*Final*

# AIR QUALITY TECHNICAL MEMORANDUM

## Gaston East-West Connector
## Gaston and Mecklenburg Counties

**STIP Project No. U-3321**
**State Project No. 8.2812501**
**Federal Aid Project No. STP-1213(6)**

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# EXECUTIVE SUMMARY

The purpose of the proposed action is to improve east-west transportation mobility in the area around the City of Gastonia, between Gastonia and the Charlotte metropolitan area, and particularly to establish direct access between the rapidly growing area of southeast Gaston County and west Mecklenburg County.

The proposed project is being studied as a new location controlled-access toll facility through southern Gaston County, beginning at I-85 west of Gastonia in Gaston County, across the South Fork Catawba River and Catawba River, and ending at I-485 near the Charlotte-Douglas International Airport in Mecklenburg County. There are twelve new location Detailed Study Alternatives (DSAs) under consideration.

This report documents the air quality assessment performed for the project. Air pollutants evaluated include those with a National Ambient Air Quality Standard (NAAQS), mobile source air toxics, and potential air quality impacts from construction activities.

**Criteria Pollutants and Transportation Conformity**. The criteria pollutants of concern in the project area are ozone and carbon monoxide, since the Charlotte (NC)-Gastonia (NC)-Rock Hill (SC) air quality region (which includes Gaston County and Mecklenburg County) is a moderate non-attainment region for ozone, and Mecklenburg County is a maintenance area for carbon monoxide.

The proposed project's DSAs would not cause or contribute to any new localized carbon monoxide violations or increase the frequency or severity of any existing carbon monoxide violations. None of the DSAs fit the criteria requiring a quantitative carbon monoxide hot-spot analysis, which indicates there is no potential for the proposed project to create a localized carbon monoxide hot spot. Also, there are no known locations of existing carbon monoxide violations in the study area that the project could affect.

The proposed project is included in the 2030 LRTPs for the Gaston Urban Area Metropolitan Planning Organization (GUAMPO) area and the Mecklenburg-Union Metropolitan Planning Organization (MUMPO) area. These LRTPs are included in the approved Conformity Determination for the Charlotte-Gastonia-Rock Hill air quality region, titled: *Conformity Analysis and Determination Report for the Cabarrus-Rowan MPO, the Gaston Urban Area MPO, and the Mecklenburg-Union MPO 2030 Long Range Transportation Plans and the FY 2007-2013 State Transportation Improvement Programs and for Non-MPO Areas of Lincoln County, Iredell County, Gaston County, and Union County Areas*. The current conformity determinations are consistent with the final conformity rule found in 40 CFR Parts 51 and 93.

In addition, in accordance with 40 CFR 93.115(b)(1), for a project identified in a transportation plan, the project's design concept and scope must not have changed significantly from those described in the transportation plan, or in a manner which would significantly impact use of the facility.

The DSAs for the project are generally consistent with the project description (freeway) and project length (about 22 miles – 20 miles in Gaston County and 2 miles in Mecklenburg County) included in both LRTPs, but are not consistent with the assumption that the project is a non-toll project and the

assumption on the number of lanes (4). The project currently is being studied only as a toll facility, and the preliminary engineering designs (January 2008) for the DSAs show a six-lane facility.

If one of the DSAs is selected as the Preferred Alternative, traffic projections will be updated again and the number of lanes for the project will be reevaluated for the Final Environmental Impact Statement (FEIS). If the updated traffic projections show only a four-lane facility is warranted, the two lanes in the center would be removed. The outside construction footprint and right of way would generally be the same for a four-lane facility and a six-lane facility.

The conformity determination for the region will need to be updated prior to the completion of the FEIS to change the project to a toll facility with the appropriate number of lanes. The MUMPO and GUAMPO LRTPs are presently being updated to 2035, and must be locally approved and federally reviewed by May 2009 (MUMPO, www.mumpo.org/2035_LRTP.htm, accessed July 8, 2008). The FEIS for the project is estimated to be completed in the summer of 2010.

The GUAMPO is in support of designating the project as a toll facility. In September 2000, the GUAMPO Technical Advisory Committee (TAC) passed a resolution that it supports the use of alternative funding methods to accelerate construction of the project, including methods that would require the payment of a toll by motorists (GUAMPO 2030 LRTP, May 2005, p. 74).

The selection of the No-Build Alternative would require the GUAMPO and MUMPO LRTPs to be updated to remove the proposed Gaston East-West Connector, and would need to seek other means to meet the region's emissions budget for conformance with the SIP.

**Mobile Source Air Toxics (MSATs)**. Under all DSAs in the design year, it is expected there would be slightly higher MSAT emissions in the study area, relative to the No-Build Alternative, due to increased vehicle miles traveled (VMT). In comparing the DSAs, MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

**Construction Air Quality**. Provided local ordinances for open burning and dust are followed, significant air quality impacts due to construction of the proposed project are not anticipated. There would also be emissions related to construction equipment and vehicles. However, these impacts related to construction would be temporary. The proposed project would be constructed in phases, limiting the overall construction activity occurring at any one location.

# 1 INTRODUCTION

## 1.1 PROJECT DESCRIPTION

The purpose of the proposed action is to improve east-west transportation mobility in the area around the City of Gastonia, between Gastonia and the Charlotte metropolitan area, and particularly to establish direct access between the rapidly growing area of southeast Gaston County and west Mecklenburg County. The proposed project would be a new location controlled-access toll facility. **Figure 1** shows the general project location.

The Gaston East-West Connector is designated as Project No. U-3321 in the North Carolina Department of Transportation (NCDOT)'s *2009-2015 State Transportation Improvement Program* (STIP).

There are twelve new location Detailed Study Alternatives (DSAs) under consideration. The corridor segments comprising these twelve DSAs are shown in **Table 1** and **Figures 2a and b**. Generally, there are two to four corridor options in any one area. Combinations of these options add up to the twelve DSAs.

**Table 1. Corridor Segments Comprising Each Detailed Study Alternative**

| Detailed Study Alternative # | West Area - generally west of US 321 | Central Area – generally east of US 321 and west of NC 279 or the South Fork Catawba River | East Area – generally east of NC 279 or the South Fork Catawba River |
|---|---|---|---|
| | H Segments | J Segments | K Segments |
| **4** | H2A-H3 | J4a-J4b-J2c-J2d-J5a-J5b | K2A-KX1-K3B-K3C |
| **5** | H2A-H3 | J4a-J2b-J2c-J2d-JX4-J1e-J1f | K1A-K1B-K1C-K4A |
| **9** | H2A-H3 | J4a-J2b-J2c-J2d-JX4-J1e-J1f | K1A-K3A-K3B-K3C |
| **22** | H2A-H2B-H2C | J3-J2c-J2d-J5a-J5b | K2A-KX1-K3B-K3C |
| **23** | H2A-H2B-H2C | J3-J2c-J2d-JX4-JIe-J1f | K1A-K1B-K1C-K4A |
| **27** | H2A-H2B-H2C | J3-J2c-J2d-JX4-JIe-J1f | K1A-K3A-K3B-K3C |
| **58** | H1A-H1B-H1C | J1a-JX1-J2d-J5a-J5b | K2A-KX1-K3B-K3C |
| **64** | H1A-H1B-H1C | J1a-J1b-J1c-J1d-J1e-J1f | K1A-K1B-K1C-K4A |
| **68** | H1A-H1B-H1C | J1a-J1b-J1c-J1d-J1e-J1f | K1A-K3A-K3B-K3C |
| **76** | H1A-HX2 | J2a-J2b-J2c-J2d-J5a-J5b | K2A-KX1-K3B-K3C |
| **77** | H1A-HX2 | J2a-J2b-J2c-J2d-JX4-J1e-J1f | K1A-K1B-K1C-K4A |
| **81** | H1A-HX2 | J2a-J2b-J2c-J2d-JX4-J1e-J1f | K1A-K3A-K3B-K3C |

See **Figures 2a and b** for a map of the Detailed Study Alternatives and their corridor segments.

Interchanges currently are proposed at eleven to twelve locations (depending on the DSA), as listed below from west to east. The interchanges at the project termini at I-85 and I-485 would be freeway to freeway interchanges. The other interchanges would be service interchanges, meaning that there would be a traffic signal or stop sign where the ramps would connect to the cross-street.

- I-85
- US 29-74
- Linwood Road
- Lewis Road (for DSAs using Corridor Segment H1C – DSAs 58, 64, 65, and 68)
- US 321
- Robinson Road
- Bud Wilson Road
- Union Road (NC 274)
- South New Hope Road (NC 279)
- Southpoint Road (NC 273)
- Dixie River Road
- I-485

The preliminary engineering designs for the DSAs (NCTA, January 2008) are for a six-lane facility with a 46-foot center grassed median. The average right-of-way width is 350 feet.

The North Carolina Turnpike Authority (NCTA) is evaluating different options available for toll collection, but none include cash lanes. An open road (highway speed) transponder-based system will likely be used as the primary means of collection. This would allow drivers to open an account and drive through the toll collection points unobstructed at highway speeds. Because toll collection is proposed to be electronic only, vehicles will not have to come to a stop to pay a toll, and there would be no toll collection areas where traffic would idle.

## 1.2 PURPOSE OF THIS REPORT

This report documents the air quality assessment performed for the project. Air pollutants evaluated include those with a National Ambient Air Quality Standard (NAAQS), mobile source air toxics, and potential air quality impacts from construction activities.

# 2 AIR QUALITY STANDARDS

## 2.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

The federal Clean Air Act of 1970, as amended (42 USC 750(c)), was enacted for the purposes of protecting and enhancing the quality of the nation's air resources to benefit public health, welfare, and productivity.

The US Environmental Protection Agency (EPA) has established primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: carbon monoxide (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), ozone ($O_3$), particulate matter, and lead.

**Table 2** lists the National Ambient Air Quality Standards. The primary standards are set at a limit intended to "protect the public health with an adequate margin of safety," and the secondary standards are set at a limit intended to "protect the public welfare from known or anticipated adverse effects (effects to aesthetics, crops, architecture, etc.)" (Federal Clean Air Act 1990: Section 109). The primary standards are established, with a margin of safety, considering long-term exposures for the most sensitive groups in the general population (i.e., children, senior citizens, and people with breathing difficulties). The following sections give descriptions of each of the criteria air pollutants and their standards.

