I-77 High Occupancy/Toll (HOT) Lanes

From I-277 (Brookshire Freeway – Exit 11) to NC 150 (Exit 36)
Mecklenburg and Iredell Counties

Federal Aid Project No. NHS-077-1(210)
WBS No. 34181.1. 1
STIP Project No. I-3311C

Federal Aid Project No. NHF-077-1(209)9
WBS No. 45454.1. 1
STIP Project No. I-5405

Federal Aid Project No. IMF-077-1(183)299
WBS No. 40099.1. 1
STIP Project No. I-4750AA

ADMINISTRATIVE ACTION
ENVIRONMENTAL ASSESSMENT

UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
&
NC DEPARTMENT OF TRANSPORTATION

Approved

7/1/13
Date

FOR Gregory J. Thorpe, PhD, Manager
Project Development and Environmental Analysis Unit
North Carolina Department of Transportation

7-1-13
Date

for John F. Sullivan, III, PE, Division Administrator
Federal Highway Administration

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STIP Project No. I-4750 AA

ADMINISTRATIVE ACTION
ENVIRONMENTAL ASSESSMENT

July 2013

UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
&
NC DEPARTMENT OF TRANSPORTATION

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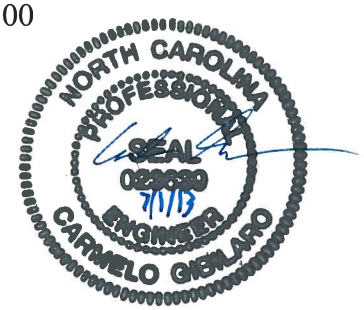

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For the North Carolina Department of Transportation

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NCDOT – Project Development and Environmental Analysis Unit

PROJECT COMMITMENTS

I-77 High Occupancy/Toll (HOT) Lanes

From I-277 (Brookshire Freeway) to NC 150 (Exit 36)
Mecklenburg and Iredell Counties

Federal Aid Project No. NHS-077-1(210)
WBS No. 34181.1. 1
STIP Project No. I-3311C

Federal Aid Project No. NHF-077-1(209)9
WBS No. 45454.1. 1
STIP Project No. I-5405

Federal Aid Project No. IMF-077-1(183)299
WBS No. 40099.1. 1
STIP Project No. I-4750AA

During the National Environmental Policy Act (NEPA) process, commitments are made to avoid, minimize, or mitigate project impacts. Commitments result from consideration of public comment or through the requirements of, or agreements with, environmental resource and regulatory agencies.

In addition to compliance with applicable federal and state requirements and regulations, such as Section 404 Individual Permit Conditions and State Consistency Conditions; North Carolina Department of Transportation (NCDOT) *Guidelines for Best Management Practices for the Protection of Surface Waters*; General Certification Conditions and Section 401 Conditions of Certification, and the Endangered Species Act, **Table PC-1** lists special project commitments that have been agreed to by NCDOT.

TABLE PC-1: Special Project Commitments

Item	Resource	EA Section	Project Commitment	Project Stage
1	Community Services	5.1.5	NCDOT will coordinate with the Charlotte Area Transit System (CATS) during final design and construction to avoid impacts to the operations of its park and ride lots in the project's study area.	Final Design through Construction Management
2	Hazardous Materials	5.2.5	If any UST or other potential source of contamination is discovered during construction activities, NCDOT should be notified of its presence immediately upon discovery. An assessment will then be conducted to determine the extent of any contamination and identify the potential impacts.	Construction Management

TABLE PC-1: Special Project Commitments

Item	Resource	EA Section	Project Commitment	Project Stage
3	Floodplains and Floodways	5.2.6	The Hydraulics Unit will coordinate with the NC Floodplain Mapping Program (FMP), to determine status of project with regard to applicability of NCDOT'S Memorandum of Agreement, or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).	Final Design through Construction Management
4	Floodplains and Floodways	5.2.6	This project involves construction activities on or adjacent to FEMA-regulated stream(s). Therefore, the Division shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction, certifying that the drainage structure(s) and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.	Division Office
5	Cultural	5.3	This project involves construction activities adjacent to a property with a known archaeological anomaly. If the adjacent property cannot be avoided, additional archaeological investigations will be necessary.	Final Design through Construction Management
6	Water Resources	5.4.2	Erosion and sediment control BMPs will be implemented in accordance with NCDOT's *Design Standards in Sensitive Watersheds* during the design and construction of this project in and around all Lake Norman and Byers Creek.	Construction Management

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EXECUTIVE SUMMARY

Project Purpose

The purpose of the proposed action is to provide immediate travel time reliability along I-77 from Uptown Charlotte to the Lake Norman area. Because the project is designed to address an immediate need, the opening and design years are both proposed for 2017.

Proposed Action

The North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), proposes to improve 26 miles of I-77 from I-277 (Brookshire Freeway) in Mecklenburg County to NC 150 (Exit 36) in Iredell County and along I-277 from I-77 to N. Brevard Street by the introduction of High Occupancy/Toll (HOT) lanes.

Vehicles meeting High Occupancy Vehicle (HOV) requirements (three or more passengers, as well as buses and motorcycles) will be permitted to use the HOT lanes free of charge (100 percent discounted). Non-HOV vehicles choosing to use the lanes would be assessed a variable fee. As more vehicles enter the HOT lanes and travel speeds in the HOT lanes begin to decrease, the fee would rise to ensure a minimum speed is maintained in the HOT lanes. This approach will address travel delays by providing a transportation option that results in more reliable local trip times and improves overall network efficiency.

The proposed project is included in the Mecklenburg-Union Metropolitan Planning Organization's (MUMPO) 2012-2018 Transportation Improvement Program (TIP) as three projects: I-3311C, I-5405, and I-4750AA.

Need for the Project

As discussed in more detail in **Section 2.1**, the primary needs for the proposed project are summarized below.

I-77 is part of the national Interstate Highway System and is a critical, north-south transportation corridor for the Charlotte-metro region and beyond. Within the immediate study area for this project, I-77 links the major employment center of downtown Charlotte, known locally as "Uptown", with the rapidly growing residential communities of northern Mecklenburg and southern Iredell counties. I-77 serves traffic demands and travel patterns for commuters (single-occupant vehicles, carpools, and transit) and other travelers within and outside of the project study area, and is a vital route for regional commerce. Currently, heavy traffic occurs during peak periods within the project limits, resulting in frequent congestion and delays.

The project study area has grown faster than the financial resources available to complete long-term transportation improvements. Existing traffic congestion within the I-77 corridor results in unpredictable delays, as well as excessive travel times for commuters and travelers. Predicted growth in the northern communities of Mecklenburg County will continue to increase these delays and travel times.

Alternatives Considered

Chapter 3 discusses all alternatives considered for the proposed action. Detailed study alternatives include the No-Build Alternative and three Build Alternatives (Alternative 1, Alternative 2, and Alternative 3). Build Alternative 2 is NCDOT's Preferred Alternative. These alternatives are described below.

No-Build Alternative. The analysis of the No-Build Alternative is required under the National Environmental Policy Act (NEPA) and serves as a benchmark against which the impacts of other alternatives can be compared. The No-Build Alternative represents the I-77 corridor without the proposed project. Under the No-Build Alternative, the only improvements that would be made to I-77 within the project limits through the design year 2017 would be the widening of existing lanes and shoulders of I-77 southbound between I-277 (Brookshire Freeway) and I-85 as STIP Project I-3311E. Where applicable in this EA, the impacts of Project I-3311E are noted. The No-Build Alternative will not meet the project's purpose to provide immediate travel time reliability along the corridor.

Build Alternatives. The proposed project consists of providing HOT lanes along I-77 from I-277 (Brookshire Freeway) to NC 150 (Exit 36) and along I-277 from I-77 to N. Brevard Street. There are three build alternatives considered in this Environmental Assessment (EA): Build Alternative 1, Build Alternative 2, and Build Alternative 3. The differences between the alternatives are the number of HOT lanes provided along various sections of I-77.

All build alternatives under consideration include the conversion of the existing HOV lanes within the project limits to HOT lanes. Under all build alternatives, the HOT lanes would be the center lanes of I-77, with the outer lanes remaining general purpose lanes. The HOT lanes are proposed to be separated from the general purpose lanes with a 4-foot buffer. The build alternatives also would require replacement/reconstruction of some cross-street bridges over I-77 and I-277, as described in **Chapter 3**.

Preferred Alternative. Based on information available to date, including this EA, NCDOT's Preferred Alternative is Build Alternative 2. Build Alternative 2 is preferred over Build Alternatives 1 and 3 because of the additional HOT lane capacity provided with minimal additional impact. Additional discussion of the reasons for identifying Build Alternative 2 as the Preferred Alternative is provided in **Chapter 3**.

Summary of Impacts

This section summarizes the estimated direct and indirect impacts to the human, physical, cultural, and natural environments from the No-Build Alternative and Preferred Alternative, and identifies proposed mitigation for impacts associated with the Preferred Alternative.

No-Build Alternative. The No-Build Alternative will incur neither right-of-way acquisition nor construction costs. There will be no short-term disruptions along the existing roadway during construction. There will be no impacts to streams, wetlands, or other natural resources, with the exception of impacts to approximately 48 linear feet of jurisdictional streams from STIP Project I-3311E. There will be no impacts to cultural resources, nor any residential or business relocations. If the No-Build Alternative is selected, Project I-3311E would be implemented. The approved CE for Project I-3311E (June 2011) would need to be reevaluated to address potential residential relocations that are now located in an historic district eligible for the National Register of Historic Places.

Preferred Alternative. Impacts for all of the Build Alternatives and the Preferred Alternative are summarized in **Table ES-1** in the order they appear in this EA, along with a listing of the EA sections where they are described in more detail.

Table ES-1: Comparison of Build Alternative Impacts

Resource	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Total Cost (2013 dollars)	$375,824,424	$393,494,288	$239,280,736
Human Environment			
Transportation & Land Use Plans	Consistent	Consistent	Consistent
Relocations - Residential	7	7	0
Relocations - Business	3	3	0
Communities and Neighborhoods	Positive effect due to travel time savings offered by the HOT lanes; minor impact due to right-of-way acquisition	Positive effect due to travel time savings offered by the HOT lanes; minor impact due to right-of-way acquisition	Positive effect due to travel time savings offered by the HOT lanes; minor impact due to right-of-way acquisition
Environmental Justice	Relocation impacts on EJ populations are disproportionately high but minor. Resulting community impacts offset by existing Oaklawn Ave. bridge remaining open while new bridge is constructed.	Relocation impacts on EJ populations are disproportionately high but minor. Resulting community impacts offset by existing Oaklawn Ave. bridge remaining open while new bridge is constructed.	No disproportionately high and adverse impacts
Community Services and Public Health and Safety	Temporary indirect impacts to CATS bus service routes that operate on I-77 and emergency services response times during construction.	Temporary indirect impacts to CATS bus service routes that operate on I-77 and emergency services response times during construction.	Temporary indirect impacts to CATS bus service routes that operate on I-77 and emergency services response times during construction.
Section 4(f) and Section 6(f) Resources	No impact.	No impact.	No impact.
Economic Effects	Temporary economic benefits during construction (construction jobs and boost to local businesses); travel delays during construction may have temporary impact on businesses adjacent to I-77; long-term benefits to the local and regional transportation network from enhanced mobility, reliable travel times, and reduced fuel costs		
Physical Environment			
Noise	Approximately 679 receptors impacted by noise before mitigation. Approximately 484 noise-impacted receptors and an additional 405 noise-sensitive receptors would benefit from 21 preliminary feasible and reasonable noise barriers. Minor impact.	Approximately 695 receptors impacted by noise before mitigation. Approximately 500 noise-impacted receptors and an additional 393 noise-sensitive receptors would benefit from 21 preliminary feasible and reasonable noise barriers. Minor Impact.	Approximately 504[1] receptors impacted by noise before mitigation. Approximately 368 noise-impacted receptors and an additional 395 noise-sensitive receptors would benefit from 19 preliminary feasible and reasonable noise barriers. Minor Impact.

[1] The design limits for Alternative 3 do not include improvements along I-277; therefore, the number of existing noise impacts for Alternative 3 does not include receptors along I-277.

Table ES-1: Comparison of Build Alternative Impacts

Resource	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Air Quality	No impact.	No impact.	No impact.
Utilities	Low impact	Low impact	Low impact
Visual	Minor changes in the visual landscape will occur, including noise barriers and two new bridges.	Minor changes in the visual landscape will occur, including noise barriers and two new bridges.	Minor changes in the visual landscape will occur, including noise barriers.
Hazardous Materials	Low potential for impact	Low potential for impact	Low potential for impact
Floodplains	Existing culverts will be extended, new culverts are proposed, and future supplemental drainage structures are recommended.	Existing culverts will be extended, new culverts are proposed, and future supplemental drainage structures are recommended.	Existing culverts will be extended, new culverts are proposed, and future supplemental drainage structures are recommended.
Cultural Resources			
Historic Architecture	No adverse effect. No historic properties will be impacted. Noise barriers may be constructed adjacent to three of the five historic districts identified in the project study area.		
Archaeological	No impact.	No impact.	No impact.
Natural Environment			
Biotic Communities and Wildlife	No adverse effect. No historic properties will be impacted. Noise barriers may be constructed adjacent to three of the five historic districts identified in the project study area.		
Water Quality	Short-term impacts such as sedimentation and turbidity, can be anticipated from construction-related activities, but will be minimized through use of Best Management Practices (BMPs). No harmful effects to the groundwater system are expected.		
Wetlands	0.007 acre (305 sq ft) impacted.	0.007 acre (305 sq ft) impacted.	0.007 acre (305 sq ft) impacted.
Ponds	0.016 acre impacted.	0.016 acre impacted.	0.016 acre impacted.
Streams	2,925 linear feet impacted.	3,237 linear feet impacted.	1,071 linear feet impacted.
Catawba River Riparian Buffer	Total estimated impacts from all encroachment into Zone 1 is 47,916 square feet (1.1 acres). Total estimated impacts from all encroachment into Zone 2 is 135,036 square feet (3.1 acres).		
Protected Species	No Effect	No Effect	No Effect

1 INTRODUCTION

1.1 Project Setting

Interstate 77 (I-77) is a north-south, Interstate highway located in the Western Piedmont region of North Carolina. Within North Carolina, the 105.7-mile interstate connects Statesville, Huntersville, and Charlotte. Charlotte is the largest city in the state of North Carolina and is the seat of Mecklenburg County. I-77 is located in the center of Mecklenburg County and connects Charlotte to suburban communities to the south (Pineville) and to the north (Huntersville, Cornelius, and Davidson in Mecklenburg County and Mooresville in Iredell County). In the Charlotte region, I-77 connects to the I-485 beltway (twice), the I-277 beltway (twice), and I-85. Further north in the City of Statesville in Iredell County, I-77 connects to I-40.

In northern Mecklenburg County and southern Iredell County, I-77 is located on the eastern edge of Lake Norman, the largest manmade body of fresh water in North Carolina.

Existing land use in the project study area consists of various densities of office, commercial, and industrial land uses surrounding interchanges, with various levels of single and multi-family residential developments located between interchanges and adjacent to the corridor. There are dense business, industrial, and residential sites within the city limits of Charlotte and the towns of Huntersville, Cornelius, Davidson, and Mooresville. In the northern portions of the project study area, there are pockets of undeveloped land of various acreages.

Beginning near Uptown Charlotte at I-277 (Brookshire Freeway – Exit 11), I-77 is six lanes wide. There is a High Occupancy Vehicle (HOV) lane in the southbound direction from I-85 (Exit 13) to I-277 (Exit 11). Between I-85 (Exit 13) and I-485 (Exit 19), I-77 is eight lanes wide. Included in these eight lanes is one HOV lane in each direction. These are the only HOV lanes in the state. North of I-485, I-77 reduces to five lanes (three lanes northbound), then to four lanes north of Gilead Road (Exit 23) to the Virginia state line.

The I-77 corridor in the Charlotte region is heavily used by local and regional commuters. I-77 experiences congestion during weekday rush hours, resulting in travel time delays for motorists.

1.2 Proposed Action

The North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), proposes to improve 26 miles of I-77 from I-277 (Brookshire Freeway – Exit 11) in Mecklenburg County to NC 150 (Exit 36) in Iredell County and along I-277 from I-77 to N. Brevard Street by the introduction of High Occupancy/Toll (HOT) lanes. The limits of the project are shown on **Figure 1**.

The project is designated with three NCDOT project numbers: I-3311C, I-5405, and I-4750AA. These projects are included in the amended Mecklenburg-Union Metropolitan Planning Organization (MUMPO) 2035 Long Range Transportation Plan (LRTP) approved May 22, 2013 and 2012-2018 Transportation Improvement Program (TIP) and are discussed in **Section 2.5.2** and described as follows:

- I-3311C – Construct two HOT lanes HOV3+ along I-77 from just north of the I-77/I-85 interchange (connecting to I-5405 HOT lane project) to and along I-277
  - Construct one HOT lane HOV 3+ from the southern terminus of the existing southbound (south of I-85) HOT Lane to I-277
  - Construct an additional HOT lane HOV3+ southbound from the southern terminus of I-5405 (north of I-85/I-77 interchange) to I-277

  - Construct two HOT lanes HOV 3+ northbound from I-277 to northbound southern terminus of I-5405 (north of I-85)
  - Along I-277 construct one HOT lane HOV 3+ in each direction from I-77 to North Brevard Street (with HOT lane designation beginning and ending at North Tryon St.)

- I-5405 - I-77 from I-277 (Brookshire Freeway) to Exit 28 convert existing HOV lanes to a HOT lane HOV 3+ and extend them to Exit 28. Add additional HOT lane in each direction beginning at I-85 to Exit 28 for a total of 2 HOT lanes in each direction.

- I-4750AA – Construct one HOT lane HOV3+ in each direction along I-77 from Exit 28 (connecting to I-5405 HOT lane project) to Brawley School Rd (Exit 35) with construction ending approximately 5500 ft. north of the NC 150 structure (Exit 36).
  - Northbound and southbound HOT designations begin and end at Brawley School Rd structure (Exit 35).

The FHWA, in its Fact Sheet, *HOT Lanes, Cool Facts*, generally defines HOT lanes and the associated variable pricing of tolls as follows:

> **What are HOT Lanes?** HOT lanes are high-occupancy vehicle (HOV) lanes that allow vehicles that do not meet occupancy requirements to pay a toll to use the lane. Variable pricing is used to manage the lane so that reliable performance is maintained at all times. By charging travelers for use of roadways, agencies can help mitigate traffic congestion while generating revenues to supplement operating costs. Often, a priced facility will offer a more reliable trip than an adjacent or nearby route.
>
> **Why are Variable Tolls used for HOT Lanes?** Congestion pricing, or "variable pricing," changes the amount charged for road use based on demand. On a typical roadway, a flat toll would not be the optimal toll throughout the day. During off-peak periods it may be too high for drivers to benefit from paying the toll. Conversely, during times of peak demand, the toll may not be high enough to make optimal use of the facility. Variable tolling offers a solution to this problem by increasing the toll during periods of peak demand and reducing it during off-peak times.

1.3 Corridor History

The majority of the I-77 corridor through the project area was constructed between the mid-1960s and the mid-1970s. In 2004, as STIP Project I-3311A, an HOV lane was added to a 5-mile section of I-77 northbound between I-85 (Exit 13) and I-485 (Exit 19) and to a 10-mile section of I-77 southbound from I-485 (Exit 19) to I-277 (Brookshire Freeway-Exit 11).

Additional studies completed within the project corridor include the following, in chronological order:

- **I-77 Sub Area Study (December 2001)** – This study analyzed the feasibility of allowing for three general-purpose lanes plus one HOV lane in each direction from I-85 to I-485. Recommendations from this study were incorporated in STIP Project I-3311A, described below.

- **I-3311A Categorical Exclusion (CE) (July 2002)** – This CE analyzed the addition of an HOV lane between I-85 and I-485 in the northbound direction and an HOV lane from I-277 to I-485 in the southbound direction. The southbound HOV lanes from I-277 to I-85 utilized existing pavement, which resulted in reduced inside shoulder width and narrowed the three existing general purpose lanes. FHWA approved these design exceptions with the understanding that

the lanes and shoulders would be restored to standard widths in the future (STIP I-3311E). Construction of I-3311A was completed in December 2004.

- **Charlotte Region Fast Lanes Study (Ongoing since 2007)** – Started in 2007, the Charlotte Region Fast Lanes Study is being conducted to analyze twelve corridors in a 10-county region for managed lanes feasibility (Fast Lanes Web site: http://www.fastlanes.org). Phase 1 involved a screening process to identify the most promising corridors. Phase 2 involved detailed evaluations of managed lanes along the most promising corridors. The I-77 North corridor, which includes the project corridor, was carried forward into the Phase 2 evaluation and found to be among the best corridors in travel time savings per mile and recommended for more detailed corridor-level study. Phase 3 began in February 2012 and has included public outreach to familiarize the public with the concept of congestion pricing and to determine the public's acceptance of managed lanes. Phase 3 was completed in Winter 2013.

- **Feasibility Study (FS-0510A) (June 2008)** – This study evaluated the widening of I-77 from just south of I-277 (Brookshire Freeway – Exit 11) to I-85 (Exit 13). The purpose of this study was to expand the existing HOV system for this portion of I-77, ultimately creating a continuous 10-mile segment from Fifth Street northward to I-485. This feasibility study also proposed widening the southbound lane and shoulder widths that were reduced as part of I-3311A. FS-0510A included the northern extension of the HOV lanes later proposed in FS-0810B. The feasibility study addressed widening the HOV facility from one to two lanes in each direction or converting to a two-lane, reversible facility.

- **Feasibility Study (FS-0810B) (March 2010)** – This study recommended converting the existing HOV facility on I-77 to HOT and extending the lanes northward to West Catawba Avenue (Exit 28).

- **I-3311E Categorical Exclusion (June 2011)** – This document analyzed restoring the width of the existing travel lanes and shoulders on the southbound lanes of I-77 between I-277 (Brookshire Freeway) and I-85 (Exit 13), which were previously reduced in width as part of I-3311A.

- **I-5405 Categorical Exclusion (July 2012**) – This document analyzed the inclusion of two HOT lanes along I-77 from I-85 (Exit 13) to West Catawba Avenue (Exit 28), as well as the conversion of the existing southbound HOT lane from I-77 to I-85 to a HOT lane. This project included the conversion of all HOV lanes within the project limits to HOT. The I-5405 project is now part of the combined project (I-3311C, I-5405, and I-4750AA) being evaluated in this EA.

2 PURPOSE AND NEED FOR PROJECT

2.1 Need for Action

I-77 is part of the national Interstate Highway System and is a critical, north-south transportation corridor for the Charlotte-metro region and beyond; connecting the Charlotte metropolitan area with Columbia, South Carolina to the south, and to the states of Virginia, West Virginia, and Ohio to the north. Within the immediate study area for this project, I-77 links the major employment center of downtown Charlotte, known locally as Uptown, with the rapidly growing residential communities of northern Mecklenburg and southern Iredell counties.

I-77 serves traffic demands and travel patterns for commuters (single-occupant vehicles, carpools, and transit) and other travelers within and outside of the project study area, and is a vital route for regional and interstate commerce. Currently, heavy traffic occurs during peak periods within the project limits, resulting in frequent congestion and delays, as described in **Chapter 3**.

The project study area has grown faster than the financial resources available to complete long-term transportation improvements. Existing traffic congestion within the I-77 corridor results in unpredictable delays, as well as excessive travel times for commuters and travelers. Projected growth in the northern communities of Mecklenburg County will continue to increase these delays and travel times.

The MUMPO *Congestion Management Process* (2009) documents causes of congestion along the project corridor from Trade Street to the Iredell County line. These include limitations to corridor widening due to existing neighborhoods and the causeway at Lake Norman, reduction in the number of lanes from 4 lanes to 3 lanes in the northbound direction between I-485 and Gilead Road, and limited queue spacing at on-ramps at Exit 23 (Gilead Road), Exit 25 (NC 73 – Sam Furr Road) and Exit 28 (West Catawba Avenue).

2.2 Purpose of the Proposed Action

The purpose of the proposed action is to provide immediate travel time reliability along I-77 from Uptown Charlotte to the Lake Norman area. Because the project is designed to address an immediate need, the opening and design years are both proposed for 2017.

To address this need, it is proposed to incorporate managed lanes (HOT lanes) with variable pricing within the project corridor. Vehicles meeting HOV requirements (three or more passengers, buses and motorcycles) will be permitted to use the HOT lanes free of charge (100 percent discounted). Non-HOV vehicles choosing to use the lanes would be charged a variable fee depending on congestion levels. As more vehicles enter the HOT lanes and travel speeds in the HOT lanes begin to slow, the fee would rise to ensure a minimum speed is maintained in the HOT lanes. This approach addresses travel delays by providing a transportation option that results in more reliable local trip times and improves overall network efficiency. In addition, the extension of managed lanes to more sections of I-77 will further MUMPO's goal to establish programs and incentives that encourage ridesharing, as stated in the MUMPO *2035 LRTP*, by offering more reliable travel times for High Occupancy Vehicles.

2.3 Project Funding

According to the *North Carolina Statewide Transportation Plan (2040 Plan*) adopted by the Board of Transportation in August 2012, North Carolina will need at least $94.1 billion (in 2011 dollars) between today and 2040 just to maintain existing physical conditions and levels of congestion and mobility for all

elements of the state's transportation system, and $122.8 billion to improve the transportation network's performance and capacity to desired conditions. For highways alone, these figures are $68.5 billion and $93.0 billion, respectively. To maintain existing conditions, the State will need to find new revenue sources to generate $32.3 billion in additional funding between now and 2040. Improving the system to target levels would require an additional $60.1 billion over what is expected from traditional revenue sources. Reflecting this overall funding shortfall, MUMPO has indicated that the first available funds for adding general purpose lanes to I-77 would not be available before 2020.

Due to traditional funding limitations and recognized financial constraints, alternative project financing options are being considered for this project – particularly a Public-Private Partnership (P3). FHWA encourages the consideration of P3s in the development of transportation improvements. FHWA defines a P3 as a contractual agreement between a public agency and a private sector entity that allows for greater private sector participation in the delivery and financing of transportation projects. Additional information on P3s can be found on FHWA's website: www.fhwa.dot.gov/ipd/p3/index.htm.

2.4 Population Growth

According to the US Census Bureau, from 2000 to 2010 the population of Mecklenburg County grew 32 percent, from 695,454 to 919,628, and the population of Iredell County grew 30 percent, from 122,660 to 159,437. Much of this population growth and associated residential development was, and continues to be, concentrated in northern Mecklenburg County (the towns of Huntersville, Cornelius, and Davidson) and southern Iredell County (Town of Mooresville). The combined populations of Huntersville, Cornelius, and Davidson grew 87 percent between 2000 and 2010; from 44,068 to 82,583. This population growth accounted for 17 percent of Mecklenburg County's population growth during the same period. The population of Mooresville grew nearly 74 percent during this period, from 18,823 to 32,711.

According to the MUMPO *2035 LRTP* (March 2010), the housing boom in the north can be attributed to the attraction of Lake Norman; the "small town" attractiveness of the northern towns of Davidson, Cornelius, and Huntersville; and the large amount of available vacant land. Many residents of these northern communities use I-77 to commute to Uptown Charlotte, which remains the "single highest concentration of employment in Mecklenburg County," and to other employment centers such as the Charlotte-Douglas International Airport.

