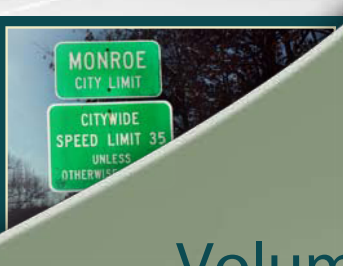
NORTH CAROLINA
Turnpike Authority

A Division of NCDOT





Volume 1
Text and Figures

Monroe Connector/Bypass

Administrative Action
Draft Supplemental Final
Environmental Impact Statement

November 2013

Lead Agencies: US Department of Transportation
Federal Highway Administration
North Carolina Department of Transportation

Cooperating Agency: US Army Corps of Engineers

Submitted Pursuant to the National Environmental Policy Act
23 CFR 771.119 and 42 USC 4332(2)(c)

Monroe Connector/Bypass
Mecklenburg and Union Counties
STIP Projects R-2559 and R-3329

ABSTRACT

This report is a Supplement to the May 25, 2010 Final Environmental Impact Statement for the Monroe Connector/Bypass. The proposed action is the construction of a controlled-access toll facility extending from US 74 near I-485 in Mecklenburg County to US 74 between the towns of Wingate and Marshville in Union County, a distance of approximately 20 miles.

On May 3, 2012 the United State Court of Appeals for the Fourth Circuit in North Carolina Wildlife Federation, Clean Air Carolina; Yadkin Riverkeeper v. North Carolina Department of Transportation and Federal Highway Administration, No. 11-2210, held that the Federal Highway Administration (FHWA) and the North Carolina Department of Transportation (NCDOT) had not complied with the provisions of the National Environmental Policy Act (NEPA) by failing to disclose critical assumptions underlying their decision to build the proposed project and by providing the public with incorrect information. Specifically, in addressing public comments on the project as to whether the data set used as the project's no-build scenario for the indirect and cumulative analysis contained the project, the agencies responded "TAZ socioeconomic forecasts for the No Build Scenario did not include the Monroe Connector. [The Mecklenburg Union County Metropolitan Planning Organization (MUMPO) confirmed our assumption regarding the reasonableness of the 2030 TAZ forecasts for use as a No Build basis." The second sentence accurately reflects the agencies' final conclusion, but the first sentence is not correct. Travel time to employment, one of eight land development factors for Union County used to project no-build growth estimates for the year 2030, presumed the presence of the proposed Monroe Connector/Bypass. As a result, the data relied upon to reflect the no build scenario included a build assumption. In response to the court's decision FHWA rescinded the Record of Decision (ROD) for this project on July 3, 2012. NCDOT and FHWA then re-initiated the National Environmental Policy Act (NEPA) process which has led to the development of this Draft Supplemental Final Environmental Impact Statement (EIS).

This Draft Supplemental Final EIS (DSEIS) addresses current environmental conditions and focuses on any changes that have occurred with regards to the project (note: there have been no changes in the proposed action), the alternatives analysis, the affected environment and impacts, and any new issues or information identified since the Final EIS was published. This DSEIS also documents the assumptions and methods underlying the modeling for the quantitative indirect and cumulative effects analysis at issue in the prior litigation, documents the actions taken to test the propriety of using the data set provided by MUMPO, and explains how and why the agencies determined the no-build and build models for the indirect and cumulative effects analysis are reasonable and enable a meaningful comparison of the environmental impacts associate with the build and no-build scenarios.

Requests for project documentation may be directed to the NCDOT at the contact below.

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FHWA-NC-EIS-09-01-DS

Monroe Connector /Bypass
From Near I-485 at US 74 to
US 74 Between the Towns of Wingate and Marshville
Mecklenburg and Union Counties

Federal Aid Project No. STP-NHF-74(90)
WBS No. 34533.1.1TA1
STIP Project No. R-3329/R-2559

ADMINISTRATIVE ACTION
Draft Supplemental Final Environmental Impact Statement

November 2013
Submitted Pursuant to 42 USC 4332(2)(c)
UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
&
NC DEPARTMENT OF TRANSPORTATION

Cooperating Agency: US Army Corps of Engineers

Approved

11/5/13
Date

Richard W. Hancock, PE, Manager
Project Development and Environmental Analysis Unit
North Carolina Department of Transportation

11/8/13
Date

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

The FHWA will issue a single Final Environmental Impact Statement and Record of Decision document pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless FHWA determines statutory criteria or practicability considerations preclude issuance of the combined document pursuant to Section 1319.

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Monroe Connector /Bypass
From Near I-485 at US 74 to
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Cooperating Agency: US Army Corps of Engineers

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For the North Carolina Department of Transportation

11.8.2013
Date

Jennifer Harris, PE, Project Development Section Head – Western Region/Turnpike
NCDOT – Project Development and Environmental Analysis Unit

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***Note**: This Draft Supplemental Final EIS has been published in three volumes:*

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NOTE: A CD of the approved Draft EIS and Final EIS is included inside the back cover of Volume #2 of this Draft Supplemental Final EIS. These documents can also be view at www.ncdot.gov/projects/monroeconnector.

P. PREFACE

This Preface lists the lead agencies and their contact information, provides background on the National Environmental Policy Act (NEPA), explains how the Draft Supplemental Final Environmental Impact Statement (EIS) will be used, and describes the organization of this document. A brief history of the project is included, along with an update on activities since the Final EIS.

P.1 LEAD AGENCIES, COOPERATING AGENCIES, AND PARTICIPATING AGENCIES

The lead agencies for this project are the Federal Highway Administration (FHWA) and the North Carolina Department of Transportation (NCDOT). In the Draft EIS, the North Carolina Turnpike Authority (NCTA) also was listed as a lead agency. On July 27, 2009, Session Law 2009-343 was signed, transferring the functions and funds of the NCTA to the NCDOT, and the NCTA became a division of NCDOT. Historical references to NCTA in previous documents now refer to NCDOT.

The following individuals may be contacted for additional information concerning this Draft Supplemental Final EIS. Comments and questions may also be sent to the project's email address: monroe@ncdot.gov.

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The US Army Corps of Engineers (USACE) is a cooperating agency. The following agencies are participating agencies:

- US Environmental Protection Agency (USEPA)
- US Fish and Wildlife Service (USFWS)
- NC Department of Environment and Natural Resources Division of Water Quality (NCDENR-DWQ)
- NC Wildlife Resources Commission (NCWRC)

- NC Department of Cultural Resources State Historic Preservation Office (SHPO)
- Charlotte Regional Transportation Planning Organization (CRTPO), formerly Mecklenburg-Union Metropolitan Planning Organization (MUMPO)[1]

The cooperating and participating agencies are identified in the *Monroe Connector/Bypass Section 6002 Coordination Plan* (NCTA, October 2007), prepared in accordance with Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU). The *Section 6002 Coordination Plan*, included in Appendix A-5 of the Draft EIS, describes agency roles and public and agency participation in the planning process.

On July 6, 2012, President Obama signed into law the Moving Ahead for Progress in the 21st Century Act (MAP-21), which creates a streamlined, performance-based, and multimodal program to address the many challenges facing the US transportation system (FHWA Web site: http://www.fhwa.dot.gov/map21/summaryinfo.cfm). Several MAP-21 provisions target the environmental review process, including providing for earlier coordination, creating greater linkage between the planning and environmental review processes, using a programmatic approach where possible, and consolidating environmental documents. Section 139(g(1)(A)) of MAP-21 retains provisions for preparing coordination plans.

P.2 HOW THIS DOCUMENT WILL BE USED

On May 3, 2012 the United State Court of Appeals for the Fourth Circuit in North Carolina Wildlife Federation, Clean Air Carolina; Yadkin Riverkeeper v. North Carolina Department of Transportation and Federal Highway Administration, 677 F.3d 596 (4th Cir., 2012), held that the FHWA and the NCDOT had not complied with the provisions of NEPA by failing to disclose critical assumptions underlying their decision to build the proposed project and by providing the public with incorrect information. Specifically, in addressing public comments on the project as to whether the data set used as the project's no-build scenario for the indirect and cumulative analysis contained the project, the agencies responded "TAZ [Traffic Analysis Zone] socioeconomic forecasts for the No Build Scenario did not include the Monroe Connector. MUMPO confirmed our assumption regarding the reasonableness of the 2030 TAZ forecasts for use as a No Build basis." The second sentence accurately reflects the agencies' final conclusion, but the first sentence is not correct. Travel time to employment, one of eight land development factors for Union County used to project no-build growth estimates for the year 2030, presumed the presence of the proposed Monroe Connector/Bypass. As a result, the data relied upon to reflect the no build scenario included a build assumption. In response to the court's decision FHWA rescinded the Record of Decision (ROD) for this project on July 3, 2012. NCDOT and FHWA then re-initiated the NEPA process which has led to the development of this Draft Supplemental Final EIS.

In response to the opinion of the US Court of Appeals for the Fourth Circuit, this Draft Supplemental Final EIS and supporting technical documentation specifically disclose and evaluate the critical assumptions of the no-build data used in the analysis. In short, the agencies contacted the individual who designed the model used to generate the data set used as the

[1] MUMPO's governing body approved a new planning area boundary on July 17, 2013. The expansion of the planning area was made necessary by the growth of the Charlotte urbanized area. MUMPO has changed its name to Charlotte Regional Transportation Planning Organization (CRTPO), to better reflect its expanded planning area.

baseline for the indirect and cumulative effects analysis of the project and requested he rerun the model without the project. He was able to do so and the new results showed very little difference in travel times between a road network with the project and without. The rerun model showed no difference in population projections based on the revised travel times.

There was little difference in travel times with and without the project in the road network, because the model's travel time measured the time to travel from population centers to the nearest employment center, not for example, travel time from one end of the project area to the other.[2] Although the agencies had argued before the Court of Appeals for the Fourth Circuit that they anticipated the project's inclusion in the travel-time factor minimally impacted the no-build scenario, their explanations were discounted, because the agencies had failed to provide them during the NEPA process. Furthermore, the agencies' explanations were based on estimations, not an actual rerunning of the model at issue. The agencies' basis for determining MUMPO's data set reasonably represents the no build scenario is thus based on new and more detailed analysis than the agencies presented in the prior litigation. This document also contains a more detailed explanation regarding the flawed 2035 no-build projections originally included in the Final EIS. Those projections are traffic forecasts, which are based on modeling separate from that at issue in determining whether MUMPO's data better represented a build or no build scenario. The error with those projections was not the result of mistakenly including the project in the no-build scenario as discussed in further detail in **Section 2.5.2** of the Draft Supplemental Final EIS. A summary of all the resources reevaluated in this document is provided in **Table P-1** at the end of this section. The steps taken to revisit modeling are discussed in detail in the revised quantitative indirect and cumulative effects analysis prepared in conjunction with this Draft Supplemental Final EIS.

In addition, this Draft Supplemental Final EIS addresses current environmental conditions and focuses on any changes that have occurred with regards to the project (note: there have been no changes in the proposed action), the alternatives analysis, the affected environment and impacts, and any new issues or information identified since the Final EIS was published. Field reviews, additional environmental studies, and coordination with environmental resource and regulatory agencies and the public have been undertaken, the results of which are reported in this document.

The FHWA intends to use this Draft Supplemental Final EIS, together with public and agency input and comments received on this document, as the basis for a Combined Final Supplemental Final EIS/ Record of Decision (SFEIS/ROD), which will be the final document prepared under the NEPA process. Section 1319(b) of MAP-21 directs the lead agency, to the maximum extent practicable, to expeditiously develop a single document that consists of a Final EIS and ROD, unless certain conditions exist. This provision is applicable to all FHWA projects for which a Final EIS is issued on or after October 1, 2012. The SFEIS/ROD will identify the Selected Alternative corridor and present the basis for the decision. It should be noted that the SFEIS/ROD will identify a corridor, not a specific design. The functional design for the Preferred Alternative presented in this document may change during final design activities occurring after the SFEIS/ROD, provided the modifications are within the Selected Alternative corridor.

[2] Different modeling was used to estimate travel times for purposes of traffic forecasting. Traffic forecasting is associated with the project's need and purpose and alternatives analysis and is discussed in further detail in **Sections 1 and 3** of this document.

The National Environmental Policy Act of 1969, as amended, requires federal agencies to consider the potential environmental consequences of their proposals, document their analyses, and make this information available to the public for comment prior to project or program implementation (FHWA Web site: http://environment.fhwa.dot.gov/projdev/index.asp). FHWA and NCDOT are making this document available for a period of at least 30 days from the publication of the notice of availability in the Federal Register to provide resource agencies and the public an opportunity for review.

The FHWA NEPA process for transportation projects fosters project decisions that balance engineering and transportation needs with social, economic, and natural environmental factors. During the process, a wide range of partners (including the public, businesses, interest groups, and agencies at all levels of government) provides input into project and environmental decisions (FHWA Web site: http://environment.fhwa.dot.gov/projdev/pd3tdm.asp).

P.3 ORGANIZATION OF THIS DOCUMENT

This Draft Supplemental Final EIS follows the guidelines for format and content described in FHWA's Technical Advisory T6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA Web site: http://environment.fhwa.dot.gov/projdev/impTA6640.asp). This approach avoids repetition of material from the Draft EIS and Final EIS by incorporating these documents by reference, and instead allows the focus of the Supplemental Final EIS to be on important changes that have occurred since the Final EIS, comments received on the Final EIS and responses to those comments, and new information that has been considered.

As described in the Technical Advisory, "the supplemental EIS should provide sufficient information to briefly describe the proposed action, the reason(s) why a supplement is being prepared, and the status of the previous draft or final EIS. The supplemental EIS needs to address only those changes or new information that are the basis for preparing the supplement and were not addressed in the previous EIS. Reference to and summarizing the previous EIS is preferable to repeating unchanged, but still valid, portions of the original document." The Draft EIS and Final EIS, incorporated by reference, are available for download on the NCDOT Web site (www.ncdot.gov/projects/monroeconnector/) and are included on a CD with all hard copies of this Draft Supplemental Final EIS.

This Draft Supplemental Final EIS is divided into ten sections, as described briefly below:

- **Section P** is this Preface.
- **Section PC** lists the special project commitments that NCDOT has agreed to implement for the Preferred Alternative.
- **Section 1** explains the proposed action, the purpose of the project, and the need for the project. Updates to supporting information since the Final EIS was published are described, including new Census data, updated land use plans, and recent improvements along existing US 74. Data and information that have not changed since the Final EIS are summarized, and in these instances, the reader is referred to the Final EIS for additional details. The purpose and need for the project have not changed.
- **Section 2** summarizes the alternatives considered for the project. It discusses the development and screening of alternatives, including alternatives eliminated from detailed study and the reasons for elimination. It also describes the Detailed Study

Alternatives (DSA), the Recommended Alternative identified in the Draft EIS, the Preferred Alternative identified in the Final EIS, and additional consideration of alternatives after the Final EIS. The Preferred Alternative identified in the Final EIS is still the Preferred Alternative.

- **Section 3** describes the Preferred Alternative and the reasons it was selected. This section also describes additional design work, other studies conducted for the Preferred Alternative, and updates to impacts associated with the Preferred Alternative that have been developed since the Final EIS was prepared.
- **Section 4** describes the existing conditions and projected impacts of the DSAs on the human, physical, cultural, and natural environments. The existing conditions for a resource are described, followed by projected impacts of the Preferred Alternative, an explanation of how the other DSAs may or may not be affected by any changes since the Final EIS, and discussion, where appropriate, on how these changes would or would not affect the decision on the Preferred Alternative.
- **Section 5** details continued coordination efforts with the public, as well as federal, state, and local agencies, since the Final EIS was issued for public review. All comments and responses are included in **Appendix A**.
- **Sections 6, 7, and 8** provide lists of the following: the preparers of the Draft Supplemental Final EIS; agencies, organizations, and persons sent a copy of the Draft Supplemental Final EIS; and the references and supporting documentation used in the preparation of the Draft Supplemental Final EIS. **Section 8** also includes a list of acronyms used in this Draft Supplemental Final EIS.

The Draft Supplemental Final EIS also includes appendices that are referenced throughout the document. The Draft Supplemental Final EIS, including figures and appendices, is available for download on the NCDOT Web site (www.ncdot.gov/projects/monroeconnector/). The supporting documentation listed in **Section 8** is comprised of technical memoranda and reports incorporated by reference into this Draft Supplemental Final EIS. This reference material is available for review upon request and also available on the NCDOT Web site.

Note that throughout the Draft Supplemental Final EIS, references to sections, tables, figures, and appendices included in this document are in bold text, while references to these elements from the Draft EIS, Final EIS, and other documents are not in bold text.

P.4 HISTORY OF PROJECT

NCDOT previously studied two projects in this area – the Monroe Bypass (North Carolina State Transportation Improvement Program [STIP] Project R-2559) and the Monroe Connector (STIP Project R-3329). They are now being advanced by NCDOT as a single project, which was the subject of the Draft EIS (March 2009), Final EIS (May 2010), and now this Draft Supplemental Final EIS. Previous studies are summarized below.

P.4.1 PREVIOUS STUDIES OF MONROE BYPASS

The Monroe Bypass project was the first of the two projects studied by NCDOT. The western terminus of this project was US 74 near Rocky River Road (Secondary Road [SR] 1514). From there, the project extended east around the north side of Monroe, and connected to US 74 between the towns of Wingate and Marshville.

NCDOT completed the original planning and environmental process for the Monroe Bypass in 1997. The process included an Environmental Assessment (EA) issued on March 14, 1996, and a Finding of No Significant Impact (FONSI) issued on June 20, 1997. The process resulted in the selection of a Preferred Alternative. **Figure P-1** shows the previous Monroe Bypass Detailed Study Alternatives (DSAs) and the Preferred Alternative that was identified in the 1997 FONSI.

For right-of-way acquisition and construction purposes, the Monroe Bypass project was divided into three sections (**Figure P-1**):

- Section A from US 74 near Rocky River Road (SR 1514) east to US 601
- Section B from US 601 to just east of Walkup Avenue (SR 1751)
- Section C from just east of Walkup Avenue and connecting with US 74 west of Marshville

In May 1997, a Public Hearing was held to present final designs for Sections B and C. It was determined that Section A would be replaced by NCDOT's Monroe Connector project; therefore, Section A was temporarily suspended at that time while feasibility studies for the Monroe Connector were initiated by NCDOT. In 2000 and 2001, right of way was purchased for Sections B and C. However, during the environmental permitting process (prior to construction), issues arose regarding the federally-endangered Carolina heelsplitter mussel, and construction was postponed.

P.4.2 PREVIOUS STUDIES OF MONROE CONNECTOR

NCDOT began the planning process for the Monroe Connector in 1999. As the name suggests, the Monroe Connector was intended to "connect" the Monroe Bypass (Sections B and C) from US 601 west to I-485. **Figure P-2** shows the Preliminary Study Corridors and DSAs for NCDOT's Monroe Connector project. A Draft EIS for the Monroe Connector was issued on October 17, 2003, and released for review and comment by the public and environmental resource and regulatory agencies in November 2003. However, a Public Hearing was not held following completion of the Draft EIS. FHWA elected to suspend the process in order to consider the project in relation to issues associated with the Monroe Bypass.

The 2003 Draft EIS for the Monroe Connector was rescinded on January 30, 2006, by notice in the Federal Register (Vol. 71, No. 19, page 4958). The notice stated: "*Based on the comments received from various Federal and state agencies and the public and a recent decision to change the eastern terminus of the project from US 601 to the proposed Monroe Bypass, the FHWA and NCDOT have agreed not to prepare a Final EIS for the proposed US 74 improvements from I-485 to US 601. FHWA, NCDOT, and the North Carolina Turnpike Authority (NCTA) plan to prepare a new Draft EIS for the proposed project. A notice of intent to prepare the EIS will be issued subsequent to this rescinding notice. The new Draft EIS will include a toll alternative among the full range of alternatives that will be analyzed as well as a change in the location of the eastern terminus.*"

P.4.3 MONROE BYPASS AND MONROE CONNECTOR COMBINED

In February 2005, at the request of the MUMPO, NCTA adopted the Monroe Connector as a candidate toll facility. At that time, the *2005–2011 STIP* included funding for construction of Sections B and C of the Monroe Bypass and NCDOT was moving forward with the Monroe Bypass as a separate project. However, due to the age of the original EA/FONSI for the Monroe Bypass (approximately 10 years), FHWA required a reevaluation of the document prior to the start of any construction. All sections of the Monroe Bypass (A, B, and C) needed to be

considered in the reevaluation because they provide the logical endpoints for the project, enabling it to function as a stand-alone bypass.

During the course of the reevaluation, it was discovered that the MUMPO *2030 Long Range Transportation Plan* (LRTP) did not include Section A of the Monroe Bypass; it included the Monroe Connector instead. A project must be in the LRTP in order for it to receive FHWA approval and funding. As originally envisioned, the Monroe Connector was meant to function as a replacement for Section A of the Monroe Bypass. Without the Monroe Bypass Sections B and C, the Monroe Connector did not have a logical eastern terminus. Likewise, without Section A (or the Monroe Connector serving as a replacement for Section A), Sections B and C of the Monroe Bypass did not have a logical western terminus and could not serve as a stand-alone bypass. FHWA and NCDOT elected to discontinue the reevaluation process to consider combining the Monroe Bypass and Monroe Connector projects into a single viable project with logical termini.

On September 20, 2006, MUMPO adopted a resolution recommending that the Monroe Bypass and Monroe Connector be combined into a single environmental study under the administration of NCTA. On January 19, 2007, FHWA issued a Notice of Intent (NOI) in the Federal Register announcing its intention to prepare a Draft EIS for the combined Monroe Connector/Bypass project (Federal Register, Vol. 72, No. 12, pages 2582 to 2583).

P.4.4 ACTIVITIES BETWEEN THE DRAFT EIS AND FINAL EIS

The *Monroe Connector/Bypass Administrative Action Draft Environmental Impact Statement* was signed on March 31, 2009 and made available for public and agency review on April 2, 2009 on NCTA's Web site. Copies of the document were distributed to public review locations and agencies on April 17, 2009. The public comment period for the Draft EIS ended on June 15, 2009.

Public and Agency Coordination. Four Pre-Hearing Open Houses, two of which were followed by Combined Corridor Design Public Hearings, were held in May 2009. Comment sheets were made available at all Pre-Hearing Open Houses and Public Hearings and on the project Web site.

The NCTA/NCDOT conducted regularly scheduled agency coordination meetings throughout the project development process. These Turnpike Environmental Agency Coordination (TEAC) meetings were held to review the status of current NCTA projects, to discuss and agree upon study methodologies, and to discuss and resolve environmental concerns and adherence to permitting requirements. TEAC meetings held since the Draft EIS included discussions on the selection of the Preferred Alternative for the Monroe Connector/Bypass project.

Additional information on coordination efforts with the public, as well as federal, state, and local agencies, between the Draft EIS and Final EIS is included in Section 3 of the Final EIS.

Updates and Refinements to the Preferred Alternative. Refinements were made to the functional design of the Preferred Alternative prior to the Final EIS based on input received from state and federal agencies and the public. Refinements included changes to interchange configurations and further consideration of potential service road locations (*Monroe Connector/Bypass Service Road Study*, PBS&J, April 2010). These are summarized in **Sections 3.3.1 and 3.3.2** of this document and described in detail in Section 2.3 of the Final EIS. Cost estimates also were updated for the Preferred Alternative in the Final EIS Section 2.3.4.

Additional Studies of the Preferred Alternative in the Final EIS. Additional studies prepared for the Preferred Alternative and presented in the Final EIS included updated traffic forecasts, an updated traffic noise study, an updated hazardous materials evaluation, an additional archaeological assessment, an assessment of critical habitat and preparation of a Biological Assessment for federally protected species, a review of potential on-site mitigation for jurisdictional resources impacts, and a quantitative indirect and cumulative effects analysis, which includes a water quality analysis. These additional studies are summarized below.

- Updated Traffic Forecasts. After publication of the Draft EIS, a re-evaluation of traffic volumes and operations was prepared based on the refined functional design of the Preferred Alternative's interchanges with the US 74 Frontage Road, Unionville-Indian Trail Road, and Austin Chaney Road (SR 1758). Detailed information is presented in the *Final Addendum to Year 2035 Build Traffic Operations Technical Memorandum* (PBS&J, February 2010) and summarized in Section 2.3.5 of the Final EIS and **Section 3.3.5** of this Draft Supplemental Final EIS.

- Traffic Noise Study Addendum. A noise study was prepared for all DSAs as part of the Draft EIS, and documented in the *Final Traffic Noise Technical Memorandum for Administrative Action Environmental Impact Statement* (PBS&J, March 2009). Between the Draft EIS and the Final EIS, design modifications were made to the Preferred Alternative, and projected traffic volumes were updated. Therefore, an updated noise study for the Preferred Alternative was prepared, as documented in the *Addendum Traffic Noise Technical Memorandum* (PBS&J, January 2010). Results of the updated study are presented in Section 2.5.2.1 of the Final EIS.

- Hazardous Materials Study Update. An updated hazardous materials evaluation was prepared for the Preferred Alternative to investigate potentially contaminated parcels in the project corridor. The results were reported in a memorandum from the NCDOT Geotechnical Engineering Unit dated December 11, 2009, and are presented in Section 2.5.2.6 of the Final EIS.

- Archaeological Assessment. An additional intensive archaeological assessment was prepared for the Preferred Alternative to identify archaeological resources that may be impacted. The *Final Archaeological Inventory and Evaluation for the US 74 Monroe Connector* (New South Associates, March 2010) examined archaeological resources within the 11.4-mile Monroe Connector portion of the project, between I-485 and US 601. In total, the Area of Potential Effects (APE) encompassed 696 acres. (Note: An updated archaeological evaluation for the Monroe Bypass portion of the project was not required since archaeological resources have not changed since the completion of prior studies.) A total of 1,034 shovel tests and eight test units were excavated for the evaluation. The results of the updated archaeological assessment are presented in Section 2.5.3.2 of the Final EIS.

- Biological Assessment. A Biological Assessment was prepared to evaluate endangered species that may be impacted by the Preferred Alternative: *Biological Assessment for the Monroe Connector-Bypass Project (R-3329/R-2559)* (The Catena Group, May 2010). Results are presented in Section 2.5.4.5 of the Final EIS. The Biological Assessment addressed the following endangered plant species: Michaux's Sumac (*Rhus michauxii*), Schweinitz's Sunflower (*Helianthus schweinitzii*), and Smooth Coneflower (*Echinacea laevigata*).

The Biological Assessment also addressed freshwater mussels, in particular the federally endangered Carolina heelsplitter (*Lasmigona decorate*). A *Freshwater Mussel Survey Report* (The Catena Group, June 2009) identified existing populations of freshwater mussels within the project study area and is also discussed in Section 2.5.4.5 of the Final EIS.

- Mitigation. A conceptual mitigation plan for impacts to jurisdictional resources (e.g. wetlands, streams, and ponds) was prepared for the Preferred Alternative. *Review for Potential On-Site Mitigation* (ESI, January 2010), summarized in Section 2.5.4.4 of the Final EIS, documents potential on-site mitigation opportunities within the project study area that may assist in meeting compensatory mitigation requirements of the project.
- Quantitative Indirect and Cumulative Effects Study. A quantitative indirect and cumulative effects study was prepared for the Preferred Alternative to expand on the qualitative analysis previously prepared for the project. The *Indirect and Cumulative Effects Quantitative Analysis* (Michael Baker Engineering, April 2010) examined potential indirect and cumulative effects with respect to land use changes in more detail for the Preferred Alternative, particularly for the Goose Creek Watershed area (critical habitat for the endangered Carolina heelsplitter). The analysis is summarized in Section 2.5.5 of the Final EIS.

  In addition, a water quality modeling analysis was prepared to determine if induced land use change resulting from the project would affect water quality within the project study area. The results of this analysis are presented in the *Monroe Connector/Bypass (STIP R-3329/R-2559) Indirect and Cumulative Effects Water Quality Analysis* (PBS&J, April 2010) and summarized in Section 2.5.5 of the Final EIS.

P.4.5 ACTIVITIES SINCE THE FINAL EIS

Following publication of the Final EIS in May 2010, the Preferred Alternative (Alternative D) was selected for implementation, as documented in the Record of Decision (ROD) (August 2010) for the project. The Selected Alternative is a controlled-access toll facility on approximately 20 miles of new location.

After the August 2010 ROD was published, the Southern Environmental Law Center (SELC), on behalf of Clean Air Carolina, NC Wildlife Federation, and Yadkin Riverkeeper, brought suit against the FHWA and NCDOT regarding the project's environmental documentation, alleging that the study did not comply with the requirements of NEPA. FHWA and NCDOT prevailed in a federal District Court decision issued on October 24, 2011. SELC then filed an appeal to the 4th US Circuit Court of Appeals, and a three-judge panel of the court overturned the lower court's decision on May 3, 2012, ruling that "*the Agencies failed to take the required "hard look" at environmental consequences"* and remanded the case "*so that the Agencies and the public can fully (and publicly) evaluate the 'no-build' data."* On June 15, 2012, NCDOT filed a petition for rehearing, seeking a review by the full circuit court of the legal analysis arising out of technical data/facts that NCDOT believes the higher court panel misunderstood. This petition for rehearing was denied on June 29, 2012, and the ROD was subsequently rescinded by FHWA on July 3, 2012.

The following updated studies and coordination have occurred since the publication of the Final EIS in May 2010, and are summarized in this document.

- *US 74 Corridor Analysis Scenarios* (HNTB, December 2010, finalized in October 2013

with no substantive changes)

- *Union County Growth Factors Technical Report* (Michael Baker Engineering, September 2012, finalized November 2013)
- *Memo to File – Review of US 74 Corridor Study (Stantec Consulting Services, Inc., July 2007)* (NCDOT, October 2012)
- *Monroe Connector/Bypass Forecasts and Modeling* (Michael Baker Engineering, October 2012)
- *Summary of Alternatives Analysis Process* (Atkins, October 2012)
- *Updated Census Tables for Monroe Connector/Bypass* (Atkins, October 2012)
- *Freshwater Mussel Survey Report Update* (Catena Group, October 2012)
- *Surveys for Schweinitz's sunflower, Michaux's sumac, and Georgia Aster at Monroe Bypass* (Atkins, October 2012)
- *US 74 Corridor Travel Time Comparison* (HNTB, October 2013)
- *Crash Data for US 74 from I-485 to Forest Hills School Road for April 1, 2020 through March 31, 2013* (NCDOT Traffic Safety Unit, June 2013)
- *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013)
- *Traffic Noise Analysis Update* (Atkins, November 2013)
- *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)
- *Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species* (Michael Baker Engineering, Draft October 2013).
- *Biological Assessment* (The Catena Group, Draft October 2013)
- Additional public involvement and agency coordination:
    - Two community workshops held in June 2012
    - Small group meetings with regional and local agencies and elected officials
    - Coordination meetings with environmental resource and regulatory agencies
    - Re-initiation of Section 7 informal consultation with USFWS (NCDOT and FHWA are currently working with USFWS to reach concurrence on the biological conclusions presented in the new Biological Assessment. USFWS consultation will be complete prior to issuance of the Combined Final Supplemental Final EIS/ROD.)

Table P-1 presents a summary of changes in the affected environment or impacts since the Final EIS was published.

TABLE P-1: Summary of Evaluation of Changes Since the Final EIS

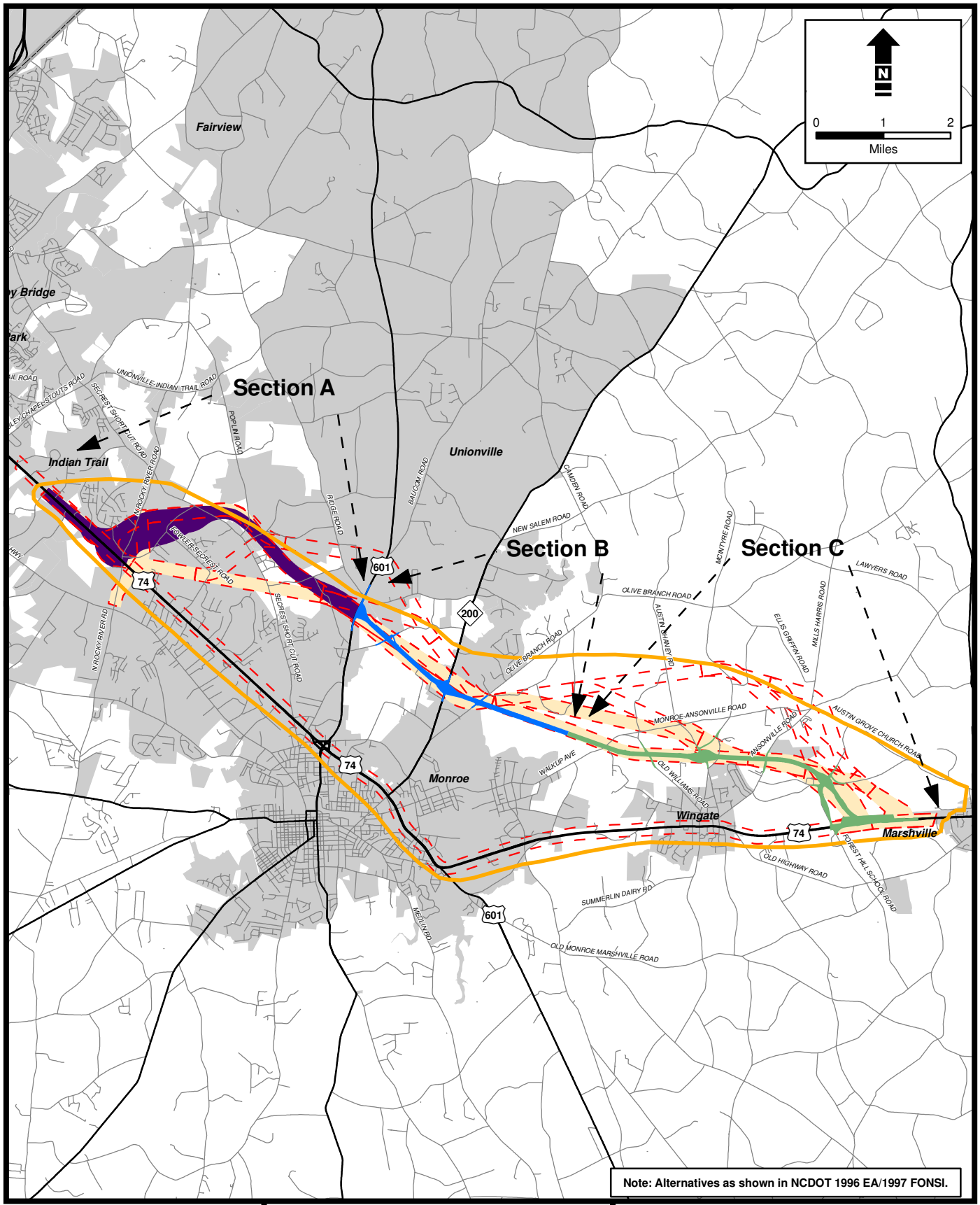
Environmental Resource/Issue		Change in Affected Environment or Impacts
Purpose and Need for Action	*Proposed Action (Section 1.1)*	No change. Review of current underlying transportation conditions and public comments received indicates that original purpose and need remains valid.
	Project Setting and History *(Section 1.2)*	No change.
	Social and Economic Conditions *(Section 1.2.2)*	Yes. Updated 2010 census data now available and included in **Appendix D**. This new data does not change any conclusions or findings.
	Transportation and Land Use Plans *(Section 1.2.3)*	Yes. Several land use plans have been updated. Monroe Connector/Bypass continues to be consistent with all updated plans.
	Roadway Conditions and Operations *(Section 1.2.4)*	Yes. Updated travel time analysis and updated crash data. The updated information does not change the purpose and need for the project.
Alternatives Considered *(Section 2)*		Yes. Additional review confirms that the alternatives development process used for the project was appropriate.
Preferred Alternative *(Section 3)*		Yes. Minor updates to impacts of Preferred Alternative based on updated information since the Final EIS, but DSA D remains the Preferred Alternative after consideration of new and updated information and public and agency comments documented in this Draft Supplemental Final EIS. Updated cost estimates provided in Section 3.3.4.
Socioeconomic Characteristics *(Section 4.1.1)*		Yes. Updated 2010 census data now available and included in **Appendix D**. This new data identified trends similar to what was presented in the Final EIS (based on 2000 Census data) and did not change any conclusions or findings.
Neighborhoods *(Section 4.1.2)*		No change.
Community Resources *(Section 4.1.2)*	Churches	Yes. One additional church was identified in the project corridor – Sardis Baptist Church. The church and its property would not be impacted.
	Schools and Colleges	No change.
	Parks and Recreational Facilities	No change.
Land Use and Transportation Plans *(Section 4.1.3)*		Yes. Several land use plans have been updated. Monroe Connector/Bypass continues to be consistent with all updated plans.
Right of Way Acquisition & Relocations *(Section 4.1.4)*		No change in number of acquisitions and relocations reported in Final EIS. Some right-of-way acquisition has been initiated for hardship situations.
Environmental Justice *(Section 4.1.5)*		Yes. Updated 2010 census data available. However, the conclusion remains that there would be no disproportionately high and adverse impact on minority or low-income populations.
Traffic Noise *(Section 4.2.1)*		Yes. FHWA's updated noise standard (23 CFR Part 772) and NCDOT's updated *Traffic Noise Abatement Policy* were considered. The *Traffic Noise Analysis Update* recommends more noise barriers than previously recommended (5 vs. 3). This is due to an increase in the number of predicted impacts as a result of changes in the way reasonableness is determined.
Air Quality *(Section 4.2.2)*	NAAQS & Existing Conditions	Yes. There have been some changes to the standards listed for lead, nitrogen dioxide, ozone, and sulfur dioxide. None of these changes affect the analysis of air quality for the project.
	Transportation Conformity	Yes. There have been three amendments to the MUMPO's 2035 Long Range Transportation Plan and the latest conformity determination is May 29, 2013. The proposed project remains in a conforming plan.

TABLE P-1: Summary of Evaluation of Changes Since the Final EIS

Environmental Resource/Issue		Change in Affected Environment or Impacts
Air Quality (cont'd) (Section 4.2.2)	Mobile Source Air Toxics (MSAT)	No change. FHWA issued new MSAT Guidance on December 6, 2012 (*Interim Guidance on Mobile Source Air Toxic Analysis in NEPA*). The Guidance states *"All MSAT analysis beginning on or after December 20, 2012 should use the MOVES model. Any MSAT analysis initiated prior to that date may continue to operate under the previous guidance and utilize MOBILE6.2."* The qualitative MSAT analysis for the project was completed in 2009 and need not be updated.
	Greenhouse Gases and Climate Change	No change.
Farmland *(Section 4.2.3)*		No change.
Utilities and Infrastructure *(Section 4.2.4)*		Yes. Since the Final EIS was published, Union County completed a *Comprehensive Water and Wastewater Master Plan* (Black & Veatch, December 2011). This additional water and sewer information does not change the findings of the Draft EIS or Final EIS.
Visual Resources *(Section 4.2.5)*		No change.
Hazardous Materials *(Section 4.2.6)*		No change.
Floodplains and Floodways *(Section 4.2.7)*		No change.
Historic Architectural Resources *(Section 4.3.1)*		No change.
Archaeological Resources *(Section 4.3.2)*		No change. An intensive ground penetrating radar survey was conducted at the Hasty-Fowler-Secrest Cemetery in May 2012, as documented in the *Ground Penetrating Radar Survey at the Hasty-Fowler-Secrest Cemetery* (New South Associates, April 2013). According to the survey, there is no indication of possible burials outside the area with extant markers.
Section 4(f) Resources *(Section 4.3.3)*		No change.
Section 6(f) Resources *(Section 4.3.3)*		No change.
Soils and Mineral Resources *(Section 4.4.1)*		No change. The Natural Resource Conservation Service (NRCS) published updated soil surveys for Union County and Mecklenburg County on July 26, 2012 and July 6, 2012, respectively. Updated soil surveys were reviewed, but they do not include changes to any soils located within the DSA corridors.
Water Resources *(Section 4.4.2)*		Yes. There have been updates to the Section 303(d)-listed streams in the project area. Stewarts Creek within the project study area is now listed on the *2012 Final North Carolina 303(d) List*. In addition, there have been updates to the permitted flow for two of the NPDES permits that discharge into streams that run through the project study area. These updates do not change any impacts to water resources as presented in the Final EIS.
Natural Communities and Wildlife *(Section 4.4.3)*		Yes. Existing natural communities acreages were updated to reflect the conversion of 3.9 acres within the project corridor from hardwood forest to urban/disturbed due to construction activity since the Final EIS. This change does not result in any increase in impacts to natural communities as reported in the Final EIS.
Water Resources in Federal Jurisdiction *(Section 4.4.4)*		No change.

TABLE P-1: Summary of Evaluation of Changes Since the Final EIS

Environmental Resource/Issue	Change in Affected Environment or Impacts
Federally Protected Species *(Section 4.4.5)*	No change. New surveys were conducted in 2012 for Carolina heelsplitter, Schweintiz's sunflower, and Michaux's sumac. No new specimens or populations were found. Biological conclusions are presented in a new Biological Assessment (October 2013) and remain as presented in the Final EIS: • Carolina heelsplitter – May Affect/Not Likely to Adversely Affect • Critical habitat for Carolina heelsplitter – May Affect/Not Likely to Adversely Affect • Michaux's sumac – No Effect • Smooth coneflower – No Effect • Schweinitz's sunflower – May Affect/Not Likely to Adversely Affect NCDOT and FHWA are currently working with USFWS to reach concurrence on the biological conclusions presented in the new Biological Assessment. USFWS consultation will be complete prior to issuance of the Combined Final Supplemental Final EIS/ROD.
Land Use Change *(Section 4.5)*	Yes. There have been updates to local land use plans and census data since the Final EIS, which have been incorporated into an updated ICE analysis. Also, evaluation confirmed the reasonableness of NCDOT's assumption that the MUMPO TAZ forecasts best represent a future No-Build Scenario. An update of the No-Build and Build Scenarios in the Quantitative ICE based on additional information from the 2010 Census, consideration of additional development activity, updated socioeconomic forecasts, and updated area plans resulted in projected land use changes (i.e., additional development) in less than two percent of the total study area acreage compared to the results of the original Quantitative ICE.



NORTH CAROLINA Turnpike Authority

MONROE CONNECTOR / BYPASS

STIP PROJECT NO. R-3329 / R-2559

Mecklenburg County and Union County

Legend

- Preferred Alternative - Project R-2559 (Section A)
- Preferred Alternative and Final Design - Project R-2559 (Section B)
- Preferred Alternative and Final Design - Project R-2559 (Section C)
- Monroe Bypass Detailed Study Alternatives
- Preliminary Study Area - Project R-2559
- Preliminary Study Corridor Boundaries - Project R-2559

MONROE BYPASS DETAILED STUDY ALTERNATIVES and PREFERRED ALTERNATIVE

Figure P-1

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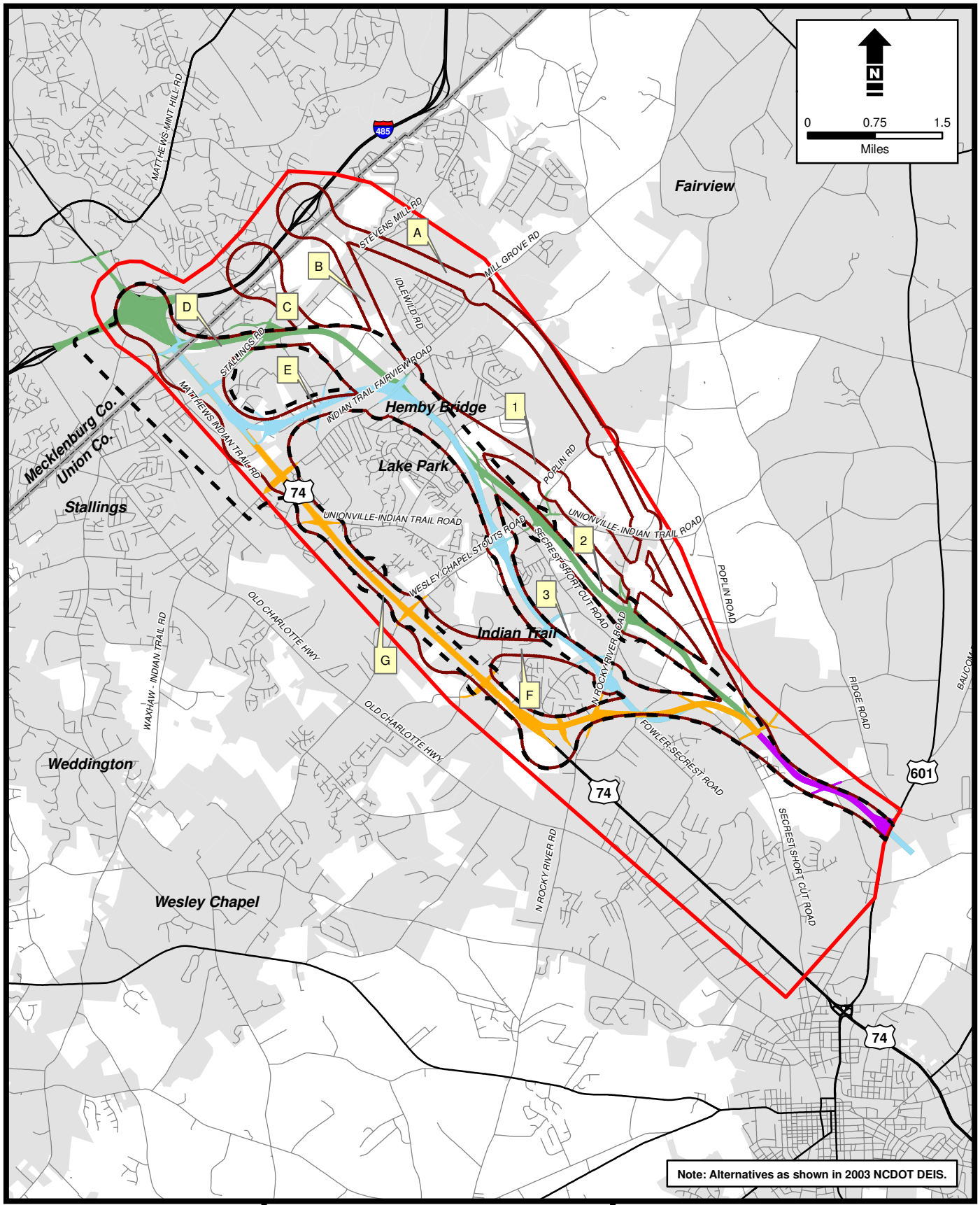

NORTH CAROLINA Turnpike Authority

MONROE CONNECTOR / BYPASS

STIP PROJECT NO. R-3329 / R-2559

Mecklenburg County and Union County

Legend

- Preliminary Designs Within the Detailed Study Corridors - Project R-3329
- Preliminary Study Corridor Boundary - Project R-3329
- Monroe Connector Preliminary Corridor - Project R-3329
- Detailed Study Alternative Corridor Boundary - Project R-3329
- D — Segment Identification

MONROE CONNECTOR PRELIMINARY CORRIDORS and DETAILED STUDY ALTERNATIVES

Figure P-2

PN_Monroe_Conn_DSA_Prelim_Corr_Combo.mxd 11-06-08

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PC. SPECIAL PROJECT COMMITMENTS

This "GREEN SHEET" identifies the special project commitments made to avoid, minimize, or mitigate project impacts beyond those required to comply with applicable federal and state requirements and regulations.

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 the NCDOT.

TABLE PC-1: Special Project Commitments

Item	Resource	Final EIS Section	Project Commitment	Project Stage
1	Community Resources	2.5.1.2	NCTA will coordinate with Mecklenburg County and Union County schools to share information to minimize impacts to school bus routes.	Final Design through Construction Management
2	Noise	2.5.2.1	A Design Noise Study will be prepared to update the noise analysis based upon the most recent traffic forecasts and the final design.	Final Design
3	Utilities and Infrastructure	2.5.2.4	NCTA will coordinate with the NCDOT Rail Division and CSX during final design for the project's eastern terminus at US 74, which would affect the east-west rail mainline through Union County.	Final Design
4	Visual Resources	2.5.2.5	NCTA is committed to incorporating community input into the aesthetic design process.	Final Design
5	Hazardous Materials	2.5.2.6	When the final proposed alignment is established and right-of-way limits are determined, a hazardous materials site assessment will be performed to determine levels of contamination at any potential hazardous materials sites. The assessment will be made prior to right-of-way acquisition.	Final Design and ROW Acquisition
6	Archaeological Resources	2.5.3.2	The cemetery delineation plan for the Hasty-Fowler-Secrest Cemetery (Site 31UN351) as well as any plan detailing removal of the burials will be submitted and approved by the State Historic Preservation Office prior to any ground-disturbing activities in areas suspected to contain marked or unmarked graves. All possible burials identified in the survey will be treated as potential human graves and treated appropriately under North Carolina burial	Final Design

TABLE PC-1: Special Project Commitments

Item	Resource	Final EIS Section	Project Commitment	Project Stage
			removal laws.	
7	Water Resources	2.5.4.2	If any construction staging, storage, refueling, borrow pit or spoil areas are chosen within the Goose Creek or Sixmile Creek watersheds, the NCTA will coordinate with the NCDOT Division Environmental Officer and USFWS and the contractor to develop BMPs for each site to avoid/minimize the potential for adverse effects.	Construction Management
8	Water Resources	2.5.4.2	NCTA will follow NCDOT's *Design Standards in Sensitive Watersheds* for implementing erosion and sediment control BMPs along the entire project.	Construction Management
9	Water Resources	2.5.4.2	Seeding will be required within 14 calendar days of completing construction activities in an area.	Construction Management
10	Water Resources	2.5.4.2	Final designs will incorporate hazardous spill basins along the project corridor within the designated hazardous spill basin area associated with Lake Twitty. These basins will be designed in accordance with NCDOT's *Best Management Practices for Protection of Surface Waters*, *Guidelines for the Location and Design of Hazardous Spill Basins*, and *Guidelines for Drainage Studies and Hydraulic Design*.	Final Design
11	Water Resources	2.5.4.2	A turbidity water quality testing program for the main stem of Stewarts Creek will be implemented to evaluate the performance of BMPs. Testing will be completed upstream and downstream of the construction area, as well as before, during, and after storm events.	Construction Management
12	Protected Species	2.5.4.3	NCTA will manage two known populations of Schweinitz's sunflower (EO#77 and EO#230) on site in accordance with NCDOT's *Roadside Vegetation Management Guidelines in Marked Areas*.	Construction Management
13	Protected Species	Supp. Final EIS 4.4.5	NCDOT and FHWA will coordinate with USFWS to monitor the status of the potential listing of Georgia Aster (*Symphyotrichum georgianum*) and Savannah Lilliput (*Toxolasma pullus*) throughout construction.	Construction Management
14	Air Quality	3.3.3	Dust suppression measures will be implemented to reduce dust generated by construction when the control of dust is necessary for the protection of motorists and residents.	Construction Management

1. PURPOSE AND NEED FOR ACTION

This section describes the proposed action, the purpose of the project, and the need for the project. Updates to supporting information since the Final EIS was published are described, including new Census data, updated land use plans, and recent improvements along existing US 74. The reader is referred to the Final EIS for additional data and information that have not changed since the Final EIS.

The purpose and need statement for the project was originally developed in 2007 and documented in the "Final Statement of Purpose and Need for the Monroe Connector/Bypass" (PBS&J, February 2008), the Draft EIS (March 2009), and the Final EIS (May 2010). Although supporting information has been updated, the purpose and need for the project remains unchanged.

In conclusion, based upon a review of new information and public and agency comments received to date, the purpose and need for the project remains unchanged.

1.1 PROPOSED ACTION

As stated in the Final EIS Section 1.1.1, the NCDOT[1], in cooperation with the FHWA, proposes to construct a project known as the Monroe Connector/Bypass, which would be a controlled-access toll road extending from US 74 near I-485 in Mecklenburg County to US 74 between the towns of Wingate and Marshville in Union County, a distance of approximately 20 miles. **Figure 1-1** shows the project study area.

The proposed project begins and ends on existing US 74 in order to provide continuity for the US 74 corridor. On the western end, the project would begin at I-485, another controlled-access facility. On the eastern end, the proposed project would terminate on US 74 between the towns of Wingate and Marshville. This is where existing and projected traffic volumes decrease and the study area transitions to a more rural character.

The project is included in the Charlotte Regional Transportation Planning Organization's (CRTPO) 2035 Long-Range Transportation Plan (LRTP) and its Transportation Improvement Program (TIP). The Project is included in the NCDOT 2012-2020 State TIP (STIP) as Project R-3329 (Monroe Connector) and Project R-2559 (Monroe Bypass) as a toll facility. Previously, the Final EIS reported that project was in the NCDOT 2009-2015 STIP. Similar to previous state and local TIPs and the conclusion in the Final EIS, current fiscally constrained planning documents do not have sufficient funds available from traditional sources in the foreseeable future to construct all priority projects in the state.

1.1.1 EVALUATION OF NEED FOR PROPOSED ACTION

FHWA and NCDOT have re-evaluated the primary needs for the proposed action and determined that those needs have not changed since the Draft EIS and Final EIS.

US 74 is the major east-west route connecting the Charlotte region, a major population center and freight distribution point, to the North Carolina coast and the port at Wilmington (North Carolina's largest port). In addition, US 74 is the primary transportation connection between Union County, the fastest growing county in North Carolina between 2000 and 2010, and

[1] On July 27, 2009, NCTA became a division of NCDOT (NC Session Law 2009-343). Where applicable, references to NCDOT as a separate agency have been removed.

Mecklenburg County/City of Charlotte, the economic hub of the region. Although Union County is the fastest growing county in the State, it is the only county adjacent to Mecklenburg County that does not have a high-speed interstate-type facility connecting it to Mecklenburg County.

US 74 also serves as an important commercial corridor for Union County residents and businesses, with many retail, commercial, and employment centers having direct access to/from US 74. In Union County, most employment is concentrated in the City of Monroe or along existing US 74.

Because of its statewide and regional importance, NCDOT designated the US 74 corridor as a Strategic Highway Corridor (SHC) and it is also designated as part of the North Carolina Intrastate System. Consistent with local planning documents, these state designations call for this corridor to serve high-speed regional travel. The SHC designation specifically calls for a freeway. The North Carolina Intrastate System designation calls for a multi-lane facility with access control and grade separations (if warranted by traffic volumes).

Finally, the US 74 corridor is designated as part of the National Highway System Strategic Highway Network (STRAHNET), which includes roads that provide defense access, continuity, and emergency capabilities for movements of military personnel and equipment.

Since the Final EIS, the existing roadway corridor has been reevaluated and the factors supporting the needs for the proposed action have been updated. These are summarized below, with more details provided in **Section 1.2.4**.

Existing and Projected Roadway Capacity Deficiencies. Currently, US 74 in the project study area is a four- to six-lane arterial roadway with speed limits that range from 35 miles per hour (mph) to 55 mph along the corridor. As shown in **Table 1-1**, the weighted average posted speed limit is 49 mph. There is limited control of access along the facility; meaning there are numerous driveway access points, turning points and intersections, including 27 at-grade signalized intersections. Thus, traffic signals and the lack of access control cause delay and congestion during typical week day peak travel times.

TABLE 1-1: Speed Limits on Existing US 74

Speed Limit (mph)	US 74 Segment from West to East	Approximate Segment Length (miles)
55	I-485 to Fowler Secrest Road (SR 1754)	8.2
45	Fowler Secrest Road to US 601 (Pageland Highway)	5.5
55	US 601 (Pageland Highway) to east of Presson Road	3.0
45	East of Presson Road to Wingate City Limit	0.2
35	Wingate City Limit to Old Highway 74 (SR 1740)	1.4
45	Old Highway 74 (SR 1740) to Olde Country Lane	0.7
55	Olde Country Lane to 0.3 mile west of Marshville Town Limit	1.5
45	0.3 miles west of Marshville Town Limit to Marshville Town Limit	0.3
35	Within Marshville Town Limit	2.5
49	***Weighted average speed limit****	*23.3*

Source: *Existing and Year 2030 No-Build Traffic Operations Technical Memorandum* (PBS&J, March 2008).
*Weighted average speed limit = sum of individual segment lengths x speed limits divided by total length

In the Final EIS, traffic simulation software was used to estimate that average speeds on existing US 74 through the project area range from 20 to 30 mph during peak hours, and were expected to decline to 20 mph by 2030 (Final EIS Section 1.1.2).