**Carbon Monoxide**. Carbon monoxide (CO) is a colorless, odorless gas resulting from incomplete fuel combustion from both mobile and stationary sources and is the most commonly occurring air pollutant. Transportation accounts for the majority of carbon monoxide emissions (2000 Ambient Air Quality Report, NC DAQ, 2002).

Carbon monoxide concentrations are generally higher in urbanized areas and are affected by daily and seasonal events. Daily variations in carbon monoxide concentrations are caused by atmospheric heating/cooling patterns. In the morning, cooler, dirtier air can get trapped below warmer, cleaner air in a temperature inversion. As the earth heats up, air near the surface gets warmer and mixes with the air above, promoting better dispersion of air pollutants later in the day. Temperature inversions occur more frequently in late autumn and early winter. Therefore, carbon monoxide concentrations tend to be higher during these months (2000 Ambient Air Quality Report, NC DEM, 1995).

**Table 2. National Ambient Air Quality Standards**

| Criteria Pollutant | Averaging Time | Standard | Standard Type |
|---|---|---|---|
| **Carbon Monoxide** | 8-hour Average | 9 ppm | Primary |
| | 1-hour Average | 35 ppm | Primary |
| **Nitrogen Dioxide** | Annual Arithmetic Mean | 0.053 ppm | Primary and Secondary |
| **Ozone** | 1-hour Average[1] | 0.12 ppm | Primary and Secondary |
| | 8-Hour Average (1997 standard)[2] | 0.08 ppm | Primary and Secondary |
| | 8-hour Average (2008 standard)[2] | 0.075 ppm | Primary and Secondary |
| **Lead** | Quarterly Average | 1.5 µg/m$^3$ | Primary and Secondary |
| **Particulate Matter < 10 micrometers ($PM_{10}$)** | 24-hour Average | 150 µg/m$^3$ | Primary and Secondary |
| **Particulate Matter < 2.5 micrometers ($PM_{2.5}$)** | Annual Arithmetic Mean | 15 µg/m$^3$ | Primary and Secondary |
| | 24-hour Average (1997 standard)[3] | 65 µg/m$^3$ | Primary and Secondary |
| | 24-hour Average (2006 standard)[3] | 35 µg/m$^3$ | Primary and Secondary |
| **Sulfur Dioxide** | Annual Arithmetic Mean | 0.03 ppm | Primary |
| | 24-hour Average | 0.14 ppm | Primary |
| | 3-hour Average | 0.50 ppm | Secondary |

1. The 1-hour average only applies to areas participating in an Early Action Compact. The Charlotte (NC)–Gastonia (NC)–Rock Hill (NC) air quality region is not an Early Action Compact area.
2. The 1997 standard – and the implementation rules for that standard – will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
3. Designations of attainment/non-attainment for the 2006 standards will take effect in 2010 www. epa.gov/oar/particlepollution/naaqsrev2006.html

Source: EPA, http://www.epa.gov/oar/oaqps/greenbk/, accessed June 2, 2008

On April 30, 1971, the EPA promulgated identical primary and secondary NAAQS for carbon monoxide, set at 9 parts per million (ppm) for the 8-hour average and 35 ppm for the 1-hour average, neither to be exceeded more than once per year (36 FR 8186).

The EPA is conducting a review of the air quality criteria for carbon monoxide and the primary (health-based) NAAQS for carbon monoxide. In March 2008, EPA produced a *Draft Plan for Review of the Primary National Ambient Air Quality Standard for Carbon Monoxide* (EPA, www.epa.gov/ttn/naaqs/standards/co/s_co_cr_pd.html, accessed June 11, 2008). The purpose of the review is to determine whether the current primary NAAQS for carbon monoxide should be retained or revised. The carbon monoxide review schedule, which is subject to change, is as follows:

| | |
|---|---|
| Integrated Science Assessment (Final) | May 2010 |
| Risk and/or Exposure Assessment (Final) | January 2011 |
| Final Rulemaking | July 2012 |

**Nitrogen Dioxide.** Several gaseous oxides of nitrogen are normally found in the atmosphere, including nitrous oxide ($N_2O$), nitric oxide (NO) and nitrogen dioxide ($NO_2$). Nitrogen dioxide is reddish-brown, but is not usually visible at typical ambient concentrations (2000 Ambient Air Quality Report, NC DAQ, 2002).

At typical concentrations, nitrogen dioxide has significant health effects as a pulmonary irritant, and it also affects some types of crops, such as oats, alfalfa, tobacco, peas, and carrots. In North Carolina, another health concern is the formation of ozone, which is promoted by the presence of nitrogen dioxide and other nitrogen oxides (2000 Ambient Air Quality Report, NC DAQ, 2002).

On April 30, 1971, the EPA promulgated identical primary and secondary NAAQS for nitrogen oxides (NOx), measured as nitrogen dioxide, of 0.053 ppm (100 µg/m3) averaged over one year. The primary and secondary nitrogen dioxide standards were reviewed several times, most recently in 2007, and the EPA decided that the existing standards adequately protected against adverse health and welfare effects (2008 State of the Environment Report, Mecklenburg County Land Use and Environmental Services Agency).

**Ozone**. Ozone ($O_3$) is the main component of smog. Since ozone is formed by chemical interactions with sunlight, ozone concentrations are generally higher during the daytime and in late spring through early fall, when temperatures are above 60º F and sunlight is more intense. In North Carolina, the ozone 'season' is April through October (2008 State of the Environment Report, Mecklenburg County Land Use and Environmental Services Agency). The photochemical reactions that form ozone and nitrogen dioxide require several hours to occur. For this reason, the peak levels of ozone generally occur 6 to 12 miles downwind of a hydrocarbon or nitrogen oxide source. Urban areas as a whole are regarded as sources of ozone precursors, not individual streets and highways. The emissions of all sources in an urban area mix together in the atmosphere, and in the presence of sunlight, the mixture reacts to form ozone, nitrogen dioxide, and other photochemical oxidants (2000 Ambient Air Quality Report, NC DAQ, 2002).

In 1997, the NAAQS for ozone was reviewed and revised to reflect improved scientific understanding of the health impacts of this pollutant. When the standard was revised in 1997, an eight-hour ozone standard was established at 0.08 parts per million (ppm). This is the standard by which current attainment designations have been determined.

On March 12, 2008, the EPA strengthened its NAAQS for ground-level ozone, the primary component of smog. The EPA is revising the 8-hour primary ozone standard, designed to protect public health, to a level of 0.075 ppm. The EPA is also strengthening the secondary 8-hour ozone standard to the level of 0.075 ppm, making it identical to the revised primary standard.

In addition to changing the levels of the standards from 0.08 pm to 0.075 ppm, the EPA is now specifying the level of the standard to the third decimal. An area will meet the revised standards if the three-year average of the annual fourth-highest daily maximum 8-hour average at every ozone monitor is less than or equal to the level of the standard (i.e., 0.075 ppm) (EPA, www.epa.gov/air/ozonepollution/pdfs/ 2008_03_factsheet.pdf, accessed June 4, 2008).

The Clean Air Act requires the EPA to designate areas as attainment (meeting the standards), non-attainment (not meeting the standards), or unclassifiable (insufficient data to classify) after the agency sets a new standard, or revises an existing standard. The following schedule will apply to the revised ozone standards:

- States must make recommendations to the EPA no later than March 2009 for areas to be designated attainment, non-attainment and unclassifiable.

- The EPA will issue final designations of attainment, non-attainment and unclassifiable areas no later than March 2010 unless there is insufficient information to make these designation decisions. In that case, EPA will issue designations no later than March 2011.

- States must submit State Implementation Plans outlining how they will reduce pollution to meet the standards by a date that EPA will establish in a separate rule. That date will be no later than three years after EPA's final designations. If EPA issues designations in 2010, then these plans would be due no later than 2013.

- States are required to meet the standards by deadlines that may vary based on the severity of the problem in the area (EPA, www.epa.gov/air/ozonepollution/pdfs/2008_03_factsheet.pdf, accessed June 4, 2008).

**Lead.** Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. The 1990 Clean Air Act Amendments made the sale, supply, or transport of leaded gasoline or lead additives unlawful after December 31, 1995. Because of the phase-out of leaded gasoline, lead concentrations declined sharply during the 1980s and early 1990s. Between 1980 and 2006, concentrations of lead in the air decreased 95 percent, while emissions of lead decreased 97 percent. Automotive sources are no longer major contributors of lead emissions to the atmosphere (Latest Findings on National Air Quality – Status and Trends through 2006, EPA, January 2008). Today, the highest levels of lead in air are usually found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers (EPA, www.epa.gov/air/lead, accessed June 4, 2008).

On May 1, 2008, EPA proposed to substantially strengthen the NAAQS for lead. The proposed revisions would improve health protection for at-risk groups, especially children. EPA is proposing to revise the level of the primary (health-based) standard from 1.5 micrograms per cubic meter (µg/m3), to within the range of 0.10 µg/m3 to 0.30 µg/m3, measured as total suspended particulates (TSP). EPA proposes to revise the secondary (welfare-based) standard to be identical in all respects to the primary standard. In conjunction with proposing to strengthen the lead NAAQS, the EPA is proposing to improve the existing lead monitoring network by requiring monitors to be placed near large sources of lead emissions and in urban areas with more than 1 million people (EPA, www.epa.gov/air/lead/pdfs/20080501_factsheet.pdf, accessed June 9, 2008).

EPA will issue final standards in September 2008 and anticipates the following implementation schedule:

- States would make recommendations for areas to be designated attainment, non-attainment, or unclassifiable by September 2009. If Tribes choose to submit recommendations, they must also provide them to EPA by September 2009.

- EPA would issue final designations of attainment, non-attainment and unclassifiable areas no later than September 2011.

- States would submit State Implementation Plans outlining how they will reduce pollution to meet the standards no later then Spring 2013.

- States would be required to meet the standards no later than Fall 2016 (EPA, www.epa.gov/air/lead/pdfs/20080501_factsheet.pdf, accessed June 9, 2008).

**Particulate Matter.** Particle pollution, also called particulate matter or PM, is a complex mixture of extremely small particles and liquid droplets in the air. Particle pollution is the main cause of visibility impairment (EPA, www.epa.gov/air/particlepollution/pdfs/20060921_factsheet.pdf, accessed June 4, 2008). Particulate matter also can interfere with plant photosynthesis by forming a film on leaves, which reduces exposure to sunlight (2000 Ambient Air Quality Report, NC DAQ, 2002).