2.5 Transportation and Land Use Plans

Various regional agency and municipal plans developed to guide land use and transportation planning decisions emphasize the importance of the I-77 corridor for both local and regional travel. Furthermore, with I-77 connecting to major arterials within local municipalities, the interstate's influence on land use and transportation recommendations is apparent in municipal small area plans. State, regional and local plans that include the project study area are discussed in the following sections.

2.5.1 State Transportation Improvement Program

The NCDOT 2012-2018 STIP includes five interstate projects, four rural projects, one urban project and one enhancement project in the project study area, as identified in **Table 2-1**.

Table 2-1: State Transportation Improvement Program (STIP) Projects Near the Project Study Area

2012-2018 STIP Project Number	Description	Status
Interstate Projects		
I-3311E	I-77 from north of I-277/NC 16 (Brookshire Freeway) to North of I-85. Widen existing southbound lanes to restore the widths that were reduced when the I-77 southbound HOV lanes were constructed in 2004.	Construction beginning in FY 2015
I-4733	I-77/SR 5544 – West Catawba Avenue (Exit 28) in Cornelius. Modify interchange.	Construction in FY 2013
I-4750A	I-77 from SR5544 - West Catawba Avenue (Exit 28) to US 21 (Exit 33) in Iredell County. Widen and reconstruct roadway, add one general purpose lane	Developmental program in current STIP, anticipated construction funding in FYs 2020-2023 for I-4750A and I-4750B, and unfunded construction beyond 2023 for I-4750B and I-4750C
I-4750B	I-77 from US 21 (Exit 33) to NC 115/US 21 (Exit 42) in Iredell County. Widen and reconstruct roadway, add one general purpose lane.	
I-4750C	I-77, from NC 115/US 21 (Exit 42) to I-40 in Iredell County. Widen and reconstruct roadway, add one general purpose lane.	
Rural Projects		
R-2307C	NC 150 from NC 27 in Lincolnton to I-77. Widen to multi-lanes.	Construction in FY 2020
R-3833	SR 1100 (Brawley School Road) in Mooresville, from SR 1177 (Chuckwood Road) to US 21. Widen to multi-lanes with interchange at I-77 between Exit 33 (US 21) and Exit 36 (NC 150).	Project currently under construction
R-2632	NC 73 from US 21 to SR 2693 (Davidson-Concord Road). Widen to multi-lanes.	Project currently under construction
R-2555	SR 5544 – West Catawba Avenue (Exit 28) from NC 73 (Sam Furr Road) to east of SR 2195 (Torrence Chapel Road). Widen to multi-lanes.	The portion of this project adjacent to I-77, R-2555A, West Catawba Avenue (Exit 28) from SR 2151 (Jetton Road) to SR 2195 (Torrence Chapel Road), has been completed.
Urban Projects		
U-5108	Northcross Drive Extension, north end of Northcross Drive to Westmoreland Road in Cornelius. Construct road on new location.	Construction in FY 2014. This project is adjacent to the west side of I-77.
Enhancement Projects		
E-4953	Construct multi-use facility adjacent to McDowell Creek, linking Birkdale neighborhood in Huntersville to Westmoreland Road in Cornelius.	Project currently under construction

Source: NCDOT's 2012-2018 Transportation Improvement Program (July 2011)

2.5.2 Long Range Transportation Plan (LRTP)

In order to provide additional capacity in the form of managed lanes on I-77 in Mecklenburg and Iredell Counties, MUMPO amended the *2035 LRTP* on May 22, 2013, to include all three sections of the proposed project (I-3311C, I-5405, and I-4750AA) as described in **Section 1.2**.

The amendment included two HOT lanes in each direction on I-77 from I-277 (Brookshire Freeway-Exit 11) to Catawba Avenue (Exit 28) and one HOT lane in each direction from Catawba Avenue (Exit 28) to NC 150 (Exit 36) and along I-277 construct one HOT lane HOV 3+ in each direction from I-77 to North Brevard Street (with HOT lane designation beginning and ending at North Tryon St.).

Figure 2 shows projects included in MUMPO's Transportation Improvement Program that are located in the vicinity of this project. An air quality conformity determination was approved by USDOT on May 31, 2013. The air quality conformity determination includes MUMPO's LRTP amendments approved on May 22, 2013.

2.5.3 Local Transportation and Land Use Plans

In addition to the STIP and LRTP, the City and County municipalities along the project corridor have developed land use plans that include the I-77 study area. These are listed in **Table 2-2.** The proposed project does not conflict with any of the recommendations included in these plans.

Table 2-2: Regional and Local Planning Documents

Mecklenburg County/City of Charlotte
Generalized Adopted Land Use Plan (July 19, 2006)
Centers, Corridors, and Wedges Growth Framework (August 23, 2010)
Central District Adopted Future Land Use (July 11, 2007)
Northeast District Adopted Future Land Use (July 5, 2007)
Northwest District Adopted Future Land Use (July 10, 2007)
Town of Cornelius
Cornelius Land Development Map (June 10, 2010)
Cornelius Comprehensive Master Plan (2011)
Town of Cornelius Residential Map (2010)
Town of Huntersville
Huntersville Approved Development and Major Features (January 2, 2011)
Gilead Road/US 21 Transportation and Land Use Vision Small Area (January 2006)
NC 73 (Sam Furr Road)/US-21 Transportation and Land Use Vision Small Area Plan (January 2006)
NC 73 Transportation/Land Use Corridor Plan (July 19, 2004)
Neighborhood Plan for the Rich Hatchet Road Community (August 17, 1998)
Town of Davidson
Davidson Comprehensive Plan (August 10,2010)
Circles @ 30 Small Area Plan (draft August 31, 2012)
Ordinance Map (September 8, 2009, corrected May 18, 2010)
Town of Mooresville
Mooresville Comprehensive Land Use Plan (July 2007)
Mooresville Comprehensive Transportation Plan (draft November 5, 2012)
Mount Mourne & South Iredell Master Plan (August/September 2004 & February 2006)
Iredell County
Iredell County 2030 Horizon Plan (September 15, 2009)
Comprehensive Transportation Plan Study Report (January 2008)

2.6 Public Transportation Service

There are numerous transit routes operating in the project study area. Six Charlotte Area Transit System (CATS) express routes operate on I-77 within all, or a portion of, the project limits. These include the North Mecklenburg Express (77x), Huntersville Express (48x), Northlake Express (53x), University Research Park Express (54x), Concord Express (80x), and Concord Mills Express (79x). These express routes currently use the existing HOV lanes on I-77. All express routes are weekday routes, with the exception of the Concord Mills Express, which operates on Saturday only. Park and ride lots for the express bus service near the project corridor are located at Northlake Mall (Exit 18), Northcross Shopping Center (Exit 25), and on Gilead Road near I-77 (Huntersville-Gateway Exit 23).

CATS also operates six local bus routes and two neighborhood bus routes within the project area. These routes do not operate on I-77, but on neighborhood streets on either side of I-77 and on bridges across I-77.

In addition to bus routes, CATS also supports vanpools throughout the region offering options of seven person or 15 passenger vans. Currently, CATS supports 76 vanpools (CATS Web site: http://charmeck.org/city/charlotte/cats/commuting/vanpool/Pages/default.aspx). Based on a review of the current vanpool list, approximately 40 percent of the vanpools operate between origins/destinations that may use I-77 for a portion of their trip.

The Iredell County Area Transportation System (ICATS) is a community transportation agency that serves both human services clients as well as the general public residing in Iredell County. ICATS operates between the hours of 5 am and 7 pm, Monday through Friday, with additional evening hours and limited weekend service available. ICATS does not provide a commuter service into Charlotte.

2.7 Strategic Highway Corridor Designation

The I-77 corridor is designated a Strategic Highway Corridor (SHC) by the NCDOT. SHC designation confirms NCDOT's commitment to improve, protect, and better plan for a series of critical highway facilities in the state. I-77 from Rock Hill, SC to Wytheville, VA is identified as Corridor 21. The vision for the corridor is a "freeway," which falls under the AASHTO Design Classification of freeway or interstate and has the functional purpose of high mobility with full control of access (https://connect.ncdot.gov/projects/planning/Pages/StrategicHighwayCorridors.aspx).

2.8 Existing Configuration of I-77 and I-277

For the purpose of describing the existing configurations of I-77 and I-277, which vary in the study area, the project corridor is divided into sections from south to north as follows:

I-77

- Section A – from I-277 to just north of I-85 (Exit 13)
- Section B – from just north of I-85 (Exit 13) to West Catawba Avenue (Exit 28)
- Section C – from West Catawba Avenue (Exit 28) to NC 150 (Exit 36)

I-277

- From I-77 to North Brevard Street

Configuration of I-77

Section A. The current lane configuration in Section A includes four 12-foot general purpose lanes in the northbound direction with a 10-foot paved outside shoulder and a 15-foot paved inside shoulder against a concrete median barrier. The southbound direction includes four 11-foot general purpose lanes and one 11-foot HOV lane adjacent to the median, with a 10-foot paved outside shoulder and a 6-foot (varies) paved inside shoulder against the concrete median barrier. The HOV and general purpose lanes are separated by paint striping.

Section B. The current lane configuration in Section B includes three 12-foot general purpose lanes and one 12-foot HOV lane in each direction with 10-foot paved outside shoulders and 10-foot paved inside shoulders divided by a grass median. The HOV and general purpose lanes are separated by paint striping.

Section C. The current lane configuration in Section C includes two 12-foot general purpose lanes in each direction with 10-foot paved outside shoulders and 10-foot paved inside shoulders divided by a grass median.

Configuration of I-277

The current lane configuration on I-277 from I-77 to Graham Street includes four 11.75-foot general purpose lanes in each direction. From Graham Street to Brevard Street, I-277 includes three 11.67-foot general purpose lanes, divided by a concrete median barrier. Inside shoulder width varies between four and six feet, and outside shoulder width varies from four to eight feet.

2.9 Existing (2012) and Design Year (2017) No-Build Traffic Conditions

Existing Annual Average Daily Traffic (AADT) at specific locations along the project corridor ranges from 70,000 to 171,700 vehicles per day (vpd). Existing traffic volumes on I-77 along the project corridor are shown on **Figure 3**. The development of the traffic estimates for this project is documented in the *Traffic Estimate Technical Memorandum (*RK&K, June 2013) and the *Supplemental to RK&K Traffic Estimate Technical Memorandum* (Atkins, June 2013) , which are incorporated by reference..

Peak and off-peak direction volumes were evaluated for the project. Peak direction volumes were analyzed (both Southbound AM and Northbound PM) for the study corridor and are documented in the *Draft Traffic Operations Technical Memorandum* (Atkins, June 2013)., which is incorporated by reference.

2.9.1 Peak Hour Travel Demand

I-77 southbound is the peak direction during the AM peak hour as commuters travel from north Charlotte, the Towns of Huntersville, Cornelius, Davidson and Mooresville to the central business district in Uptown Charlotte. Existing (2012) peak hour volumes at specific segments along the corridor in the Southbound AM direction ranges from 5,225 in the segment from North of Exit 36 to NC 150 (Exit 36) to 20,955 in the segment from Lasalle Street (Exit 12) to I-277 (Brookshire Freeway, Exit 11) and average 10,975 along the corridor.

I-77 northbound is the peak direction during the PM peak hour. Existing (2012) Northbound PM direction peak hour volumes range from 6,225 to 22,015 in the same segments as the Southbound AM direction, and average 12,185 along the corridor.

During the AM peak hour, the average growth in traffic for the I-77 study area corridor is expected to be minor between 2012 and 2017. The completion of I-485 between I-77 and I-85 (STIP R-2248E) and a

new interchange at Brawley School Road (STIP R-3833) will have an impact on the I-77 traffic patterns over the next five years. The I-77 AM and PM peak period volumes north of I-485 (Exit 19) are projected to be higher in the year 2017 No-Build Scenario than in the 2012 Existing Scenario. South of I-485, generally, the 2017 No-Build volumes are about the same or lower than the 2012 Existing volumes with the exception of I-77 northbound and I-277 (Brookshire Freeway) eastbound (Inner loop) in the PM peak period. Additionally, I-77 northbound and I-277 (Brookshire Freeway) westbound (Outer loop) PM peak period volumes are higher than in the AM peak period. I-77 southbound and I-277 Inner loop volumes are also higher in the PM peak period except from Gilead Road (Exit 23) to I-277 (Exit 11) which is higher in the AM peak period. A comparison of the I-77 and I-277 AM and PM peak period volumes for the 2012 Existing and 2017 No-Build Scenarios is presented in **Table 2-3**.

Table 2-3: Comparison of 2012 Existing and 2017 No-Build Peak Period Volumes

Location	Southbound / Inner loop			Northbound / Outer loop		
	2012 Existing	2017 No-Build	Percent Change	2012 Existing	2017 No-Build	Percent Change
I-77						
North of Exit 36	5,225 (5,560)	6,505 (6,525)	24% (17%)	4,380 (6,225)	6,315 (7,440)	44% (20%)
Exit 36 to Exit 35	6,130 (6,310)	6,770 (7,065)	10% (12%)	5,995 (8,195)	7,640 (8,780)	27% (7%)
Exit 35 to Exit 33	6,130 (6,310)	7,295 (8,140)	19% (29%)	5,995 (8,195)	9,280 (10,395)	55% (27%)
Exit 33 to Exit 31	8,095 (8,595)	8,420 (9,815)	4% (14%)	7,825 (9,930)	10,930 (11,470)	40% (16%)
Exit 31 to Exit 30	8,385 (9,650)	8,780 (11,345)	5% (18%)	8,780 (10,135)	11,715 (10,995)	33% (8%)
Exit 30 to Exit 28	8,940 (10,515)	9,650 (12,690)	8% (21%)	9,840 (10,425)	12,200 (10,800)	24% (4%)
Exit 28 to Exit 25	7,960 (9,550)	7,945 (10,145)	0% (6%)	8,900 (10,445)	10,915 (11,060)	23% (6%)
Exit 25 to Exit 23	9,505 (9,850)	10,005 (11,315)	5% (15%)	8,780 (11,295)	10,760 (11,970)	23% (6%)
Exit 23 to Exit 19	11,810 (10,155)	12,505 (11,905)	6% (17%)	9,560 (11,900)	12,120 (12,990)	27% (9%)
Exit 19 to Exit 18	11,680 (8,800)	11,595 (8,465)	-1% (-1%)	8,465 (11,785)	8,200 (14,140)	-3% (20%)
Exit 18 to Exit 16	12,985 (8,890)	12,745 (8,325)	-2% (-6%)	8,635 (12,760)	8,505 (13,825)	-2% (8%)
Exit 16 to Exit 13	15,775 (10,665)	14,525 (9,170)	-8% (-14%)	9,920 (16,025)	9,415 (15,590)	-5% (-3%)
Exit 13 to Exit 12	20,085 (15,255)	20,210 (15,360)	1% (1%)	13,985 (21,235)	13,850 (21,140)	-1% (0%)
Exit 12 to Exit 11	20,955 (15,835)	21,020 (16,165)	0% (2%)	14,380 (22,015)	14,445 (21,645)	0% (-2%)
I-77 Corridor Average	10,975 (9,710)	11,285 (10,460)	3% (8%)	8,960 (12,185)	10,450 (13,015)	17% (7%)
I-277						
I-77 to Graham	11,105 (11,675)	10,470 (11,580)	-6% (-1%)	13,740 (15,700)	13,150 (14,455)	-4% (-8%)
Graham to Church	10,025 (10,890)	9,605 (10,985)	-4% (1%)	12,575 (14,455)	12,185 (13,355)	-3% (-8%)
Church to College	7,415 (8,875)	6,990 (9,125)	-6% (3%)	11,030 (12,270)	10,720 (11,210)	-3% (-9%)

Table 2-3: Comparison of 2012 Existing and 2017 No-Build Peak Period Volumes

Location	Southbound / Inner loop			Northbound / Outer loop		
	2012 Existing	2017 No-Build	Percent Change	2012 Existing	2017 No-Build	Percent Change
College to Caldwell	5,690 (6,105)	5,455 (6,400)	-4% (5%)	12,125 (13,210)	12,180 (12,340)	0% (-7%)
East of Caldwell	7,450 (7,545)	7,370 (8,050)	-1% (7%)	8,875 (10,285)	8,970 (9,445)	1% (-8%)
I-277 Corridor Average	8,335 (9,020)	7,980 (9,230)	-4% (2%)	11,670 (13,185)	11,440 (12,160)	-2% (-8%)

Note: AM Peak (PM Peak)

2.9.2 Peak Period Traffic Operations

Measures of Effectiveness (MOE) were selected to evaluate the mobility of the I-77 corridor and make comparisons between existing conditions and the No-Build Alternative. The MOEs used to evaluate the overall corridor performance are vehicle miles traveled (VMT) and average speed. Descriptions of the MOEs used in the evaluation are:

- Vehicle Miles Traveled (VMT) – Represents the total distance traveled in miles by all active and arrived vehicles during the peak period. Alternatives with higher VMT represent a benefit to mobility as more vehicles are able to travel greater distances. VMT is a direct model output for the entire analyzed network.
- Average Speed – Represents the average speed in miles per hour (mph) for vehicles on the I-77 mainline from north of NC 150 (Plaza Drive, Exit 36) to south of I-277 (Brookshire Freeway, Exit 11), I-277 mainline from Brevard Street to I-77, and the ramps to/from I-77 to the north and I-277 to the east. Alternatives with a higher average speed represent a benefit to mobility as vehicles are able to get to their destination in less time. Average speed is shown for all vehicles, general purpose vehicles, and HOV / HOT vehicles. Average speed is a direct model output for each link of the corridor. A corridor average speed was calculated by first determining a travel time for each link based on the model output average speed and link length. The sum of link travel times was divided by the overall corridor length to determine the corridor average speed.

The Year 2012 Existing condition is summarized in **Table 2-4**, and was analyzed to provide an assessment of existing conditions. This scenario assumed no modifications to the existing roadway, and no tolling of the existing single HOV lane in each direction. **Table 2-4** also includes a summary of the 2017 No-Build scenario to provide an assessment of the anticipated conditions in the design year without modifications to the existing I-77 and I-277 corridors except for committed STIP projects. To determine reasonably foreseeable transportation projects, fiscally constrained transportation projects were identified from NCDOT's 2012-2018 State Transportation Improvement Program (STIP) and MUMPOs currently approved LRTP and TIP. Currently unfunded transportation projects identified in the STIP were not considered reasonably foreseeable. However, because the design year for this project is 2017, only projects where construction is anticipated to be complete by 2017 were included in the analysis. The 2017 No-Build scenario assumed no tolling of the existing single HOV lane in each direction.

The traffic analysis methodology is in accordance with the NCDOT Congestion Management's Capacity Analysis Guidelines (January 2012). Freeway network analysis for these scenarios was performed using VISSIM.

Table 2-4: Existing (2012) and 2017 No-Build Peak Period Results

Comparison of AM Peak Period Network MOE	2012 Existing	2017 No-Build
Vehicles Miles Traveled (VMT) [mi]	667,405	704,164
	-(5.2%)	-
I-77 Southbound / I-277 Inner		
Average Speed [All Vehicles] [mph]	58.2	46.7
	(24.7%)	-
Average Speed [General Purpose Vehicles] [mph]	58.2	46.7
	(24.7%)	-
Average Speed [HOV/HOT Vehicles] [mph]	58.6	46.9
	(25.0%)	-
I-77 Northbound / I-277 Outer		
Average Speed [All Vehicles] [mph]	63.4	54.9
	(15.4%)	-
Average Speed [General Purpose Vehicles] [mph]	63.4	54.9
	(15.3%)	-
Average Speed [HOV/HOT Vehicles] [mph]	63.7	55.2
	(15.4%)	-
Comparison of PM Peak Period Network MOE	**2012 Existing**	**2017 No-Build**
Vehicles Miles Traveled (VMT) [mi]	725,136	744,049
	-(2.5%)	-
I-77 Southbound / I-277 Inner		
Average Speed [All Vehicles] [mph]	60.8	51.3
	(18.6%)	-
Average Speed [General Purpose Vehicles] [mph]	60.8	51.3
	(18.6%)	-
Average Speed [HOV/HOT Vehicles] [mph]	61.1	51.5
	(18.7%)	-
I-77 Northbound / I-277 Outer		
Average Speed [All Vehicles] [mph]	59.5	56.0
	(6.2%)	-
Average Speed [General Purpose Vehicles] [mph]	59.5	56.0
	(6.2%)	-
Average Speed [HOV/HOT Vehicles] [mph]	59.9	56.4
	(6.1%)	-

Note: The percentage in parentheses is percent change compared with the 2017 No-Build Alternative.

3 ALTERNATIVES

A No-Build Alternative and three Build alternatives are evaluated in this EA. As discussed in **Section 3.5**, the Preferred Alternative is Build Alternative 2.

3.1 No-Build Alternative

The No-Build Alternative represents the I-77 corridor without the proposed project. Under the No-Build Alternative, the only improvements that would be made to I-77 within the project limits through the design year 2017 would be implementation of STIP Project I-3311E. Project I-3311E is the widening of existing lanes and shoulders of I-77 southbound between I-277 (Brookshire Freeway) and I-85, which was a commitment made when Project I-3311A was constructed (see **Section 1.3**). The existing southbound lanes (general purpose and HOV) would be widened from 11 feet to 12 feet under I-3311E. The potential impacts of Project I-3311E are discussed in **Chapter 5**.

As stated in **Section 2.2**, the purpose of the proposed project is to provide immediate travel time reliability along I-77 from Uptown Charlotte to the Lake Norman area. The No-Build Alternative would not meet the project's purpose and need. However, in accordance with the National Environmental Policy Act (NEPA) (40 CFR 1502.14(d)) and FHWA guidance (Technical Advisory T 6640.8A; p. 16), the No-Build Alternative is given full consideration in this EA to provide a baseline for comparison with the Build Alternatives.

Future planned improvements to I-77 identified in NCDOT's 2012-2018 STIP and MUMPO's 2012-2018 TIP (amended May 22, 2013) that may be constructed in the future beyond 2017 include:

- I-4733 – I-77/SR 5544 (West Catawba Avenue) in Cornelius. Modify interchange (construction in FY2013; coordinate with I-4750).
- I-4750 – I-77, SR 5544 (West Catawba Avenue – Exit 28) to I-40. Widen and reconstruct roadway. New travel lanes would be general purpose lanes.
    - I-4750A – I-77, SR 5544 (West Catawba Avenue – Exit 28) to US 21 (Exit 33) in Iredell County.
    - I-4750B – I-77, US 21 (Exit 33) to NC 115/US 21 (Exit 42) in Iredell County. Widen and reconstruct roadway (anticipated construction in FY 2023 and beyond).
    - I-4750C – I-77, NC 115/US 21 (Exit 42) to I-40 in Iredell County. Widen and reconstruct roadway (construction beyond FY 2023).

Implementation of these future planned projects listed above will not address the project purpose to provide immediate (by design year 2017) travel time reliability along I-77 from Uptown Charlotte to the Lake Norman Area. I-3311E as currently proposed would only widen the existing southbound lanes from I-85 to I-277, and would not provide any additional capacity to relieve existing congestion. All sections of the I-4750 project are not scheduled for construction until 2020 and beyond.

3.2 Build Alternatives

The proposed project consists of providing HOT lanes along I-77 from I-277 (Brookshire Freeway-Exit 11) to NC 150 (Exit 36) and along I-277 from I-77 to N. Brevard Street. There are three Build Alternatives considered in this EA: Build Alternative 1, Build Alternative 2, and Build Alternative 3. The differences between the Build Alternatives are the number of HOT lanes provided along various sections of I-77. The Build Alternatives are summarized in **Table 3-1** and described below.

General Description

Table 3-1 summarizes the main elements of the three build alternatives. All Build Alternatives under consideration include the conversion of the existing HOV lanes within the project limits to HOT lanes, as noted in **Table 3-1**. Under all Build Alternatives, the HOT lanes would be the center lanes of I-77, with the outer lanes serving as general purpose lanes. The HOT lanes are proposed to be separated from the general purpose lanes by a 4-foot buffer. The Build Alternatives also would require replacement/reconstruction of some cross-street bridges over I-77 and I-277, as described later in this section. The number of HOT lanes listed in **Table 3-1** includes the converted HOV lanes.

The improvements for all of the Build Alternatives north of I-85 will be within the existing right of way, with work being done primarily in the median. Additional right of way will be required south of I-85 under Build Alternatives 1 and 2, but not Build Alternative 3.

Build Alternative 1. This alternative will convert the existing HOV lanes within the project limits to HOT lanes (southbound between I-277 [Brookshire Freeway] and Hambright Road, and northbound from I-85 to I-485). One new HOT lane would be constructed for northbound travel between I-277 (Brookshire Freeway) and I-85. An additional HOT lane in each direction would be constructed in the median between I-85 and Catawba Avenue (Exit 28). One new HOT lane would be constructed in the median in each direction between Catawba Avenue (Exit 28) and NC 150 (Exit 36). One HOT lane would be built in each direction on I-277 from I-77 to N. Brevard Street. A new direct connection flyover bridge for the HOT lanes would be provided from I-77 to I-277. One new bridge will be constructed to carry northbound HOT traffic over I-85 and southbound I-77.

A total of six bridges would be replaced under this alternative, including Hamilton Street over I-277, and the following bridges over I-77: Oaklawn Avenue, Lasalle Street, Hambright Road, Westmoreland Road, and Griffith Street. Additional right of way will be required south of I-85. Alternative 1 provides the proposed lane and shoulder widening identified in STIP Project I-3311E.

In summary, one HOT lane would be provided in each direction between I-277 (Brookshire Freeway) and I-85 (Exit 13); two HOT lanes will be provided in each direction between I-85 (Exit 13) and Catawba Avenue (Exit 28), and one HOT lane in each direction between Catawba Avenue (Exit 28) and NC 150 (Exit 36).

Build Alternative 2. This alternative is the same as Alternative 1, except that an additional HOT lane would be constructed in each direction from I-277 (Brookshire Freeway) to I-85, for a total of two HOT lanes in each direction on I-77 between I-277 and I-85. In summary, this alternative would provide two HOT lanes in each direction from I-277 (Brookshire Freeway-Exit 11) to Catawba Avenue (Exit 28) and one HOT lane in each direction between Catawba Avenue (Exit 28) and NC 150 (Exit 36). Alternative 2 provides the proposed lane and shoulder widening identified in STIP Project I-3311E.

Build Alternative 3. This alternative includes the same elements north of I-85 that are in Alternatives 1 and 2. Namely, two HOT lanes in each direction from I-85 (Exit 13) north to Catawba Avenue (Exit 28), one HOT lane in each direction from Catawba Avenue (Exit 28) north to NC 150 (Exit 36), and the replacement of three bridges over I-77 at Hambright Road, Westmoreland Road, and Griffith Street. South of I-85, the existing southbound HOV lane would be converted to HOT and no HOT lane would be added for northbound travel.