Since 2007, NCDOT implemented several measures to improve traffic flow along existing US 74 and partially mitigate congestion (listed in **Table 2-2**), as recommended in the July 2007 *US 74 Corridor Study* (Stantec). However, there is still congestion along the corridor during a typical day. As described in greater detail in **Section 1.2.4**, current real time travel information available from INRIX, Inc., which was validated through travel time field surveys, shows that average travel speeds during peak hours are still lower than posted speed limits.

Based on midweek traffic volumes for all of 2011 and 2012 and August 2013, the average peak period travel speed through the corridor ranges from 37 mph to 41 mph in the westbound direction, and 42 mph to 45 mph in the eastbound direction. These average speeds compared to the corridor weighted average posted speed limit of 49 mph show that congestion exists along US 74 today, and it will only get worse because traffic volumes are expected to increase in the future due to projected growth in Union County.

In summary, real-time travel flow information demonstrates that US 74 currently experiences congestion during peak periods of the day, and the corridor does not currently operate as a high-speed facility (average speed of 50 mph or greater), nor will it in the future without substantial improvements.

1.1.2 PURPOSE OF PROPOSED ACTION

Based on NCDOT's review of changes and updates to project information, the purpose of the proposed action has not changed since the Draft EIS and Final EIS. The purpose of the project is to improve mobility and capacity within the project study area by providing a facility for the US 74 corridor from near I-485 in Mecklenburg County to between the towns of Wingate and Marshville in Union County that allows for high-speed regional travel consistent with the designations of the North Carolina SHC program and the North Carolina Intrastate System, while maintaining access to properties along existing US 74.

1.2 PROJECT SETTING AND HISTORY

The project setting, the existing road network, and public and agency involvement in the development of the purpose and need are discussed in more detail in Section 1.4 of the Draft EIS. Changes and updates to these sections are noted in the summary below.

Project Setting. There are no changes to the project setting described in the Draft EIS and referenced in the Final EIS. The majority of the project study area is within Union County, with a portion adjacent to (and northwest of) I-485 within Mecklenburg County. Portions of the project study area are within the jurisdictions of the Towns of Mint Hill, Matthews, Stallings, Hemby Bridge, Indian Trail, Wingate, and Marshville; the Village of Lake Park; and the City of Monroe.

Public and Agency Involvement in Development of the Purpose and Need. There are no updates to the history of public and agency involvement presented in the Draft EIS. A formal scoping letter was distributed on January 5, 2007 to solicit early coordination and input (Appendix A-3 of the Draft EIS). Purpose and need also was discussed at five coordination meetings with environmental resource and regulatory agencies in 2007. Public comment was

solicited at the first series of Citizens Informational Workshops, held in June 2007. A majority of the citizens providing written comments supported the use of tolls and the purpose of the project.

1.2.1 TRANSPORTATION SYSTEMS

The project's designation in various national and statewide networks and its relationship to other transportation modes are discussed in more detail in Section 1.5 of the Draft EIS. There are no changes or updates to these sections since the Final EIS.

1.2.2 SOCIAL AND ECONOMIC CONDITIONS

Section 1.6 of the Draft EIS discusses population and employment, commuting patterns, and growth and development patterns. This information from the Draft EIS is summarized in Section 1.1.6 of the Final EIS. Since that time, 2010 Census data has become available. It is presented in **Appendix D** and summarized below.

Regional Context. There are no changes to the regional context since the Final EIS, with the exception of an expansion of the MUMPO planning area. The project study area is part of the MUMPO planning area, which at the time of the Final EIS included all of Mecklenburg County and the western and central portions of Union County. MUMPO's governing body approved a new planning area boundary on July 17, 2013 due to growth of the Charlotte urbanized area. The new MUMPO planning boundary extends to include most of Iredell County. As of September 2013, MUMPO is now known as the Charlotte Regional Transportation Planning Organization (CRTPO). The Charlotte-Mecklenburg County region is the commercial capital of the Carolinas, and Charlotte is the largest city in North Carolina.

Population and Employment. Since the Final EIS, 2010 Census data became available, and the same trends that occurred from 1990 to 2000 continue from 2000 to 2010. As discussed in Section 1.3.1.1 of the Final EIS, the population of the Demographic Study Area (33 Union County and 6 Mecklenburg County Census Block Groups surrounding the project study area) grew 49.0 percent between 1990 and 2000. Based on 2010 Census data, the Demographic Study Area grew another 49.3 percent between 2000 and 2010. Union County as a whole grew 46.9 percent from 1990 to 2000, and 62.8 percent from 2000 to 2010. Union County had the highest percentage of growth among all North Carolina counties from 2000 to 2010. The population and employment of both Mecklenburg and Union Counties are expected to increase through the year 2030. Additional information on socioeconomic characteristics of the project study area is provided in **Section 4.1.1**. Growth trends are discussed in more detail in Section 1.6 of the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013). Union County has exhibited strong growth in the past, and the factors driving those trends are poised to continue attracting growth to Union County regardless of whether the Monroe Connector/Bypass is constructed.

Commuting Patterns. Based on 2006 data reported in the Draft EIS and Final EIS, 61 percent of Union County's residents commuted to outside Union County for work. Since the Final EIS, updated information is available regarding place of work. Based on commuting data from the US Census Bureau for 2006-2010, approximately 50 percent of workers living in Union County commute outside of Union County for work. Of the workers that commute outside of Union County, approximately 85 percent commute to Mecklenburg County.

According to the 2007-2011 American Community Survey (ACS) five-year estimates, over 87 percent of Union County workers (that work outside the home) drive alone to work.

Approximately ten percent travel to work in a carpool (mostly 2-person carpools), and only around one percent use public transportation, bicycle, or walk to work. In addition, approximately 46 percent of workers residing in Union County travel 30 or more minutes to work.

Growth and Development Patterns. There are no substantial changes to regional growth and development patterns since the Final EIS. According to the CRTPO *2035 LRTP*, the southern and eastern portions of Mecklenburg County, which is the area along the Union County line, is expected to be one of the most rapidly growing areas in the region.

1.2.3 TRANSPORTATION AND LAND USE PLANS

As discussed in Section 1.7 of the Draft EIS, the transportation needs and goals of the Mecklenburg-Union County region relating to roadways are addressed in three inter-related plans: the NCDOT *2009-2015 STIP*, the CRTPO *2030 LRTP*, and the *Mecklenburg-Union Thoroughfare Plan*. The proposed action is included in each of these plans in a manner that is consistent with the SHC and the North Carolina Intrastate System visions for the facility and corridor. Each of these plans has been updated, or is currently being updated, as described below.

Between the Draft EIS and Final EIS, the CRTPO *2030 LRTP* was updated to 2035. The Monroe Connector/Bypass project is included in the CRTPO *2035 LRTP* as a regionally significant project and is ranked as the CRTPO's number one project. The project is designated as a toll facility in the *2035 LRTP,* and the design concept and scope included in the *2035 LRTP* are consistent with the Preferred Alternative.

Since the Final EIS, the STIP has been updated to the *2012-2020 STIP*. The project is included in this STIP as a NCTA project.

The most recent Mecklenburg-Union Thoroughfare Plan (2004) will be replaced by the Comprehensive Transportation Plan (CTP), in accordance with NC General Statute 136-66.2. A draft version of the CTP dated June 2013 is available. The Monroe Connector/Bypass is included on the Highway Map of the Draft CTP as a recommended freeway (CRTPO Web site: www.mumpo.org/plans-programs/comprehensive-transportation-plan).

Land use plans are discussed in Section 3.3 of the Draft EIS and Section 1.3.1.3 of the Final EIS. Several local governments have updated their land use plans and/or other planning documents since the Final EIS. The Town of Fairview adopted a new land use plan in 2010 that added some commercial nodes at major intersections in the project study area, but otherwise the updated land use plans do not include major changes in the project study area. Changes in growth expectations, land use, and zoning based on interviews with local planners were incorporated into the updated quantitative assessment of indirect and cumulative effects, as summarized in **Section 4.5**.

1.2.4 ROADWAY CONDITIONS AND OPERATIONS

Section 1.8 of the Draft EIS discusses roadway conditions and operations along existing US 74 within the project study area. There were no changes to this information in the Final EIS. Since the Final EIS was published in May 2010, additional improvements have been implemented by NCDOT along the existing US 74 corridor, including signal timing optimization, signal phasing modification, increased turn lane storage lengths, and lane assignment modifications. These

improvements, many of which implement the recommendations of the *US 74 Corridor Study* (Stantec, July 2007), are discussed in **Section 2.4**.

Due to improvements along the US 74 corridor since the Final EIS was published, the previous roadway conditions presented in Section 1.8 of the Draft EIS (and summarized in Section 1.1.2 and Section 1.1.8 of the Final EIS) have been updated to more accurately reflect existing conditions. Updated information on existing and projected roadway conditions and operations is presented in the following sections.

Existing US 74 Characteristics. US 74, also known as Independence Boulevard in Mecklenburg County and Roosevelt Boulevard in Union County, is a four- to six-lane highway within the project study area, with 27 at-grade signalized intersections, additional unsignalized intersections, and numerous commercial and residential driveway connections. The traffic signals are shown in **Figure 1-1**. The Final EIS reported 26 signalized intersections, but this number has been updated to include a new signal at the entrance to the Poplin Place Shopping Center (Wellness Boulevard) in Monroe. Traffic signal spacing ranges from less than ¼ mile to a maximum of 2½ miles. The characteristics of US 74 discussed in Section 1.8.1 of the Draft EIS remain valid, except for the changes described above.

The speed limits posted for US 74 within the project study area are shown in **Table 1-1**. Posted speed limits were verified in May 2013, and there have been no changes since the Final EIS.

Travel Times Along the US 74 Corridor. Travel times are discussed in Section 1.8.2 of the Draft EIS and summarized in the Final EIS based on the *Existing and Year 2030 No-Build Traffic Operations Technical Memorandum* (PBS&J, March 2008). The Draft EIS and Final EIS reported that, based on traffic simulation computer models (Sim Traffic), average travel speeds in 2007 on US 74 in the project study area were estimated to range from approximately 20 mph to 30 mph during the peak hour, and were expected to decline through 2030.

To account for improvements to the US 74 corridor since the Final EIS was published (see **Section 2.4** for a description of these improvements), FHWA and NCDOT collected new travel time information to update travel performance along the existing corridor. The update includes travel time runs conducted along the US 74 corridor in March 2013, and the use of a larger set of traffic flow information available from INRIX, Inc. INRIX (www.inrix.com) is a company that provides real-time, historical, and predictive traffic flow information based on blending real-time road sensor data with real-time data points from GPS-enabled vehicles and mobile devices. The results are described below.

The results of the travel time runs conducted along the corridor in March 2013 are documented in the memorandum titled *US 74 Corridor Travel Time Comparison* (HNTB, October 2013), which is incorporated by reference and available for review on the project website. For these travel time runs, US 74 through the project study area was driven eastbound and westbound on midweek days in March 2013 for the AM (6:30-9:00 AM), noon (11:30 AM-1:30 PM), and PM (4:00-6:00 PM) peak periods. The travel time runs were conducted on midweek days (Tuesday-Thursday) to represent average weekday traffic conditions since conditions on Mondays and Fridays typically have higher variability. The travel time runs were conducted based on standards published by the Institute of Transportation Engineers (ITE) (*Manual of Transportation Engineering Studies, 2nd Edition*, November 2010) and FHWA (*FHWA Travel Time Data Collection Handbook*, March 1998). Based on these field travel time runs, corridor average travel speeds are approximately 40 mph eastbound and westbound during all three peak periods.

The March 2013 travel time runs were compared to INRIX data to determine if INRIX data could be used to describe existing conditions for a broader set of time periods. INRIX data was obtained for segments along the corridor for the same time periods as the field travel time runs to provide for a direct comparison. Combining the corridor segment data, INRIX data results show average travel speeds of approximately 44 mph eastbound and westbound during all three peak periods. In comparison to the field travel time runs, INRIX data generally shows slightly faster average travel speeds and slightly shorter average travel times. Therefore, average speeds and travel times based on INRIX data are deemed reasonable to simulate existing conditions, with the speeds reported in INRIX likely being equal to or slightly faster than actual driver experience.

INRIX data was then obtained and analyzed for each midweek day for all of 2011, all of 2012, and for August 2013. Based on a review of the data, the peak periods are lunch and evening (PM) for eastbound travel on US 74, and morning (AM) and evening (PM) for westbound travel.

Table 1-2 presents the results for eastbound peak hour travel speeds compared to speed limits, and **Table 1-3** presents the results for westbound peak hour travel speeds. In order for the speed limits to match up with the segment data provided by INRIX, a weighted average speed limit had to be calculated for the posted speed limits between US 601 (Pageland Highway – the easternmost intersection of US 74 and US 601 east of Monroe) and the easternmost segment within the Marshville town limit. It should be noted that US 74 east of US 601 (Pageland Highway) is where the corridor begins to transition to a more rural character and traffic volumes are lower than the more urban/suburban segments of US 74 to the west that comprise the majority of the corridor.

TABLE 1-2: Peak Hour Speeds Along US 74 Eastbound (2011, 2012, August 2013)

Approx. Length (miles)	Eastbound US 74 Segments (from west to east)	Speed Limit (mph)	Weighted Avg Speed Limit to Match INRIX Segments (mph)	2011 Peak Hour Avg Speed (mph)		2012 Peak Hour Avg Speed (mph)		August 2013 Peak Hour Avg Speed (mph)	
				Lunch	PM	Lunch	PM	Lunch	PM
8.2	I-485 to Fowler Secrest Road (SR 1754)	55	55	46	40	45	40	45	40
5.5	Fowler Secrest Road to US 601 (Pageland Hwy) (*easternmost intersection of US 74 and US 601 east of Monroe*)	45	45	35	38	37	39	38	38
3.0	US 601 (Pageland Hwy) to east of Presson Road	55	46	47	46	48	47	49	48
0.2	East of Presson Road to Wingate City Limit	45							
1.4	Wingate City Limit to Old Highway 74 (SR 1740)	35							
0.7	Old Highway 74 (SR 1740) to Olde Country Lane	45							
1.5	Olde Country Lane to 0.3 mile west of Marshville Town Limit	55							
0.3	0.3 miles west of Marshville Town Limit to Marshville Town Limit	45							
2.5	Within Marshville Town Limit	35							
23.3	**Corridor Weighted Average Speed (mph)**		**49**	**44**	**42**	**44**	**43**	**45**	**43**

TABLE 1-2: Peak Hour Speeds Along US 74 Eastbound (2011, 2012, August 2013)

Approx. Length (miles)	Eastbound US 74 Segments (from west to east)	Speed Limit (mph)	Weighted Avg Speed Limit to Match INRIX Segments (mph)	2011 Peak Hour Avg Speed (mph)		2012 Peak Hour Avg Speed (mph)		August 2013 Peak Hour Avg Speed (mph)	
				Lunch	PM	Lunch	PM	Lunch	PM
Comparison - Average Travel Speeds to Speed Limits									
I-485 to Fowler Secrest Road (SR 1754)			-9 to -15 mph	below speed limit					
Fowler Secrest Road to US 601 (Pageland Hwy)			-6 to -10 mph	below speed limit					
US 601 (Pageland Hwy) to within Marshville			+3 to 0 mph	about/slightly above speed limit					
OVERALL CORRIDOR			**-4 to -7 mph**	**below speed limit**					

Source: INRIX, Inc.

TABLE 1-3: Peak Hour Speeds Along US 74 Westbound (2011, 2012, August 2013)

Approx. Length (miles)	Eastbound US 74 Segments (from east to west)	Speed Limit (mph)	Weighted Avg Speed Limit to Match INRIX Segments (mph)	2011 Peak Hour Avg Speed (mph)		2012 Peak Hour Avg Speed (mph)		August 2013 Peak Hour Avg Speed (mph)	
				AM	PM	AM	PM	AM	PM
2.5	Within Marshville Town Limit	35	46	37	38	38	39	40	41
0.3	0.3 miles west of Marshville Town Limit to Marshville Town Limit	45							
1.5	Olde Country Lane to 0.3 mile west of Marshville Town Limit	55							
0.7	Old Highway 74 (SR 1740) to Olde Country Lane	45							
1.4	Wingate City Limit to Old Highway 74 (SR 1740)	35							
0.2	East of Presson Road to Wingate City Limit	45							
3.0	US 601 (Pageland Highway) to east of Presson Road	55							
5.5	Fowler Secrest Road to US 601 (Pageland Highway)	45	45	38	37	39	39	39	36
8.2	I-485 to Fowler Secrest Road (SR 1754)	55	55	38	43	41	44	40	42
23.3	**Corridor Weighted Average Speed (mph)**		**49**	**37**	**39**	**39**	**41**	**40**	**40**
Comparison - Average Travel Speeds to Speed Limits									
Within Marshville to US 601 (Pageland Hwy)			-5 to -9 mph	below speed limit					
US 601 (Pageland Hwy) to Fowler Secrest Road			-6 to -9 mph	below speed limit					
Fowler Secrest Road to I-485			-11 to -17 mph	below speed limit					
OVERALL CORRIDOR			**-8 to -12 mph**	**below speed limit**					

Source: INRIX, Inc.

Table 1-2 and **Table 1-3** show that the majority (60 percent) of the corridor (from I-485 to US 601 (Pageland Highway – east of Monroe)) operates substantially below the posted speed limits, both eastbound and westbound during all peak periods. For the portion of the corridor east of US 601 (Pageland Highway), eastbound operates at or slightly above the weighted average posted speed limit, while westbound operates at 5-9 mph below the posted speed limit. All speeds are still below the desired 50 mph.

For the overall corridor (Marshville to I-485), the weighted average posted speed limit is 49 mph. Eastbound US 74 weighted average travel speeds range from 42-45 mph (4-7 mph below weighted average speed limit), and westbound US 74 weighted average travel speeds range from 37-41 mph (8-12 mph below weighted average speed limit).

INRIX data can be graphically illustrated using a software tool (Regional Integrated Transportation Information System [RITIS]) from the University of Maryland's Center for Advanced Transportation Technology Lab (CATT Lab) (RITIS Web site: http://vpp.ritis.org).

Exhibits 1-1 through 1-4 are screenshots from the RITIS software tool that graphically illustrate the August 2013 average operating speeds (in mph) summarized in **Table 1-2** and **Table 1-3**. Green lines in the exhibits correspond to speeds of 49 mph or greater. Yellow, red, and orange colors designate slower operating speeds.

Exhibit 1-1: Average Operating Speeds for US 74 Eastbound (August 2013 Lunch Peak)

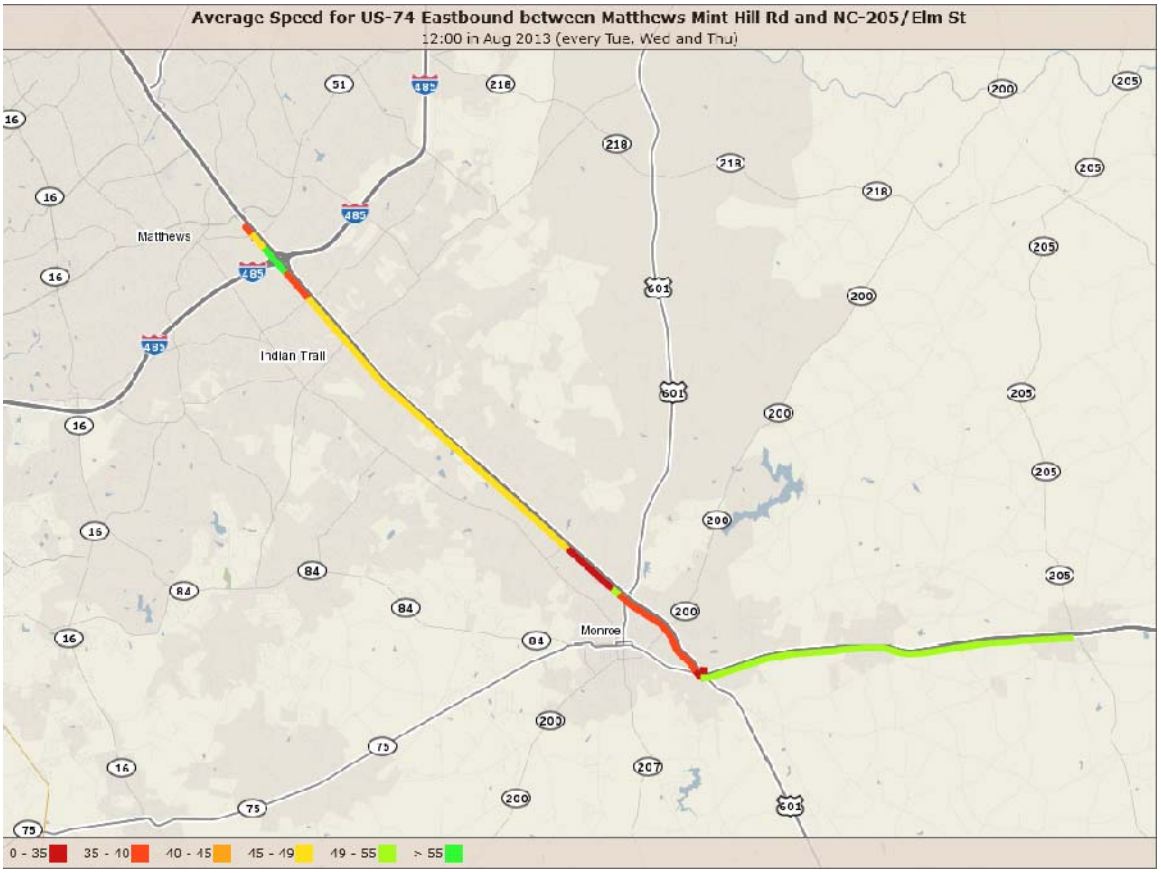


Exhibit 1-2: Average Operating Speeds for US 74 Eastbound (August 2013 PM Peak)

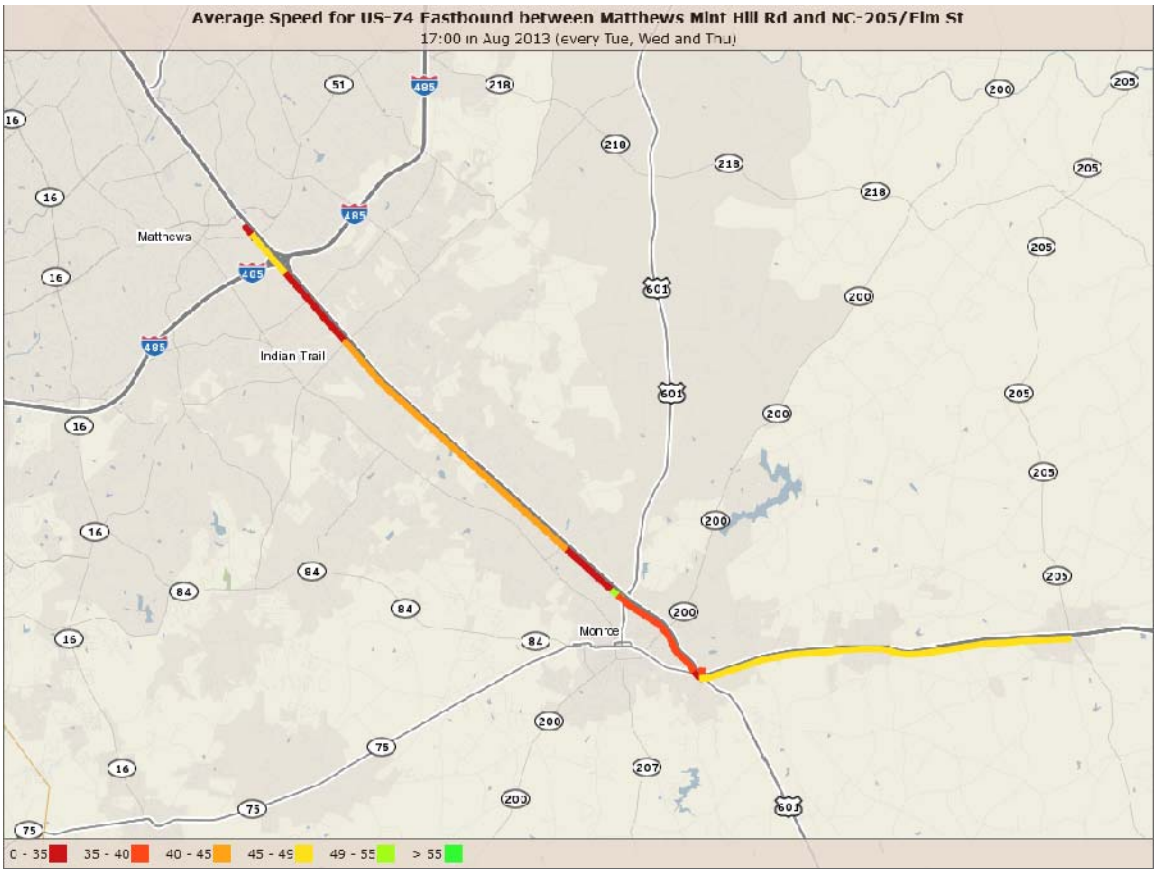


Exhibit 1-3: Average Operating Speeds for US 74 Westbound (August 2013 AM Peak)

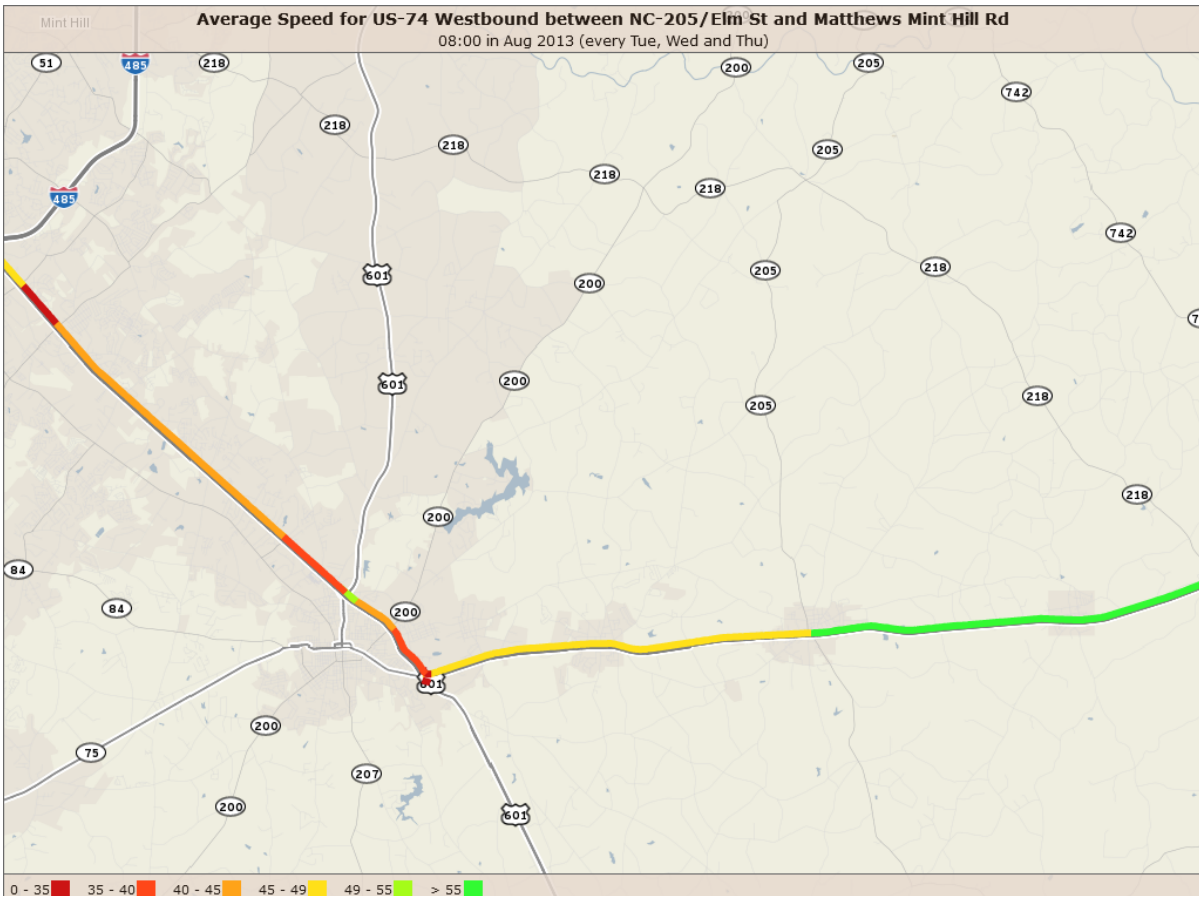
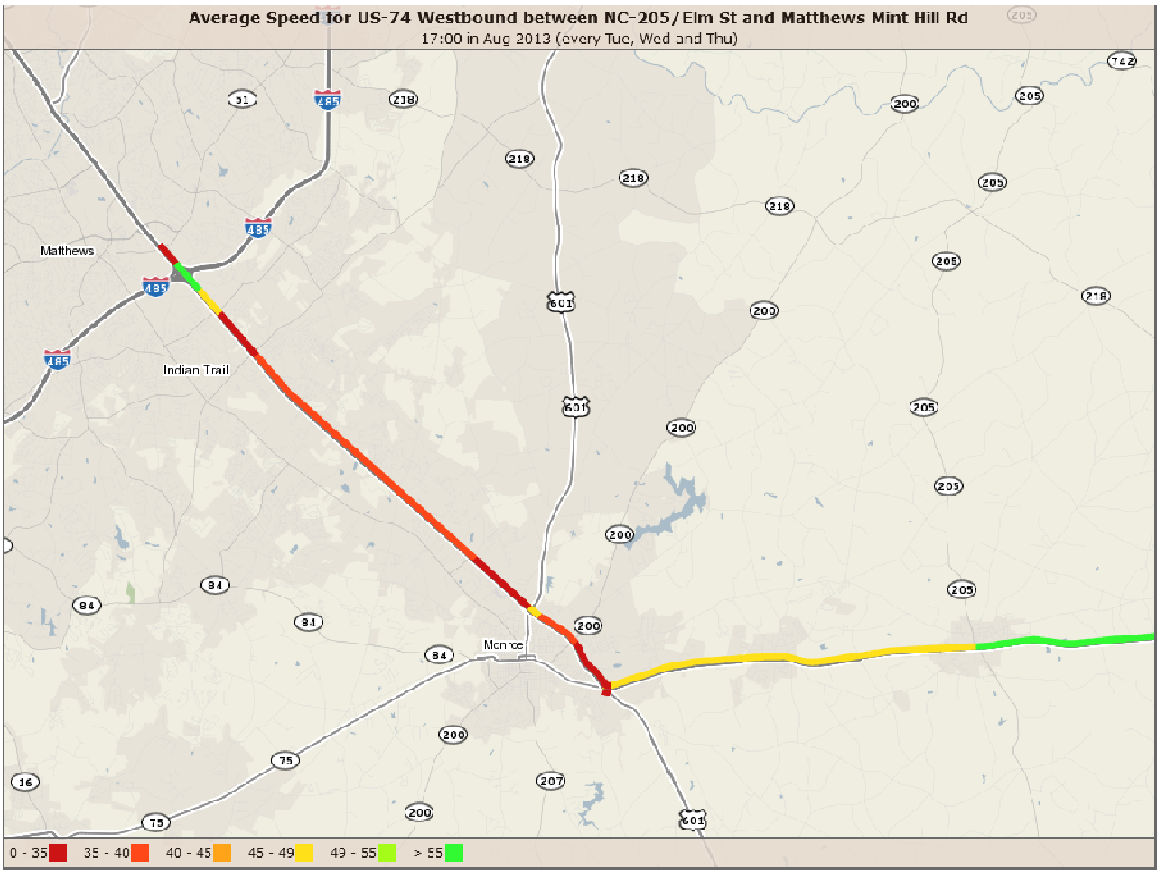


Exhibit 1-4: Average Operating Speeds for US 74 Westbound (August 2013 PM Peak)



While intersection and corridor improvements along existing US 74 (**Table 2-2**) have been beneficial, present day operating speeds are still substantially less than desirable. Adding lanes to the current facility would likely have little impact on the operating speeds because the frequent intersections and numerous driveway access points are two controlling features of the facility that limit the ability to raise the posted and operating speeds. The FHWA *Benefits of Access Management Brochure* (FHWA Web site: http://ops.fhwa.dot.gov/access_mgmt/docs/benefits_am_trifold.pdf) states that for every 10 driveway access points per mile, the operating speed is decreased on average by 2.5 mph, up to a maximum of a 10 mph reduction. The same brochure provides a table on the impact signal spacing has on travel time, reproduced as **Table 1-4**.

TABLE 1-4: Impact of Signal Spacing on Travel Time

Signals Per Mile	Increase in Travel Time (%)
2	--
3	9
4	16
5	23
6	29
7	34
8	39

Source: FHWA *Benefits of Access Management Brochure* (FHWA Web site: http://ops.fhwa.dot.gov/access_mgmt/docs/benefits_am_trifold.pdf)

In regards to driveway spacing, in the westbound direction, the corridor has four one-mile segments with 10-19 driveways, and six one-mile segments with 20-29 driveways; having an impact of an approximately 2.5 mph reduction and a 5.0 mph reduction in operating speeds on those segments, respectively. In the eastbound direction, the corridor has nine one-mile segments with 10-19 driveways, two one-mile segments with 20-29 driveways, and one one-mile segment with 30-39 driveways; having an impact of an approximately 2.5 mph, a 5.0 mph, and a 7.5 mph reduction in operating speeds on those segments, respectively.

In regards to traffic signals, the two densest areas of traffic signals can be seen on **Figure 1-1**, and are from Fowler Secrest Road east to Secrest Shortcut Road (3.5 traffic signals per mile), and from Stafford Road just east of US 601 North to Campus Park Drive just west of US 601 South (3.7 traffic signals per mile). The impact of this spacing places an extra 9-16 percent travel time on corridor users.

Increasing traffic volumes also will negatively impact operating speeds along existing US 74. Since traffic volumes are projected to continue to increase through 2035, the average travel speed along existing US 74 will decline as traffic volumes increase due to anticipated population and employment growth in the region. Based on 2008 and 2035 No-Build traffic forecasts (HNTB, March 2010), average volumes along the US 74 corridor are projected to increase approximately 34 percent.

In conclusion, even with improvements implemented along US 74 since the Final EIS, average travel speeds along the US 74 corridor are still below 50 mph. Conditions are not expected to improve in the future as traffic volumes increase; therefore average travel times in 2035 are expected to be longer and average travel speeds are expected to decrease compared to existing conditions, supporting the need for the project.

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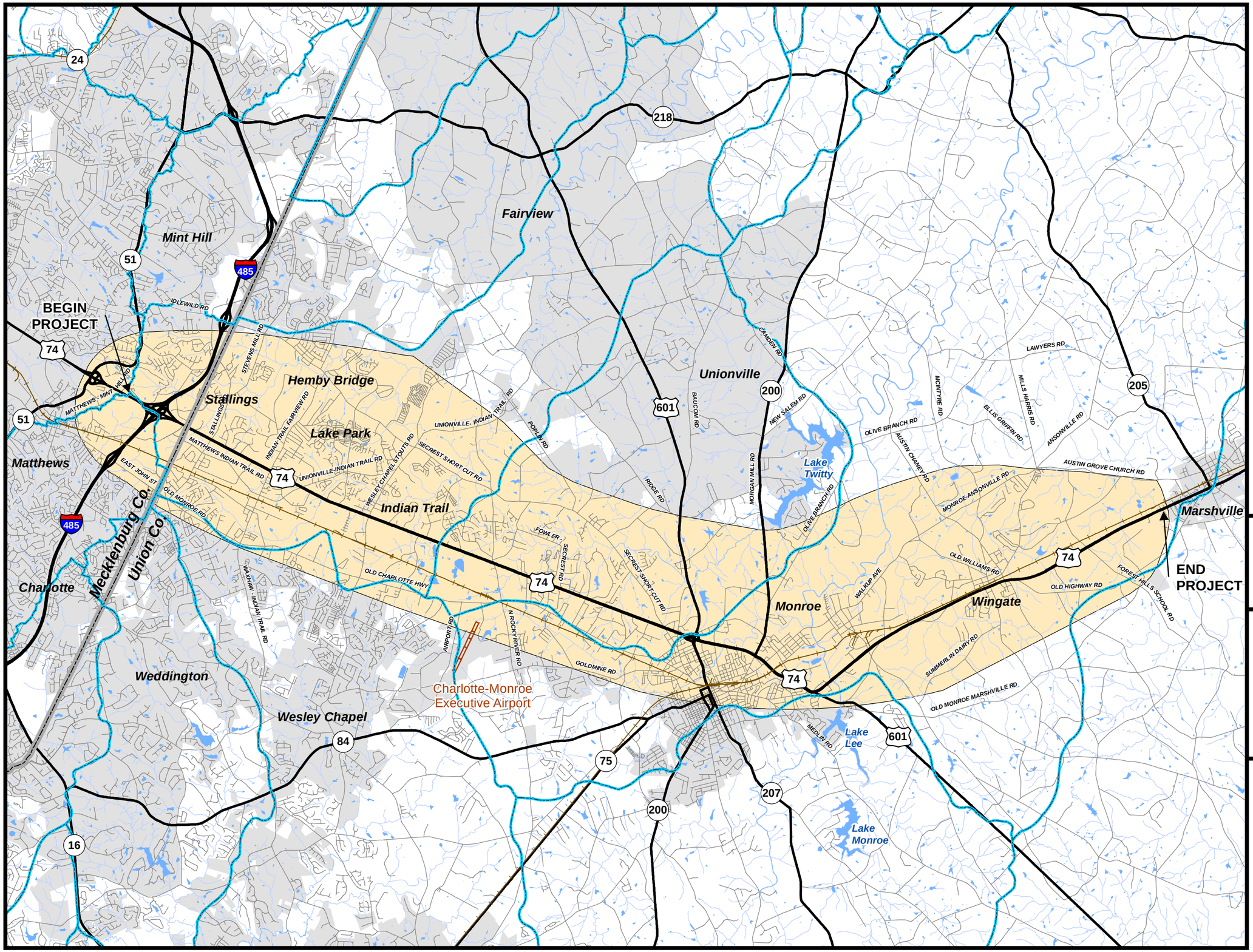
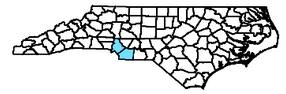


Legend

- Project Study Area
- Municipal Limits
- Watershed Basin
- Lakes
- Streams
- Railroad



Mecklenburg and Union Counties
North Carolina Counties

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

N

0 0.875 1.75
Miles

NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. R-3329/R-2559

Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PROJECT STUDY AREA

Figure 1-1

EAUpdate_Study_Area.mxd JNL 04.24.13

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2. ALTERNATIVES CONSIDERED

Section 2 summarizes the extensive multi-step alternatives development process carried out during the preparation of the Draft EIS, additional analyses conducted and documented in the Final EIS as a result of public and agency comment, and updates and analyses conducted after the Final EIS. This section consolidates information from the Draft EIS, Final EIS, and technical reports developed during the course of project studies. DSA D remains the Preferred Alternative, as noted in ***Section 2.6*** *and discussed in* ***Section 3*** *of this Draft Supplemental Final EIS.*

2.1 ALTERNATIVES DEVELOPMENT AND SCREENING

The NCDOT followed an alternatives screening process for the Monroe Connector/Bypass, and incorporated additional comparative and detailed analyses as part of the Final EIS and after the Final EIS, including those following comments received from the public and resource agencies. A typical alternatives screening process for a transportation project starts with an initial qualitative screening of a large number of alternatives. Further screenings refine the remaining alternatives and implement progressively more detailed qualitative and quantitative evaluation criteria.

As defined in the American Association of State Highway and Transportation Officials' (AASHTO) *Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects – Practitioner's Handbook* (August 2007), the term "alternatives screening" is commonly used to refer to the process for reviewing a range of preliminary alternatives or concepts and deciding which ones to carry forward for detailed study. The primary function of an alternatives screening process is to determine reasonableness as a means of separating the unreasonable alternatives (which can be eliminated without detailed study) from reasonable alternatives that must be carried forward for detailed study. As was the circumstances of the Monroe Connector/Bypass, if there are many reasonable alternatives, the screening process also can be used as the basis for defining a range that represents the full spectrum of reasonable alternatives.

The development and evaluation of alternatives for determination of the Detailed Study Alternatives (DSA) included in the Draft EIS is documented in detail in the *Alternatives Development and Analysis Report* (PBS&J, April 2008), and further studies of existing US 74 are documented in the *Upgrade Existing US 74 Alternatives Study* (HNTB, April 2009), incorporated by reference and available on the project Web site (www.ncdot.gov/projects/monroeconnector/). Additional studies of improving existing US 74 conducted after the Final EIS are documented in the *US 74 Corridor Analysis Scenarios* (HNTB, December 2010). This Draft Supplemental FEIS summarizes results of that work.

The following subsections summarize the process used to identify the Detailed Study Alternatives in the Draft EIS (**Section 2.2**); additional analyses conducted and included in the Final EIS as a result of public and agency comment (**Section 2.3**); and updates and analyses conducted after the Final EIS (**Section 2.4**). The majority of the public comments received on alternatives are related to the alternative analysis, including comments received after the Final EIS, and many of these comments are related to the alternatives for upgrading existing US 74. The history of the evaluation of the Improve Existing US 74 Alternative also is summarized in a table in **Appendix B**. **Section 2.5** summarizes a review of traffic forecasts and operations analyses for the Build Alternatives. Finally, **Section 2.6** provides a conclusion regarding the entire extensive alternatives development and evaluation process. The entire alternatives development process is depicted in the flow chart in **Figure 2-1a-b** at the end of this section. **Appendix B** includes figures showing the alternative

corridors for Upgrade Existing US 74 Alternatives and New Location Alternatives referenced in **Figure 2-1a-b**.

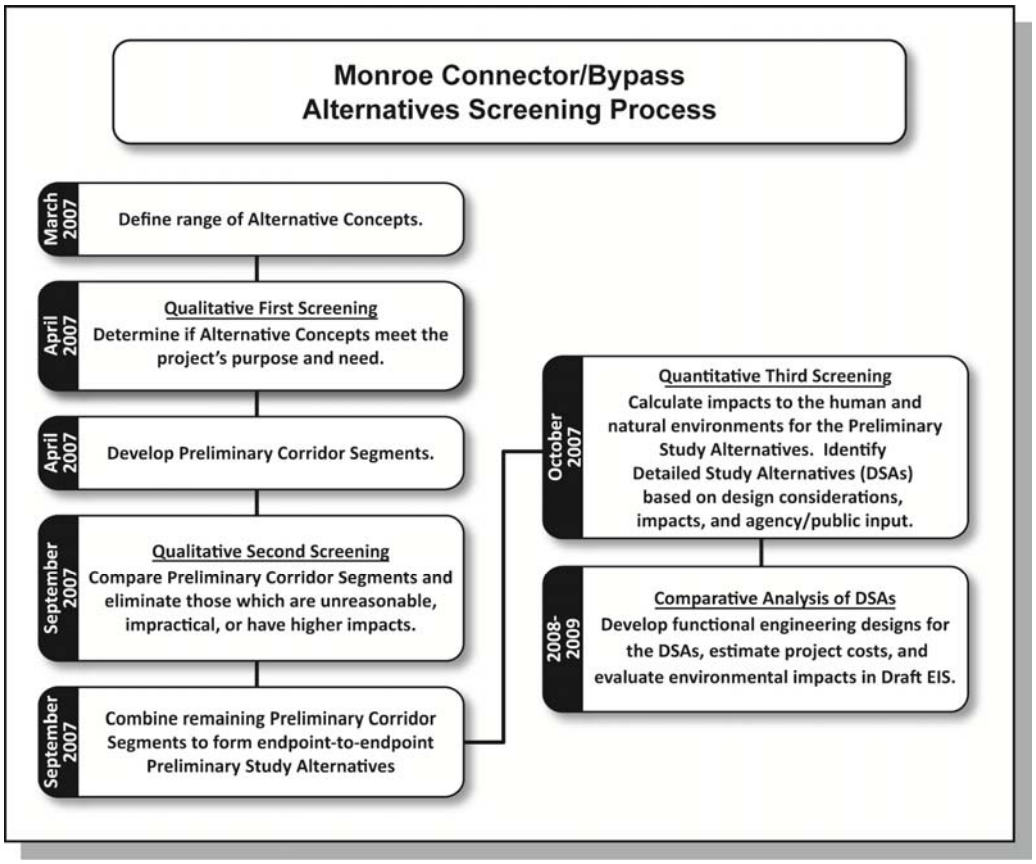
2.2 ALTERNATIVES SCREENING FOR THE DRAFT EIS

2.2.1 PROCESS OVERVIEW AND SCREENING RESULTS

Screening Process

Exhibit 2-1 broadly depicts the overall alternatives evaluation process used to develop the Detailed Study Alternatives included in the Draft EIS, and the time frame for the screenings. The chart simplifies the extensive screening procedure used for the Monroe Connector/Bypass, involving several levels of study and analysis to narrow down a reasonable set of alternatives for detailed study in the Draft EIS. As the chart shows, the initial screening was conducted in three steps.

EXHIBIT 2-1. Alternatives Evaluation Process for the Monroe Connector/Bypass



1st Qualitative Screening – evaluated the ability of an alternative concept to meet the project's purpose and need based on the established screening criteria. The 1st Qualitative Screening evaluated the range of alternative concepts suggested in the *FHWA Technical Advisory T 6640.8A* (1987) that should be considered when determining reasonable alternatives. These are:

- No-Build or No-Action Alternative
- Transportation Demand Management Alternative

- Transportation System Management Alternative
- Mass Transit and Multi-Modal Alternatives
- Build Alternatives, including Upgrading Existing Roadways and New Location Alternatives

The following three evaluation criteria were based on the purpose and need and applied to the analysis of each alternative concept:

- Does the alternative address the need to enhance mobility and increase capacity in the US 74 corridor?
- Is the alternative consistent with the NC Strategic Highway Corridor program and the NC Intrastate System (i.e. does it allow for high-speed regional travel)?
- Does the alternative maintain access to properties along existing US 74?

2nd Qualitative Screening – compared Preliminary Corridor Segments on new location and along existing US 74 and other roadways, and eliminated those which were determined unreasonable, impractical, and/or had higher impacts.

3rd Quantitative Screening – calculated and compared impacts to the human and natural environments for the Preliminary Study Alternatives and identified the Detailed Study Alternatives based on design considerations, impacts, and agency/public input.

Public and Agency Input

The public and local, state, and federal environmental resource and regulatory agencies were involved throughout the project development process. Numerous opportunities for involvement were provided to solicit and obtain input and comment, beginning at the initial development of the project's purpose and need, and continuing through the determination of the range of reasonable alternatives for detailed study (and beyond). Comments were accepted at any time, with formal opportunities provided at milestones in the process. The plan to involve the public and agencies in the process is included in the *Section 6002 Project Coordination Plan* (October 2007) for the project and summarized in Section 2 and Section 9 of the Draft EIS.

Agencies were involved in the technical process of both purpose and need and alternatives development and screening via monthly agency coordination meetings (Turnpike/Environmental Agency Coordination, or TEAC, meetings). Input from agencies was requested as the screening criteria were developed and refined. At the TEAC meetings, NCDOT requested and received agreement from participating agencies on vital elements of the project's purpose and need and subsequent alternatives development and detailed study alternatives identification.

In June 2007, over 25,000 newsletters were distributed to solicit public involvement beginning early in the process. The purpose and need for the project was presented at Citizens Informational Workshops held on June 25 and 26, 2007. There was agreement on existing and future need, and strong support of the project purpose by the public[1]. Following support of the project purpose and need, project alternatives were then presented to both the public and agencies, as documented in Section 2 of the Draft EIS.

[1] Per the Summary of the Citizens Informational Workshop Comment Forms (July 2007), over 90% of respondents agreed with the proposed project purposes of 1) improving mobility 2) providing high-speed regional travel, and 3) maintaining property access.

Tolling

Tolling was a consideration in the alternatives development process beginning with the 2nd Qualitative Screening. However, as discussed below, the tolling aspect of the project had no influence on the concepts identified for detailed study and little influence on the roadway preliminary design.

In the 1st Qualitative Screening, which evaluated alternative concepts' abilities to meet purpose and need, tolling was not a consideration. Non-toll alternatives considered included upgrading existing US 74 by widening, upgrading existing US 74 to a Superstreet design, TSM Alternatives, and TDM Alternatives. Mass Transit/Multi-Modal Alternatives (the mass transit component likely would include user fees) also were considered. These were eliminated from detailed study for reasons unrelated to the ability to toll.

Concepts that passed through the 1st Qualitative Screening were Improve Existing US 74 (controlled-access highway), New Location Roadway (controlled-access highway), and New Location/Improve Existing Roadways Hybrid (controlled-access highway). These concepts were determined to be the only ones that could meet the project's purpose and need (either tolled or non-tolled).

As discussed in Section 2.3.2.5 of the Draft EIS, the NCTA determined that the Monroe Connector/Bypass is financially feasible with the collection of tolls. In the Charlotte Regional Transportation Planning Organization's (CRTPO's) 2035 LRTP, tolling has been identified as a funding source for this project. Using tolls, the NCDOT can provide the funding needed to construct the project many years earlier than with traditional funding sources. Using tolls as a funding mechanism for construction and maintenance allows needed capacity to be added when budget shortfalls would otherwise prevent or delay completion of critical projects.

In the 2nd Qualitative Screening, tolling was considered in the design of the Preliminary Corridor Segments. All alternative concepts that made it through the first qualitative screening to the second qualitative screening are concepts that could involve tolling in their designs. The FHWA memorandum titled *NEPA Analysis of Toll Roads* (October 2004) states that an MPO may identify toll revenues as a funding source for a highway in its transportation plan when all other public funds are committed for other projects and not available (as is the case for the Monroe Connector/Bypass). The memo goes on to say that the NEPA document for such projects does not need to consider non-toll alternatives since the planning process demonstrated that these alternatives are not economically feasible.

State law prohibits tolling of existing roadways and requires a free alternate route (NCGS 136-89.197). To accommodate this, constructing the project along an existing roadway corridor would require frontage roads to provide the free alternate route. However, as part of the purpose and need criteria for the project, there is a need to maintain access to existing properties along existing US 74, so frontage roads would be needed for the Upgrade Existing US 74 Alternatives under either a toll or non-toll scenario to provide property access. Also, as discussed in Draft EIS Section 2.5.1.3, there are minimal differences between a roadway design with and without an electronic toll collection (ETC) system as proposed with this project.

Results of Alternatives Screening in Draft EIS

1st Qualitative Screening – Concepts eliminated in the 1st Qualitative Screening were the TSM concept, the mass transit/multi-modal concept, and transportation demand management concepts (measures such as carpooling, telecommuting, and shifting work schedules to off peak hours). The

results revealed that only a controlled-access highway type facility (either on new location or an upgrade of existing roadways, or combination of new location and upgrade existing) would fulfill the identified needs and meet the purpose of the project.

The reasons for the conclusions are detailed in the *Alternatives Development and Analysis Report* (PBS&J, April 2008) and Section 2.2.2 of the Draft EIS. These conclusions were reviewed and remain valid.

The No-Build (or No-Action) alternative served as the baseline comparison for the design year (2035). This alternative assumes that the transportation systems for Union and Mecklenburg Counties would evolve as currently planned in the MUMPO *2030 Long Range Transportation Plan*, but without major improvements to the existing US 74 corridor from near I-485 to between the towns of Wingate and Marshville. Since the Draft EIS, the MUMPO *2035 LRTP* has been released; however, the *2035 LRTP* does not include any additional projects within the project area that would change the conclusions presented in the Draft EIS regarding the No-Build Alternative.

2nd Qualitative Screening – Section 2.3 of the Draft EIS summarizes the 2nd Qualitative Screening. The 2nd Qualitative Screening consisted of a series of assessment steps to determine which Preliminary Corridor Segments to include in the 3rd Quantitative Screening. This 2nd screening included four steps:

1. Establish a project study area to develop Preliminary Corridor Segments.

   This study area was reevaluated for this Draft Supplemental Final EIS and remains valid.

2. Assess Individual Preliminary Corridor Segments
   - Preliminary Corridor Segments include new location corridors and corridors along existing roadways (including existing US 74 and a corridor south of existing US 74). These are shown in **Appendix B**.
   - Segment eliminated if it had likely substantial impacts to the natural and/or human environment.
   - Segment carried forward if it provided a route where no other similar options existed and/or if additional information and evaluation were needed to determine if the Preliminary Corridor Segment would be viable and reasonable.
3. Assess and Compare Relative Preliminary Corridor Segments
   - This evaluation focused on four areas where several options existed to provide the same route. These four areas are shown in Figure 2-4a-e of the Draft EIS.
   - Segments were eliminated that had greater impacts to the natural and/or human environment compared to other corridor segments in the same area that provided a similar function.
4. Consolidate Corridor Segments into Preliminary Study Alternatives (shown in **Appendix B**)

The 2nd Qualitative Screening resulted in the elimination of ten corridor segments and consolidation of several others (see Figure 2-5 of the Draft EIS for the Preliminary Corridor Segments that passed through to the evaluation in the 3rd Quantitative Screening).

3rd Quantitative Screening - The Preliminary Corridor Segments retained after the 2nd Qualitative Screening were combined to form 25 Preliminary Study Alternatives (PSAs). The purpose of the 3rd screening was to identify those Preliminary Study Alternatives that should be carried forward for detailed study in the Draft EIS. Sixteen DSAs were identified, as discussed in **Section 2.2.2**.

For the PSAs, design criteria and conceptual alignments were developed within the 1,000-foot corridors and preliminary impacts were quantified for the PSAs to compare and evaluate them. The screening criteria included factors such as cost, residential and business relocations, stream and wetland impacts, potential impacts to protected species, and other human and natural environment impact screening factors. These factors, listed in Table 2-3 in the Draft EIS, were identified with input from local, regional, and federal agency representatives and staff and the public.

All PSAs assumed that toll collection would be made using an open road tolling technology, which allows for tolls to be collected at highway speeds and eliminates the need for conventional toll plazas.

Subsequent to the 3rd Quantitative Screening, additional evaluation of PSA G (Improve Existing US 74) was included in the Draft EIS in response to agency comments requesting additional information regarding upgrading existing US 74. NCDOT further assessed PSA G and also developed and assessed a Revised PSA G (reduced impact compared to PSA G), as documented in *Upgrade Existing US 74 Alternatives Study* (HNTB, April 2009) and summarized in Sections 2.4.4.2 and 2.4.4.3 of the Draft EIS. The additional evaluations confirmed that PSA G and Revised PSA G would still not be reasonable or practicable, and therefore, they were not considered as detailed study alternatives.

2.2.2 DETAILED STUDY ALTERNATIVES IN THE DRAFT EIS

The 16 endpoint-to-endpoint detailed study alternatives (DSAs) listed in **Table 2-1**, and shown in **Appendix B**, were selected for further detailed study based upon the outcome of the alternatives screening process described above.

As previously noted, despite its inability to meet the project purpose and need, the No-Build Alternative was still retained to provide a baseline for comparison with the DSAs in accordance with NEPA regulations (40 CFR Part 1502.14(d)) and FHWA guidelines (Technical Advisory T 6640.8A; Section V.E.1).

Based on the information considered in the Draft EIS, the FHWA and NCDOT identified DSA D as the Recommended Alternative, as discussed in Section 2.8 of the Draft EIS and shown in Figure 2-8a-c of the Draft EIS. The FHWA and NCDOT identified a Recommended Alternative as a way of giving readers of the Draft EIS an indication of the agencies' thinking at the time.

TABLE 2-1: Detailed Study Alternatives

DSA	DSA Segments*	Length (miles)
A	18A, 21, 22A, 31, 36, 36A, 40	20.6
B	18A, 21, 30, 31, 36, 36A, 40	20.5
C	2, 21, 22A, 31, 36, 36A, 40	19.7
D	2, 21, 30, 31, 36, 36A, 40	19.6
A1	18A, 21, 22A, 31, 34, 34B, 40	20.5
B1	18A, 21, 30, 31, 34, 34B, 40	20.5
C1	2, 21, 22A, 31, 34, 34B, 40	19.6
D1	2, 21, 30, 31, 34, 34B, 40	19.6
A2	18A, 21, 22A, 31, 36, 36B, 41	20.6
B2	18A, 21, 30, 31, 36, 36B, 41	20.5
C2	2, 21, 22A, 31, 36, 36B, 41	19.7
D2	2, 21, 30, 31, 36, 36B, 41	19.6

TABLE 2-1: Detailed Study Alternatives

DSA	DSA Segments*	Length (miles)
A3	18A, 21, 22A, 31, 34, 34A, 41	20.5
B3	18A, 21, 30, 31, 34, 34A, 41	20.4
C3	2, 21, 22A, 31, 34, 34A, 41	19.6
D3	2, 21, 30, 31, 34, 34A, 41	19.6

*Preliminary Corridor Segments 0, 1, 1A, 42, and 43 were combined with other segments during development of the DSAs. DSA Segments 34A, 34B, 36A, and 36B were added within existing DSA Segment corridor limits during preparation of the functional design plans to allow combinations of all DSA Segments to form end-to-end alternatives. DSA Segment descriptions can be found in Figure 2-1 and Section 2.5 of the Draft EIS.