Particulate matter is divided into two categories: fine particles ($PM_{2.5}$), which are 2.5 micrometers in diameter and smaller, and coarse particles ($PM_{10}$), which are smaller than 10 micrometers. Fine particles can be emitted directly, such as in smoke from a fire, or they can form from chemical reactions of gases such as sulfur dioxide, nitrogen dioxide and some organic gases. Sources of fine particle pollution (or the gases that contribute to fine particle formation) include power plants, gasoline and diesel engines, wood combustion, high-temperature industrial processes such as smelters and steel mills, and forest fires. Coarse particles generally include dust kicked up by traffic, construction and demolition industries, and biological sources (EPA, http://www.epa.gov/air/particlepollution/pdfs/20060921_factsheet.pdf, accessed June 4, 2008).

The EPA has regulated particulate matter since 1971. The EPA added specific standards for fine particles following its review in 1997. Nationwide monitoring for $PM_{2.5}$ began in 1999.

In September 2006, the EPA revised the 1997 standards. The revised 2006 standards address both fine particulates ($PM_{2.5}$) and coarse particulates ($PM_{10}$). The 2006 standards strengthen the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$, and retain the current annual $PM_{2.5}$ standard at 15 $\mu g/m^3$. For $PM_{10}$, the EPA retained the 24-hour standard of 150 $\mu g/m^3$ and revoked the annual $PM_{10}$ standard (EPA, http://www.epa.gov/oar/particlepollution/naaqsrev2006.html, accessed June 11, 2007).

The EPA expects designations of attainment/non-attainment for the new standards to be based on 2007-2009 air quality data, and for those designations to take effect in April 2010. State Implementation Plans for the new standards will be due in April 2013, and states must meet the new standards by April 2015, with a possible extension to April 2020 (EPA, http://www.epa.gov/air/particlepollution/pdfs/20060921_factsheet.pdf, accessed June 4, 2008).

**Sulfur Dioxide.** Sulfur dioxide ($SO_2$) is a colorless, corrosive, harmful gas with a pungent odor. Smaller concentrations of sulfur trioxide and other sulfate compounds are also found in sulfur dioxide emissions. Sulfur oxides contribute to the formation of acid rain and the formation of particles that reduce visibility (2000 Ambient Air Quality Report, NC DAQ, 2002). Sulfur dioxide also accelerates the decay of building materials and paints. Eighty-seven percent of the sulfur dioxide released into the air is attributable to fuel combustion at stationary sources. Other sources of sulfur dioxide emissions include industrial facilities such as petroleum refineries, cement manufacturing facilities, and metal processing facilities (Latest Findings on National Air Quality – Status and Trends through 2006, EPA, January 2008).

On April 30, 1971, the EPA promulgated primary sulfur dioxide NAAQS. These primary standards were set at 0.14 parts per million (ppm) averaged over a 24-hour period, not to be exceeded more than once per year, and 0.030 ppm annual arithmetic mean. Although retained through a number of NAAQS reviews, EPA initiated another review of the sulfur oxides standards in May 2006. The proposed rule is anticipated in July 2009, with final rulemaking in March 2010 (Integrated Plan for Review of the Primary NAAQS for Sulfur Oxides, EPA, October 2007).

## 2.2 TRANSPORTATION CONFORMITY

Section 176(c) of the Clean Air Act Amendments requires that transportation plans, programs, and projects conform to the intent of the state air quality implementation plan (SIP), or to interim emissions tests in areas where no SIP is approved or found adequate. Conformity applies to transportation plans, programs, and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in areas that do not meet, or previously have not met, NAAQS for ozone, carbon monoxide, particulate matter, or nitrogen dioxide (FHWA, http://www.fhwa.dot.gov/safetealu/factsheets/conformity.htm, Fact Sheets on Highway Provisions, accessed June 3, 2008).

In North Carolina, the North Carolina Department of Environment and Natural Resources, Division of Air Quality (DAQ) develops the State Implementation Plan (SIP), which is the document that describes how North Carolina will maintain or achieve compliance with the NAAQS.

Both the Clean Air Act and SAFETEA-LU (Section 6011) require conformity between a proposed transportation system and the SIP. The transportation conformity regulations are intended to ensure that a state does not undertake federally funded or approved transportation projects, programs, or plans that are inconsistent with the state's obligation to meet and maintain the NAAQS. Metropolitan Planning Organizations (MPOs) must show that expected emissions from their transportation system are within the mobile source emission budgets in the applicable SIP. Transportation projects must come from conforming transportation plans/programs, and conforming transportation plans/programs must come from conforming SIPs.

A conformity determination demonstrates that the total emissions projected for a plan, program or project are within the emissions limits (budgets) established by the SIP, and that transportation control measures (TCMs), if any, are implemented in a timely fashion. Metropolitan Planning Organization (MPO) policy boards make initial conformity determinations in metropolitan areas, while State Departments of Transportation (DOTs) usually do so in areas outside of MPOs. Conformity determinations must also be made at the Federal level by US Department of

Transportation (USDOT). (FHWA, http://www.fhwa.dot.gov/environment/conformity/con_broc.htm, Transportation Conformity, accessed June 3, 2008).

In carbon monoxide and particulate matter non-attainment and maintenance areas, additional localized, or microscale, analysis may be necessary to determine project-level transportation conformity for federally funded or approved highway and transit projects. These projects must come from a currently conforming transportation plan/program. This type of analysis is sometimes referred to as "hot-spot analysis" (FHWA, http://www.fhwa.dot.gov/environment/conformity/con_broc.htm, Transportation Conformity, accessed June 3, 2008).

## 2.3 MOBILE SOURCE AIR TOXICS

The Clean Air Act identified 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list of toxics and has selected a group of 21 that it considers mobile source air toxics (MSATs). More recently, the EPA has extracted a subset of this list of 21 and developed what it now labels the six priority MSATs. These are benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene. While EPA has identified these as the more significant MSATs, the agency has not proposed to establish ambient standards for any of these pollutants. (FHWA, Memorandum – Interim Guidance on Air Toxic Analysis in NEPA Documents, Appendix D, February 3, 2006).

The EPA issued a final rule on *Control of Emissions of Hazardous Air Pollutants from Mobile Sources* in March 2001 under provisions of the Clean Air Act requiring the EPA to characterize, prioritize, and control these emissions as appropriate. In addition to highlighting the 21 MSATs, the final rule summarized the mobile sources contribution to national inventories of hazardous air pollutants. Since MSATs can be loosely defined as volatile organic compounds, nonvolatile organics, diesel particulate matter/diesel exhaust gases, or metals, the linkage with transportation vehicles and fuels is direct (FHWA, Memorandum – Interim Guidance on Air Toxic Analysis in NEPA Documents, Appendix D, February 3, 2006).

On February 9, 2007, under authority of CAA Section 202(l), EPA signed a final rule to fulfill a commitment from the 2001 rule. This final rule, *Control of Hazardous Air Pollutants from Mobile Sources*, sets standards to control MSATs from motor vehicles. Under this rule, EPA is setting standards on fuel composition, vehicle exhaust emissions, and evaporative losses from portable containers. The new standards are estimated to reduce total emissions of MSATs by 330,000 tons in 2030, including 61,000 tons of benzene. Concurrently, total emissions of volatile organic compounds (VOC) will be reduced by over 1 .1 million tons in 2030 as a result of adopting these standards.

## 2.4 LOCAL ORDINANCES

Mecklenburg County has an Air Pollution Control Ordinance (MCAPCO). Sections of the ordinance applicable to transportation sources include:

- Article 1 – Permitting Provisions for Air Pollution Sources, Rules and Operating Regulations for Acid Rain Sources, Title V, and Toxic Air Pollutants

  - Section 1.5600 – Transportation Facility Procedures

- Article 2 – Air Pollution Control Regulations and Procedures
  - Section 2.2000 – Transportation Conformity
  - Section 2.0800 – Transportation Facilities

Transportation sources subject to permitting as a transportation facility are defined in the ordinance as airport facilities (excluding military airfield) and parking facilities. The ordinance section on highway projects (Article 2, Section 2.0803) was repealed effective February 1, 2005.

Section 2.2000 of the ordinance, addressing transportation conformity, states in Subsection 2003(a) that "Conformity analyses, determinations, and redeterminations for transportation plans, transportation improvement programs, FHWA/FTA projects, and State or local regionally significant projects shall be made according to the requirements of 40 CFR 93.104 and shall comply with the applicable requirements of 40 CFR 93.119, 93.120, 93.124, 93.125, and 93.126."

The MCAPCO also has applicable general provisions for nuisance dust (Section 1.5108) and open burning (Section 1.5106).

**Appendix A** includes the MCAPCO sections cited above and correspondence with the Mecklenburg County Department of Air Quality.

# 3 EXISTING CONDITIONS

## 3.1 CRITERIA POLLUTANTS

Pollutants that have a NAAQS are called criteria pollutants. An area that exceeds the NAAQS for one or more criteria pollutants is said to be in "non-attainment" of the NAAQS enforced under the Clean Air Act. The designation of an area is determined on a pollutant by pollutant basis. The EPA classifies areas as either in attainment or non-attainment. Ozone, carbon monoxide, and some particulate matter non-attainment areas are further classified based on the degree of exceedance(s) over the NAAQS (e.g. marginal, moderate, serious, severe, and extreme). Attainment areas can be further categorized as in attainment or as a maintenance area for attainment; which means that the urban area has exceeded NAAQS levels for one or more pollutants in the past. Efforts in these maintenance areas must be made in order to maintain the status quo and not exceed the NAAQS. (EPA, www.epa.gov/oar/oaqps/greenbk, accessed June 11, 2008).

The proposed project is located in Gaston County and Mecklenburg County, which are within the Charlotte (NC)-Gastonia (NC)-Rock Hill (SC) air quality region (also referred to as the Metrolina region). The following paragraphs discuss the attainment status of this region with respect to each of the six criteria pollutants.

**Carbon Monoxide**. Except for Mecklenburg County, all other areas within the Charlotte-Gastonia-Rock Hill air quality region are designated as attainment for carbon monoxide. Mecklenburg County is a maintenance area for carbon monoxide (EPA, www.epa.gov/oar/oaqps/greenbk, accessed June 11, 2008).

