. An air quality analysis was performed to estimate the maximum localized 1-hour and 8-hour carbon monoxide (CO) concentrations caused by vehicular traffic associated with the operation of a park and ride facility near the proposed University City Blvd. Station. Concentrations of CO were determined in accordance with the guidance documents and regulations listed below.

2.1 Microscale Air Quality Guidance

Guidance in the following documents was used for microscale carbon monoxide modeling for various intersections and proposed parking facilities within the project study area, including the proposed University City Blvd. Station parking garage.

- NC Division of Air Quality, (September 2007) *Guidelines for Evaluating the Air Quality Impacts of Transportation Facilities.*
- US EPA Office of Air Quality Planning and Standards, EPA-454/R-92-005, (November 1992), *Guidelines for Modeling Carbon Monoxide from Roadway Intersections.*
- Federal Highway Administration, (July 2001), *Transportation Conformity Reference Guide.*
- All applicable federal, State, and local regulations, including:
  - 40 CFR 93 (Determining Conformity of Federal Actions to State or Federal Implementation Plans)
  - 15 North Carolina Administrative Code 2D.0800, 2D.1600 (General Conformity), 2D.2000 (Transportation Conformity)
  - Mecklenburg County Air Pollution Control Ordinance (MCAPCO)

In accordance with 40 CFR 93.105(c)(1)(i), Interagency Consultation Procedures, the Air Quality Section of the Mecklenburg County Land Use and Environmental Services Agency (LUESA) was consulted in March 2009, prior to initiating the microscale assessment and employing the planned project methodology.

2.2 Models for Predicting Carbon Monoxide Concentrations

Two computer models were utilized as part of the review of the proposed parking facility. MOBILE6.2 was used to generate emission factors and the Point, Area, and Line Source Algorithm (PAL2.1) was also utilized to predict pollutant concentrations at the sensitive receptor locations. These models were used to remain consistent with the analyses previously completed for this project, and documented in the *Air Quality Technical Report* (January 2010).

On March 2, 2010, the United States Environmental Protection Agency (EPA) announced the availability of the Motor Vehicle Emissions Simulator model (MOVES2010a) for official use outside of California. MOVES2010a is the state-of-the-art upgrade to EPA's modeling tools for estimating emissions from cars, trucks, motorcycles, and buses, based on analysis of millions of emission test results and considerable advances in the Agency's understanding of vehicle emissions (*Federal Register Doc: 2010-4312*). The publication of this notice started a two-year grace period before MOVES2010a is the required to be used in all regional emissions analyses for transportation conformity determinations outside of California. On December 20, 2010, EPA approved the use of MOVES2010a for completing quantitative hot-spot analyses in project-level transportation conformity determinations.

After receiving notice from EPA in February 2011, CATS consulted with the Air Quality Section of the Mecklenburg County LUESA, prior to initiating and employing the planned project methodology. LUESA staff indicated that training for the use of MOVES2010a had not yet been administered but would soon be underway. For the purpose of the NEPA document and relevant technical documentation, the proposed LYNX BLE falls into the 2-year grace period and it would not be necessary to use MOVES2010a for project-level conformity analyses. The use of MOBILE6.2 remains acceptable for analyzing emissions from motor vehicles. It should be noted, however, that use of MOVES2010a will likely be necessary for any transportation facility permits applied for outside of the 2-year grace period, as directed by LUESA staff.

2.2.1 MOBILE6.2 Emission Factors

The MOBILE6.2 emission factor model was used to provide vehicular emission factors and the PAL model for estimating CO concentrations along roadways and at parking facilities. According to *40 CFR Part 51, Appendix W, Section 5.2.3*, the latest version of the MOBILE model should be used for emissions input to intersection models. MOBILE6.2 is the latest update to the MOBILE model for use by state and local governments to meet Clean Air Act requirements. MOBILE6.2 was used for the regional transportation conformity demonstration as part of the 2035 Long Range Transportation Plan (LRTP), which includes the LYNX BLE. Input and assistance from the Mecklenburg County LUESA Air Quality Section was necessary to determine the emissions factors and to confirm use of MOBILE6.2 for this project-level hot-spot analysis.

The MOBILE6.2 input and output files used to generate the various emission factors for 2008 and 2030 are included in Appendix A of the original Air Quality Technical Report (January 2010). The emission factors by roadway type for 2008 and 2030 can be found in Table 2-1 and

Table 2-2. In Table 2-2, the CO emission factors are listed for hot and cold starts, which were necessary for PAL input.