2.3 ADDITIONAL CONSIDERATION OF ALTERNATIVES IN THE FINAL EIS

After the Draft EIS comment period ended, the FHWA and NCDOT identified a Preferred Alternative (DSA D), as documented in the Final EIS, based on consultation with local transportation planning agencies, and state and federal environmental resource and regulatory agencies, as well as consideration of agency and public comments received on the Draft EIS and at the public hearings. The Preferred Alternative is discussed in **Section 3** of this Draft Supplemental Final EIS.

During the comment period for the Draft EIS, comments were received requesting additional information on the Transportation Demand Management (TDM) Alternative, Mass Transit/Multi-Modal Alternatives, and Transportation System Management (TSM) Alternatives. Additional information on the TDM Alternative and the Mass Transit/Multi-Modal Alternative from the *Alternatives Development and Analysis Report* (2008) was provided in Section 3.3.2 of the Final EIS, and is reproduced below. Minor updates are provided below for the existing conditions for the TDM Alternatives and Mass Transit/Multi-Modal Alternatives, but these updates do not change the decision to eliminate these alternatives from detailed study.

One additional TSM Alternative concept was evaluated and documented in Section 3.3.2 of the Final EIS. This additional analysis from the Final EIS is summarized below. Other studies conducted on the TSM Alternatives after the Final EIS are summarized in **Section 2.4**.

TDM Alternatives

The Charlotte Area Transit System (CATS) promotes ridesharing to employment destinations in the Charlotte area by providing a car rideshare matching service and a vanpool program. The CATS vanpool program had 78 vanpools at the time the Final EIS was published, with two originating in Union County – one in Indian Trail and one in Waxhaw. Currently there are 76 vanpools, with three originating in Union County – two in Indian Trail and one in Waxhaw (CATS website: http://charmeck.org/city/charlotte/cats/commuting/vanpool/Pages/current.aspx).

CATS also promotes employer programs for managing travel demand. As reported in the Final EIS, there were 57 companies participating in CATS Employee Transportation Coordinator (ETC) Program. Currently there are 62 participating companies (CATS website: http://charmeck.org/city/charlotte/cats/commuting/ETC/Pages/default.aspx).

The TDM Alternative was eliminated from further study because it does not meet the project's purpose and need, as discussed in Section 3.3.2 of the Final EIS. TDM measures would provide increased transportation choices in the area, however, only a small percentage of travelers would take advantage of these options. TDM measures would not provide for high-speed regional travel, enhanced mobility, nor increased capacity for the majority of travelers in the US 74 corridor.

Mass Transit/Multi-Modal Alternatives

The Mass Transit Alternative concept would include bus or rail passenger service. The Multi-Modal Alternative concept would combine mass transit with existing roadway improvements under the TSM Alternatives, as described in Section 3.3.2 of the Final EIS.

Separate studies of mass transit are being undertaken in Mecklenburg County by CATS. Plans and existing services in Union County, and between Union County and Mecklenburg County, are described below. Neither Union County nor the City of Monroe operates a public transportation system, with the exception of on-demand paratransit services. There are no plans to begin other public transportation services in the near future.

As reported in the Final EIS, CATS operates an express bus service to and from Uptown Charlotte (Route 74X), stopping at three park and ride lots in Union County. The first is located at Union Towne Shopping Center off US 74 in Indian Trail. The second is located at the K-Mart at 2120 West Roosevelt Boulevard (US 74) in Monroe, and the third one is located at Christ Bible Teaching Center at 1103 Unarco Road off (US 74) in Marshville. CATS still operates this express service, but it no longer stops at the Christ Bible Teaching Center (CATS Web site: http://charmeck.org/city/charlotte/cats/Bus/routes/Pages/default.aspx).

CATS is planning a major expansion of its mass transit service throughout Mecklenburg County. In November 1998, Mecklenburg County citizens approved a local sales tax (one-half percent) to support implementation of the *2025 Integrated Transit/Land Use Plan*, which identified five major mass transit corridors. One of these corridors, the Southeast Corridor, has a study area that extends from Center City Charlotte southeast along US 74 to Central Piedmont Community College just south of I-485 in Mecklenburg County. This project is also known as the LYNX Silver Line, and there are currently no plans to extend the project into Union County.

As discussed in Section 3.3.2 of the Final EIS, the Mass Transit and Multi-Modal Alternatives were eliminated from further consideration.

TSM Alternatives

A TSM Alternative was studied and included in the Draft EIS. This TSM Alternative Concept 1 considered minor operational and physical improvements to increase capacity along existing US 74 consisting of traffic signal timing optimization, access control measures (e.g. driveway consolidation, closing median breaks), and intersection improvements such as adding intersection turn lanes and extending turn lanes to accommodate longer queues. This alternative concept could also include converting existing lanes on US 74 to high occupancy vehicle (HOV) lanes. This alternative was eliminated from detailed study in the Draft EIS (Section 2.2.2.3 of Draft EIS).

As part of the comments received on the Draft EIS, it was brought to the attention of NCTA that NCDOT Division 10 conducted a study of the existing US 74 corridor titled *US 74 Corridor Study* (Stantec, July 2007). Study goals were "to identify and develop improvements that, where possible, would provide a LOS [level of service] of D or better at each signalized intersection for projected 2015 traffic volumes. Because of development along the study corridor and agency budgetary constraints,

LOS goals were not attainable at all locations. Where LOS goals could not be attained, reasonable improvements were recommended within the study constraints."

It is clearly stated in the *US 74 Corridor Study* executive summary that the purpose of the study was to provide recommendations for interim and immediate actions until such time as the Monroe Connector/Bypass was constructed. The study itself notes that "this vital transportation corridor (US 74) will be in critical need of additional through lanes on US 74 or alternate routes will need to be identified to meet the demands of the public" (page iv).

The information from this study, including a description of the improvements studied, and the results, were incorporated into TSM Alternative Concept 2, as discussed in Section 3.3.2 of the Final EIS, summarized below.

TSM Alternative Concept 2 is an enhancement of Concept 1. Improvements included in Concept 2 are those labeled Long Term Improvements in the *US 74 Corridor Study* (July 2007). By long term improvements, the authors of that study meant improvements to be implemented by 2015. The improvements include closing median openings, converting US 74 to a Superstreet from Stallings Road (SR 1365) to Unionville-Indian Trail Road (SR 1367), a distance of about 2.7 miles, and a series of intersection improvements. These improvements are listed in Table 3-5 of the Final EIS.

The *US 74 Corridor Study* concluded that by implementing the improvements listed in Table 3-5 of the Final EIS, an overall LOS D in 2015 could be attained at the intersections along the US 74 study corridor, except for the intersection of US 74 at Rocky River Road (SR 1514). However, these improvements would not result in high-speed travel through the corridor in 2015. With the improvements listed in the table, average travel speeds in 2015 for the eastbound direction in the pm peak were estimated to be 30 mph along the Superstreet design and 29 mph for the remainder of the corridor evaluated. Travel times were calculated using computer modeling and reported in Appendix IV and Appendix VII (Superstreet Design Area) of the *US 74 Corridor Study*. A review of the travel time tables shows one consistent anomaly across all tables. This anomaly occurs for the segment from Faith Church Road to Unionville-Indian Trail Road, where average travel speeds are reported as well above speed limits (e.g. 101.4 mph, 127.8 mph). This anomaly was removed from the travel time reported here.

A comparison of the year 2015 traffic volumes used in the *US 74 Corridor Study* to the year 2035 No-Build volumes developed in *Revised Monroe Connector/Bypass No-Build Traffic Forecast Memo* (HNTB, March 2010), shows that the volumes in 2035 along US 74 would generally be significantly higher. Therefore, the levels of service at the intersections in 2035 would be expected to degrade to below LOS D and travel speeds based on the computer model also would decrease.

TSM Alternative Concept 2 was eliminated from further consideration, as discussed in Section 3.3.2 of the Final EIS.

Since the Final EIS, many of the recommended improvements from the *US 74 Corridor Study* have been implemented by NCDOT, as discussed in **Section 2.4** under the subheading "TSM Measures Implemented along Existing US 74".

2.4 ADDITIONAL CONSIDERATION OF ALTERNATIVES AFTER THE FINAL EIS

After the Final EIS, additional consideration was given to Improve Existing US 74 Alternatives as part of the Section 404 jurisdictional resources individual permit process. In addition, as part of the updates to all information conducted for this Draft Supplemental Final EIS, data was collected on improvements that have been made to existing US 74 in the project study area since the Final EIS. These improvements are TSM-type improvements. The additional analyses for the Improve Existing US 74 Alternatives and the TSM-type measures that have been implemented along the corridor are discussed below.

Appendix B includes a table that summarizes the history of Improve Existing US 74 alternatives in the project development process for the Monroe Connector/Bypass.

Improve Existing US 74 Alternatives

In response to questions from the USACE on the Section 404 jurisdictional resource individual permit application NCDOT prepared a 2035 comparative planning level analysis of four Upgrade Existing US 74 corridor scenarios to determine if upgrading US 74 would provide acceptable corridor levels of service in the design year 2035 (*US 74 Corridor Analysis Scenarios*, HNTB, December 2010). A total of four scenarios were analyzed: 1) No-Build, 2) Superstreet Existing, 3) Widen to 6-Lane (No Superstreet), and 4) Superstreet 6-Lane. The third option assumed widening the entire US 74 corridor to a 6-lane section while maintaining other existing roadway characteristics.

The results of the comparative analysis showed that in the design year 2035, US 74 under all four scenarios is expected to exceed LOS D in the majority of the corridor. Exceeding the maximum volume LOS D threshold indicated that the segment is expected to operate at LOS E or F and experience heavy congestion, queuing and unstable traffic flow. The Superstreet 6-Lane scenario option provided the highest corridor capacity compared to the other three scenarios, and the best projected levels of service and travel speeds. However, 65 percent of the corridor is expected to operate at LOS F, and to operate with greatly reduced average travel speeds (well below the speed limit) under this scenario. For these reasons, these alternatives were not considered to be reasonable and feasible.

TSM Measures Implemented along Existing US 74

In recent years, approximately 45 TSM measures have been implemented along existing US 74 by NCDOT as funds have become available and by developers of adjacent properties as they improve their properties. Overall, improvements have been implemented at all 23 intersections along existing US 74 that were mentioned for improvement in the *US 74 Corridor Study*. **Table 2-2** lists the improvements made within the existing US 74 corridor since the July 2007 publication of the *US 74 Corridor Study*. Whether an improvement was made before or after May 2010 (the date the Final EIS was published) and whether the improvement is included as a recommendation in the *US 74 Corridor Study* also are noted in the table.

TABLE 2-2: US 74 Improvements Implemented Since July 2007[1]

Intersection	Improvement	*US 74 Corridor Study* Recommendation	Completed	
			Prior to May 2010[2]	After May 2010
Stallings Road	Signal Timing Optimized	Y		X
	Re-configured lane assignments on NB Stallings Rd. to have one left turn and one left turn/thru/right turn lane	N		X
Indian Trail –Fairview Road	Signal timing optimized	Y		X
	Incorporated 7-phase signal	N	X	
Unionville - Indian Trail Road	Signal timing optimized	Y		X
	Added 2nd left turn lane for US 74EB	Y	X	
	Re-configured lane assignments on NB Unionville-Indian Trail Rd. to have one left turn/thru lane and one thru/right turn lane	Y	X	
Faith Church Road / Harris Teeter Dist Center	Signal timing optimized	Y		X
	Added 2nd left turn lane for US 74EB	N		X
	Added 2nd left turn lane on Faith Church Road	N		X
Wesley Chapel - Stouts Road/Sardis Church Road	Signal timing optimized	Y		X
	8-phase signal	Y	X	
	Added 2nd left turn lane on Wesley Chapel-Stouts Road	Y	X	
	Added right turn lane on US74EB	Y	X	
	Added right turn lane on US74WB	N		X
Chamber Drive	Signal timing optimized	Y		X
	Added right turn lane on US74WB	N	X	
Rocky River Road	Signal timing optimized	Y		X
	Added right turn lane on Rocky River Road SB	N	X	
Poplin Place/ Wellness Blvd.	Signal timing optimized	Y		X
	Added 2nd left turn lane for US 74EB	N	X	
	Added right turn lane on US74WB	N	X	
	Re-configured lane assignments on Poplin Pl. to have one left turn lane, one left turn /thru lane and one right turn lane	N	X	
Hanover Drive	Signal timing optimized	Y		X
	US 74WB left turn lane storage extended to 275 feet	Y	X	
Dickerson Boulevard	Signal timing optimized	Y		X
	Added 2nd left turn lane on Dickerson Blvd. NB	N	X	
	US 74WB left turn lane storage increased	N	X	

1. July 2007 is the date the US 74 Corridor Study was published.
2. May 2010 was the date of the Final EIS.

In addition to the improvements shown in **Table 2-2**, the NCDOT has also implemented a closed-loop signal system and optimized signal timings at the following intersections since the Final EIS was published, consistent with the recommendations included in the *US 74 Corridor Study*:

- Fowler Secrest Road/John Moore Road
- Rolling Hills Drive / Carroll Street
- Roland Drive / Round Table Road
- Williams Road
- Secrest Shortcut Road
- Stafford Street
- Boyte Street
- Morgan Mill Road
- Walkup Avenue
- Sutherland Avenue
- Venus Street / Dove Street
- Franklin Street
- US 601 South

The NCDOT also installed or modified directional crossovers (which only allow vehicles to make a specific movement such as eastbound US 74 to a destination on the north side of the roadway) at the following locations, consistent with the recommendations included in the *US 74 Corridor Study*:

- 2nd & 4th median openings west of Chamber Drive
- East of Poplin Place (into shopping center)

Finally, NCDOT converted the crossover between Dickerson Boulevard and Hanover Drive to a directional crossover, consistent with the recommendation of the *US 74 Corridor Study*.

One major long-term improvement recommended in the *US 74 Corridor Study*, constructing a superstreet facility for the intersections of US 74 with Stallings Road, Indian Trail-Fairview Road, and Unionville-Indian Trail Road, has not yet been implemented. In August 2013, NCDOT awarded $6.1 million in funding from the Highway Safety Improvement Program to convert four intersections on US 74 in Indian Trail (Indian Trail-Fairview Road, Unionville-Indian Trail Road, Faith Church Road, and Sardis Church Road) to superstreet facilities. These improvements are scheduled for construction in late 2015.

Even with the implementation of the improvements described above, US 74 experiences congestion during peak travel periods as highlighted in **Section 1.2.4**. Existing average speeds along US 74 are less than posted speed limits and less than 50 mph during peak travel periods. TSM improvements, while providing some short-term benefit, would continue to not meet the purpose and need for the Monroe Connector/Bypass project.

2.5 TRAFFIC FORECASTS AND OPERATIONS ANALYSES

2.5.1 BACKGROUND INFORMATION

As part of the alternatives analysis process, FHWA and NCDOT relied upon several traffic studies. The traffic studies include traffic forecasts (**Section 2.5.2**) and traffic operations analyses (**Section 2.5.3**). General descriptions for forecasts and operations analyses are provided below.

- A "traffic forecast" provides projected traffic volumes for a given year. Traffic volumes are provided as annual average daily traffic (AADT) on various roadways. Forecasts are based on consideration of a variety of data. For this project, this data includes, but is not limited

to: traffic counts, historic travel trends, the MUMPO Long Range Transportation Plan (LRTP), the *Metrolina Regional Travel Demand Model* (MRM), and existing road network operations. These individual data sources are not themselves traffic forecasts, and do not include the level of detail ultimately developed in the traffic forecast for a particular project. For example, the MRM may not include all of the roadways within a study area. Therefore, these roadways are included in the traffic forecast through analyzing traffic counts or other available data sources. Another example is traffic count data collected at one point in time and then annualized to compare to travel trends throughout the year.

- An "operations analysis" is based on the traffic forecasts. The operations analysis estimates congestion levels for roadway segments and intersections, which are typically measured in level of service (LOS). Other measures, such as volume/capacity (v/c) ratios, also are sometimes used.

A number of traffic forecasts and operations analyses were prepared for build and no-build Alternative scenarios, including several scenarios for upgrading US 74. Traffic forecasts and traffic operations analyses used in the Draft EIS are discussed in Sections 1.8.3 and 1.8.4 for the No-Build scenario, and in Section 2.6 of the Draft EIS for the Build scenario. Section 2.4.4.3 of the Draft EIS discusses upgrading existing US 74 to a toll facility, including traffic forecasts and operations.

In the Final EIS, Section 1.1.8 provides additional background information for the No-Build scenario traffic operations analysis discussed in Section 1.8.3 of the Draft EIS. Final EIS Section 2.3.5 notes traffic operations and traffic volumes were reevaluated for the Build condition based on the refined functional design of the Preferred Alternatives' interchanges at the US 74 Frontage Road, Unionville-Indian Trail Road, and Austin Chaney Road (SR 1758). Final EIS Appendix A – Errata corrects an error in Draft EIS Table 2-7 regarding the 2035 No-Build Alternative forecasts (further explained in **Section 2.5.2** – Question 4).

For this Draft Supplemental Final EIS, **Section 2.4** discusses additional traffic operations analyses conducted for various alternatives for improving existing US 74 (superstreets and widening scenarios).

2.5.2 TRAFFIC FORECASTS

As part of this Draft Supplemental Final EIS, the various traffic forecasts prepared for the project were given an in-depth hard look considering new data and updated regional travel demand models, and NCDOT guidance contained in *Guidelines to Determine When to Request an Updated Traffic Forecast* (NCDOT Transportation Planning Branch, February 24, 2009). The review is presented in the memorandum titled, *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013), included in **Appendix G**. The memorandum answers the following questions. A summary of the answer to each question is provided below, with full details in the memorandum.

1. What traffic forecasts were developed during the Monroe Connector/Bypass project development process and what were they used for?
2. How could updated socioeconomic (SE) data sets affect the No-Build scenario and Build scenario traffic forecasts for the Monroe Connector/Bypass project?
3. How could changes in socioeconomic data related to the project's indirect and cumulative effects affect the traffic forecasts for the Monroe Connector/Bypass?
4. Are the current No-Build traffic forecasts still valid for the purposes they were used?

5. Are the current Build scenario traffic forecasts still valid for the purposes they were used?
6. How would the Monroe Connector/Bypass affect the traffic on the US 74 corridor?

Question 1 - What traffic forecasts were developed during the Monroe Connector/Bypass project development process and what were they used for?

Numerous traffic forecasts - and interpolations, extrapolations, and redistributions of these forecasts - have been developed and used for different purposes during the Monroe Connector/Bypass development process. **Table 2-3** provides a listing and description of each forecast and the uses of each forecast. Methods used to develop the forecasts are included in each of the listed traffic forecast documents. Additionally, traffic and revenue studies were developed to support the project financing, but these are revenue forecasts, not project-level traffic forecasts, so are not included in the table.

TABLE 2-3: Summary of Monroe Connector/Bypass Project Traffic Forecasts

Document Name		Date/Prepared By	Forecast Years/Scenarios	Used in NEPA process? / Notes	
TRAFFIC FORECASTS					
Document A	*Traffic Forecast for the No-Build Alternatives for NCDOT State TIP Project No. R-3329 and NCDOT State TIP Project No. R-2559, Monroe Connector/Bypass Study*	June 2008 Martin/Alexiou/ Bryson	2007 & 2030 No-Build	Yes	Supplemented by Document F.
Document B	*Technical Memorandum for TIP Projects R-2559 & R-3329 US74 Upgrade Scenario*	June 2008 Wilbur Smith Associates (WSA)	2035 Upgrade Existing: Non Toll and Toll for upgrade	Yes	Used to evaluate Upgrade US 74 Preliminary Study Alternatives PSA G and Revised PSA G in the Draft EIS.
Document C	*Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass*	September 2008 WSA	2008 & 2035 No-Build Build Non-Toll Build Toll	No/ Yes	No-Build found in error, not used for any analysis and replaced by Document F (see Final EIS Appendix A). Build cases used in technical studies for Draft EIS and Final EIS.
TRAFFIC FORECAST INTERPOLATIONS, EXTRAPOLATIONS, AND REDISTRIBUTIONS					
Document D	*Monroe Connector/Bypass Alternative 3A - 2013 AADT Build Toll Scenario*	January 2009 HNTB	2013 Build Toll	No	Only used to represent opening year traffic volumes on the April 2009 Public Hearing maps. Not used for any project analysis or presented in any NEPA document.
Document E	*2035 Build Toll Forecast, Segment 2 (Alternative 3A)*	July 2009 HNTB	2035 Build Toll	Yes	Developed to account for a minor change in frontage road configuration at western terminus of project.
Document F	*NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum*	March 2010 HNTB	2008 & 2035 No-Build	Yes	Corrects and replaces the No-Build forecast in Document C and supplements Document A.
Document G	*Monroe Connector / Bypass Year 2025 Build Toll Alternative 3A Traffic Volume Projections*	August 2010 HNTB	2025 Build Toll	No	Prepared for the design-build teams for use in their design preparation.

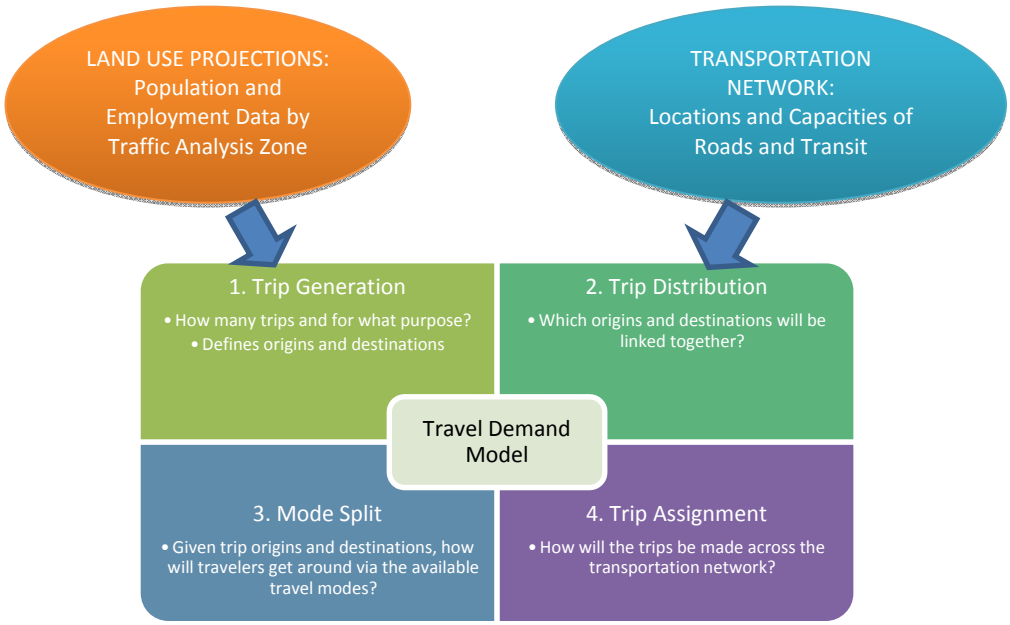
A – Utilized MRM Version MRM05 and 2005 socioeconomic (SE) data (SE_*Year*_taz2934)
B thru G – Utilized MRM06 and 2005 SE data (SE_*Year*_taz2934)
D, **E** and **G** – Based on interpolation or redistribution of **B**
F – Based on interpolation and extrapolation of **A**

Traffic forecast interpolations, extrapolations, or redistributions of the original traffic forecasts were developed for conditions or years not included in the initial traffic forecasts. This approach uses the original forecasts and base data assumptions to mathematically calculate traffic estimates and redistributions of traffic for conditions not included or known at the time of the initial forecasts. This methodology is appropriate when the differences being considered, such as different forecast years or minor differences in project geometry, do not change the original forecast, assumptions, methodology or base data.

Question 2 - How could updated socioeconomic data sets affect the No-Build scenario and Build scenario traffic forecasts for the Monroe Connector/Bypass project?

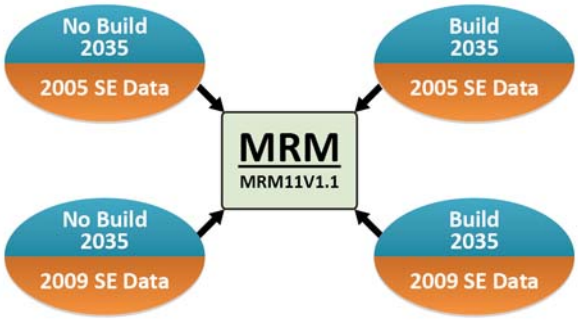
Socioeconomic (SE) data sets are used in the *Metrolina Regional Travel Demand Model* (MRM) as input to the model. The two key components of the MRM model are the set of SE data projections input to the MRM (population and employment data by geographic areas called traffic analysis zones [TAZ]), and the modeled transportation network (locations and capacities of roads, including the presence [build] or absence [no-build] of the Monroe Connector/Bypass, and transit). **Exhibit 2-1** illustrates the major components of the MRM.

Exhibit 2-1: Components of the Metrolina Regional Travel Demand Model



The MRM model output is an important, but not the only, input to the traffic forecasts developed for the project (see **Section 2.5.1**). The MRM is developed and maintained by the Charlotte Department of Transportation (CDOT) and is frequently updated, so over time a number of MRM versions and SE data sets are created. The travel demand model and SE data development process is described in detail in the *Monroe Connector/Bypass Quantitative Indirect and Cumulative Effects Analysis Update* (Michael Baker Engineering, Inc., November, 2013).

In order to consider if the updates to the SE data set that have occurred since the traffic forecasts were prepared would affect the No-Build Scenario and Build Scenario traffic forecasts, two sets of SE data were used with the current version of the MRM, MRM11v1.1, to test the sensitivity of the MRM output to different SE data sets. For this comparison, the MRM was run with two inputs for the transportation network (blue oval in **Exhibit 2-1**), the No-Build Scenario and the Build Scenario, and two inputs for the SE data (orange oval in **Exhibit 2-1**).



MRM conditions modeled for Question 2

The two SE data sets input to the MRM were the SE data included in the MRM for the original forecasts (called 2005 SE Data), and the latest SE data set (called 2009 SE Data).

The outputs from the MRM are travel demand model daily traffic volumes for the roadway links in the MRM. This raw model output (output straight from the model) is one of the factors that go into creating a traffic forecast, as discussed in **Section 2.5.1**. Raw model output is an important factor in developing traffic forecasts by, but not limited to, determining growth rates from base year to future year scenarios, traffic volume orders of magnitude, volume trends along facilities, and future year volumes for new location facilities.

It is important to note that a travel demand model is not an exact measure of existing or future traffic volumes, but is a tool to generally measure impacts of growth and development and help forecast travel characteristics at the planning level. Travel demand models employ a mathematical approach to understanding how changes in land use, population, and area employment may impact the transportation system. The MRM encompasses multiple counties in two states and was developed and calibrated as a tool to evaluate existing and future travel demands on a regional basis.

Raw model volumes for specific roadway links can be extracted from the regional model, but inherently have levels of variability based on the nature and purpose of the MRM. The accuracy of raw model volumes for existing and future conditions is based on a variety of factors which include existing and future roadway network detail, existing calibration parameters, and accuracy of future land use, population, and area employment estimates. Therefore, it is not appropriate to directly compare raw model daily volumes to balanced traffic forecast volumes. However, raw model output from the MRM can be used to determine trends and as validation of the applicability of results from the project's traffic forecasts since those forecasts use MRM model results as one of the factors in developing the forecasts.

To help answer **Question 2**, the raw model output from the MRM was extracted for segments along the Monroe Connector/Bypass and segments along existing US 74. To make the comparisons, this data was then converted to vehicle miles traveled (VMT) by multiplying the daily volume along a segment by the length of the segment. The VMTs were then added together to arrive at a total corridor VMT for the Monroe Connector/Bypass and a total corridor VMT for existing US 74 for each of the four model configurations used in this comparison. Because individual segment traffic volumes directly output from the MRM model have inherently higher degrees of variability, comparing the overall corridor VMTs and percent changes is more appropriate in identifying general trends in traffic patterns that may affect project traffic forecasts. The inherent variability of MRM

output for individual links can be based on different segment lengths, different socioeconomic growth assumptions in TAZs, different model networks and link characteristics, and different model methodologies for trip distribution and assignment from one MRM version to another.

Table 2-4 presents the effects of varying the SE data sets on MRM model output using VMT.

TABLE 2-4: Effects of Socioeconomic Data Sets on Travel Demand Model Output

Corridor	2035 No-Build Scenarios Using MRM11v1.1			2035 Build Scenarios Using MRM11v1.1		
	Corridor VMT 2005 SE Data Set	Corridor VMT 2009 SE Data Set	% Change	Corridor VMT 2005 SE Data Set	Corridor VMT 2009 SE Data Set	% Change
Monroe Connector/Bypass	n/a	n/a	n/a	798,990	822,160	**3 %**
Existing US 74	921,340	965,940	**5 %**	743,790	782,050	**5 %**

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

As shown in **Table 2-5**, using the 2009 SE data resulted in an increase of 5 percent in VMT along existing US 74 under both the Build and No-Build scenarios and a 3 percent increase along the Monroe Connector/Bypass compared to the 2005 SE data. Changes in the MRM model output are to be expected and appropriate when comparing various socioeconomic data that are based on a variety of different information, assumptions, time periods, and horizon years. This comparison shows that even while differences exist between various socioeconomic data, the resulting VMTs are generally consistent.

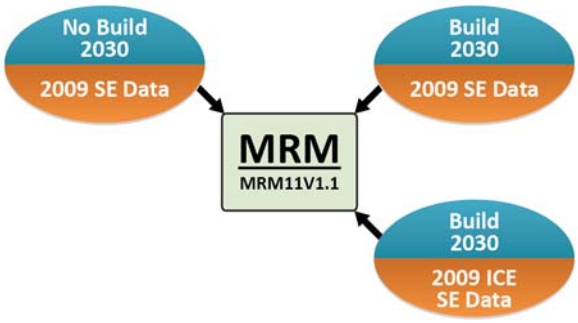
In summary, a comparison of the effects of the 2005 SE Data and the 2009 SE Data show that model output and VMTs are within 5 percent along existing US 74 and 3 percent along the Monroe Connector/Bypass. Keeping in mind that MRM model output is just one factor that goes into a traffic forecast, it is reasonable to conclude that the differences between the SE data sets would not substantially change the traffic forecast.

Question 3 - How could changes in socioeconomic data related to the project's indirect and cumulative effects affect the traffic forecasts for the Monroe Connector/Bypass?

In the litigation related to this project (see **Section P.4.5**), the Plaintiffs challenged the traffic forecasts in the Draft EIS and Final EIS because the No-Build scenario traffic forecasts and the Build Scenario traffic forecasts used an MRM model that included the same set of SE data that did not account for alleged differences in the data that might result from constructing the project versus not constructing the project. The Defendants (FHWA and NCDOT) contended that the induced growth potential of the project would not change the socioeconomic data to a degree that would significantly alter the traffic forecasts, noting that raw model output from the MRM is just one of many inputs that go into a project's traffic forecasts.

However, for this Draft Supplemental Final EIS, a sensitivity analysis was conducted using the most current version of the MRM (MRM11v1.1) to see how raw model output would change between the most current 2009 SE Data and a modified 2009 SE Data set (2009 ICE SE Data) that includes the potential induced growth forecasts from the *Monroe Connector/Bypass Quantitative Indirect and Cumulative Effects Analysis Update* (Michael Baker Engineering, Inc., November, 2013).

The MRM model was run with one set of SE data (2009 SE Data) for the 2030 No-Build scenario and two sets of SE data (2009 SE Data and 2009 ICE SE Data) for the Build scenario. The year 2030 was used because this is the evaluation year used in the *Monroe Connector/Bypass Quantitative Indirect and Cumulative Effects Analysis Update.*



MRM conditions modeled for Question 3

Table 2-5 presents the effects of the 2009 ICE SE Data on MRM model output using VMT. VMTs were calculated for the Monroe Connector/Bypass corridor and the existing US 74 Corridor. Regional VMTs for Union County, Mecklenburg County and the entire MRM model area also were evaluated for the Build Scenario to fully consider the potential effects of the 2009 ICE SE Data on the transportation network of the MRM.

TABLE 2-5: Effects of the Indirect and Cumulative Effects Analysis Socioeconomic Data on Travel Demand Model Output

Corridor	*Column 1* Corridor VMT 2030 No-Build MRM11 2009 SE Data	*Column 2* Corridor VMT 2030 Build MRM11 2009 SE Data	% Change Column 1 to Column 2 No-Build to Build	*Column 3* Corridor VMT 2030 Build MRM11 2009 ICE SE Data	% Change Column 1 to Column 3 No-Build to Build	% Change Column 2 to Column 3 Build to Build
Monroe Connector/Bypass	n/a	757,410	n/a	793,570	n/a	5 %
Existing US 74	918,520	729,910	-21 %	760,970	-17 %	4 %
Union County	n/a	9,612,890	n/a	9,948,280	n/a	3 %
Mecklenburg County	n/a	44,747,460	n/a	44,745,210	n/a	~0 %
MRM Network	n/a	105,856,110	n/a	106,207,330	n/a	~0 %

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

As shown in **Table 2-5**, there is a small difference in VMT reductions (3 percent) along existing US 74 comparing the No-Build scenario to the two Build scenarios. In other words, each Build scenario reduces VMT on existing US 74 relatively to the same degree over the No-Build scenario.

When comparing the two Build scenarios, again there is limited variability between the different build scenarios (2009 SE Data and 2009 ICE SE Data) output from the MRM model. At the corridor

level, the table shows a 4-5 percent increase in VMT between the Build Scenario with the 2009 SE Data and the Build Scenario with the 2009 ICE SE Data. As the geographic boundaries get larger, the relative difference in the MRM outputs between the modeled Build conditions becomes smaller. The difference in MRM model outputs in Union County is 3 percent, while for Mecklenburg County and the Metrolina region as a whole is effectively zero.

In summary, the effect of the 2009 ICE SE Data set on the raw MRM model VMT outputs between the Build conditions (Build with 2009 SE Data and Build with 2009 ICE SE Data) is relatively small. Since the travel demand model outputs are just one of many factors considered in the development of a project specific traffic forecast, it can be reasonably concluded that changes in the socioeconomic data due to potential induced growth from the Monroe Connector/Bypass would not substantially or significantly alter the future Build scenario traffic forecasts for the project study area.

Question 4 - Are the current No-Build traffic forecasts still valid for the purposes they were used?

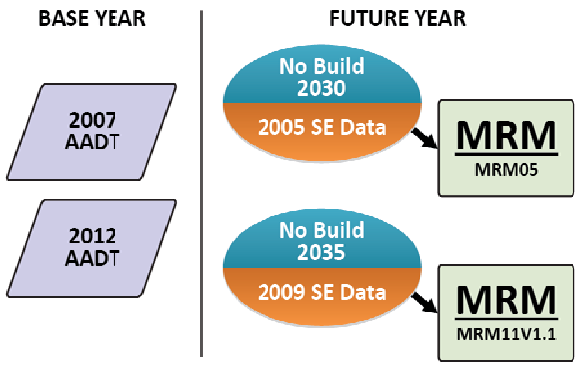
The current No-Build traffic forecasts are documented in the *Traffic Forecast for the No-Build Alternatives for NCDOT State TIP Project No. R-3329 and NCDOT State TIP Project No. R-2559, Monroe Connector Bypass Study* (Martin/Alexiou/Bryson, June 2008) (Document A), and *NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (HNTB, March 2010) (Document F) listed in **Table 2-3**. The No-Build scenario forecasts include forecast volumes for the existing US 74 corridor. Both year 2030 and year 2035 No-Build forecasts used MRM version MRM05 with 2005 SE Data. Note that the current No-Build forecasts are for year 2035, but the MRM05 model they are based on has a horizon year of 2030, so the year 2035 forecast volumes were extrapolated from the 2030 MRM model output.

The base year 2007 and future year 2030 No-Build forecasts (Document A) were used in the traffic operations analyses conducted for the existing US 74 corridor, as summarized in Sections 1.8.3 and 1.8.4 in the Draft EIS. It should be noted that, as discussed in **Section 1.2.4**, real-time travel information on the existing US 74 corridor substantiates the need for the project, and it is no longer necessary to estimate traffic conditions using the base year forecasts.

The 2035 No-Build scenario forecasts (Document F) along the existing US 74 corridor were used to evaluate the effects of the Monroe Connector/Bypass on US 74 volumes through comparison with the 2035 Build scenario forecasts, as addressed in Final EIS Appendix A – Errata.

To determine whether the current No-Build scenario traffic forecasts are still valid for the purposes they were used, several conditions were compared to evaluate whether an updated No-Build forecast would be expected to have lower, equal, or higher forecast volumes.

In considering the base year (2007) No-Build scenario traffic forecasts, actual traffic counts (in annual average daily traffic volumes [AADT]) are a primary factor in determining these base-year forecast volumes. For this reason, 2007 and 2012 traffic count-based AADTs from NCDOT for existing US 74 were



Comparisons used for Question 4

compared to determine if an updated base-year traffic forecast would be expected to have higher volumes than the current 2007 No-Build forecasts. Over the five-year period from 2007 to 2012, average volumes along the US 74 corridor showed approximately zero percent growth based on available AADT data.

Based on this trend of no change in AADTs from 2007 to 2012, it is reasonable to conclude that an updated base year No-Build forecast (i.e. 2013) would generally be equal to the 2007 No-Build forecast. Therefore, the 2007 base-year No-Build traffic operations discussion included in Draft EIS Section 1.8.3 would still be valid for 2012 if no other physical conditions along existing US 74 substantially changed. However, a number of improvements have been made to existing US 74 in recent years, as described in **Section 2.4**. The effects of these physical changes on traffic operations analyses along existing US 74 are addressed in **Section 2.5.3**.

To consider the future year No-Build forecasts, **Table 2-6** compares the output in corridor VMT of the MRM version and SE Data for the 2030 No-Build scenario used for the original 2030 and 2035 No-Build forecasts (MRM05 with 2005 SE Data) with output from the latest MRM version with the latest SE Data (MRM11v1.1 and 2009 SE Data) for the 2035 No-Build scenario.

TABLE 2-6: Comparisons of No-Build Scenario MRM Model Output

Corridor	Corridor VMT 2030 No-Build MRM05 2005 SE Data	Corridor VMT 2035 No-Build MRM11 2009 SE Data	% Change
Existing US 74	876,000	965,940	10 %

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

As shown in **Table 2-6**, MRM model output in corridor VMT increases 10 percent from the original MRM model version, SE Data Set and horizon year (2030) to the latest MRM model, SE Data Set, and horizon year (2035). Based on this comparison, an updated future year No-Build forecast would reasonably be expected to have volumes equal to or greater than the current 2030 No-Build forecast and extrapolated 2035 No-Build forecast, and new forecasts would not change the conclusions in the Draft EIS regarding the need for the project. However, as mentioned above in the discussion of the base year forecasts, a number of improvements have been made to existing US 74 in recent years, as described in **Section 2.4**. The effects of these physical changes on traffic operations analyses along existing US 74 are addressed in **Section 2.5.3**.

As noted in **Table 2-3**, the 2035 No-Build traffic forecast documented in Document C was discovered to be incorrect and was corrected and replaced by the 2035 No-Build traffic forecast documented in Document F. This error appears in Draft EIS Table 2-7 and was discovered through public comments prior to publication of the Final EIS. The corrected data is presented in the Final EIS Appendix A – Errata. The forecasting error that generated the incorrect no-build data presented in Document C occurred in a forecasting step outside of the MRM regional model, and does not have any connection to the inputs used (including socioeconomic data sets) in the MRM model or the MRM output. NCTA met with the consulting firm responsible for the error in the 2035 No-Build forecast to investigate the cause of the error, but the source was not immediately apparent. At the time of the investigation, the consulting firm was no longer involved in that aspect of the project. Staff responsible for developing the original 2035 No-Build forecast are no longer employed by that

consulting firm. Following the investigation, HNTB North Carolina, (HNTB) was contracted by NCTA to prepare an update to the No-Build traffic forecast (Document A). The HNTB forecast update was not based on the No-Build forecasts that were determined to be in error. The forecast update methodology is provided in the *NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (HNTB, March 2010)(Document F).

In the Draft EIS, the erroneous 2035 No-Build forecasts included in Draft EIS Table 2-7 were used only in a general comparison to the 2030 No-Build forecasts to determine if trends would change or if the No-Build Alternative traffic operations analysis (*Existing and Year 2030 No-Build Traffic Operations Technical Memorandum*, PBS&J, March 2008) needed to be updated in the Draft EIS, since this analysis was used to help document the purpose and need for the project (see Section 1.8.4.2 of the Draft EIS). The erroneous 2035 No-Build traffic volumes were not used in any technical memoranda associated with the EIS process. As noted above, the No-Build traffic operations analysis used the 2030 No-Build traffic forecasts.

The Draft EIS (Section 2.6.1) concluded that since 2035 No-Build traffic forecasts (the incorrect forecasts) showed increased volumes along existing US 74 compared to the 2030 No-Build traffic forecasts, it was not necessary to update the operational analysis for the No-Build Alternative from 2030 to 2035 since an updated analysis would just show worse traffic operations on existing US 74, which were already shown to be below acceptable levels of service using the 2030 No-Build forecasts (Draft EIS Section 1.8.4). In the Final EIS – Appendix A Errata, the corrected 2035 No-Build traffic forecasts are presented, and there still would be higher volumes along existing US 74 under the corrected 2035 No-Build traffic forecasts compared to the 2030 No-Build traffic forecasts, and the conclusions made in the Draft EIS remained valid. Therefore, the incorrect 2035 No-Build traffic forecasts do not affect the alternatives analysis.

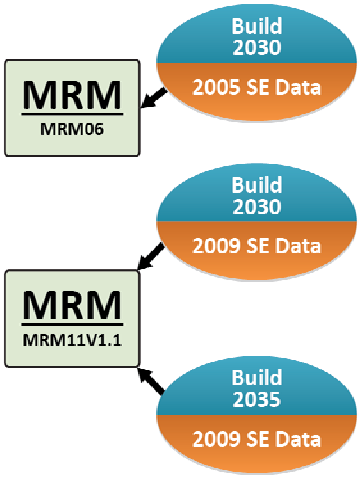
In conclusion, the correct No-Build traffic forecasts remain valid for the purposes they were used. An updated No-Build forecast that uses the latest MRM model and SE Data Set versions would be expected to have equal or higher volumes along existing US 74 compared to the current forecasts, continuing to support the need for the project. See also the answer to **Question 6** and **Section 2.5.3**.

Question 5 - Are the current Build traffic forecasts still valid for the purposes they were used?

The current 2035 Build scenario traffic forecasts used in the EIS process are described in Document C and Document E listed in **Table 2-3**. The Build scenario forecasts include forecast volumes for the Monroe Connector/Bypass and for the existing US 74 corridor with the Monroe Connector/Bypass in place. In addition, a forecast was prepared (Document B) for upgrading US 74 to a toll facility in place of the Monroe Connector/Bypass (addressed as alternatives PSA G and Revised PSA G in the Draft EIS). This forecast was based upon the Build scenario forecasts documented in Document C and the volumes forecast for the new location Monroe/Connector Bypass.

The 2035 Build scenario forecast volumes were used in the traffic operations analyses for elements along the Monroe Connector/Bypass. The traffic operations analyses were then used to help prepare the functional designs of the Monroe Connector/Bypass. The 2035 traffic forecasts along the Monroe Connector/Bypass also were used in the traffic noise analysis.

The 2035 Build scenario forecasts of traffic volumes along the existing US 74 corridor were used to evaluate the effects of the Monroe Connector/Bypass on US 74 volumes compared to the 2035 No-Build scenario forecasts. They were also used to evaluate traffic operations along existing US 74 under the Build scenario for comparison to operations under the No-Build scenario (Draft EIS Section 2.6.3.2).



MRM conditions modeled for Question 5

To determine the validity of the current Build scenario forecasts for the project, a comparison of the raw model output from the 2030 MRM06 (2005 SE Data) model used in developing the Build scenario forecasts was made with the most recent MRM version (MRM11v1.1) using the most recent SE data set (2009 SE Data) for years 2030 and 2035.

Table 2-7 presents the effects of different combinations of MRM version and SE Data on the Build scenario using VMT for the Monroe Connector/Bypass corridor and the existing US 74 Corridor.

TABLE 2-7: Comparisons of Build Scenario MRM Model Output

Corridor	*Column 1* Corridor VMT 2030 Build MRM06 2005 SE Data	*Column 2* Corridor VMT 2030 Build MRM11 2009 SE Data	% Change Column 1 to Column 2	*Column 3* Corridor VMT 2035 Build MRM11 2009 SE Data	% Change Column 2 to Column 3
Monroe Connector/Bypass	813,920	757,400	-7 %	822,160	9 %
Existing US 74	614,340	729,910	19 %	782,050	7 %

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

For the Monroe Connector/Bypass, the results of the comparison in **Table 2-7** show that MRM model output for the Monroe Connector/Bypass is relatively consistent through different versions of the MRM and SE data sets, varying up to 7 percent.

Growth in traffic volumes from 2030 to 2035 is expected, and is reflected in the reasonable 9 percent increase in VMT on the Monroe Connector/Bypass and 7 percent increase in VMT along existing US 74 shown in the table when the model and SE Data versions are held constant and the year increases from 2030 to 2035.

Based on these comparisons, and keeping in mind the MRM output is just one of many factors that go into creating a traffic forecast, the current 2035 Build scenario forecasts for segments along the

Monroe Connector/Bypass would not be expected to change substantially with updated MRM versions or SE Data and remain valid for the purposes for which they are used. Likewise, the forecasts prepared for Upgrade Existing US 74 as a toll facility in Document B (used for PSA G and Revised PSA G) would not be expected to change substantially for the mainline volumes. However, the frontage roads likely would have higher traffic volume assignments, as described below, since they would become the free US 74 alternative.

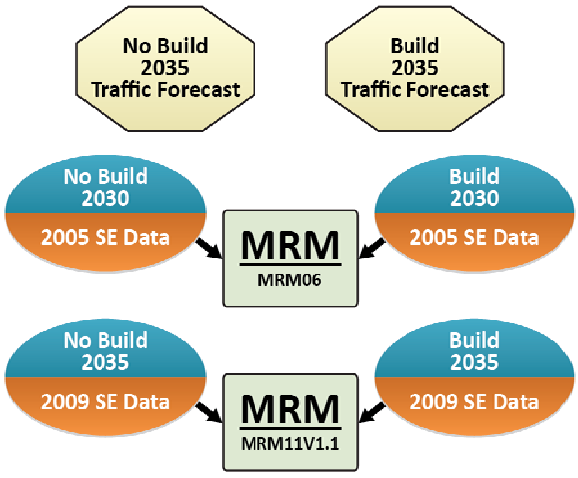
For existing US 74, the results of the comparison in **Table 2-7** show that 2030 MRM model output for existing US 74 under the Build scenario is 19 percent higher with MRM11v1.1 and 2009 SE Data compared to MRM06 with 2005 SE Data. The updated MRM model is assigning more demand for US 74 under the 2035 Build scenario, but it also is predicting more demand under the No-Build scenario, as discussed under **Question 4** and **Question 6**. The 2035 Build scenario forecasts for segments along existing US 74 likely would change using the most recent MRM model and SE Data, but these trends and patterns also occur under the No-Build scenario, and the conclusion that traffic volumes would be less on existing US 74 with the Monroe Connector/Bypass in place is still valid no matter which MRM versions/SE Data set versions are compared.

Regarding the traffic operations analysis for existing US 74 with the Build scenario described in Draft EIS Section 2.6.3.2, the traffic volumes on which this analysis is based likely would change with the latest MRM model and SE Data set. In addition, as mentioned previously, a number of improvements have been made to existing US 74 in recent years, as described in **Section 2.4**. The effects of these changes on traffic operations analyses along existing US 74 are addressed in **Section 2.5.3.**

Question 6 – How would the Monroe Connector/Bypass affect traffic volumes on the US 74 corridor?

Three comparisons were made to evaluate how traffic volumes might change on existing US 74 with the proposed project in place. These included reviewing the current 2035 No-Build and Build traffic forecasts and reviewing the raw MRM model output in VMT for the MRM model used to create the 2035 Build forecast and for the latest MRM model with the latest SE data (2009 SE Data).

Table 2-8 presents the comparisons of VMTs along the existing US 74 corridor under the various No-Build and Build scenarios. In every case, traffic volumes are expected to be less along the existing US 74 corridor with the Monroe Connector/Bypass in place, thereby improving traffic flow conditions along existing US 74 compared to the No-Build scenario.



Comparisons used for Question 6

TABLE 2-8: Effects of the Monroe Connector/Bypass on US 74 Traffic

Comparison Tool	Existing US 74 Corridor VMT No-Build	Existing US 74 Corridor VMT Build	% Change No-Build to Build
2035 Traffic Forecasts*	1,095,700	760,460	-31 %
2030 MRM06 2005 SE Data	888,020	614,340	-31 %
2035 MRM11v1.1 2009 SE Data	965,940	782,050	-19 %

VMT – vehicle miles traveled
*2035 No-Build Traffic Forecasts - from *NCDOT STIP Project R-3329 & R02559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (HNTB, March 2010)
*2035 Build Traffic Forecasts – from *Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass* (Wilbur Smith and Associates, September 2008)

2.5.3 TRAFFIC OPERATIONS ANALYSES

Traffic operations analyses prepared for the EIS process for the project are listed in **Table 2-9**. Each of these analyses are discussed below in light of the information included in **Section 2.5.2** above, **Section 1.2.4**, and the recent improvements implemented along existing US 74.

TABLE 2-9: Summary of Monroe Connector/Bypass Project Traffic Operations Analyses

Document Name		Date/ Prepared By	Traffic Forecast Used and Scenario*	Used in NEPA process? / Notes	
Document 1	*Existing and Year 2030 No-Build Traffic Operations Technical Memorandum*	March 2008 PBS&J	Document A 2030 No-Build	Yes	Included in Draft EIS.
Document 2	*Year 2035 Build Traffic Operations Technical Memorandum*	February 2009 PBS&J	Document C 2035 Build Toll	Yes	Included in Draft EIS. Evaluated operations along the Monroe Connector/Bypass and also along existing US 74 with the bypass in place.
Document 3	Upgrade Existing US 74 Alternatives Study	March 2009 HNTB	Document B 2035 – Build a Toll Facility Along Existing US 74	Yes	Evaluated preliminary study alternatives PSA G and Revised PSA G in the Draft EIS.
Document 4	*Final Addendum to Year 2035 Build Traffic Operations Technical Memorandum*	February 2010 PBS&J	Document E 2035 Build Toll	Yes	Reevaluation of traffic operations for Monroe Connector/Bypass based on refined functional design of Preferred Alternative. Included in the Final EIS.
Document 5	*US 74 Corridor Analysis Scenarios*	December 2010 HNTB	Document F 2035 No-Build	Yes	Planning level evaluation of upgrading US 74 to a superstreet, a 6-lane arterial, and a 6-lane superstreet. Prepared during the Section 404 permitting process. Included in the Draft Supplemental Final EIS.

*See **Table 2-3** for title of forecast document and other related information.

Traffic operations analysis conducted for elements along the Monroe Connector/Bypass are documented in Documents 2 and 4 listed in **Table -9**. As discussed in the answer to **Question 5** above, the MRM model output for the Monroe Connector/Bypass is relatively consistent through different versions of the MRM and SE data sets. Therefore, the traffic operations analysis conducted in Documents 2 and 4 for elements along the Monroe Connector/Bypass are still valid, and therefore the refined functional designs and traffic noise analyses based on these analyses would not change.

As listed in **Table 2-9**, a number of traffic operations analyses were conducted for existing US 74. Each of the following analyses is discussed below.

- Document 1 - traffic operations on existing US 74 under a No-Build scenario (2007 and 2030).
- Document 2 - traffic operations on existing US 74 under the Build scenario (2035)
- Document 3 – traffic operations on existing US 74 if US 74 was upgraded to a toll facility with frontage roads (2035).
- Document 5 – traffic operations on existing US 74 if US 74 was improved as a Superstreet Existing, Superstreet 6-Lane, or a 6-Lane Arterial (2035).

Document 1 evaluated existing US 74 under the No-Build scenario for 2007 and 2030. The traffic operations results were summarized in Draft EIS Sections 1.8.3 and 1.8.4. As discussed in the answer to **Question 4**, an updated base year No-Build forecast (2012) would be expected to have volumes approximately equal to the current 2007 Base Year No-Build forecast. Updated future year No-Build forecasts would reasonably be expected to have volumes equal to or greater than the current 2030 No-Build scenario forecast and extrapolated 2035 No-Build scenario forecast. For the operations analysis of the base year conditions, the roadway and intersection configurations that existed at the time of the analysis were used. For the 2030 year, signals were optimized and improvements included in the STIP current at the time were assumed. Since that time, as discussed in **Section 2.4**, several improvements have been implemented or are soon to be constructed along existing US 74.

If the No-Build scenario traffic operations analyses were updated with an updated No-Build forecast and updated information on new and planned improvements on existing US 74, the updated forecast likely would have higher traffic volumes, thereby increasing congestion, but the physical improvements likely would improve operations at the physical improvement locations. However, desired levels of service (LOS D or better) likely would not be experienced in the design year due to the high volumes of traffic. Rather than updating the traffic operations analysis for the No-Build scenario, a new analysis of travel speeds along the corridor was conducted, as discussed in **Section 1.2.4**. For this project, an analysis of the travel speeds along the existing US 74 corridor for the No-Build scenario is appropriate since an element of the project's purpose and need is to provide a high-speed facility (50 mph or greater).

Document 2 evaluated traffic operations for intersections along existing US 74 under the 2035 Build scenario. The analysis was conducted to compare levels of service to the No-Build scenario, as summarized in Draft Section 2.6.3.2. The analysis showed fewer intersections along existing US 74 operating at undesirable LOS under the Build scenario, with the primary factor contributing to the LOS improvement being the lower traffic volumes along the existing US 74 corridor with the Monroe Connector/Bypass in place. As discussed in the answers to **Question 5** and **Question 6**, traffic volumes along the existing US 74 corridor are expected to be less with the Monroe Connector/Bypass in place even if forecasts were updated to the latest MRM model and SE Data. The general

conclusions in the Draft EIS that traffic operations would improve on existing US 74 with the project in place are still valid, and the traffic operations analysis included in Document 2 does not need to be updated.

Document 3 evaluated traffic operations along existing US 74 if US 74 was upgraded to a toll facility with frontage roads (Alternatives PSA G and revised PSA G). This operations analysis used the traffic forecast prepared in Document B listed in **Table 2-9**. As discussed in the answer to **Question 5**, the forecasts prepared for Upgrade Existing US 74 as a toll facility would not be expected to change substantially for the mainline volumes. However, the frontage roads likely would have higher traffic volume assignments. Since forecast volumes are expected to be the same for the mainline and higher for the frontage roads with an updated forecast, traffic operations for PSA G and Revised PSA G would be similar or worse, and do not generate a need to reconsider these alternatives.

Document 5 evaluated traffic operations at a planning level for existing US 74 if US 74 was improved as a Superstreet Existing, Superstreet 6-Lane, or Widened as 6 Lanes with no superstreet. The 2035 No-Build traffic forecasts in Document F listed in **Table 2-9** were used in the operations analysis. As summarized in **Section 2.4**, the results of the comparative analysis showed that in 2035, US 74 under these three improvement scenarios would exceed LOS D in the majority of the corridor. As discussed in the answer to **Question 4**, an updated No-Build forecast that uses the latest MRM model and SE Data Set versions would be expected to have equal or higher volumes along existing US 74 compared to the current forecasts. Therefore, an updated analysis of these three US 74 improvement options would show equal or worse levels of service. Therefore, there is no need to reconsider these alternatives.

2.6 CONCLUSION REGARDING THE ALTERNATIVES ANALYSIS PROCESS

As noted in the AASHTO *Practitioner Handbook for Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects*, a key principle in NEPA is that agencies should apply a "rule of reason" when determining the appropriate range of alternatives considered in a NEPA document and the degree to which each alternative is considered. The NCDOT applied practical judgment and documented determinations at each stage of alternatives analysis. These decisions were reasonable and supported by extensive factual information in the record.