Alternative 3 does not provide the lane and shoulder widening improvements identified in STIP Project I-3311E. STIP Project I-3311E would be built as a separate project if Alternative 3 is implemented. The potential impacts of Project I-3311E are discussed in **Chapter 5.**

Table 3-1. Build Alternatives

Interstate Section (south to north)	Build Alternative 1	Build Alternative 2	Build Alternative 3
I-77 I-277 (Brookshire Freeway) to just north of I-85 (Exit 13)	1 HOT lane in each direction **Including:** SB – convert existing HOV lane to HOT NB – add one new HOT lane (includes new bridge over I-85 and SB I-77 for the HOT lane)	2 HOT lanes in each direction **Including:** SB – convert existing HOV lane to HOT and add a second lane NB – add two new HOT lanes (includes new bridge over I-85 and SB I-77 for the HOT lanes)	1 HOT lane southbound **Including:** SB – convert existing HOV to HOT NB – no HOT lanes added
I-77 Just north of I-85 (Exit 13) to West Catawba Ave (Exit 28)	2 HOT lanes in each direction **Including:** SB – convert existing HOV lane to HOT and add one new HOT lane NB – convert existing HOV lane to HOT and add one new HOT lane	2 HOT lanes in each direction **Including:** SB – convert existing HOV lane to HOT and add one new HOT lane NB – convert existing HOV lane to HOT and add one new HOT lane	2 HOT lanes in each direction **Including:** SB – convert existing HOV lane to HOT and add a new HOT lane NB – convert existing HOV lane to HOT and add one new HOT lane
I-77 West Catawba Ave (Exit 28) to NC 150 (Exit 36)	1 HOT lane in each direction **Including:** SB – add one new HOT lane NB – add one new HOT lane	1 HOT lane in each direction **Including:** SB – add one new HOT lane NB – add one new HOT lane	1 HOT lane in each direction **Including:** SB – add one new HOT lane NB – add one new HOT lane
I-277 North Brevard St to I-77	1 HOT lane in each direction to connect (via a new bridge) to the I-77 HOT lanes. **Including:** EB – add one new HOT lane WB – add one new HOT lane	1 HOT lane in each direction to connect (via a new bridge) to the I-77 HOT lanes **Including:** EB – add one new HOT lane WB – add one new HOT lane	No improvements on I-277. There will be no direct connection to the I-77 HOT lanes from I-277
Bridge Replacement – cross-street bridges over I-77	Hamilton St Oaklawn Ave Lasalle St Hambright Rd Westmoreland St Griffith St	Hamilton St Oaklawn Ave Lasalle St Hambright Rd Westmoreland St Griffith St	Hambright Rd Westmoreland St Griffith St
Right of Way	Additional right of way is anticipated south of I-85 Additional right of way is not anticipated north of I-85	Additional right of way is anticipated south of I-85 Additional right of way is not anticipated north of I-85	All improvements constructed within existing right of way

SB – southbound NB – northbound EB – eastbound WB – westbound

Typical Cross-Sections

Proposed typical sections for I-77 and I-277 are shown on **Figures 4** through **6**. For the purposes of describing the proposed typical sections, the corridor is divided into the same sections previously discussed in **Section 2.8**, and changes from the existing typical are identified by alternative.

Section A. Section A is between I-277 and just north of I-85.

Alternative 1 – The lane configuration in Section A under Alternative 1 would continue to include four 12-foot general purpose lanes in the northbound direction and would increase the outside shoulder from a 10-foot paved shoulder to a 12-foot paved shoulder. The inside paved shoulder would be reduced from 15-feet to 10-feet. The existing HOV lane would be converted to a HOT lane which would be adjacent to the inside shoulder and separated from the general purpose lanes by a 4-foot buffer.

The four general purpose lanes in the southbound direction would be widened from 11-foot to 12-foot lanes, the outside shoulder would be widened from a 10-foot paved shoulder to a 12-foot paved shoulder, and the inside shoulder would increase from 6 feet to 10 feet. The existing 11-foot HOV lane would be widened to 12 feet and converted to an HOT lane. The HOT lane will continue to be separated from the general purpose lanes by a 4-foot buffer.

The northbound and southbound lanes will be separated by a 2-foot concrete median barrier.

Alternative 2 – The lane configuration in Section A under Alternative 2 is the same as Alternative 1, except an additional 12-foot HOT lane would be included in each direction (for a total of two HOT lanes in each direction) between the inside shoulder and the 4-foot buffer with the general purpose lanes.

Alternative 3 – The lane configuration in Section A under Alternative 3 would remain the same as existing conditions, except the existing southbound HOV lane would be restriped as an HOT lane.

Section B. Section B is between I-85 and Catawba Avenue (Exit 28). For all of the project alternatives, Section B would continue to have the same number of 12-foot wide general purpose lanes in each direction identified in **Section 2.8**. Existing HOV lanes in this section would be converted to HOT lanes and a total of two 12-foot HOT lanes would be provided in each direction between the inside shoulder and general purpose lanes. The HOT lanes and the general purpose lanes would be separated by a 4-foot buffer.

Section C. Section C is between Catawba Avenue (Exit 28) and NC 150 (Exit 36). For all of the project alternatives, Section C would continue to have two 12-foot general purpose lanes in each direction. One 12-foot HOT lane would be added in each direction, separated by a 4-foot buffer.

Replaced Bridges

Each of the three Build Alternatives includes the reconstruction of three bridges over I-77, located at Hambright Road (State Road [SR] 2117), Westmoreland Road (SR 2147), and at Griffith Street (SR 2158) (Exit 30) to provide sufficient horizontal clearance along I-77. In addition, for Build Alternatives 1 and 2, the bridges over I-77 at Oaklawn Avenue and Lasalle Street (Exit 12), and Hamilton Street over I-277, also would need to be replaced because the horizontal clearances of the existing bridges do not provide adequate width and they are not long enough to span the wider roadway cross section.

For the bridges at Hambright Road, Westmoreland Road, and Griffith Street (Exit 30), as currently planned, the existing bridges would be reconstructed on their existing alignment and to the same capacity, but sidewalks and bike lanes would be added on the side of each bridge, along with slightly wider travel lanes. Typical cross sections for these bridges are shown on **Figure 7**.

Although the bridge decks will be somewhat wider, it is anticipated that all three reconstructed bridges will not require any additional right of way. Because the number of lanes on each bridge will remain the same, there will be no increase in traffic capacity. There will be no impacts outside of the right of way, and no significant impacts associated with the reconstruction of these bridges. Should design changes or construction impacts differ from those currently anticipated, it may be necessary to undertake further analysis before the reconstruction of these bridges can commence.

As mentioned above, Build Alternatives 1 and 2 also would require the in-kind replacement of the bridges located at Hamilton Street, Oaklawn Avenue, and Lasalle Street. As currently planned, the existing bridges would be reconstructed to match their existing cross sections. Typical cross sections for these bridges are shown on **Figures 8 and 9.**

The footprints of the reconstructed bridges at Hamilton Street and Lasalle Street are not anticipated to change; therefore no significant impacts are associated with the reconstruction of these bridges.

The Oaklawn Avenue bridge will be reconstructed with improvements to the horizontal alignment of the bridge, which will result in impacts outside of the existing right of way, as discussed in **Chapter 5**. The design-build contractor will have the option to propose alternative bridge designs for these and other bridges along the proposed project. For example, the contractor may decide to provide for the possibility of future slip ramps to the proposed HOV/HOT lanes on I-77. This could require a wider design that would extend outside of the existing right of way, and could change traffic patterns on the bridges. Any additional expansion of structures beyond the right of way would need to be evaluated for compliance with NEPA before they could be approved.

Widened Bridges

Alternatives 1 and 2 will require the following bridges to be widened to accommodate the HOT lanes. Bridges on I-277 will be widened to the outside shoulder. Bridges on I-77 will be widened to the inside shoulder and median. Alternative 3 will only require widening of bridges on I-77.

- I-277
    - Over N. Brevard Street
    - Over abandoned rail corridor (between N. Brevard Street N. College Street)
    - Over N. College Street
    - Over N. Tryon Street
    - Over N. Church Street
    - Over N. Graham Street
    - Over NC Music Factory Blvd.
- I-77
    - Southbound I-77 over Northbound I-77
    - Northbound I-77 over I-85
    - Bridge over Dixon Branch (between Alexanderana Road and Hambright Road)
    - Southbound Bridge over Lake Norman
    - Northbound Bridge over Lake Norman

In summary, Alternatives 1 and 2 will each require 12 bridges to be widened. Alternative 3 will require five bridges to be widened.

New Bridges

Build Alternatives 1 & 2 will require a new flyover bridge for the northbound HOT lanes over I-85 southbound I-77 and a new bridge to connect the HOT lanes on I-77 to the HOT lanes on I-277. Build Alternative 3 will not require any new bridges.

3.3 Build Alternative Cost Estimates

The estimated costs for construction, right of way, and utilities for each build alternative are presented in **Table 3-2**. Cost estimates are based on the preliminary engineering designs included in **Appendix A** and are in current year (2013) dollars. Construction costs do not include tolling related equipment and assumed preliminary noise wall inclusion.

Table 3-2: Build Alternative Preliminary Cost Comparison

	Alternative 1	Alternative 2	Alternative 3
Construction[1,2]	$369,280,000	$386,910,000	$239,250,000
Right of way[3]	$5,980,000	$5,920,000	$0
Utilities[4]	$564,424	$664,288	$30,736
Total	$375,824,424	$393,494,288	$239,280,736

Source [1] Atkins (April 2013) [2] Construction costs do not include tolling related equipment [3] NCDOT (May 2013) [4] NCDOT (May 2013)

3.4 Traffic Analysis for the Build Alternatives

The development of the traffic estimates for this project is documented in the *Traffic Estimate Technical Memorandum (*RK&K, June 2013) and the *Supplemental to RK&K Traffic Estimate Technical Memorandum* (Atkins, June 2013), which are incorporated by reference. The traffic operations analysis was performed for five scenarios; the 2012 Existing condition, the 2017 No-Build Alternative, and the three Build Alternatives. The 2012 Existing condition and 2017 No-Build are summarized in **Section 2.9.2**. The analysis of the three Build Alternatives used the same Measures of Effectiveness defined in **Section 2.9.2**.

The analysis of the three Build Alternatives includes providing access to the HOT lanes at combined ingress and egress weave zones, also known as “open” access. The open access lengths and spacing between the access area and adjacent ramps are in accordance with the California Department of Transportation (CalTrans) Policy Directive issued on March 23, 2011 regarding managed lane design. All open areas have a minimum length of 2,000 feet and lane change distances of 800 feet between the beginning or end of the access area and the adjacent on- or off-ramp. Based on guidance from other HOT lane facilities in the country, HOT access points were spaced in order to maintain a minimum of four to five mile spacing on average through the corridor. Increasing the number of access points along the corridor causes more friction, becomes difficult to sign and is inefficient for collecting tolls.

The analysis was performed for the AM and PM peak three-hour period for each build alternative. The analysis included freeway network elements only and did not include ramp terminal intersections. The results of the analyses are summarized in **Table 3-3** and documented in the *Draft Traffic Operations Technical Memorandum* (Atkins, June 2013), which is incorporated by reference.

Table 3-3: 2017 No-Build and Build Alternative Peak Period Analysis Results

Comparison of AM Peak Period Network MOE*	Alternative			
	No-Build	1	2	3
Vehicles Miles Traveled (VMT) [mi]	704,164	763,907	767,165	726,213
	-	8.5%	8.9%	3.1%
I-77 Southbound / I-277 Inner				
Average Speed [All Vehicles] [mph]	46.7	57.8	57.5	53.5
	-	23.9%	23.3%	14.6%
Average Speed [General Purpose Vehicles] [mph]	46.7	55.7	55.0	51.2
	-	19.5%	18.0%	9.7%
Average Speed [HOV/HOT Vehicles] [mph]	46.9	64.0	64.2	62.7
	-	36.6%	36.9%	33.8%
I-77 Northbound / I-277 Outer				
Average Speed [All Vehicles] [mph]	54.9	63.8	63.8	63.7
	-	16.1%	16.1%	16.0%
Average Speed [General Purpose Vehicles] [mph]	54.9	63.5	63.5	63.5
	-	15.7%	15.7%	15.6%
Average Speed [HOV/HOT Vehicles] [mph]	55.2	65.0	65.2	64.8
	-	17.7%	18.0%	17.4%
Comparison of PM Peak Period Network MOE*	**Alternative**			
	No-Build	**Alt 1**	**Alt 2**	**Alt 3**
Vehicles Miles Traveled (VMT) [mi]	744,049	824,192	828,359	803,198
	-	10.8%	11.3%	7.9%
I-77 Southbound / I-277 Inner				
Average Speed [All Vehicles] [mph]	51.3	60.1	60.3	53.8
	-	17.2%	17.6%	4.9%
Average Speed [General Purpose Vehicles] [mph]	51.3	59.1	59.3	51.3
	-	15.3%	15.7%	0.0%
Average Speed [HOV/HOT Vehicles] [mph]	51.5	65.0	65.2	64.5
	-	26.3%	26.7%	25.3%
I-77 Northbound / I-277 Outer				
Average Speed [All Vehicles] [mph]	56.0	61.5	60.9	61.8
	-	9.8%	8.7%	10.4%
Average Speed [General Purpose Vehicles] [mph]	56.0	60.9	59.8	61.2
	-	8.7%	6.8%	9.3%
Average Speed [HOV/HOT Vehicles] [mph]	56.4	63.5	63.5	63.3
	-	12.6%	12.6%	12.1%

*Percentage is percent change compared with the 2017 No-Build Alternative

3.5 Preferred Alternative

Based on the information available to date, Alternative 2 is NCDOT's Preferred Alternative. It should be noted this is not a final decision. After the EA comment period ends, FHWA and NCDOT will either 1) decide to prepare an EIS, or 2) identify a Selected Alternative and prepare a Finding of No Significant Impact (FONSI). In making this decision, FHWA and NCDOT will consider agency and public comments on this EA, comments received at the public hearing, and input from local transportation planning agencies and state and federal environmental resource and regulatory agencies.

A comparison of the impacts of the Build Alternatives is presented in **Table 3-4**. The resources in the table are organized in the order they are presented in this EA, not in order of importance. Farmland and mineral resources are not included in the table because these resources are not present in the project study area. Indirect and cumulative effects and construction impacts are the same for any alternative and would not be significant, and therefore they are also not listed in the table, but are discussed in **Sections 5.5** and **5.6**, respectively.

Table 3-4: Comparison of Build Alternative Impacts

Resource	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Total Cost (2013 dollars)	$375,824,424	$393,494,288	$239,280,736
Human Environment			
Transportation & Land Use Plans	Consistent	Consistent	Consistent
Relocations - Residential	7	7	0
Relocations - Business	3	3	0
Communities and Neighborhoods	Positive effect due to travel time savings offered by the HOT lanes; minor impact due to right-of-way acquisition	Positive effect due to travel time savings offered by the HOT lanes; minor impact due to right-of-way acquisition	Positive effect due to travel time savings offered by the HOT lanes; minor impact due to right-of-way acquisition
Environmental Justice	Relocation impacts on EJ populations are disproportionately high but minor. Resulting community impacts offset by existing Oaklawn Ave. bridge remaining open while new bridge is constructed.	Relocation impacts on EJ populations are disproportionately high but minor. Resulting community impacts offset by existing Oaklawn Ave. bridge remaining open while new bridge is constructed.	No disproportionately high and adverse impacts
Community Services and Public Health and Safety	Temporary indirect impacts to CATS bus service routes that operate on I-77 and emergency services response times during construction.	Temporary indirect impacts to CATS bus service routes that operate on I-77 and emergency services response times during construction.	Temporary indirect impacts to CATS bus service routes that operate on I-77 and emergency services response times during construction.
Section 4(f) and Section 6(f) Resources	No impact.	No impact.	No impact.
Economic Effects	Temporary economic benefits during construction (construction jobs and boost to local businesses); travel delays during construction may have temporary impact on businesses adjacent to I-77; long-term benefits to the local and regional transportation network from enhanced mobility, reliable travel times, and reduced fuel costs		

Table 3-4: Comparison of Build Alternative Impacts

Resource	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Physical Environment			
Noise	Approximately 679 receptors impacted by noise before mitigation. Approximately 484 noise-impacted receptors and an additional 405 noise-sensitive receptors would benefit from 21 preliminary feasible and reasonable noise barriers. Minor impact	Approximately 695 receptors impacted by noise before mitigation. Approximately 500 noise-impacted receptors and an additional 393 noise-sensitive receptors would benefit from 21 preliminary feasible and reasonable noise barriers. Minor impact	Approximately 504[2] receptors impacted by noise before mitigation. Approximately 368 noise-impacted receptors and an additional 395 noise-sensitive receptors would benefit from 19 preliminary feasible and reasonable noise barriers. Minor impact
Air Quality	No impact.	No impact.	No impact.
Utilities	Low impact	Low impact	Low impact
Visual	Minor changes in the visual landscape will occur, including noise barriers and two new bridges.	Minor changes in the visual landscape will occur, including noise barriers and two new bridges.	Minor changes in the visual landscape will occur, including noise barriers.
Hazardous Materials	Low potential for impact	Low potential for impact	Low potential for impact
Floodplains	Existing culverts will be extended, new culverts are proposed, and future supplemental drainage structures are recommended.	Existing culverts will be extended, new culverts are proposed, and future supplemental drainage structures are recommended.	Existing culverts will be extended, new culverts are proposed, and future supplemental drainage structures are recommended.
Cultural Resources			
Historic Architecture	No adverse effect. No historic properties will be impacted. Noise barriers may be constructed adjacent to three of the five historic districts identified in the project study area.		
Archaeological	No impact.	No impact.	No impact.
Natural Environment			
Biotic Communities and Wildlife	No adverse effect. No historic properties will be impacted. Noise barriers may be constructed adjacent to three of the five historic districts identified in the project study area.		
Water Quality	Short-term impacts such as sedimentation and turbidity, can be anticipated from construction-related activities, but will be minimized through use of Best Management Practices (BMPs). No harmful effects to the groundwater system are expected.		
Wetlands	0.007 acre (305 sq ft) impacted.	0.007 acre (305 sq ft) impacted.	0.007 acre (305 sq ft) impacted.
Ponds	0.016 acre impacted.	0.016 acre impacted.	0.016 acre impacted.
Streams	2,925 linear feet impacted.	3,237 linear feet impacted.	1,072 linear feet impacted.

[2] The design limits for Alternative 3 do not include improvements along I-277; therefore, the number of existing noise impacts for Alternative 3 does not include receptors along I-277.

Table 3-4: Comparison of Build Alternative Impacts

Resource	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Catawba River Riparian Buffer	Total estimated impacts from all encroachment into Zone 1 is 47,916 square feet (1.1 acres). Total estimated impacts from all encroachment into Zone 2 is 135,036 square feet (3.1 acres).		
Protected Species	No Effect	No Effect	No Effect

Build Alternative 2 is the Preferred Alternative, for the reasons described below. For many resources, there are no adverse effects or the same effects for all the alternatives (**Table 3-4**). These were not differentiators in identifying the Preferred Alternative.

From I-85 to NC 150 (Exit 36), all three alternatives are identical with the addition of two HOT lanes in each direction from I-85 to West Catawba Avenue (Exit 28) and one HOT lane in each direction from West Catawba Avenue (Exit 28) to NC 150 (Exit 36). Variations in resource impacts between the three Build Alternatives occur in the portion of the project from I-277 (Brookshire Freeway) to I-85; which is anticipated to be the most heavily travelled portion of the project corridor. This portion of I-77 currently experiences significant delays, and these delays are anticipated to increase in the future. While both Build Alternatives 1 and 2 would provide guaranteed travel time in both the northbound and southbound directions, Build Alternative 2 would provide double the HOT lane capacity over Alternative 1, while increasing project costs by less than 5 percent. This added capacity would allow for the continued flow of HOT traffic in the event of an accident or vehicle breakdown. Build Alternative 3 would not provide any new capacity south of I-85. While Build Alternative 3 does result in the least amount of stream impacts and relocations, the cumulative effects associated with Project I-3311E as described in **Section 5.5** should also be considered; thus negating any benefits of selecting this alternative.

4 AFFECTED ENVIRONMENT

The existing conditions within the project study area related to the human, physical, cultural, and natural environments are described in this chapter. The potential impacts of the project to these resources are discussed in **Chapter 5, Environmental Consequences**.

4.1 Human Environment

This section provides information on the following aspects of the existing human environment: land use, demographics (population, housing, and economic characteristics), community facilities and services, parklands, and Section 4(f)/6(f) resources. The sections below are based on the *Community Impact Assessment & Screening Indirect and Cumulative Effects Assessment* (Atkins, May 2013), prepared for the project (I-3311C, I-5405, and I-4750AA) and incorporated by reference.

4.1.1 Land Use

I-77 has influenced growth and land use patterns in the region since its construction in the 1970s. Development pressure has expanded north from Uptown Charlotte into the towns of Huntersville, Cornelius, Davidson, and Mooresville. General development trends along the I-77 project corridor consist of various densities of office, commercial, and industrial land uses surrounding interchanges, with various levels of single and multi-family residential developments located between interchanges and adjacent to the corridor. **Table 2-2** in **Section 2.5.3** provides a list of local and regional plans influencing growth and land use in the project corridor.

Municipalities traversed by the I-77 corridor, including Charlotte, Huntersville, Cornelius, Davidson, and Mooresville, have developed policy, district, and/or area plans to guide and manage growth in their respective planning areas, recognizing the importance of I-77 in land use and transportation planning. For example, the Town of Huntersville has undertaken small area land use plans for interchanges at I-77, including NC-73 (Sam Furr Road)(2006) and Gilead Road (2006). The purpose of these plans is to provide transportation infrastructure and land redevelopment recommendations that are mutually supportive and in alignment with the community's vision for its future.

The development of land use plans and small area plans by the municipalities in the project area demonstrates their commitment to managing and regulating growth within their jurisdictions, including along the I-77 project corridor. The regulation of growth in these areas will continue in accordance with adopted plans following construction of the proposed improvements to I-77.

4.1.2 Demographics

Data from the 2010 Census was used to characterize the existing demographic conditions in the project study area. A Demographic Study Area (DSA) was defined to determine demographic characteristics for the communities surrounding the project. It is the smallest statistical area of the 2010 Census that includes the project study area. The DSA for this project is comprised of 39 block groups (31 within Mecklenburg County and 8 within Iredell County), as shown on **Figure 10**. Demographic information is summarized below with additional detail included in **Appendix B – Demographic Tables**.

Population Trends

As noted in **Section 2.4**, the population of Mecklenburg County grew 32 percent from 2000 to 2010. The population of Iredell County increased 30 percent over this same time period.

North Mecklenburg County accounted for approximately 17 percent of the county's growth between 2000 and 2010. During this same period, the combined populations of Huntersville, Cornelius, and

Davidson grew 87 percent from 44,068 to 82,583, spurring residential development in these areas. Residential growth also has occurred at the southern end of the project area around the Johnson and Wales University campus and the NC Music Factory.

There are also block groups within the DSA that experienced decreases in population between 2000 and 2010. The majority of these block groups are located south of I-85 and include older urban neighborhoods. The largest decrease (45 percent) occurred in the combined block groups in Census Tract 50, primarily due to razing of the Double Oaks Apartments in approximately 2007. This area is planned for redevelopment by the Charlotte-Mecklenburg Housing Partnership.

Future population estimates obtained from the North Carolina Office of State Budget and Management for Mecklenburg and Iredell counties and the state are shown in **Table 4-1**. Future growth rates for the county and state are projected to be lower than the growth rates observed between 2000 and 2010. It is anticipated that growth rates in the DSA will continue to be higher than the state and county rates due to historical trends, the availability of vacant land, and planned growth as noted in local land use plans.

Table 4-1. Future Population Estimates

Geography	2010 Census Actual	July 2020		July 2030	
		Estimate	% Change 2010-2020	Estimate	% Change 2020-2030
Mecklenburg County	919,628	1,094,997	19.1%	1,266,537	15.7%
Iredell County	159,437	176,825	10.9%	193,885	9.6%
North Carolina	9,535,483	10,614,863	11.3%	11,629,559	9.6%

Source: US Census 2010 and NC Office of State Budget and Management (January 28, 2013)

Race/Ethnicity

Whites, African Americans, and Hispanics are the three largest racial/ethnic groups within the DSA. The non-white population of the DSA is equivalent to Mecklenburg County and greater than 20 percentage points higher when compared to Iredell County. Nearly 57 percent of the DSA's residents are white, 35 percent African American, and 10 percent Hispanic or Latino. Other racial groups comprising the remaining 8 percent of the DSA population include Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and Other.

The percentage of African Americans in the DSA (34.9 percent) is slightly higher than that of Mecklenburg County (30.8 percent) and notably higher (more than 10 percent higher) than Iredell County (11.9 percent). The DSA has 13 block groups with African American population concentrations of 57 percent or more. The majority (10) of these block groups are located south of I-85, as shown on **Figure 10**.

The percentage of the DSA's population that is Hispanic or Latino is nearly 10 percent, which is slightly less than the Mecklenburg County total of about 12 percent. However, one block group located near the Hambright Road crossing has a notably high concentration of Hispanic or Latinos at 23.4 percent, as shown on **Figure 10**.

Income/Poverty Status

According to the American Community Survey (ACS) 5-Year Estimate (2006-2010) data, the median household income for Mecklenburg County was $55,294 and for Iredell County it was $48,962. Slightly

more than half (21) of the 39 block groups in the DSA have median household incomes below the county median.

Based on ACS 5-year Estimates (2006-2010), the percentage of residents in the DSA living below the poverty level in 2010 (13.8 percent) was slightly higher than both Mecklenburg (12.5 percent) and Iredell counties (12.4 percent). The data revealed the presence of some areas in the DSA with populations having notably higher concentrations of persons living below the poverty level as compared to the county. The areas in the DSA with the highest percentages of residents living below the poverty level are located south of I-85. The location of these block groups is shown on **Figure 10**. Five block groups in the DSA, two in Huntersville, and three in Mooresville reported no residents living below the poverty level.

Limited English Proficiency

Executive Order 13166 "Improving Access to Services for Persons with Limited English Proficiency" requires all recipients of federal funds to provide meaningful access to persons who are limited in their English proficiency (LEP). The US Department of Justice defines LEP individuals as those "who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English" (67 FR 41459).

The DSA meets the US Department of Justice's Safe Harbor threshold requirement for presence of a LEP population, as identified in USDOT's *Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons* (2005). This guidance defines the threshold as either five percent of the total DSA adult population or 1,000 adult persons within a particular language group who speak English less than "Very Well." Data was used from the ACS 5-Year Estimates (2006-2010) to identify adults aged 18 or older who speak English less than "Very Well" by language group.

The Census data indicate the presence of a Spanish language group that exceeds the Safe Harbor threshold of 1,000 adult persons. In accordance with the Safe Harbor provisions, written translations of vital documents may be provided for the LEP language group in addition to other measures assuring meaningful access. These other measures include notice of Right of Language Access for future meetings for this project and use of interpreters when deemed warranted for meaningful public participation. These measures comply with Executive Order 13166.

Business/Employment

According to the MUMPO *2035 LRTP*, the MUMPO planning area accounted for an estimated 65 percent of the jobs in the Piedmont region of south central North Carolina in 2005. Mecklenburg County, including the City of Charlotte, contains over 93 percent of the total jobs in the MUMPO planning area. Charlotte is, and will continue to be, the economic engine of the MUMPO planning area, as well as the broader region. Employment in Mecklenburg County is projected to grow substantially, from roughly 610,000 jobs estimated in 2005 to roughly 1.1 million jobs in 2035, a 74 percent increase (MUMPO, 2010).

According to MUMPO, areas in and near the northern towns, (particularly along I-77 and I-485) are expected to show significant employment increases as well, and at some of those locations this will result in relatively high employment densities by 2035. Huntersville, Davidson, and Cornelius are each projected to at least double their employment by 2035 (MUMPO, 2010).