The Mecklenburg County 2008 State of the Environment Report (Mecklenburg County Land Use and Environmental Services Agency [LUESA]) provides some background information and history relative to the designation:

> "Mecklenburg County was designated a non-attainment area for carbon monoxide in March 1978. During the period from 1974-1984 the carbon monoxide NAAQS was often exceeded more than 10 times per year….The number of exceedances per year fell dramatically beginning in the early to mid 1980s….The last recorded exceedances of the carbon monoxide standard in the Mecklenburg County network were measured in 1990. Automotive emission controls found on newer vehicles are the main factor accounting for the reduction in carbon monoxide concentrations."

**Ozone**. On April 14, 2006, the Charlotte-Gastonia-Rock Hill air quality region was designated as a moderate non-attainment area for the 8-hour ozone NAAQS (EPA, http://www.epa.gov/oar/oaqps/greenbk, accessed June 11, 2008). This non-attainment region is shown in **Figure 3.** It includes the following counties in North Carolina: Mecklenburg, Gaston, Lincoln, Cabarrus, Rowan, Union, and southern portion of Iredell. The urbanized area of eastern York County, SC also is included.

Compliance with the ozone standard is required by June 15, 2010. The SIP for ozone for this region submitted to EPA by the North Carolina Division of Air Quality projects that the eight-hour ozone standard will be met by this time (Mecklenburg County LUESA, 2008 State of the Environment Report).

The Charlotte-Gastonia-Rock Hill region is a "NOx limited" area. "This means that the area needs to control nitrogen oxides emissions to reduce ozone formation effectively. The major sources of nitrogen oxides emissions in the region come from mobile sources and electric generating facilities. Reduction of emissions from these two source sectors can significantly influence the ozone formation in this region. The SIP for the region includes the following control measures:" (Mecklenburg County LUESA, 2008 State of the Environment Report):

- 15 percent volatile organic compound (VOC) Reasonable Further Progress (RFP) Plan;
- VOC and NOx Reasonably Available Control Technology (RACT)
- Reasonably Available Control Measures (RACM);
- Motor Vehicle Inspection and Maintenance programs (I/M);
- Federal Emission Standards for highway vehicles and non-road equipment;
- Fuel Standards; and
- Industrial NOx emission reductions required by federal and state control initiatives such as the NOx SIP call, Clean Air Interstate Rule, and NC Clean Smokestacks Act.

In 2007, the eight-hour ozone design value measured in the Mecklenburg County monitoring network was 0.093 ppm (compared to the current standard of 0.08 ppm). This is the highest design value determined since the 2004 designation year, but less than the concentrations measured in 1987. Mecklenburg County experienced 19 days when the ozone NAAQS was exceeded in 2007, the most days measured above the eight-hour standard since 2002 (Mecklenburg County LUESA, 2008 State of the Environment Report).

As described in **Section 2.1**, meteorological conditions are an important factor in ozone formation. According to the Mecklenburg County 2008 State of the Environment Report (Mecklenburg County Land Use and Environment Agency [LUESA]):

> The year 2007 was the sixth-warmest summer (June-August) in North Carolina in the period from 1987 to 2007. It was also the second driest summer (June-August) in North Carolina in the period from 1987 to 2007. These two pieces of information would indicate that conditions may have been particularly favorable for ozone formation in the summer of 2007; especially in August 2007, when the highest eight-hour concentration (0.127 ppm) of the year was measured. That measurement was the highest eight-hour concentration measured since 1988. Data from 2007 would seem to indicate that the potential for the formation of unhealthy concentrations of ozone at ground-level continues to exist when conditions are optimal."

**Particulate Matter**. The Charlotte-Gastonia-Rock Hill air quality region is in attainment for all particulate matter NAAQS (EPA, http://www.epa.gov/oar/oaqps/greenbk, accessed June 11, 2008).

Recent measured concentrations are close to the standards. In 2006, the 24-hour $PM_{2.5}$ value for the region was 32 $\mu g/m^3$, just below the new 24-hour $PM_{2.5}$ standard established in 2006. In 2007, the annual value for the region was 14.9 $\mu g/m^3$, just under the annual standard of 15 $\mu g/m^3$ (Mecklenburg County LUESA, 2008 State of the Environment Report).

Evaluation of $PM_{2.5}$ monitoring data indicates that sulfate, the condensate of $SO_2$, is one major contributor to $PM_{2.5}$ formation in the southeast United States. Controlling $SO_2$ emission sources in this region may reduce $PM_{2.5}$ concentrations in Mecklenburg County (Mecklenburg County LUESA, 2008 State of the Environment Report).

**Nitrogen Dioxide**. The Charlotte-Gastonia-Rock Hill air quality region is in attainment for the nitrogen dioxide NAAQS (EPA, http://www.epa.gov/oar/oaqps/greenbk, accessed June 11, 2008).

On March 10, 2005, EPA issued the Clean Air Interstate Rule (CAIR), a rule that will achieve the largest reduction in air pollution in more than a decade. CAIR will permanently cap emissions of sulfur dioxide ($SO_2$) and nitrogen oxides (NOx) in the eastern United States. CAIR achieves large reductions of sulfur dioxide and/or nitrogen oxides emissions across 28 eastern states (including North Carolina) and the District of Columbia. When fully implemented, CAIR will reduce sulfur dioxide emissions in these states by over 70 percent, and nitrogen oxides emissions by over 60 percent, from 2003 levels (EPA, www.epa.gov/air/interstateairquality/, accessed June 11, 2008).

**Sulfur Dioxide**. The Charlotte-Gastonia-Rock Hill air quality region is in attainment for the sulfur dioxide NAAQS (EPA, http://www.epa.gov/oar/oaqps/greenbk, accessed June 11, 2008).

**Lead**. The Charlotte-Gastonia-Rock Hill air quality region is in attainment for the lead NAAQS (EPA, http://www.epa.gov/oar/oaqps/greenbk, accessed June 11, 2008).

## 3.2 MOBILE SOURCE AIR TOXICS

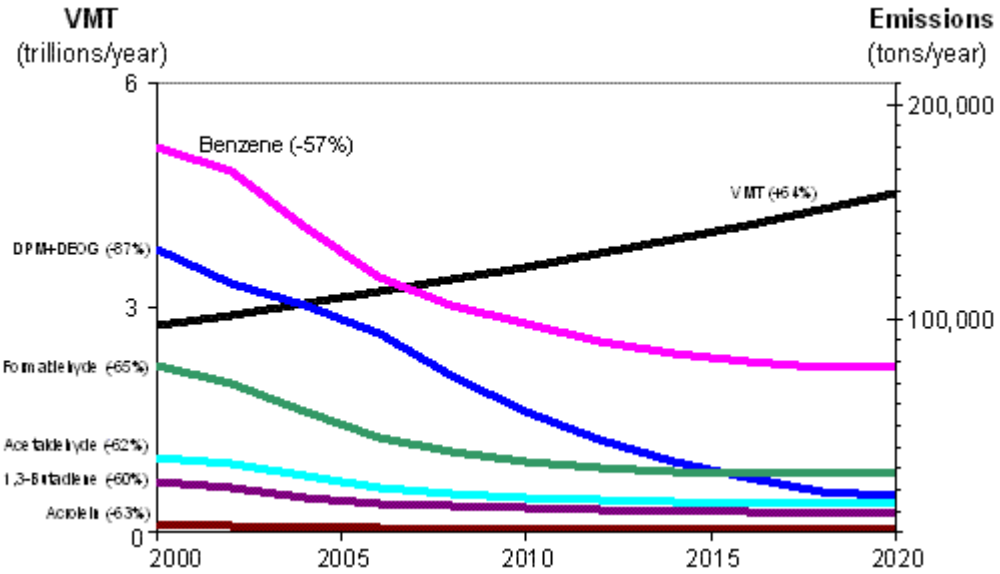
In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on *Controlling Emissions of Hazardous Air Pollutants from Mobile Sources* (66 CFR 17229) (March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent, as shown in Chart 1.

On February 9, 2007 and under authority of CAA Section 202(l) EPA signed a final rule, *Control of Hazardous Air Pollutants from Mobile Sources*, which sets standards to control MSATs from motor vehicles. Under this rule, EPA is setting standards on fuel composition, vehicle exhaust emissions, and evaporative losses from portable containers. The new standards are estimated to reduce total emissions of MSATs by 330,000 tons in 2030, including 61,000 tons of benzene. Concurrently, total emissions of volatile organic compounds (VOC) will be reduced by over 1.1 million tons in 2030 as a result of adopting these standards.

**Chart 1. Vehicle Miles Traveled (VMT) vs. Mobile Source Air Toxics Emissions, 2000-2020**




Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: Highway Statistics 2000, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns. 1 short ton = 907,200,000 mg.

# 4 AIR QUALITY IMPACTS

## 4.1 CRITERIA POLLUTANTS AND TRANSPORTATION CONFORMITY

Traffic exhaust is the center of concern when determining the air quality impacts of a new roadway facility or the improvement of an existing roadway facility. Transportation is a primary contributor to four of the six criteria pollutants: ozone (through emissions of nitrogen oxides and hydrocarbons), carbon monoxide, particulate matter, and nitrogen dioxide (FHWA, Air Quality Planning for Transportation Officials, www.fhwa.dot.gov/environment/aqplan/index.htm, accessed June 9, 2008). The impacts resulting from highway construction can range from intensifying existing air pollution to improving the ambient air conditions.

The criteria pollutants of concern in the project area are ozone and carbon monoxide, since the Charlotte-Gastonia-Rock Hill air quality region (which includes Gaston County and Mecklenburg County) is a moderate non-attainment region for ozone, and Mecklenburg County is a maintenance area for carbon monoxide.

Traffic exhaust contributes to ozone formation by emitting hydrocarbons and nitrogen oxides, which are carried into the atmosphere where they react with sunlight to form ozone and nitrogen dioxide. Automotive emissions of hydrocarbons and nitrogen oxides are expected to decrease in the future due to continued installation and maintenance of pollution control devices on new vehicles. However, these technological improvements may be offset by the increasing number of vehicles on the transportation facilities in the area. Since ozone takes several hours to form from hydrocarbons and nitrogen oxide, urban areas as a whole are regarded as sources of ozone precursors, not traffic on individual streets and highways. Therefore, compliance of an individual project with the ozone NAAQS is demonstrated if the project is included in a conforming transportation plan, which considers the urban area as a whole.