The public and local, state, and federal environmental resource and regulatory agencies were involved throughout the entire project development process. Agencies were involved via monthly agency coordination meetings, as discussed in Section 3.2 of the Final EIS. The public was involved via newsletters, workshops, the project website, and through as-requested small group meetings. The decisions relative to alternatives development and analysis were informed, open, and valid.

The NCDOT complied with its obligation to rigorously explore and objectively evaluate all reasonable alternatives and gave extensive treatment to preliminary and detailed study alternatives in their comparison. Poor existing and projected travel conditions in the project area are well-documented and demonstrated. The NCDOT examined "minor" improvements and evaluated and re-examined others (i.e. improve existing US 74 alternatives and TSM alternatives) with a "hard look" and subsequently determined that they were not reasonable and did not require more detailed study.

The NCDOT followed a widely-accepted screening process in alternatives evaluation for the Monroe Connector/Bypass. In addition, NCDOT generally conformed to legal principles and practitioner guidelines prescribed by the CEQ, FHWA, and AASHTO throughout the process.

The screening-level process and decisions in the Monroe Connector/Bypass EIS remain valid, and based on a review of new information and analyses and consideration of public and agency comments, there are no conditions that warrant re-considering new alternatives or updating previous screening decisions. As discussed in **Section 3**, DSA D still remains the best option due to its ability to meet all elements of the purpose and need and based on results of comparative analyses.

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	1st Qualitative Screening	2nd Qualitative Screening	3rd Qualitative Screening	Additional Examination of Alternatives	Detailed Study
No-Build Alternative	→	→	→	→	Retained and given full consideration in the Draft EIS for baseline comparison, in accordance with 40 CFR 1502.14(d) and FHWA Guidance (FHWA Technical Advisory T6640.8A, 1987).
Trans. Demand Mgmt (TDM)	Alternative eliminated due to its inability to fully meet the project's purpose and need				
Mass Transit/ Multi-Modal Alternative	Alternative eliminated due to its inability to fully meet the project's purpose and need.				
Improve Existing US 74 Alternatives	See Figure 2-1b				
New Location Build Alternatives	Concept meets the project's purpose and need.	❑ Compared Preliminary Corridor Segments and eliminated those which were unreasonable, impractical, or had higher impacts. ❑ Remaining corridor segments from 2nd screening were combined to form 25 Preliminary Study Alternatives (PSAs).	Calculated impacts from the 25 PSAs. Identified 16 Detailed Study Alternatives based on design considerations, impacts (20+ factors considered), and agency/public input.	❑ 16 new location Detailed Study Alternatives (DSAs) were selected for further comparative study in the Draft EIS. ❑ DSA D was selected as the Preferred Alternative for implementation.	

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

ALTERNATIVE CONCEPTS AND DECISION POINTS

Figure 2-1a

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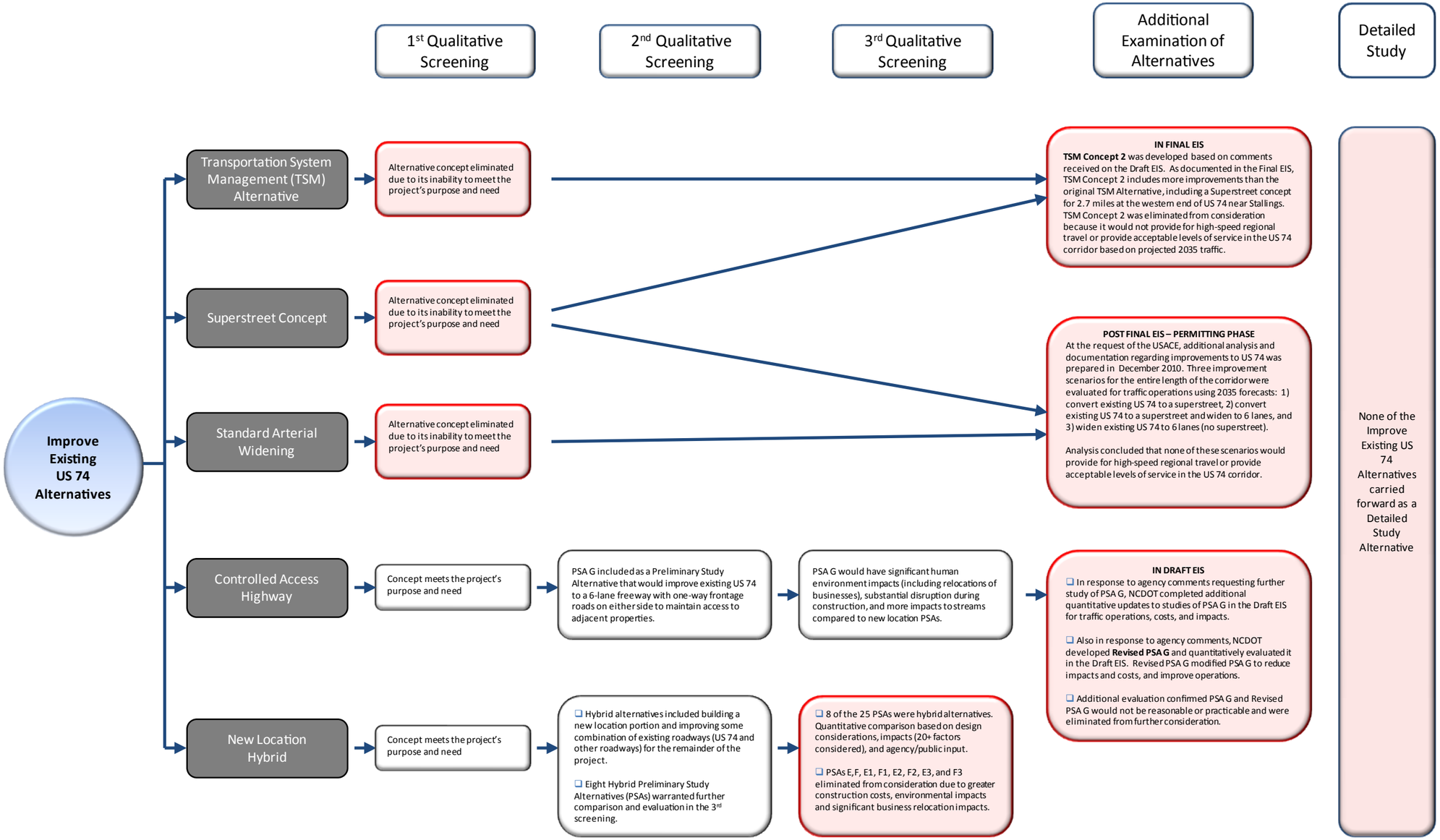

NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. R-3329/R-2559

Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

ALTERNATIVE CONCEPTS AND DECISION POINTS

Figure 2-1b

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3. PREFERRED ALTERNATIVE

Section 3 describes the Preferred Alternative and reasons for selecting DSA D as the Preferred Alternative. This section also describes additional design work and presents a summary of updated impacts associated with the Preferred Alternative.

3.1 DESCRIPTION OF THE PREFERRED ALTERNATIVE

As presented in Section 2 of the Final EIS, the FHWA and NCTA (a division of NCDOT as of July 27, 2009) identified Detailed Study Alternative (DSA) D as the Preferred Alternative, based on the information in the Draft EIS and input received during the public comment period. DSA D was identified as the Recommended Alternative in the Draft EIS. DSA D, in relation to the other Detailed Study Alternatives, is shown in **Figure 3-1a-c**. After consideration of comments received on the Final EIS (**Section 5**) and additional studies completed since the Final EIS (listed in **Section P.4.5**), FHWA and NCDOT reaffirm DSA D as the Preferred Alternative. **Figure 3-2** shows the Preferred Alternative.

3.1.1 GENERAL DESCRIPTION

The Preferred Alternative is proposed as a four to six-lane controlled-access toll facility. The Preferred Alternative follows existing US 74 for approximately one mile from just east of I-485 to east of Stallings Road (SR 1365) and then proceeds eastward on a new location alignment from east of Stallings Road (SR 1365) to the project terminus at existing US 74 between the towns of Wingate and Marshville. The total length of the Preferred Alternative is approximately 19.7 miles.

From west to east, interchanges are located at US 74, Indian Trail-Fairview Road (SR 1520), Unionville-Indian Trail Road (SR 1367), Rocky River Road (SR 1514), US 601, NC 200, and Austin Chaney Road (SR 1758). Partial interchanges are located at Forest Hills School Road (SR 1754) and US 74 at the eastern end of the project.

The Preferred Alternative includes upgrading an approximately one-mile segment of existing US 74 at the western end of the project to a controlled-access highway facility with frontage roads. For this segment, the toll road is six lanes wide and elevated on retained fill, with one-way frontage roads of two to three lanes on either side, for a total of ten to twelve lanes. For the remainder of the new location portion, the Preferred Alternative has four lanes and a 70-foot median. The median width may be reduced during final design, which would reduce the footprint of the project. However, the wider median width was used to conservatively evaluate impacts of the Preferred Alternative.

Design refinements to the Preferred Alternative incorporated since the Draft EIS are discussed in Section 2.3.1 of the Final EIS and summarized in **Section 3.3.1**, and generally include modifications to improve access to neighborhoods, reduce visual impacts and relocations, and maintain local connectivity.

3.1.2 DESIGN CRITERIA

The design speed for the tolled highway segments is 70 miles per hour (mph), which would accommodate a posted speed limit of 65 mph. The design speed for the frontage roads on

reconstructed US 74 is 40 mph, which would allow for a posted speed limit of 35 mph. The general design criteria for the project are presented in Appendix B of the Draft EIS.

Two typical sections were developed for the Preferred Alternative – one for the segment on new location and one for the segment that includes upgrading an approximately one-mile portion of existing US 74. These typical sections are depicted in **Figure 3-3**. The typical section for the new location roadway has four 12-foot travel lanes with a 70-foot median and 12-foot inside and outside paved shoulders. The right of way needed for this typical section is approximately 300 feet, with additional right of way required for interchanges, frontage roads, and improvements to intersecting roads.

The typical section for the upgraded portion of existing US 74 includes a six-lane tolled highway elevated on fill with retaining walls. One-way frontage roads of two to three lanes would be built immediately at the base of the retaining walls to carry local traffic on either side of the elevated toll road. The number of lanes on the frontage roads would vary depending on the proximity to u-turn locations, along with on and off ramps. In areas where ramps are present, three lanes are necessary to provide adequate distance to allow vehicles to merge into traffic. The right of way required for this section is approximately 260 feet.

Since the publication of the Final EIS in May 2010, the American Association of State Highway and Transportation Officials (AASHTO) published an updated edition of the "Green Book" (*A Policy on Geometric Design of Highways and Streets, 6th Edition*, 2011), which contains current design research and practices for highway and street geometric design. This updated reference was reviewed and does not include any new information that would necessitate any changes to the design of the project as presented in the Final EIS.

3.1.3 TOLLING INFORMATION

Planning for Tolls. As shown in Table 6-2 of the MUMPO *2030 LRTP*, tolls were indicated as the funding source for the Monroe Connector (I-485 to US 601) portion of this project, but not for the Monroe Bypass portion of the project (US 601 to US 74). On March 24, 2010, MUMPO endorsed its *2035 LRTP*, which includes tolls as a funding source for the entire project.

Toll Collection System. Tolls would be collected by an electronic toll collection (ETC) system. There would be no cash toll booths. The primary means of ETC involves setting up an account with NCDOT and using a transponder/receiver system. The transponder is a small device usually mounted on the windshield of a vehicle. The receiver is typically mounted over the roadway, and it electronically collects tolls from a driver's account as the vehicle travels under it at highway speed.

The NCDOT will work with other toll authorities to enable, where possible, other systems' transponders to work on the Monroe Connector/Bypass. Toll road users also will have the option of acquiring transponders with prepaid tolls. For travelers who do not have a transponder, a video system will capture license plate information and NCDOT will bill the vehicle's registrant.

In addition, in accordance with NC General Statutes §136-89.213(b), NCDOT will operate a facility in the immediate vicinity of the project that accepts cash payments for prepaid tolls, so establishing an account is not required. It is anticipated that this storefront-type facility would operate from an existing commercial building or strip shopping center within the project area. The facility is not expected to generate a high volume of traffic that would impact local streets.

Incorporating Tolls into Functional Engineering Designs. There are minimal differences between a roadway design with and without an ETC system. The ETC equipment, which is primarily mounted on an overhead structure, takes up little space, and does not require additional right of way. While the right-of-way requirements may not differ between a non-toll facility and a toll facility, the alignment of loop ramps that have ETC equipment may slightly differ. At these locations, the loop ramp is modified slightly to provide a tangent section that facilitates accurate video capture of license plates.

Financial Feasibility of Tolling and Toll Rates. The financial feasibility of tolling the proposed project was evaluated in progressively more detail in the following documents. These documents were incorporated by reference into the Final EIS and are available for review and download on the project Web site: www.ncdot.gov/projects/monroeconnector.

- *Proposed Monroe Connector Preliminary Traffic and Revenue Study* (Wilbur Smith Associates, October 2006). This document was included by reference into the Draft EIS. This preliminary study concluded that tolling the entire Monroe Connector/Bypass project would generate significantly more revenue than the Monroe Connector alone. In addition, the study found that the Monroe Connector in combination with the Monroe Bypass would reduce congestion by providing a good alternative to US 74.
- *2009 Update for Monroe Connector/Bypass Preliminary Traffic and Revenue Study* (Wilbur Smith Associates, April 2009). The update was conducted at a preliminary level of study. Updates from the 2006 study included toll collection methods and alignment and interchange configurations.
- *Final Report Proposed Monroe Connector/Bypass Comprehensive Traffic and Revenue Study* (Wilbur Smith Associates, October 2010). This report documented certified anticipated revenue for use by bond rating agencies and investors to evaluate financial return on the project.

The initial price of the toll was determined as part of the *Comprehensive Traffic and Revenue Study* (Wilbur Smith Associates, October 2010). The price of the toll likely will vary over time, based upon variables such as managing demand, financing the initial construction of the project, and paying for roadway operations and maintenance. The toll rate will differ for cars and trucks, and will also be dependent on the collection method, i.e., transponder, registered license plate, or bill via US Mail. Initial toll rates for those utilizing a transponder are expected to be approximately $0.13 per mile for cars and $0.51 per mile for trucks.

3.2 REASONS FOR SELECTING DSA D AS THE PREFERRED ALTERNATIVE

According to FHWA regulations (23 CFR 771.125) and Council on Environmental Quality regulations (40 CFR 1502.14), the lead agency(ies) should identify a Preferred Alternative in a Final EIS. This is the alternative the lead agency(ies) believes would fulfill its statutory mission and responsibilities, giving consideration to social, economic, environmental, technical and other factors.

The FHWA and NCDOT identified DSA D as the Preferred Alternative in the Final EIS, for the reasons listed below. DSA D was also identified by the FHWA, NCTA, and NCDOT as the Recommended Alternative in the Draft EIS (Section 2.8). After consideration of comments received on the Final EIS and additional studies completed since the Final EIS, the reasons cited

in Section 2.2 of the Final EIS for selecting DSA D as the Preferred Alternative still apply. The comparisons listed below were made prior to the design refinements described in **Section 3.3**. However, the relative comparisons listed below still apply, since it is expected that if designs were refined for each DSA, the relative values would remain similar.

Additional information regarding input received during the Draft EIS and Final EIS public review periods is included at the end of this section under "Public Involvement." Please note this list is not in order of importance and does not represent all benefits or impacts of DSA D, just those elements that differentiated DSA D when compared to the other DSAs.

Cost and Design Considerations

- DSA D is one of the shortest alternatives at 19.7 miles (all alternatives range from 19.6 to 20.6 miles).
- DSA D is one of the eight alternatives that would not require the relocation of Rocky River Road and the associated wetland impacts. The relocation of Rocky River Road is required for the eight alternatives that include DSA Segment 22A.
- DSA D is higher in the range of median total project costs with a median cost of $777.4 million (the median costs of the DSAs range from $752.5 million for DSA A2 to $785.3 million for DSA D1). The higher cost of the Preferred Alternative is offset by lower impacts in several other areas as described below. Updated cost estimates for the Preferred Alternative, which incorporate design refinements discussed in **Section 3.3**, as well as increases due to inflation as a result of the updated project opening date, are provided in **Section 3.3.4**. It is expected that relative costs amongst the DSAs would remain similar if updated costs were provided for all DSAs, and therefore the conclusions listed in this bullet would not change.

Human Environment Considerations

- DSA D is one of the four DSAs with the fewest residential relocations at 107 (the range being 94 to 149 residential relocations). Through design refinements for the Preferred Alternative, this number has been reduced by 12 residential relocations for a total of 95 residential relocations.
- Although DSA D is higher in the range of business relocations at 48 (the range being 14 to 49 business relocations), this number has been reduced from preliminary estimates by one business relocation through design refinements for a total of 47 business relocations. Most of the impacted businesses are located along existing US 74 at the western end of the project. The relocation of these businesses is in exchange for the other positive factors associated with DSA D, including having the roadway located farther away from densely developed residential subdivisions and farther from Stallings Elementary School.
- DSA D would have no direct impacts to schools and would avoid any indirect impacts to Stallings Elementary School. DSA D is one of eight alternatives that would have no direct impacts to schools. The other eight alternatives would have a direct impact to Central Piedmont Community College and would be adjacent to Stallings Elementary School.
- DSA D is one of the four alternatives that would impact only three church properties (other DSAs impact four or five church properties). None of the DSAs would impact church buildings.
- DSA D is one of the eight alternatives that would avoid impacts to the proposed

Matthews Sportsplex property, a public park to be developed by the Mecklenburg County Park and Recreation Department. Also see Cultural Resource Considerations below.

Physical Environment Considerations

- DSA D is one of the alternatives that has the least impacts to active agricultural lands at 499 acres. Impacts range from 494 acres for DSA C to 627 acres for DSA B3.
- DSA D is one of eight DSAs (DSAs C, D, C1, D1, C2, D2, C3, and D3) that would potentially impact the most hazardous materials sites (11-12 sites impacted, with the lowest impacts being 6-7 sites). However, the anticipated impact severity is "low" for all potentially impacted sites. An updated survey of potentially contaminated sites conducted for the Preferred Alternative revealed only five potentially contaminated sites, as discussed in **Section 4.2.6**.

Cultural Resources Considerations

- DSA D is one of eight alternatives that would not have impacts on the proposed Matthews Sportsplex property, a future public park and Section 4(f) resource. The other eight alternatives would affect this proposed park.

Natural Resources Considerations

- DSA D is in the middle range of impacts to upland forest at 450 acres (all alternatives range from 358 to 514 acres). As discussed in **Section 4.4.3**, impacts to terrestrial communities from all the DSAs were updated to account for an area near the western end of the project where 3.9 acres of upland forest were cleared within DSA Segment 2. Based on this update, DSA D would still be in the middle of the range of upland forest impacts at 446 acres (all alternatives range from 354 to 514 acres).
- DSA D is lower in the range of impacts to ponds at 2.6 acres (all alternatives range from 2.5 to 3.8 acres).
- DSA D is in the middle range of impacts to wetlands at 8.1 acres (all alternatives range from 6.2 to 11.0 acres).
- DSA D would have the least impacts to perennial streams with 9,794 linear feet of impact (all alternatives range from 9,794 to 12,383 linear feet).
- DSA D is lower in the range of impacts to intermittent streams at 11,915 linear feet (all alternatives range from 10,767 to 13,020 linear feet).
- DSA D would have the least linear feet of streams requiring mitigation at 12,550 linear feet (all alternatives range from 12,550 to 16,387 linear feet). While final decisions with respect to mitigation requirements have not been made by the regulatory agencies, for estimation purposes, streams were considered to require mitigation if they were perennial or if they were intermittent and had a stream rating issued by the NCDENR-DWQ of greater than or equal to 26. This implies that streams impacted by DSA D are of lower quality than those impacted by other DSAs.
- DSA D is one of eight alternatives that would cross only two 303(d)-listed streams, while the other eight alternatives would cross four. Both 303(d)-listed streams are proposed to be bridged.

Public Involvement Prior to Publication of the Draft EIS

- Substantial public input regarding the DSAs, particularly at the western end of the project (DSA Segment 2 versus DSA Segment 18A), was received throughout the alternatives screening process. Much of this public input has been generated by C.A.R.E., a community-based group focused on informing and mobilizing residents against DSA Segment 18A of the Monroe Connector/Bypass (included in DSAs A, B, A1, B1, A2, B2, A3, and B3). C.A.R.E. submitted more than 2,000 signatures in opposition to DSA Segment 18A. Specifically, the group is concerned about noise, visual, and air quality impacts to the new Stallings Elementary School and adjacent neighborhoods, as well as impacts to North Fork Crooked Creek, which is a 303(d)-listed stream. While this input was a factor in the decision to recommend DSA D, the recommendation was based on a wide range of factors included in the comprehensive review and analysis of the potential impacts of all DSAs, as described above.

Public Involvement between the Draft EIS and Final EIS

- The formal public review period for the Draft EIS was from May 1, 2009 (the day the Notice of Availability of the Draft EIS was published in the Federal Register [Vol. 74, No. 83, Page 20297]) to June 15, 2009. However, the Draft EIS was available on the project Web site beginning April 2, 2009, and a press release was issued that day announcing the document's availability for public review.
- A series of Public Hearings and Open Houses was held the week of May 18, 2009. The purpose of the public review period and the Pre-Hearing Open Houses/Public Hearings was to receive input on the Draft EIS and project corridors and design, as well as the selection of DSA D as the Recommended Alternative. Section 3.1.2 of the Final EIS has additional information on this topic. Of the comments received during the public review period that expressed an opinion on the selection of DSA D as the Recommended Alternative, 382 were in favor of DSA D and 50 were opposed to it. An additional 150 names were submitted on an electronic petition opposing DSA D; however, NCDOT cannot verify the validity of the signatures on this petition.
- None of the public comments received resulted in changes to any of the reasons listed above for selecting DSA D as the Preferred Alternative. Detailed information regarding comments received from the public, as well as local, state, and federal agencies, is presented in Section 3 of the Final EIS. Substantive comments on the Draft EIS and responses to those comments are included in Section 3.3 of the Final EIS. All comments received on the Draft EIS and responses to the comments are included in Appendix B of the Final EIS.

Public Involvement after Publication of the Final EIS

- The formal public review period for the Final EIS was from June 11, 2010 (the day the Notice of Availability of the Final EIS was published in the Federal Register [Vol. 75, No. 112, Page 33300]) to July 12, 2010. Chapter 5 of the Final EIS includes a full list of agencies and organizations that received copies of the document, as well as a list of local libraries and government offices where the Final EIS was made available for public review. The Final EIS in its entirety was also made available for download on the project Web site.
- Detailed information regarding comments received from the public on the Final EIS, as well as local, state, and federal agencies, is presented in **Section 5** of this document.

All comments received on the Final EIS and responses to the comments are included in **Appendix A**. None of the comments received resulted in a change in the Preferred Alternative.

- Two Citizens Update Workshops were held on June 18 and 19, 2012. Both meetings included a formal presentation that described the project's legal proceedings, status of the right-of-way process, and the next steps. The presentation was followed by a question and answer session and project team members were available to answer one-on-one questions before and after the presentation. A total of 207 citizens signed in at the workshops (102 in Stallings and 105 in Monroe). At the meeting in Stallings, one comment form was submitted to state support for the project. At the meeting in Monroe, four comment forms were submitted – three in support of the project and voicing frustration with the delay, and one with a suggestion to widen NC 218. **Section 5.2.1** provides additional information about the workshops.
- Since the Final EIS, the project study team met with several organizations and agencies to provide updates on the project or make a presentation about the project at the request of community groups. These small group meetings are described in **Section 5.2.2**. Additional agency coordination since the Final EIS is presented in **Section 5.3**.

3.3 DESIGN REFINEMENTS TO THE PREFERRED ALTERNATIVE

The following sections summarize design refinements to the Preferred Alternative since the Draft EIS was published, as presented in Section 2.3 of the Final EIS. There have not been any additional design refinements since the Final EIS was published. The refinements include design modifications made as a result of public involvement activities since publication of the Draft EIS, avoidance and minimization of impacts to Waters of the US, and proposed service roads based on the results of the *Final Monroe Connector/Bypass Service Road Study* (PBS&J, April 2010). This section also summarizes cost estimates, traffic forecasts, and operational analysis for the Preferred Alternative.

Figure 3-4a-t (previously Figure 2-3 from Final EIS) shows the refined functional design for the Preferred Alternative that incorporates the design modifications, minimization efforts, and service roads discussed below. The base mapping for **Figure 3-4a-t** has been updated with 2012 parcel data for Union and Mecklenburg Counties, a 2012 subdivision layer from Union County, 2012 303(d)-listed streams, and new development in the study area. The names of some resources have also been updated.

3.3.1 DESIGN REFINEMENTS SUMMARY

As a result of the public involvement activities and public review period associated with this project after the Draft EIS was published, six areas of concern regarding the functional design were raised by the members of the public, local municipalities, and regulatory agencies.

Design modifications were made in the following areas: Forest Park subdivision, Beverly Drive, Bonterra Village, Unionville-Indian Trail Road interchange, and Austin Chaney Road interchange/McIntyre Road. Design revisions also were considered for the Maple Hill Road area, but were not implemented. These design modifications, which generally reduced residential relocations and potential noise and visual impacts, are described in detail in Section 2.3.1 of the Final EIS.

3.3.2 SERVICE ROADS SUMMARY

The *Final Monroe Connector/Bypass Service Road Study* (PBS&J, April 2010) was prepared for the Preferred Alternative. This document is incorporated by reference and available on the project Web site (www.ncdot.gov/projects/monroeconnector/). The objective of this study was to identify and evaluate parcels whose access would be eliminated by the Preferred Alternative (i.e., land-locked parcels) and to evaluate the feasibility and reasonableness of providing service roads to restore access to those parcels.

The service road evaluation methodology and design assumptions are described in detail in Section 2.3.2.1 of the Final EIS. Based on the analysis conducted, fourteen areas (including 89 parcels) were recommended for preliminary service roads. The proposed service roads are presented in Section 2.3.2.2 of the Final EIS. Service roads were generally recommended where the cost of purchasing isolated or remnant parcels was greater than the cost associated with providing the service road. The service road functional designs are shown on Figure 2-4a-h of the Final EIS and included on **Figure 3-4a-t** of this document. Impacts associated with the service roads are included with the impacts of the Preferred Alternative presented in **Section 3.4**.

3.3.3 AVOIDANCE AND MINIMIZATION OF IMPACTS TO WATERS OF THE US

Throughout the alternatives development process, the alternative corridors and engineering designs were developed considering avoidance and minimization of impacts to Waters of the US (wetlands, streams and ponds) where possible. As part of the Draft EIS, a preliminary hydraulic analysis was performed to identify preliminary sizes and locations of major drainage structures along the DSAs that would be needed to adequately carry floodwaters. Major drainage structures are bridges, box culverts, or pipe culverts greater than 72 inches in diameter.

As discussed in Section 4.6.3 of the Draft EIS, major drainage structures and crossings were reviewed by the environmental resource and regulatory agencies at the Turnpike Environmental Agency Coordination (TEAC) meeting on October 7, 2008, and at a bridging location field review on October 21, 2008. As a result of these meetings, the agencies agreed on several recommended bridge and culvert locations, and NCDOT agreed to include bridges at several locations previously recommended for culverts in order to avoid or minimize stream and wetland impacts. Locations where NCDOT agreed to include bridges to avoid or minimize impacts to streams and wetlands along the Preferred Alternative were as follows:

- Crossing 19– recommended twin 150-foot bridges to avoid 307 linear feet of impacts to South Fork Crooked Creek (Stream S047).
- Crossing 20– recommended 75-foot bridge to avoid 196 linear feet of impacts to South Fork Crooked Creek (Stream S047).
- Crossing 30– recommended twin 240-foot bridges to avoid 519 linear feet of impacts to Stewart's Creek (Stream S082).
- Crossing 37– recommended twin 320-foot bridges to avoid 522 linear feet of impacts to Richardson Creek (Stream S111).
- Crossing 38– recommended twin 280-foot bridges to avoid 378 linear feet of impacts to Ray's Fork (Stream S112).
- Crossing 47– replace culvert with twin 575-foot bridges to avoid 2.28 acres of impacts to Wetlands W170 and W167 and 395 linear feet of impacts to Meadow Branch (Stream S152).

The Preferred Alternative was selected, in part, because it had the least perennial stream impacts among all the DSAs and the second least total stream impacts. All 303(d)-listed streams are proposed to be bridged. Strict adherence to standard Best Management Practices (BMPs), including those for sedimentation and erosion control and the NCDOT *Design Standards in Sensitive Watersheds*, will minimize project impacts.

As presented in Section 2.3.3 of the Final EIS, in addition to the measures listed above, specific areas where design refinements for the Preferred Alternative resulted in net reductions to stream impacts include:

- The area around Beverly Drive where a bridge was removed, resulting in an impact reduction of approximately 109 linear feet to Stream S036, which was anticipated to require mitigation;
- The area around Bobwhite Circle where a service road was removed and a bridge was modified, resulting in an impact reduction of approximately 189 linear feet to Streams S114b, S140f and S140g, all of which were anticipated to require mitigation;
- The area surrounding the Austin Chaney Road interchange where design modifications resulted in a net impact reduction of approximately 423 linear feet to Streams S156b, S157a and S157b, 344 linear feet of which were anticipated to require mitigation; and
- The area east of the Forest Hills School Road interchange where a previously shown NCDOT service road was shortened, resulting in an impact reduction of approximately 67 linear feet to Stream S169a, which was anticipated to require mitigation.

The changes in jurisdictional resource impacts resulting from the individual refinements to the Preferred Alternative are listed in **Table 3-1**. A summary of changes in jurisdictional resource impacts to the Preferred Alternative between the Draft EIS and Final EIS are summarized in **Table 3-2**, and include the impacts from service roads. There have not been any additional refinements to the functional design of the Preferred Alternative since the Final EIS. Updated wetland and stream impacts based on the refined functional design for the Preferred Alternative are described in **Section 3.4**.

TABLE 3-1: Changes in Jurisdictional Resource Impacts Due to Design Refinements

Design Refinement	Change in Impact to Resource Compared to Draft EIS DSA D Conceptual Design[1]				
	Perennial Streams (linear ft)	Intermittent Streams (linear ft)	Total Streams (linear ft)	Wetlands (acres)	Ponds (acres)
Eliminate Beverly Drive Bridge	-109	0	-109	0	0
Secrest Shortcut crossing	+196	0	+196	-0.1	0
Compress Unionville-Indian Trail Road Interchange	-116	+127	+11	+0.1	0
Re-Design Austin Chaney Road Interchange	-285	-138	-423	0	+0.3
TOTAL CHANGE (from design refinements listed above)	**-314**	**-11**	**-325**	**0**	**+0.3**

Source: *Natural Resources State Technical Report for the Monroe Connector/Bypass* (ESI, December 2008) with updated y-line and service road information provided October 2009.
Notes: [1]Impacts calculated based on slope stake limits plus a 40-foot buffer.

TABLE 3-2: Changes in Jurisdictional Resource Impacts Since the Draft EIS

Impacts[1]	Perennial Streams (linear ft)	Intermittent Streams (linear ft)	Total Streams (linear ft)	Wetlands (acres)	Ponds (acres)	Stream Impacts Requiring Mitigation[2]
Impacts Reported in Draft EIS for DSA D	9,794	12,269	22,063	8.1	2.6	12,550
Impacts for Preferred Alternative (no service roads)	9,205	12,389	21,594	8.0	3.1	11,975
Add Service Road Impacts	+1,148	+341	+1,489	+0.1	+0.0	+1,260
TOTAL IMPACTS FOR PREFERRED ALTERNATIVE	10,353	12,729	23,083	8.1	3.1	13,235
Change from Draft EIS to Preferred	+559	+460	+1,020	0	+0.5	+685

Source: *Natural Resources State Technical Report for the Monroe Connector/Bypass* (ESI, December 2008) with updated y-line and service road information provided October 2009.
Notes: [1]Impacts calculated based on slope stake limits plus a 40-foot buffer. [2]Based on assumption that all perennial stream impacts require mitigation as well as any impacts to intermittent streams with NCDWQ stream ratings greater than 26.

3.3.4 COST ESTIMATES FOR THE PREFERRED ALTERNATIVE

Cost estimates revised since the Final EIS for the Preferred Alternative are presented in **Table 3-3**. The cost estimates presented in Section 2.3.4 of the Final EIS assumed a construction contract award date of December 2010 and a project opening in December 2014. The revised cost estimate assumes a construction start date of October 2014 and a project opening in October 2018. No other assumptions or data were changed; therefore, the resulting $97 million increase in project costs is entirely attributable to inflation. The costs presented in the table are based on the Preferred Alternative refined functional engineering design, as described in Sections 2.3.1 and 2.3.2 of the Final EIS. The estimates are in year-of-expenditure dollars, as described in the table notes. Cost estimates are provided as a range of probable project costs for construction, right-of-way acquisition, and environmental mitigation (mitigation of impacts to streams and wetlands). The total project cost provided represents the 70 percent confidence level. This means that there is a 70 percent probability that the construction phase of the project will cost less than or equal to $898.0 million.

TABLE 3-3: Cost Estimates for Preferred Alternative

	Approximate Length (miles)	Probable Range of Costs Through Year of Expenditure (millions $)*				Project Cost (millions $) (70% chance costs will be less)
		Construction Cost	Environmental Mitigation Cost	ROW & Utility Cost	Total Cost	
Preferred Alternative	19.7	638.6 to 690.9	11.3 to 11.9	195.8 to 220.5	845.7 to 923.3	898.0

Source: HNTB, April 26, 2013.

Notes: * Assumptions and notes regarding costs:

1. Construction cost includes construction, utilities, engineering, and administrative costs.
2. Year of expenditure costs were modeled using a range of possible inflation rates.
3. Future construction costs were modeled to mid-point of construction using inflation rates ranging from 2.5% to 4%, with 3% being most likely.
4. Future right-of-way costs were modeled to anticipated year of acquisition using inflation rates ranging from 0% to 4%, with 2% being most likely.
5. Future administrative costs were modeled to anticipated year of expenditure using inflation rates ranging from 2.5% to 4.5%, with 4% being most likely.
6. Ranges of costs are based on cost projections in which the lowest 10% and highest 10% were discarded.
7. Prior calculations (April 13, 2010) for year of expenditure costs assumed an award date of December 2010 and an opening in December 2014.
8. Revised calculations (April 26, 2013) for year of expenditure costs assume an award date of October 2014 and an opening in October 2018.
9. Environmental mitigation costs are based on NCEEP fee schedule dated July 1, 2009 for estimated impacts to streams and wetlands and assume mitigation for impacts to all wetlands, all perennial streams, and intermittent streams with a NCDENR-DWQ stream rating greater than or equal to 26.
10. Right-of-way costs were provided by Carolina Land Acquisitions in January 2009. The cost estimate was updated in March 2010 to reflect new assumptions.

Design-Build Procurement

In April 2010, NCDOT solicited Statements of Qualifications (SOQ) from prospective design-build teams for the design and construction of the Monroe Connector/Bypass. Seven teams submitted SOQs in May 2010. Upon review of each team's credentials, NCDOT reduced the list from seven to three and requested that the remaining teams submit technical and price proposals on October 14, 2010. On October 28, 2010, NCDOT opened the design-build price proposals and read the technical scores. The team selected through the best-value procurement process was Monroe Bypass Constructors (a joint venture of United Infrastructure, Boggs Paving, and Anderson Columbia) with a construction bid of $367,700,000.

As presented in the Final EIS, the total project cost was expected to range from $749 million to $824 million. Construction costs were estimated to range from $558 million to $617 million. Within the construction cost estimate, the highway design-build bids were expected to range from $465.7 million to $513.7 million. The remaining costs were for non-highway construction costs (i.e., landscaping, toll integration, construction management, administration, and agency reserve funds).

The actual design-build cost estimates ranged from $367.7 million to $424.4 million, resulting in a mean estimate of $398 million. This mean estimate represents a 14.5 percent and 22.5 percent reduction in the predicted range of design-build costs presented in the Final EIS. This difference can be attributed, in part, to the following factors:

- *Scope changes:* The NCDOT cost estimate was based on the refined functional design plans, which included a 70-foot median width. The design-build teams were directed to include a reduced 46-foot median in their proposal, saving an estimated $25 million in

reduced quantities of earthwork, bridges and drainage systems. Other scope changes included narrower inside paved shoulder widths and the option to eliminate angular offsets at loop ramp deceleration lanes.

- *An extremely competitive bidding environment:* In 2010, NCDOT experienced bids that were, on average, 20 percent lower than the engineer's estimates.

Within their Technical Proposal, the selected team proposed a four-year design and construction timetable, with a project opening date of December 31, 2014, based upon the award of the project in December 2010. On October 26, 2010, $233.92 million in State Appropriation Revenue Bonds were sold; however, the remainder of the project financing was delayed until the successful resolution of a lawsuit filed by the Southern Environmental Law Center (SELC) challenging the EIS. NCDOT prevailed in the initial lawsuit filed by the SELC in the United States District Court in the opinion published on October 24, 2011. Following the favorable court opinion, and along with a written agreement from the design-build team to retain their original price, the following activities took place:

- November 9, 2011 - $10 million Senior Lien Turnpike Revenue Bonds sold
- November 16, 2011 - $214.505 million State Appropriation Revenue Bonds sold
- November 23, 2011 - Design-build highway construction contract awarded
    - Revised Substantial Completion Date (project opening) to December 31, 2015
    - Revised Final Completion Date to July 1, 2016
- December 15, 2011 - $145.535 million GARVEE bonds sold

Following award of the design-build contract in November 2011, the engineering team began preparation of final construction plans and the contractor began mobilizing equipment and work force. NCDOT suspended the work of the design-build team on May 22, 2012 following the decision of the United States 4th Circuit Court of Appeals. For the six months between project award and work suspension, the design-build team was paid $35 million, largely for design work, mobilization, bonds, and insurance. In order to retain the design-build team and their favorable bid, NCDOT has agreed to pay monthly damage claims. These payments are based on actual costs incurred by the contractor during the suspension. Payments for damages between May 22, 2012 and May 31, 2013 total $1.538 million. An additional $69,000 in damages is currently being processed and NCDOT will continue to compensate the contractor for actual costs until a new Notice to Proceed is given or the contract is terminated. The bonds sold in 2010 and 2011 have funded these damages; and the budgeted contingency fund has been reduced by this amount. In addition to the monthly damage claims for work suspension, the contractor has requested that an inflationary adjustment be applied to the base bid. As of September 2013, NCDOT and the design-build team have not agreed to an adjustment amount.

3.3.5 UPDATED TRAFFIC FORECASTS AND OPERATIONS ANALYSIS IN THE FINAL EIS

Since the publication of the *Final Year 2035 Build Traffic Operations Technical Memorandum* (PBS&J, April 2009), which presented traffic operations information used in the Draft EIS, an addendum was prepared for the Final EIS to re-evaluate traffic conditions. The addendum analyzed traffic volumes and operations based on the refined functional design of the Preferred Alternative's interchanges with the US 74 Frontage Road, Unionville-Indian Trail Road, and

Austin Chaney Road (SR 1758). The addendum found that each of these interchanges would still operate at an acceptable level of service (LOS D) in 2035 using the refined functional design.

Detailed information on the revised traffic operations analysis is presented in the *Final Addendum to Year 2035 Build Traffic Operations Technical Memorandum* (PBS&J, February 2010). This document is incorporated by reference and is available for review and download on the NCTA Web site: www.ncdot.gov/projects/monroeconnector/. A complete summary of updated traffic forecasts and operations analysis is provided in Section 2.3.5 of the Final EIS. Additional discussions about traffic forecasts are included in **Section 2.5**.

3.4 SUMMARY OF IMPACTS FROM THE PREFERRED ALTERNATIVE

Section 3.2 presents the reasons cited by FHWA and NCDOT for selecting DSA D as the Preferred Alternative. Impacts from the Preferred Alternative are discussed in detail in Section 2 of the Final EIS and any updates to those impacts are presented in **Section 4** of this document. A summary of the impacts from the Preferred Alternative, including updates presented in **Section 4**, is presented in the following sections:

HUMAN ENVIRONMENT

Impacts to the human environment are documented in the *Community Impact Assessment* (PBS&J, 2009), Section 3 of the Draft EIS, Section 2.5.1 of the Final EIS, and **Section 4.1** of this document.

- The Preferred Alternative impacts seven neighborhoods:
    - Forest Park (relocation of homes on end of road or at edge of neighborhood and change in access)
    - Acorn Woods (relocation of homes in neighborhood and change in access)
    - Bonterra (change in access)
    - Poplin Farms (relocation of homes in neighborhood)
    - Avondale Park (right-of-way encroachment only)
    - Silverthorn (right-of-way encroachment only)
    - Glencroft (right-of-way encroachment only)
- The Preferred Alternative does not directly impact any schools in the project study area. However, implementation of the Preferred Alternative will alter access to Central Piedmont Community College (CPCC). CPCC Lane, which provides access to the campus from existing US 74, will be closed to allow for control of access in the vicinity of the I-485 interchange. New access would be provided from existing US 74 via the proposed McKee Road. The Preferred Alternative also may alter traffic patterns on existing US 74 and Forest Hills School Road in the vicinity of Forest Hills High School. None of these changes would preclude operations of the schools.
- The Preferred Alternative may impact three church properties (no church buildings would be taken with implementation of the Selected Alternative):

- Benton Heights Presbyterian Church – right of way required along US 601 to accommodate improvements associated with the proposed US 601 interchange; control of access requirements may necessitate altering existing entrances.
- Trinity Baptist Church – right of way required along US 601 to accommodate improvements associated with proposed US 601 interchange.
- Lee Park Baptist Church (formerly Morgan Mill Road Baptist Church) – right of way required along NC 200 to accommodate improvements associated with the proposed NC 200 interchange.

- The Preferred Alternative requires relocation of approximately 95 residences, 47 businesses, and 3 farms. Business relocations are concentrated along existing US 74. These total numbers have not changed since the Final EIS. However, since the approval of the original ROD in August 2010 (rescinded July 2012), NCDOT has acquired three commercial properties, 22 residential properties, and one vacant parcel under hardship situations. Requests for right-of-way acquisition for hardship situations are being considered on a case by case basis. The purchase of this right of way did not influence NCDOT's or FHWA's decision to move forward with the Preferred Alternative as presented in the Final EIS. If updated information since the Final EIS led to a change in the Preferred Alternative, the purchased right of way would be sold and new right of way acquired for a different alternative.
- The construction of the Preferred Alternative does not have a disproportionately high and adverse impact on minority and low-income populations.

PHYSICAL ENVIRONMENT

Impacts to the physical environment are documented in a variety of technical memorandums as noted below, as well as in Section 4 of the Draft EIS, Section 2.5.2 of the Final EIS, and **Section 4.2** of this document.

- Noise impacts are documented in *Final Traffic Noise Technical Memorandum* (PBS&J, March 2009), *Addendum Traffic Noise Technical Memorandum* (PBS&J, January 2010), and *Traffic Noise Analysis Update for the Monroe Connector/Bypass* (Atkins, November 2013). The number of impacted receptors is estimated to be 153. Five preliminary feasible and reasonable noise barriers have been identified for the Preferred Alternative:
  - Noise wall NW2C – Along the shoulder of westbound Monroe Connector/Bypass near White Oak Lane and Strand Drive.
  - Noise wall NW4 (Previously N4-1) – Along the shoulder of eastbound Monroe Connector/Bypass near Beverly Drive.
  - Noise wall NW7B (Previously N7-1) – Along the shoulder of eastbound Monroe Connector/Bypass near Avondale neighborhood (Dusty Hollow Road).
  - Noise wall NW11 (Previously N9-1) – Along the shoulder of westbound Monroe Connector/Bypass near Glencroft Drive.
  - Noise wall NW12 - Along the cut slope of eastbound Monroe Connector/Bypass near Phifer Circle.

  A Design Noise Study will be prepared during the final design process to update the noise analysis based upon the most recent traffic forecasts and the final design of the Selected Alternative.

- An assessment of air quality is documented in *Final Air Quality Technical Memorandum* (PBS&J, February 2009). The project will not cause or contribute to any new localized carbon monoxide violations or increase the frequency or severity of any existing carbon monoxide violations, and a quantitative carbon monoxide hot-spot analysis is not required. The Monroe Connector/Bypass is currently included in the approved MUMPO 2035 LRTP, which conforms to the intent of the State Implementation Plan (SIP). The USDOT made a conformity determination on the 2035 LRTP on May 3, 2010, with amendments approved by FHWA/FTA on December 19, 2011; July 6, 2012; and May 29, 2013. This conformity determination meets all of the applicable Clean Air Act (CAA) Section 176(c) requirements for federally funded or approved transportation projects. Specifically, the requirements for carbon monoxide hot-spot analysis are codified at 40 CFR 93.116 and 40 CFR 93.123. By meeting these regulatory requirements as well as other requirements in the conformity regulations, this conformity determination demonstrates compliance with the requirements of CAA Section 176(c)(1).
- The Preferred Alternative impacts approximately 184 acres of prime farmland soils and 751 acres of statewide important farmland soils. There are no farmland soils classified as unique or locally important within the right of way for the Preferred Alternative.
- Utility coordination will be conducted during final design. All utility providers will be contacted and coordinated with to ensure that the proposed design and construction of the project does not substantially disrupt service.
- On the eastern end of the project, the Preferred Alternative crosses the CSX Railroad line that parallels existing US 74. NCTA will coordinate with the NCDOT Rail Division and CSX Railroad during final design for the project's eastern terminus at US 74, which would affect the east-west rail mainline through Union County.
- Five potentially contaminated parcels are within the project corridor. When the final design is complete and right-of-way limits are determined, a hazardous materials site assessment will be performed to determine levels of contamination at any potential hazardous materials sites. The assessment will be made prior to right-of-way acquisition.
- The Preferred Alternative includes six bridge crossings and 35 major culverts or pipes. There would be five crossings of floodways and 11 crossings of floodplains. During final design, a detailed hydrologic and hydraulic analysis will be performed for each crossing location to determine the actual size and configuration of each structure. Also, for all new location crossings on FEMA-regulated streams (streams where a floodway and/or floodplain has been identified), a Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) will be prepared and submitted to the NC Floodplain Mapping Program or Mecklenburg County, as applicable, for approval. In National Flood Insurance Program flood hazard areas, the final hydraulic designs for the Selected Alternative would be such that the floodway would carry the 100-year flood without a substantial increase in flood elevation.

CULTURAL RESOURCES

Impacts to cultural resources are documented in Section 5.2 of the Draft EIS, Section 2.5.3 of the Final EIS, and **Section 4.3** of this document.

- The Preferred Alternative would not result in an Adverse Effect to any historic property on or eligible for listing on the National Register of Historic Places (NRHP). No property would be acquired from any of the historic resources identified within the project corridor. The effects determinations are No Adverse Effect for Secrest Farm, Hiram Secrest House, and Perry-McIntyre House. The effects determination for William Bivens House is No Effect. These determinations were reconfirmed with the HPO on September 29, 2009. The NCDOT Historic Architecture Group confirmed on August 17, 2012 that there are no changes to the findings presented in the Final EIS.
- The proposed action would have no effects on any archaeological resource on or eligible for listing on the NRHP. An intensive ground penetrating radar survey was conducted at the Hasty-Fowler-Secrest Cemetery (Site 31UN351**) in May 2012, where human remains are suspected to be present. According to the survey, there is no indication of possible burials outside the area with extant markers. As included in the project commitments, all possible burials identified in the survey will be treated as potential human graves and treated appropriately under North Carolina burial removal laws. The NCDOT Archaeology Group confirmed on August 8, 2012, that there are no changes to the findings presented in the Final EIS.
- The Preferred Alternative would not impact any Section 4(f) or Section 6(f) resources.

NATURAL ENVIRONMENT

Impacts to the natural environment are documented in Section 6 of the Draft EIS, Section 2.5.4 of the Final EIS, and **Section 4.4** of this document.

- Table 6-3 of the Draft EIS presents the acreage of terrestrial communities that would be impacted by each DSA (area within each DSA's proposed right of way based on functional engineering designs). **Table 4-4** of this document provides an update to the table from the Draft EIS to reflect a change of 3.9 acres of Mesic Mixed Hardwood Forest to Urban/Disturbed within the proposed right of way for DSAs that include DSA Segment 2. Table 2-10 of the Final EIS presents impacts to terrestrial communities for the Preferred Alternative right of way based on the refined functional design. The impacts of the Preferred Alternative presented in the Final EIS are updated below to reflect a change of 3.9 acres of Mesic Mixed Hardwood Forest to Urban/Disturbed since the Final EIS. Terrestrial communities will be impacted permanently by project construction from clearing and paving, as follows:
    - Agriculturally maintained – 489 acres
    - Basic mesic forest (Piedmont subtype) – 22 acres
    - Mesic mixed hardwood forest (Piedmont subtype) – 390 acres
    - Piedmont/Low mountain alluvial forest – 21 acres
    - Pine forest – 13 acres
    - Successional – 97 acres
    - Urban/disturbed – 216 acres
    - Open water – 6 acres
    - Impervious surface – 58 acres

- The Preferred Alternative will impact 8.1 acres of wetlands and 23,082 linear feet of streams, including 10,353 linear feet of perennial stream and 12,729 linear feet of intermittent stream. Impacts were calculated using the refined functional design estimated construction limits, plus 40 feet, in accordance with NCDOT procedures for functional level designs. It is expected that the stream and wetland impact estimates likely will decrease as the level of design detail increases, since smaller buffers are used in estimating impacts from preliminary design (construction limits plus 25 feet) and from final design (construction limits plus 5-10 feet).
- Protected species information is presented in Section 6.5 of the Draft EIS, and summarized in Section 1.3.4.5 of the Final EIS. Following the publication of the Draft EIS, the *Biological Assessment for the Monroe Connector-Bypass Project (R-3329/R-2559)* (The Catena Group, May 2010) was prepared to evaluate protected species that may be impacted by the Preferred Alternative. A summary of the Biological Assessment is presented in Section 2.5.4.5 of the Final EIS. Since the Final EIS, additional coordination has occurred with the USFWS (**Section 5** and **Appendix C-2**), and additional surveys and analysis have been conducted. Additional surveys were conducted for protected plant species in September 2012 and additional freshwater mussel surveys were performed in October 2012. The surveys did not identify any protected species in the project area. NCDOT requested re-initiation of Section 7 informal consultation with USFWS on October 23, 2013 and submitted a new Biological Assessment (The Catena Group, October 2013) along with the *Draft Technical Report on Direct, Indirect and Cumulative Impacts to Federally Listed Species* (Michael Baker Engineering, Inc., October 2013) (**Appendix C-2**). This additional information is summarized in **Section 4.4.5**. The biological conclusions for federally protected species have not changed since the Final EIS and are listed below:
    - Michaux's sumac – No Effect
    - Smooth coneflower – No Effect
    - Schweinitz's sunflower – May Affect/Not Likely to Adversely Affect
    - Carolina heelsplitter – May Affect/Not Likely to Adversely Affect
    - Carolina heelsplitter Designated Critical Habitat – May Affect/Not Likely to Adversely Affect

    NCDOT and FHWA are currently working with USFWS to reach concurrence on the biological conclusions presented in the new Biological Assessment. Consultation with USFWS will be complete prior to issuance of the Final Supplemental Final EIS/ROD.

LAND USE AND TRANSPORTATION PLANNING

- The project is consistent with local land use plans and the MUMPO 2035 Long Range Transportation Plan (LRTP).

INDIRECT AND CUMULATIVE EFFECTS

Potential indirect and cumulative effects of the project are documented in *Indirect and Cumulative Effects Assessment* (HNTB, January 2009), *Monroe Connector/Bypass (R-3329/R-2559 Indirect and Cumulative Effects Quantitative Analysis* (Michael Baker Engineering, Inc., April 2010), and *Monroe Connector/Bypass (R-3329/R-2559) Indirect and Cumulative Effects Water Quality Analysis* (PBS&J, April 2010).

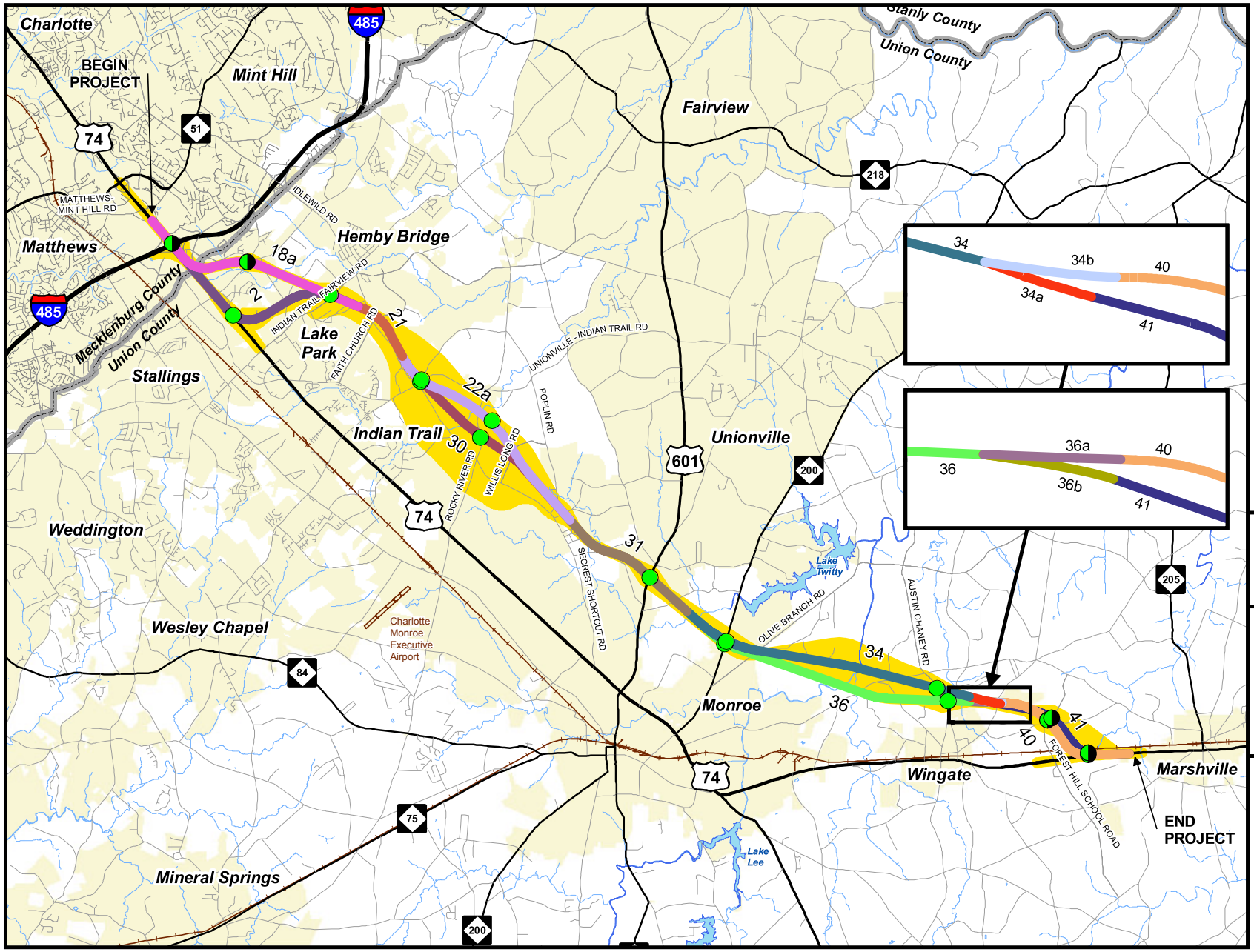
Since the Final EIS was published, an updated quantitative analysis of indirect and cumulative effects was prepared for the project. The *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013) addresses questions raised about the assumptions used in the previous quantitative ICE and incorporates new information gathered since the previous report. Conclusions from the updated quantitative analysis are summarized as follows:

- The prior use of the Metrolina Regional Model (MRM) socioeconomic forecasts as a No-Build control total was a reasonable assumption. The high level of growth forecasted in the No-Build Scenario is reasonable given past trends and current conditions.
- Overall, the land use results are similar to the results of the previous quantitative ICE analysis. The overall results for the study area are generally one to two percent greater in the updated analysis. Impervious surface impacts are generally similar to previous results, with shifts of less than two percent in five watersheds only.
- All changes in land use within the entire study area from the Baseline to the 2030 Preferred Alternative are within approximately two percent (i.e., between negative one percent and one percent) of the change that is predicted for the 2030 No-Build Scenario.
- The indirect land use effects are modest, totaling about 2,300 acres of additional development, an increase of less than 2 percent over the No-Build Scenario and an increase in development of about 1 percent of the total land area within the study area.
- The incremental effect of the 2030 Preferred Alternative will be an approximately one percent increase in impervious surface throughout the study area as compared to the change predicted for the 2030 No-Build Scenario.
- With the 2030 Preferred Alternative, increases in percent impervious surface as compared to the change predicted for the 2030 No-Build are found in 7 of the 18 watersheds. These increases are between approximately one and three percent.
- No measurable differences in impervious surface were found between the 2030 No-Build and the 2030 Build Scenario within the Goose Creek or Sixmile Creek watersheds (habitat for the endangered Carolina heelsplitter). Therefore, no indirect effects are anticipated to the Carolina heelsplitter. As there are no indirect effects anticipated, the project does not contribute an incremental effect that would yield potential cumulative effects. Potential direct effects are not anticipated, and are addressed in the *Biological Assessment* (The Catena Group, October 2013) discussed in greater detail in **Section 4.4.5**.