The I-77 corridor is, and will remain, critical for regional commerce and commuters, with the personal automobile the primary mode for commuters. According to the 2010 US Census, approximately 81 percent of the working Mecklenburg County population drove alone to work, and approximately 13 percent carpooled. For Iredell County, approximately 88 percent of workers in the county drove alone

to work, and approximately 10 percent carpooled. Approximately 76 percent of workers in the DSA drove alone to work and 13 percent carpooled, as shown in **Table 4-2**.

Table 4-2: Means of Transportation to Work for Workers Age 16 and Over

Geography	Car, truck, or van - drove alone	Car, truck, or van - carpooled	Public transportation (excluding taxicab)	Taxicab, motorcycle, bicycle, walked, or other means
Mecklenburg County	80.9%	12.6%	3.5%	3.1%
Iredell County	87.9%	10.0%	0.4%	1.8%
Demographic Study Area	76.3%	13.2%	3.7%	6.8%

Source: US Census Bureau, ACS 5-Year Estimates (2006-2010), Table C08134, "Means of Transportation to Work by Travel Time to Work"

4.1.3 Community Resources and Services

Community resources located near the project study area are shown on the mapping provided in **Appendix A** (Sheets A-CC). Community resources were obtained from Mecklenburg County, NCDOT and ESRI GIS, NCONEMAP, and field reviews. As expected, the numbers of community facilities decrease outward from Uptown Charlotte and other urban centers. Community facilities shown on the mapping include the following:

- Churches/Cemeteries
- Schools and Colleges
- Hospitals and Medical Facilities/Health Centers
- Fire/Medic/Police Stations
- Libraries/Community Centers (note there are none adjacent to I-77 or I-277)
- Parks/Greenways and Recreation Areas

The following sections describe the community facilities located adjacent to the I-77 and I-277 right of way. The **Appendix A** map sheet where each resource is displayed is listed.

Churches and Cemeteries

- Elmwood and Pinewood Cemetery is located in the Third Ward neighborhood southeast of the I-77/I-277 interchange (Sheet D).
- North Pinewood Cemetery is in the Biddleville neighborhood southwest of the I-77/I-277 interchange (Sheet D).
- Oaklawn Cemetery is located west of I-77 and north of Oaklawn Avenue (Sheet E).
- There are several neighborhood churches adjacent to the corridor, including New Life Fellowship Center in the Double Oaks neighborhood (Sheet F); Cosmopolitan Community Church and Memorial Presbyterian Church in the Lincoln Heights neighborhood (Sheet H); Kingdom Builders Church in the JT Williams neighborhood (Sheet I); Williams Memorial Presbyterian Church and Wilson Church in the Slater Road/Hamilton Circle neighborhood (Sheet K); Grace Covenant Church in the Town of Cornelius (Sheet U); and Centre Presbyterian Church in the Town of Mooresville (Sheet Z).

Schools and Colleges

- Johnson C. Smith University is located southeast of the I-77 interchange with I-277 (Brookshire Freeway). It is a private liberal arts university with an approximate enrollment of 1,600 students (Sheet D).
- There are four schools located adjacent to the I-77 corridor. Irwin Academic Center, formerly known as the Villa Heights School, is a public school located in the Third Ward neighborhood (Sheet D). Lincoln Heights Academy is a public school located on Newcastle Street and currently operates as a school for special needs students (Sheets E and F). The former JT Williams Middle School located at 2400 Carmine Street is now operating as an alternative public school (Sheet G). Statesville Road Elementary School is located in the Slater Road/Hamilton Circle neighborhood (Sheet K).
- Strayer University is an accredited private university in Huntersville that offers undergraduate and graduate course work (Sheet R).

Hospitals and Medical Facilities/Health Centers

- Presbyterian Hospital Huntersville is located west of I-77 at 10030 Gilead Road (Sheet R) and provides a full range of medical services from outpatient radiology and laboratory tests to emergency surgery and maternity services. The 50-bed facility opened in October 2004 and includes an emergency department, five operating rooms, 36 medical-surgical beds, four intensive care unit beds, eight labor-delivery-postpartum beds and two nursery beds.
- A private medical office, Charlotte Obstetric and Gynecologic Associates Huntersville facility, is located at 16455 Statesville Road (Sheet T).
- The Lake Norman Regional Medical Center is located near the I-77 and Langtree Road interchange. This center provides clinical care with a 123-bed hospital, orthopedic specialty center, an outpatient surgery center, comprehensive women's center, a surgical center for weight loss, and four medical office buildings (Sheet Z).

Fire/Medic/Police

- The Mecklenburg County Jail North is located at 5235 Spector Drive, adjacent to I-77 north of Sunset Road (see Sheet L). The facility opened in 1994 and has capacity to house 614 inmates. Inmates at the facility are classified as minimum to medium security risk.

Parks, Greenways, and Recreation Areas

Existing public park and recreational facilities in the project study area are operated by Mecklenburg County Park and Recreation and include, from south to north:

- Biddleville Park is a 3.2-acre park, located at 500 Andrill Terrace in the McCrorey Heights neighborhood, and includes a softball field and half-court basketball court (Sheet D).
- Anita Stroud Neighborhood Park is a 6-acre park located at 2215 Double Oaks Road in the Double Oaks neighborhood and includes one half-court basketball court, picnic shelters, playground units, and a walking trail (Sheet E).
- Double Oaks Park is a 16-acre park located at 2605 Double Oaks Road in the Double Oaks neighborhood that includes a full basketball court and an outdoor swimming pool. The park also includes a small playground at the end of Newland Road. South of the playground is a large undeveloped area of the park with no existing park uses (Sheets E and F).

- Irwin Creek Greenway is located east of I-77 and south of I-277. It does not cross I-77. It is part of a 2.06-mile paved creekside walk in the center city area of Charlotte (Sheet D).
- McDowell Creek Greenway is a 1.5-mile paved trail that extends from Westmoreland Road to Sam Furr Road on the west side of I-77 and is part of the Carolina Thread Trail and the Lake Norman Bike Route (Sheet U).
- Six proposed greenways on the Mecklenburg County greenway map would cross I-77 in the project area. None of the proposed greenways are included in current financially-constrained plans.

Other recreational resources

- Lake Norman, located in the northern half of the study area, is a dammed portion of Catawba River. Lake Norman is part of the Catawba-Wateree Hydro Project operated by Duke Energy, and is also used for recreation. Constructed in 1963, Lake Norman is the largest man-made body of fresh water in North Carolina, with 520 miles of shoreline. I-77 runs along the eastern edge of Lake Norman (Sheets W – AA). The portion of Lake Norman east of I-77 and south of Griffith Street is locally known as Lake Davidson (Sheet W), and is heavily used for recreation. The Lake Norman YMCA is located on the eastern shore of Lake Davidson (21300 Davidson Street, Cornelius).

4.1.4 Section 4(f) and Section 6(f) Resources

Section 4(f) and Section 6(f) resources are afforded special protections from Federal actions. The names "Section 4(f) resources" and "Section 6(f) resources" are derived from the laws which establish these protections.

The Department of Transportation Act of 1966 (49 USC Section 303) regulates the use and taking of Section 4(f) resources for Federally-funded transportation projects. Section 4(f) resources include publicly-owned parks, recreation areas, and wildlife and waterfowl refuges as well as significant historic sites under public or private ownership.

The Land and Water Conservation Fund Act of 1965 established funding to provide matching cooperative agreement assistance to states and local governments for the planning, acquisition, and development of outdoor public recreation sites and facilities. Section 6(f) of the Act prohibits the conversion of property acquired or developed with these cooperative agreements to a non-recreational purpose without the approval of the Department of the Interior's National Park Service (NPS). Section 6(f) also requires that any applicable land converted to non-recreational uses be replaced with land of equal or greater value, location, and usefulness.

There are no Section 6(f) resources within the project study area. Section 4(f) resources located in the study area include Biddleville Park, Anita Stroud Park, Double Oaks Park and existing sections of Irwin Creek Greenway and McDowell Creek Greenway. Section 4(f) resources also include the historic resources on or eligible for listing on the National Register of Historic Places identified in **Section 4.3**.

4.2 Physical Environment

This section includes a description of noise, air quality, farmland, utilities, visual resources, hazardous materials, mineral and energy resources, and floodplains and floodways within the project study area.

4.2.1 Noise

This section is a summary of the following technical memoranda, incorporated by reference.

- I-3311C *Design Noise Report* (Atkins, June 2013)
- I-5405 *Design Noise Report* (Atkins, June 2012)
- I-5405 Draft Design Noise Report Addendum (Atkins, April 2013)
- I-4750 HOT Draft *Design Noise Report* (RK&K, April 2013)

Background

Noise is basically defined as unwanted sound. It is emitted from many natural and man-made sources. Highway traffic noise is usually a composite of noises from engine exhaust, drive train, and tire-roadway interaction.

The magnitude of noise is usually described by a common unit of reference called the "decibel" (dB). The A-weighted decibel scale is used almost exclusively when measuring vehicle noise because it places an emphasis on the frequency range to which the human ear is most sensitive (1,000–6,000 Hertz). Sound levels that are measured using the A-weighted decibel scale are written as dB(A).

Noise Abatement Criteria

The FHWA has established Noise Abatement Criteria (NAC) and procedures to be used in the planning and design of highways. The FHWA NAC are presented in **Table 4-3**. As shown in the table, the NAC are divided into Activity Categories depending upon different sensitivities to noise. Most land uses in the project area are in Activity Categories B and C.

Table 4-3. Noise Abatement Criteria

Activity Category	Activity Criteria[1] $L_{eq(h)}$[2]	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	67	Exterior	Residential
C[3]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section4(f) sites, schools, television studios, trails, and trail crossings
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[3]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted

1. The $L_{eq(h)}$ Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
2. The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with $L_{eq(h)}$ being the hourly value of L_{eq}.
3. Includes undeveloped lands permitted for this activity category.

Noise mitigation measures must be considered when future noise levels either approach or exceed the NAC levels, or if there are substantial increases over existing noise levels. The definitions of approach and substantial increase are determined by each state. NCDOT defines approach as within 1 decibel of the NAC. NCDOT definitions for "substantial increases" are presented in **Table 4-4**.

Title 23 CFR Section 772.11(a) states, "In determining and abating traffic noise impacts, primary consideration is to be given to exterior areas. Abatement will usually be necessary only where frequent human use occurs and a lowered noise level would be of benefit."

Table 4-4. NCDOT Definition of Substantial Increase in Noise Levels

Existing Average Noise Level dB(A) Leq(hour)	Increase (in decibels) from Existing Noise Levels to Future Noise Levels Defined as a Substantial Increase
≥55	10 or more
54	11 or more
53	12 or more
52	13 or more
51	14 or more
≤50	15 or more

Source: *Traffic Noise Abatement Policy* (NCDOT, 2004).

Existing Noise Walls along Project Corridor

North of I-85, there are two noise walls located between Cindy Lane and Sunset Road, one on either side of I-77 (**Appendix A**, Sheets K and L). The noise wall west of I-77 is located along the shoulder near Hamilton Oaks Court and Hamilton Circle and ranges in approximate height from 9 feet to 16 feet. The noise wall east of I-77 is located along the shoulder and cut slope near Juniper Drive. This sound barrier ranges in approximate height from 6 feet to 14 feet.

South of I-85, there are brick walls, approximately 11 feet in height, located along the right of way line on both sides of I-77 (**Appendix A**, Sheets D through H). These walls were constructed as privacy walls, not as sound barriers.

Existing Noise Impacts

Traffic noise and temporary construction noise can be a consequence of transportation projects, especially in areas near high-volume and high-speed existing steady-state traffic noise sources. The traffic noise analyses utilized the FHWA Traffic Noise Model software (TNM 2.5), validated to field-collected traffic noise monitoring data, to predict existing and future noise levels at all noise-sensitive receptors potentially impacted by noise in the project area. According to the traffic noise analyses, existing traffic noise impacts 522 receptors in the vicinity of the proposed project.

Noise impacts associated with the proposed project are presented in **Section 5.2.1**.

4.2.2 Air Quality

Air quality is evaluated in the *Microscale Carbon Monoxide and Mobile Source Air Toxics Air Quality Analysis, I-77 HOV-HOT Conversion* (Kimley-Horn and Associates, June 2013). Existing conditions are summarized below.

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), ozone (O_3), lead (Pb), particulate matter (PM), and sulfur dioxide (SO_2) (EPA Web site: www.epa.gov/air/criteria.html). 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; 42 USC 7409). 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 project is located in Mecklenburg County and southern Iredell County, which are both within the Metrolina nonattainment area for ozone (O3) and the Charlotte nonattainment area for carbon monoxide (CO) as defined by the EPA. The Metrolina area was designated moderate nonattainment for O3 under the eight-hour ozone standard effective June 15, 2004. A revised eight-hour ozone standard was declared in 2008 and went into effect on July 20, 2012. The 1990 Clean Air Act Amendments (CAAA) designated the Charlotte area as moderate nonattainment area for CO. However, due to improved monitoring data, the Charlotte area was re-designated as maintenance for CO on September 18, 1995. The region is in attainment of the NAAQS for nitrogen dioxide, lead particulate matter, and sulfur dioxide (EPA Web site: http://www.epa.gov/oaqps001/greenbk).

Transportation Conformity

Section 176(c) of the CAAA requires that transportation plans, programs, and projects conform to the intent of the state air quality implementation plan (SIP). The current SIP does not contain any transportation control measures for Mecklenburg County. The MUMPO 2035 LRTP and 2012-2018 TIP conform to the intent of the SIP. The MUMPO 2035 LRTP and 2012-2018 TIP were amended on May 22, 2013. The USDOT made a conformity determination on the MUMPO 2035 LRTP Amendment/FY 2012-2018 TIP Amendment on May 31, 2013. The current conformity determination includes Build Alternative 2 and is consistent with the final conformity rule found in 40 CFR Parts 51and 93.

Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the CAAA of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (http://www.epa.gov/iris/). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are acrolein, benzene, 1, 3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics (MSAT), the list is subject to change and may be adjusted in consideration of future EPA rules. The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines.

According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in **Exhibit 1**.

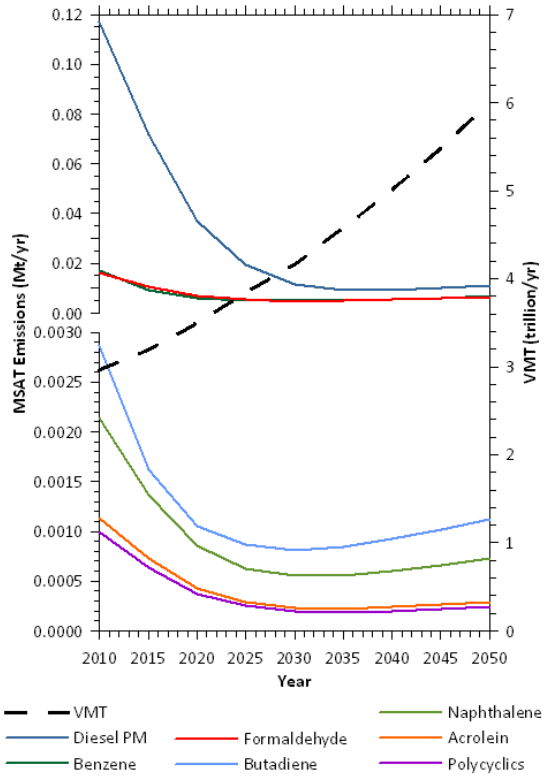

Exhibit 1: National MSAT Emission Trends 1999 – 2050, for Vehicles Operating On Roadways Using EPA's MOVES 2010b Model.

Source: EPA MOVES201b model runs conducted during May – June 2012 by FHWA.

4.2.3 Farmland

The Farmland Protection Policy Act (FPPA) of 1981 (CFR Part 658) requires all federal agencies to consider the impact of their activities on prime, unique, statewide, and locally important farmland soils, as defined by the US Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (Public Law 97-98, Subtitle 1, Section 1540). Adherence to the FPPA is required unless certain conditions are met, one of which is that the project is within an urban area as defined by the US Census. The entire project study area is recognized by the US Census Bureau as an urban area, and therefore is not subject to the Farmland Protection Policy Act.

4.2.4 Utilities

Information about existing utilities was obtained through field review and data available from the Charlotte-Mecklenburg County GIS department. Identified utility services along the project corridor include overhead power lines, natural gas pipelines, phone lines, and petroleum pipelines. Utility services identified during the data collection do not represent a comprehensive list of utilities within the study area. Additional utilities are likely to be identified in the project study area.

Underground utilities such as water and sewer also are likely to cross I-77. These utilities were not identified during the field review or review of available GIS information. Potential impacts to utilities are discussed in **Section 5.2.3**.

4.2.5 Visual Resources

The landscape of the I-77 corridor is typical of urban and suburban development. Visual resources travelers along I-77 experience include the unique scenic vistas of Uptown Charlotte and Lake Norman, and visually sensitive resources such as historic districts or properties. Historic resources are identified in **Section 4.3, Cultural Resources**.

4.2.6 Hazardous Materials

Known hazardous material sites of concern in the project study area were identified in three separate documents prepared by NCDOT's GeoEnvironmental Section or Atkins, listed below and incorporated by reference:

- *Hazardous Materials Report* (NCDOT, March 2013) (STIP Projects I-3311C, I-5405, and I-4750AA)
- *HazMat Review Project Memo* (Atkins, February 2012)(STIP Project I-5405)
- *Geotechnical Pre-Scoping Report* (NCDOT, November 2008) (STIP Project I-4750)

In addition to these reports, a GIS search was conducted by RK&K in October 2012 for STIP Project I-4750AA using the Registered Tanks Database (NC Division of Waste Management, 2012) and is also incorporated by reference.

Properties identified in these reports are, or may be, contaminated and therefore may result in potentially increased project costs and future liability if acquired by NCDOT. These properties may include active and abandoned underground storage tank sites, hazardous waste sites, regulated landfills and unregulated dumpsites. A search of appropriate environmental agencies' databases and Sanborn Maps was performed to assist in evaluating sites identified during the study.

The general findings from these three reports and one GIS investigation include:

- There are no Comprehensive Environmental Response, Compensation and Liability Information System (CERCLA) or associated National Priorities List (NPL) sites identified within the NCDOT right of way for the project study area.
- There are no Resource Conservation and Recovery Act (RCRA) generators located within a one-mile radius of the centerline of the project study corridor. There were no RCRA generator facilities identified within the NCDOT right of way for the project study area.
- The State Hazardous Waste Sites (SHWS) records did not identify any state hazardous waste sites within the right of way for the proposed project area.
- The Voluntary Cleanup Program (VCP) list, also known as Responsible Party Voluntary Action Sites (from the NCDENR) revealed that there are four VCP sites within the searched area. There were no VCP sites identified within the right of way for the proposed project area.

The hazardous materials investigations identified eleven sites that may contain petroleum underground storage tanks (USTs) within the project study area and one other geoenvironmental concern (auto body shop). It is anticipated that all twelve of these sites present a low geoenvironmental impact potential to the project. These identified sites, from south to north, include:

- **Mecklenburg County Maintenance Garage, 900 West 12th Street, Charlotte, NC 28202** – This facility currently operates as a maintenance facility. There are five tanks currently in use. Ten tanks have been removed between 1990 and 2009. There are two ground water incidents assigned to this facility. This site is currently being investigated under STIP# P-5002.
- **ADM Milling, 620 West 10th Street, Charlotte, NC 28202** – This facility currently operates as a grain processing plant. According to the UST Section Registry, three tanks were closed in 1991. There are three ground water incidents assigned to this facility. A tanker car buried for fuel storage is rumored to still be on site. This site is currently being investigated under STIP# P-5002 and further investigation may be warranted based on the results of this study.
- **Moores Body Shop, 825 North Graham Street, Charlotte, NC 28206** – This facility currently operates as a paint and body shop.
- **Quick n Easy Food Mart, 1327 Lasalle Street, Charlotte, NC 28216** – This facility operates as a convenience store/gas station. According to the UST Section Registry, there are five USTs currently in use. There is one ground water incident associated with this facility.

- **Xpress Mart 3, 1312 Lasalle Street, Charlotte, NC 28212** – This facility currently operates as a convenience store/gas station. According to the UST Section Registry, there are three USTs currently in use. There is one ground water incident associated with this facility.
- **AM Best Truck Stop, 4601 Sunset Road, Charlotte, NC 28216** – This facility currently operates as a convenience store/truck stop. According to the UST Section Registry, there are four USTs currently in use. There is one ground water incident associated with this facility.
- **Circle K # 1678, 5018 Sunset Road, Charlotte, NC 28213** – This facility currently operates as a convenience store/gas station. According to the UST Section Registry, there are four USTs currently in use. There is one ground water incident associated with this facility.
- **Quick Trip #1029, 4937 Sunset Road, Charlotte, NC 28269** – This facility currently operates as a convenience store/gas station. It is the former location of Jakes Redball/Charlotte 76 Truck Stop (0-014624). According to the UST Section Registry, there are four tanks assigned to the current owner and currently in use. The former facility had 16 tanks removed between 1988 and 2006, and there are two ground water incidents associated with the former facility.
- **Bowman Trucking Co, 12801 Mt. Holly-Huntersville Road, Huntersville, NC 28078** – This facility operates as a trucking company. According to the UST Section Registry, there are five USTs currently in use. There is one ground water incident associated with this facility.
- **Cashion's Quick Stop #3, 19733 Statesville Drive, Cornelius, NC 28031** – This facility currently operates as a convenience store/gas station. According to the UST Section Registry, there are five USTs currently in use. There are no ground water incidents associated with this facility.
- **Quality Mart, 391 West Plaza Avenue, Mooresville, NC 28115** – This facility currently operates as a convenience store/gas station. According to the UST Section Registry, there are four USTs currently in use. Three tanks were removed in 1990 and one tank removed in 1983. There are no ground water incidents associated with this facility.
- **Port City Exxon, 388 West Plaza Drive, Mooresville, NC 28115 (Facility ID # 0-032870)** – This facility operates as a convenience store and Exxon gas station. It is located in the northeast quadrant of the I-77 and NC 150 interchange. The tank bed and pump island are located 77 feet and 71 feet, respectively, from the NC 150 median. According to the UST Section registry, there are three tanks currently in use. No monitoring wells were observed. There is no other evidence of UST's or UST removal.

Six additional properties were identified near the project based on the October 2012 GIS search of the Registered Tanks Database, and are listed below:

- **Citgo/Allied Express, 20635 Catawba Avenue, Cornelius, NC 28031** – This facility operates as a convenience store and gas station. There are five tanks currently in use.
- **I-77 Texaco, 468 River Road/Hwy 150, Mooresville, NC 28117** – This facility operates as a convenience store and gas station. There are four tanks currently in use and four tanks previously removed.
- **Lakeside Food Mart, 843 Williamson Road, Mooresville, NC 28115** – This facility operates as a convenience store and gas station. There are three tanks currently in use.
- **Ruscho Food Store 19, 44 Davidson Gateway, Davidson, NC 28203** – This facility operates as a convenience store and gas station. There are two tanks currently in use.
- **Xpress Stop #2, 491 River Highway, Mooresville, NC 28117** – This facility operates as a convenience store and gas station. There are four tanks currently in use.

- **Yogi Mart #1, 861 Williamson Road, Mooresville, NC 28207** – This facility operates as a convenience store and gas station. There are four tanks currently in use.

The limited environmental screening conducted by Atkins in February 2012 (*Hazmat Review Project Memo,* February 2012) covered a one-mile radius of the centerline of the study corridor from I-277 north to Catawba Avenue (Exit 28) (Project I-5405) and identified the following sites with potential presence of contamination:

- One EPA Emergency Response Notification System (ERNS) site was identified within the NCDOT right of way for the project study area. The exact location is not known, but the approximate location was described as the intersection of I-77 and I-85. This ERNS site involved a release of approximately 50 gallons of diesel fuel on December 3, 1997 from a 1993 Volvo Semi that was run off the road and bobtailed, rupturing a fuel line. The local fire department responded and Hepeco conducted the cleanup of the spill.
- NCDENR's leaking underground storage tank (LUST) listing revealed one LUST facility within the NCDOT right of way for the proposed project. This site was identified as the former Dick Property located at 10301 Puckett Road in Huntersville (southwest quadrant of the I-77/I-485 interchange). Petroleum-contaminated soil was identified during the removal of a 550-gallon UST in October 2003. Contaminated soil was excavated from the site and over-excavation soil samples indicated the site was cleaned to below regulatory standards. The LUST case file for this site was closed by NCDENR.
- The NCDENR-maintained Incident Management Database (IMD) list of groundwater and/or soil contamination incidents indicated one site located within the right of way of the proposed project. This site was identified as Statesville Road and Alexanderana Road (northeast quadrant of the I-77/I-85 interchange). The incident was described as a used oil pit discovered in April 2004 during construction of I-485. Contaminated soil was removed from the site and confirmation samples indicated that the site was cleaned to state standards. The case file for this incident was closed by NCDENR.

Potential impacts to hazardous materials are discussed in **Section 5.2.5**.

4.2.7 Mineral and Energy Resources

The project study area does not contain mineral resources or quarries. There are no energy resource activities such as oil wells or mines in the project study area.

4.2.8 Floodplains and Floodways

Floodplain and floodway protection is required under several federal, state, and local laws, including Executive Order 11988, entitled "Floodplain Management," which requires federal agencies to avoid making modifications to and supporting development in floodplains wherever practical. Both Mecklenburg County and Iredell County participate in the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA).

There are 17 locations along the project corridor where I-77 crosses a stream located within a FEMA regulated special flood hazard area (SFHA), as shown in **Appendix A**.

4.3 Cultural Resources

Archaeological and historic architectural resources are protected by a variety of laws and their implementing regulations. The most notable of these are the National Historic Preservation Act (NHPA)

of 1966, as amended in 2001; the Archaeological and Historic Preservation Act of 1974; and the Archaeological Resources Protection Act (ARPA) of 1979. Treatment of archaeological and architectural resources for federal projects is also guided by Advisory Council on Historic Preservation regulations, Protection of Historic Properties (36 CFR 800).

Archaeological and architectural resources were identified according to the requirements of 36 CFR 800 and Section 106 of the NHPA, along with the environmental assessment process, to ensure full consideration of all possible impacts associated with the project.

The North Carolina Department of Cultural Resources State Historic Preservation Office (NC-HPO) was consulted regarding archaeological and historic architectural resources in the project study area. Separate investigations were conducted for each section of the project study area. Documentation supporting these investigations is listed below and incorporated by reference.

- Section A – I-77 from I-277 to just north of I-85 (Exit 13), and I-277
  - Historic Architecture - *Intensive Level Historic Architectural Analysis* (URS, December 2012)
  - Historic Architecture - NC-HPO Concurrence Letter (NC Department of Cultural Resources, January 31, 2013)
  - Archaeology - *Survey Required Form* (NCDOT, May 2, 2012)
  - Archaeology - NC-HPO Concurrence Letter (NC Department of Cultural Resources, October 30, 2012)
- Section B – I-77 from just north of I-85 (Exit 13) to West Catawba Avenue (Exit 28)
  - Historic Architecture - *No Survey Required Form* (NCDOT, December 22, 2011)
  - Archaeology - *No Survey Required Form* (NCDOT, December 2, 2011)
- Section C – I-77 from West Catawba Avenue (Exit 28) to NC 150 (Exit 36)
  - Historic Architecture - *No Historic Properties Present Form* (NCDOT, July 10, 2012)
  - Archaeology - *No Survey Required Form* (NCDOT, April 26, 2012)

4.3.1 Historic Architectural Resources

Historic resources in the project corridor are discussed below by section.