Carbon monoxide is a more stable atmospheric pollutant (meaning it does not react as quickly with other chemicals) that is emitted directly from tailpipes. Therefore, localized concentrations of carbon monoxide can occur, and these concentrations can be estimated through modeling. As discussed below, the compliance of a project with the carbon monoxide NAAQS, therefore, is considered at both the localized, or hot-spot, level, and at the transportation plan level.

**Localized Carbon Monoxide Hot-Spot Analysis**. In accordance with 40 CFR 93.116, an FHWA project must not cause or contribute to any new localized carbon monoxide violations, or increase the frequency or severity of any existing carbon monoxide violations in carbon monoxide non-attainment and maintenance areas. A quantitative hot-spot analysis is required in the following cases (40 CFR 93.123):

(i) For projects in or affecting locations, areas, or categories of sites which are identified in the applicable implementation plan as sites of violation or possible violation;

(ii) For projects affecting intersections that are at Level of Service D, E, or F, or those that will change to Level of Service D, E, or F because of increased traffic volumes related to the project;

(iii) For any project affecting one or more of the top three intersections in the non-attainment or maintenance area with highest traffic volumes, as identified in the applicable implementation plan; and

(iv) For any project affecting one or more of the top three intersections in the non-attainment or maintenance area with the worst level of service, as identified in the applicable implementation plan.

As discussed below, it is concluded that the project would not cause or contribute to any new localized carbon monoxide violations or increase the frequency or severity of any existing carbon monoxide violations since none of the DSAs fit the above criteria requiring a quantitative carbon monoxide hot-spot analysis.

Mecklenburg County is a carbon monoxide maintenance area, while Gaston County is classified as attainment for carbon monoxide. Within Mecklenburg County, all the DSAs would have a freeway-to-freeway interchange at I-485 and a service interchange at Dixie River Road. Based on the preliminary engineering designs and the 2030 traffic projections for the project as a toll facility, the ramp terminals at Dixie River Road would operate at Level of Service (LOS) C or better in 2030

(Toll Traffic Operations Technical Memorandum, PBS&J, June 2008). In preceding years, traffic volumes are projected to be less, therefore the LOS is expected to be LOS C or better in those years also.

In addition, under all the DSAs, all of the other signalized intersections along the project interchanges in Gaston County are projected to operate at LOS C or better. (Toll Traffic Operations Technical Memorandum, PBS&J, June 2008).

The applicable implementation plan (SIP) does not contain a list of intersections as noted in items iii and iv above. However, there is a list of high congestion locations in Mecklenburg County available from the Charlotte Department of Transportation (CDOT) (CDOT, www.charmeck.org/departments/transportation/roads/home.htm, accessed July 8, 2008). This list, included in **Appendix B**, is for 2005 and includes 65 intersections. The top three intersections were: 1) Fairview Road/Providence Road/Sardis Road, 2) Central Avenue/Eastway Drive, and 3) Harris Boulevard/Tryon Street. None of these intersections are located in the project area. Based on this list, it was concluded that the proposed DSAs would not affect sites of carbon monoxide violation or possible violation, nor any of the top three intersections in the maintenance area with the highest traffic volumes or worst level of service.

**Transportation Conformity**. As discussed in **Section 2.2** of this report, Section 176(c) of the CAAA requires that transportation plans, programs, and projects conform to the intent of the SIP. The Conformity Determination for the Charlotte-Gastonia-Rock Hill air quality region's transportation plans is titled: *Conformity Analysis and Determination Report for the Cabarrus-Rowan MPO, the Gaston Urban Area MPO, and the Mecklenburg-Union MPO 2030 Long Range Transportation Plans and the FY 2007-2013 State Transportation Improvement Programs and for Non-MPO Areas of Lincoln County, Iredell County, Gaston County, and Union County Areas*.

The original conformity determination is dated June 8, 2005. The US Department of Transportation (USDOT) issued the conformity finding (approval of the conformity determination) on June 30, 2005. There have been two amendments since the original determination. Amendment 1 is dated September 16, 2005, with a USDOT conformity finding on October 1, 2005. Amendment 2, the latest conformity determination, is dated May 25, 2007, with a USDOT conformity finding on June 29, 2007. **Appendix C** includes the Amendment 2 Conformity Analysis and Determination Report, and the part of Appendix D of the report pertaining to Gaston and Mecklenburg Counties.

The project primarily is located in Gaston County, which is within the Charlotte-Gastonia-Rock Hill nonattainment area for ozone ($O_3$) as defined by the EPA. This area was designated moderate nonattainment for ozone under the eight-hour ozone standard effective June 15, 2004.

A portion of the project also is located in Mecklenburg County, which is within the Metrolina nonattainment area for ozone and the Charlotte nonattainment area for carbon monoxide, as defined by the EPA. The 1990 CAAA designated these areas as a moderate nonattainment area for carbon monoxide. However, due to improved monitoring data, this area was redesignated as maintenance for carbon monoxide on September 18, 1995. This area was designated moderate nonattainment for ozone under the eight-hour ozone standard effective June 15, 2004.

Section 176(c) of the CAAA requires that transportation plans, programs, and projects conform to the intent of the SIP. The current SIP does not contain any transportation control measures for

Mecklenburg or Gaston Counties. The MUMPO amended 2030 Long Range Transportation Plan (LRTP) and the 2009-2015 Transportation Improvement Program (TIP), as well as the GUAMPO amended 2030 LRTP and the 2009-2015 TIP conform to the intent of the SIP. The USDOT made a conformity determination on the LRTPs and TIPs on June 29, 2007. The MUMPO 2009-2015 TIP was adopted by the Technical Advisory Committee (TAC) on May 21, 2008; the GUAMPO 2009-2015 TIP was adopted by the TAC on May 27, 2008; and rural Gaston County (donut area) projects from the 2009-2015 State Transportation Improvement Program (STIP) were adopted by the Board of Transportation on June 5, 2008.

The MUMPO and GUAMPO 2009-2015 TIPs are direct subsets of their respective conforming 2030 LRTPs. For the donut area of Gaston County, projects from the 2009-2015 STIP are consistent with projects from the 2007-2013 STIP that were found to conform to the intent of the SIP (or interim emissions, in areas where no SIP is approved or found adequate). The current conformity determinations are consistent with the final conformity rule found in 40 CFR Parts 51 and 93.

The proposed project (STIP Project U-3321) is included in both the 2030 LRTP for the GUAMPO area and the 2030 LRTP for the MUMPO area, both of which are conforming transportation plans. In addition, in accordance with 40 CFR 93.115(b)(1), for a project identified in a transportation plan, the project's design concept and scope must not have changed significantly from those described in the transportation plan, or in a manner which would significantly impact use of the facility.

The DSAs for the project are generally consistent with the project description (freeway) and project length (about 22 miles – 20 miles in Gaston County and 2 miles in Mecklenburg County) included in both LRTPs, but are not consistent with the assumption that the project is a non-toll project and the assumption on the number of lanes (4) (see **Appendix C**). The project currently is being studied only as a toll facility, and the preliminary engineering designs (January 2008) for the DSAs show a six-lane facility.

However, it should be noted that the decision to design the facility as a six-lane roadway was based on year 2030 traffic projections for a non-toll facility using the Metrolina Regional Travel Demand Model (Gaston East-West Connector Traffic Forecasting and System Level Analysis for the Detailed Study Alternatives, Martin/Alexiou/Bryson, April 2007). These were the projections available at the time the designs were started. The 5$^{th}$ and 6$^{th}$ lanes were added by reducing the median width to 46 feet from the standard 70 feet normally used for a four-lane freeway of the type proposed. Subsequent traffic projections generated using the 2030 Metrolina Regional Travel Demand Model for the project as a toll facility show that traffic volumes would be less than the 2030 projections for a non-toll facility (Gaston East-West Connector (U-3321) Traffic Forecasts for Toll Alternatives, Martin/Alexiou/Bryson, 2008). **Appendix D** shows the two sets of traffic projections.

If one of the DSAs is selected as the Preferred Alternative, traffic projections will be updated again and the number of lanes for the project will be reevaluated for the Final Environmental Impact Statement (FEIS). If the updated traffic projections show only a four-lane facility is warranted, the two lanes in the center would be removed. The outside construction footprint and right of way would generally be the same for a four-lane facility and a six-lane facility.

The conformity determination for the region will need to be updated prior to the completion of the FEIS to change the project to a toll facility with the appropriate number of lanes. The MUMPO and GUAMPO LRTPs are presently being updated to 2035, and must be locally approved and federally

reviewed by May 2009 (MUMPO, www.mumpo.org/2035_LRTP.htm, accessed July 8, 2008). The FEIS for the project is estimated to be completed in the summer of 2010.

The GUAMPO is in support of designating the project as a toll facility. In September 2000, the GUAMPO Technical Advisory Committee (TAC) passed a resolution that it supports the use of alternative funding methods to accelerate construction of the project, including methods that would require the payment of a toll by motorists (GUAMPO 2030 LRTP, May 2005, p. 74).

The selection of the No-Build Alternative would require the GUAMPO and MUMPO LRTPs to be updated to remove the proposed Gaston East-West Connector, and would need to seek other means to meet the region's emissions budget for conformance with the SIP.

## 4.2 MOBILE SOURCE AIR TOXICS

The following discussion is based on guidance in FHWA's *Memorandum – Interim Guidance on Air Toxic Analysis in NEPA Documents* (February 3, 2006).

### 4.2.1 Unavailable Information for Project Specific MSAT Impact Analysis

This technical memorandum for the project's EIS includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives in this EIS. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

**Information that is Unavailable or Incomplete.** Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements; including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

- **Emissions:** The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model--emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its

discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

- **Dispersion.** The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The National Cooperative Highway Research Program (NCHRP) is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

- **Exposure Levels and Health Effects.** Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

**Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs.** Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the EPA conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or state level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSATs was taken from the IRIS database *Weight of Evidence Characterization* summaries. This information is taken verbatim from EPA's IRIS database and represents the agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust** (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- **Diesel exhaust** also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems[1,2]. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

**Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community.** Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.). Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

In this technical memorandum, FHWA has provided a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that all Detailed Study Alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

### 4.2.2 Qualitative Impact Assessment for Mobile Source Air Toxics

The FHWA has developed a tiered approach for analyzing MSATs in NEPA documents. Depending on the specific project circumstances, FHWA has identified three levels of analysis (FHWA, Memorandum – Interim Guidance on Air Toxic Analysis in NEPA Documents, February 3, 2006):

- No analysis for projects with no potential for meaningful MSAT effects;
- Qualitative analysis for projects with low potential MSAT effects; or
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

[1] South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 Studies on the relationship between health and air quality); NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.