As presented in Section 2.5.5.2 of the Final EIS, a water quality modeling analysis was conducted to determine if induced land use change resulting from the Preferred Alternative would affect water quality within the project study area. Specifically, the modeling effort attempted to quantify the differences between the stream flow and pollutant loadings (total sediment, nitrogen, and phosphorous) of the Build and No-Build future land use scenarios.

The results of the analysis generally suggest that the water quality effects of the project are relatively minor compared to those expected from growth under the No-Build Scenario. Based upon the findings of the updated ICE analysis summarized above, which were very similar to the results of the original quantitative ICE, NCDOT and FHWA determined that additional water quality modeling is not necessary as the differences are not large enough to see substantial differences compared to the prior water quality analysis. Therefore, the conclusions of the water quality modeling analysis presented in the Final EIS are still valid.

Additional information on indirect and cumulative effects is presented in **Section 4.5**.



Legend

- Potential Interchange
- Potential Partial Interchange
- Interstate Highway
- US Highway
- NC State Highway
- State Road
- Railroad
- Parcels
- Corridor Study Area
- River / Stream
- Lake
- County Boundary

Detailed Study Alternative

- Segment 18A
- Segment 2
- Segment 21
- Segment 22A
- Segment 30
- Segment 31
- Segment 34
- Segment 34A
- Segment 34B
- Segment 36
- Segment 36A
- Segment 36B
- Segment 40
- Segment 41

Mecklenburg and Union Counties
North Carolina Counties

Source: Mecklenburg County and Union County GIS.
Map Printed March 2009.

N

0 4,250 8,500
Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

DETAILED STUDY ALTERNATIVES

Figure 3-1a

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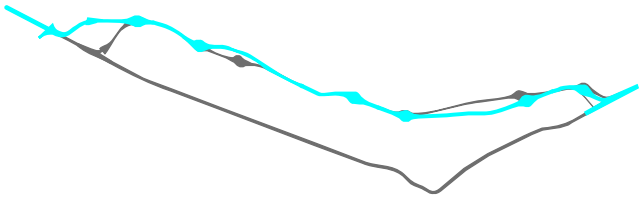
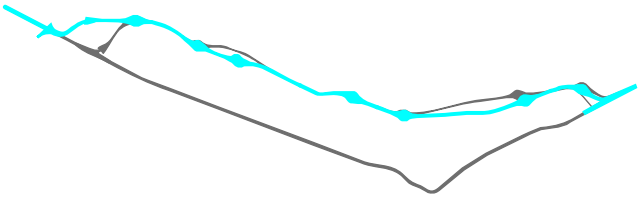
Alternative A

(Segments 18A, 21, 22A, 31, 36, 36A, and 40)



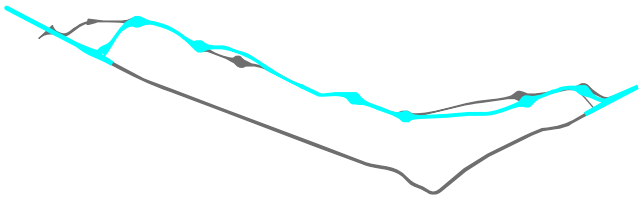
Alternative B

(Segments 18A, 21, 30, 31, 36, 36A, and 40)



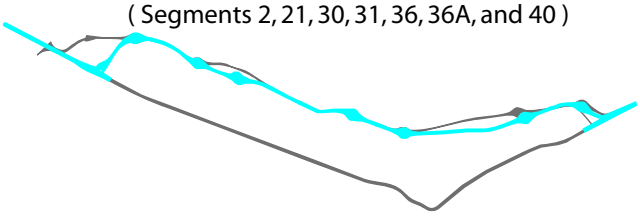
Alternative C

(Segments 2, 21, 22A, 31, 36, 36A, and 40)



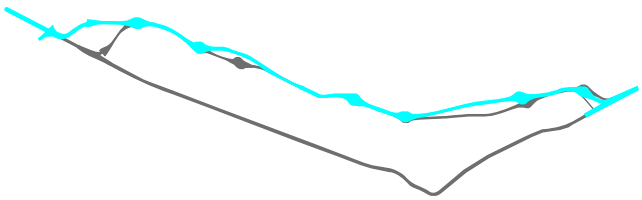
Alternative D

Recommended Alternative in Draft EIS
Preferred Alternative in Final EIS
(Segments 2, 21, 30, 31, 36, 36A, and 40)



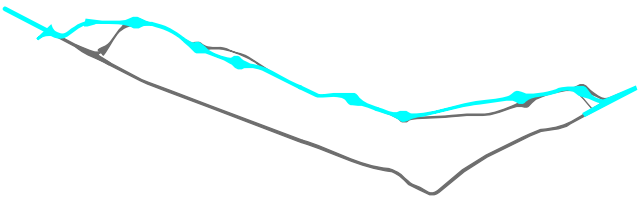
Alternative A1

(Segments 18A, 21, 22A, 31, 34, 34B, and 40)



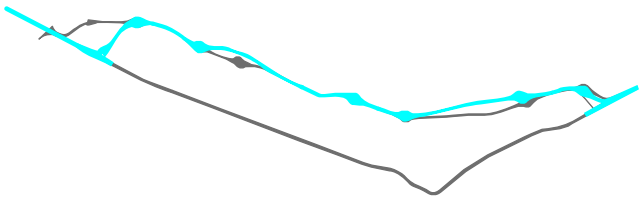
Alternative B1

(Segments 18A, 21, 30, 31, 34, 34B, and 40)



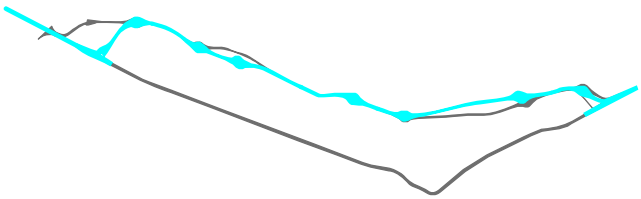
Alternative C1

(Segments 2, 21, 22A, 31, 34, 34B, and 40)



Alternative D1

(Segments 2, 21, 30, 31, 34, 34B, and 40)



NORTH CAROLINA Turnpike Authority

MONROE CONNECTOR / BYPASS

STIP PROJECT NO. R-3329 / R-2559
Mecklenburg County and Union County

DETAILED STUDY ALTERNATIVES

FIGURE 3-1b

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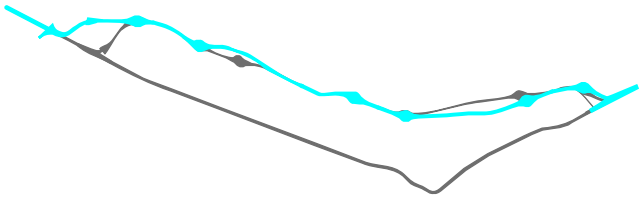
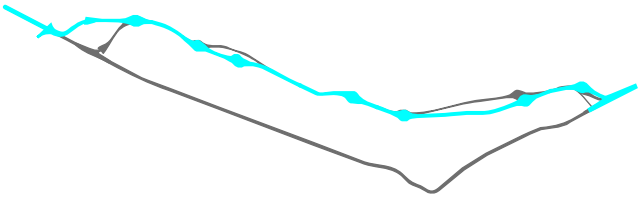
Alternative A2

(Segments 18A, 21, 22A, 31, 36, 36B and 41)



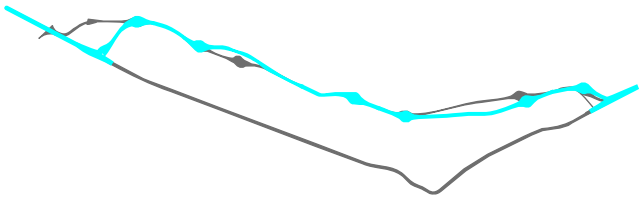
Alternative B2

(Segments 18A, 21, 30, 31, 36, 36B and 41)



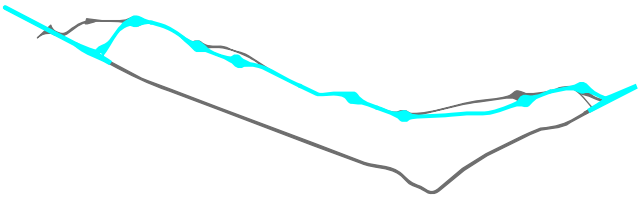
Alternative C2

(Segments 2, 21, 22A, 31, 36, 36B, and 41)



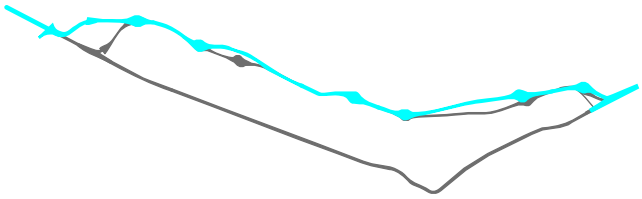
Alternative D2

(Segments 2, 21, 30, 31, 36, 36B, and 41)



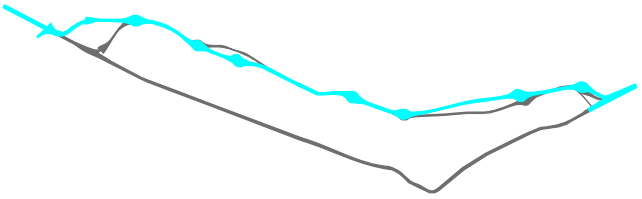
Alternative A3

(Segments 18A, 21, 22A, 31, 34, 34A, and 41)



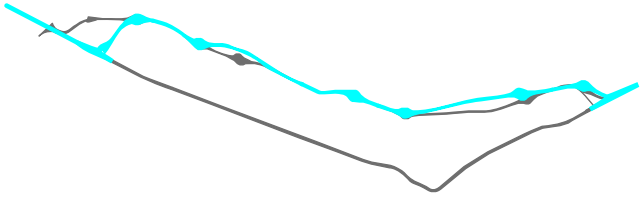
Alternative B3

(Segments 18A, 21, 30, 31, 34, 34A, and 41)



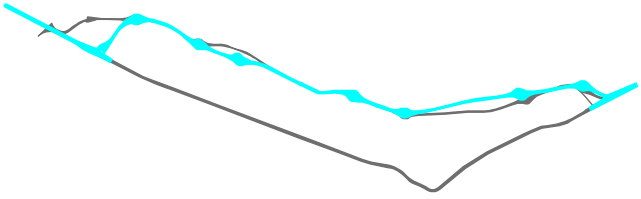
Alternative C3

(Segments 2, 21, 22A, 31, 34, 34A, and 41)



Alternative D3

(Segments 2, 21, 30, 31, 34, 34A, and 41)



NORTH CAROLINA Turnpike Authority

MONROE CONNECTOR / BYPASS

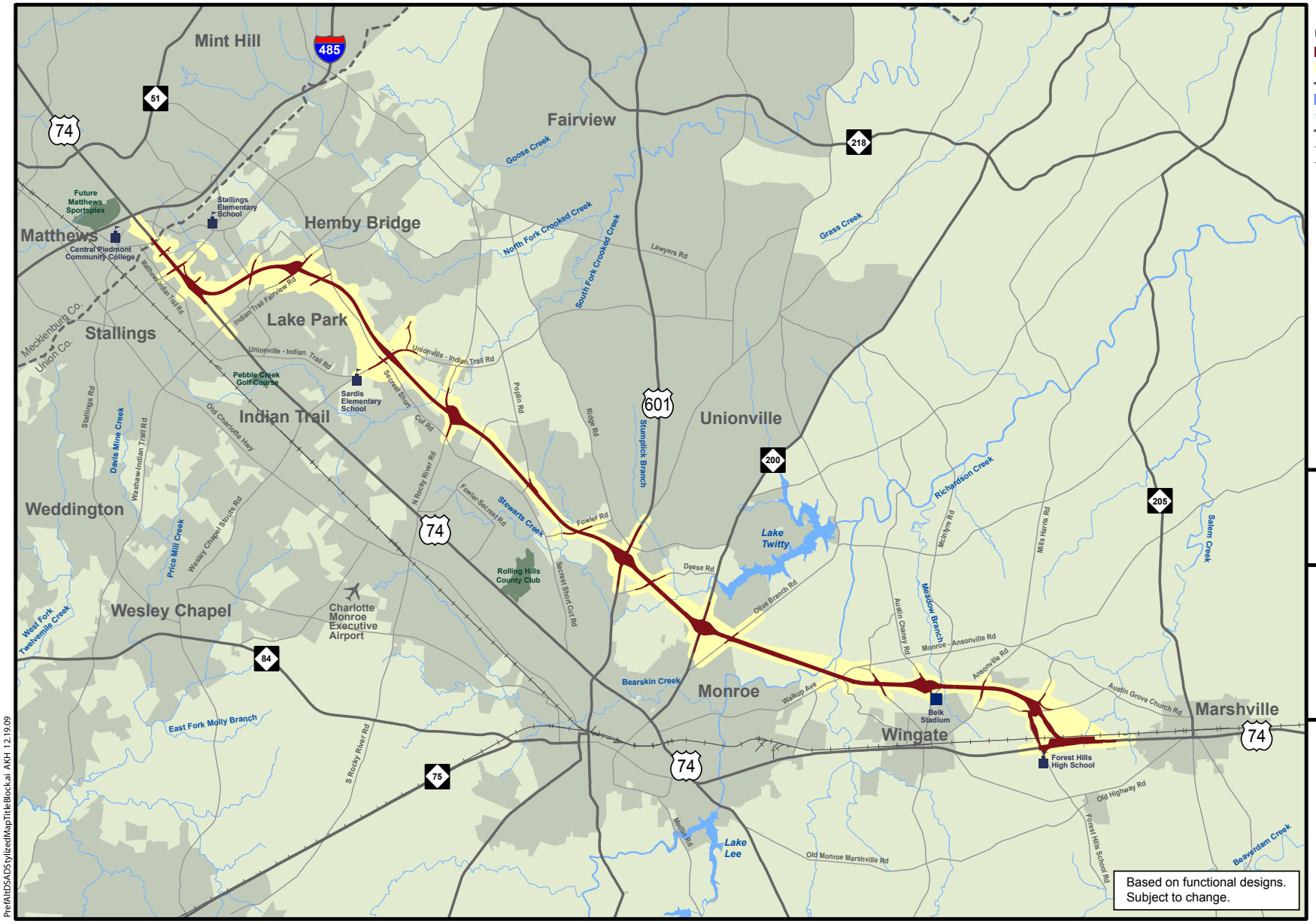
STIP PROJECT NO. R-3329 / R-2559

Mecklenburg County and Union County

DETAILED STUDY ALTERNATIVES

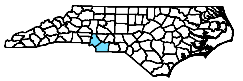
FIGURE 3-1c

FEIS_Prelim_Corr_SegREV.ai 02.24.09



Legend

- Preferred Alternative Right of Way
- Preferred Alternative Study Corridor
- County Line
- Lakes
- Streams
- Interstates & Highways
- Local Roads
- Railroad



Mecklenburg and Union Counties
North Carolina Counties

Source: Mecklenburg County and Union County GIS
Map printed: February 2010

N

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Miles

NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. R-3329/R-2559

Mecklenburg County and Union County

MONROE CONNECTOR / BYPASS

PREFERRED ALTERNATIVE DSA D

Figure 3-2

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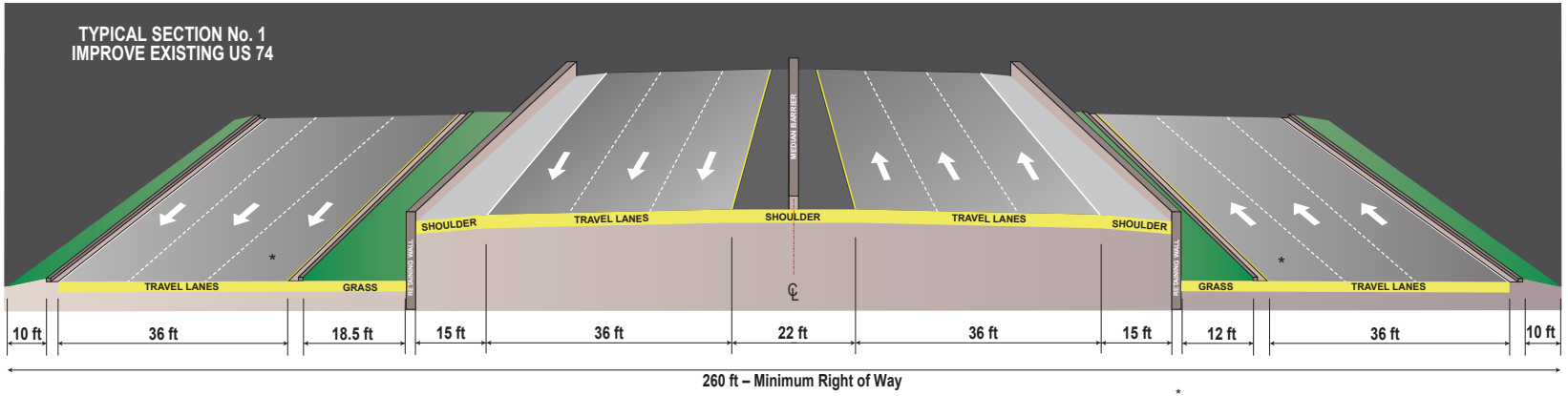
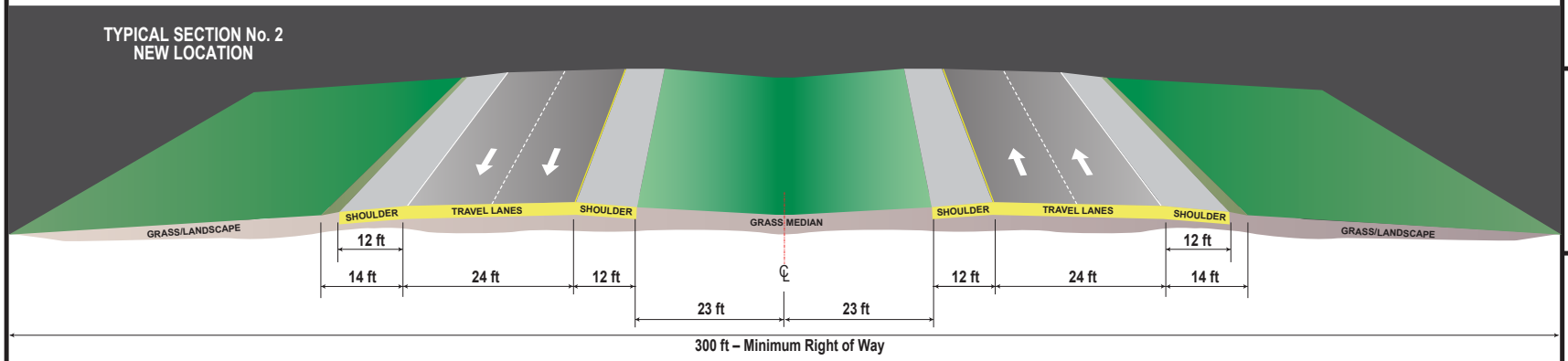


*
Areas with turn lanes or near access points will require three lanes on the service roads. Other areas will only have two lanes.



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NORTH CAROLINA Turnpike Authority

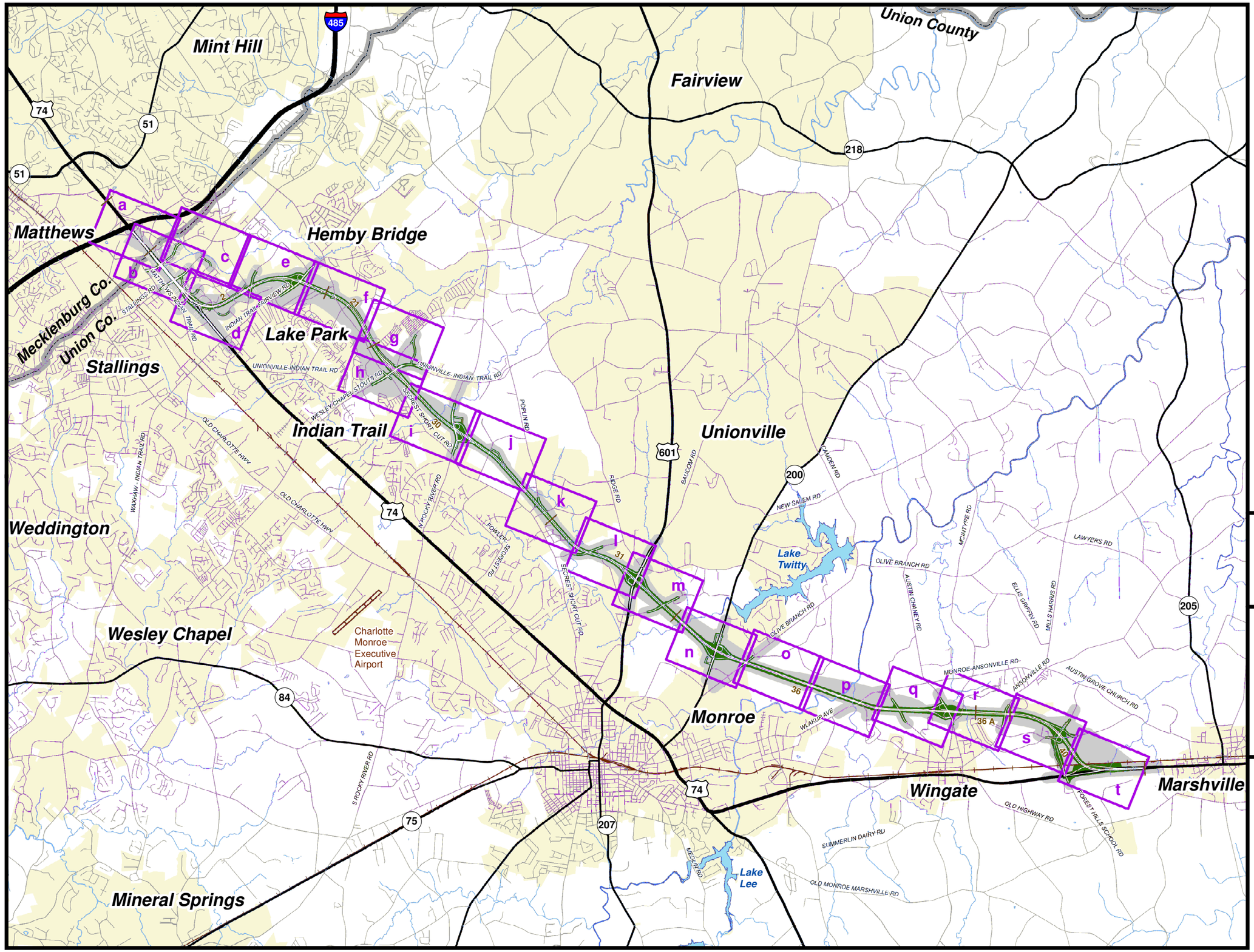
STIP PROJECT
NO. R-3329/R-2559

Union County and
Mecklenburg County

MONROE CONNECTOR / BYPASS

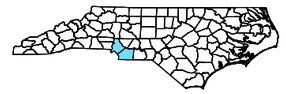
TYPICAL SECTION

Figure 3-3



Legend

- Functional Design
- Right of Way
- Segment Breakline
- 41 Segment Name
- Map Grid
- City Limits
- Corridor Study Area
- Interstate Highway
- US Highway
- NC State Highway
- Major Road
- Railroad
- River / Stream
- Lake
- County Boundary



Mecklenburg and Union Counties
North Carolina Counties

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4 INDEX

EAUpdate_FEIS_AltD_Designs.mxd JNL 04.25.13

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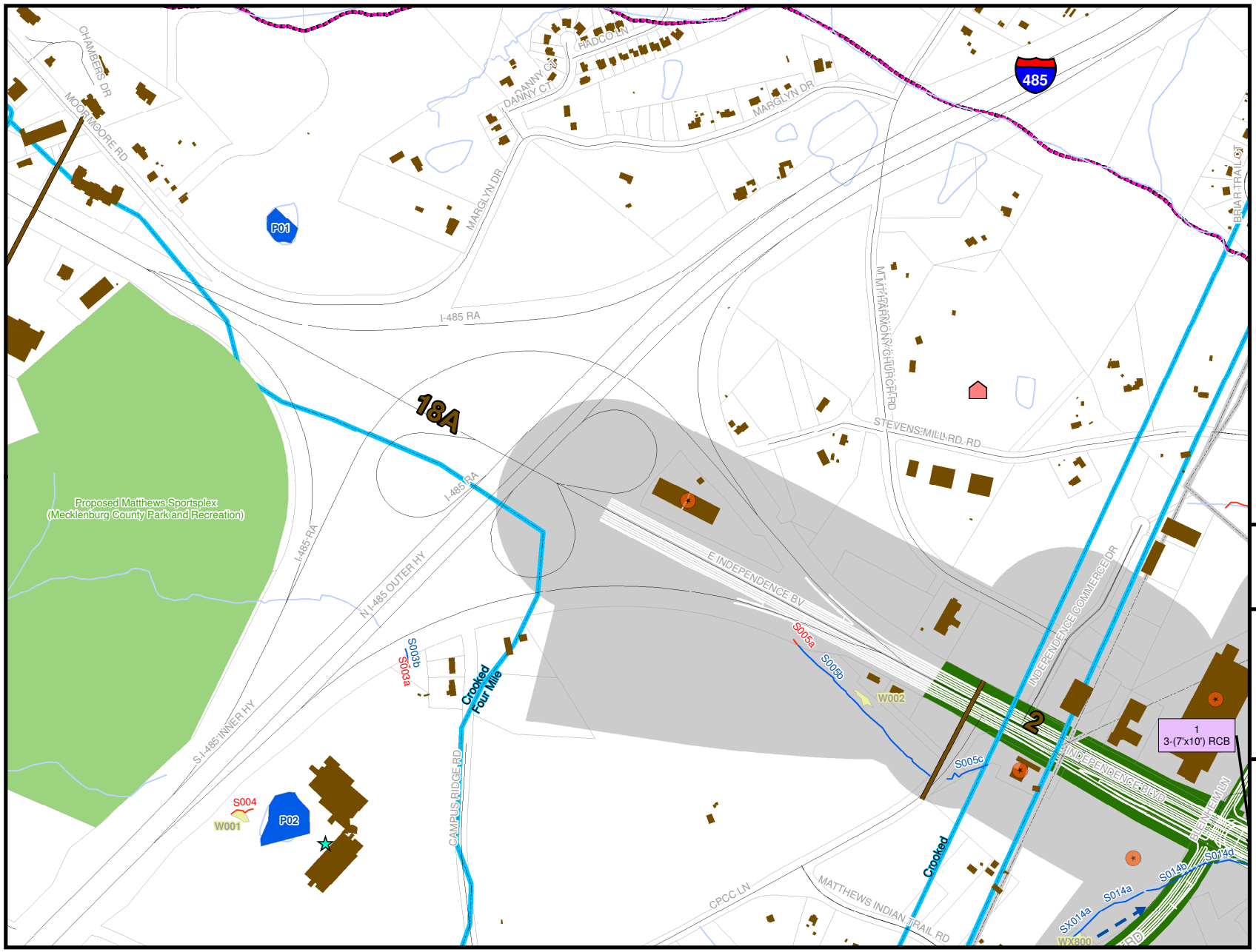
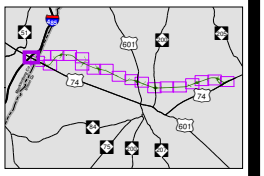


Legend

- Functional Design
- Right of Way
- Segment Breakline
- 21 Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
- Significant Natural Heritage Area
- 303(d) Streams
- Surveyed Intermittent Stream (S000)
- Surveyed Perennial Stream (S000)
- Other Hydrology
- Surveyed Wetlands (W000)
- Surveyed Ponds (P00)
- Floodway
- 100 Year Floodplain
- 500 Year Floodplain
- Basins
- Protected Watershed
- Critical Watershed
- Cemetery
- Church
- College
- Fire Department
- Library
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

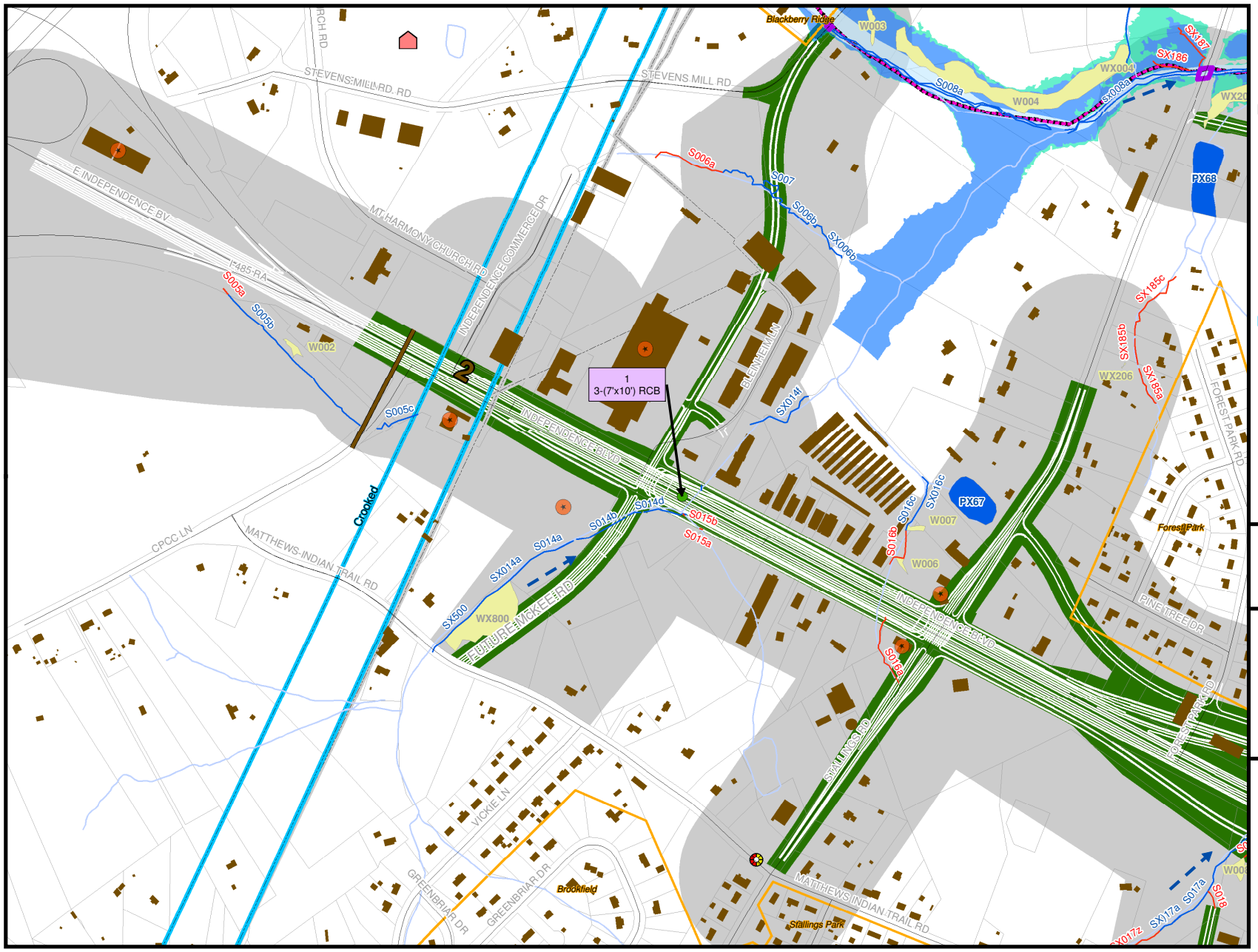
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4a

EAUpdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
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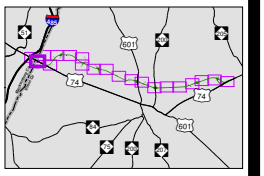
- Fire Department
- Library
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

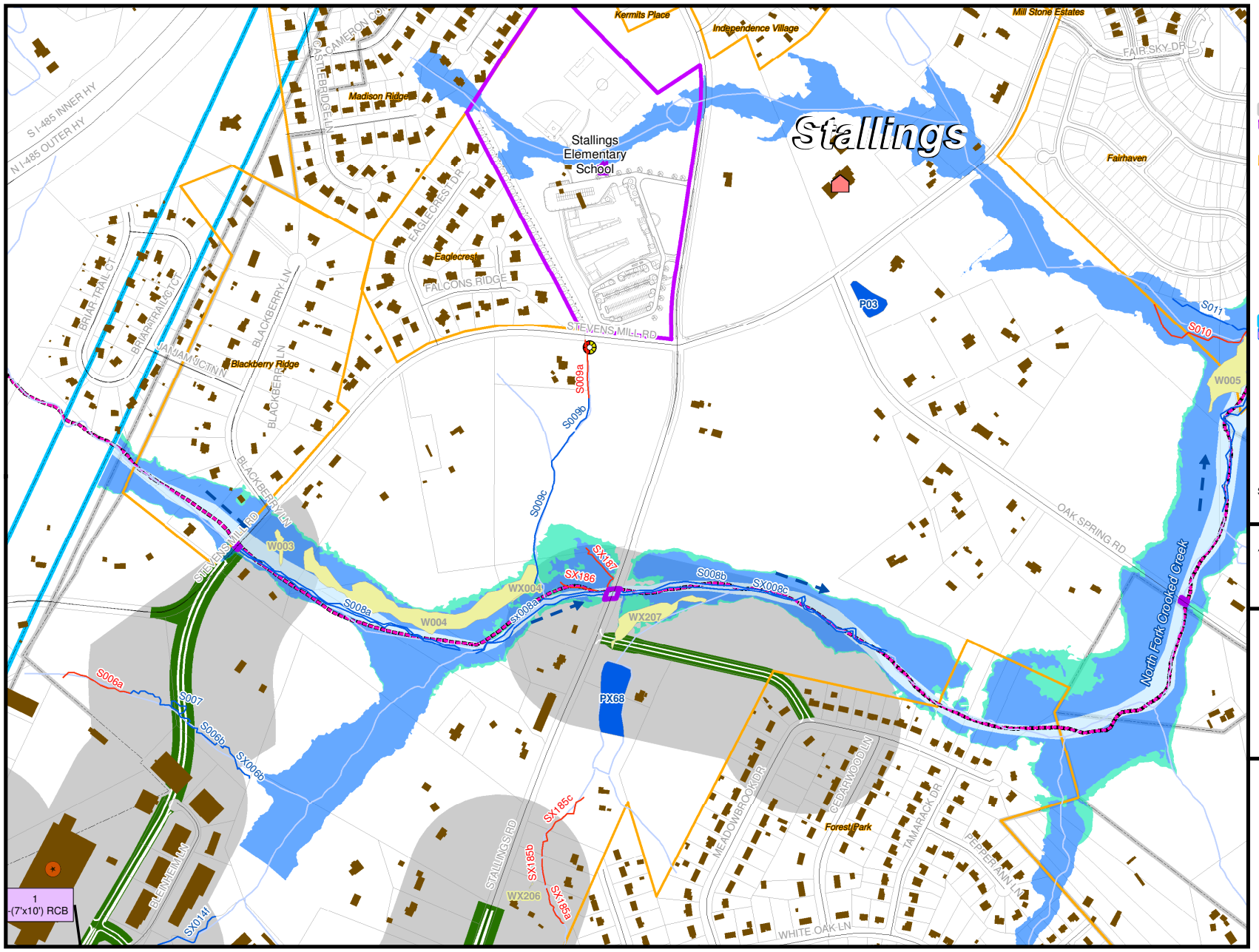
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4b

EAUpdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
- Significant Natural Heritage Area
- 303(d) Streams
- Surveyed Intermittent Stream (S000)
- Surveyed Perennial Stream (S000)
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- Surveyed Ponds (P00)
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- 500 Year Floodplain
- Basins
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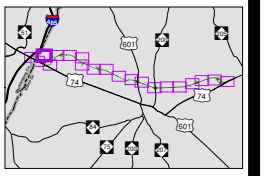
- Critical Watershed
- Cemetery
- Church
- College
- Fire Department
- Library
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

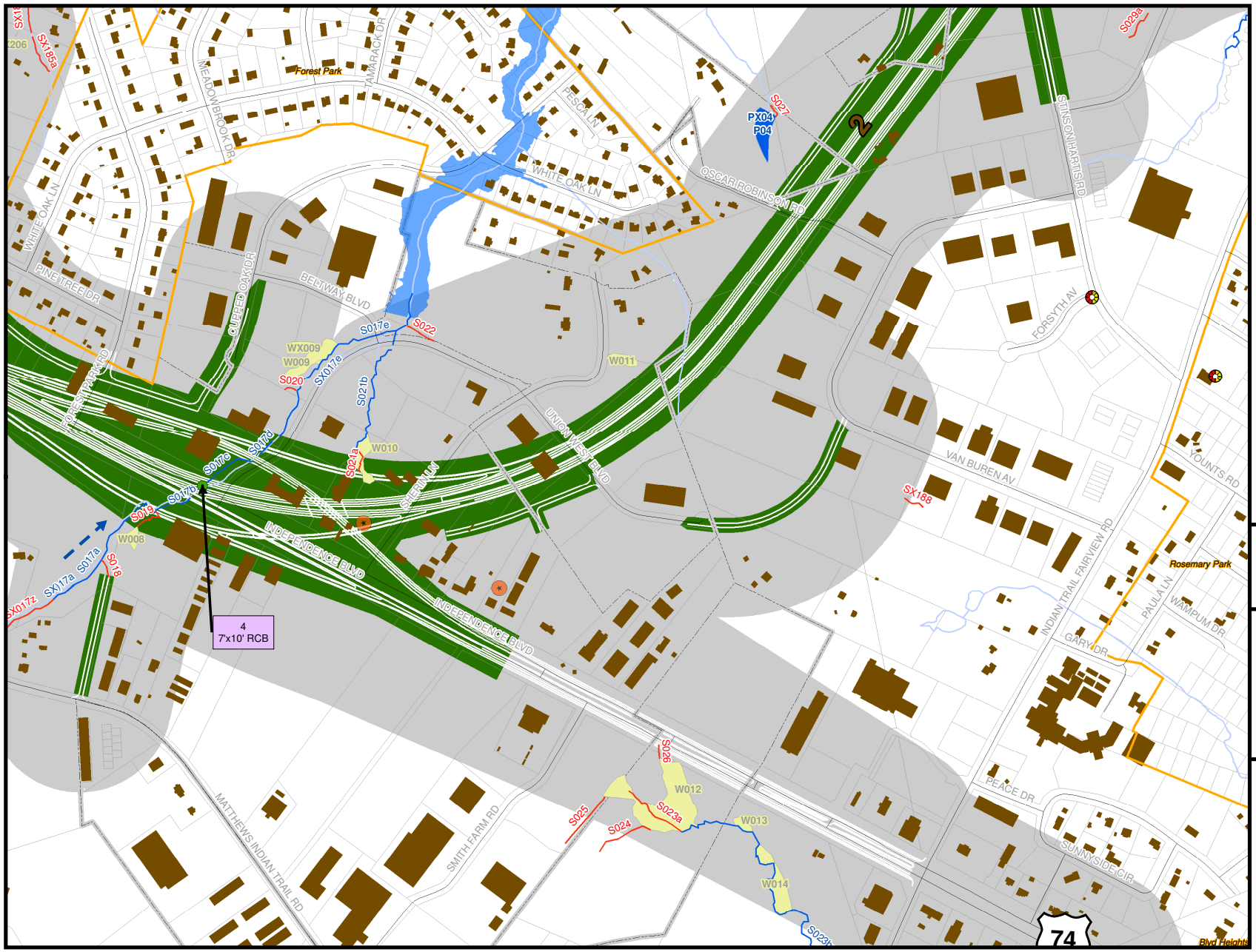
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4c

EA/Update_FEIS_Alt0_Designs.mxd 04.25.13 JNL



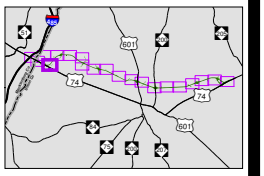
Legend

- Functional Design
- Right of Way
- Segment Breakline
- 21 Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
- Significant Natural Heritage Area
- 303(d) Streams
- Surveyed Intermittent Stream (S000)
- Surveyed Perennial Stream (S000)
- Other Hydrology
- Surveyed Wetlands (W000)
- Surveyed Ponds (P00)
- Floodway
- 100 Year Floodplain
- 500 Year Floodplain
- Basins
- Protected Watershed
- Critical Watershed

- Cemetery
- Church
- College
- Fire Department
- Library
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

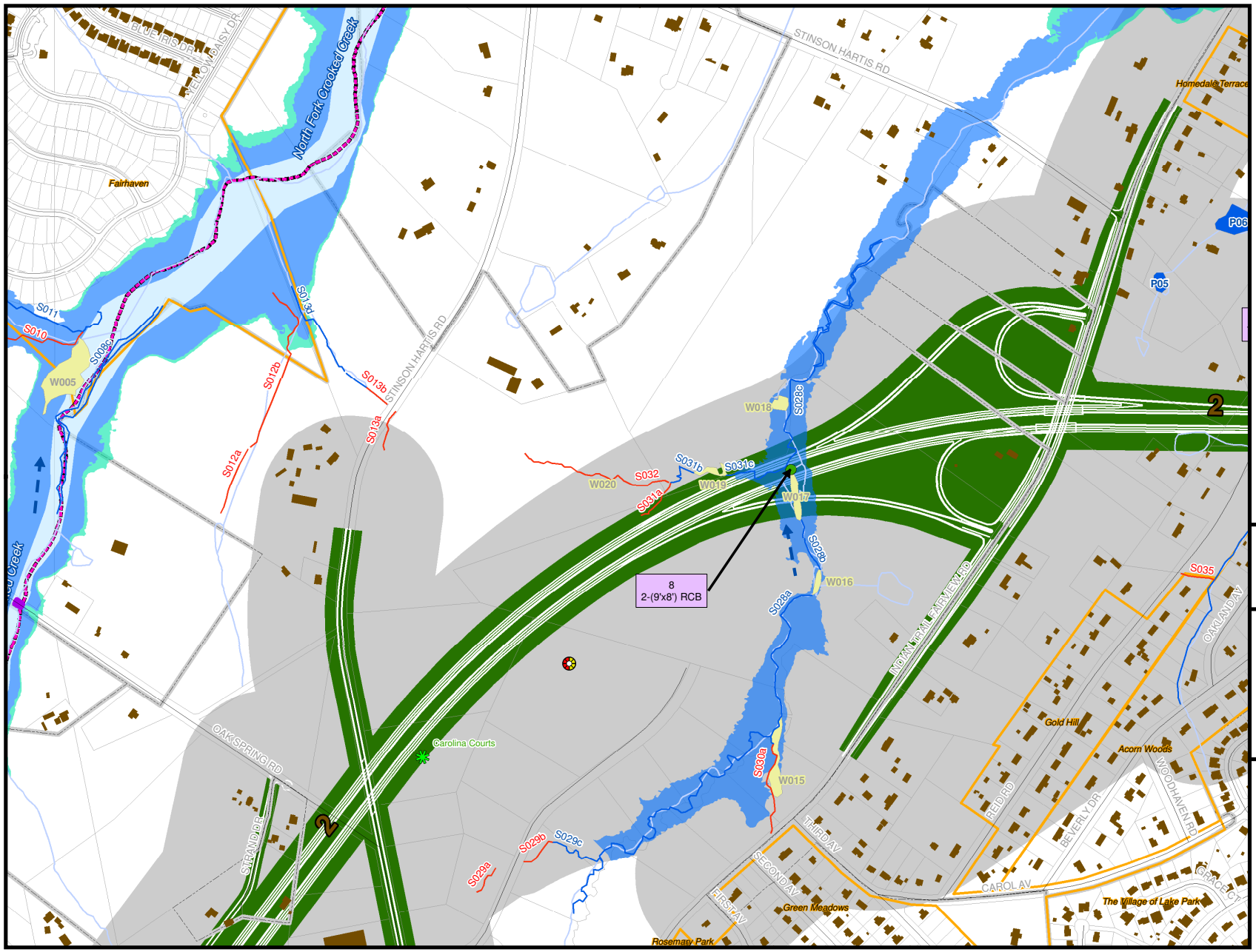
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4d

EA\Update_FEIS_Alt\D_Designs.mxd 04.25.13 JNL


North Fork Crooked Creek
Fairhaven
STINSON HARTIS RD
Homedale Terrace
BLUE IRIS DR
YELLOW DAISY DR
S011
S010
S009c
S012b
S012a
S013d
S013b
S013a
W005
W018
S028c
S031b
S031c
S032
W020
S031a
W019
W017
S028b
W016
S028a
8
2-(9'x8') RCB
P06
P05
2
NORTH PARK FARMS DR
S035
OAKLAND AV
Gold Hill
Acorn Woods
REID RD
BEVERLY DR
WOODHAVEN RD
CAROL AV
GROVE CT
The Village of Lake Park
Green Meadows
Rosemary Park
FIRST AV
SECOND AV
THIRD AV
S030a
W015
S029b
S029c
S029a
Carolina Courts
OAK SPRING RD
SIRAN DR
Legend
Functional Design
Right of Way
Segment Breakline
Segment Name
Corridor Study Area
Structures
Parcels
City Limits
Bridges
Existing Roads
Railroad
Subdivisions
Historic Sites
Parks
Significant Natural Heritage Area
303(d) Streams
Surveyed Intermittent Stream (S000)
Surveyed Perennial Stream (S000)
Other Hydrology
Surveyed Wetlands (W000)
Surveyed Ponds (P00)
Floodway
100 Year Floodplain
500 Year Floodplain
Basins
Protected Watershed
Critical Watershed
Cemetery
Church
College
Fire Department
Library
Police Station
Potential Hazmat
Gold Mines
Hospital
Schools
Notable Features
Stream Crossings
Culvert (72" dia. or larger)
Bridge
Flow Direction
Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.
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250
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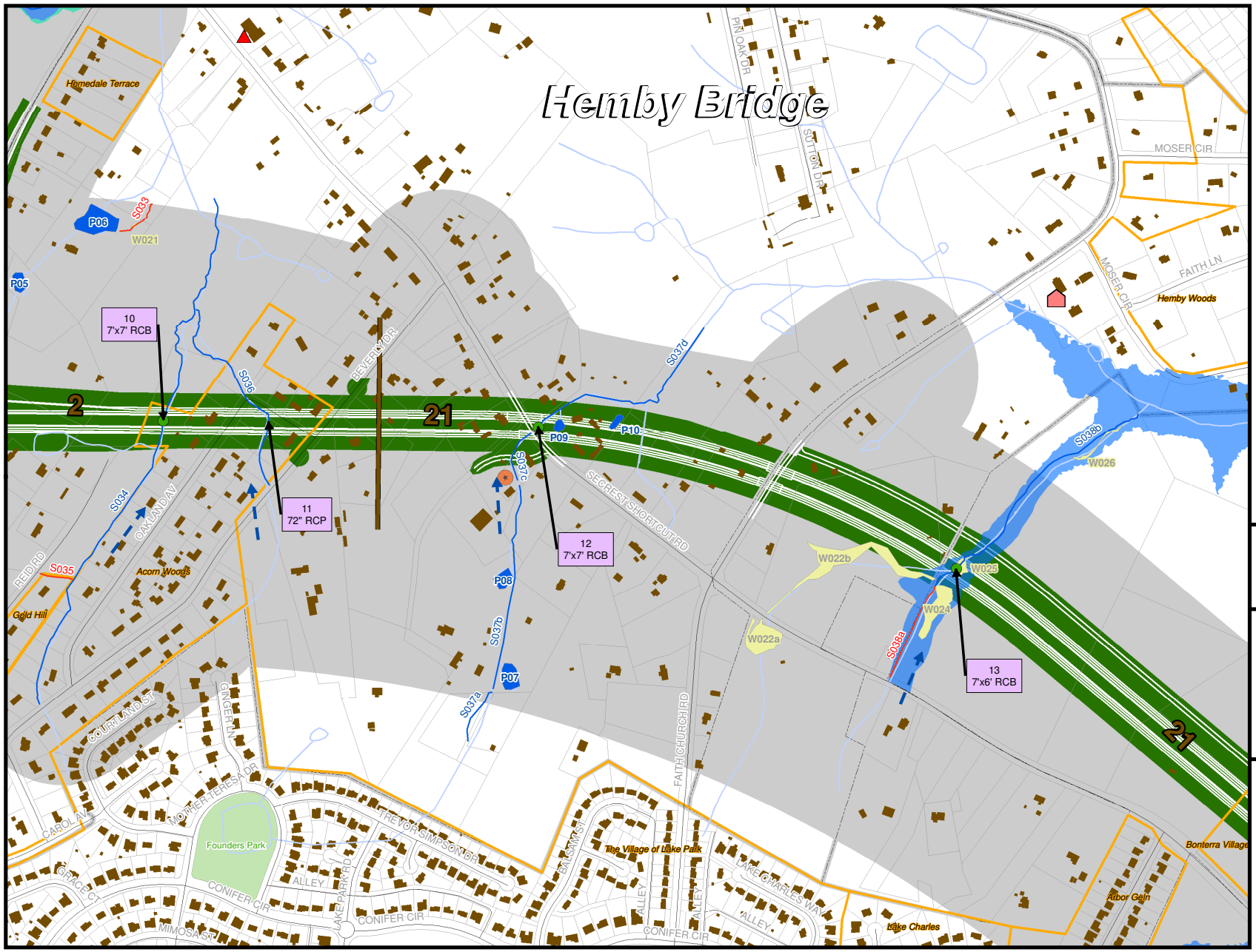
Feet
NORTH CAROLINA Turnpike Authority
STIP PROJECT NO. R-3329/R-2559
Mecklenburg County and Union County
MONROE CONNECTOR/ BYPASS
PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS
Figure 3-4e
EA/Update_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- 21 Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
- Significant Natural Heritage Area
- 303(d) Streams
- Surveyed Intermittent Stream (S000)
- Surveyed Perennial Stream (S000)
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- Surveyed Wetlands (W000)
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- 500 Year Floodplain
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- Critical Watershed
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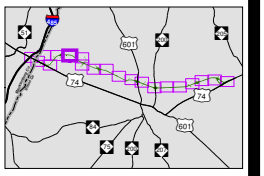
- Fire Department
- Library
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. R-3329/R-2559

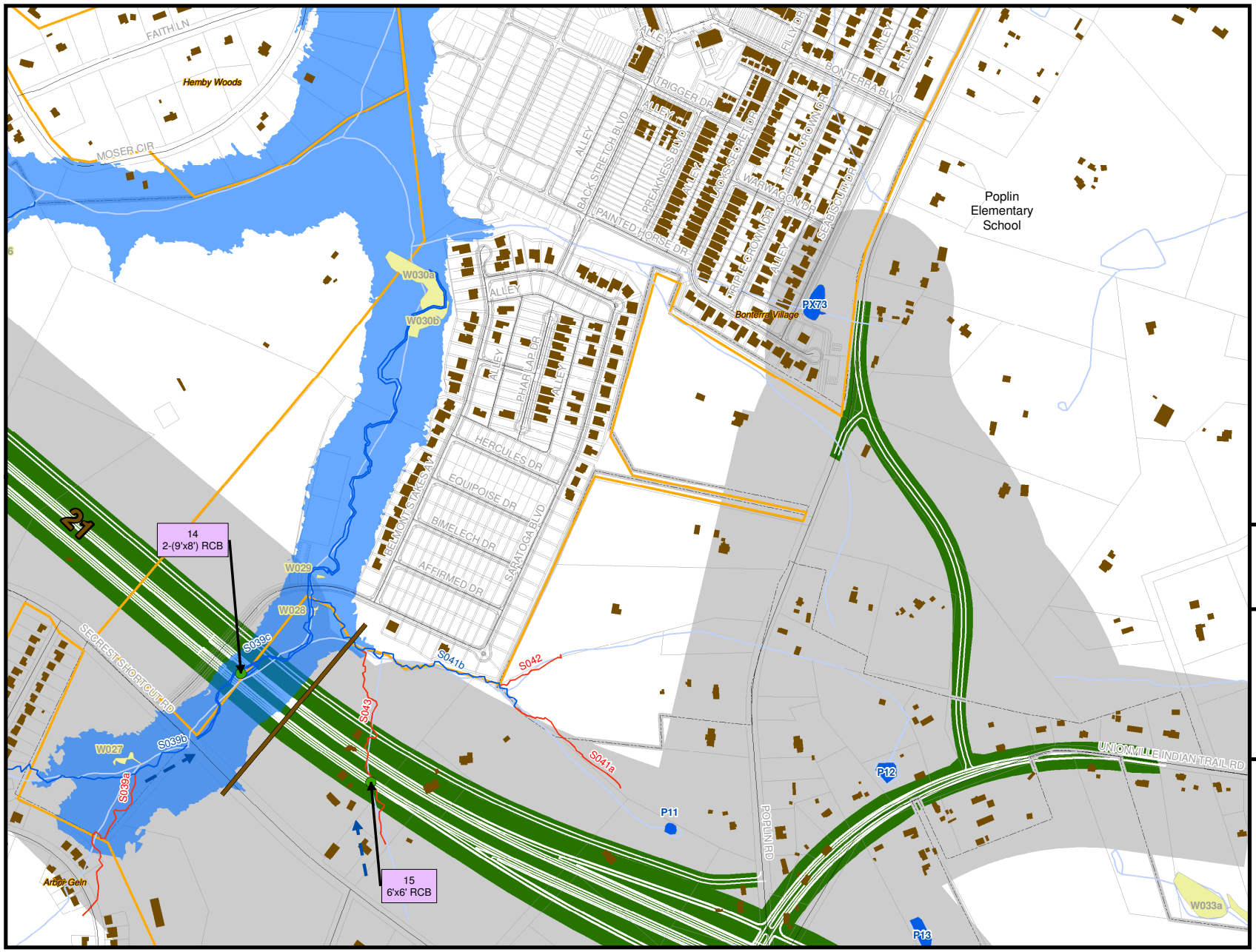
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4f

EAUpdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
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- Critical Watershed
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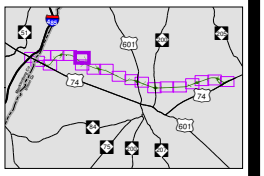
- College
- Fire Department
- Library
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