Section A and I-277

Section A and I-277 of the project corridor were investigated and summarized in the *Intensive-Level Historic Architectural Analysis* (URS, 2012). The investigation identified resources south of I-85 in Section A, as well as along I-277. The NC-HPO concurred in a letter dated January 31, 2013 that the seven resources identified in the analysis are eligible for listing in the National Register of Historic Places (NRHP). Agency correspondence is included in **Appendix C**. These resources are shown on the notable features maps included in **Appendix A.** They are all located adjacent to I-77 and I-277, and include:

- Orient Manufacturing Company/Chadwick-Hoskins No.3/Alpha Cotton Mill. The eligible historic building is located north of I-277 at the corner of East 12th Street and North Brevard Street (Sheet A), and is currently part of Alpha Mill Apartments. This building is listed under Criterion A for Industry and Criterion C for Architecture.
- Sears, Roebuck and Company Department Store. This eligible historic building is located to the south of I-277 at the corner of West 11th Street and North Tryon Street (Sheet A). It is currently owned by Mecklenburg County as office space. This building is eligible for listing under Criterion C for Architecture.

- Seaboard Historic District. This eligible historic district is located in the southwest quadrant of the North Graham Street underpass at I-277 (Sheet B). This district is eligible for listing under Criterion A for Industry and Criterion C for Engineering and Design.
- Elmwood and Pinewood Cemetery. This eligible historic district is located immediately to the east of I-77 between Trade Street (Exit 5) and I-277 (Brookshire Freeway) (Sheet D). This district is eligible for listing under Criterion A for Ethnic Heritage, Criterion C for Design, and meets Criterion Consideration D as a cemetery that derives its primary significance from age and distinctive design features.
- McCrorey Heights Historic District. This eligible historic district is located west of I-77 in the northwest quadrant of the I-77/I-277 (Brookshire Freeway) interchange (Sheet C). This district is eligible for listing under Criterion A for Ethnic Heritage and Criterion C for Architecture.
- Oaklawn Park Historic District. This eligible historic district is located west of I-77 between the Oaklawn Avenue overpass and Lasalle Street (Exit 12) (Sheet E). This district is eligible for listing under Criterion A for Ethnic Heritage and Criterion C for Architecture.
- Dalebrook Historic District. This eligible historic district is located west of I-77 in the southwest quadrant of the I-77/I-85 interchange (Sheets G and H). This district is eligible for listing under Criterion A for Ethnic Heritage and Criterion C for Architecture.

Detailed descriptions of these resources are included in the *Intensive-Level Historic Architectural Analysis* (URS, 2012). The eligibility concurrence of these resources was made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Section B

Section B of the project corridor was investigated in December 2011 by the Historic Architecture Group. The group conducted a review of the NC-HPO quad maps, Mecklenburg County tax data, relevant background reports, historic designations roster, and indexes for this project section's Area of Potential Effects (APE) from I-277 to Catawba Avenue (Exit 28). No existing cultural resources (historic architecture) were identified in the APE, which generally includes the existing I-77 right of way between I-277 (Brookshire Freeway) and West Catawba Avenue (Exit 28).

As a result, Section B of the project qualified for a "No Survey Required" under the 2007 Programmatic Agreement and no coordination is required with the NC-HPO. Documentation supporting this conclusion is located in **Appendix C**.

Section C

On April 27, 2012, NCDOT conducted a site visit to evaluate any potential historic architectural resources along Section C of the project. One National Register-listed site, Centre Presbyterian Church (ID 0014) is located at 129 Centre Church Rd, near Williamson Road (Exit 33). This church and cemetery are located more than 700 feet southeast of the Williamson Road interchange, and Fairview Road is located between the church property and I-77. As a result of proposed improvements remaining within the existing right of way, no historic properties will be affected. Documentation supporting this conclusion is located in **Appendix C**.

4.3.2 Archaeological Resources

Archaeological resources in the project corridor are discussed below by section.

Section A and I-277

A reconnaissance survey was conducted in April 2012 which identified that current soil conditions and topography in this section of the corridor do not suggest the presence of intact archaeological materials, historic or prehistoric. Nevertheless, the proposed realignment of Oaklawn Avenue and its bridge crossing I-77 will impact the front section of Oaklawn Cemetery. As a result, a survey was required for this section of the corridor. A ground-penetrating radar survey was conducted identifying one possible anomaly consistent with the expected signature of a historic-era grave on the Oaklawn Cemetery property. This anomaly is located outside of the current construction footprint of the proposed bridge replacement. However, if this area cannot be avoided, additional archaeological investigations will be necessary. Concurrence by the NC-HPO with this recommendation was made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for compliance with Section 106 codified at 36 CFR Part 800. Documentation supporting this conclusion is located in **Appendix C**.

Section B

As previously noted, Section B of the project corridor was investigated in December 2011 by NCDOT at the Office of State Archaeology(OSA). No existing cultural resources (historic architecture or archaeological resources) were identified in the APE. The review further found that the APE has "an extremely low potential for containing intact archaeological materials" and did not recommend any additional study for Section B of the project corridor. Documentation supporting this conclusion is located in **Appendix C**.

Section C

Section C of the project corridor was investigated by NCDOT on April 12, 2012. NCDOT conducted a map review and search of site files at the Office of State Archaeology (OSA). Comprehensive archaeological surveys have been conducted in various locations on either side of the I-77 corridor, resulting in numerous archaeological sites having been recorded. Based on previous comprehensive archaeological surveys, a review of proposed design plans, and the highly disturbed nature of the interstate corridor, the project's APE is considered to have an extremely low potential for containing intact archaeological materials. Therefore, an archaeological survey is not recommended and no further work is necessary for Section C of the project corridor). Documentation supporting this conclusion is located in **Appendix C**.

4.4 Natural Environment

Natural systems were inventoried in the following reports, summarized below and incorporated by reference:

- *I-3311C Natural Resources Technical Report (NRTR)* (Atkins, May 2013)
- *I-5405 Natural Resources Technical Report* (Atkins, February 2012)
- *I-4750 Natural Resources Technical Report* (RK&K, September 2012)

The *NRTRs* assess biological features within the project study area and include descriptions of wildlife, vegetation, protected species, water quality and wetlands. They also document preliminary determination of permit requirements. A summary of the findings from the studies is included in the following sections.

4.4.1 Physiology and Soils

The study area lies in the piedmont physiographic region of North Carolina. Topography in the project vicinity is comprised of gently rolling hills with narrow, level floodplains along streams. Elevations in the project study area range from 680 to 820 feet above sea level. The Mecklenburg County Soil Survey (NRCS, 2011) and the Iredell County Soil Survey (USDA, 2011) identify 47 soil types within the project study area. The majority of these soils are non-hydric and well-drained. The characteristics of these soils and their locations along the corridor are described in more detail in the NRTR documents.

4.4.2 Biotic Resources

Biotic resources include terrestrial communities, wildlife, and aquatic communities.

Terrestrial Communities

Eight terrestrial communities were identified in the project study area. Detailed descriptions of these communities can be found in the NRTRs. A brief description of each community type is provided below:

Maintained/Disturbed - Maintained/Disturbed areas consist largely of the paved surface and right of way of the existing I-77. Other examples are scattered throughout the study area in places where the vegetation is periodically mowed or maintained, such as roadside shoulders, residential lawns, industrial and commercial areas, and utility rights of way. The vegetation in this community is comprised of grasses, herbs, and vines, adventitious shrubs, tree saplings, and planted trees. Within this community, several Headwater Forest wetlands were identified per the North Carolina Wetland Assessment Method (NCWAM).

Mesic Mixed Hardwood Forest -The areas included within this community classification most closely correspond to the mesic mixed hardwood forest (Piedmont subtype) natural community. This community was observed in association with smaller stream drainages, headwaters, and adjoining slopes within the project study area. Herbaceous vegetation was highly variable depending on slope, drainage, and sunlight penetration.

Dry-Mesic Oak-Hickory Forest - The Dry-Mesic Oak-Hickory Forest community occurs in uplands, generally over the more acidic soils of the study area. Within the project study area, this community occurs in strips along the edges of the I-77 right of way. Although this community type is typically not associated with wetlands, several wetlands classified as Non-Tidal Freshwater Marsh and Headwater Forest, according to NCWAM, were identified within this community.

Basic Mesic Forest (Piedmont Subtype) - With the transition from Dry-Mesic Oak-Hickory Forest to Basic Mesic Forest, an increase in soil moisture is accompanied by a decrease in acidity, resulting in rich bottomlands along stream courses. This vegetation type occurs on lower slopes, north-facing slopes, ravines, and small stream bottoms. Included within this community are wetlands classified by the NCWAM as Headwater Forest and Floodplain Pool.

Mixed Pine/Hardwood Forest - This community is characterized by co-dominance of pines and hardwoods in the canopy and understory and can be found throughout the project study area.

Pine Forest - There are many pine-dominated stands along the project, which vary in density, size, and age. Most of the stands range from approximately 10 to 50 years in age, are planted or have naturalized, and consist of loblolly, shortleaf, Virginia and scattered white pine. Younger stands are typically thick and indicate recent disturbances. Older stands tend to naturally thin themselves and allow more sunlight to penetrate to the forest floor.

Piedmont/Low Mountain Alluvial Forest - The areas within this community classification most closely correspond to the piedmont/low mountain alluvial forest natural community. These areas are typically associated with stream floodplains.

Lake Fringe Forest - The areas within this community classification share vegetative characteristics of the piedmont/low mountain alluvial forest and the piedmont/low mountain semi-permanent impoundment natural communities. The hydrology in this community is closely linked to the rise and fall of Lake Norman, which can create extended periods of inundation and exposure.

Wildlife

Terrestrial communities in the study area are mainly comprised of highly disturbed habitats, with small pockets (from a few acres to 50 acres) of forested habitat adjoining the corridor. Habitat for small or disturbance-adapted species exists in grassy or wooded areas. The NRTR documents include complete lists of species that may be found in the project study area. Species that were actually observed within the project study area include:

- Mammals - white-tailed deer, eastern cottontail, coyote, beaver, gray squirrel, muskrat, raccoon, and striped skunk
- Birds - Carolina chickadee, brown thrasher, mourning dove, American crow, blue jay, American goldfinch, Carolina wren, northern mockingbird, American robin, and red-shouldered hawk.
- Reptiles - black rat snake, brown snake, and eastern box turtle.

Aquatic Communities

Aquatic communities in the project study area consist of both perennial and intermittent piedmont streams, as well as Lake Norman. The perennial and intermittent streams are often channelized and/or inundated with sediment from adjacent runoff, offering less than optimal habitat for many species. However, perennial streams in the study area could support bluegill, black crappie, various mussels, snakes, and fish. Perennial and intermittent streams in the project study area could support aquatic communities of frogs, crayfish, and various benthic macroinvertebrates. Lake habitats could support a variety of fish, reptiles, amphibians, and birds.

Potential impacts to biotic resources are discussed in **Section 5.4.1**.

4.4.3 Water Resources and Water Quality

This section discusses water resources in the project study area. Potential impacts to water resources are discussed in **Section 5.4.2**. The location of each water resource is shown in **Appendix A** (Sheets A-CC).

4.4.3.1 Water Resources

Water Basins

Water resources in the project study area are part of the Catawba River basin (US Geological Survey [USGS] Hydrologic Units 03050101 and 03050103).

Named Streams

Nine named streams found on either USGS topographic maps or in NCDWQ hydrology data occur within and near the project study area. Named streams are identified on the maps included in **Appendix A** (sheet numbers are included with the descriptions below). From south to north these streams are:

- **Irwin Creek** – Located primarily on the east side of I-77, the creek crosses to the west side of I-77 between W. 5th Street and Lasalle Street then back to east side of I-77. Irwin Creek crosses under I-77 through an existing culvert (Appendix Sheets D, E, and F).
- **Dillons Twins Lakes –** This stream crosses I-77 through a culvert at the I-77/I-85 interchange and crosses I-77 again through a culvert north of Cindy Lane (Appendix Sheets G, H, and K).
- **Long Creek –** This stream crosses I-77 through a culvert between Lake Road and W.T. Harris Boulevard (Appendix Sheet N).
- **Dixon Branch –** This stream crosses I-77 through a culvert between W.T. Harris Boulevard and I-485 (Sheets N, O, and P).
- **Vances Twin Lakes –** This stream crosses I-77 at the I-485 interchange through a culvert (Sheet P).
- **Torrence Creek –** This stream crosses I-77 between Hambright Road and Mt. Holly-Huntersville Road under a bridge (Sheets Q and R).
- **Caldwell Station Creek** – This stream crosses I-77 north of Sam Furr Road through a culvert (Appendix Sheet T).
- **McDowell Creek** – This stream crosses I-77 north of Westmoreland Road through a culvert (Appendix Sheet U).
- **Byers Creek –** This stream crosses I-77 north of NC 150 through a culvert (Sheet CC).

Numerous unnamed perennial and intermittent tributaries are also present in the project study area. Surveyed streams within the project study area are shown on figures included in **Appendix A** and described in more detail in the NRTR reports prepared for the project.

Lake Norman and the Catawba-Wateree Hydro Project

Lake Norman is located in the northern portion of the study area. Cowans Ford Dam created Lake Norman when it dammed the Catawba River in 1963. Lake Norman expands east and west of I-77, with the majority of open water to the west. The lake has a significant surface water connection to jurisdictional stream features. I-77 crosses Lake Norman on causeways in three locations. The full pond elevation of Lake Norman is 760 feet.

According to Duke Energy's website, "the water of Lake Norman is used in two ways to provide electricity to the Piedmont Carolinas. It is used to power generators at the Cowans Ford Hydroelectric Station and by Marshall Steam Station and McGuire Nuclear Station to cool the steam that drives the turbines" (Duke Energy Corporation website: http://www.duke-energy.com/lakes/facts-and-maps/lake-norman.asp). None of these power stations are located in the project study area.

The Catawba-Wateree Hydro Project is licensed by the Federal Energy Regulatory Commission (FERC). The FERC licenses and governs all non-federal hydropower projects located on navigable waterways. As part of the licensing process, the FERC defines the lands and facilities included in the hydropower project operating obligation and under FERC's jurisdiction, called the project boundary (Duke Energy Corporation Web site: www.duke-energy.com/catawba-wateree-relicensing/relicensing-terms.asp).

For Lake Norman, the FERC project boundary is the "full pond contour", which is approximately 760 feet above mean sea level. Any crossings of this contour require a permit from FERC.

Water Supply Resources

Lake Norman is a water supply source for Lincoln County, Mecklenburg County, the City of Charlotte, and the towns of Davidson, Mooresville, and Huntersville. Water supply watershed critical and protected areas associated with Lake Norman are shown in **Appendix A.**

Lake Norman waters are classified by NCDENR as a Water Supply-IV, which are waters used for drinking, culinary, or food processing purposes where a WS-I, II or III classification is not feasible. These waters are also protected for Class C uses (i.e., fishing, wading, boating). WS-IV waters are generally in moderately to highly developed watersheds or Protected Areas. There are two restricted areas, critical and protected, around a WS-IV source. The critical area is 0.5 mile and draining to water supplies as measured from the full pond elevation (760 feet for Lake Norman). The protected area is five miles and draining to water supplies as measured from the normal pool elevation. The stream crossings on the project are within 0.5 mile of a critical area of a water supply source classified as WS-IV.

Wild and Scenic Rivers

No federally designated Wild and Scenic Rivers occur within the project study area (US Department of Interior Web site: http://www.rivers.gov/north-carolina.php).

No water bodies in the project study area are found on the Nationwide Rivers Inventory, a list of free-flowing river segments possessing outstanding natural or cultural value (National Park Service Web site: www.nps.gov/ncrc/programs/rtca/nri).

There are no state-listed river segments protected under the state Natural and Scenic Rivers Act (NCGS 113A-30 through 113A-44) located within the project study area (NC State Parks Web site: http://www.ncparks.gov/About/docs/Rivers_System.pdf).

4.4.3.2 Water Quality

This section includes a discussion on best usage classifications, impaired waters, and point source discharges in the project study area.

Best Usage Classifications

The NCDWQ classifies stream segments according to their highest supportable use. Unless otherwise stated, unnamed tributaries with no designated best usage classification share the classification of their respective receiving waters.

The NRTRs reported six of the nine named streams in the project study area are classified as Class C. Class C waters are protected for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner. There are no restrictions on watershed development activities for Class C waters.

As previously noted, Lake Norman is designated WS-IV. WS-IV waters are protected as water supplies as well as for Class C uses.

No Outstanding Resource Waters (ORW), designated anadromous fish waters, or Primary Nursery Areas (PNA) are present within one mile downstream of the project study area. There are no designated High Quality Waters (HQW) or water supply watersheds (WS-I or WS-II) within one mile downstream of the project study area. In addition, there are no benthic or fish monitoring sampling stations within one mile of the project study area.

Impaired Waters

Section 305(b) of the Clean Water Act (CWA) requires states to report biennially to the US Environmental Protection Agency (EPA) on the quality of the waters in their state. In general, 305(b) reports describe the quality of surface waters, groundwaters, wetlands, and existing programs to protect water quality. The 305(b) report also describes whether the waters support their designated uses (e.g., swimming, aquatic life support, water supply), as well as likely causes (e.g., sediment, nutrients) and potential sources of impairment.

Section 303(d) of the CWA requires states to develop a list of waters, derived from the 305(b) report, that are not meeting water quality standards or which have impaired uses (NCDWQ Web site: http://portal.ncdenr.org/web/wq/ps/mtu/assessment).

EPA's water quality planning and management regulations that implement Section 303(d) of the CWA can be found in 40 CFR Section 130. The *North Carolina Water Quality Assessment and Impaired Waters List* is an integrated report that includes both the 305(b) and 303(d) reports (NCDWQ Web site: http://portal.ncdenr.org/web/wq/ps/mtu/assessment).

The North Carolina 2012 Final 303(d) list of impaired waters identifies Irwin Creek within the project study area as impaired for aquatic life due to standard violations of copper, lead, and zinc.

Point Source Discharges

Point source discharges in North Carolina are regulated through the National Pollutant Discharge Elimination System (NPDES) program administered by the NCDWQ. All dischargers are required to obtain a permit to discharge. As of March 26, 2013, there is one permitted discharge point adjacent to the project study area. This site will not be impacted by the addition of HOT lanes on I-77. NPDES permits within two miles of the project study area allow for discharges into Irwin Creek, Long Creek, Torrence Creek, McDowell Creek, and Lake Norman. This information was obtained from the NCDWQ data base for NPDES Individual Permits, NPDES General Permits, and NPDES Stormwater Permits (http://portal.ncdenr.org/web/wq/swp/ps/npdes).

4.4.4 Jurisdictional Issues

This section discusses wetlands and streams, riparian buffer rules, and protected wildlife and plant species in the project study area.

4.4.4.1 Wetlands, Streams, and Ponds

Background

Section 404 of the CWA prohibits discharges of dredged or fill material into “Waters of the United States”, except in accordance with a permit. The term Waters of the United States has broad meaning and incorporates both wetlands and surface waters. The US Army Corps of Engineers (USACE) is responsible for issuing permits and enforcing permitting requirements under Section 404 of the CWA. The USEPA issues the regulations, known as Section 404(b)(1) Guidelines, that the USACE must follow when issuing Section 404 permits. USEPA also participates in the permitting process.

The USACE regulatory program is defined in 33 CFR 321-330. In addition, Executive Order 11990 requires that new construction in wetlands be avoided to the extent possible, and that all practical measure be taken to minimize or mitigate impacts to wetlands.

Water bodies such as rivers, streams, lakes, and ponds are subject to jurisdictional consideration under the Section 404 Program. By regulation, wetlands also are considered Waters of the United States. Wetlands are described as:

> "Those areas that are inundated or saturated by groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328.3(b)).

The NCDWQ also has regulatory input through Section 401 of the CWA, Water Quality Certification. Section 401 requires an applicant for a Section 404 permit to obtain certification from the State that the project complies with State water quality standards.

Surveys for Jurisdictional Resources

Wetland delineations and stream and pond surveys were conducted October 18-21, October 31, and November 1-4, 2011; March and April 2012; and December 19-20, 2012. Delineated wetlands, streams, and ponds are shown on the maps in **Appendix A**.

Written verification on preliminary jurisdictional determinations for Section A and along I-277 was received on April 25, 2013, and is included in **Appendix C**. Written verification on final jurisdictional determinations for Section B was received on June 15, 2012 and is included in **Appendix C**. Written verification from the USACE on final jurisdictional determinations is pending for Section C of the project corridor.

Wetlands. A total of 33 wetlands were delineated within the project study area. All of the wetlands in the project study area are within the Catawba River basin (USGS Hydrologic Unit 03050101 and 03050103). Many of the wetlands are small headwater systems associated with numerous stream tributaries. Bottomland hardwood and riverine swamp forest wetland systems are associated with Lake Norman. USACE wetland delineation forms and NCDWQ wetland rating forms are included in the NRTRs.

Open Water. Seven open water areas or ponds are located within the project study area. Six of these features consist of artificially excavated pits that are sustained by high groundwater levels. In the project study area, these six open water areas total approximately 0.98 acres of pond or other open water. One of these open waters (identified as OWA on **Appendix A** Sheet U) has a surface water connection to jurisdictional stream features. The seventh open water area is Lake Norman.

Streams. A total of 98 perennial and intermittent stream segments were identified in the project study area. Several stream features run parallel to the project study area and therefore may cross in and out of the project study area. The NRTRs identify each stream segment as either perennial or intermittent, as well as the bank height, average width and depth, substrate (what the bottom is comprised of), water quality classification, and NCDWQ score. Within the project study area, the streams have substrates of mostly sand, silt, and gravel with stream clarity being mostly clear to slightly turbid.

4.4.4.2 Catawba River Riparian Buffer Rules

Permanent riparian buffer protection rules were enacted by the State for the main stem of the Catawba River and its main stem lakes below Lake James south to the North Carolina/South Carolina border (15 NCAC 02B.0243-0244). Lake Norman is one of the main stem lakes in which the buffer rules apply.

The buffer protection rules apply within 50 feet of all riparian shorelines along the Catawba River main stem and the seven main stem lakes. The buffer is 50 feet wide, measured from the water's edge (at full

pond in the lakes), and has two zones. Zone 1 is the 30 feet nearest the water and Zone 2 is 20 feet landward of Zone 1. Grading and clearing of vegetation in Zone 1 is not allowed except for certain uses. Zone 2 can be cleared and graded but must be revegetated to maintain diffuse flow to Zone 1. Certain activities (including road crossings) may be allowable with mitigation but must first be reviewed and given written approval by NCDWQ. If it can be shown that there are "no practical alternatives" to the proposed activity, a variance may be allowed with mitigation (NCDWQ Web site: http://portal.ncdenr.org/web/wq/swp/ws/401/riparianbuffers/rules).

4.4.4.3 Protected Species

Species with the federal classification of Endangered (E), Threatened (T), or Threatened due to Similarity of Appearance (T[S/A]) are protected under the Endangered Species Act, as amended (16 USC 1531 et seq.).

As of December 26, 2012, the US Fish and Wildlife Service (USFWS) lists four federally protected species in Mecklenburg County. As of September 22, 2010, two species are listed in Iredell County (http://www.fws.gov/raleigh/species/cntylist/nc_counties.html), as follows:

- **Mecklenburg County**
  - Carolina heelsplitter (*Lasmigona decorata*) (E) – In North Carolina, this freshwater mussel is known to exist in a handful of streams in the Rocky and Catawba River systems. The species exists in very low abundances, usually within six feet of shorelines. The general habitat requirements for the Carolina heelsplitter are shaded areas in large rivers to small streams, often burrowed into clay banks between the root systems of trees, or in runs along steep banks with moderate current.
  - Michaux's sumac (*Rhus michauxii*) (E) – This plant species is endemic to the inner Coastal Plain and lower Piedmont in North Carolina, growing in sand or rocky, open, upland woods on well-drained sands or sandy loam soils. The plant is shade intolerant and therefore grows best where disturbance (e.g., mowing, clearing, grazing, periodic fire) maintains its open habitat.
  - Schweinitz's sunflower (*Helianthus schweinitzii*) (E) – This perennial herb is found along roadside rights of way, edges of thickets and old pastures, clearings, and other sunny or semi-sunny habitats where disturbances help create open or partially open areas for sunlight.
  - Smooth coneflower (*Echinacea laevigata*) (E) – This perennial herb is typically found in meadows, open woodlands, clear cuts, and utility and roadside rights of way. It grows best where there is abundant sunlight, little competition, and periodic disturbances.
- **Iredell County**
  - Bog turtle (*Clemmys muhlenbergii*) (T(S/A)) – This turtle is typically found in the mud, grass, and moss of bogs, swamps, and marshy meadows. These wetlands are usually fed by cool springs flowing slowly over the land, creating the wet, muddy soil needed by the turtles.
  - Dwarf-flowered heartleaf (*Hexastylis naniflora*) (T) – This plant is endemic to the western Piedmont and foothills of North and South Carolina. This herbaceous evergreen is found in moist to rather dry forests along bluffs; boggy areas next to streams and creek heads; and adjacent hillsides, slopes, and ravines. Occurrences are generally found on a north facing slope. Undisturbed natural communities such as Piedmont/Coastal Plain Heath

Bluff, Dry-Mesic Oak Hickory Forest, and Mesic Mixed Hardwood Forest hold the most viable occurrences.

Candidate Species

Candidate (C) species are taxons under consideration for which there is insufficient information to support a listing. Candidate species are afforded no federal protection under the ESA. As of December 26, 2012, the USFWS lists one Candidate species for Mecklenburg County, Georgia aster (*Symphyotrichum georgianum).* No candidate species were listed for Iredell County. A review of the NCNHP records, updated August 2012, indicates no known occurrences of Georgia aster within one mile of the study area.

Bald Eagle and Golden Eagle Protection Act (BGEPA)

In 1962, the US Congress adopted the BGEPA to protect golden eagles, which also strengthened protection of bald eagles since they were often killed by people mistaking them for golden eagles. The BGEPA prohibits the "take, possession, sale, or purchase" of the bald eagle as well as the "offer to sell, purchase, export or import" the bald eagle (16 USC 668-668d). Since the bald eagle was removed from the Federal List of Threatened and Endangered Species in July 2007, the BGEPA is the primary law protecting bald eagles.

Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within one mile of open water.

Water bodies within the study area and a 660-foot buffer were reviewed for bald eagle nests and habitat by biologists during field surveys. Existing disturbance in the area of I-77 would exclude bald eagles from using any marginal stream or pond habitat within this 660-foot buffer. Forested riparian buffers are narrow and fragmented in this area, and are immediately adjacent to major commercial and industrial areas and large residential developments. The noise, movement, and human presence associated with I-77 itself are deterrents to the use of this area by eagles. No bald eagle nests or bald eagles were found during the field studies, nor are there any NCNHP known occurrences within one mile of the project. No surveys outside of the project study area were conducted.

5 ENVIRONMENTAL CONSEQUENCES

This chapter identifies the consequences of implementing the alternatives to the human, physical, cultural, and natural environments. Potential impacts associated with the No-Build Alternative are included for comparison purposes, as appropriate.

5.1 Human Environment

5.1.1 Land Use and Transportation Planning

No-Build Alternative

There would be no impact to land use or zoning under the No-Build Alternative. Existing land use would not change, and current patterns of development that are consistent with zoning regulations likely would continue under this alternative.