[2] Department of Preventive Medicine, University of Southern California Los Angeles, et. al. *Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study.* The Lancet, (2007).

Projects requiring a quantitative analysis include projects that have the potential for meaningful differences among project alternatives. To fall into this category, projects must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location; or
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the annual average daily traffic volumes (AADT) are projected to be in the range of 140,000 to 150,000, or greater, by the design year; and also
- Be proposed to be located in proximity to populated areas or in rural areas, in proximity to concentrations of vulnerable populations (i.e., schools, nursing homes, hospitals).

The proposed project falls into the qualitative analysis category due to its length and regional importance. The project would not qualify as requiring a quantitative analysis because it would not significantly alter a major intermodal facility, nor would the AADT be in the range of 140,000 to 150,000. The AADTs for the various Detailed Study Alternatives (DSAs) vary by segment, and **Table 3** shows the three representative DSAs for which 2030 forecasts were prepared for the project as a toll facility. The AADT volumes range from 10,000-12,800 AADT on the west end of the project between I-85 and US 29-74 to 58,400-61,800 AADT on the east end of the project across the Catawba River between NC 273 (Southpoint Road) and Dixie River Road.

It was not necessary to prepare forecasts for all twelve DSAs, as they all have segments in common with the representative three DSAs, and previous forecasts for the year 2025 showed only small differences in forecasts between the DSAs.

**Table 3. Year 2030 Traffic Projections Along Project**

| Project Segment | Annual Average Daily Traffic Volumes (AADT) | | |
|---|---|---|---|
| | DSA 4 (Toll) | DSA 64 (Toll) | DSA 77 (Toll) |
| I-85 to US 29/74 | 12,800 | 10,000 | 12,200 |
| US 29/74 to Linwood Road | 20,800 | 11,400 | 18,000 |
| Linwood Road to Lewis Road | 15,400 | 9,600 | 17,400 |
| Lewis Road to US 321 | 15,400 | 14,200 | 17,400 |
| US 321 to Robinson Road | 20,000 | 18,800 | 21,400 |
| Robinson Road to Bud Wilson Road | 29,200 | 29,400 | 30,400 |
| Bud Wilson Road to NC 274 | 28,000 | 28,600 | 28,200 |
| NC 274 to NC 279 | 31,600 | 35,000 | 34,800 |
| NC 279 to NC 273 | 42,200 | 44,200 | 43,400 |
| NC 273 to Dixie River Road | 58,400 | 61,800 | 60,600 |
| Dixie River Road to I-485 | 55,400 | 54,400 | 53,000 |

Source: Gaston East-West Connector Traffic Forecasts for Toll Alternatives, Martin/Alexiou/Bryson for NCTA, May 2008

As discussed above in **Section 4.2.1**, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot

identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives.

The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm .

For each DSA, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. **Table 4** shows the projected 2030 vehicle miles traveled (VMT) and vehicle hours traveled (VHT) in the Metrolina region as a whole and also just in Gaston County (a subset of the Metrolina region), under the No-Build Alternative and three representative DSAs, DSAs 4, 64, and 77. The other DSAs are combinations of the segments included in these three representative DSAs and would have similar results. The VMT and VHT for Gaston County under various alternatives are presented in addition to the VMT and VHT for the Metrolina region as a whole because the Metrolina region is so large (13 counties). Including information for the smaller area of Gaston County provides another picture of the trends projected for each alternative in the county where the majority of the project is located.

**Table 4. Vehicle Miles and Vehicle Hours Traveled Under Various Scenarios**

| Scenario | Region | 2030 Vehicle Miles Traveled (VMT) in 1000's | | | 2030 Vehicle Hours Traveled (VHT) in 1000's | | |
|---|---|---|---|---|---|---|---|
| | | Daily | AM Peak | PM Peak | Daily | AM Peak | PM Peak |
| No-Build Alternative | Gaston County Only | 8,512 | 2,058 | 2,308 | 234.9 | 70.3 | 78.6 |
| | Entire Metrolina Region | 92,634 | 22,245 | 24,679 | 2,579.6 | 710.4 | 855.6 |
| Detailed Study Alternative 4 – Toll Facility | Gaston County Only | 9,510 | 2,308 | 2,577 | 258.7 | 74.9 | 87.2 |
| | Entire Metrolina Region | 93,339 | 22,290 | 24,880 | 2580.0 | 711.9 | 861.2 |
| Detailed Study Alternative 64 – Toll Facility | Gaston County Only | 9,473 | 2,294 | 2,569 | 255.8 | 75.2 | 84.5 |
| | Entire Metrolina Region | 93,226 | 22,245 | 24,867 | 2602.7 | 720.0 | 868.8 |
| Detailed Study Alternative 77 – Toll Facility | Gaston County Only | 9,492 | 2,308 | 2,566 | 259.7 | 77.0 | 87.0 |
| | Entire Metrolina Region | 93,216 | 22,267 | 24,843 | 2,607.7 | 723.4 | 872.2 |

Source: 2030 Traffic Projections for the Gaston East-West Connector, Prepared by Martin/Alexiou/Bryson, May, 2008. Using the Metrolina Regional Travel Demand Model of April 2006, with updated trip tables.

The VMT in Gaston County estimated for each of the DSAs is slightly higher than that for the No-Build Alternative (about 12 percent increase in Gaston County and <1 percent increase in the Metrolina region as a whole) because the DSAs would provide a new facility over the Catawba River and South Fork Catawba River where there are few to no existing crossings.

This increase in VMT means MSAT emissions under the DSAs would probably be slightly higher than the No-Build Alternative in the immediate area of the project. In addition, because the estimated VMT under each of the DSAs are nearly the same, varying by less than one percent, it is expected there would be no appreciable difference in overall MSAT emissions among the various DSAs.

Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great, even after accounting for VMT growth (12 percent VMT growth in Gaston County), that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Because of the specific characteristics of the project alternatives [i.e. new connector roadway], under each DSA there may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur. The localized increases in MSAT emissions would likely be most pronounced along the new roadway sections that would be built where there are few major roadways and little industry, such as the area west of US 321 and south of Linwood Road, and the area west of Daniel Stowe Botanical Garden under any of the DSAs. However, even if these increases do occur, they too will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In sum, under all DSAs in the design year, it is expected there would be slightly higher MSAT emissions in the immediate area of the project, relative to the No-Build Alternative, due to increased VMT. In comparing the DSAs, MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

## 4.3 CONSTRUCTION AIR QUALITY

Provided local ordinances for open burning and dust are followed, as described below, significant air quality impacts due to construction of the proposed project are not anticipated. The proposed project would be constructed in phases, limiting the overall construction activity occurring at any one location. There would also be emissions related to construction equipment and vehicles. However, these impacts related to construction would be temporary.

**Open Burning**. During construction of any of the DSAs, all materials resulting from clearing and grubbing, demolition or other operations will be removed from the project site, burned or otherwise disposed of by the contractor. Any burning will be accomplished in accordance with applicable laws, local ordinances and regulations of the North Carolina SIP for air quality in compliance with 15A NCAC 02D.1903. For construction in Mecklenburg County, open burning, if allowed, will require a permit from the Mecklenburg County LUESA Department of Air Quality in accordance with the MCAPCO Section 1.5106.

**Dust**. Also during construction, measures will be taken to reduce dust generated by construction when the control of dust is necessary for the protection and comfort of motorists and area residents. These dust suppression measures may include watering unpaved work areas, temporary and permanent seeding and mulching, and covering stockpiled materials, and using covered haul trucks.

# 5 CONCLUSIONS

**Criteria Pollutants and Transportation Conformity**. The criteria pollutants of concern in the project area are ozone and carbon monoxide, since the Charlotte-Gastonia-Rock Hill air quality region (which includes Gaston County and Mecklenburg County) is a moderate non-attainment region for ozone, and Mecklenburg County is a maintenance area for carbon monoxide.

The proposed project's DSAs would not cause or contribute to any new localized carbon monoxide violations or increase the frequency or severity of any existing carbon monoxide violations. None of the DSAs fit the criteria requiring a quantitative carbon monoxide hot-spot analysis, which indicates there is no potential for the proposed project to create a localized carbon monoxide hot spot. Also, there are no known locations of existing carbon monoxide violations in the study area that the project could affect.

The proposed project is included in the 2030 LRTPs for the GUAMPO area and the MUMPO area. These LRTPs are included in the approved Conformity Determination for the Charlotte-Gastonia-Rock Hill air quality region, titled: *Conformity Analysis and Determination Report for the Cabarrus-Rowan MPO, the Gaston Urban Area MPO, and the Mecklenburg-Union MPO 2030 Long Range Transportation Plans and the FY 2007-2013 State Transportation Improvement Programs and for Non-MPO Areas of Lincoln County, Iredell County, Gaston County, and Union County Areas*. The current conformity determinations are consistent with the final conformity rule found in 40 CFR Parts 51 and 93.

In addition, in accordance with 40 CFR 93.115(b)(1), for a project identified in a transportation plan, the project's design concept and scope must not have changed significantly from those described in the transportation plan, or in a manner which would significantly impact use of the facility.

The DSAs for the project are generally consistent with the project description (freeway) and project length (about 22 miles – 20 miles in Gaston County and 2 miles in Mecklenburg County) included in both LRTPs, but are not consistent with the assumption that the project is a non-toll project and the assumption on the number of lanes (4). The project currently is being studied only as a toll facility, and the preliminary engineering designs (January 2008) for the DSAs show a six-lane facility.

If one of the DSAs is selected as the Preferred Alternative, traffic projections will be updated again and the number of lanes for the project will be reevaluated for the Final Environmental Impact Statement (FEIS). If the updated traffic projections show only a four-lane facility is warranted, the two lanes in the center would be removed. The outside construction footprint and right of way would generally be the same for a four-lane facility and a six-lane facility.