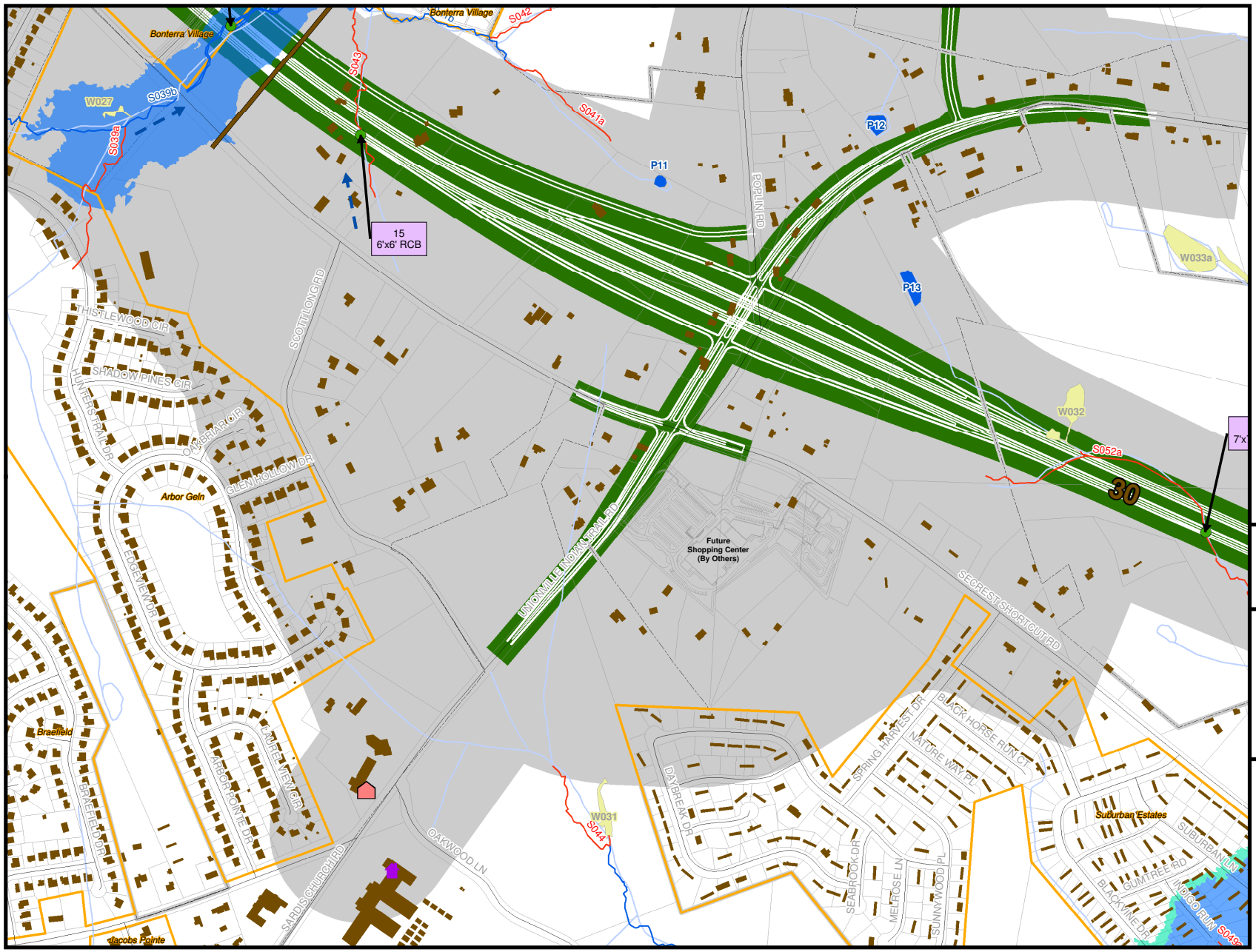
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4g

EA/pdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
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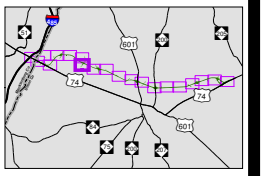
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

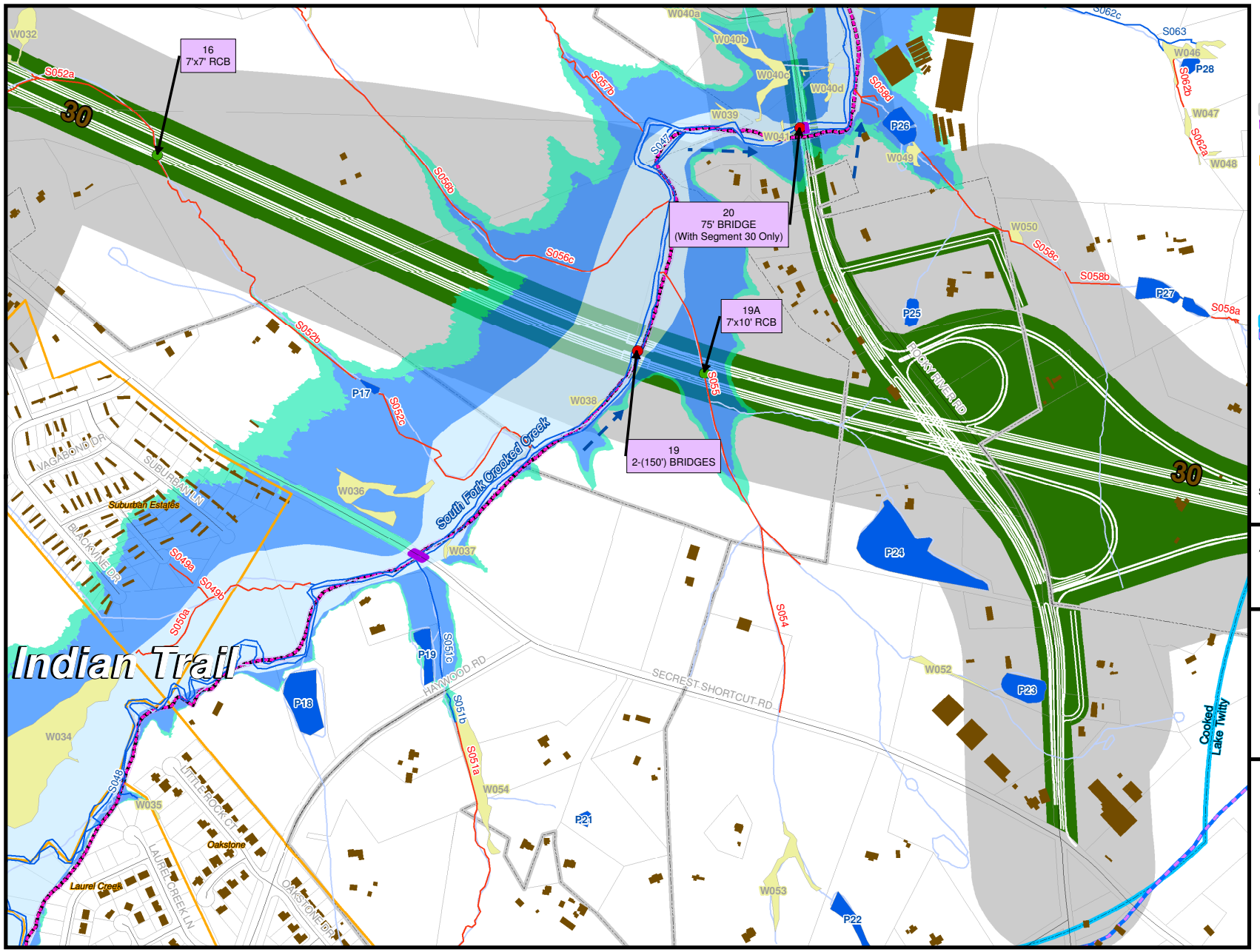
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4h

EA\Update_FEIS_Alt\D_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
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- 303(d) Streams
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- Surveyed Perennial Stream (S000)
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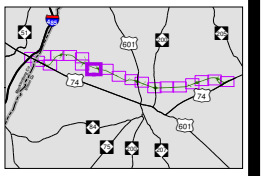
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

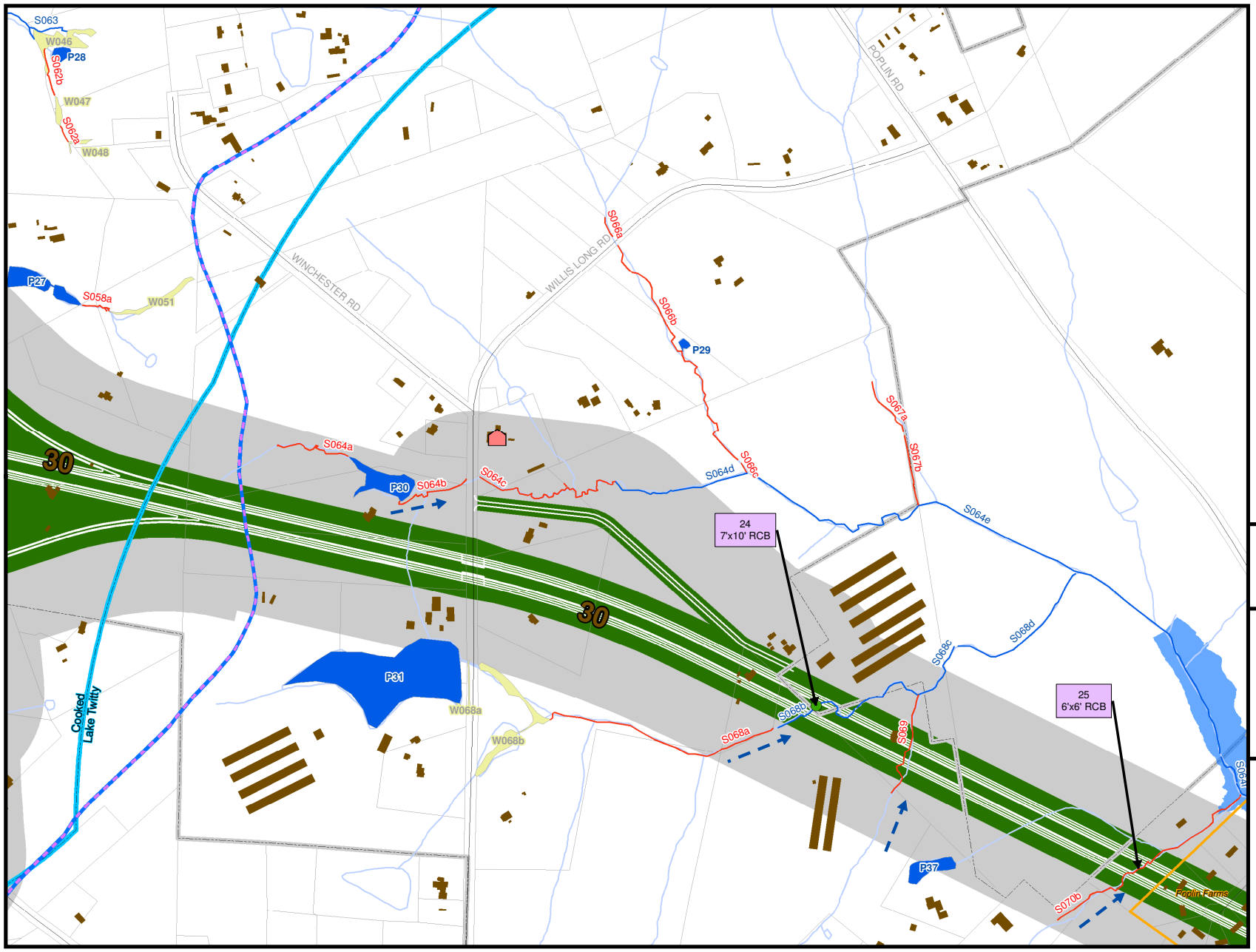
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4i

EA/Update_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
- Historic Sites
- Parks
- Significant Natural Heritage Area
- 303(d) Streams
- Surveyed Intermittent Stream (S000)
- Surveyed Perennial Stream (S000)
- Other Hydrology
- Surveyed Wetlands (W000)
- Surveyed Ponds (P00)
- Floodway
- 100 Year Floodplain
- 500 Year Floodplain
- Basins
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- Critical Watershed
- Cemetery
- Church
- College
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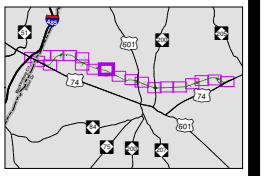
- Library
- Police Station
- Potential Hazmat
- Gold Mines
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

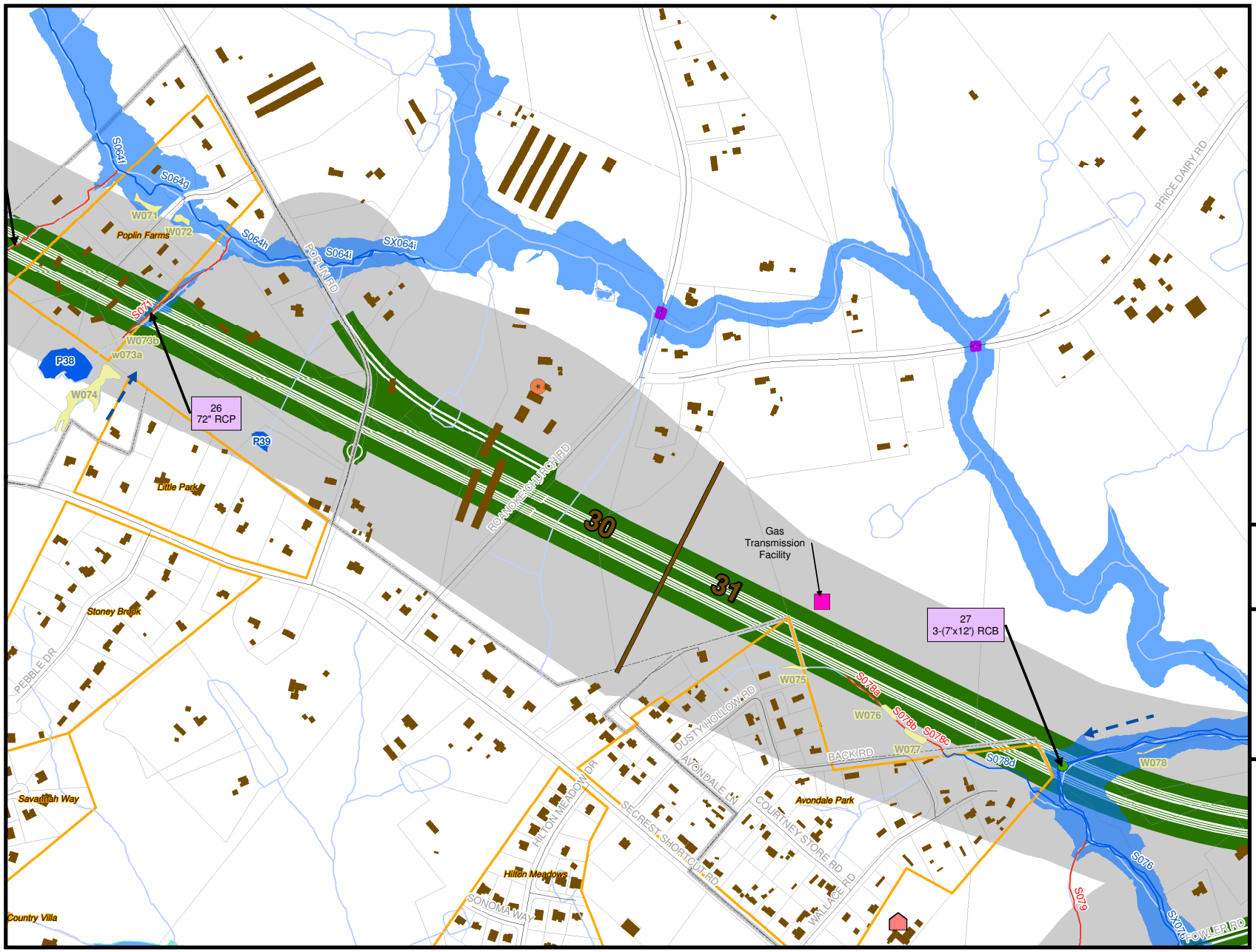
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4j

EAUpdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- 21 Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
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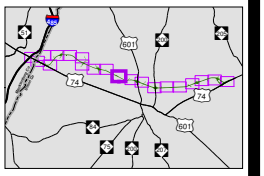
- Hospital
- Schools
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

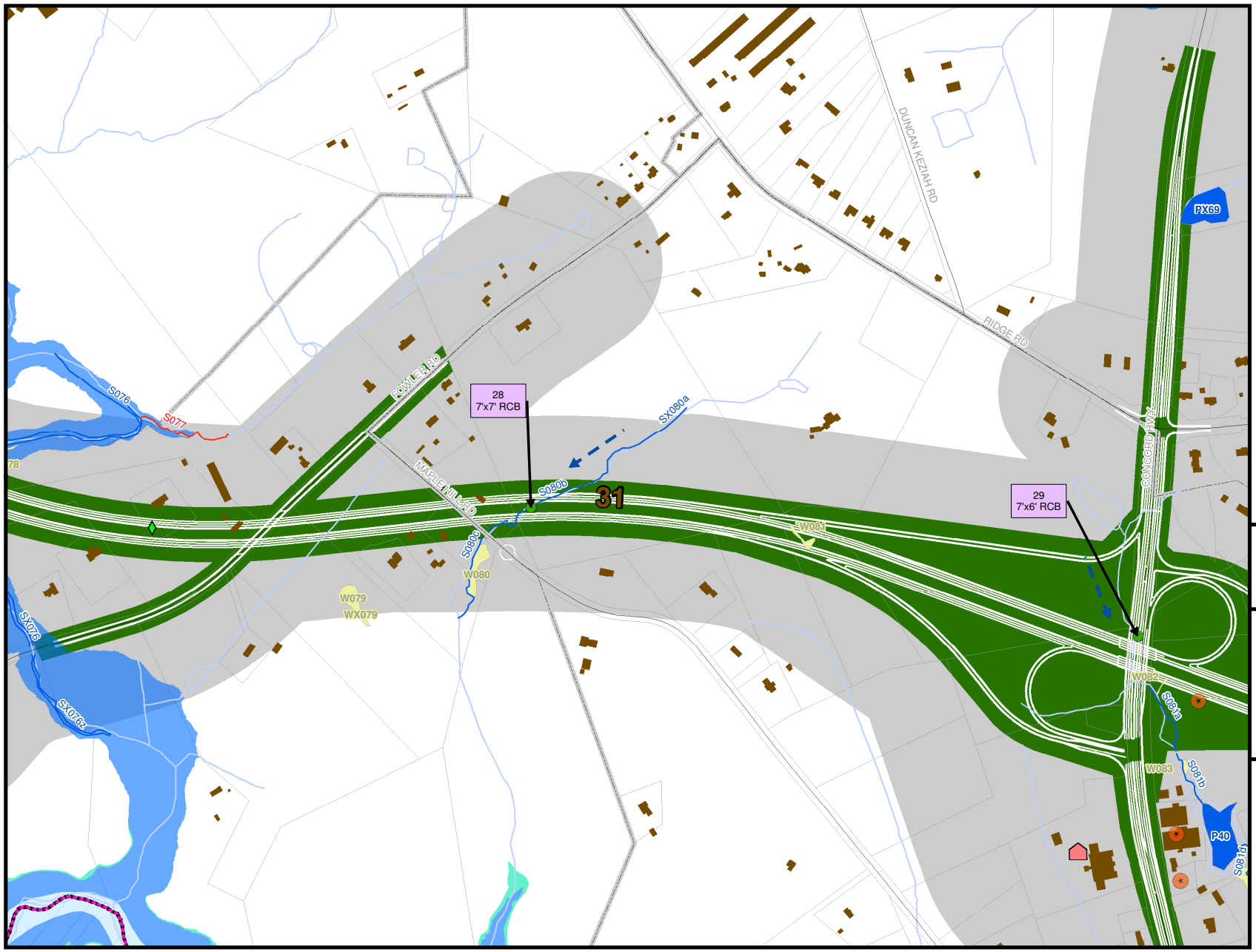
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4k

EA/pdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- 31 Segment Name
- Corridor Study Area
- Structures
- Parcels
- City Limits
- Bridges
- Existing Roads
- Railroad
- Subdivisions
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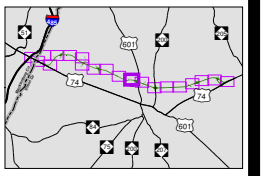

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

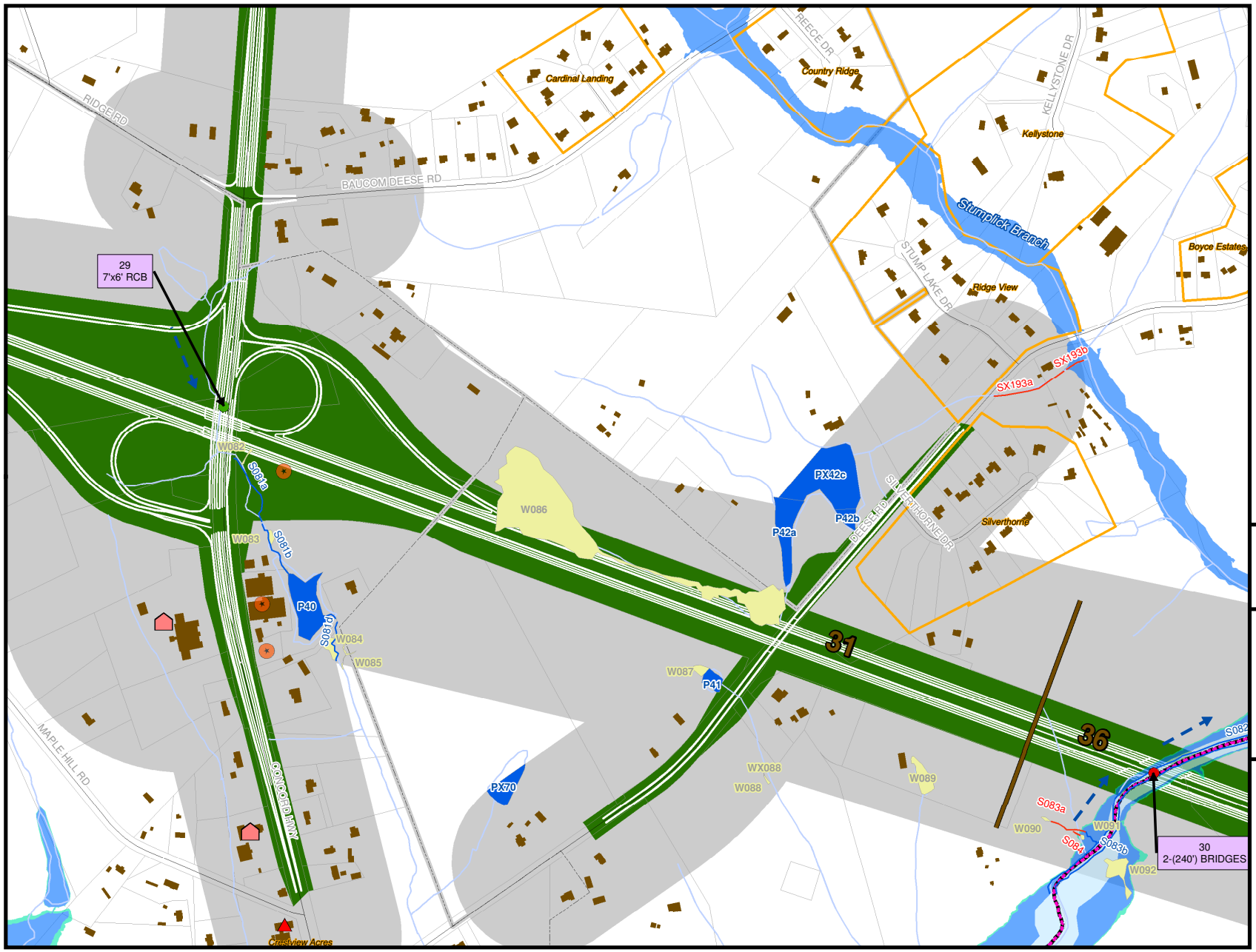
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4I

EA/Update_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
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- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4m

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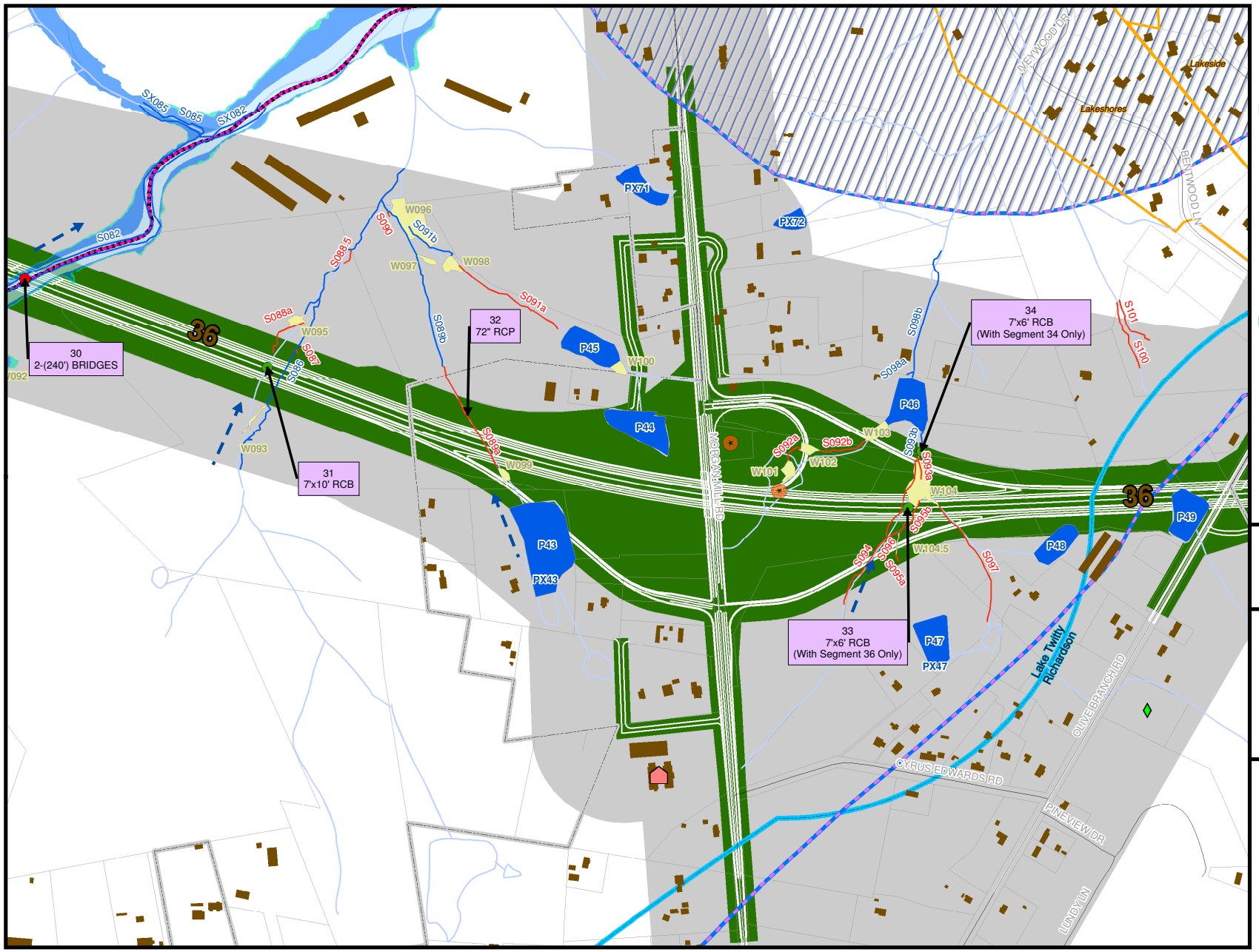


Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

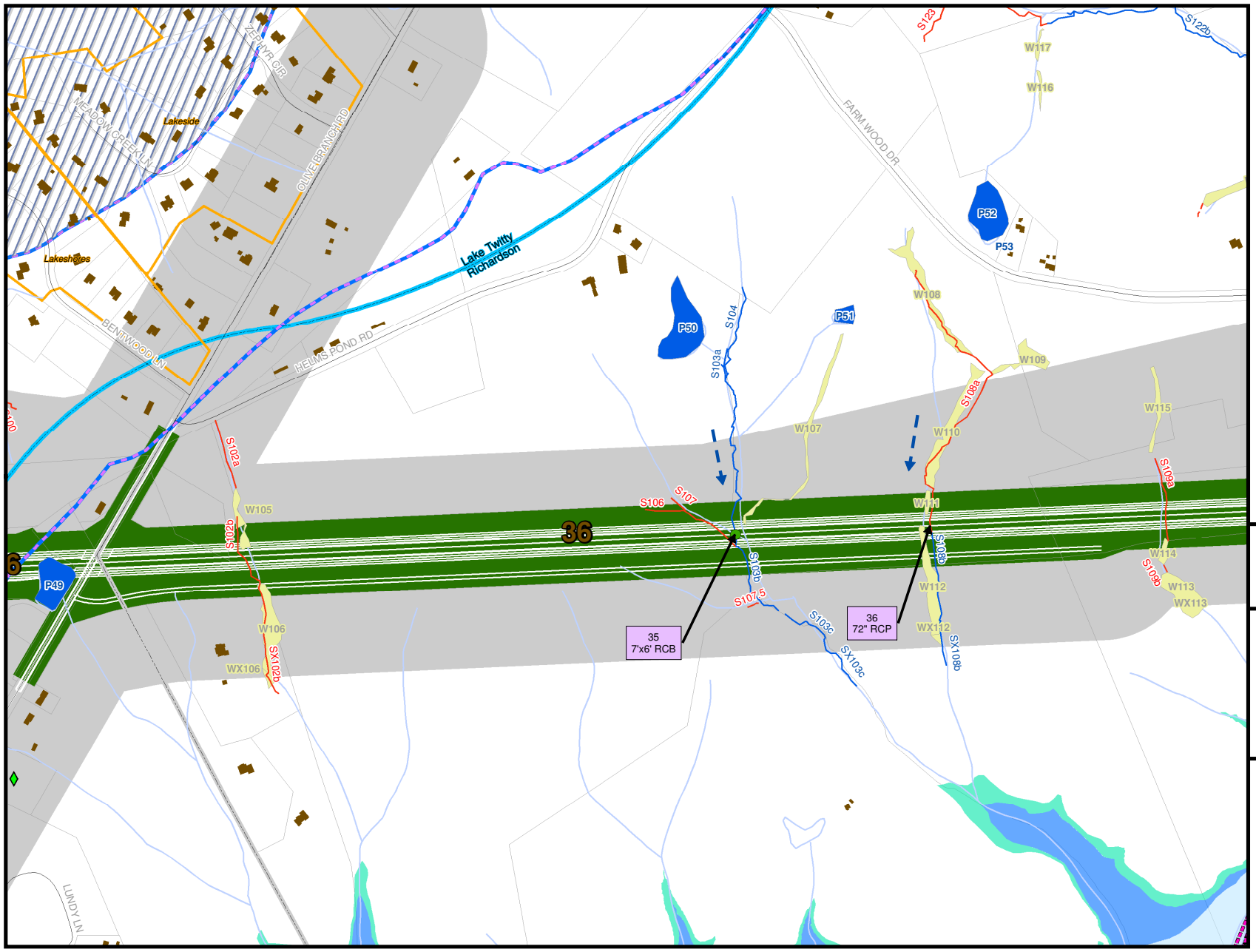
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4n

EA/pdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
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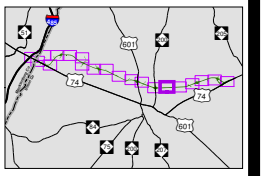

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

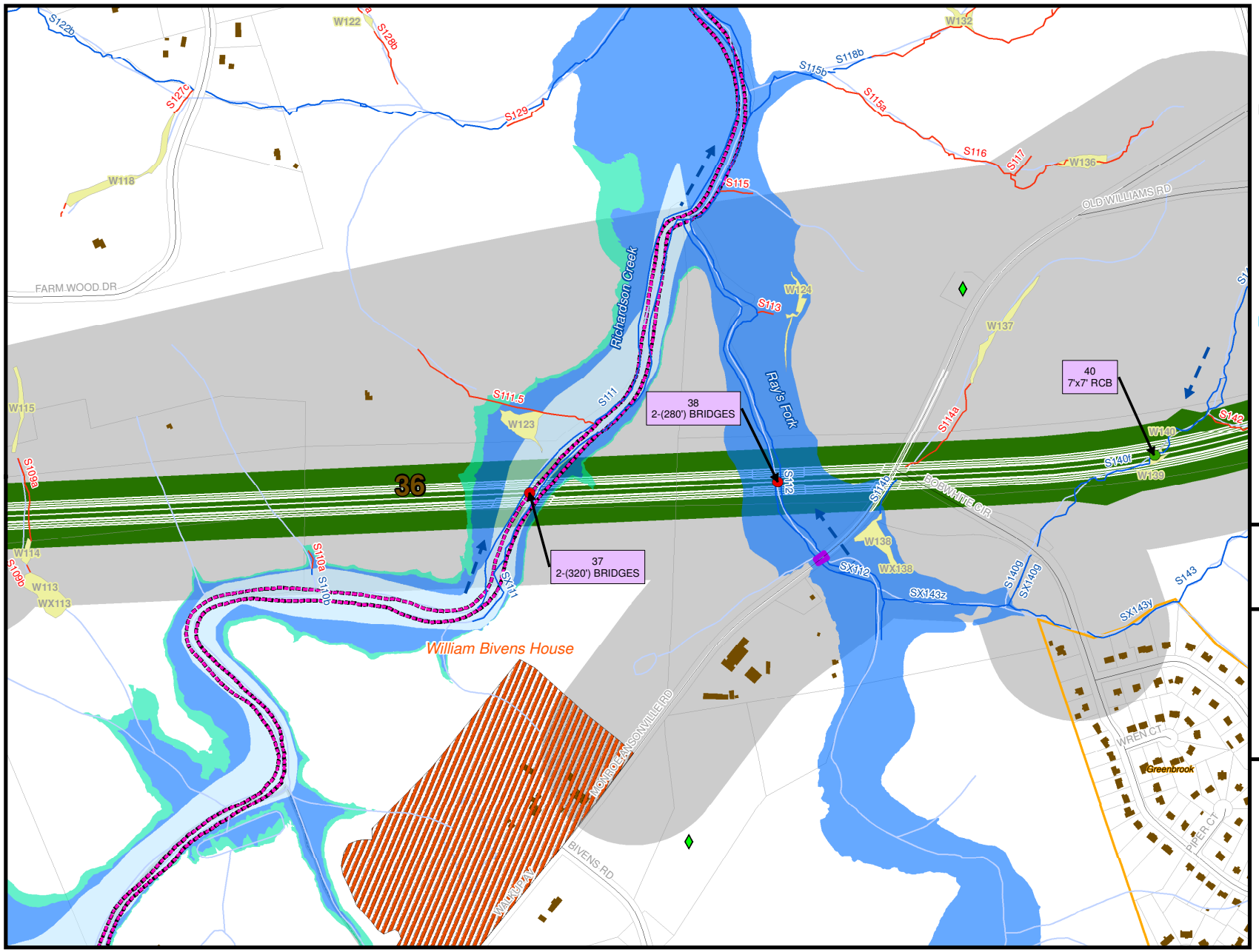
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4o

EA/pdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

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Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. R-3329/R-2559

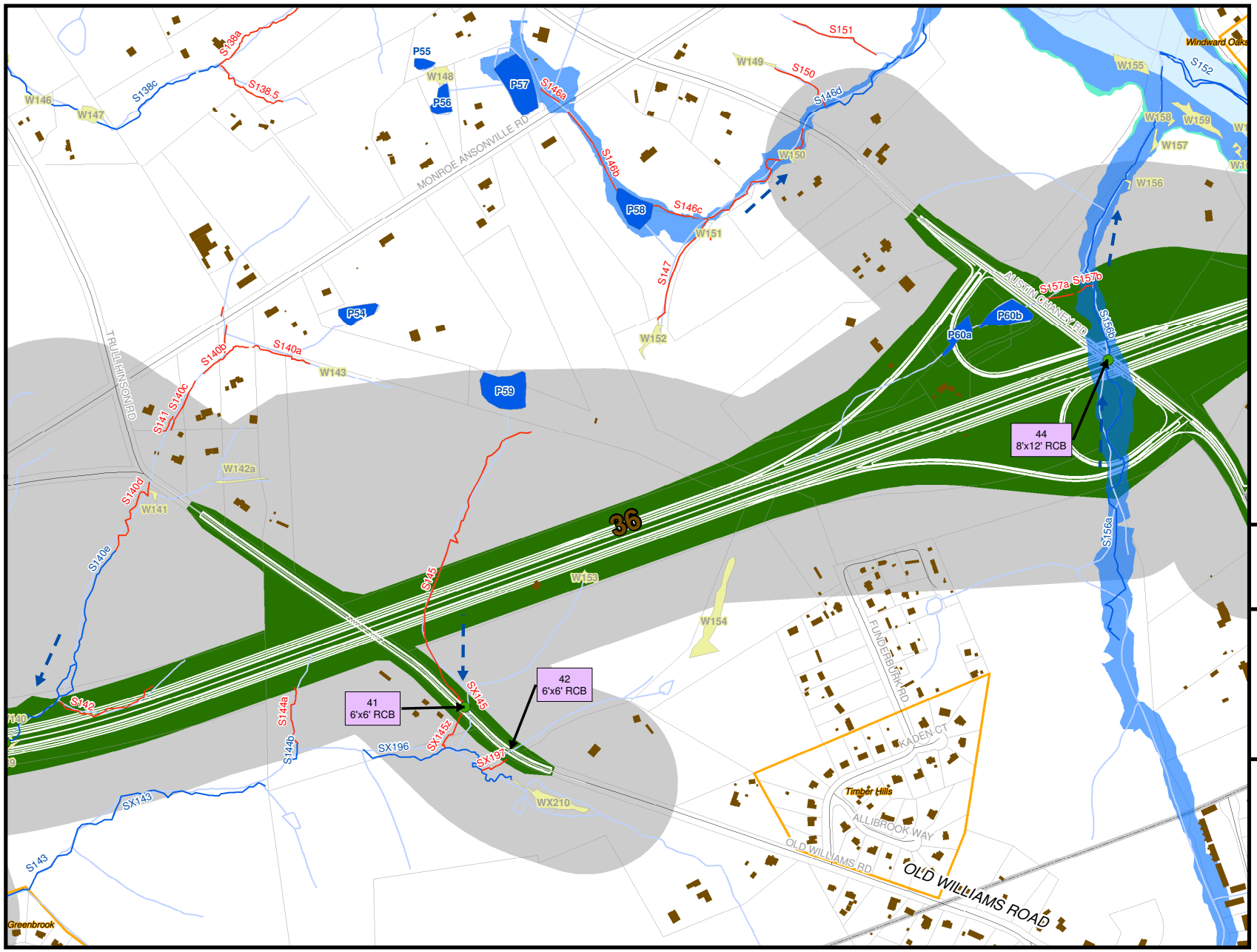
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4p

EA/Update_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
- Segment Name
- Corridor Study Area
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Stream Crossings

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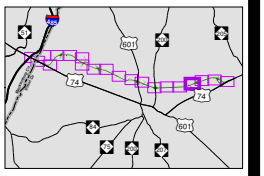

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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Feet

North Carolina Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

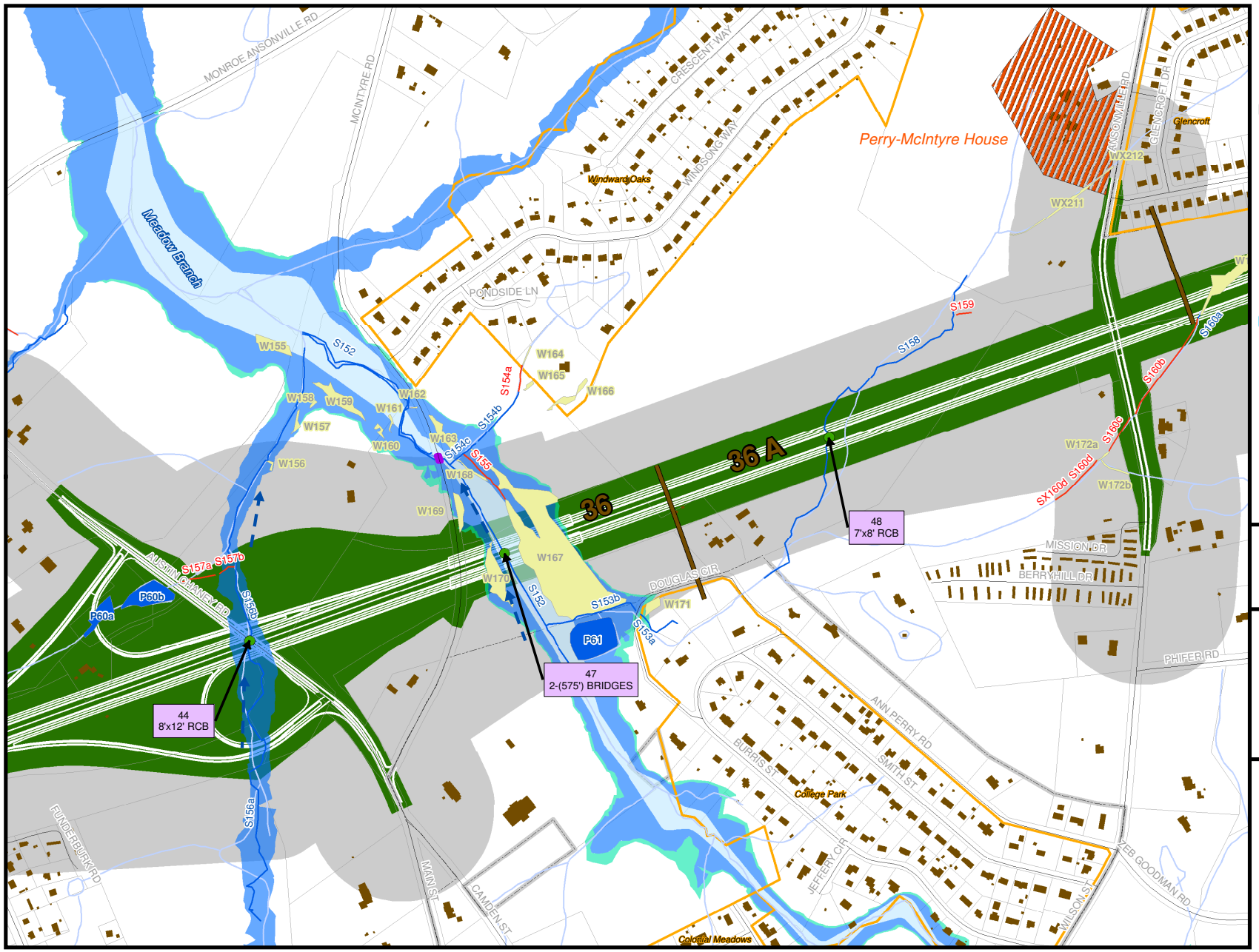
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4q

EA/Update_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
- Right of Way
- Segment Breakline
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- Corridor Study Area
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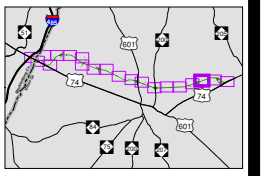
- Notable Features

Stream Crossings

- Culvert (72" dia. or larger)
- Bridge
- Flow Direction



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

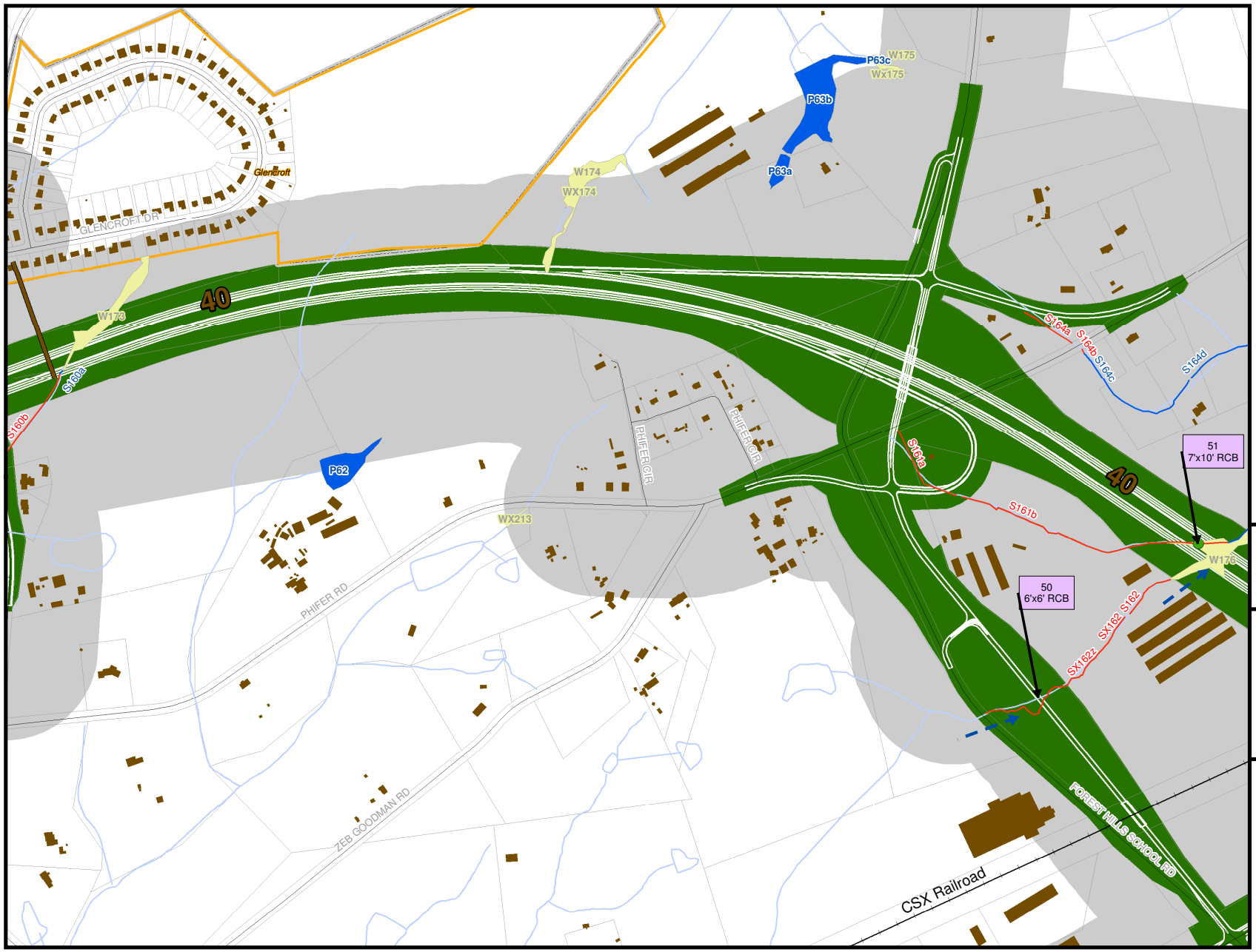
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4r

EA/pdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

- Functional Design
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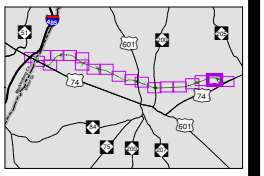

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

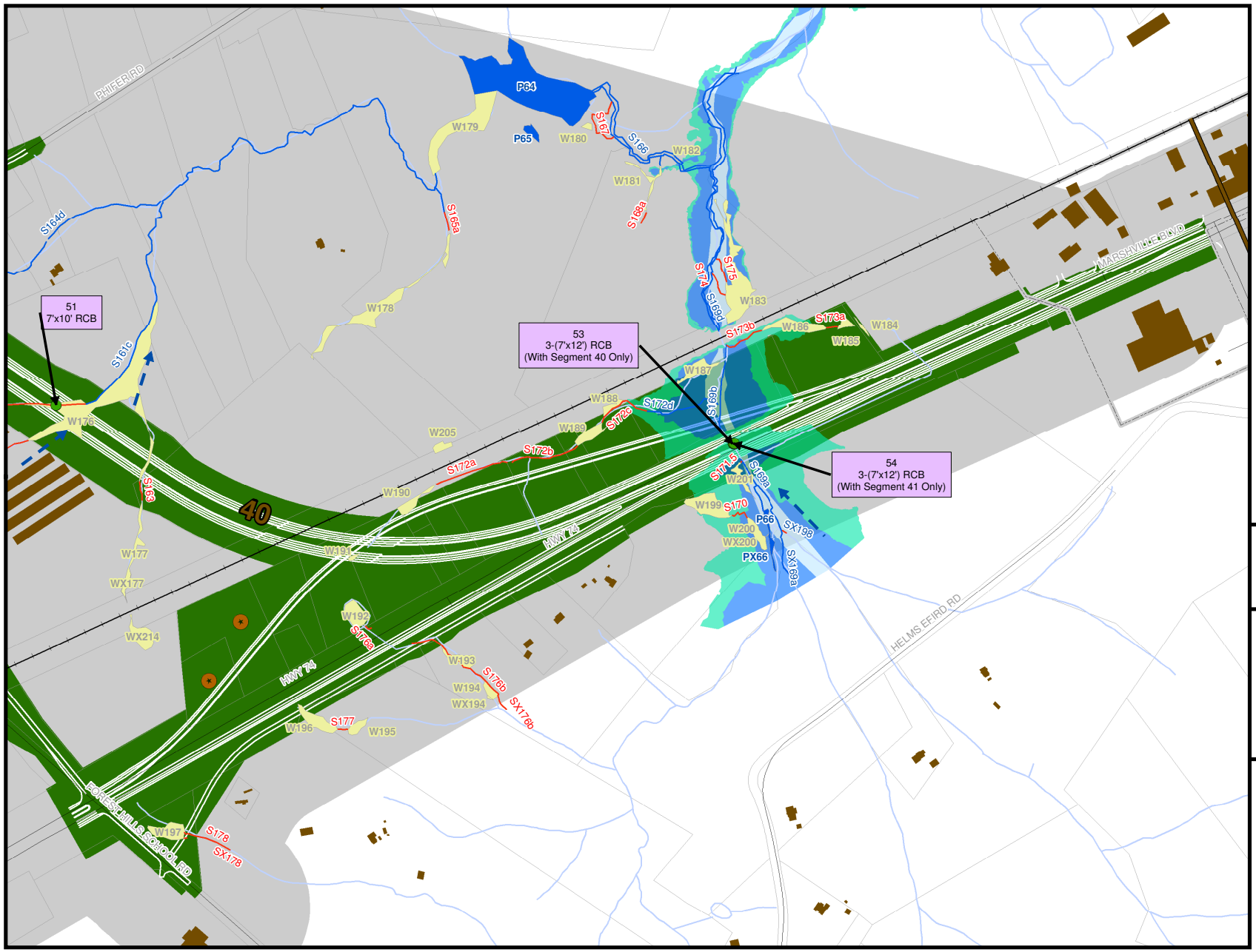
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4s

EAUpdate_FEIS_Alt0_Designs.mxd 04.25.13 JNL



Legend

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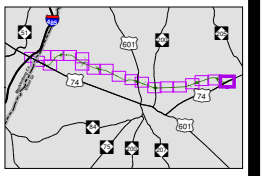

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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Feet

North Carolina Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

PREFERRED ALTERNATIVE FUNCTIONAL DESIGNS

Figure 3-4t

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4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Section 4 *provides a summary of information presented in Section 1.3 of the Final EIS, including the affected environment. This section also contains, where indicated, clarification and updates such as changes in the existing environment, changes in guidance documents, or changes based on new information or additional studies conducted since the Final EIS was published (listed in* ***Section P.4.5****).* ***Table P-1*** *summarizes changes in the affected environment or impacts since the Final EIS and notes the significance of any new impacts. The sections below follow the same order as presented in the Draft EIS and Final EIS.*

4.1 HUMAN ENVIRONMENT

This section summarizes the affected environment and environmental consequences described in Section 3.8 of the Draft EIS and Section 1.3.1 of the Final EIS, and includes general updates to the existing environment where indicated.

4.1.1 SOCIO-ECONOMIC CHARACTERISTICS

The *Community Impact Assessment* (February 2009), the Draft EIS, and the Final EIS for the project used 1990 and 2000 Census data, along with other sources of demographic and economic data, as the basis for analysis. Since the Final EIS was published in May 2010, data from the 2010 Census has been released. The boundary of the Demographic Study Area has not changed, but some 2000 Census block groups in the Demographic Study Area were subdivided for the 2010 Census. For this Draft Supplemental Final EIS, social and economic characteristics described in the Draft EIS and Final EIS were updated where applicable based on updated population and economic data (including the 2010 census). Updated demographic characteristics are presented in greater detail in **Appendix D**, which includes the memo *Updated Census Tables for Monroe Connector/Bypass* (Atkins, October 2012).

Population Growth. During the period between 2000 and 2010, both Union and Mecklenburg counties and the Demographic Study Area experienced population growth. Union and Mecklenburg counties grew at rates (62.8 percent and 32.2 percent, respectively) higher than that of the state (18.5 percent). Population growth in the Demographic Study Area between 2000 and 2010 (49.3 percent) was consistent with the growth experienced between 1990 and 2000 (49 percent) that was presented in the Draft EIS and Final EIS. Areas of growth between 2000 and 2010 were also consistent with those presented in the Draft EIS (Figure 3-1) and Final EIS. As shown in **Figure 4-1**, the largest percent increases in population from 2000 to 2010 generally occurred in and around the communities of Stallings and Indian Trail in western Union County and near Matthews within Mecklenburg County. Areas with negative or low growth are located within and around Monroe and Marshville.

Race and Ethnicity. Whites, African Americans, and Hispanics were the three largest racial/ethnic groups within the Demographic Study Area in 2010 as well as in 2000. There was a slight decrease in the percentage of the African American population in the study area between 2000 and 2010, as well as an increase in the Hispanic population. Specifically, the African American percentage of the Demographic Study Area's population decreased from 16.2 percent to 15.6 percent between 2000 and 2010, while the Hispanic population increased from 8.8 percent to

14.3 percent. However, the general locations of these populations within the study area remain the same.

Income. As was the case in 2000, the median family incomes for Mecklenburg County ($67,375) and Union County ($71,538) as reported in the 2010 Census were higher than the state average ($56,153). Generally, the lowest incomes in the Demographic Study Area are reported around Monroe and the highest incomes are reported in the western portion of Union County near Stallings and Hemby Bridge.

Housing. Based on a review the ACS 5-Year Estimates (2006-2010) for age of housing, 54 percent (23,475) of the homes in the Demographic Study Area have been built since 1990, including 28 percent (12,347) that have been built since 2000. Most of these newer homes have been built in the western portion of the Demographic Study Area (west of Rocky River Road).

Employment. The following information was obtained from the North Carolina Department of Commerce Division of Employment Security. In 2011, total employment in Mecklenburg and Union Counties was 550,568 and 52,119, respectively. The increase in total employment between 2000 and 2011 in Mecklenburg and Union Counties was 6.8 percent and 14.6 percent, respectively.

In 2000 and 2011, the sector that provided the highest number of jobs in Mecklenburg County was Trade, Transportation, and Utilities, although the percentage of jobs in that sector declined from 24.8 percent to 21.4 percent between 2000 and 2011. The Professional/Business sector provided the second highest number of jobs in both 2000 and 2011, with 21.4 percent and 20.7 percent of total employment, respectively. The Education and Health Services sector provided the third highest number of jobs in Mecklenburg County; and this sector saw a large increase in percentage of total employment between 2000 and 2011 (from 11.1 percent to 17.5 percent).

In 1990, the Manufacturing sector by far provided the highest percentage of jobs in Union County at 40.7 percent. In 2000, the Manufacturing sector still provided the highest percentage of jobs in Union County, but the percentage fell to 28.9 percent. By 2011, the percentage of jobs in Union County in the Manufacturing sector fell to 18.7 percent and dropped to third in terms of total employment. In 2011, Education and Health Services moved to the top in terms of total employment in Union County at 22 percent, a large increase over 13.3 percent in 2000. Trade, Transportation, and Utilities provided the second highest number of jobs in 2011, with 20.6 percent of total employment.

Conclusion. Overall, there have not been any significant changes in the demographic characteristics of the study area since the Final EIS. The minor changes described above are applicable to all DSAs and the Preferred Alternative. Therefore, the conclusions presented in Sections 1.3.1.1 and 2.5.1.1 of the Final EIS are still valid. The Monroe Connector/Bypass project would not serve a specific economic development purpose, but local planners believe that the project is vital to the economic well-being of Union County, and will assist in attracting more non-residential uses to Union County.

4.1.2 COMMUNITY RESOURCES

Community resources information is presented in Section 1.3.1.2 of the Final EIS. As described below, there have been no changes to neighborhoods in the project study area since the Final EIS. One additional community facility (a church) has been located in the Preferred Alternative project corridor, but it would not be impacted by the Preferred Alternative or any of the DSAs.

Neighborhoods. The project study area contains a number of named neighborhoods and other communities located within six municipalities and unincorporated areas of Union County and Mecklenburg County. Based on parcel data and field reviews, there are approximately 20 named neighborhoods within the DSA corridors, varying from small to large, and recent construction to older subdivisions. Figures 1-3a-c in the Final EIS show the general location of existing named neighborhoods in relation to the DSAs. Newer subdivisions within the DSAs include Fairhaven, Lake Park, Bonterra Village, Arbor Glen, Silverthorne, and Glencroft.