The No-Build Alternative is not consistent with the adopted MUMPO *2035 Long Range Transportation* Plan (LRTP) as the LRTP includes the proposed project.

Build Alternatives

All of the Build Alternatives, including the Preferred Alternative, are consistent with area land use and transportation plans. Implementation of any of the Build Alternatives would not conflict with planning guidelines in any of the local area land use plans identified in **Table 2-2** in **Section 2.5.3**. MUMPO amended their LRTP and TIP on May 22, 2013 to include the proposed projects I-3311C, I-5405, and I-4750AA.

5.1.2 Acquisitions and Relocations

Public Law 91-646, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, commonly called the Uniform Relocation Act, is the primary law for acquisition and relocation activities on Federal or Federally-assisted projects. The law provides uniform policy and procedures for the acquisition of real property by all agencies that receive financial assistance for any program or project of the United States Government. If Federal funds are used in any phase of the program or project, the Uniform Relocation Act applies.

The NCDOT Right of Way Branch is responsible for acquisition of land and right of way for the construction and improvements of all roads and highways that are part of the State Highway System. The Relocation Reports for the I-3311C, I-5405, and I-4750AA project (NCDOT, May 2013) are included in **Appendix D**.

No-Build Alternative

Since there would be no construction activities under the No-Build Alternative, there will be no property relocations or acquisition impacts.

If the No-Build Alternative is selected, as discussed in **Section 5.5**, there could be up to three residential relocations along Dean Street associated with STIP Project I-3311E.

Build Alternatives

None of the Build Alternatives would displace farms or non-profit organizations. Both Alternative 1 and Alternative 2 (the Preferred Alternative) would relocate seven residences and three businesses, while Alternative 3 would not involve any relocations, as shown in **Table 5-1**. If Alternative 3 is selected, there could be up to three residential relocations associated with Project I-3311E as discussed in **Section 5.5**.

Measures to minimize relocations will be investigated during final design of the Preferred Alternative.

Table 5-1: Residential and Business Relocations

Resource	Alternative 1	Alternative 2	Alternative 3
Residential Relocations	7	7	--
Business Relocations	3	3	--
Total Relocations	10	10	--

Source: *Relocation Reports for I-3311C, I-5405, and I-4750AA* (NCDOT, May 2013)

All of the residential relocations under Alternatives 1 and 2 are due to the reconstruction and realignment of the Oaklawn Avenue bridge. The realignment of the bridge will require five structures to be removed (four single family houses and one triplex) resulting in seven residential relocations. Property records from the City of Charlotte indicate that six out of the seven residences are tenant occupied.

All three of the business relocations are located along I-277 and are due to expanded roadway fill limits resulting from the roadway widening. The three businesses potentially impacted are located at 330 West 10th Street, 801 North Tryon Street, and 800 North College Street. As final designs are completed for the selected alternative, ways to avoid these relocations will be investigated.

South of I-85, Build Alternatives 1 and 2 will require right of way from parcels that will not involve relocations, as shown in the preliminary designs in **Appendix A**. No right of way is anticipated to be required north of I-85 for either of these alternatives. Build Alternative 3 will not require additional right of way. Right of way will be refined for the Preferred Alternative during final design and will be minimized to the extent practicable.

It is anticipated that there is comparable replacement housing in the area for displaced owners and tenants. The NCDOT relocation and right-of-way acquisition policies ensure that comparable replacement housing is available for relocatees prior to construction of state and/or Federally-assisted projects. Furthermore, NCDOT will use three programs to minimize the inconvenience of relocation: Relocation Assistance, Relocation Moving Payments, and Relocation Replacement Housing Payments or Rent Supplement.

The relocation program for the proposed action will be conducted in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and the North Carolina Relocation Assistance Act (NCGS 133-5 through 133-18).

More information on right-of-way acquisition and relocation is available in the following two NCDOT brochures: *Relocation Assistance* and *The Real Estate Acquisition Process Brochure*, which can be found at:

- www.ncdot.gov/download/construction/roadbuilt/relocationbooklet_07.pdf
- https://connect.ncdot.gov/resources/row/Resources/ROW Brochure -Single Page Layout.pdf

5.1.3 Communities and Neighborhoods

Effects on communities and neighborhoods can include the physical taking of land, homes, and businesses (see **Section 5.1.2**); the construction of physical or psychological barriers that can result from new transportation facilities that divide or isolate a section of the community; changes in access or travel patterns within a community; or physical intrusions such as noise, dust, or visual impacts that can negatively affect a community. Impacts to communities and neighborhoods are addressed in the

Community Impact Assessment & Screening Indirect and Cumulative Effects Assessment (Atkins, May2013), prepared for the project (I-3311C, I-5405, and I-4750AA) and summarized below.

No-Build Alternative

Commuters and travelers using I-77 will continue to experience travel delays under the No-Build Alternative. Residents of neighborhoods adjacent to the corridor would not be affected.

As discussed in **Section 5.5**, there could be up to three residential relocations along Dean Street in the Oaklawn Park neighborhood associated with STIP Project I-3311E, but these relocations would not physically divide the neighborhood and would not change access or travel patterns.

Build Alternatives

Community benefits associated with all of the Build Alternatives, including the Preferred Alternative, include travel time savings by providing a non-congested option in the HOT lanes. Travel time savings associated with all of the Build Alternatives would be the result of more reliable travel times in the HOT lanes, not a shorter route.

Build Alternatives 1 and 2 will displace seven residences near the Oaklawn Avenue bridge over I-77 and three businesses along I-277, as discussed in **Section 5.1.2**. Build Alternative 3 will not displace any residences or businesses. If Alternative 3 is selected, there could be up to three residential relocations associated with Project I-3311E as discussed in **Section 5.5**.

Existing communities and neighborhoods will not be divided internally or from one another by physical or psychological barriers by any of the Build Alternatives. Construction of any of the Build Alternatives will not change access or travel patterns within the community or any neighborhood. The proposed project will remain on the existing alignment of I-77 and no new routes or interchanges are proposed.

Proposed noise barriers along I-77 will reduce existing noise levels. These noise barriers may be viewed by some residents as a negative visual impact, but as a benefit by other residents.

5.1.4 Environmental Justice

Environmental justice is addressed in the *Community Impact Assessment & Screening Indirect and Cumulative Effects Assessment* (Atkins, May2013), prepared for the project (I-3311C, I-5405, and I-4750AA) and summarized below.

Background

Title VI of the Civil Rights Act of 1964 protects individuals from discrimination on the grounds of race, age, color, religion, disability, sex, and national origin. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" provides that each Federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations. Special populations may include the elderly, children, the disabled, low-income areas, Native Americans and other minority groups.

Executive Order 12898 requires that Environmental Justice principles be incorporated into all transportation studies, programs, policies and activities. The three Environmental Justice principles are:

1) To ensure the full and fair participation of all potentially affected communities in the transportation decision-making process;

2) To avoid, minimize or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority or low-income populations; and
3) To fully evaluate the benefits and burdens of transportation programs, policies, and activities, upon low-income and minority populations.

As discussed in **Section 4.1.2**, and shown in **Figure 10**, Census data indicates a notable presence of minority and low-income populations meeting the criteria for Environmental Justice within the DSA. Most of the EJ populations are located south of I-85.

No-Build Alternative

The No-Build Alternative would not impact any populations, including Environmental Justice (EJ) populations, except for users of I-77, who would continue to experience travel delays and travel time reliability issues.

If the No-Build Alternative is selected, as discussed in **Section 5.5**, there could be up to three residential relocations along Dean Street in the Oaklawn Park neighborhood associated with STIP Project I-3311E. The Oaklawn Park area includes EJ populations. As discussed in **Section 5.5**, these relocations would not represent a disproportionately adverse impact.

Build Alternatives

There is a potential for disproportionate impacts to EJ populations if additional right of way is required south of I-85, resulting in residential relocations in identified EJ areas. As there are no relocations north of I-85, these effects have the potential to affect EJ populations more than the general population. The benefit of the project will extend to users of I-77 residing in the project corridor and beyond in the form of an option for reliable travel times on I-77, but the minor burdens associated with the project, specifically right-of-way acquisition and relocations, would only affect identified EJ communities south of I-85.

Under Build Alternatives 1 and 2, adverse impacts to EJ populations would include right-of-way acquisition and relocations. Alternatives 1 and 2 will require the relocation of seven residential housing units in an identified EJ community. According to the Relocation Reports (NCDOT, May 2013) (**Appendix D**), four of the seven relocations are minorities and all seven relocations have incomes below half of the county median. Alternative 3 does not require any residential relocations. If Alternative 3 is selected, as discussed in **Section 5.5**, there could be up to three residential relocations along Dean Street in the Oaklawn Park neighborhood associated with STIP Project I-3311E.

The units that would be relocated as a result of Alternatives 1 and 2 result from the Oaklawn Avenue bridge replacement on a new alignment (adjacent to the existing alignment). While these relocations are adverse, the replacement of the bridge on a new alignment will allow the existing bridge to remain open while the new bridge is under construction, which will maintain connectivity during construction. In addition, the community will be provided with a new bridge that will have a useful life of over 50 years. These benefits compared to the minor adverse impacts are expected to result in a net benefit to the community.

It should be noted that all Census block groups in the DSA south of I-85 include identified EJ populations; therefore, any relocations south of I-85 would be within an EJ community. Seven relocations along an approximately 25-mile project are not considered to be severe. Six of the seven units are rental, and based on a visual survey of the area, there is adequate replacement rental housing available in the surrounding area. In addition, the relocations are located along the edge of the neighborhood and would not impact community cohesion. In conclusion, the relocation impacts to identified EJ

communities would be disproportionately high, but minor. Resulting community impacts are offset by the existing Oaklawn Avenue bridge remaining open while the new bridge is constructed.

Since this project involves managed lanes (tolling), the potential impacts of tolling the Build Alternatives on EJ populations also must be considered. According to FHWA's *Environmental Justice Emerging Trends and Best Practices Guidebook* (November 2011), potential impacts to EJ populations from road pricing projects should be considered for three areas:

- Income equity – relates to the disproportionate impacts of road pricing on low-income populations
- Modal equity – relates to disproportionate road pricing impacts based on travel modes, typically between transit users and auto users
- Equity in participation – relates to the extent to which all groups can participate and have their interests considered in the planning and project implementation process

Income Equity. Studies of other HOT lanes projects around the US have found that a broad spectrum of income groups express approval of the projects because they are given the option of using the tolled route when reliable travel times are important (e.g., to get to work on time or to pick up a child a daycare on time to avoid late charges), but are also provided a free route (general purpose lanes) if they don't want to pay the toll (Income-Based Equity Impacts of Congestion Pricing, FHWA). In addition to the general purpose lanes, Statesville Road provides an alternate free route on the east side of I-77 through the project area. Another equity concern arises when congestion pricing relies on electronic cashless technology. Households that do not have credit cards or bank accounts may be unable to set up toll accounts, which may limit their use of toll facilities. Consideration may be given to providing facilities that allow easy and convenient access to equipment required to use HOT lanes and other toll facilities across the state. This may include consideration of providing transponders at low or no cost to low-income commuters, and allowing cash payments for people who do not have debit or credit cards.

Modal Equity. The proposed project would not affect transit or HOV vehicles, which would not be charged a toll and would continue to have priority for use of HOT lanes. Transit service would actually be enhanced by the extension of HOT lanes since transit vehicles would have priority along additional lane miles. Non high occupancy vehicles (NHOV) would only be allowed to use the HOT lanes when they are willing to pay the variable toll and can do so without causing congestion in the HOT lanes. In addition, general purpose lanes may benefit from capacity that becomes available as NHOVs choose to pay the toll and move to the HOT lanes, so even people who do not use the HOT lanes may benefit from them.

Equity in Participation. All communities and stakeholders potentially affected by the project are invited to participate in the project development process. Public involvement is discussed in **Section 6.2**. In addition, MUMPO adopted the Title VI Expansion for its Public Involvement Plan, on September 19, 2012. The plan includes strategies for enhanced involvement of minority and low-income communities based on community input.

Monitoring programs on existing HOT lane facilities in the US have not demonstrated that low-income populations experienced disproportionately high and adverse effects (*SR 167 HOT Lanes Social Economic and Environmental Justice Report*, WSDOT, January 2007). The Environmental Assessment (EA) for the *Interstate 85 (I-85) HOV to HOT Conversion Project* (GDOT, approved by FHWA in March 2010) looked at seven similar HOT lane conversion projects around the US and found that no information from those projects indicated equity-based impacts to low-income populations. The FHWA primer *Income-Based Equity Impacts of Congestion Pricing* found that approximately half of HOT lane users used the lanes

once a week or less, and suggested that HOT lane use is not necessarily related to income, but to travel time.

Based on these findings from FHWA reports and other HOT lanes projects, as well as the considerations presented above, the tolling aspect of this project is not expected to have disproportionately high and adverse effects on minority or low-income populations.

5.1.5 Community Resources and Services

Community resources and services are addressed in the *Community Impact Assessment & Screening Indirect and Cumulative Effects Assessment* (Atkins, May2013), prepared for the project (I-3311C, I-5405, and I-4750AA) and summarized below.

No Build Alternative

Under the No-Build Alternative, emergency fire and rescue vehicles and CATS buses will continue to experience travel delay on I-77.

Build Alternatives

No direct impacts to any community resources would occur as a result of any of the Build Alternatives. It is anticipated that the extent of impacts to public services as a result of the proposed project will be minimal and short-term. The CATS bus routes that operate on I-77 may be temporarily affected by construction activities; however, transit users will benefit from the travel time reliability offered by the HOT lanes. CATS express routes currently use the existing HOV lanes, and it is assumed the express bus routes will use the HOT lanes. Transit vehicles would not be charged a toll to use the HOT lanes.

It is anticipated that all of the Build Alternatives may temporarily impact emergency services during construction. Maintenance of traffic along the corridor will be important during construction, and coordination with emergency management services is necessary to minimize impacts to emergency response times.

5.1.6 Section 4(f)/6(f) Resources

No Build Alternative

The No-Build Alternative would have no effect on Section 4(f) or Section 6(f) resources.

If the No-Build Alternative is selected, as discussed in **Section 5.5**, there could be up to three residential relocations along Dean Street in the Oaklawn Park neighborhood associated with STIP Project I-3311E. The Oaklawn Park neighborhood has been determined eligible for the National Register of Historic Places (NRHP). The current designs prepared for Project I-3311E, documented in the Project I-3311E CE (July 2011) were prepared prior to the designation of the Oaklawn Park neighborhood as eligible for the NRHP. A reevaluation of Project I-3311E would be required before implementation of that project to evaluate whether design measures could be taken to avoid impacting the properties within the historic district.

Build Alternatives

All of the improvements under Build Alternative 3, and most of the improvements under Build Alternatives 1 and 2, are anticipated to occur within the existing right of way. None of the Build Alternatives require right-of-way acquisition or easements from any land or resource protected under Section 4(f) of the Department of Transportation Act of 1966, including any significant publicly owned park, recreation area, or wildlife and waterfowl refuge or any land from an historic site of national, state or local significance. Similar to the No-Build Alternative, if Build Alternative 3 is selected, Project I-3311E

would be implemented. The approved CE for Project I-3311E (June 2011) would need to be reevaluated to address potential residential relocations along Dean Street that are now located in an historic district eligible for the National Register of Historic Places.

There are seven historic resources (two individual sites and five districts) adjacent to the study corridor. No acquisition of land from any of these resources would be required by any of the Build Alternatives. Proposed noise barriers would be located in the existing right of way and adjacent to three of the historic districts. Representatives from NCDOT and FHWA met with the State Historic Preservation Officer on February 19, 2013 and determined that the proposed project would have no effect on the Orient Manufacturing/Alpha Cotton Mill and Sears Roebuck Department Store historic properties or the historic districts of Dalebrook, McCrorey Heights, and Elmwood/Pinewood Cemetery. A conditional determination of no adverse effect to the Oaklawn Park and Seaboard Street historic districts was granted with the requirement to discuss the design of the noise barrier at a future meeting. The design of the noise barriers was discussed at a meeting held on June 25, 2013 where it was determined that residents and property owners in the historic districts will determine the look of the proposed noise barriers. Documentation supporting this decision is included in **Appendix C**.

There are six publicly owned parks or recreational areas adjacent to the study corridor. No acquisition of land from any these resources would be required by any of the Build Alternatives.

Therefore, the project will have no effect on Section 4(f) resources.

There are no properties or resources in the project study corridor that have received grant money from the Land and Water Conservation Fund to be considered a Section 6(f) resource. Therefore, the project will have no effect on Section 6(f) resources.

5.1.7 Economic Effect

No-Build Alternative

No construction activities would occur under the No-Build Alternative. No substantial positive economic effects will occur due to the No-Build Alternative, as jobs will not be created or lost. Existing travel delay and unreliable travel times will continue to worsen under the No-Build Alternative resulting in continued negative economic effects from lost time and wasted fuel.

Build Alternatives

The project would have an immediate benefit to the economy during the construction phase. This positive effect from construction jobs would be temporary. Temporary short term construction impacts to adjacent establishments in the area are also anticipated. The impacts to these adjacent establishments would be both positive (construction workers spending money locally for food, gas, etc) and negative (travel delay to customers during construction). Following completion, the proposed project would provide long-term benefits to the local and regional transportation network, as described below.

The I-77 corridor is, and will remain, critical for regional commerce as well as commuters traveling to and from work, with the personal automobile the primary mode for commuters. Improvements to the corridor will provide needed mobility, enhancing the function of a critical north-south freeway in the Charlotte metro area. The proposed project would enhance mobility on I-77 by providing an option for reliable travel times, which would result in economic benefits such as reduced fuel costs. The benefits of reliable travel times would also apply to travelers using I-77 to access connecting interstates of I-85 and I-485.

5.2 Physical Environment

5.2.1 Noise Impacts

In accordance with Title 23 Code of Federal Regulations Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (Title 23 CFR 772) and the North Carolina Department of Transportation Traffic Noise Abatement Policy, each Type I highway project must be analyzed for predicted traffic noise impacts. In general, Type I projects are proposed Federal or Federal-aid highway projects for construction of a highway or interchange on new location, improvements of an existing highway which significantly changes the horizontal or vertical alignment or increases the vehicle capacity, or projects that involve new construction or substantial alteration of transportation facilities such as weigh stations, rest stops, ride-share lots or toll plazas.

Traffic noise impacts are determined through implementing the current Traffic Noise Model (TNM) approved by the Federal Highway Administration and following procedures detailed in Title 23 CFR 772, the NCDOT Traffic Noise Abatement Policy and the NCDOT Traffic Noise Analysis and Abatement Manual. When traffic noise impacts are predicted, examination and evaluation of alternative noise abatement measures must be considered for reducing or eliminating these impacts. Temporary and localized noise impacts will likely occur as a result of project construction activities. Construction noise control measures should be incorporated into the project plans and specifications.

The design noise reports prepared for this project listed below and incorporated by reference. They can be viewed by request at the NCDOT Project Development & Environmental Analysis Unit, located in Century Center Building A, 1010 Birch Ridge Drive, Raleigh, NC.

- I-3311C *Design Noise Report* (Atkins, June 2013)
- I-5405 *Design Noise Report* (Atkins, June 2012)
- I-5405 Draft Design Noise Report Addendum (Atkins, April 2013)
- I-4750 HOT Draft *Design Noise Report* (RK&K, April 2013)

No-Build Alternative

The Traffic Noise Analysis considered traffic noise impacts for the No-Build Alternative. If the proposed project does not occur, 522 receptors are predicted to experience traffic noise impacts since these receptors are located next to the existing I-77. Since the design year for the project is 2017 (four years from the current year) future traffic noise levels would not increase enough (10 to 15 dB(A) or more) between existing and design years to result in any traffic noise impacts classified as substantial noise increases. Based upon research, humans barely detect noise level changes of 2-3 dB(A). A 5 dB(A) change is more readily noticeable. Therefore, most people working and living near the roadway will not notice this predicted increase.

Build Alternatives

The maximum number of receptors in each project alternative predicted to become impacted by future traffic noise is shown in the **Table 5-2**. The table includes those receptors expected to experience traffic noise impacts by either approaching or exceeding the FHWA Noise Abatement Criteria or by a substantial increase in exterior noise levels.

Table 5-2: Predicted Traffic Noise Impacts by Alternative*

Alternative	Traffic Noise Impacts			
	Residential (NAC B)	Churches/Schools, etc. (NAC C & D)	Businesses (NAC E)	Total
Existing and No-Build	458	64[1,2]	0	522
1	608	71[1,2]	0	679
2	624	71[1,2]	0	695
3[3]	482	22[1,2]	0	504

*Per TNM®2.5 and in accordance with 23 CFR Part 772

Source: I-3311C *Design Noise Report* (Atkins, June 2013), I-5405 *Design Noise Report* (Atkins, June 2012), I-5405 *Draft Design Noise Report Addendum* (Atkins, April 2013), and I-4750 HOT *Draft Design Noise Report* (RK&K, April 2013).

1. For category C impacts, these impacts include McColl Center for Visual Arts (1), 1st Ward Elem School (40), private park at 901 N. Brevard (1), Oaklawn Cemetery (1), Lincoln Heights Academy playground (5 for Build Alts only), Greenville Park/Walter Byer Elem/Middle School (1 for Build Alts only), Anita Stroud Park Basketball half court (1 for Build Alts only), Double Oaks Park playground (1), Right Choices Alternative School track (7), Comfort Inn pool (1), Sterling Bay Apts tennis court (1), Sterling Bay Apts sand play area (1), Emerald Bay Condo pool (1), Harborwatch Condominiums pool (1), and Gibbs Cove Neighborhood boat launch (1).
2. For category D impacts, these impacts include the New Life Christian Academy on Samuel St. (7 equivalent receptors). The wood frame buildings have single-glazed windows that are opened in warm weather (10 dB(A) exterior to interior noise reduction for window open and 20 dB(A) exterior to interior noise reduction for windows closed).
3. The design limits for Alternative 3 do not include improvements along I-277, therefore, the number of existing noise impacts along I-277 are not included in the Alternative 3 impacts.

Traffic Noise Impacts and Noise Contours. The maximum extent of the 71- and 66- dB(A) noise level contours measured from the center of the proposed roadway is 400 feet and 650 feet, respectively. The 71 dB(A) contour correlates to the traffic noise impact threshold for FHWA NAC E land uses (**Table 4-3**), and the 66 dB(A) contour correlates to the traffic noise impact threshold for FHWA NAC B and C land uses. This noise level contour information should assist local authorities in exercising land use control over the remaining undeveloped lands, so as to avoid development of incompatible activities adjacent to the project corridor.

Traffic Noise Abatement Measures. Measures for reducing or eliminating the traffic noise impacts were considered for all impacted receptors for Build Alternatives 1, 2, and 3. The primary noise abatement measures evaluated for highway projects include highway alignment changes, traffic system management measures, establishment of buffer zones, noise barriers and noise insulation (NAC D only). For each of these measures, benefits versus costs (reasonableness), engineering feasibility, effectiveness and practicability and other factors were included in the noise abatement considerations.

Substantially changing the highway alignment to minimize noise impacts is not considered to be a viable option for this project due to engineering and/or environmental factors. Traffic system management measures are not considered viable for noise abatement due to the negative impact they would have on the capacity and level of service of the proposed interstate roadway. Costs to acquire buffer zones for impacted receptors will exceed the NCDOT base dollar value of $37,500 plus an incremental increase of $525 (as defined in the NCDOT Policy) per benefited receptor, causing this abatement measure to be unreasonable.

Noise Barriers. Noise barriers include two basic types: earthen berms and noise walls. These structures act to diffract, absorb and reflect highway traffic noise. For this project, earthen berms are not found to be a viable abatement measure because the additional right of way, materials and construction costs

are estimated to exceed the NCDOT maximum allowable base quantity of 7,000 cubic yards, plus an incremental increase of 100 cubic yards per benefited receptor, as defined in the NCDOT Policy.

A noise barrier evaluation was conducted for this project utilizing the Traffic Noise Model (TNM 2.5) software developed by the FHWA. Based on the results of the studies, traffic noise abatement is recommended and noise abatement measures are proposed in 21 locations for Alternatives 1 and 2, and in 19 locations for Alternative 3. Information regarding these walls by alternative is summarized in **Table 5-3**.