Table 2-1
CO Emission Factors from MOBILE6.2

Road Type-Mecklenburg County	2008 CO Emission Factors	
	(g/mi)[1]	(mph)[2]
Urban freeway	9.567	55
Urban principal arterial	8.448	35
Urban minor arterial	8.441	35
Urban collector	8.381	30
Urban local	8.496	25
Road Type-Mecklenburg County	**2030 CO Emission Factors**	
	(g/mi)	**(mph)**
Urban freeway	4.996	55
Urban principal arterial	4.438	35
Urban minor arterial	4.431	35
Urban collector	4.448	30
Urban local	4.518	25

[1] g/mi (grams per mile traveled)
[2] mph (miles traveled per hour)

Table 2-2
Hot and Cold Start CO Emission Factors from MOBILE6.2

2008	CO Emission Factors (Warm)			CO Emission Factors (Cold)		
Road Type	**g/mi[1] @ 2.5 mph[2]**	**g/mi @ 5 mph**	**Idle-g/hr**	**g/mi @ 2.5 mph**	**g/mi @ 5 mph**	**Idle-g/hr[3]**
Urban freeway	22.30	12.76	55.75	28.54	19.00	71.34
Urban principal arterial	22.93	12.90	57.31	29.58	19.55	73.94
Urban minor arterial	22.97	12.95	57.41	29.59	19.58	73.98
Urban collector	23.14	13.06	57.85	29.77	19.69	74.43
Urban local	23.41	13.34	58.51	29.89	19.82	74.73
2030	**CO Emission Factors (Warm)**			**CO Emission Factors (Cold)**		
Road Type	**g/mi @ 2.5 mph**	**g/mi @ 5 mph**	**Idle-g/hr**	**g/mi @ 2.5 mph**	**g/mi @ 5 mph**	**Idle-g/hr**
Urban freeway	11.71	6.88	29.27	15.05	10.22	37.61
Urban principal arterial	12.17	7.06	30.43	15.73	10.62	39.33
Urban minor arterial	12.18	7.08	30.46	15.73	10.63	39.32
Urban collector	12.37	7.19	30.91	15.92	10.74	39.79
Urban local	12.48	7.27	31.20	15.95	10.75	39.88

[1] g/mi - (grams per mile traveled)
[2] mph - (miles traveled per hour)
[3] g/hr - (grams emitted per hour)

2.2.1.1 Traffic Volumes

The traffic volumes for the intersections near the proposed project site are based on updated turning count movements provided by CATS (February 2011). These turning movements were derived as a result of changes to the project, which included the elimination of the I-485/N. Tryon Station parking garage and increased parking capacity at the University City Blvd. Station. These traffic volumes determined that there would be 47 vehicles entering the University City Blvd. parking garage during the PM peak hour.

2.2.1.2 Modeled Receptors

The only receptor locations that would be affected by traffic from the University City Blvd. parking garage would be the sidewalks at nearby intersections. As a result, the receptor locations for those intersections selected for analysis were identified in accordance with the *Guidelines for Modeling Carbon Monoxide from Roadway Intersections* (EPA, 1992). The following criteria, as defined in the guidance, were used to select receptors:

- Receptors must be at least ten feet from each of the traveled roadways that comprise the intersection and must be at a height of six feet; these criteria generally apply to all receptors, with further refinements listed below.
- Receptors nearby occupied lots must be located along the nearest edge within the lot to which the general public has continuous access. If this cannot be determined, the property line of the lot nearest to traffic lanes should be used.
- Receptors nearby vacant lots must be located using the same criteria for receptors near occupied lots.
- For sidewalks, receptors should be located at least ten feet from each of the traveled roadways that comprise the intersection. If the width of the sidewalk allows, it is recommended that receptors be placed at the midpoint between the curb and the building line. At a minimum, receptors should be located near the corner and at midblock for each approach and departure at the intersection. Receptors should be placed on both sides of the road. For long approaches, it is recommended that receptors be located 80 feet and 160 feet from the intersection corner.
- Receptors (any location type) near breathing height (six feet) to which the general public has continuous access.

2.2.1.3 Background Concentrations and Persistence Factors

For the project study area, the latest background hourly average CO concentration and the persistence factor to be used for modeling purposes were provided by the Mecklenburg County LUESA Air Quality Section. The use of these background concentrations represents a worst-case scenario that conservatively results in the highest predicted 1-hour CO concentration. The background concentration provided by the LUESA was 1.1 parts per million (ppm) for 1-hour averages and 0.912 ppm for 8-hour averages. The persistence factor used was 0.83.

2.2.2 PAL Modeling Methodology

The proposed parking facility at the University City Blvd. Station was analyzed in accordance with MCAPCO and the *Guidelines for Evaluating the Air Quality Impacts of Transportation*

Facilities (EPA, 1992). As outlined in these guidance documents, the PAL algorithm was used to model CO concentrations under worst case conditions at the proposed parking facility.

The Mecklenburg County LUESA Air Quality Section requires permits (under MCAPCO Section 2.0805) if new construction or expansion of a parking deck or garage is undertaken resulting in a parking capacity of at least 750 spaces or a potential parking area of at least 225,000 square feet. Permits also are required if new construction or expansion of a combination of parking lots, decks, and garages is undertaken resulting in a parking capacity of at least 1,000 spaces or a potential parking area of at least 300,000 square feet. Similarly, permits are required if new construction or expansion of an existing parking lot or combination of parking lots is undertaken resulting in a parking capacity of at least 1,500 spaces or a potential parking area of at least 450,000 square feet. Exceptions to these general rules are contained in the regulations, but do not currently apply to the proposed Light Rail Alternative. Confirmation of permit applicability will be sought from Mecklenburg County LUESA Air Quality Section as the project design advances and parking spaces and station site plans are finalized.