An estimated 12,347 housing units were constructed in the Demographic Study Area between 2000 and 2010. However, this new construction has not been occurring within the DSA corridors. Based on a review of parcel data available from Union County, no new neighborhoods have been platted or constructed within the DSA corridors since the Final EIS was published in May 2010. The annual number of building permits issued in Union County as a whole has notably decreased since 2006 (US Census Bureau Web site: http://censtats.census.gov/bldg/bldgprmt.shtml). In 2011, only 692 building permits (all single family) were issued, compared to 3,953 in 2006. Based on the fact that no new neighborhoods have been constructed within the DSA corridors, no updates are required to the neighborhood information presented in Section 3.2 of the Draft EIS and Section 1.3.1.2 of the Final EIS, as summarized in the following paragraphs.

All DSAs would impact nine neighborhoods. The majority of these impacts would involve minor right-of-way encroachment and/or changes in access. Two neighborhoods, Acorn Woods and Poplin Farms, would experience the relocation of homes in the midst of their neighborhoods, regardless of which DSA is selected. DSAs C, D, C1, D1, C2, D2, C3, and D3 would involve relocations in three neighborhoods, while the remaining DSAs (A, B, A1, B1, A2, B2, A3, and B3) would require relocations in only two neighborhoods. None of the DSAs would result in the total displacement of a neighborhood.

As a result of design refinements to the Preferred Alternative, potential impacts to two neighborhoods (Suburban Estates and Windward Oaks) were eliminated and impacts to Bonterra Village were modified in response to the residents' request for revised access, as described in Section 2.5.1.2 of the Final EIS. Neighborhood impacts associated with the Preferred Alternative are presented in Table 2-5 of the Final EIS.

Generally, more neighborhood impacts would occur in the western portion of the Preferred Alternative between Stallings and Indian Trail. This area is more densely developed and suburban in nature than the eastern portion of the project. Community cohesion impacts may occur and could include the effects of neighborhood division, social isolation, changes in community character, and increased/decreased neighborhood or community access. The majority of the neighborhoods in the project study area have a suburban or agrarian visual character, which could be altered by the presence of a major toll facility.

Community Resources. Community resources located in the Monroe Connector/Bypass project study area and discussed in this section are shown on **Figures 4-2a-c**. Community facilities in the project study area near the DSAs include churches and cemeteries, schools and colleges, and parks and recreation areas. These resources provide basic needs and services to communities and neighborhoods in the area and are concentrated generally in the city and town centers. As expected, the number of community facilities decreases outward from the city and town centers.

Community resources information was obtained in part from the North Carolina Center for Geographic Information and Analysis, Union and Mecklenburg Counties' Geographic

Information System (GIS) Departments, ADC Map Books, and initial field reviews conducted in April and May 2008. A detailed analysis of community facilities is provided in the *Community Impact Assessment* (PBS&J, February 2009). For this document, GIS data and online mapping were reviewed in September 2012 and revealed only one additional community resource within the Preferred Alternative project corridor since the Final EIS, the Sardis Baptist Church, located at 3602 Unionville-Indian Trail Road West in Indian Trail. While the church is located within the project corridor, labeled as C2 on **Figure 4-2a**, it would not be impacted by the Preferred Alternative or any of the DSAs. In addition, one church identified in the Draft EIS has changed names; Morgan Mill Baptist Church is now Lee Park Baptist Church (labeled as C9 on **Figure 4-2b**).

Based on this review of updated data, the information and conclusions provided in Sections 3.2.3 and 3.2.4 of the Draft EIS and Section 1.3.1.2 of the Final EIS are still valid.

Churches and Cemeteries. All DSAs would impact three to five church properties, but no church buildings would be impacted. The Preferred Alternative impacts three church properties.

Schools and Colleges. Four schools are located within or immediately adjacent to the DSA corridors: Central Piedmont Community College (CPCC), Stallings Elementary School, Sardis Elementary School, and Forest Hills High School. All DSAs would temporarily impact school bus routes during construction, as well as result in modifications of existing routes and/or promote new bus routes. NCTA will coordinate with Charlotte Mecklenburg Schools and Union County Public Schools regarding minimizing impacts to school bus routes.

All DSAs would have a minimal indirect impact on Central Piedmont Community College (CPCC) through a change in access. Implementation of DSAs A, B, A1, B1, A2, B2, A3, or B3 also would require a small amount of right of way from the CPCC property in the southeast quadrant of the existing I-485/US 74 interchange to accommodate improvements to the interchange.

Parks and Recreational Facilities. There is one park and one recreation facility located within the DSAs. The Matthews Sportsplex is currently under construction and is located on a 160-acre property owned by Mecklenburg County in the southwest quadrant of the existing I-485/US 74 interchange. DSAs A, B, A1, B1, A2, B2, A3, and B3 would require approximately 2.25 acres from the Matthews Sportsplex. The minor encroachments on the edge of the parcel are not anticipated to impact access or any future use of the property for park purposes.

Carolina Courts, a private recreation facility, is a 44,000 square-foot facility located at 7210 Stinson Hartis Road, to the southwest of the proposed Indian Trail-Fairview Road interchange. The entire Carolina Courts property would be purchased and entitled to relocation benefits under DSAs that use Corridor Segment 2 (DSAs C, D (Preferred Alternative), C1, D1, C2, D2, C3, and D3). Based on a hardship situation, NCDOT purchased the Carolina Courts property in 2012 and is currently working with Carolina Courts to allow them time to have a new building constructed before moving out of the existing facility.

4.1.3 LAND USE AND TRANSPORTATION PLANNING

As described in Section 1.1.7 of the Final EIS, the Monroe Connector/Bypass project is included as a toll facility in the *MUMPO 2035 LRTP*, and is recognized as a regionally significant project. This is still the currently adopted LRTP.

Both the Monroe Connector (STIP Project R-3329) and Monroe Bypass (STIP Project R-2559) projects are included in the current *2012–2020 State Transportation Improvement Program*

(STIP) as multi-lane freeways on new location, as they were in the 2009-2015 STIP current at the time of the Final EIS.

Since the DSAs are generally on new location, direct land use changes from any of the DSAs would include converting the land needed for right of way from its existing use to transportation use. This land includes a wide variety of uses, such as industrial, commercial, residential, recreational, agricultural, and undeveloped. Land use plan updates and indirect land use impacts as a result of the Preferred Alternative are discussed in **Section 4.5**.

4.1.4 RIGHT-OF-WAY ACQUISITION AND RELOCATIONS

Potential residential and business relocation impacts within each of the DSAs are presented in Table 3-6 of the Draft EIS. The detailed *Relocation Reports* prepared by Carolina Land Acquisition (January 2009) are included in Appendix C of the Draft EIS. There have been no changes in the project corridor since the *Relocation Reports* were prepared that would require an update to the relocation impacts presented in the Draft EIS. There was no change in the number of relocations estimated for the Preferred Alternative between the Draft EIS and Final EIS. In addition, no new homes or businesses have been constructed in the Preferred Alternative corridor since the Final EIS.

Since the approval of the original ROD in August 2010 (rescinded July 2012), NCDOT has acquired three commercial properties, 22 residential properties, and one vacant parcel under hardship situations within the Preferred Alternative corridor. Requests for right-of-way acquisition for hardship situations are being considered on a case by case basis. If another alternative is selected for implementation, any properties purchased by NCDOT that are not needed could be resold.

4.1.5 ENVIRONMENTAL JUSTICE

As presented in Section 3.5 of the Draft EIS and summarized in Section 1.3.1.5 of the Final EIS, the Monroe Connector/Bypass project was evaluated for the potential for disproportionately high and adverse impacts on minority and low-income populations in two ways: 1) impacts that result from building and operating any new road (e.g., taking of land, noise impacts, air impacts, etc.) and 2) impacts that result specifically from tolling the proposed facility. The first category of impacts mainly involves people who are living in the immediate vicinity of the project. The second category involves people who are potential users of the road – a much broader geographic area.

The general locations of African American populations, Hispanic populations, and low-income populations based on the 2010 Census are shown in **Figures 4-3**, **4-4**, and **4-5**. The general locations of these populations have not changed notably from what was presented in the Draft EIS based on the 2000 Census (Figures 3-4, 3-5, and 3-6 of the Draft EIS), but there are six additional 2010 block groups within the Demographic Study Area with Hispanic percentages that exceed the county percentage by more than ten percentage points. However, there are not anticipated to be any new impacts to minority populations since no new homes or businesses have been constructed in the Preferred Alternative corridor since the Final EIS was published.

Based on information presented in Section 3.5 of the Draft EIS, the construction of any of the DSAs was determined not to have a disproportionately high and adverse impact on minority and low-income populations. The *Relocation Reports* (January 2009) estimate a low percentage of minorities would be relocated by the DSAs and that no disproportionate impacts to low-income households would occur. Based on an examination of the updated US Census information

presented in **Section 4.1.1** and **Appendix D** of this document, there have not been significant changes in the study area demographics that would change the conclusion presented in Section 2.5.1.5 of the Final EIS, which is that construction of the Preferred Alternative would not have a disproportionately high and adverse impact on minority and low income populations. The project would not deny, reduce, or delay receipt of project benefits to low-income or minority groups.

As stated in Section 1.3.1.5 of the Final EIS, one benefit of the project would be reduced traffic on existing alternate non-toll routes, including US 74. As shown in Section 5 of the *Year 2035 Build Traffic Operations Technical Memorandum* (PBS&J, February 2009*),* and summarized in Section 2.6.3.2 of the Draft EIS, existing US 74 would have fewer segments and intersections operating at an unacceptable level of service in 2035 if the project is constructed versus the No-Build Alternative. In addition, based on comparisons of annual average daily traffic (AADT) on US 74 between the 2035 No-Build[1] and the 2035 Build[2] scenarios, all but one of nine segments along US 74 would see a decrease in 2035 AADT under the Build scenario. Completing the project would benefit all motorists, including low-income motorists who may choose not to use the toll facility or may tend to use it less frequently. Therefore, impacts to low-income and/or minority populations resulting from implementing the Monroe Connector/Bypass as a toll facility are not anticipated to be disproportionately high and adverse.

4.1.6 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. The US Department of Justice defines Limited English Proficiency (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 Demographic Study Area meets the US Department of Justice's Safe Harbor threshold requirement for presence of an LEP population, as identified in guidance issued by the USDOT's *Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons* (2005). This guidance defines the safe harbor threshold as either five percent of the total Demographic Study Area 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. Results of the LEP analysis are presented in **Appendix D** and summarized below.

The ACS data indicate the presence of a Spanish language group that exceeds the Safe Harbor threshold. The Demographic Study Area includes approximately 5,600 Spanish-speaking adults that speak English less than "Very Well." Individual block groups with the highest percentages of Spanish-speaking adults that speak English less than "Very Well" are generally located in and around Monroe, generally south of the DSAs.

[1] 2035 No-Build volumes from HNTB's *NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (March 2010)

[2] 2035 Build volumes from Wilbur Smith Associates' *Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass* (September 2009)

Provisions have been made for Spanish-speaking people at past public meetings regarding the project. Specifically, an interpreter was provided at the first citizens informational workshop in 2007, but no requests for language assistance were received. At subsequent public workshops, NCDOT or consultant staff with the ability to speak Spanish were in attendance and could serve as interpreters if needed. In accordance with the Safe Harbor provisions, written translations of vital documents will be provided for the LEP language group (Spanish), if requested, in addition to other measures assuring meaningful access. These other measures include providing notice of citizens' Right to Language Access for all future meetings associated with this project, and use of interpreters when deemed warranted to assist with public participation.

4.2 PHYSICAL ENVIRONMENT

4.2.1 NOISE

Section 4.1 of the Draft EIS provides details of the noise analysis conducted for the DSAs (*Final Traffic Noise Technical Memorandum for Administrative Action Environmental Impact Statement Monroe Connector Bypass,* March 2009), referred to here as the *2009 Traffic Noise Technical Memorandum*.

Based upon the *2009 Traffic Noise Technical Memorandum*, the numbers of impacted receptors range from 108 impacted Category B receptors for DSA B2, to 130 impacted Category B receptors for DSA C1. Category B receptors in the project area are mostly residential (with some churches) and the impacts to Category B receptors are primarily substantial increase impacts. The numbers of Category C (business) impacts range from nine to eleven for DSAs that use DSA Segment 18A (DSAs A, B, A1, B1, A2, B2, A3, and B3) to 28 to 31 for DSAs that use DSA Segment 2 (DSAs C, D, C1, D1, C2, D2, C3, and D3). The higher numbers of business impacts for DSAs using DSA Segment 2 occur along existing US 74.

Impacted receptors are receptors expected to experience traffic noise impacts either by approaching or exceeding the FHWA Noise Abatement Criteria (NAC) for the applicable activity category, as listed in Table 4-1 in the Draft EIS, or by a substantial increase in exterior noise levels (as defined in NCDOT's Traffic Noise Abatement Policy). Impacted receptors do not include noise-sensitive receptors that would be relocated by the project.

Since the Final EIS was published, FHWA adopted new noise standards and NCDOT released an updated noise policy. The new standards revised the Activity Categories for the FHWA Noise Abatement Criteria, as shown in **Table 4-1**. However, for the activity categories present in the project study area, the activity criteria did not change. Category A uses stayed the same. Category B previously included a variety of noise-sensitive uses such as residences, recreation areas, playgrounds, parks, motels/hotels, schools, churches, libraries and hospitals, but now is only for residences. Category C used to include developed lands, properties or activities not included in Category A or B. Category C now includes the activities, excluding residential, that were previously in Category B. Category C uses are now Category E.

TABLE 4-1: 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.

The new FHWA Noise Abatement Criteria activity categories do not change the numbers of impacted receptors reported in the Draft EIS. The impacted churches are now in Category C and the impacted businesses are in Category E. The impact criteria do not change for these uses.

In the Draft EIS, three locations were identified where noise barriers were preliminarily determined to be feasible and reasonable. The three preliminary noise barriers are listed in Table 4-6 of the Draft EIS, and shown in Figure 4-1a-c of the Draft EIS. Two of the preliminary noise barriers apply to all the DSAs. These are Barrier N4-1 for the Acorn Woods/Gold Hill neighborhoods and Barrier N7-2 for the Avondale Park neighborhood. Barrier N9-1 for the Glencroft neighborhood is recommended for DSAs A, B, C, D (Preferred Alternative), A1, B1, C1, and D1.

As described in Section 2.5.2.1 of the Final EIS, the noise analysis for the Preferred Alternative (DSA D) was updated in the Final EIS to incorporate design changes and updated traffic forecasts prepared since the Draft EIS was circulated. An addendum to the 2009 traffic noise study was prepared for the Preferred Alternative, titled *Addendum Traffic Noise Technical Memorandum for Administrative Action Environmental Impact Statement Monroe*

Connector/Bypass (January 2010), referred to here as the *2010 Traffic Noise Addendum*. The updated study reported that the Preferred Alternative would impact 124 Category B receptors (all residences) and 29 Category C receptors (businesses), based on the previous FHWA Noise Abatement Criteria Activity Categories. Compared to the results presented in Table 4-5 of the Draft EIS, two additional residences and one additional business were predicted to be impacted by future traffic noise from the Preferred Alternative. This is due to the design changes that reduced the right of way required at the Preferred Alternative's interchanges with Unionville-Indian Trial Road and Austin Chaney Road and left in place additional noise sensitive receptors near the proposed right of way.

The *2010 Traffic Noise Addendum* recommended the same three preliminary barriers for the Preferred Alternative as was recommended in the *2009 Traffic Noise Technical Memorandum*, except that Barrier N4-1 became longer and the number of benefited receptors increased from 16 to 26 receptors.

The original Date of Public Knowledge for the project, prior to the July 2012 rescission of the ROD, was the ROD's approval date of August 2010. The new Date of Public Knowledge will be after July 2011, and therefore will be after the date new FHWA noise standards became effective (July 13, 2011) and after the NCDOT's updated Traffic Noise Abatement Policy became effective (July 13, 2011). NCDOT also published a *Traffic Noise Analysis and Abatement Manual* (August 2011) to accompany the updated policy.

Because new standards, policy, and guidance manuals became effective (July 13, 2011) subsequent to the previous traffic noise studies (2009 and 2010), and because the Date of Public Knowledge will occur after the effective date of the new FHWA noise standards (July 13, 2011), a *Traffic Noise Analysis Update for the Monroe Connector/Bypass* was prepared for the Preferred Alternative (Atkins, November 2013) (referred to here as the *2013 Traffic Noise Analysis Update*). The updated noise analysis incorporates the new FHWA standards and NCDOT policy and the procedures included in the NCDOT *Traffic Noise Analysis and Abatement Manual*.

As shown in the *2013 Traffic Noise Analysis Update,* Build Condition year 2035 traffic volumes are predicted to impact 192 receptors in the vicinity of the proposed Preferred Alternative. This compares to 153 impacted receptors along the project under the Preferred Alternative identified in the *2010 Traffic Noise Addendum*, an increase of 39 receptors. The increase in number of impacted receptors is due to the use of a different truck percentage in the noise model. In previous studies, in accordance with the allowable procedures at the time, one-half the truck percentages from the traffic forecast were included in the model. The updated noise analysis includes the full truck percentages provided in the traffic forecast.

Consideration for noise abatement measures was given to all impacted receptors in the *2013 Traffic Noise Analysis Update*. Traffic noise abatement measures are preliminarily recommended as feasible and reasonable in five locations for the benefit of 144 receptors in the vicinity of the project, based on available information. Previous recommendations for noise barriers for the Preferred Alternative documented in the *2010 Traffic Noise Addendum* included three noise barriers as preliminarily reasonable and feasible, benefiting 61 receptors. **Table 4-2** is a summary of the recommended noise abatement measures. The locations of preliminary noise barriers are shown on **Figure 4-6a-c**.

TABLE 4-2: Monroe Connector/Bypass Preferred Alternative Preliminary Recommended Noise Barriers[1]

Barrier Name[1]	Barrier Description	Number of Impacted Receptors Benefited	Total Number of Benefits
NW2C	Along the shoulder of WB Monroe Connector/Bypass near White Oak Lane and Strand Drive	22	28
NW4 (Previously Wall N4-1)	Along the shoulder of EB Monroe Connector/Bypass near Beverly Dr	34	25
NW7B (Previously Wall N7-1)	Along the shoulder of EB Monroe Connector/Bypass near Avondale neighborhood (Dusty Hollow Rd)	32	38
NW11 (Previously Wall N9-1)	Along the shoulder of WB Monroe Connector/Bypass near Glencroft Dr	21	38
NW12	Along the cut slope of EB Monroe Connector/Bypass near Phifer Cir.	6	8
TOTALS		**102**	**144**

1. This assessment is based upon preliminary design and preliminary mapping and is a preliminary recommendation. It is subject to change based on final design and the public involvement process.

More noise barriers are preliminarily recommended as reasonable and feasible in the *2013 Traffic Noise Analysis Update* compared to previous studies due to changes in the way reasonableness is determined. Reasonableness is now calculated using a maximum allowable barrier area per benefited receptor (previous procedures used a maximum allowable cost per benefited receptor). In addition, common noise environments (often these are areas located between the same interchanges) are now used to consider abatement measures for noise-sensitive receptors of similar types.

While there are updates to the traffic noise impacts presented in the Final EIS, the traffic noise analysis results summarized in the *2013 Traffic Noise Analysis Update* do not represent significant new adverse impacts. Although the number of predicted noise impacted receptors increased from 153 to 192 (an increase of 39 impacted receptors) without noise barriers in place, the numbers of impacted receptors that would benefit from the preliminarily recommended noise barriers also increased from 61 impacted receptors benefitting to 102 impacted receptors benefitting. Overall, the total number of benefitted receptors increased from 61 receptors to 144 receptors. In addition, the same changes to procedures and standards would apply to all the Detailed Study Alternatives, and NCDOT expects that changes in results would be similar for all the Detailed Study Alternatives.

4.2.2 AIR QUALITY

The air quality assessment performed for the project was described in Section 4.2 of the Draft EIS. Air pollutants evaluated include those with a National Ambient Air Quality Standard (NAAQS), mobile source air toxics (MSAT), and potential construction-related air quality impacts. Section 1.3.2.2 of the Final EIS provides updates to transportation conformity and MSATs, and Section 2.5.2.2 of the Final EIS includes a discussion of climate change and greenhouse gas emissions.

Since the Final EIS, there have been updates to the NAAQS and transportation conformity, as discussed below.

National Ambient Air Quality Standards and Existing Conditions. The US Environmental Protection Agency (EPA) has established primary and secondary 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). **Table 4-3** lists the current NAAQS (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).

TABLE 4-3: National Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	Standard	Standard Type	Form
Carbon Monoxide	8-hour	9 ppm	Primary	Not to be exceeded more than once per year
	1-hour	35 ppm		
Lead	Rolling 3-month Average	0.15 µg/m^3 (1)	Primary and Secondary	Not to be exceeded
Nitrogen Dioxide	1-hour	100 ppb	Primary	98th percentile, averaged over 3 years
	Annual	53 ppb(2)	Primary and Secondary	Annual mean
Ozone	8-hour	0.075 ppm(3)	Primary and Secondary	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter <10 micrometers (PM10)	24-hour	150 µg/m^3	Primary and Secondary	Not to be exceeded more than once per year on average over 3 years
Particulate Matter <2.5 micrometers (PM2.5)	Annual	12 µg/m^3	Primary	Annual mean, averaged over 3 years
	Annual	15 µg/m^3	Secondary	Annual mean, averaged over 3 years
	24-hour	35 µg/m^3	Primary and Secondary	98th percentile, averaged over 3 years
Sulfur Dioxide	1-hour	75 ppb(4)	Primary	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	3-hour	0.5 ppm	Secondary	Not to be exceeded more than once per year

Source: EPA Web site: www.epa.gov/air/criteria.html, accessed April 1, 2013.

[1] Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain on maintain the 2008 standard are approved.

[2] The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

[3] Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

[4] Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Comparing the NAAQS table below with the one in the Draft EIS (Table 4-8) that was referenced in the Final EIS, there have been some changes to the standards listed for lead, nitrogen dioxide, ozone, and sulfur dioxide. For lead, the quarterly average is no longer listed. For nitrogen dioxide, a 1-hour primary standard has been added. For ozone, the 1-hour average and the 1997

8-hour average are no longer listed. For sulfur dioxide, the annual arithmetic mean and the 24-hour average primary standards are no longer listed, and a 1-hour average primary standard has been added. None of these changes affect the analysis of air quality for the Monroe Connector/Bypass.

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

The Charlotte-Gastonia-Rock Hill air quality region remains in attainment for nitrogen dioxide, lead, particulate matter, and sulfur dioxide (EPA Web site: www.epa.gov/oar/oaqps/greenbk). Additional detailed information regarding these criteria air pollutants can be found in the *Air Quality Technical Memorandum for the Monroe Connector Bypass* (PBS&J, February 2009). Similarly, the region was and is in maintenance for carbon monoxide and non-attainment for ozone, as described below.

> *Carbon Monoxide*. Except for Mecklenburg County, all other areas within the Charlotte-Gastonia-Rock Hill air quality region are designated as attainment for carbon monoxide. Mecklenburg County is a maintenance area for carbon monoxide (EPA Web site: www.epa.gov/oar/oaqps/greenbk).
>
> *Ozone*. On June 15, 2004, the Charlotte-Gastonia-Rock Hill air quality region was designated as a moderate non-attainment area for the 1997 8-hour ozone NAAQS (EPA Web site: www.epa.gov/oar/oaqps/greenbk). The region includes the following counties in North Carolina: Mecklenburg, Gaston, Lincoln, Cabarrus, Rowan, Union, and the southern portion of Iredell. The urbanized area of eastern York County, South Carolina, also is included.
>
> Compliance with the 1997 ozone standard was required by June 15, 2010 unless the area qualified for an extension. On May 31, 2011, EPA took final action to extend the applicable attainment date for the region to June 15, 2011. On November 15, 2011, EPA made a determination of attainment for the region based on monitoring data for the 2008-2010 monitoring period. The final rule became effective on April 6, 2012 (*Federal Register*, Vol. 77, No. 45, March 7, 2012).
>
> As published in the May 21, 2012, Federal Register (Volume 77, Number 98), the Charlotte-Rock Hill air quality region was designated a marginal non-attainment area for the 2008 8-hour ozone standard, with an effective date of July 20, 2012 (EPA Web site: www.epa.gov/air/oaqps/greenbk/hindex.html). The region includes all of Mecklenburg County and parts of Cabarrus, Gaston, Iredell, Lincoln, Rowan, and Union Counties in North Carolina, as well as part of York County in South Carolina.

Transportation Conformity. Section 176(c) of the Clean Air Act Amendments (42 USC 7506(c)) requires that transportation plans, programs, and projects conform to the intent of the State Implementation Plan (SIP). Conformity requirements apply to transportation plans,

programs, and projects funded or approved by the FHWA or the Federal Transit Administration (FTA) in areas that do not meet, or previously have not met, NAAQS for ozone, carbon monoxide, particulate matter, or nitrogen dioxide (*Fact Sheets on Highway Provisions*, FHWA Web site: www.fhwa.dot.gov/safetealu/factsheets/conformity.htm).

Under the transportation conformity regulations, a regional transportation conformity determination is required every time a Metropolitan Planning Organization (MPO) approves an update or amendment to its long range transportation plan (LRTP) and transportation improvement program (TIP).

In addition to the regional conformity determination for LRTPs and TIPs, FHWA also must make a project-level conformity determination. For all pollutants, a project-level conformity determination can be made only if the project is included in a conforming LRTP and TIP. In addition, for carbon monoxide (CO) and particulate matter (PM), a project-level conformity finding requires a localized conformity analysis, known as a "hot-spot" analysis.

For the Monroe Connector/Bypass project, transportation conformity determinations are required for two pollutants: ozone and carbon monoxide**.** The conformity requirements apply to these pollutants because the Metrolina region as a whole is designated as a nonattainment area for the 2008 8-hour ozone standard and Mecklenburg County is designated as a maintenance area for carbon monoxide.

Regional Conformity Determinations for LRTPs. As discussed in the Final EIS Section 2.5.2.2, MUMPO at that time had an approved LRTP with a horizon year of 2035, which was adopted on March 24, 2010. USDOT approved a conformity determination for this LRTP update on May 3, 2010. Since the Final EIS, there have been three amendments to the 2035 LRTP for MUMPO.

- Amendment 1 is dated July 20, 2011, with a FHWA/FTA conformity finding on December 19, 2011.
- Amendment 2 is dated June 20, 2012, with a FHWA/FTA conformity finding on July 6, 2012.
- Amendment 3, the latest conformity determination, is dated May 22, 2013, with a FHWA/FTA conformity finding on May 29, 2013.

The associated conformity determinations included the Monroe Connector/Bypass; therefore, the proposed project remains in a conforming LRTP.

CRTPO is currently preparing a new air quality conformity analysis as part of the 2040 Metropolitan Transportation Plan (MTP), which will update the 2035 LRTP. FHWA approval is expected in May 2014.

Regional Conformity Determinations for TIPs. MUMPO currently has an approved TIP covering the years 2012 through 2018. The 2012–2018 TIP is a direct subset of the respective conforming 2035 LRTP. The FHWA and FTA approved a regional conformity determination for the MUMPO 2012-2018 TIP on December 19, 2011.[3] The current TIP is valid for four years. Therefore, an update to MUMPO's 2009-2015 TIP is required by 2016. The latest conforming

[3] The December 19, 2011 conformity determination for the Metrolina Region is titled: Final *Conformity Analysis and Determination Report for the Metrolina Area: Cabarrus-Rowan MPO, Mecklenburg-Union MPO, and Gaston Urban Area MPO 2012-2018 Transportation Improvement Program, 2035 Long Range Transportation Plan Amendments and Projects from the 2012-2018 State Transportation Improvement Program for the Donut Area Counties of Lincoln, Iredell, Gaston, and Union*

TIP includes the Monroe Connector/Bypass.

Project-Level Conformity. The DSAs for the project are generally consistent with the project descriptions (freeway) and project lengths (approximately 20 miles total) included in the LRTP.

As described in Section 4.2.5.1 of the Draft EIS, a localized hot-spot analysis for project-level conformity is not required. The requirements for carbon monoxide hot-spot analysis (codified at 40 DFR 93.116 and 93.123) were reviewed and a determination was made that the findings of the Draft EIS are still valid.

Mobile Source Air Toxics. FHWA issued new MSAT Guidance on December 6, 2012 (*Interim Guidance on Mobile Source Air Toxic Analysis in NEPA*). The Guidance states "All MSAT analysis beginning on or after December 20, 2012 should use the MOVES model. Any MSAT analysis initiated prior to that date may continue to operate under the previous guidance and utilize MOBILE6.2." MSAT analysis for this project was completed in 2009 and did not require a quantitative analysis, and therefore need not be updated. Therefore, the MSAT analysis presented in Section 1.3.2.2 and Appendix E of the Final EIS is still valid.

4.2.3 FARMLAND

Section 4.3 of the Draft EIS presents information on farmland soils in the project area. Section 1.3.2.3 of the Final EIS presents updated impacts to prime and important farmland soils within the DSAs based on soils surveys and lists of farmland soils for Union County and Mecklenburg County published by the NRCS on June 19, 2009 and April 29, 2009, respectively. The Final EIS also presents updated agricultural census information. All DSAs would involve the use of prime and statewide important farmland soils. As stated in the Final EIS Section 2.5.2.3, the Preferred Alternative right of way would impact 184 acres of prime farmland soils and 751 acres statewide important farmland soils.

Since the Final EIS was published, the NRCS published updated soils surveys and lists of farmland soils for Union County (July 26, 2012) and Mecklenburg County (July 6, 2012). Upon review of the updated surveys, it was determined that there are no changes to the designation of any soils located within the DSAs; therefore the farmland soils information presented in the Final EIS and the farmland conversion impact ratings presented in Section 4.3.4.2 of the Draft EIS are still valid. As stated in Section 2.5.2.3 of the Final EIS, the soils impacted by the Preferred Alternative do not meet the threshold for consideration of protection under the Farmland Protection Policy Act of 1981 (FPPA), and therefore no further coordination with the NRCS is required.

As stated in Section 4.3.3.2 of the Draft EIS, Union County has a voluntary farmland preservation program; however, there are no participating farm parcels located within the DSAs. This information was verified based on a review of Union County GIS data for Voluntary Agricultural Districts in June 2013 (http://maps.co.union.nc.us).

Based upon a review of updated information, there are no changes to the farmland impacts presented in the Final EIS.

Farm Displacements. As reported in Section 4.3.4.3 of the Draft EIS, the *Relocation Reports for the Monroe Connector/Bypass* (Carolina Land Acquisition, January 2009) note that all DSAs would include three farm displacements. Because much of eastern Union County is still rural, it is anticipated that there would be suitable replacement property available for farm relocation. There are no updates to this information as presented in the Draft EIS and referenced in the Final EIS.

4.2.4 UTILITIES AND INFRASTRUCTURE

As presented in Section 4.4 of the Draft EIS and Section 1.3.2.4 of the Final EIS, all DSAs, including the Preferred Alternative, have the potential to impact electric power, water and sewer facilities, natural gas, telecommunications, and railroads. For this document, utility information was verified and updated as appropriate through review of various Union County plans and reports, conversations with Union County Public Works staff, and internet research.

Since the Final EIS was published, Union County completed a *Comprehensive Water and Wastewater Master Plan* (Black & Veatch, December 2011), available from the Union County Department of Public Works. The plan includes an analysis of water and sewer demand and capacity through 2030 along with recommended improvements to meet demand. The recommendations focus on extending water transfer agreements with neighboring jurisdictions and purchasing additional capacity at existing wastewater treatment plants. This additional water and sewer information does not change the findings of the Draft EIS or Final EIS, which are that utility impacts can be addressed through coordination with utility providers during final design and construction so that no services are substantially disrupted.

4.2.5 VISUAL RESOURCES

Impacts to visual resources are presented in Section 4.5 of the Draft EIS and summarized in Section 1.3.2.5 of the Final EIS. Based on a windshield survey of the project study area, there have not been any notable changes to the visual character of the project study area. Therefore, the information on visual resources presented in the Draft EIS and Final EIS is still valid.

4.2.6 HAZARDOUS MATERIALS

Section 4.6 of the Draft EIS presents information on hazardous materials. This information is also summarized in Section 1.3.2.6 of the Final EIS. Based on the assessment presented in Section 4.6.2 of the Draft EIS, DSAs A, B, A1, B1, A2, B2, A3, and B3 would impact six to seven potentially contaminated sites, while DSAs C, D, C1, D1, C2, D2, C3, and D3 would impact 11 to 12 sites. Generally, the DSA corridor segments utilizing portions of US 74 had the highest numbers of potentially contaminated sites. All potential impacts were rates as "low" impact, meaning there would be little to no impacts to cost or schedule if the project would directly affect the site.

For the Final EIS, an updated hazardous materials evaluation was prepared by the NCDOT Geotechnical Engineering Unit for the Preferred Alternative in December 2009. As presented in Section 2.5.2.6 of the Final EIS, the Preferred Alternative corridor includes three sites with minor soil contamination, a fourth site with an estimated 70 cubic yards of petroleum contaminated soil, and a fifth site with an estimated 85-175 cubic yards of petroleum contaminated soil. All of these sites can be addressed during final design and construction. The NCDOT Geotechnical Engineering Unit reviewed the Preferred Alternative corridor in October 2012 and verified that no additional potentially contaminated sites are present beyond those identified in the Final EIS. Therefore, the evaluation of hazardous materials presented in the Final EIS is still valid.

4.2.7 FLOODPLAINS AND FLOODWAYS

Information on floodplains and floodways is presented in Section 4.7 of the Draft EIS. Updated information, including a correction to the number of floodway crossings, is presented in

Section 1.3.2.7 of the Final EIS. The Flood Insurance Rate Maps (FIRMs) developed for Union County in November 2008 and for Mecklenburg County in November 2009 were used to calculate impacts to floodplains and floodways in the Final EIS. These are still the most current FIRMs available according to the North Carolina Floodplain Mapping Program Web site (www.ncfloodmaps.com/firm_indexes.htm); therefore, impacts to floodplains and floodways as presented in the Final EIS and summarized below are still valid.

The project study area includes nine named streams with defined floodplains; six of these streams also have defined floodways. As shown in Table 1-5 of the Final EIS, the number of floodplain crossings associated with the DSAs ranges from ten to fourteen, and the number of floodway crossings ranges from four to seven. The number of bridge crossings over streams ranges from five to nine and the number of major culverts or pipes (>72 inches in diameter) ranges from 33 to 38.

The Preferred Alternative would include six bridge crossings and 35 major culverts or pipes. There would be five floodway crossings and 11 floodplain crossings. All stream crossings would be perpendicular or near to perpendicular, which would minimize impacts to the associated floodplains. All bridges or culverts designed for the project will be sized to ensure that no increases to the extent and level of flood hazard risk will result from such encroachments. As included in Section 2.5.2.7 of the Final EIS, a floodplain finding was made in accordance with Executive Order 11988 that there is no other practicable alternative to reduce impacts to floodplains.

4.3 CULTURAL RESOURCES

4.3.1 HISTORIC ARCHITECTURAL RESOURCES

Information on historic architectural resources is presented in Section 5.2 of the Draft EIS and Section 1.3.3.1 of the Final EIS. Information on historic architectural resources in relation to the modified designs for the Preferred Alternative is provided in Section 2.5.3.1 of the Final EIS.

As reported in Section 2.5.3.1 of the Final EIS, the Preferred Alternative would not result in an Adverse Effect to a historic property on or eligible for listing on the National Register of Historic Places (NRHP). For this document, NCDOT historians determined there is no new information on historic resources for the Preferred Alternative, and the effects determinations are still valid.

4.3.2 ARCHAEOLOGICAL RESOURCES

Information on archaeological resources is presented in Section 5.3 of the Draft EIS and Section 1.3.3.2 of the Final EIS, and summarized as follows. No NRHP eligible sites have been discovered by previous archaeological investigations and no currently recorded NRHP sites are located in or near the Monroe Bypass portion of the project study area (east of US 601). For the western (Monroe Connector) portion of the project study area (west of US 601), a field review was conducted in 2003. The study indicated a long history of erosion and soil disturbance in Union County and low probability that sites worthy of further investigation are located in the project study area.

As presented in Section 2.5.3.2 of the Final EIS, an additional archaeological assessment was prepared for the Preferred Alternative to identify archaeological resources that may be impacted. The Office of State Archaeology confirmed that an updated archaeological evaluation for the Monroe Bypass portion of the project was not required; therefore, an updated assessment was

prepared only for the Monroe Connector portion of the project between I-485 and US 601. Twenty archaeological sites were identified, all of which were determined not eligible for the NRHP. However, further work was recommended at the Hasty-Fowler-Secrest Cemetery (Site 31UN351**) where human remains were suspected to be present within the Area of Potential Effects (APE).

Since the Final EIS was published, based on the recommendations of the archaeological assessment, an intensive ground penetrating radar survey was conducted at the Hasty-Fowler-Secrest Cemetery in May 2012, as documented in the *Ground Penetrating Radar Survey at the Hasty-Fowler-Secrest Cemetery* (New South Associates, April 2013). According to the survey, there is no indication of possible burials outside the area with extant markers. As included in the project commitments, all possible burials identified in the survey will be treated as potential human graves and treated appropriately under North Carolina burial removal laws.

With the exception of the Hasty-Fowler-Secrest Cemetery survey, NCDOT archaeologists determined there is no other new information on archaeological resources for the Preferred Alternative. Therefore, the finding that the project would have No Effect on archaeological resources on or eligible for listing on the NRHP is still valid.

4.3.3 SECTION 4(F) AND SECTION 6(F) RESOURCES

Section 4(f) and Section 6(f) resources are afforded special considerations from federal actions. 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. Section 6(f) resources include public recreation sites and facilities that have utilized funding through the Land and Water Conservation Fund Act.

As presented in Section 1.3.3.3 of the Final EIS, there is one Section 4(f) resource within the DSA corridors, the Matthews Sportsplex. There are no Section 6(f) resources. Section 2.5.3.3 of the Final EIS states that the Preferred Alternative would not impact any Section 4(f) or Section 6(f) resources. For this document, the DSA corridors were reviewed using GIS data and aerial imagery to identify any new potential Section 4(f) resources. The list of Land and Water Conservation Fund grants on the National Parks Service Web site was also reviewed to identify any new grants in the DSA corridors. No additional Section 4(f) or Section 6(f) resources were identified in the DSA corridors. Therefore, the finding reported in the Final EIS is still valid.

4.4 NATURAL RESOURCES

4.4.1 SOILS, GEOLOGY, AND MINERAL RESOURCES

Information about soils, geology, and mineral resources is presented in Section 6.1 of the Draft EIS and Section 1.3.4.1 of the Final EIS. Soil types within the DSA corridors are listed in Table 1-6 of the Final EIS. There are also several active and inactive mines in Union and Mecklenburg Counties. Soil limitations can be overcome through proper engineering design. It is expected that abandoned mine shafts can be accommodated in the design and construction of the roadway.

Since the Final EIS was published, the Natural Resource Conservation Service (NRCS) published updated soil surveys for Union County and Mecklenburg County on July 26, 2012 and July 6, 2012, respectively. However, the updated soil surveys do not include changes to any soils located within the DSA corridors; therefore, the soils and mineral resources information presented in the Final EIS is still valid for all DSAs, including the Preferred Alternative.

4.4.2 WATER RESOURCES

Water resources are discussed in Section 6.2 of the Draft EIS and Section 1.3.4.2 of the Final EIS. Since the Final EIS was published, the North Carolina Department of Environment and Natural Resources Division of Water Quality (NCDWQ) has updated the Section 303(d)-listed streams in the project study area. The Final EIS notes that Stewarts Creek was included in the Draft 2008 303(d) list. Stewarts Creek within the project study area is now listed on the 2012 Final North Carolina 303(d) list, along with the portions of North Fork Crooked Creek, South Fork Crooked Creek, and Richardson Creek within the project study area (NCDWQ Web site: http://portal.ncdenr.org/web/wq/ps/mtu/assessment).

There have also been updates to National Pollutant Discharge Elimination System (NPDES) permits for dischargers to streams in the project study area. Table 1-7 in the Final EIS identifies the eight permitted discharges into streams that run through the project study area. Since the Final EIS was published, there have been updates to the permitted flow for two of the NPDES permits (http://portal.ncdenr.org/web/wq/swp/ps/npdes). The permitted flow for the Monroe wastewater treatment plant increased from 1.9 million gallons per day (MGD) to 12.5 MGD and the permitted flow for the John Glen water treatment plant was reduced from not limited to 0.9 MGD.

For this document, the NCDWQ Web site was reviewed to verify the best usage classifications and water quality plans applicable to streams in the project study area. There have been no updates to the best-usage classifications of the named stream segments in the study area since the Final EIS was published. The basinwide water quality plans included in Section 6.2.2.4 of the Draft EIS are still up to date.

The updated water resources information presented above does not change the discussion of water resources impacts and mitigation discussed in Section 6.2.3 of the Draft EIS and Section 2.5.4.2 of the Final EIS. Therefore, the findings for the Preferred Alternative presented in Section 2.5.4.2 of the Final EIS, as well as the project commitments related to water resources presented in Table PC-1 of the Final EIS, remain valid.

4.4.3 NATURAL COMMUNITIES AND WILDLIFE

Natural communities include terrestrial (land-based) communities and aquatic communities, and their respective wildlife resources. Information on natural resources and wildlife is presented in the *Natural Resources Technical State Report for the Monroe Connector/Bypass* (ESI, December 2008) and summarized in Section 6.3 of the Draft EIS and Section 1.3.4.3 of the Final EIS. As described in Section 6.3.5 of the Draft EIS, terrestrial communities would be impacted permanently by project construction from clearing and paving. Table 6-3 of the Draft EIS provides the acreage of terrestrial communities by habitat type that would be impacted by each DSA. Table 2-10 of the Final EIS presents potential impacts to terrestrial communities from the Preferred Alternative.

Based on a review of 2012 aerial imagery compared to 2007 aerial imagery (the most recent available when the Draft EIS was developed), there is one area near the western end of the project, between Stinson-Hartis Road and Eaton Avenue, where trees were cleared and buildings (Carolina Courts) constructed within the proposed right of way for DSA Segment 2 after the natural communities field surveys were conducted. DSA Segment 2 is included in DSAs C, D (the Preferred Alternative), C1, D1, C2, D2, C3, and D3. The area within the proposed right of way where trees were cleared totals 3.9 acres that were classified as Mesic Mixed Hardwood Forest in the Draft EIS (Figure 6-1) and Final EIS that should now be classified as

Urban/Disturbed. **Table 4-4** is an updated version of Table 6.3 from the Draft EIS that reflects the change of 3.9 acres of Mesic Mixed Hardwood Forest to Urban/Disturbed within the proposed right of way for DSAs that include DSA Segment 2.

TABLE 4-4: Potential Impacts to Terrestrial Communities by Detailed Study Alternative (updated Table 6.3 of the Draft EIS)

DSA	Agriculturally Maintained (acres)	Basic Mesic Forest (Piedmont Subtype) (acres)	Mesic Mixed Hardwood Forest (Piedmont Subtype) (acres)	Piedmont/ Low Mountain Alluvial Forest (acres)	Pine Forest (acres)	Suc-cessional (acres)	Urban/ Disturbed (acres)	Open Water (acres)	Total (acres)
A	546	29	433	26	19	101	230	10	1,394
B	552	27	430	22	19	97	234	8	1,389
C	494	20	396	24	16	105	212	10	1,277
D	499	17	393	20	16	101	215	8	1,269
A1	608	25	360	21	10	88	237	10	1,359
B1	613	22	357	17	10	84	240	8	1,351
C1	555	15	323	19	6	92	219	10	1,239
D1	560	13	320	15	6	88	222	8	1,232
A2	561	29	439	27	19	101	232	10	1,418
B2	566	27	436	23	19	97	235	8	1,411
C2	509	20	402	25	16	105	213	10	1,300
D2	514	17	399	21	16	101	216	8	1,292
A3	622	25	366	22	10	88	238	10	1,381
B3	627	22	363	18	10	84	241	8	1,373
C3	570	15	329	20	6	92	220	10	1,262
D3	575	13	326	16	6	88	223	8	1,255

Source: Data in table was calculated using GIS with data from the *Jurisdictional and Community Impacts Technical Memorandum for the Monroe Connector/Bypass* (ESI, January 2009) and functional engineering designs.
NOTE: The acreages for DSAs containing DSA Segment 2 (DSAs C, D, C1, D1, C2, D2, C3, and D3) were updated to reflect the conversion of 3.9 acres of Mesic Mixed Hardwood Forest to Urban/Disturbed following publication of the Final EIS.

As shown in the table, the conversion of the forested area causes a small reduction (four acres) in the acreage of forested land to be impacted by eight of the 16 DSAs, including the Preferred Alternative (DSA D), and therefore would not result in any increase in impacts to natural communities as reported in the Final EIS.

All of the DSAs, including the Preferred Alternative, would have direct impacts on terrestrial communities and the animals that inhabit them. Destruction of natural communities along the Preferred Alternative right of way would result in the loss of foraging and breeding habitats for the various animal species that inhabit the area. Habitat fragmentation also is expected to occur under the No-Build Alternative due to projected continued growth in population and development in Union County.

Aquatic communities in the DSAs include both intermittent and perennial streams, as well as still-water ponds. The locations of these resources within the Preferred Alternative corridor have been verified by jurisdictional determinations from NCDWQ and the USACE, as described in **Section 4.4.4**. These determinations are valid until October 1, 2015, and therefore the locations of aquatic communities and potential impacts to these communities as reported in the Final EIS are still valid and no updates are required at this time. Potential impacts to aquatic communities discussed in the Final EIS include fluctuations in water temperature as a result of

the loss of riparian (forest) vegetation, and temporary and permanent impacts to aquatic organisms as a result of increased sedimentation. Impacts to aquatic communities and wildlife from erosion and sedimentation will be minimized through implementation of a stringent erosion-control schedule and the use of Best Management Practices (BMPs), as discussed in Section 2.5.4.2 of the Final EIS.

Updated information regarding indirect and cumulative impacts to natural communities and wildlife is presented in the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013) and **Section 4.5** of this document.

4.4.4 WATER RESOURCES IN FEDERAL JURISDICTION

Jurisdictional resources are discussed in Section 6.4 of the Draft EIS and Section 1.3.4.4 of the Final EIS. Project construction for any of the DSAs cannot be accomplished without infringing on surface waters, including streams, wetlands, and ponds. Streams may be bridged, filled, relocated, or placed in a culvert by project construction. Wetlands may be either partially or completely filled. In some instances, larger wetland areas may become hydraulically disconnected from an adjacent stream.

Table 1-8 in the Final EIS presents the amount of streams, wetlands, and ponds estimated to be impacted by each DSA. The impacts were calculated using the functional design estimated construction limits plus 40 feet, in accordance with NCDOT procedures, and take into account avoidance and minimization measures that have been incorporated into the project, including the bridging of streams and wetlands. Based on the functional designs prepared for all the DSAs, DSA A2 would have the greatest intermittent stream impacts (totaling 13,374 linear feet), and DSA A3 would have the greatest perennial stream impacts (12,383 linear feet). DSA D1 would have the least intermittent stream impacts (11,121 linear feet), and DSA D (Preferred Alternative) would have the least perennial stream impacts (9,794 linear feet). DSA C would have the most wetland impact (11.0 acres), and DSA D3 would have the least impact (6.6 acres).

Table 2-11 in the Final EIS presents the impacts to water resources for the Preferred Alternative based on the refined functional design's estimated construction limits plus 40 feet. There have been no changes to the refined functional design for the Preferred Alternative; therefore, the estimated impacts to jurisdictional resources presented in Table 2-11 of the Final EIS are still valid. These impacts include 12,729 linear feet of intermittent streams, 10,353 linear feet of perennial streams, 3.1 acres of ponds, and 8.1 acres of wetlands.

Based upon field reviews conducted by NCDOT, USACE and NCDWQ on May 26 and 27 and June 9 of 2010, jurisdictional determination forms were received from NCDWQ on August 5, 2010, and from the USACE on October 1, 2010. These forms confirm the locations of jurisdictional resources within the Preferred Alternative corridor. In accordance with Section 404 of the Clean Water Act, these determinations can be relied upon for a period up to five years (in this case, October 1, 2015).

Mitigation would be required for the anticipated impacts to Waters of the US, and will be provided through the in-lieu fee program of the NCDENR Ecosystem Enhancement Program (EEP). A conceptual mitigation plan for the Preferred Alternative that includes the EEP has been prepared, and is described in Section 2.5.4.4 of the Final EIS. Following issuance of the Record of Decision in August 2010 (since rescinded), the USACE issued a Section 404 permit for the project on April 15, 2011. Due to the appellate court decision (See **Section P.4.5**), the USACE suspended the Section 404 permit on May 21, 2012, and NCDWQ withdrew the Section 401 permit on June 8, 2012. As a result of the extended preparation time for this Draft

Supplemental Final EIS, the USACE decided on April 17, 2013 to revoke the Section 404 permit until a new Record of Decision is issued and updated information is submitted in a new application. A copy of the permit revocation letter is included in **Appendix C**.

4.4.5 PROTECTED SPECIES

Information on protected species is presented in Section 6.5 of the Draft EIS and Section 1.3.4.5 of the Final EIS, and is based on the analysis documented in the *Natural Resources State Technical Report for the Monroe Connector/Bypass* (ESI, December 2008). The US Fish and Wildlife Service (USFWS) lists four species under federal protection that are considered to have ranges extending into Union County and/or Mecklenburg County (USFWS Web site: http://www.fws.gov/raleigh/species/cntylist/nc_counties.html). These species are listed in Table 1-9 in the Final EIS**,** along with the bald eagle, which has been delisted but is still federally-protected by the Bald and Golden Eagle Protection Act. As reported in Section 6.5.4 of the Draft EIS and Section 1.3.4.5 of the Final EIS, a biological conclusion of No Effect was determined for Michaux's sumac, smooth coneflower, and bald eagle. A biological conclusion of May Affect, Not Likely to Adversely Affect was determined for Schweinitz's sunflower, and a biological conclusion of Unresolved was determined for the Carolina heelsplitter and its designated critical habitat.

Following publication of the Draft EIS, a Biological Assessment was prepared to evaluate protected species that may be impacted by the Preferred Alternative. The *Biological Assessment for the Monroe Connector-Bypass Project (R-3329/R-2559)* (The Catena Group, May 2010) examined impacts to endangered plant species and freshwater mussels. A summary of the Biological Assessment is presented in Section 2.5.4.5 of the Final EIS. The USFWS concurred with the following biological conclusions, as presented in the Biological Assessment, on July 29, 2010:

- Michaux's sumac – No Effect
- Smooth coneflower – No Effect
- Schweinitz's sunflower – May Affect/Not Likely to Adversely Affect
- Carolina heelsplitter – May Affect/Not Likely to Adversely Affect
- Carolina heelsplitter Designated Critical Habitat – May Affect/Not Likely to Adversely Affect

A copy of the USFWS concurrence letter is included in **Appendix C**. Conservation measures were proposed in the Biological Assessment and accepted by USFWS to further ensure a conservative approach to the analysis of the project's impacts on the Carolina heelsplitter. These measures included funding continued operation of US Geological Survey stream gauge on Goose Creek for five years and providing funding to the Carolina Heelsplitter Conservation Bank in the Flat Creek watershed in Lancaster County, South Carolina in the amount of $150,000 to support ongoing research and surveying efforts, as well as protect, manage, and monitor land in the conservation bank. These conservation measures have been implemented.

In September 2012, additional surveys were performed in the project area for Schweinitz's sunflower (*Helianthus schweinitzii*), Michaux's sumac (*Rhus michauxii*), and Georgia aster (*Symphyotrichum georgianum* or *Aster georgianus*) to update the findings of the Biological Assessment. Additional surveys were not conducted for smooth coneflower because it is not listed as potentially occurring in Union County. It is listed as potentially occurring in Mecklenburg County, but the Preferred Alternative corridor only extends slightly into

Mecklenburg County and there is no potential for impacts. Georgia aster is currently listed as a candidate species in both Union and Mecklenburg Counties, but the species may be elevated in the future and therefore was included in the surveys.

Surveys were performed visually using systematic overlapping transects to cover all suitable habitat areas. As stated in a project memorandum to file dated October 1, 2012, no plants of any of the three species were found. Therefore, the biological conclusions for Schweinitz's sunflower and Michaux's sumac as reported in the Final EIS and Biological Assessment are still valid. It is anticipated these conclusions would be the same for other DSAs. NCDOT and FHWA will coordinate with USFWS to monitor the status of the potential listing of Georgia Aster (*Symphyotrichum georgianum*) and Savannah Lilliput (*Toxolasma pullus*) throughout construction.

Updated field surveys of the Carolina heelsplitter population in the critical habitat portion of Goose Creek, from the Rocky River confluence to the NC 218 crossing, were conducted in 2011 as part of a Biological Assessment for an NCDOT bridge replacement project (Project B-5109). These surveys located a total of twelve live individuals, and one fresh dead shell. The majority of the individuals were estimated to be less than 5 years of age based on shell condition and growth rests, indicating relatively recent reproduction. These twelve live individuals were the most that have ever been recorded in Goose Creek in one year. From 1993 to 2010, the combined total of live individuals found was only nineteen. Repeated survey efforts in Duck Creek in 2011 and 2012 have not located any live individuals.

In October 2012, additional freshwater mussel surveys were performed in the project area. As documented in the *Freshwater Mussel Survey Report Update* (The Catena Group, May 2013), streams identified during the 2009 surveys that contained robust freshwater mussel populations (South Fork Crooked Creek, Stewarts Creek, and portions of Crooked Creek and Richardson Creek) were re-evaluated in 2012 since these streams could potentially support the federally endangered Carolina heelsplitter (*Lasmigona decorata*). As was the case in 2009, the Carolina heelsplitter was not found in any of the surveyed streams. Therefore, the biological conclusions for this species and its critical habitat as reported in the Final EIS and Biological Assessment are still valid.

In addition to August 2011 letters requesting additional information or clarifications of project information, USFWS on December 20, 2012, sent a letter to NCDOT recommending re-initiation of consultation under Section 7 of the Endangered Species Act, among other comments. Copies of these letters are provided in **Appendix C-2**. FHWA and NCDOT met with USFWS representatives on July 10, 2013 to discuss the results of the draft quantitative ICE update (meeting minutes are provided in **Appendix C-2**).

On August 28, 2013, NCDOT and FHWA submitted a *Draft Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species* (Michael Baker Engineering, Inc., August 2013). In response to USFWS comments provided on September 30, 2013, NCDOT submitted a letter to USFWS on October 23, 2013 requesting re-initiation of Section 7 informal consultation for the project, along with a new *Biological Assessment* (The Catena Group, October 2013) and a revised *Draft Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species* (Michael Baker Engineering, Inc., October 2013). These documents are included in **Appendix C-2**. The *Draft Technical Report* considers the additional surveys and analysis conducted after the Final EIS, including the updated field surveys described above and the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013) summarized in **Section 4.5**. The following findings are presented in the *Draft*

Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species (Michael Baker Engineering, Inc., October 2013):

- Updated field surveys for protected plants and the Carolina heelsplitter within the project area found no new populations, thus there is no change in the anticipated direct effects of the project.
- For the Schweinitz's sunflower, findings indicate that for the Future Land Use Study Area (FLUSA) under the 2030 Build Scenario, there is a four percent greater decrease in land exhibiting habitat characteristics that might support the species as compared to the change predicted under the 2030 No-Build Scenario.
- For the Carolina heelsplitter and Carolina heelsplitter critical habitat, since there are no predicted changes in land use within the Sixmile Creek and Goose Creek watersheds from the 2030 No-Build to the 2030 Build Scenario, there are no indirect or cumulative land use impacts. There are also no differences in the impervious surface levels or percent impervious cover between the 2030 Build and 2030 No-Build Scenarios for the two watersheds.

The biological conclusions presented in the October 2013 *Biological Assessment* are the same as those presented in the original May 2010 *Biological Assessment*. NCDOT and FHWA are currently working with USFWS to reach concurrence on the biological conclusions presented in the new (October 2013) *Biological Assessment*. USFWS consultation will be complete prior to issuance of the Combined Final Supplemental Final EIS/ROD.

4.5 INDIRECT AND CUMULATIVE EFFECTS

The following is a summary of the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013). The document is included in its entirety in **Appendix E-1** and selected supporting documentation referenced in the document is provided in **Appendix E-2**.

Background. The FHWA rescinded its Record of Decision (ROD) for the project on July 3, 2012. This action was in response to the decision of the United States Court of Appeals for the Fourth Circuit to vacate the United States District Court decision in *NC Wildlife Federation v NCDOT* and remand the decision for further review and analysis by the agencies.[4]

Since that time, the NCDOT and the FHWA have conducted additional research, investigation and analysis on the potential indirect and cumulative effects on land use and water quality in the project area. The NCDOT and the FHWA developed the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013) to update the quantitative indirect and cumulative effects analysis for land use (Quantitative ICE) for the Monroe Connector/Bypass project and to determine whether the quantitative indirect and cumulative effects water quality analysis included in the Final EIS as Appendix H remains appropriate.