Table 5-3: Project Recommended Noise Barriers

Report	Wall		Potential Barrier Location	Approx Length (ft)	Approx Area (sq. ft.)	Number of Impacted Receptors Benefited	Total Number of Benefits	Quantity of Wall per Benefit (sq ft) / Allowable Base Quantity
Alternative 1								
I-3311C	1	277NW 2bc (system)	NW2b - eastbound I-277 shoulder from North Graham St. ramp to North Church St. ramp	705	13,875	66	77	**545** / 2,535
			NW2c - eastbound I-277 shoulder from North Church St. ramp to North Tryon St. ramp	1,125	28,095			
	2	277NW3	Along westbound I-277 shoulder from near North Brevard St. to near North Tryon St.	1,260	24,150	10	34	**710** / 2,500
I-3311C	3	77NW1A	Along southbound I-77 shoulder, near Oaklawn Ave. and Patton Ave.	1,335	28,275	10	16	**1,767** / 2,535
	4	77NW1B	Along southbound I-77 shoulder south of Lasalle Street and north of Oaklawn Ave.	3,180	70,140	40	53	**1,323** / 2,535
	5	77NW2A	Along westbound I-277 near Polk Street	2,130	36,090	21	35	**1,031** / 2,570
	6	77NW2B	Along northbound I-77 near Whisnant St. south of Oaklawn Ave.	1,755	35,025	17	19	**1,843** / 2,605
	7	77NW2C	Along northbound I-77 near Genesis Park Dr. north of Oaklawn Ave.	2,280	51,270	63	81	**633** / 2,710
	8	77NW3	Along northbound I-77 near Double Oaks Park playground south of Lasalle St.	1,305	23,940	8	9	**2,660** / 2,500 If considered w/ 77NW2C, then **836** / 2,500
	9	77NW4	Along southbound I-77 north of Lasalle St. and south of I-85 near Lincoln Heights Ct.	2,760	59,580	35	56	**1,064** / 2,535
	10	77NW5	Along northbound I-77 south of I-85 near Julia Ave.	2,775	56,475	25	42	**1,345** / 2,535
I-5405	11	NW7	East of I-77, along Juniper Dr. just north of Cindy Ln.	1,785	35,925	7	34	**1,057** / 2,500
	12	NW8	East of I-77, along shoulder near Suburban Dr. and Ivy Hollow Apts.	2,325	41,940	49	104	**403** / 2,500
	13	NW9	West of I-77, along shoulder near Lakeview Rd. Javitz Rd. Shalom Dr.	4,290	74,070	16	53	**1,398** / 2,500

Table 5-3: Project Recommended Noise Barriers

Report	Wall		Potential Barrier Location	Approx Length (ft)	Approx Area (sq. ft.)	Number of Impacted Receptors Benefited	Total Number of Benefits	Quantity of Wall per Benefit (sq ft) / Allowable Base Quantity
	14	NW12	West of I-77, primarily along shoulder near Hickorywood Apts and Leslie Brooke Dr. area.	3,510	53,655	29	76	**706** / 2,500
	15	NW14	West of I-77, along shoulder near Northstar Dr.	1,365	22,965	11	15	**1,531** / 2,500
	16	NW15	West of I-77, along shoulder near Doe Valley Dr.	1,395	28,290	12	41	**690** / 2,500
	17	NW 16	West of I-77, along cut and shoulder near Ogden Cove Rd.	1,875	35,325	7	19	**1,859** / 2,500
	18	NW17	East of I-77, along shoulder near Sterling Bay Apts.	2,295	42,210	13	37	**1,141** / 2,500
I-4750AA	19	NW 24	Adjacent to I-77 southbound from Wades Way to Edgeway Rd.	1,740	30,810	8	12	**2,568** / 2,605
	20	NW 25	Adjacent to I-77 southbound, from Sapphire Dr. to Bear Run Cir.	2,280	33,066	16	43	**769** / 2,605
	21	NW 27	Adjacent to I-77 southbound, from Hickory Hill Rd. to the northern end of Gibbs Rd.	4,080	72,596	21	33	**2,200** / 2,640
			Alternative 1 Totals	***47,550***	***897,767***	***484***	***889***	--
Alternative 2								
I-3311C	1	277NW 2bc (system)	NW2b - eastbound I-277 shoulder from North Graham St. ramp to North Church St. ramp	705	13,875	66	77	**545** / 2,535
			NW2c - eastbound I-277 shoulder from North Church St. ramp to North Tryon St. ramp	1,125	28,095			
	2	277NW3	Along westbound I-277 shoulder from near North Brevard St. to near North Tryon St.	1,260	24,150	10	34	**710** / 2,500
I-3311C	3	77NW1A	Along southbound I-77 shoulder, near Oaklawn Ave. and Patton Ave.	1,425	27,735	11	15	**1,849** / 2,535
	4	77NW1B	Along southbound I-77 shoulder south of Lasalle Street and north of Oaklawn Ave.	3,105	69,510	42	53	**1,312** / 2,535
	5	77NW2A	Along westbound I-277 near Polk Street	2,130	33,810	21	35	**966** / 2,570
	6	77NW2B	Along northbound I-77 near Whisnant St. south of Oaklawn Ave.	1,770	34,560	18	18	**1,920** / 2,605
	7	77NW2C	Along northbound I-77 near Genesis Park Dr. north of Oaklawn Ave.	2,400	52,620	63	84	**625** / 2,710
	8	77NW3	Along northbound I-77 near Double Oaks Park playground south of Lasalle St.	1,335	25,245	8	9	**2,805** / 2,500 If considered w/ 77NW2C, then **837** / 2,500
	9	77NW4	Along southbound I-77 north of Lasalle St. and south of I-85 near Lincoln Heights Ct.	2,730	58,230	44	59	**987** / 2,535

Table 5-3: Project Recommended Noise Barriers

Report	Wall		Potential Barrier Location	Approx Length (ft)	Approx Area (sq. ft.)	Number of Impacted Receptors Benefited	Total Number of Benefits	Quantity of Wall per Benefit (sq ft) / Allowable Base Quantity
	10	77NW5	Along northbound I-77 south of I-85 near Julia Ave.	2,850	56,190	28	42	**1,338** / 2,535
I-5405	11	NW7	East of I-77, along Juniper Dr. just north of Cindy Ln.	1,785	35,925	7	34	**1,057** / 2,500
	12	NW8	East of I-77, along shoulder near Suburban Dr. and Ivy Hollow Apts.	2,325	41,940	49	104	**403** / 2,500
	13	NW9	West of I-77, along shoulder near Lakeview Rd. Javitz Rd. Shalom Dr.	4,290	74,070	16	53	**1,398** / 2,500
	14	NW12	West of I-77, primarily along shoulder near Hickorywood Apts and Leslie Brooke Dr. area.	3,510	53,655	29	76	**706** / 2,500
	15	NW14	West of I-77, along shoulder near Northstar Dr.	1,365	22,965	11	15	**1,531** / 2,500
	16	NW15	West of I-77, along shoulder near Doe Valley Dr.	1,395	28,290	12	41	**690** / 2,500
	17	NW 16	West of I-77, along cut and shoulder near Ogden Cove Rd.	1,875	35,325	7	19	**1,859** / 2,500
	18	NW17	East of I-77, along shoulder near Sterling Bay Apts.	2,295	42,210	13	37	**1,141** / 2,500
I-4750AA	19	NW 24	Adjacent to I-77 southbound from Wades Way to Edgeway Rd.	1,740	30,810	8	12	**2,568** / 2,605
	20	NW 25	Adjacent to I-77 southbound, from Sapphire Dr. to Bear Run Cir.	2,280	33,066	16	43	**769** / 2,605
	21	NW 27	Adjacent to I-77 southbound, from Hickory Hill Rd. to the northern end of Gibbs Rd.	4,080	72,596	21	33	**2,200** / 2,640
			Alternative 2 Totals	*47,775*	*894,872*	*500*	*893*	--
Alternative 3								
5405	1	NW1A	West of I-77, along right of way south of Oaklawn Ave.	750	16,500	7	9	**1,833** / 2,500
5405	2	NW1B	West of I-77, along shoulder from Oaklawn Ave. past Dean St.	3,645	96,240	43	57	**1,688** / 2,500
5405	3	NW2A	East of I-77, along right of way near Whisnant St. south of Oaklawn Ave.	1,230	23,280	9	14	**1,663** / 2,500
5405	4	NW2B	East of I-77, along shoulder north of Oaklawn Ave., past Genesis Park Dr.	2,280	57,210	32	58	**986** / 2,500
5405	5	NW3	East of I-77, along shoulder of I-77 and Lasalle St. off ramp.	1,755	33,480	8	9	**3,720** / 2,500 But if considered w/ 77NW2B, then **1,354** / 2,500
5405	6	NW4	West of I-77, along shoulder near Lincoln Heights Ct.	1,530	39,015	33	48	813 / 2,500
5405	7	NW5	East of I-77, along shoulder near Julia Ave. and Carmine St.	3,000	63,990	13	38	1,684 / 2,500
5405	8	NW6	West of I-77, along shoulder near Biesterfield Dr.	3,690	66,555	34	63	1,056 / 2,500

Table 5-3: Project Recommended Noise Barriers

Report	Wall		Potential Barrier Location	Approx Length (ft)	Approx Area (sq. ft.)	Number of Impacted Receptors Benefited	Total Number of Benefits	Quantity of Wall per Benefit (sq ft) / Allowable Base Quantity
I-5405	9	NW7	East of I-77, along Juniper Dr. just north of Cindy Ln.	1,785	35,925	7	34	**1,057** / 2,500
	10	NW8	East of I-77, along shoulder near Suburban Dr. and Ivy Hollow Apts.	2,325	41,940	49	104	**403** / 2,500
	11	NW9	West of I-77, along shoulder near Lakeview Rd. Javitz Rd. Shalom Dr.	4,290	74,070	16	53	**1,398** / 2,500
	12	NW12	West of I-77, primarily along shoulder near Hickorywood Apts and Leslie Brooke Dr. area.	3,510	53,655	29	76	**706** / 2,500
	13	NW14	West of I-77, along shoulder near Northstar Dr.	1,365	22,965	11	15	**1,531** / 2,500
	14	NW15	West of I-77, along shoulder near Doe Valley Dr.	1,395	28,290	12	41	**690** / 2,500
	15	NW 16	West of I-77, along cut and shoulder near Ogden Cove Rd.	1,875	35,325	7	19	**1,859** / 2,500
	16	NW17	East of I-77, along shoulder near Sterling Bay Apts.	2,295	42,210	13	37	**1,141** / 2,500
I-4750AA	17	NW 24	Adjacent to I-77 southbound from Wades Way to Edgeway Rd.	1,740	30,810	8	12	**2,568** / 2,605
	18	NW 25	Adjacent to I-77 southbound, from Sapphire Dr. to Bear Run Cir.	2,280	33,066	16	43	**769** / 2,605
	19	NW 27	Adjacent to I-77 southbound, from Hickory Hill Rd. to the northern end of Gibbs Rd.	4,080	72,596	21	33	**2,200** / 2,640
			Alternative 3 Totals	*44,820*	*867,122*	*368*	*763*	--

Source: I-3311C *Design Noise Report* (Atkins, June 2013), I-5405 *Design Noise Report* (Atkins, June 2012), I-5405 *Draft Design Noise Report Addendum* (Atkins, April 2013), and I-4750AA *Draft Design Noise Report* (RK&K, April 2013).

This evaluation completes the highway traffic noise requirements of Title 23 CFR Part 772. If any changes occur during final design, or new information becomes available that may result in a change to the proposed noise abatement measures, these changes must be reviewed and approved by FHWA prior to implementation.

In accordance with NCDOT Traffic Noise Abatement Policy, the Federal/State governments are not responsible for providing noise abatement measures for new development for which building permits are issued after the Date of Public Knowledge. The Date of Public Knowledge of the proposed highway project will be the approval date of the Finding of No Significant Impact (FONSI). For development occurring after this date, local governing bodies are responsible to insure that noise compatible designs are utilized along the proposed facility.

Construction Noise. The predominant construction activities associated with this project are expected to be earth removal, hauling, grading, and paving. Temporary and localized construction noise impacts will likely occur as a result of these activities. Generally, low-cost and easily implemented construction noise control measures should be incorporated into the project plans and specifications to the extent possible. These measures include, but are not limited to, work-hour limits, equipment exhaust muffler

requirements, haul-road locations, elimination of "tail gate banging", ambient-sensitive backup alarms, construction noise complaint mechanisms, and consistent and transparent community communication.

The I-77 corridor is densely developed with a mix of residential, institutional, commercial, and industrial land uses. Areas where construction noise could create temporary impacts include the noise sensitive areas adjacent to I-77, which are identified by the Noise Study Areas shown on the maps in **Appendix A**.

5.2.2 Air Quality

Detailed information regarding air quality impacts is presented in the *Microscale Carbon Monoxide and Mobile Source Air Toxics Air Quality Analysis, I-77 HOV-HOT Conversion* (Kimley-Horn and Associates, June 2013). The document can be viewed by request at the NCDOT Project Development & Environmental Analysis Unit, located in Century Center Building A, 1010 Birch Ridge Drive, Raleigh, NC.

No-Build Alternative

The selection of the No-Build Alternative would require an update to the region's current conformity determination (May 31, 2013), which includes the proposed project.

Build-Alternatives

The USDOT made a conformity determination on the MUMPO 2035 LRTP Amendment/FY 2012-2018 TIP Amendment on May 31, 2013. The current conformity determination includes Build Alternative 2 and is consistent with the final conformity rule found in 40 CFR Parts 51 and 93.

A quantitative CO hot-spot analysis was performed which concluded that none of the Build Alternatives would exceed the 1-hour or 8-hour standards for this pollutant.

In addition, a quantitative MSAT analysis for all of the Build Alternatives indicates a significant decrease in pollutant levels by the design year, consistent with what is being modeled and observed at the national level.

Therefore, the combined I-3311C, I-5405, and I-4750AA improvements are not anticipated to create any adverse effects on the air quality of the Mecklenburg and Iredell County nonattainment and maintenance areas, thereby complying with the NAAQS.

MSAT Research. Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

Incomplete or Unavailable Information for Project Specific MSAT Health Impact Analysis. In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, http://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are; cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/search.php?term=emissions).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are 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, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than one in a million due to emissions from a source. The results of this statutory two-step process do

not guarantee that cancer risks from exposure to air toxics are less than one in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Burning of Debris. Any burning of will be done in accordance with applicable local laws and ordinances and regulations of the North Carolina SIP for air quality in compliance with 15 NCAC 2D.1900. In addition, the Mecklenburg County Air Pollution Control Ordinance (MCAPCO) prohibits open burning and dust and related material discharges. Open burning is allowed under extenuating circumstances and requires a special permit.

Construction Air Quality. Construction activity may generate a temporary increase in MSAT emissions. Project-level assessments that render a decision to pursue construction emission mitigation will benefit from a number of technologies and operational practices that should help lower short-term MSATs. In addition, the SAFETEA-LU has emphasized a host of diesel retrofit technologies in the Congestion Mitigation and Air Quality Improvement (CMAQ) Program provisions – technologies that are designed to lessen a number of MSATs.

The EPA has listed a number of approved diesel retrofit technologies; many of these can be deployed as emissions mitigation measures for equipment used in construction. This listing can be found at: www.epa.gov/otaq/retrofit/index.htm.

5.2.3 Utilities

No-Build Alternative

There will be no impact to existing utilities under the No-Build Alternative.

If the No-Build Alternative is selected, as discussed in **Section 5.5**, there could be utility impacts associated with STIP Project I-3311E. Wherever possible, effects to utilities will be avoided through close coordination with municipalities and utility companies during design and construction.

Build Alternatives

Construction of any of the Build Alternatives could impact utilities. The impacts to utilities that would result from construction of any of the Build Alternatives will be temporary in nature.

Effects to utilities will be minimized and avoided through close coordination with municipalities and utility companies during design and construction. Where effects cannot be avoided, this coordination will serve to mitigate the effects. Mitigation measures that will be used include:

- Conduct early coordination with utility owners to modify design to avoid/minimize conflicts.
- Conduct early coordination with utility owners and operators to identify construction requirements and financial responsibility for relocations based upon easements, license agreements, ownership, or other existing agreements covering the use of affected utilities.

5.2.4 Visual and Aesthetic Resources

No-Build Alternative

Under the No-Build Alternative, there will be no change to, and therefore no impact to, the visual or aesthetic environments.

Build Alternatives

Build Alternatives 1 and 2 require the construction of two new bridges where there are no existing bridges. One new bridge will be located at the interchange of I-77/I-277 (Brookshire Freeway) and the second new bridge will be located at the interchange of I-77/I-85. Minor impacts in the visual landscape will occur from the construction of both bridges to motorists using I-77, I-277, and I-85, and to surrounding land uses.

The new bridge at the interchange of I-77/I-277 (Brookshire Freeway) will involve construction of a new grade-separated bridge from I-77 to I-277. This new structure will be added to an existing system of over and underpasses. The new bridge will be approximately 24 feet higher than the existing I-277 ramp to southbound I-77. This new bridge would not change the overall visual character or quality of the area.

The new bridge at the interchange of I-77 and I-85 will involve construction of a grade-separated bridge over I-85 for the northbound HOT lanes. The existing interchange is currently a complex system of ramps and bridges. The new bridge over I-85 will be approximately 25 feet higher than the existing I-77 bridges over I-85. This new bridge would not change the overall visual character or quality of the area.

For all of the Build Alternatives, the visibility of proposed improvements depends on the location of the viewer. However, the inclusion of treatments such as coloring of structural elements, buffer areas, and landscaped screening into a project design can obscure views and minimize impacts of transportation features.

Although there are no prominent scenic vistas or visual resources that will be affected by the Build Alternatives, and no substantial adverse visual effects are anticipated to result from the project, it is the policy of the NCDOT to include aesthetic features and landscaping in its roadway designs when practicable and cost effective. Such features may include:

- Integrating landscaping into the project design to promote visual continuity of the highway and to blend it into the natural landscape as much as possible.
- Minimizing the loss of vegetation, especially during construction when equipment and material access, storage, and staging are required.
- Design project features, if reasonable and feasible, to be compatible with the surrounding natural environment features and development.

5.2.5 Hazardous Materials

No-Build Alternative

There will be no construction activities under the No-Build Alternative and therefore no impacts from hazardous material sites will occur.

Build Alternatives

As summarized in **Section 4.2.6**, a review of the regulatory database search findings did not reveal any sites that would likely create substantial impacts for the Build Alternatives. Regulatory records for past

environmental incidents at various sites near and within the project study area were identified, but these incidents have been closed by NCDENR.

If any UST or other potential source of contamination is discovered during construction activities, NCDOT should be notified of their presence immediately upon discovery. An assessment will then be conducted to determine the extent of any contamination and identify the potential impacts.

5.2.6 Floodplains and Floodways

Potential impacts to floodplains and floodways were identified in three separate documents prepared by Atkins and RK&K. These reports, listed below, are incorporated by reference.

- *Preliminary Hydraulic Technical Memorandum* (Atkins, March 2012)
- *Preliminary Hydraulics Report* (RK&K, August 2012)
- *Preliminary Hydraulics Technical Memorandum* (Atkins, April 2013)

No-Build Alternative

There will be no construction activities under the No-Build Alternative and therefore no impacts to floodplains and floodways will occur.

If the No-Build Alternative is selected, as discussed in **Section 5.5**, there could be culvert extensions due to the widening that would occur in FEMA-regulated floodways and adjacent floodplains.

Build Alternatives

Potential impacts to floodplains and floodway from the Build Alternatives are discussed below by corridor section.

Section A (I-77 from I-277 to just north of I-85 (Exit 13)) and I-277. The *Preliminary Hydraulics Technical Memorandum* (Atkins, April 2013) focused on the reach of Irwin Creek from Lasalle Street to I-277 (Brookshire Freeway), including one box culvert at I-77 and one bridge crossing at Oaklawn Avenue.

Build Alternatives 1 and 2 will encroach on the jurisdictional limits of Irwin Creek. Both alternatives will require the extension of the existing box culvert that carries Irwin Creek under I-77. It is anticipated that the extension will impact approximately 162 linear feet for Alternative 1 and approximately 300 linear feet for Alternative 2.

Also for Alternative 2, the addition of a box culvert parallel to the Lasalle Street northbound exit ramp will impact over 1,000 linear feet of Irwin Creek. Irwin Creek at this location is approximately 30 to 40 feet lower than the existing roadway. Initial designs considered utilizing a retained earth wall to separate the ramp from the creek, but this would require a 30 to 40-foot vertical wall. Concern with this option was raised as the flow of the creek would be along the base of the wall, which could create additional maintenance and long term stability issues. The site is also physically constrained by other resources that include Double Oaks Park located adjacent to the creek to the east. This park is a Section 4(f) resource which limits the ability to realign the creek to the east. To the west side of I-77, just south of Lasalle Street, is the Oaklawn Park Historic District which limits the ability to realign the highway away from the creek. Finally, design standards regarding departure angle and deceleration lengths limit the ability to modify the ramp away from the creek. Therefore, a culvert is the proposed design option at this location.

Build Alternatives 1 and 2 will replace and realign the Oaklawn Avenue bridge over I-77. There is FEMA buyout property located to the north of the existing alignment of Oaklawn Avenue bridge. The new

bridge structure is not anticipated to affect the floodplain, however, coordination with FEMA is required.

Section B (I-77 from just north of I-85 (Exit 13) to West Catawba Avenue (Exit 28)). The *Preliminary Hydraulic Technical Memorandum* (Atkins, March 2012) concluded that adding additional lanes within the median of I-77 for the corridor south of Catawba Avenue (Exit 28) will require FEMA coordination at one major drainage crossing (Caldwell Station Creek) where the stream daylights within the median of I-77. Widening to the outside will require additional FEMA coordination at locations where culverts have to be extended within a FEMA regulated Special Flood Hazard Area (SFHA).

Section C (I-77 from West Catawba Avenue (Exit 28) to NC 150 (Exit 36)). The *Preliminary Hydraulics Report* (RK&K, August 2012) identified five hydrologic crossings north of Catawba Avenue (Exit 28) that are located in FEMA floodplains. Four of the structures are reinforced concrete box culverts and one is a dual bridge. The dual bridge can be widened so as to not impact the water surface elevation, the floodplain or the floodway by aligning proposed piers with existing piers. Drainage for additional impervious surface will be tied into the existing drainage system. However, based on future stormwater runoff calculations, future supplemental structures at these five crossings north of Catawba Avenue (Exit 28) are recommended (RK&K, August 2012).

Mitigation

The NCDOT Hydraulics Unit will coordinate with FEMA and local authorities to ensure compliance with applicable floodplain management ordinances. This coordination will occur under the Memorandum of Agreement (MOA) between NCDOT and the North Carolina Floodplain Mapping Program, which has been delegated by FEMA to maintain current Flood Insurance Rate Maps and handle map revisions or obtain a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).

This project involves construction activities on or adjacent to FEMA-regulated streams. Therefore, NCDOT Division 10 and 12 offices shall submit sealed as-built construction plans to the NCDOT Hydraulics Unit upon completion of project construction, certifying that the drainage structures and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically. Stream crossings in Section C of the project corridor are within 0.5 mile of a critical area of a water supply source classified as WS-IV. According to Appendix O of the NCDOT Guidelines for Drainage Studies and Hydraulic Design, there may be a need for Hazardous Spill Basins on the project.

The Hydraulics Unit will coordinate with the NC Floodplain Mapping Program, to determine status of project with regard to applicability of NCDOT'S Memorandum of Agreement, or approval of a CLOMR and subsequent final LOMR.

5.3 Cultural Resources

Cultural resources in the project study area are identified in **Section 4.3**.

No-Build Alternative

There will be no construction activities under the No-Build Alternative and therefore no impacts to cultural resources will occur.

If the No-Build Alternative is selected, as discussed in **Section 5.5**, there could be up to three residential relocations along Dean Street in the Oaklawn Park neighborhood associated with STIP Project I-3311E. The Oaklawn Park neighborhood has been determined eligible for the NRHP. The current designs

prepared for Project I-3311E, documented in the Project I-3311E CE (July 2011) were prepared prior to the designation of the Oaklawn Park neighborhood as eligible for the NRHP. A reevaluation of Project I-3311E and coordination with the NC-HPO would be required before implementation of that project to evaluate whether design measures could be taken to avoid impacting the properties within the historic district.

Build Alternatives

Historic Architectural Resources. The NC-HPO reviewed the project and determined no historic resources on or eligible for listing on the National Register of Historic Places (NRHP) will be affected by any of the Build Alternatives. As such, there will be no impact to historic architectural cultural resources. A Concurrence Form for Assessment of Affects was received from NC-HPO on February 19, 2013 and amended June 25, 2013, and is included in **Appendix C**.

If Build Alternative 3 is selected, as discussed in **Section 5.5**, there could be up to three residential relocations along Dean Street in the Oaklawn Park neighborhood associated with STIP Project I-3311E. The Oaklawn Park neighborhood has been determined eligible for the NRHP. The current designs prepared for Project I-3311E, documented in the Project I-3311E CE (July 2011) were prepared prior to the designation of the Oaklawn Park neighborhood as eligible for the NRHP. A reevaluation of Project I-3311E and coordination with the NC-HPO would be required before implementation of that project to evaluate whether design measures could be taken to avoid impacting the properties within the historic district.

Archaeological Resources. The NC-HPO concurred in a letter dated October 30, 2012, that there is one possible historic-era grave located on the Oaklawn Cemetery property near the proposed realignment and replacement of the Oaklawn Avenue bridge under Build Alternatives 1 and 2. Currently, the potential grave site is not within the proposed construction limits of Build Alternatives 1 or 2. However, if during final design it is determined that the potential gravesite area cannot be avoided, additional archaeological investigations will be necessary. This letter is included in **Appendix C**.

5.4 Natural Environment

5.4.1 Biotic Resources

Biotic communities in the project study area are described in **Section 4.4.2**.

No-Build Alternative

There will be no construction activities under the No-Build Alternative and therefore no impacts to biotic resources will occur.

Build Alternatives

All project related impacts will occur in an area already heavily disturbed by development. Impacts to biotic resources are not likely as project-related impacts to terrestrial (vegetative) communities will be largely restricted to the disturbed (maintained) areas along existing right of way and habitat for small or disturbance-adapted species will not change as a result of any of the build alternatives.

5.4.2 Water Resources and Water Quality

Water resources in the project study area are identified in **Section 4.4.3**.

No-Build Alternative

There will be no construction activities under the No-Build Alternative and therefore no impacts to water resources will occur.

Build Alternatives

Water Quality. Construction activities will mainly involve widening in the median of I-77. Drainage for the additional impervious surface will be tied into the existing drainage system. Also for Alternative 2, the addition of a box culvert parallel to the Lasalle Street northbound exit ramp will impact over 1,000 linear feet of Irwin Creek, an impaired stream on the 303(d) list. Short term impacts to water quality, such as sedimentation and turbidity, can be anticipated from construction-related activities. In efforts to minimize water resource impacts, construction activities will follow the NCDOT *BMP's for Construction and Maintenance Activities and Protection of Surface Waters*. Sedimentation control guidelines will be strictly enforced during construction activities. Additional BMP's are outlined in the "Design Standards in Sensitive Watersheds" (NCAC 04B .0024), and should be adhered to during the design and construction of this project in and around all waters classified as "Water Supply".

Some of the stream crossings are within 0.5 mile of a critical area of a water supply source classified as WS-IV (See **Appendix A**). According to Appendix O in the NCDOT *Guidelines for Drainage Studies and Hydraulic Design*, there may be a need for Hazardous Spill Basins on the project.

There are no large cuts that would affect groundwater on the project. In accordance with standard practice locations with high groundwater will be drained with appropriate subsurface drains. No harmful effects to the groundwater system are expected as a result of this project.

Catawba-Wateree Hydro Project. Lake Norman is included in the FERC boundary for the Catawba-Wateree Hydro Project, for which Duke Energy Corporation has a FERC license. Any non-maintenance activity that encroaches on the FERC boundary (the full pond contour of 760 feet above mean sea level for Lake Norman) requires a permit. I-77 crosses Lake Norman three times within the project area and a FERC permit would be needed to construct the project. NCDOT will coordinate with Duke Energy Corporation to obtain the necessary FERC permit.

5.4.3 Jurisdictional Topics

Jurisdictional topics include impacts to Waters of the United States (wetlands, streams, and ponds) and impacts to Catawba River riparian buffers.

No-Build Alternative

There will be no construction activities under the No-Build Alternative and therefore no impacts to jurisdictional resources will occur.

If the no-build alternative is selected and Project I-3311E is implemented, Project I-3311E is estimated to impact approximately 48 linear feet of stream due to culvert extensions, as discussed in **Section 5.5.**

Build Alternatives

Wetlands, Streams, and Ponds. Table 5-4 identifies the preliminary impacts to potential jurisdictional resources for the Build Alternatives. These preliminary impact estimates were calculated using a 20-foot buffer of the preliminary design construction limits. As shown in **Table 5-4**, the project has the potential to impact 0.007 acres of wetlands, 0.016 acres of open water (ponds), and between 1,071 for Build Alternative 3 and 3,237 linear feet of jurisdictional streams for Build Alternative 2. Impacts were calculated from preliminary design construction limits plus 20 feet, in accordance with NCDOT standard procedures.

If Alternative 3 is selected and Project I-3311E is implemented, Project I-3311E is estimated to impact approximately 48 linear feet of stream due to culver extensions, as discuss in **Section 5.5.**

Construction activities associated with the Build Alternatives will include lengthening existing drainage structures in stream channels. The construction activities will follow the NCDOT's BMPs for Construction and Maintenance Activities and Protection of Surface Waters. Sedimentation control guidelines will be strictly enforced during construction activities.

There is no impact identified at Lake Norman and the project would not involve construction activities outside the existing right of way that would impact the Catawba River Riparian Buffer.

Table 5-4 identifies the preliminary impacts to potential jurisdictional resources for the Build Alternatives. These preliminary impact estimates were calculated using a 20-foot buffer of the preliminary design construction limits (March 2013).