The conformity determination for the region will need to be updated prior to the completion of the FEIS to change the project to a toll facility with the appropriate number of lanes. The MUMPO and GUAMPO LRTPs are presently being updated to 2035, and must be locally approved and federally reviewed by May 2009 (MUMPO, www.mumpo.org/2035_LRTP.htm, accessed July 8, 2008). The FEIS for the project is estimated to be completed in the summer of 2010.

The GUAMPO is in support of designating the project as a toll facility. In September 2000, the GUAMPO Technical Advisory Committee (TAC) passed a resolution that it supports the use of alternative funding methods to accelerate construction of the project, including methods that would require the payment of a toll by motorists (GUAMPO 2030 LRTP, May 2005, p. 74).

The selection of the No-Build Alternative would require the GUAMPO and MUMPO LRTPs to be updated to remove the proposed Gaston East-West Connector, and would need to seek other means to meet the region's emissions budget for conformance with the SIP.

**Mobile Source Air Toxics**. In sum, under all DSAs in the design year, it is expected there would be higher MSAT emissions in the immediate project area, relative to the No-Build Alternative, due to increased VMT. In comparing the DSAs, MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

**Construction Air Quality**. Provided local ordinances for open burning and dust are followed, significant air quality impacts due to construction of the proposed project are not anticipated. There would also be emissions related to construction equipment and vehicles. However, these impacts related to construction would be temporary. The proposed project would be constructed in phases, limiting the overall construction activity occurring at any one location.

# 6 REFERENCES AND SUPPORTING DOCUMENTATION

## REFERENCES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2006 Memorandum – Interim Guidance on Air Toxic Analysis in NEPA Documents. February. http://www.fhwa.dot.gov/environment/airtoxic/020306guidmem.htm

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Gaston County, and Union County areas. September 16. USDOT Conformity Finding, October 1, 2005.

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2007 Integrated Plan for Review of the Primary NAAQS for Sulfur Oxides. October.

2001 Control of Emissions of Hazardous Air Pollutants from Mobile Sources. Published in the Federal Register on March 29, 2001, Volume 66, Number 61, pages 17230-17273.

## SUPPORTING PROJECT DOCUMENTATION

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2008 Preliminary Engineering Designs for the Gaston East-West Connector Detailed Study Alternatives. January. Prepared by PBS&J and Gibson Engineers for NCTA.

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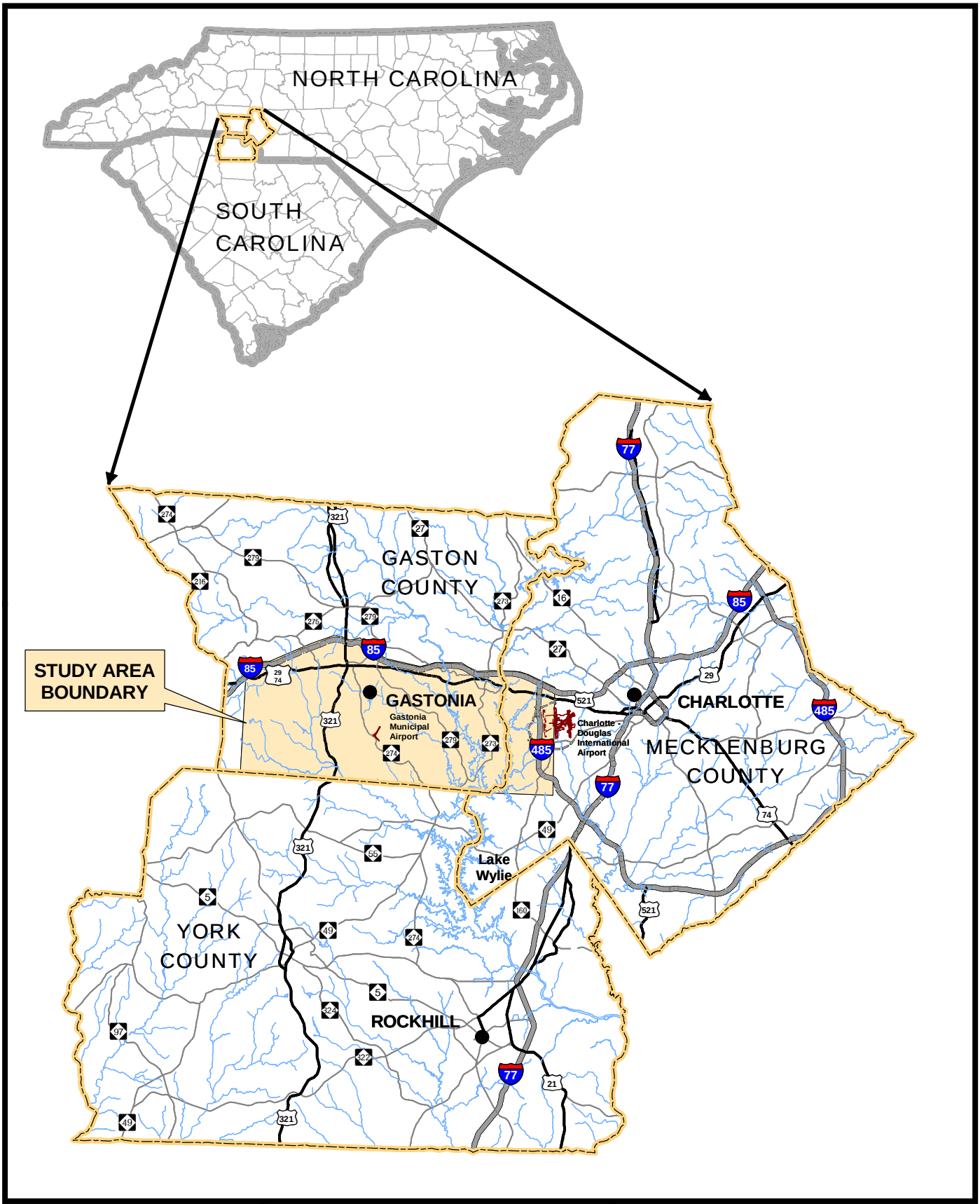



NORTH CAROLINA Turnpike Authority

**GASTON EAST-WEST CONNECTOR**

STIP PROJECT NO. U-3321

Gaston and Mecklenburg Counties

0 4.25 8.5

Miles

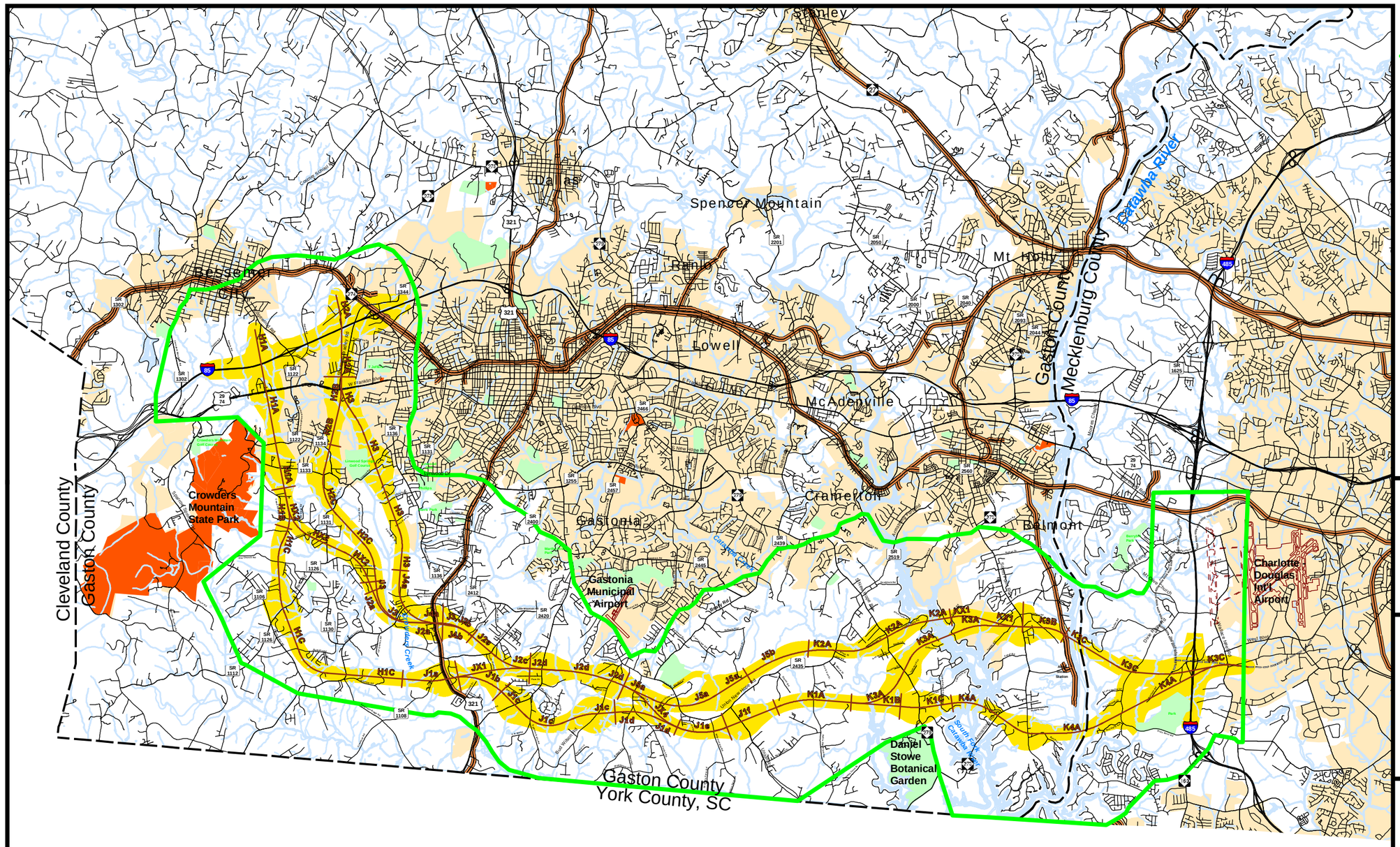
N

Source: Gaston, York, and Mecklenburg Counties GIS.
Map Printed On 3-12-08.