The University City Blvd. Station parking garage is proposed to be over 1,500 spaces, utilizing approximately 550,000 square feet of potential parking area. Therefore, the amount of spaces and parking area exceed the criteria defined by MCAPCO and a Transportation Facilities Construction Permit would be required from the Mecklenburg County LUESA Air Quality Section. To facilitate the permit requirements, a detailed air quality analysis of the proposed facility was conducted as part of this report.

For purposes of the analysis, conservative assumptions were used to model the operational variables of the parking garage. This “worst-case scenario” analysis, predicts results based on the usage of the maximum number of parking spaces and available square footage contained at the facility. This assumption produces a worst-case pollutant concentration, since the pollutant emissions would be the direct result of the number of vehicles idling and traveling in the garage. These vehicles were also accounted for as roadway pollutant line sources as they exit the garage and head toward nearby intersections. Vehicles exiting the garage would be in cold start mode, which is the most polluting mode of operation for autos. The proposed parking garage would have entrances/exits on the ground floor as well as an option for a pedestrian bridge to access the light rail platform. To model the worst case scenario, it was also assumed that the 47 vehicles entering the garage during the PM peak period would travel to the roof level in order to find available parking. It was also assumed that all exiting vehicles would exit the parking facility and turn directly onto the private driveway, then left onto the Tyner Drive extension and then left onto the new public road (Public Road A) to return to North Tryon Street/US-29. These assumptions result in the maximum vehicular travel distances and thus, produce the maximum pollutant concentrations. Consequently, if the worst case scenario analysis would not violate the state or federal air quality standard, then a lesser amount of vehicles would also not violate the air quality standard.

2.2.2.1 PAL Model Input

The PAL model inputs that were used to predict CO concentrations for the proposed parking garage at the University City Blvd. Station are shown in Table 2-3. These inputs represent a conservative, worst-case scenario analysis.

Table 2-3
PAL Model Inputs for the proposed University City Blvd. Station

Parking Lot Configuration	
Number of Levels:	Six levels
Spaces per Level:	Level 1: 158 Level 2: 230 Level 3: 243 Level 4: 291 Level 5: 292 Level 6: 292
Total Spaces[1]:	1,506 spaces
Dimensions:	310 feet x 300 feet
Area:	8,640 square meters per level
Emission Factors	
Roadway Line Source:	0.002794 g-sec-m*
Parking Level 1:	0.000038530 g-sec-m^2**
Parking Level 2:	0.000036380 g-sec-m^2**
Parking Level 3:	0.000031289 g-sec-m^2**
Parking Level 4:	0.000026643 g-sec-m^2**
Parking Level 5:	0.000019872 g-sec-m^2**
Parking Level 6:	0.000013056 g-sec-m^2**
Traffic Variables	
Traffic Speed:	5 mph in the garage, 10 mph on roadways.
Traffic volumes:	Projected 2030 p.m. traffic volumes and turning movements. 2030 p.m. (worst-case scenario) 1,553 vehicles total (47 entering/1,506 exiting[2])

*grams per second per meter (g-sec-m)
**grams per second per meter squared (g-sec-m^2)
[1] Parking garage analysis was based on worst case scenario estimates as opposed to 30% design plan estimates
[2] Vehicles exiting the garage structure would be assumed to be in cold start mode.

3.0 CONSEQUENCES

This section discusses the potential air quality impacts from the additional operation of the parking garage at the University City Blvd. Station. It should be noted that the potential air quality impacts identified in the *Air Quality Technical Report* (January 2010) for the No Build, TSM, and the unchanged portions of the Build analysis for the proposed LYNX BLE remain; this section only documents the potential air quality impacts as a result of the LYNX BLE project changes.

Carbon monoxide concentrations from the PAL model output were given in grams/cubic meter and were converted to ppm. Table 3-1 lists the predicted 2030 maximum CO concentrations (which include the background concentration of 1.1 ppm) for the proposed garage subject to MCAPCO.

Table 3-1
Predicted Maximum Carbon Monoxide Concentration (2030)

Station Name	Maximum CO Concentration (ppm)*		Location of Maximum CO Concentration
	1-Hour Average NAAQS – 35 ppm	8-Hour Average NAAQS – 9 ppm	
University City Blvd.	2.8	2.4	Southwest Corner of Garage

*includes background concentration of 1.1 ppm for 1-hour average and 0.9 ppm for 8-hour average

As shown in Table 3-1, no violations of the 1-hour or 8-hour National Ambient Air Quality Standards (NAAQS) for CO are expected due to the operation of the parking garage. These results are consistent with the results of the analysis in the previous *Air Quality Technical Report* (January 2010) in which no violations of the NAAQS for carbon monoxide were found. The emissions from the operation of this parking facility would also be in compliance with the local transportation conformity plan, since the proposed LYNX BLE is an element of MUMPO's adopted 2035 LRTP, and is included in the Mecklenburg County's conformity document as a regionally significant project. The results of this analysis are expected to satisfy the requirements for the Transportation Facilities Construction Permit as outlined by MCAPCO.