Table 5-4. Potential Impacts to Jurisdictional Resources

Resource	Alternative 1	Alternative 2	Alternative 3
Wetland Communities		**Acres**	
W13	0.007 (300 sq ft)	0.007 (300 sq ft)	0.007 (300 sq ft)
Total	**0.007**	**0.007**	**0.007**
Open Water (Ponds)		**Acres**	
OWL (12)	0.003	0.003	0.003
OWK (11)	0.013	0.013	0.013
Total	**0.016**	**0.016**	**0.016**
Jurisdictional Streams		**Linear Feet**	
Caldwell Station Creek	91	91	91
Dillons Twin Lakes	467	467	467
Dixon Branch	81	81	-
Irwin Creek	1,809	2,009	-
Long Creek	22	22	22
S17	56	56	56
S20	77	77	77
S22	34	34	34
S25	31	31	31
S36	29	29	29
S38	28	28	28
S40	77	77	77
S45	26	26	26
S46	12	12	12
S52	45	45	45
S57	-	67	-
S59	14	9	-
S60	76	76	76
Total	**2,975**	**3,237**	**1,071**

Preliminary impact estimates were calculated using a 20-foot buffer of the conceptual design slope stakes (March 2013)

Catawba River Buffer Rules. Impact to the Catawba River Riparian Buffer cannot be avoided by any of the proposed Build Alternatives because the current alignment of I-77 already crosses Lake Norman, which is subject to the buffer rule. Estimated encroachment into Buffer Zones 1 and 2 is the same for all three Build Alternatives. The majority of this encroachment is the result of resurfacing the existing travel lanes and shoulders on the causeway. Total estimated impacts from all encroachment into Zone 1 is 47,916 square feet (1.1 acres). Total estimated impacts from all encroachment into Zone 2 is 135,036 square feet (3.1 acres).

Road crossings are subject to the Catawba River Riparian Buffer Rules, as discussed above. Road crossings that impact greater than 40 linear feet, but equal to or less than 150 linear feet or one-third acre (14,505 square feet) of riparian buffer are allowable without mitigation. Road crossings that impact greater than 150 linear feet or one-third acre of riparian buffer are allowable with mitigation. These uses require prior written authorization from the NCDWQ. NCDOT will coordinate with NCDWQ as applicable.

Implementation of the Preferred Alternative would be a designated as a use that is allowable with mitigation because the impact is more than one-third acre of buffer. A determination of "no practical alternative" is required from the NCDWQ, and approval of mitigation (15A NCAC 02B.0244).

The required area of mitigation shall be determined by the NCDWQ by applying a multiplier of 2.0 to impacts in Zone 1 of the riparian buffer and a multiplier of 1.5 to impacts in Zone 2. Mitigation may be met by payment of a compensatory mitigation fee to the Riparian Buffer Restoration Fund, donation or real property or of an interest in real property, or restoration or enhancement of a non-forested riparian buffer (15A NCAC 02B.0244). The NCDWQ will issue a mitigation determination that specifies the required mitigation (15A NCAC 02B.0244).

Permits. Permits from the USACE under Section 404 of the Clean Water Act will be required for impacts to jurisdictional Waters of the United States. In addition, a Section 401 Water Quality Certification from the NC Division of Water Quality (NCDWQ) would be required prior to issuance of the Section 404 permit. Based on the length of stream impact, an Individual Permit is anticipated. The USACE holds the final discretion as to what permit will be required to authorize project construction. All permit options (Regional General Permit, Nationwide Permit, and an Individual Permit) will be coordinated with the appropriate agencies.

Mitigation. The USEPA and USACE regulations governing wetlands mitigation embrace a policy of "no net loss of wetlands" and sequential consideration of avoidance, minimization, and mitigation.

Three general types of wetland and stream mitigation include avoidance, minimization and compensatory mitigation. Compensatory mitigation typically consists of the restoration of existing degraded wetlands or waters, or the creation of Waters of the US of equal or greater value than the waters to be impacted. This type of mitigation is only undertaken after avoidance and minimization actions are exhausted and should be undertaken, when practicable, in areas near the impact site (i.e., on-site compensatory mitigation).

The NCDOT will begin investigating potential on-site stream and wetland mitigation opportunities after approval of the FONSI. If on-site mitigation is not feasible, mitigation will be provided by North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP).

A final determination regarding mitigation to the Waters of the US rests with the USACE and the NCDWQ, and compensatory mitigation for impacts will be resolved during the permitting phase.

5.4.4 Protected Species

A brief description of physical characteristics and a summary of habitat preferences and findings for the protected species discussed in **Section 4.4.4** are provided below:

Mecklenburg County

- **Carolina heelsplitter -** The study area contains numerous streams with various substrates, most of which are moderately to severely degraded. The presence of pollutants and sediment from overland runoff likely precludes the establishment of Carolina heelsplitter in these reaches. No populations of the mussel have been found within the stream drainages associated with the project corridor. The closest existing occurrence known in the Catawba River system is near the South Carolina state line in southern Union County. A recent review of the North Carolina Natural Heritage Program (NHP) database was conducted (January 19, 2012) to determine if there were any records of rare mussels within the proposed project study area or receiving waters. This review indicated that there are no known occurrences of the federally protected Carolina heelsplitter within the project area. The closest population is in Waxhaw Creek (Catawba subbasin HUC 03050103), which is over 25 miles away from this project. There is lack of suitable habitat and data indicating that there are no known occurrences of Carolina Heelsplitter in the project area (memo dated January 20, 2012, NCDOT Natural Environment Section) (see **Appendix C**).

  BIOLOGICAL CONCLUSION: NO EFFECT

- **Michaux's sumac** - The study area contains approximately 15 to 20 acres of suitable habitat for Michaux's sumac. Roadway shoulders, utility rights of way, and mowed forest edges provide exposed situations and are frequently encountered. Detailed surveys for Michaux's sumac were performed by Atkins biologists on October 17-21, 2011. All areas of suitable habitat were systematically walked and visually surveyed. In areas where large blocks of habitat occurred, overlapping transects were employed to ensure coverage of all habitat. No occurrences of Michaux's sumac were found. A review of NCNHP records, updated May 2012, indicates no known Michaux's sumac occurrence within one mile of the project study area.

  BIOLOGICAL CONCLUSION: NO EFFECT

- **Schweinitz's sunflower** - The study area contains approximately 15 to 20 acres of suitable habitat for Schweinitz's sunflower. Roadway shoulders, utility right-of-ways, and mowed forest edges provide exposed situations and are frequently encountered. Detailed surveys for Schweinitz's sunflower were performed by Atkins biologists on October 17-21, 2011. All areas of suitable habitat were systematically walked and visually surveyed. In areas where large blocks of habitat occurred, overlapping transects were employed to ensure coverage of all habitat. No occurrences of Schweinitz's sunflower were found. A review of NCNHP records, updated May 2012, indicates no known Schweinitz's sunflower occurrence within one mile of the project study area.

  BIOLOGICAL CONCLUSION: NO EFFECT

- **Smooth coneflower** - Suitable habitat for smooth coneflower in the study area occurs in areas along stream drainages. Detailed surveys for smooth coneflower were performed by Atkins biologists on October 17-21, 2011. All areas of suitable open habitat were surveyed, with particular attention being paid to areas of neutral to basic soils. Habitat was systematically walked and visually surveyed, and overlapping transects were employed to

ensure coverage of all habitat. No occurrences of coneflower were found. A review of NCNHP records, updated May 2012, indicates no known smooth coneflower occurrence within one mile of the project study area.

BIOLOGICAL CONCLUSION: NO EFFECT

Iredell County

- **Bog turtle** - Species listed as Threatened Due to Similarity of Appearance do not require Section 7 consultation with the USFWS. However, this project is not expected to affect the bog turtle because no suitable habitat is present within the project study area. Freshwater wetlands within the project study area are forested riparian systems. A review of NCNHP records, updated August 2012, indicates no known bog turtle occurrence within one mile of the project study area.

BIOLOGICAL CONCLUSION: NOT REQUIRED

- **Dwarf-flowered heartleaf** - Suitable habitat for dwarf-flowered heartleaf is present in the study area along forested slopes adjacent to intermittent and perennial streams and along hillsides and ravines throughout the project study area. Habitat evaluations were conducted by ESI biologists on March 13 - 15 and March 20-22, 2012. Following confirmation of the flowering status of dwarf-flowered heartleaf at a nearby reference population, surveys were conducted in the project study area on March 27- 29 and April 12, 2012. Slopes, hillsides, and ravines containing heartleaf species were surveyed for the presence of dwarf-flowered heartleaf. A related species, little brown jugs, was observed in flower in several of the areas surveyed within the project study area but no individuals of dwarf-flowered heartleaf were observed. A review of NCNHP data, updated August 2012, indicates no known occurrences within one mile of the project study area.

BIOLOGICAL CONCLUSION: NO EFFECT

Bald Eagle and Golden Eagle Protection Act

Since there was no foraging habitat within the review area, a detailed survey of the project study area and the area within 660 feet of the project limits was not conducted. A review of the NCNHP database dated October 2011 revealed no known occurrences of bald eagles within one mile of the project study area. The closest bald eagle record is in the Catawba River, approximately 6 miles west of the project study area. Due to the lack of habitat, known occurrences, disturbed nature of the project corridor, it has been determined that this project will not affect this species.

Table 5-5 summarizes the federally protected species in Mecklenburg County and Iredell County and the biological conclusions for potential impacts to these species as a result of the project.

Table 5-5. Federally Protected Species - Mecklenburg and Iredell Counties

County	Species		Federal Status	Habitat Present	Biological Conclusion
	Scientific Name	Common Name			
Mecklenburg	*Lasmigona decorata*	Carolina heelsplitter	E	No	No Effect
	Rhus michauxii	Michaux's sumac	E	Yes	No Effect
	Helianthus schweinitzii	Schweinitz's sunflower	E	Yes	No Effect
	Echinacea laevigata	Smooth coneflower	E	Yes	No Effect

Table 5-5. Federally Protected Species - Mecklenburg and Iredell Counties

County	Species		Federal Status	Habitat Present	Biological Conclusion
	Scientific Name	Common Name			
Iredell	*Clemmys muhlenbergii*	Bog turtle	T (S/A)	No	Not Required
	Hexastylis naniflora	Dwarf-flowered heartleaf	T	Yes	No Effect

Source: *Natural Resources Technical Report* (Atkins, February 2012); *Protected Species Report for I-5405* (NCDOT, January 20, 2012), *Natural Resources Technical Report* (RK&K, September 2012)
E – Endangered
T – Threatened
T(S/A) – Threatened due to similarity of appearance

5.5 Indirect and Cumulative Effects

The project has been evaluated through application of the Indirect and Cumulative Impact (ICI) Pre-Screening Procedure as set forth in the NCDOT/NCDENR *Guidance for Assessing the Indirect and Cumulative Impacts of Transportation Projects in North Carolina – Volume II: Practitioner's Handbook (Section II: Pre-Screening Projects for Applying Indirect & Cumulative Impact Assessment)* – the *ICE Guidance.*

Based on the ICE Pre-Screening applied specifically to this project, it is concluded that the project has low potential to result in significant indirect and cumulative impacts, as defined by the National Environmental Policy Act or the North Carolina Environmental Policy Act. This conclusion is based on evaluation of the project's design concept and scope, including purpose and need, type, facility function, and design year of 2017, in combination with evaluation of the demographic, land use and planning trends of the area in which the project is located. The data and evaluation supporting this conclusion are included in the *Community Impact Assessment & Screening Indirect and Cumulative Effects Assessment* (Atkins, May 2013) and are incorporated by reference:

- The project is not likely to influence future growth and development in the project area. In addition, the potential for indirect impacts in the form of changes in land use is low. Existing development trends were identified in the *Community Impact Assessment & Screening Indirect and Cumulative Effects Assessment*, and consist of various densities of office, commercial, and industrial land uses surrounding interchanges. Various levels of single and multifamily development are located between interchanges and adjacent to the corridor. These existing development patterns along the corridor are expected to continue, but the project will not add any interchanges or access point on I-77 that may attract new development. Therefore, although the project has the potential to influence the timing of development along the corridor, local plans are in place to regulate the type and intensity of development that will be allowed. It is reasonable to assume that municipal land use plans and policies would not be modified as a result of the proposed project, nor would the project conflict with existing plans and policies.
- Project improvements will be predominately within existing right of way and mitigation of potential impacts is not likely to result in project-induced effects. The project will introduce an option for more reliable travel times in the area through enhanced mobility, but will not affect traffic or land use patterns in the area since it will not add any new access points or interchanges.

- The project has a low potential for cumulative effects resulting from incremental effects of the project with other past, current, and future projects in the area. Non-transportation projects include concentrated residential and commercial development in northern Mecklenburg County (the towns of Huntersville, Cornelius, and Davidson) and southern Iredell County (Town of Mooresville). Transportation projects include those past transportation projects listed in **Section1.3**, as well as current and future transportation projects listed in **Section3.1**.

One project, STIP Project I-3311E, is within the study corridor and is scheduled for construction in the same time period as the proposed project. The limits of Project I-3311E are I-77 from I-277 to I-85. Project I-3311E would widen the I-77 southbound travel lanes to 12-foot lanes, widen the inside shoulder to 10 feet, and widen the outside shoulder to 12 feet for a total widening of the overall roadway by 12 feet. Project I-3311E is a result of design exceptions approved by FHWA on December 21, 2004 for Project I-3311A, which constructed the southbound HOV lane on I-77. The design exceptions were granted provided they could be addressed with a future project, STIP Project I-3311E. A Categorical Exclusion (CE) was approved for Project I-3311E on June 20, 2011, which is incorporated by reference. The project is scheduled in the STIP for construction beginning in FY 2015.

Project I-3311E would have a cumulative effect under the No Build Alternative and Build Alternative 3. Build Alternatives 1 and 2 would provide the proposed lane and shoulder widening identified in STIP Project I-3311E as part of these alternative's designs south of I-85.

Based on the preliminary designs included in the Project I-3311E CE, Project I-3311E would cost $14.778 million in 2011 dollars. The proposed project is not expected to have an adverse effect on the quality of the human or natural environment. The CE documents the following effects of Project I-3311E.

- Project I-3311E will require right of way from residential properties along Dean Street. The existing brick wall along the southbound I-77 right of way will be moved closer to several residences due to the widening of the southbound lanes and shoulders. There will be three residential relocations as a result.
- Noise levels could increase during construction but will be temporary.
- At the I-77 culvert crossing of Irwin Creek, the existing culvert would be extended approximately 32 feet. Since this culvert extension will occur in a FEMA-regulated floodway and the adjacent floodplain contains insurable structures, FEMA approval will be required.
- Underground fiber optic cable for the Charlotte Intelligent Transportation System (ITS) network is located in the existing paved shoulder along southbound I-77 and would be impacted by the proposed improvements. Several other utilities are located in the study area, including water/sewer pipes under I-77, Piedmont Natural Gas high pressure gas lines, and Duke Power high-voltage power lines. Coordination with utility providers would be required to minimize impacts to service.
- It is anticipated that the proposed project will impact a total of 48 linear feet of streams due to culvert extensions at three streams crossing under I-77, including the 32-foot culvert extension at Irwin Creek. No wetlands will be impacted.

Since the June 2011 CE for Project I-3311E, the Oaklawn Park neighborhood, which includes the homes on Dean Street, has been determined eligible for the NRHP. The relocations and property encroachment along Dean Street documented in the Project I-3311E, would now also be impacts to an historic district (which is also a Section 4(f) resource). If the proposed I-3311E design was shifted east to avoid this historic district and the three relocations, the other impacts listed above would remain the

same. Stream impacts would be the same because the widening would simply occur on the west side of the culverts instead of the east side. However, shifting the widening to the east to avoid the historic district and relocations would introduce a curve in an otherwise straight stretch of interstate, which would not be desirable. Shifting the widening east also would involve the northbound lanes of I-77 in the design of the widening, which would make traffic control and construction phasing more complex and substantially increase the costs of Project I-3311E. A reevaluation of Project I-3311E would be required before implementation of I-3311E to assess design options.

Direct natural environmental impacts of the project, as well as other reasonably foreseeable projects in the study area, will be addressed during programmatic discussions with resource agencies, and will be further evaluated by the NCDOT Natural Environment Section during project permitting for each project. Significant cumulative impacts to water resources and other natural resources are not expected. Together these projects will increase impervious surface area; however, the environmental permitting process combined with the application of BMPs and stormwater management regulations will minimize cumulative effects. Other natural environmental impacts that may result from the cumulative effect of these projects will be addressed through the implementation of local, state and federal regulations.

In conclusion, based on the current design alternatives being developed for the project, which are largely confined to the existing right of way, implementation of the project would not contribute, in conjunction with past, present, or future projects, to significant adverse cumulative effects on resources in the study area.

5.6 Temporary Construction Impacts

A construction mitigation plan will be developed during the design phase that will contain detailed information regarding traffic operations during construction. As with all construction projects, proper traffic management plans will be developed and implemented in coordination with the local agencies and in compliance with local agency and federal guidelines in an effort to minimize traffic pattern changes and associated impacts. Typical traffic control plans and standard construction phasing procedures will be part of the construction process. The construction plans will account for impact to motorists during all phases of construction. The plans may require the development of an emergency response plan to ensure emergency responders have sufficient and available roadway access to respond to their calls. Finally, all construction plans will incorporate techniques for managing traffic flows, while creating and maintaining a safe working environment for the construction workers. This may include a public information program to communicate timely information regarding construction times and other necessary information throughout the duration of construction.

As the replacement of up to six bridges would occur simultaneously with the proposed action, the same noise and other construction limitations would apply as for the rest of the proposed action. The exact method by which traffic flow would be maintained has not been determined. The contractor may elect to maintain traffic on the current bridges while construction is underway, resulting in no additional impacts. Alternatively the contractor could elect to build temporary bridges, which would be demolished once the project is complete. Thus, it is impossible to identify any additional temporary environmental impacts associated with maintaining traffic on the bridges. Once the construction traffic management plan is prepared, NCDOT will evaluate whether there are any impacts that have not been evaluated in this document and prepare any additional documentation necessary under NEPA.

6 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

This section summarizes the agency coordination and public involvement activities conducted in association with this project.

6.1 Agency Coordination

A Start of Study Notification letter was sent to various resource agencies and elected officials in January 2013. The purpose of the letter was to solicit input concerning known environmental conditions and potential impacts within the corridor, particularly as they relate to social, economic, cultural, physical, or biological resources. The following agencies and elected officials received the Start of Study notification letter. An asterisk (*) Indicates a response was received and correspondence is included in **Appendix E**.

Agencies

- Centralina Council of Government
- Charlotte Department of Transportation*
- Charlotte Mecklenburg Police Department*
- Charlotte Fire Department*
- Charlotte Mecklenburg School District
- City of Charlotte
- Cornelius-Lemley Fire & Rescue
- Cornelius Police Department
- Davidson Fire Department
- Davidson Police Department
- Federal Highway Administration
- Iredell County*
- Lake Norman RPO*
- Lake Norman Transportation Commission
- Mecklenburg County
- Mecklenburg EMS Agency
- Mecklenburg-Union Metropolitan Planning Organization*
- North Mecklenburg Volunteer Rescue Squad
- State Historic Preservation Office (NC-HPO)
- Town of Cornelius*
- Town of Davidson
- Town of Huntersville
- Town of Mooresville*
- US Army Corps of Engineers
- US Environmental Protection Agency
- US Fish and Wildlife Service

Elected Officials

- Robert Pittenger – US Congressman District 9
- Melvin Watt – US Congressman District 12
- David Curtis –NC Senate District 44
- Jeff Tarte – NC Senate District 41
- Joel Ford – NC Senate District 38
- Malcolm Graham – NC Senate District 40
- Daniel Clodfelter – NC Senate District 37
- Kelly Alexander – NC House District 107
- Beverly Earle – NC House District 101
- Carla Cunningham – NC House District 106
- Charles Jeter – NC House District 92
- Thom Tillis – NC House District 98
- Robert Brawley – NC House District 95

A total of 175 comments were received from 16 agencies. No elected officials submitted comments. **Table 6-1** identifies comments by common topic and the number of agencies that provided comments on that topic. Specific comments received are included in **Appendix E.**

Table 6-1: Summary of Scoping Comments

Topic	Number of Agencies Commenting
Air Quality	3
Bridge Construction	2
Design	4
Hazardous Materials	2
Historic Resources	2
Safety	2
Construction Phasing	2

A meeting with agencies was held on February 20, 2013 to answer their questions and provide additional information about the project. Agencies in attendance (in person or via conference call) included:

- City of Charlotte
- Centralina Council of Governments
- EPA
- FHWA
- NCDOT
- NCDWQ
- USACE
- USFWS

6.2 Public Involvement

Efforts to inform and encourage input from area residents, businesses, and other stakeholders were conducted throughout 2012 and early 2013. Two sets of Citizens Informational Workshops were held, as well as several neighborhood meetings. **Appendix F** includes copies of workshop notification newsletters, public involvement materials (workshop handout), and the public comments received throughout the public involvement process.

6.2.1 Citizens Informational Workshops - Project I-5405

Two Citizens Informational Workshops were held to allow the public the opportunity to review the project and provide comments. On April 25, 2012, notices were mailed to adjacent property owners (552 mailings) and local officials (68 mailings). Public Meeting notices were also placed in area newspapers; including La Noticia (May 2 and 9), Charlotte Observer (April 29, May 3, 7, 9), and the Charlotte Post (May 3 and 10). Workshops were held from 4:00 pm to 7:00 pm at the following locations:

May 9th, 2012
Cornelius Town Hall
21445 Catawba Ave, Cornelius
Attendees: 25

May 10th, 2012
NCDOT Traffic Management Center
2327 Tipton Dr, Charlotte
Attendees: 4

Project maps and information were displayed at the workshops, and agency and consultant staff were there to discuss the project and answer questions. The workshops were an open house format and did not include a formal presentation.

A total of 13 citizens and agencies provided comments on the project. Eight comment forms were submitted at the workshop on May 9, one comment form was submitted on May 10, and one comment form was submitted via email. The comment period remained open until May 21, 2012. Three additional comments were received after the workshop.

When asked if they felt that adding HOT lanes would help reduce congestion along I-77, nearly all of the citizens completing comment forms answered "yes." When asked if they would be willing to pay a toll to use the HOT lanes, six of the ten respondents answered "yes" and two answered "maybe." Four citizens had comments regarding I-77 entry and exit ramps. These comments were:

- Request for a roundabout at Exit 30
- Request to provide future exit and entry ramps directly to I-77 at Westmoreland Road
- Concern about the ability of the existing entry and exit ramps to handle increased traffic volumes
- Concern regarding potential future traffic backups during rush hour at Exit 28 as they exist today at Exit 23

The Town of Huntersville provided comments concerning operational impacts, secondary and cumulative impacts, and considerations for the larger travel corridor. Operational concerns expressed in the comments included impacts to interchange ramps and local system intersections, and impacts at either end of the project if adjacent projects do not occur in a timely fashion. The comments expressed a desire for a thorough study of regional transportation needs in the travel corridor between Charlotte and Statesville. The Town feels the project should fit into an overall strategy that is environmentally and fiscally achievable and does not preclude or make more expensive other investments in the corridor.

6.2.2 Citizens Informational Workshops - Projects I-3311C and I-4750AA

NCDOT held two joint Citizens Informational Workshops to inform local residents and officials about these two HOT lane projects being studied in the area. At the time of these workshops, information for the I-4750AA project was identified as I-4750 (HOT). Information about all three STIP projects, I-3311C, I-5405 and I-4750AA was provided at the workshops.

The workshops were advertised through a public notice, newsletters, local television stations, and radio. Workshops were held from 5:00 pm to 7:00 pm at the following locations:

August 1, 2012	August 2, 2012
Cornelius Town Hall	Ivory Baker Recreation Center
21445 Catawba Ave, Cornelius	1920 Stroud Park Court, Charlotte
Attendees: 54	Attendees: 25

The purpose of the workshops was to inform the community of the proposed introduction of HOT lanes along portions of I-77 and I-277. Project maps, a handout, a summary of frequently asked questions, diagrams of typical sections, and other information were distributed or displayed.

Comment forms with four questions were provided at the workshops. Nineteen comment forms and two letters were submitted at the workshops. The comment period remained open until August 17, 2012. One comment was submitted via email after the workshops were held.

In general, those commenting on the project noted that I-77 currently does not have enough capacity where there are two lanes, that additional lanes would reduce delay, and that a corridor wide approach is needed. Additional data was requested on the success of HOT lanes currently operating in other locations. When asked if they would be willing to pay a toll to use the HOT lanes, 7 of the 19 respondents answered "yes" and 10 answered "no". Two respondents did not answer the question.

6.2.3 Oaklawn Park Neighborhood Meetings

After the public workshops, several residents of the Oaklawn Park Neighborhood requested follow up meetings. Team representatives met with neighborhood residents on four occasions. These included:

Tuesday, August 14, 2012 – A meeting with residents was held at the home of an Oaklawn Park resident. Approximately three residents were in attendance. This meeting was held to provide workshop information to several residents unable to attend the workshops. The general concern raised by residents was the right of way acquisition process.

Monday, September 10, 2012 – This meeting was held at the request of Oaklawn Park residents at the Ivory Baker Recreation Center. Approximately 20 to 30 residents were in attendance. The information from the August workshops was presented, with emphasis on the Oaklawn Park neighborhood area of the I-77 corridor. Potential right of way needs resulting in the displacement of homes raised the most concern from meeting attendees.

Monday, January 7, 2013 – Project team members met with the Oaklawn Park Community Improvement District Organization at the Ivory Baker Recreation Center to provide an update on the I-3311C project and the potential impacts to Oaklawn Park neighborhood. Approximately 20 to 30 residents were in attendance.

This meeting was held to inform Oaklawn Park residents that NCDOT listened to their concerns about potential impacts from right of way acquisition in the neighborhood. The meeting presented the concept of a new design that would possibly eliminate impacts to the Oaklawn Park neighborhood by widening to the east side of I-77. Preliminary designs were not available for viewing at this meeting but have since been completed and are part of Alternatives 1 and 2. A question and answer session was conducted, with most questions about the NCDOT right of way acquisition process.

Monday, March 4, 2013 – Project team members met with the Oaklawn Park Community Improvement District Organization at the Ivory Baker Recreation Center to present revised preliminary designs in the vicinity of the Oaklawn Park Neighborhood. Approximately 20 to 30 residents were in attendance.

Updated conceptual designs were shared with the group that showed the elimination of the potential relocations along Dean Street. The designs were revised to shift all widening to the east side of I-77 to not only avoid the potential residential relocations but to also avoid any direct impacts to the Oaklawn Park neighborhood, which has been determined to be eligible for listing on the National Register of Historic Places. It was shared that a noise impact analysis was underway and there is a possibility that noise walls may be included which could replace the existing privacy wall along Dean Street. The residents expressed their desire for only one wall to be present and questioned what the new noise wall would look like. An explanation was given as to the potential types of noise wall which are available, but a final decision regarding the wall's appearance would not be made until it is determined that a noise wall is feasible and reasonable and the benefited residents and property owners confirm their desire for

its construction. Determination of the aesthetics of the wall will be made during the final design portion of the project. The community also requested a copy of the Environmental Assessment for review when it is available.

Other questions / concerns raised at the meeting were in regard to recent flooding in the backyards along Dean Street, which were causing sinkholes in the area. These questions and concerns were forwarded to Charlotte-Mecklenburg Stormwater Services.

Monday, May 6, 2013 – Project team members met with the Oaklawn Park Community Improvement District Organization at the Ivory Baker Recreation Center to discuss potential noise barriers. Approximately 20 residents were in attendance. Potential noise barriers were discussed; specifically what they could look like. Team members explained to residents how to participate in a voting process that is expected to determine what potential noise barriers will look like. The voting process will also be used to determine if local residents want noise barriers installed.

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