**PROJECT LOCATION IN REGION**

**Figure 1**

DEIS_Proj_Local_Regional.mxd 3-12-08 JNL




NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. U-3321

Gaston County and Mecklenburg County

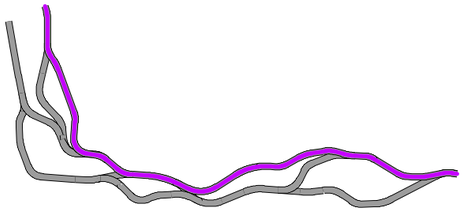
**GASTON EAST-WEST CONNECTOR**

**RECOMMENDED DETAILED STUDY ALTERNATIVES**

**Figure 2a**

CIA_DSA.mxd 5/28/08

## Alternative 4



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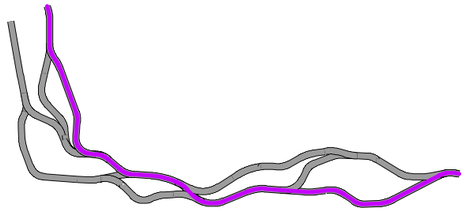

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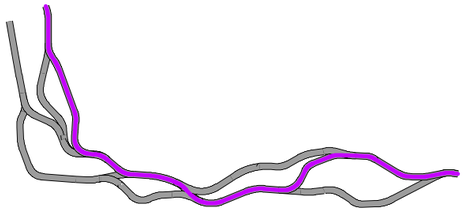

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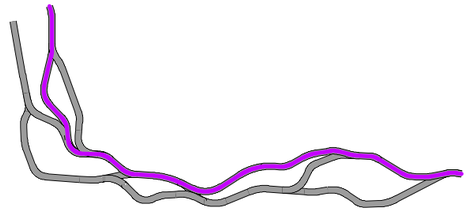

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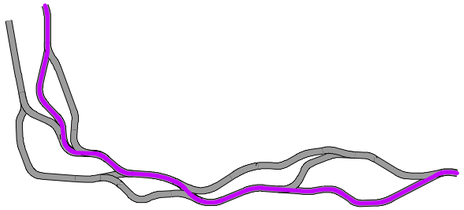
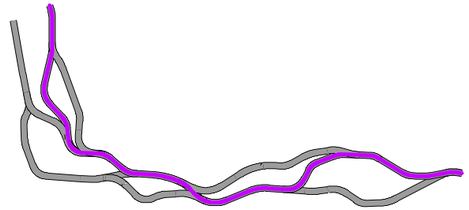
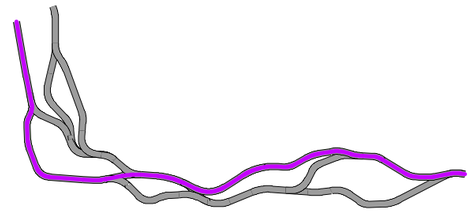


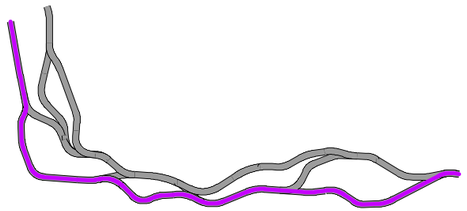
## Alternative 27



## Alternative 58



## Alternative 64



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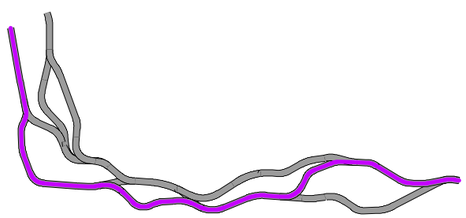

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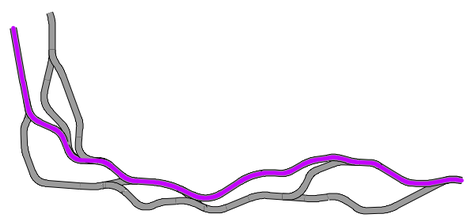

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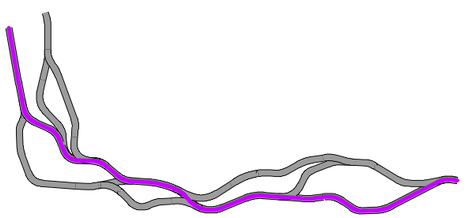
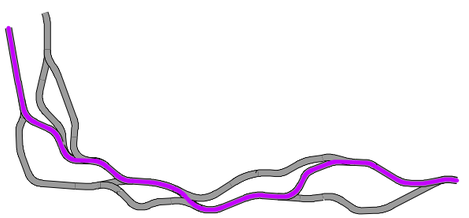


## Alternative 81



**Legend**

Design Right-of-Way

Corridor Segments Comprising Each Detailed Study Alternative

Source: Gaston County and Mecklenburg Counties GIS.
Map Printed On 5-28-08.

N

0 5,000 10,000
Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. U-3321

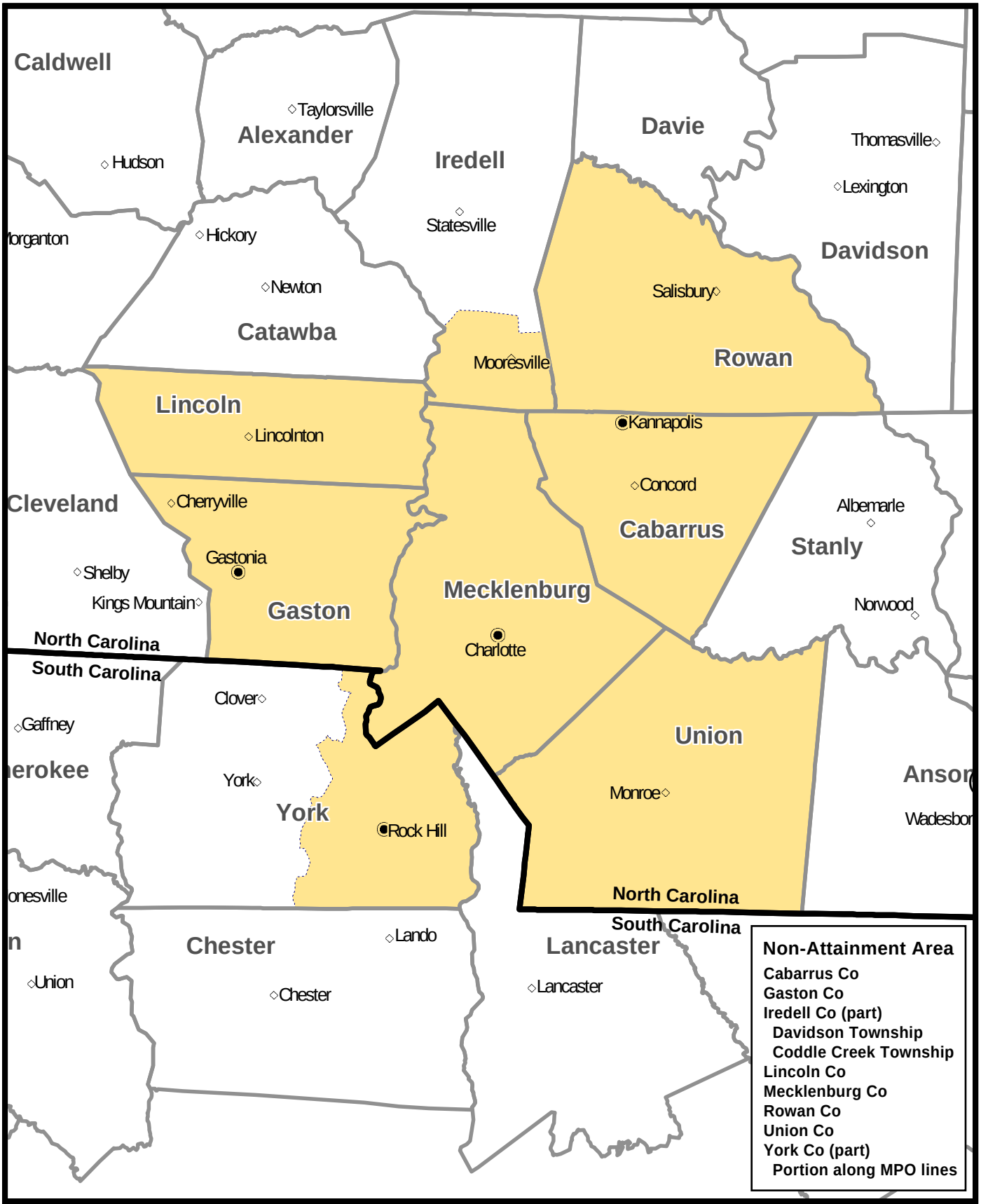
Gaston County and Mecklenburg County

**GASTON EAST-WEST CONNECTOR**

# RECOMMENDED DETAILED STUDY ALTERNATIVES

**Figure 2b**

CIA_Recomm_Seg.mxd 5/28/08




NORTH CAROLINA Turnpike Authority

GASTON EAST-WEST CONNECTOR

STIP PROJECT NO. U-3321

Gaston and Mecklenburg Counties

NOT TO SCALE

Source: Counties GIS.

Map Printed On 6-16-08.

N

# METROLINA REGION 8-HOUR OZONE NON-ATTAINMENT AREA

**Figure 3**

Fig3_MetrolinaRegion8HourOzone.ai

# APPENDIX A

## Part 1 – Correspondence with Mecklenburg County Department of Air Quality

## Part 2 - Mecklenburg County Air Pollution Control Ordinance - Selected Sections

# Appendix A- Part 1

## Correspondence with Mecklenburg County Department of Air Quality

# Appendix A- Part 2

## Mecklenburg County Air Pollution Control Ordinance - Selected Sections

# APPENDIX B

## 2005 High Congestion Locations from the Charlotte Department of Transportation

# APPENDIX C

## Amendment 2 - Conformity Analysis and Determination Report for the Cabarrus-Rowan MPO, the Gaston Urban Area MPO, and the Mecklenburg-Union MPO 2030 Long Range Transportation Plans and the FY 2007-2013 State Transportation Improvement Programs and for Non-MPO Areas of Lincoln County, Iredell County, Gaston County, and Union County Areas

- **Conformity Analysis and Determination Report – Main Text**
- **Appendix D – Sections Pertaining to Gaston and Mecklenburg Counties**

# APPENDIX D

## Traffic Projections
## Gaston East-West Connector
## 2030 - Non-Toll Facility Scenario
## 2030 - Toll Facility Scenario