4.5.1 METHODOLOGY

The scope of the work for the update of the Quantitative ICE generally included the following activities:

[4] NC Wildlife Federation v NC DOT, US Court of Appeals for the 4th Circuit, May 3, 2012, p 15

1. Review conditions and trends in the study area and update baseline land use data,
2. Review the regional travel demand model socioeconomic projections, developed for MUMPO, including how other studies have used the projections, and determine the most appropriate data set for the ICE analysis of future land use,
3. Develop the future No-Build and Build land use scenarios and thoroughly explain the methods used to estimate induced growth,
4. Report revised induced growth results and conclusions based on the updated land use scenarios, and
5. Review measures that localities and others could adopt to minimize any impacts of future development, whether induced or not, on sensitive environmental resources.

The Quantitative ICE update summarizes the conclusions reached in the evaluation of ICE and describes the data collected, methodologies used and analysis conducted for the ICE for the project. The update also re-evaluates and considers data and analytical research relevant to the project area, and new information relevant to the analysis of the indirect and cumulative effect on land use, water quality, and federally designated threatened and endangered species and their critical habitat in the surrounding area. Since the Carolina heelsplitter (federally protected freshwater mussel) lives in two watersheds in the study area, water quality is a major focus area of the updated analysis. Thus, results are reported for both the overall study area and at the watershed level.

How Was the Study Area Land Use Data Updated? In reviewing conditions in the study area, the study team analyzed the following:

- Conducted new interviews with local planners
- Incorporated the 2010 Census and reviewed and analyzed growth trends and conditions in the study area
- Identified and incorporated new, reasonably foreseeable proposed or approved development activity
- Reviewed new planning documents (such as new land use plans and new capital improvement plans) and identified differences in future growth plans and related infrastructure.

The additional research found some changes in existing land uses and some updates to future expectations of land use change and development. Overall, the evidence strongly indicates that Union County has a history of relatively fast growth and continues to exhibit factors that would continue to encourage growth rates that exceed the regional average regardless of whether the proposed project is completed.

How Was Existing Land Use Modeled for this Study? Existing land use was modeled using a combination of parcel level GIS data from Mecklenburg and Union Counties, raster (image) format GIS data describing undeveloped land cover and a cross check against aerial imagery. These sources were combined to model the land uses in the study area in a land cover raster image. Given the age of various data sources available, the most recent date to which the existing land use could be reasonably updated is 2010.

How Was Future Growth Estimated? Several different agencies and organizations forecast or project growth in North Carolina to the county level. Federal law requires every MPO to estimate the long-term travel needs of their respective regions in their Metropolitan

Transportation Plans (MTP). Most MPOs must also assess the air quality impacts of their MTPs for compliance with the Clean Air Act. Thus, MPOs develop future demographic projections (including employment and households) for small geographic units called traffic analysis zones (TAZs). These projections typically consider projections from other state and federal agencies and private organizations. As noted above, the Quantitative ICE analysis requires a data source that enables future projection of land use at a detailed geographic level. Since the MPO's projection process and future projections have been determined to be acceptable for complying with the Clean Air Act and other federal regulations, which includes a public review process, they were considered the best available and reasonable source for estimating future growth in the context of the ICE analysis for this project. Furthermore, as described below, an in-depth review was conducted of the MPO projection process, the data origins and assumptions, and as necessary, assumptions were tested regarding the Monroe Connector/Bypass in order to fully understand the appropriate use of the data.

4.5.2 HOW WERE THE MPO SOCIOECONOMIC PROJECTIONS DEVELOPED?

MUMPO developed its latest projections in 2009 for use in its most recent (2035) Long-Range Transportation Plan (LRTP). These projections were developed using a spreadsheet workbook based model called a Land Use Allocation Model (LUSAM). The LUSAM model relied, in turn, on previous projections developed in 2005 by MUMPO and its regional partners at other surrounding MPOs and Rural Planning Organizations (RPOs). Those projections supported the 2030 LRTP.

The 2005 Projections (which were used in the 2030 LRTP) were developed through a process with three main components, a Top-Down projection, a Bottom-Up projection and input from an advisory group on the final projections. The development of the TAZ-level projections relied first on the Top-Down process to project future growth at the regional level and then allocate the regional growth to the county level. Dr. Thomas Hammer conducted the Top-Down analysis and his report, *Demographic and Economic Forecasts for the Charlotte Region*, documents his methodology and results. Dr. Hammer used a highly detailed, employment and earnings based model to estimate regional growth and then allocated that growth to counties based on detailed statistical relationships based on his research into 227 other counties in 29 other metropolitan areas across the eastern US.

A subsequent Bottom-Up process allocated the county-level growth to the TAZ level within each county. Different parts of the Metrolina region used different approaches to the Bottom-Up process, but for the MUMPO area, which included most of Union County, a process prepared by Paul Smith of UNC-Charlotte provided the initial allocation. Mr. Smith's report *Mecklenburg-Union Metropolitan Planning Organization Population Projections and Employment Allocations, 2000-2030* documents his methodology and results. Mr. Smith's process focused on the household (and by default population) allocation and the allocation of population-chasing employment. Population-chasing employment is that employment associated with retail and services that tend to follow population growth. Non-population-chasing employment was distributed solely based on the input of staff and expert panel participants. Mr. Smith's allocation process started with the county-level control totals developed in the Top-Down process, existing baseline data (2000), and the influence of the land development factors chosen and ranked by expert panels. Within Union County, there were eight land development factors used to assess the attractiveness and capacity of each TAZ in the county to draw future growth. As was the case with the Top-Down projections, the Bottom-Up steps used input from local planners and jurisdictional representatives to review and refine the projections prior to adoption.

Review of Metrolina Socioeconomic Projection Versions. The study team reviewed and analyzed the Metrolina Regional Model (MRM) Socioeconomic Projections and assessed them for use in the ICE analysis. The review included an assessment of the following factors:

1. Review of the various socioeconomic projection versions developed by the MPO and the assumptions upon which they rely
2. Analysis of the specific methodology used with the Travel Time to Employment factor in the allocation of growth within Union County
3. Re-evaluation of the Travel Time to Employment factor where the Monroe Connector/Bypass was removed from the analysis
4. Assessment of other studies that have used or analyzed the MPO projections and the conclusions they have drawn about those projections and from those projections.

From 2003 to 2009, the Charlotte Department of Transportation (CDOT), the official custodian of the MRM, in cooperation with MUMPO and other MPOs and Rural Planning Organizations (RPOs) in the region, developed various socioeconomic projections to input into the MRM in support of the MPO LRTP development. **Table 4-5** summarizes these various projections and shows a timeline of the development of these projections.

The 2009 Projections were used for the Quantitative ICE analysis because MUMPO used this data set with its most recent transportation planning approvals and the June 2013 update of its LRTP. Although MUMPO is currently working on a new set of socioeconomic projections to support its 2040 LRTP, those projections are not anticipated to be complete or fully approved nor accepted for transportation conformity purposes until May 2014 and therefore would be inappropriate to use in the analysis.

TABLE 4-5: MRM Socioeconomic Projections Versions

Projections Name	TAZ File Name	Projections Completed	Use for LRTP Conformity Determination	Associated Model Version	Base and Horizon Years
2009 Projections	SE_*Year*_091028	October 2009	MUMPO 2035 LRTP	MRM 09 v1.0 MRM 11 v1.0 MRM 11 v1.1	Base: 2005 Horizon: 2015, 2025, 2035
2008 Interim Projections	SE_*Year*_081119_ MUMPO_interim	November 2008		None	Base: 2005 Horizon: 2015, 2025, 2035
2008 Projections	SE_*Year*_081024	October 2008	RFATS 2035 LRTP	MRM 08 v1.0	Base: 2005 Horizon: 2015, 2025, 2035
2005 Projections	SE_*Year*_taz2934	May 2005	MUMPO 2030 LRTP	MRM 05 v1.0 MRM 06 v1.0 MRM 06 v1.1	Base: 2000 Horizon:2010, 2020, 2030

The 2009 Projections used a spreadsheet workbook modeling process (called the Land Use Allocation Model or LUSAM) that included a number of variables. A detailed analysis of those factors showed that none of the factors used to develop the projections were affected by the proposed project. In particular, the study team worked with CDOT and Paul Smith to reanalyze the Travel Time to Employment Factor used in the Bottom Up allocation process of the 2005 Projections which were used for the 2030 LRTP and which substantially provided the basis for the 2009 Projections. When Mr. Smith ran his original land use allocation models in 2004, his roadway network for his Travel Time to Employment Factor included the proposed project.

When Mr. Smith reran his allocation models in July 2012 without the proposed project in his roadway network for that factor, the results were exactly the same as the original results.

4.5.2.1 Did the Monroe Connector/Bypass Influence the MPO Projections?

A detailed assessment of the MRM socioeconomic projections reveals the following regarding the influence of the Monroe Connector/Bypass on the 2009 Projections:

- The proposed project did not affect the Travel Time to Core Employment factor in the LUSAM process, as this factor had zero weight for all districts for all LUSAM runs.
- The proposed project did not affect the Planners' Judgment factor in the LUSAM process, as this factor had zero weight for all districts in Union County for all LUSAM runs.
- The proposed project was included in the Travel Time to Employment factor used by Paul Smith in developing the 2005 Projections, but a reassessment of that factor without the proposed project (as discussed in Section 3.2 of the Quantitative ICE update) shows that the project had no influence on the projection results.
- The proposed project did not affect Dr. Hammer's projections of households and employment that were used in the 2005 Projections for county level control totals and were used in the 2008 Interim and 2009 Projections for developing the district level targets.
- There is no evidence or indication that any other factor in the LUSAM process or the other projection processes was influenced by the proposed project, and communications with CDOT and Union County planning staff indicate that the proposed project was not a consideration in development of the projections.
- A review of the distribution of projected households and employment relative to the proposed project location shows no signs that the proposed project influenced the projections.

The analysis shows that the various models used to develop the MRM socioeconomic projections are insensitive to the presence or absence of the proposed project. It was determined the methodology used by CDOT and MUMPO to develop the socioeconomic projections is effectively insensitive to any potential induced land use effects associated with the Monroe Connector/Bypass. Dr. Hammer states that he made specific adjustments to his projections for two large roadway projects (NC 16 in Lincoln County and the Garden Parkway) but not the Monroe Connector/Bypass in the Top-Down process that was used to develop total population and employment estimates. As the sensitivity analysis of Paul Smith's Travel Time to Employment Factor showed, the proposed project made no difference in the Bottom-Up allocation process. If the ICE analysis were to follow the exact same methodology used by MUMPO to calculate induced growth impacts of the Monroe Connector/Bypass then the result would be to find no induced growth, since the methodology would be blind to the accessibility impacts of the project. Therefore, other methodologies were used to estimate potential induced growth and induced land use changes associated with the proposed project, as summarized below in **Section 4.5.3**.

4.5.2.2 Are There Other Information Sources that Agree with the Assessment of the MPO Forecasts?

The NCTA hired Wilbur Smith Associates (WSA) to conduct a preliminary and then final comprehensive traffic and revenue study for the proposed project. WSA, in consultation with NCTA, hired the Kenan Institute of Private Enterprise at the University of North Carolina's Kenan-Flagler Business School (Kenan Institute) in 2009 to develop a set of TAZ-level socioeconomic projections specifically for the project's Comprehensive Traffic and Revenue Study. The Kenan Institute reviewed the 2008 Interim Projections and made two adjustments to MUMPO's socioeconomic estimates. "The first was to make region-wide adjustments consistent with the national growth expectations (the 2008 economic adjustment). The second was to reallocate growth in Union County in line with development factors and constraints."[5]

Looking within the project corridor, the Kenan Institute accepted the allocation of growth by the MPO in Mecklenburg County. However, it reallocated the projected population growth within Union County away from the line of high growth in the southwest quadrant of the county to the Monroe Connector/Bypass corridor because of the project. The Kenan Institute also reallocated a portion of the expansion in several high growth TAZs in the northeastern quadrant of the county towards the corridor. The Kenan Institute made these adjustments based on results of interviews with local planners, analysis of growth trends in the area, and analysis of water and sewer demand and capacity in the area. Our analysis of the Kenan Institute adjustments to MUMPO's projections showed that the Kenan Institute reallocated about 1,800 households or about 3 percent of Union County growth towards the project corridor. Further analysis of the Kenan Institute adjustments to 2008 Interim Projections showed that the reallocation of growth was similar to the growth patterns in the Draft EIS Qualitative ICE.

4.5.2.3 How Did the Quantitative ICE Use the MPO Projections?

The preceding analysis of the MPO socioeconomic projections leads to the conclusion that, if MUMPO's land use models were used to evaluate future changes between the No-Build and Build scenarios, there would be no difference between the two. The conclusions of the Qualitative ICE and research into local expectations suggest that it is unlikely that there would be absolutely no difference in land use development conditions in the study area between a No-Build and Build Scenario. Therefore, an induced growth analysis was conducted to account for the potential environmental impacts of these potential land use changes. In the analysis of potential induced land use changes, the MPO socioeconomic projections were used as control totals along with local land use plans and other regulations, to develop a scenario without the project (hereafter referred to as the No-Build Scenario). Potential induced growth and induced land use changes associated with the proposed project were estimated and that estimated induced growth was added to the No-Build land use scenario to create a new scenario that represents future conditions with the project and its growth-inducing impacts (i.e. the Build Scenario). This methodology was originally developed in consultation with the resource agencies and did not reallocate growth within the FLUSA, and is thus considered conservative in nature in that it might overestimate cumulative impacts since we did not reallocate growth between the No-Build and Build scenarios.

A reallocation approach might have resulted in shifting growth eastward in the study area by taking expected growth from the areas of northwestern and central Union County and shifting it

[5] Kenan Institute Report p 29

eastward toward Wingate. This approach might have been reasonable as areas of eastern Union County will be relatively more accessible under a Build Scenario due to reduced travel times and therefore some growth that would have occurred in northwestern or central Union County under a No-Build Scenario would instead occur in eastern Union County. To err on the side of overestimating cumulative impacts, an additive approach was used where growth was added, over and above the No-Build Scenario, to create the Build Scenario without reallocation.

4.5.3 HOW WAS INDUCED GROWTH ESTIMATED?

The No-Build Scenario was developed using local zoning and land use plans to determine the total build-out capacity of the study area and then using the MPO projections as a control total (total population and total employment for the study area) for determining how much of that capacity would actually develop by 2030.

The Build Scenario was developed using a combination of the four analytical techniques.

1. A scenario writing approach was used to identify areas most likely to see induced growth based on planning information and interviews.
2. A build-out analysis was conducted to see which areas had the most capacity for induced growth.
3. An accessibility analysis was completed to see which areas would most benefit from the proposed project and thus be most likely to see induced growth.
4. A Hartgen Analysis was used to estimate potential commercial growth at interchange areas.

These methods were combined to estimate the likely induced development within the FLUSA and this induced development was then added to the No-Build Scenario to create a Build Scenario. The accessibility analysis used to help determine land use effects associated with the project was based on the assumption of a "free" high-speed roadway. Since NCDOT intends to implement the project as a toll road or "priced" facility, it is possible that our results will represent a high range or conservative estimate of effects. A logical conclusion is that a toll captures some of the value that drivers' gain in shorter travel times and therefore the accessibility improvements of new, tolled facilities are less likely to encourage induced land use changes than a free facility might. Nevertheless, there is insufficient research on induced land use changes associated with tolled facilities to estimate how much tolling would reduce potential induced land use changes. Therefore, the estimates were not adjusted to account for that factor.

In the research conducted for the ICE, two noteworthy proposals surfaced that the study team specifically considered for how those proposals might need to be addressed in the future land use scenarios. The study team investigated the proposed industrial park in eastern Union County, called Legacy Park. Based on interviews with Union County officials, CSX staff and researchers familiar with the proposal, the study team determined that the proposal was not reasonably foreseeable at this time and did not include any portion of the proposal in any future land use scenario. Additionally, the study team reviewed the draft *US 74 Revitalization Study* (HNTB, June 2013) and its recommendations for their potential impact to future land use scenarios. Since the study is still draft and has not been adopted, and since the land use and other recommendations would result in minimal changes to the land use scenario results, the study team determined it was not reasonably foreseeable to incorporate the draft plan recommendations into any future land use scenario.

4.5.4 WHAT ARE THE RESULTS OF THE UPDATED ICE ANALYSIS?

The following section outlines the updated results from the three updated scenarios, the 2010 Existing (Baseline), the 2030 No-Build, and the 2030 Build scenario. As with any attempt to project the future, the accuracy of these results for future years is problematic as the typical error range for long-range forecasting of households and employment is upward of 25 percent. Thus, one should interpret the future year results as the best estimate within a wide range of potential error. **Table 4-6** shows the results of all updated land use scenarios. **Figure 4-7** illustrates the updated 2010 Baseline Land Use. **Figure 4-8** illustrates the results of the updated No-Build Scenario. **Figure 4-9** illustrates the results of the updated Build Scenario.

TABLE 4-6: Updated Land Use Scenario Results

	Updated Baseline (2010)		Updated 2030 No-Build			Updated 2030 Build		
Land Use	Total Area (acres)	% of Total Area	Total Area (acres)	% of Total Area	Change in % from Baseline	Total Area (acres)	% of Total Area	Change in % from No-Build
Total Residential	71,500	35%	97,900	48%	13%	99,700	49%	1%
Low Density	*55,600*	*28%*	*79,500*	*40%*	*12%*	*80,600*	*40%*	*0%*
Medium Density	*12,900*	*6%*	*14,900*	*7%*	*1%*	*15,600*	*8%*	*1%*
High Density	*3,100*	*2%*	*3,500*	*2%*	*0%*	*3,500*	*2%*	*0%*
Commercial	3,900	2%	5,600	3%	1%	5,900	3%	0%
Industrial/Office/Institutional	7,100	4%	8,700	4%	1%	8,800	4%	0%
Transportation	12,700	6%	12,800	6%	0%	13,900	7%	1%
Total Developed	**95,200**	**47%**	**125,000**	**62%**	15%	**128,200**	**63%**	**2%**
Total Agricultural	**52,900**	**26%**	**37,500**	**19%**	-8%	**35,500**	**18%**	**-1%**
Total Forested	**51,900**	**26%**	**37,700**	**19%**	-7%	**36,500**	**18%**	**-1%**
Total Other	**1,900**	**1%**	**1,800**	**1%**	0%	1,800	1%	**0%**
TOTAL	**202,000**	**100%**	**202,000**	**100%**	0%	**202,000**	**100%**	**0%**

Notes: Results have been rounded to the nearest 100 acres and whole percent. Differences were calculated prior to rounding. Totals may appear not to equal the sum of the parts because of rounding.

Impervious surface was calculated based on the Natural Resource Conservation Service (NRCS) (formerly the Soil Conservation Service) TR-55 Manual guidance for impervious surface levels by land use category. Impervious surface results were compared to the results of the prior Quantitative ICE analysis to determine whether additional water quality modeling might be needed. Given how similar the updated results are, there appears to be little need for additional water quality modeling. The results for the Baseline, No-Build and Build Scenarios compared to the prior results are shown in **Table 4-7**.

TABLE 4-7: Percent Impervious Cover Results from 2010 Report Compared to 2013 Report

Watershed Name	Impervious Cover Results from 2010 Report				Impervious Cover Results from 2013 Report				Difference in Change in Build from No-Build between 2010 Report and 2013 Report
	2007 Baseline	2030 No-Build	2030 Build	Change in Build from No-Build	2010 Baseline Updated	2030 No Build Updated	2030 Build Updated	Change in Build from No-Build	
Study Area	18%	22%	22%	0%	18%	22%	23%	1%	1%
Beaverdam Creek	6%	7%	7%	0%	6%	7%	7%	0%	0%
Richardson Creek (Upper)	14%	18%	18%	0%	14%	18%	18%	0%	0%
Rays Fork	12%	16%	17%	1%	12%	16%	17%	1%	0%
Bearskin Creek	24%	31%	31%	0%	24%	31%	31%	0%	0%
Richardson Creek (Middle)	23%	27%	29%	2%	23%	27%	30%	3%	1%
Gourdvine Creek	6%	8%	8%	0%	6%	8%	8%	0%	0%
Salem Creek	9%	13%	14%	1%	9%	13%	16%	3%	2%
Sixmile Creek	25%	30%	30%	0%	26%	31%	31%	0%	0%
Twelvemile Creek	22%	25%	25%	0%	22%	25%	25%	0%	0%
Richardson Creek (Lower)	10%	15%	16%	1%	10%	15%	17%	2%	1%
Stewarts Creek	15%	20%	22%	2%	15%	21%	23%	2%	0%
Fourmile Creek	32%	34%	34%	0%	32%	35%	35%	0%	0%
Crooked Creek	21%	25%	27%	2%	22%	26%	28%	2%	0%
Goose Creek	13%	17%	17%	0%	13%	18%	18%	0%	0%
Irvins Creek	35%	37%	37%	0%	35%	38%	38%	0%	0%
McAlpine Creek	36%	37%	37%	0%	36%	38%	38%	0%	0%
Bakers Branch	6%	8%	8%	0%	5%	8%	8%	0%	0%
Wide Mouth Branch	10%	12%	12%	0%	10%	12%	12%	0%	0%

Notes: Results have been rounded to the nearest one whole percent. Differences were calculated prior to rounding. Totals may appear not to equal the sum of the parts because of rounding.

4.5.5 WHAT ARE THE IMPACTS ASSOCIATED WITH THE RESULTS OF THE ANALYSIS?

The following sections summarize indirect impacts to land use and impervious surface; cumulative impacts to water quality, endangered species, land use and farmland, and wildlife habitat; indirect and cumulative impacts to traffic; and consistency with local plans.

4.5.5.1 Indirect Impacts to Land Use and Impervious Surface

Land Use Impacts. All changes in land use within the entire study area from the Baseline to the Build Scenario are within two percent (i.e., between negative one percent and one percent) of the change that is predicted for the 2030 No-Build Scenario. Additional development (including direct and indirect effects) estimated to occur under the 2030 Build Scenario totals approximately 3,400 acres more, or about 2 percent more than the total development expected under the 2030 No-Build Scenario. The indirect land use effects are modest, totaling about 2,300 acres of additional development, an increase of less than 2 percent over the No-Build Scenario and an increase in development of about 1 percent of the total land area within the study area.

Incremental effects to agricultural and forested lands are a reduction of 2,000 and 1,200 acres, respectively, as a result of the additional developed land. The 2030 No-Build Scenario shows a 29 percent reduction in agricultural land compared to the 2010 Baseline, whereas the 2030 build Scenario shows a 33 percent reduction. The 2030 No-Build Scenario shows a 27 percent

reduction in forested land compared to the 2010 Baseline, whereas the 2030 Build Scenario shows a 30 percent reduction. For both forested and agricultural land uses, the decrease equals a change of less than one percent of total land. Overall, while there are sizeable reductions in agricultural and forested lands, the indirect impacts are small and the cumulative impacts are minimal and the small additional loss does not create a substantial overall impact. It is likely that some portion of the household increase would shift within the study area and the remainder would shift from elsewhere in the greater metropolitan area. However, in an effort to estimate the environmental impacts for each watershed without underestimating them, no portion of this induced household growth has been subtracted from elsewhere in the study area.

Impervious Surface Impacts. Findings show the incremental effect of the 2030 Build Scenario will be a one percent increase in impervious surface throughout the study area as compared to the change predicted for the 2030 No-Build Scenario. This results in approximately 2,000 additional acres of impervious surface. With the 2030 Build Scenario, increases in percent impervious surface as compared to the change predicted for the 2030 No-Build are found in six of the 18 watersheds in the study area. These increases are between one and three percent. There is no difference in impervious surface resulting from direct or indirect effects in the Goose Creek or Sixmile Creek watersheds between the 2030 No-Build and 2030 Build Scenarios.

4.5.5.2 Cumulative Impacts to Water Quality

As stated above, there are small differences in impervious surfaces associated with seven of the 18 watersheds in the study area. It is not anticipated that these minor changes would alter the results of the previous water quality Quantitative ICE, as they are within the standard error of such analyses. For this reason, additional water quality modeling is not required.

4.5.5.3 Cumulative Impacts to Endangered Species

The Carolina heelsplitter is found only in the Goose Creek and Sixmile Creek watersheds. No measurable differences in impervious surface were found between the 2030 No-Build and 2030 Build Scenarios within the Goose Creek or Sixmile Creek watersheds. Therefore, no indirect effects are anticipated on the Carolina heelsplitter associated with the Monroe Connector/Bypass project. As there are no indirect effects anticipated, cumulative effects to the Carolina heelsplitter are extremely unlikey, though cannot be unquestionably discounted. Potential direct effects are not anticipated, as addressed in the Biological Assessment for the species (**Appendix C-2**).

For the 2030 Build Scenario, findings indicate a four percent greater decrease of land exhibiting habitat characteristics that might support the Schweinitz's sunflower as compared to the change predicted for the 2030 No-Build Scenario based on results of this study. These reductions are likely an overestimate as the land categories included do not constitute actual habitat for the species and there will remain substantial areas available for species habitat under both the No-Build and Build Scenarios. Therefore, no ICEs to the sunflower are expected. The Biological Assessment provides more detail on direct and potential indirect and cumulative impacts.

4.5.5.4 Cumulative Impacts to Land Use and Farmland

The 2030 Build Scenario is predicted to have one percent additional conversion of land to development as compared to the conversion predicted with the No-Build Scenario. The composition of the development is different between the Build and the No-Build Scenarios. With the 2030 Build Scenario, there is more Low Density and Medium Density Residential, Commercial, and Industrial/Office/Institutional growth. The 2030 Build Scenario is predicted to

convert 2,100 additional acres of agricultural land to low density residential or other developed uses. This represents one percent greater conversion than that predicted with the No-Build Scenario for farmlands in the study area. While the raw decrease in farmland acreages seems sizeable, the vast majority of farmland loss will occur with or without the project. Therefore, the modest additional loss caused by the project does not constitute a cumulative effect.

4.5.5.5 Cumulative Impacts to Wildlife Habitat

Total Habitat Impacts. The 2030 Build Scenario is predicted to convert approximately three percent more undeveloped vegetated land in the study area as compared to that predicted for the No-Build Scenario. These conversions are mostly concentrated in Salem Creek and Richardson Creek – Lower, with some lesser amounts scattered among Richardson Creek – Middle, Stewarts Creek and Crooked Creek. The incremental losses represent a maximum of 9 to 12 percent additional loss relative to the Baseline conditions for the three most affected watersheds.

Forest Fragmentation Impacts. The forest fragmentation analysis indicates that indirect impacts will be modest but that cumulative effects may be more substantial. Nevertheless, most of the cumulative effects are likely to occur with or without the proposed project.

4.5.5.6 Indirect and Cumulative Impacts to Traffic

Traffic levels with and without the induced land use impacts of the Monroe Connector/Bypass were calculated to test the order-of-magnitude impact of induced land use on travel and congestion. Overall, these forecasted traffic levels indicate that the growth-induced impacts of the proposed project will add to the total volume of traffic in Union County and to the total vehicle miles traveled (VMT) and vehicle hours traveled (VHT) within the county, but the overall regional change in VMT is just one percent. Roads that connect to the Monroe Connector/Bypass will likely see some increases in traffic. Overall, however, the increases in traffic are modest and would not likely create substantial congestion issues within the design year of the project. In addition, relative to a No-Build Scenario, 2030 traffic on US 74 would decrease by approximately 20 percent relative to the No-Build Scenario with the induced growth and travel taken into account.

4.5.5.7 Consistency with Local Plans

Overall, the projected induced growth is consistent with local plans as most jurisdictions in the eastern portions of the study area, which are likely to see the greatest induced growth, have recently developed planning documents or economic plans that anticipate the proposed project.

4.5.6 How Can Indirect and Cumulative Impacts Be Minimized or Avoided?

Cumulative effects occur because of decisions made not just by NCDOT and FHWA, but also by other local, state and federal entities as well as private institutions and citizens. Separating, quantifying and minimizing and possibly avoiding the environmental effects from individual contributors continues to prove challenging and would require collaboration and coordination among the local governments within the study area along with the efforts of FHWA and NCDOT and other agencies.

First, one should note that the assumptions used in the methodology of this report and the reports summarized herein were generally designed to overestimate impacts to sensitive resources and water quality. Thus, the actual impacts in the future may be less than estimated

here, as current and future regulations may prove more effective in reducing impacts from development than past regulations.

Nevertheless, cities, counties, towns and developers could do more to limit development impacts to water quality and other sensitive environmental resources. In an effort to promote the use of "nature friendly" growth management strategies, the North Carolina Wildlife Resources Commission (NCWRC) developed the Green Growth Toolbox.[6] The handbook for the toolbox document provides a background on green growth practices, offers tips on green planning, sample land use zoning ordinances, and provides examples of green growth projects. As discussed in Section 6, practices included in the Toolbox could reduce overall cumulative effects for development throughout North Carolina. The "Green Growth Toolbox" and low-impact development (LID) techniques offer valuable tools for local governments and NCDOT to use for reducing cumulative effects to resources within the study area.

4.6 OTHER IMPACTS

4.6.1 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

The following information is reproduced from Section 8.1 of the Draft EIS and Section 1.3.6.1 of the Final EIS. There have been no updates to this information.

Implementation of any of the DSAs would involve a commitment of a range of natural, physical, human, and fiscal resources. Land used for the construction of the proposed facility is considered an irreversible commitment during the time period that the land is used for a highway facility. However, if a greater need arises for use of the land or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion will be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material would be expended. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. However, they are not in short supply and their use will not have an adverse effect upon continued availability of these resources. Any construction also would require a substantial one-time expenditure of both state and federal funds, which are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area, region, and state will benefit from the improved quality of the transportation system. These benefits will consist of improved accessibility and connectivity, savings in time, and greater availability of quality services which are anticipated to outweigh the commitment of these resources.

4.6.2 RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM IMPACTS

The following information is reproduced from Section 1.3.6.2 of the Final EIS. The date of the STIP has been updated from 2009-2015 to 2012-2018.

The most disruptive short-term impacts associated with the proposed project would occur during land acquisition and project construction. However, these short-term uses of human, physical,

[6] NCWRC, 2012. http://www.ncwildlife.org/Conserving/Programs/GreenGrowthToolbox.aspx

socioeconomic, cultural, and natural resources would contribute to the long-term productivity of the project study area.

The short-term local impacts and use of resources by implementation of any of the DSAs would be consistent with the maintenance and enhancement of long-term productivity. Construction of the proposed Monroe Connector/Bypass would add a vital link to the long range transportation system for the region. The project is consistent with the long range transportation goals and objectives of the NCDOT *2012-2018 STIP* and the MUMPO *2035 LRTP*. It is anticipated that the roadway would enhance long-term access and connectivity opportunities in Union County and Mecklenburg County, and would support local, regional, and statewide commitments to transportation improvement and economic viability.

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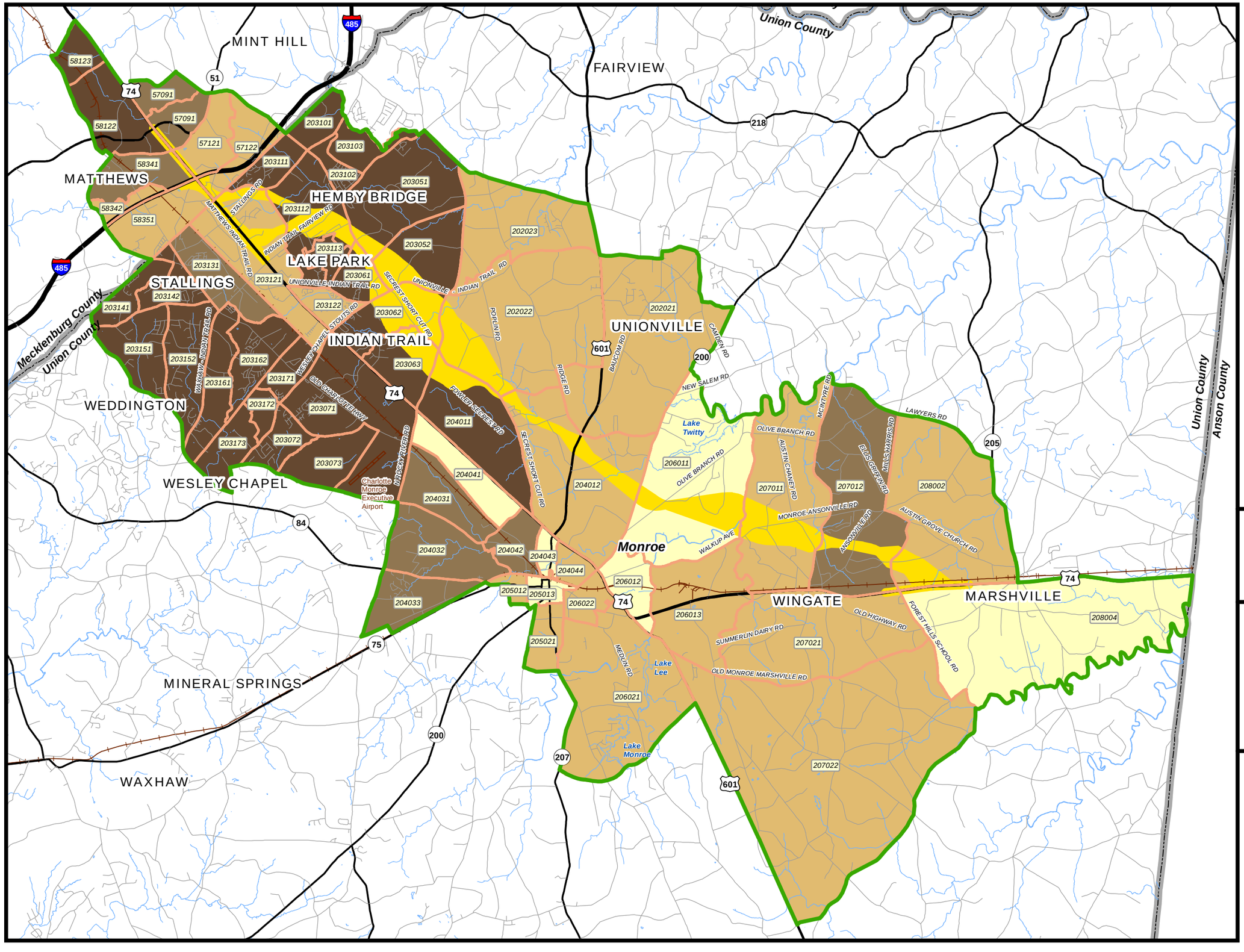
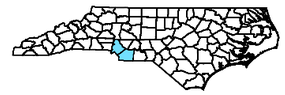


Legend

2010 Population Growth by Census Block Group

- < 0
- 0 - 24.99%
- 25 - 49.99%
- 50% or above
- 2010 Block Groups
- Demographic Study Area
- Corridor Study Area
- Interstate Highway
- US Highway
- NC State Highway
- Major Road
- Railroad
- River / Stream
- County Boundary
- xxxxxx Census Block Group ID Number

Note: 207021 Symbolizes Census Tract 207.02 Block Group 1.



- Mecklenburg and Union Counties
- North Carolina Counties

Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI.
Map Printed May 2013.

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Miles

NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. R-3329/R-2559

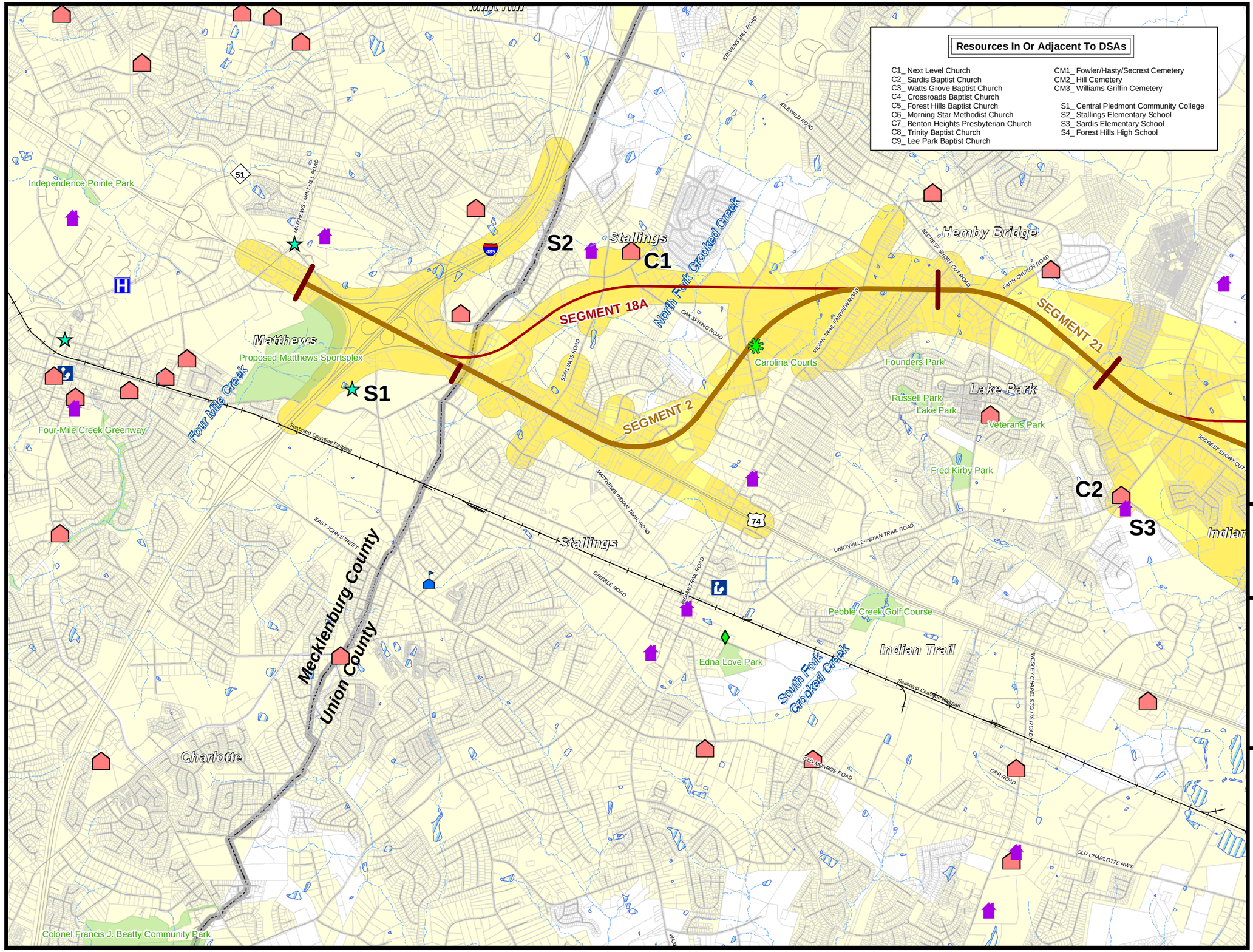
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

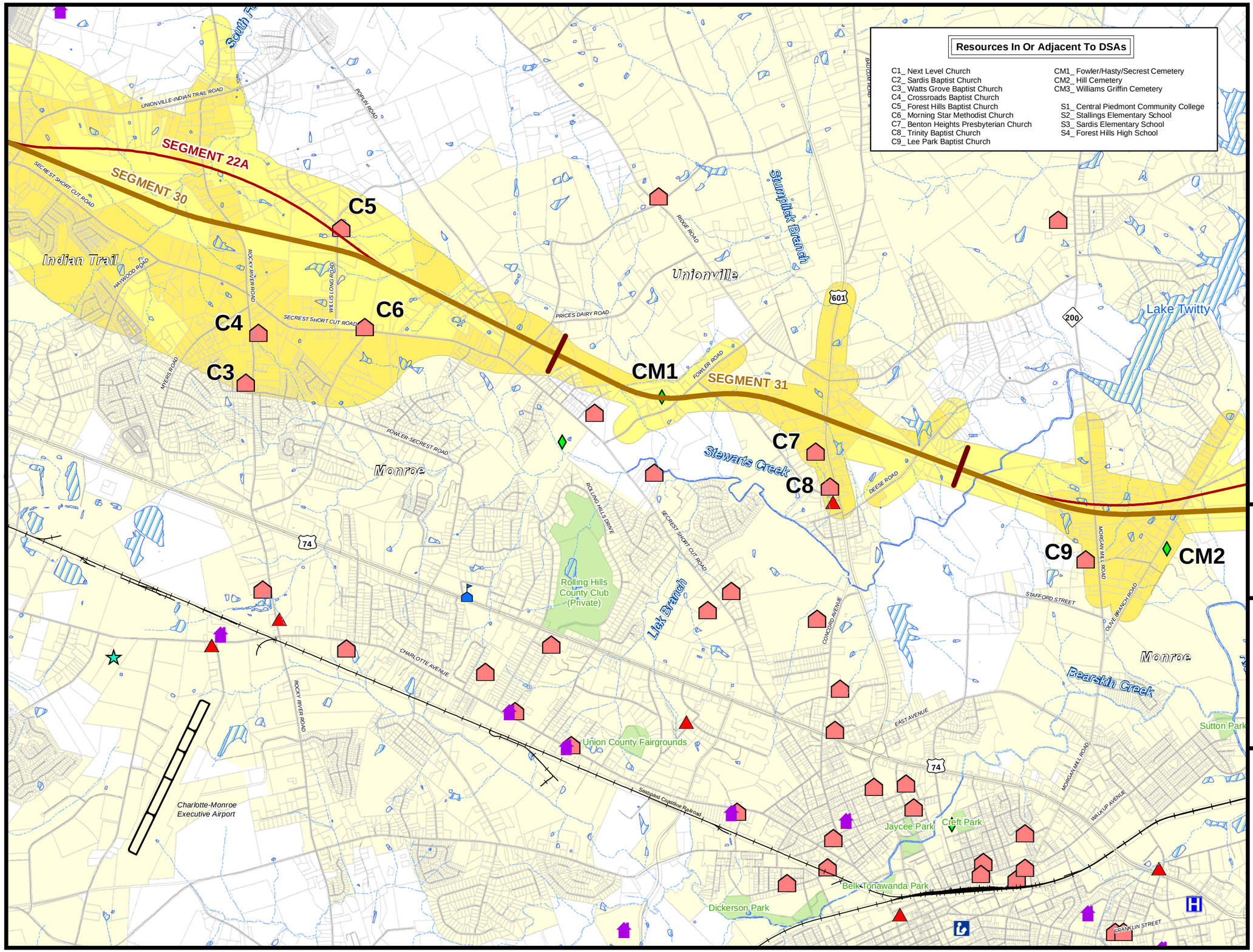
POPULATION CHANGE (2000/2010)

Figure 4-1

EAUpdate_PopChange2000_2010.mxd 04.25.13 JNL



EAUpdate_Comm_Resources2.mxd 04.29.13 JNL


Resources In Or Adjacent To DSAs
C1_ Next Level Church
C2_ Sardis Baptist Church
C3_ Watts Grove Baptist Church
C4_ Crossroads Baptist Church
C5_ Forest Hills Baptist Church
C6_ Morning Star Methodist Church
C7_ Benton Heights Presbyterian Church
C8_ Trinity Baptist Church
C9_ Lee Park Baptist Church
CM1_ Fowler/Hasty/Secrest Cemetery
CM2_ Hill Cemetery
CM3_ Williams Griffin Cemetery
S1_ Central Piedmont Community College
S2_ Stallings Elementary School
S3_ Sardis Elementary School
S4_ Forest Hills High School
SEGMENT 22A
SEGMENT 30
SEGMENT 31
C5
C6
C4
C3
CM1
C7
C8
C9
CM2
Indian Trail
Unionville
Monroe
Lake Twitty
Stewarts Creek
Stumpfolk Branch
Lick Branch
Bearskin Creek
Rolling Hills County Club (Private)
Union County Fairgrounds
Charlotte-Monroe Executive Airport
Jaycee Park
Creft Park
Belk-Tonawanda Park
Dickerson Park
Sutton Park
UNIONVILLE-INDIAN TRAIL ROAD
SECREST SHORT CUT ROAD
HATWOOD ROAD
ROCKY RIVER ROAD
WELLS LONG ROAD
MYERS ROAD
POPLIN ROAD
RIDGE ROAD
PRICES DAIRY ROAD
FOWLER ROAD
FOWLER-SECREST ROAD
ROLLING HILLS DRIVE
DEESE ROAD
CHARLOTTE AVENUE
CONCORD AVENUE
STAFFORD STREET
OLIVE BRANCH ROAD
MORGAN MILL ROAD
EAST AVENUE
WALKUP AVENUE
FRANKLIN STREET
Seaboard Coastline Railroad
74
601
200
Legend
Preferred Alternative
Segment Breaklines
Functional Design Centerline
Railroad
Streams
Lakes
Parks
Parcels
Corridor Study Area
Municipal Limits
NotableFeatures
Cemetery
Church
College
Fire Department
Library
Police Station
Hospital
Schools
Mecklenburg and Union Counties
North Carolina Counties
Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.
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NORTH CAROLINA Turnpike Authority
STIP PROJECT NO. R-3329/R-2559
Mecklenburg County and Union County
MONROE CONNECTOR/ BYPASS
COMMUNITY RESOURCES
Figure 4-2b
EAUpdate_Comm_Resources2.mxd 04.25.13 JNL

Resources In Or Adjacent To DSAs

C1_ Next Level Church
C2_ Sardis Baptist Church
C3_ Watts Grove Baptist Church
C4_ Crossroads Baptist Church
C5_ Forest Hills Baptist Church
C6_ Morning Star Methodist Church
C7_ Benton Heights Presbyterian Church
C8_ Trinity Baptist Church
C9_ Lee Park Baptist Church

CM1_ Fowler/Hasty/Secrest Cemetery
CM2_ Hill Cemetery
CM3_ Williams Griffin Cemetery

S1_ Central Piedmont Community College
S2_ Stallings Elementary School
S3_ Sardis Elementary School
S4_ Forest Hills High School

SEGMENT 34
SEGMENTS 34 A & B
SEGMENTS 36, A & B
SEGMENT 36
SEGMENT 40
SEGMENT 41
CM2
CM3
S4
Lake Twitty
Chiltepin Creek
Richardson Creek
Meadow Branch
Rays Fork
Monroe
Wingate
Sutton Park
Jesse Helms Park
Seaboard Coastline Railroad
OLIVE BRANCH ROAD
ELLIS GRIFFIN ROAD
MILLS HARRIS ROAD
ANSONVILLE ROAD
AUSTIN GROVE CHURCH ROAD
PHIFFER ROAD
TRULL HENSON ROAD
AUSTIN CHAPEL ROAD
MONROE-ANSONVILLE ROAD
ZEB GOODMAN ROAD
OLD WILLIAMS ROAD
OLD HIGHWAY ROAD
FOREST HILL SCHOOL ROAD
WALKUP AVENUE
SECREST AVENUE
ROOSEVELT BOULEVARD
BYERS ROAD
SOUTH MAIN STREET
SYCAMORE GROVE ROAD
SUMMERLIN DAIRY ROAD
74

Legend

- Preferred Alternative
- Segment Breaklines
- Functional Design Centerline
- Railroad
- Streams
- Lakes
- Parks
- Parcels
- Corridor Study Area
- Municipal Limits
- NotableFeatures
- Cemetery
- Church
- College
- Fire Department
- Library
- Police Station
- Hospital
- Schools

Mecklenburg and Union Counties
North Carolina Counties

Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

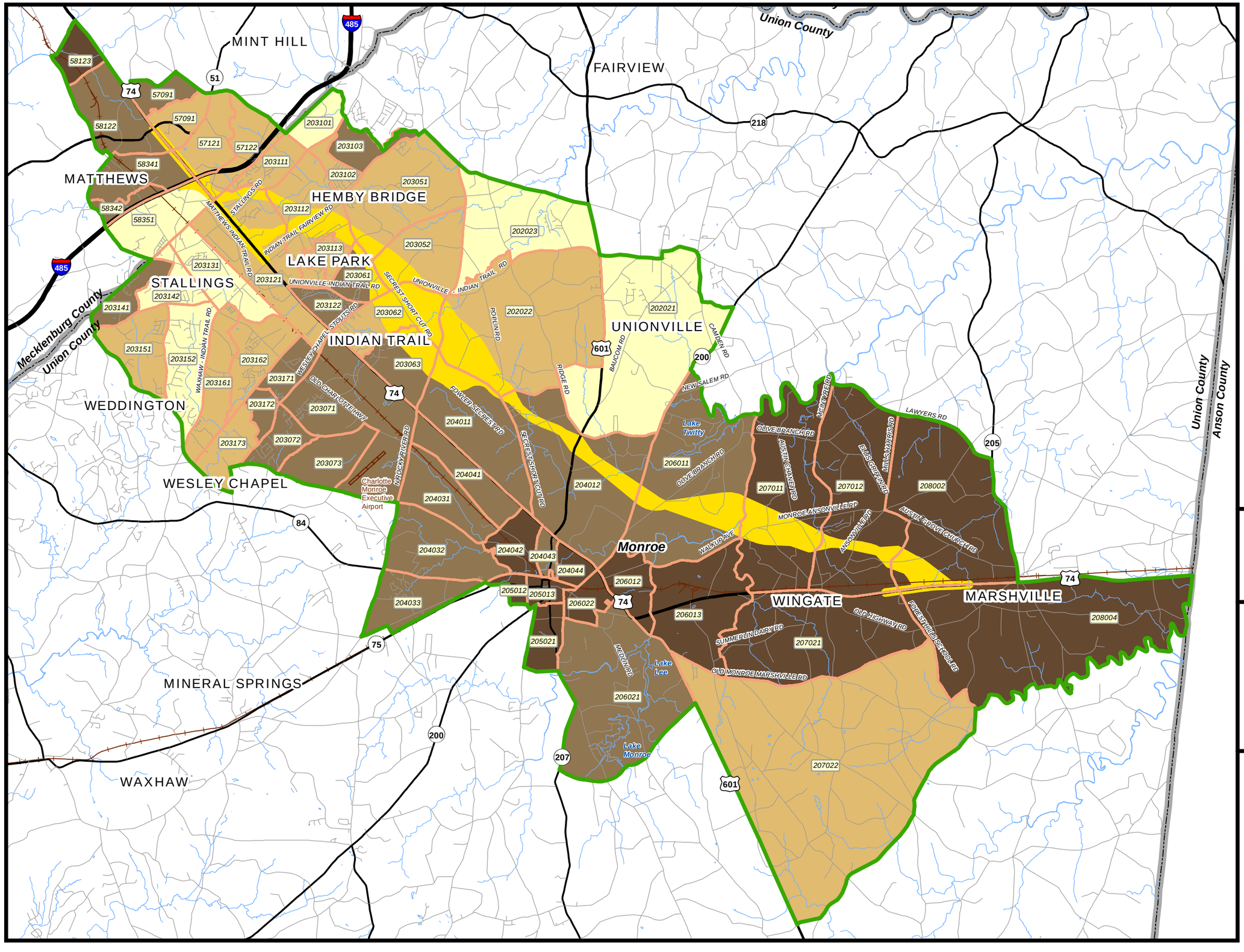
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

COMMUNITY RESOURCES

Figure 4-2c

EAUpdate_Comm_Resources2.mxd 04.25.13 JNL

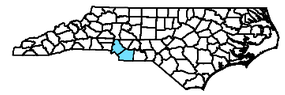


Legend

2010 Percentage African American by Census Block Group

- 0 - 4.99%
- 5 - 9.99%
- 10 - 24.99%
- 25% or above
- 2010 Block Groups
- Demographic Study Area
- Corridor Study Area
- Interstate Highway
- US Highway
- NC State Highway
- Major Road
- Railroad
- River / Stream
- County Boundary
- xxxxxx Census Block Group ID Number

Note: 207021 Symbolizes Census Tract 207.02 Block Group 1.



- Mecklenburg and Union Counties
- North Carolina Counties

Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

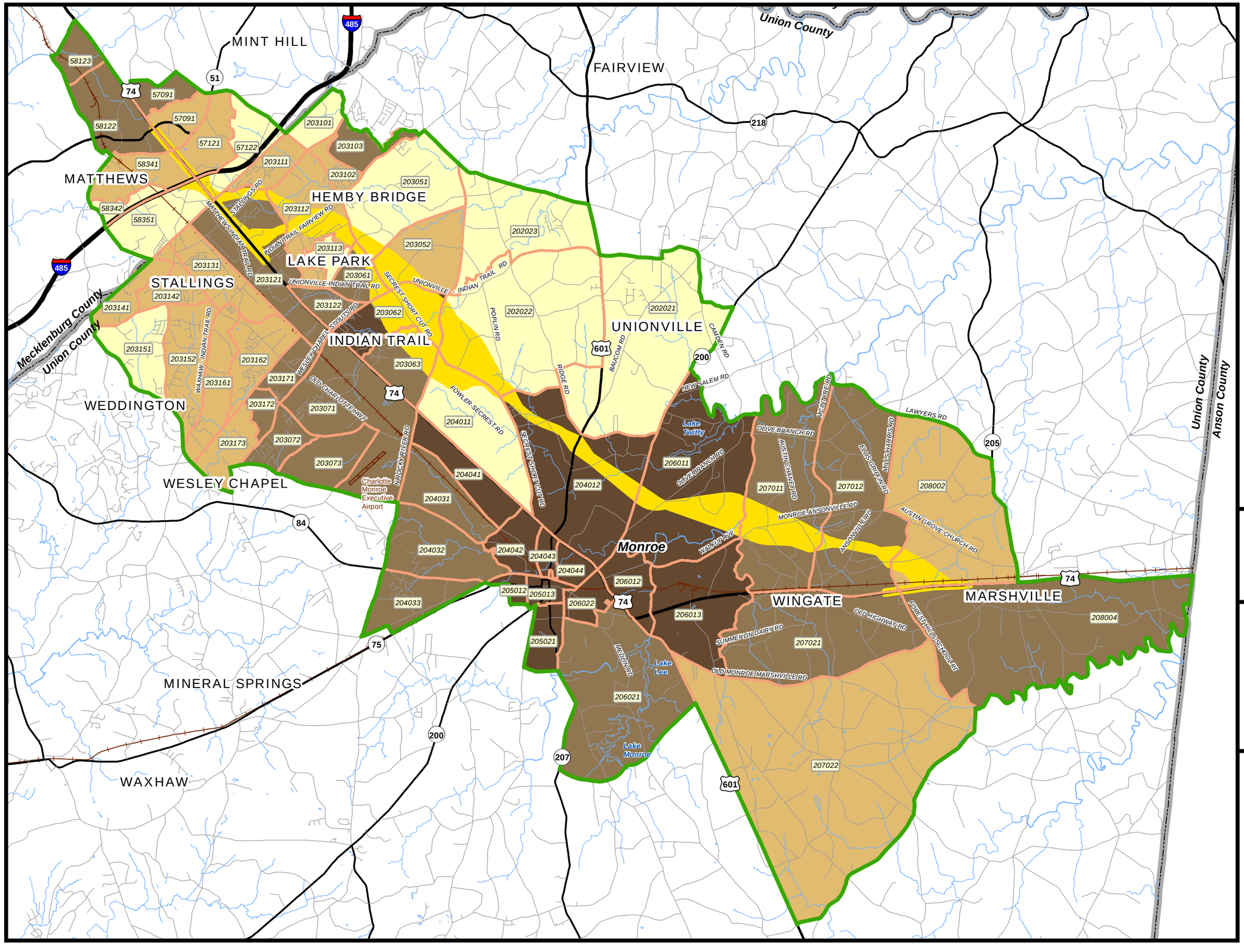
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

AFRICAN AMERICAN POPULATION IN THE DEMOGRAPHIC AREA

Figure 4-3

EAUpdate_PopChange2000_2010.mxd 04.25.13 JNL

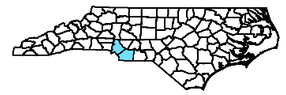


Legend

2010 Percentage Hispanic by Census Block Group

- 0 - 4.99%
- 5 - 9.99%
- 10 - 24.99%
- 25% or above
- 2010 Block Groups
- Demographic Study Area
- Corridor Study Area
- Interstate Highway
- US Highway
- NC State Highway
- Major Road
- Railroad
- River / Stream
- County Boundary
- xxxxxx Census Block Group ID Number

Note: 207021 **Symbolizes Census Tract 207.02 Block Group 1.**



Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI.
Map Printed May 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

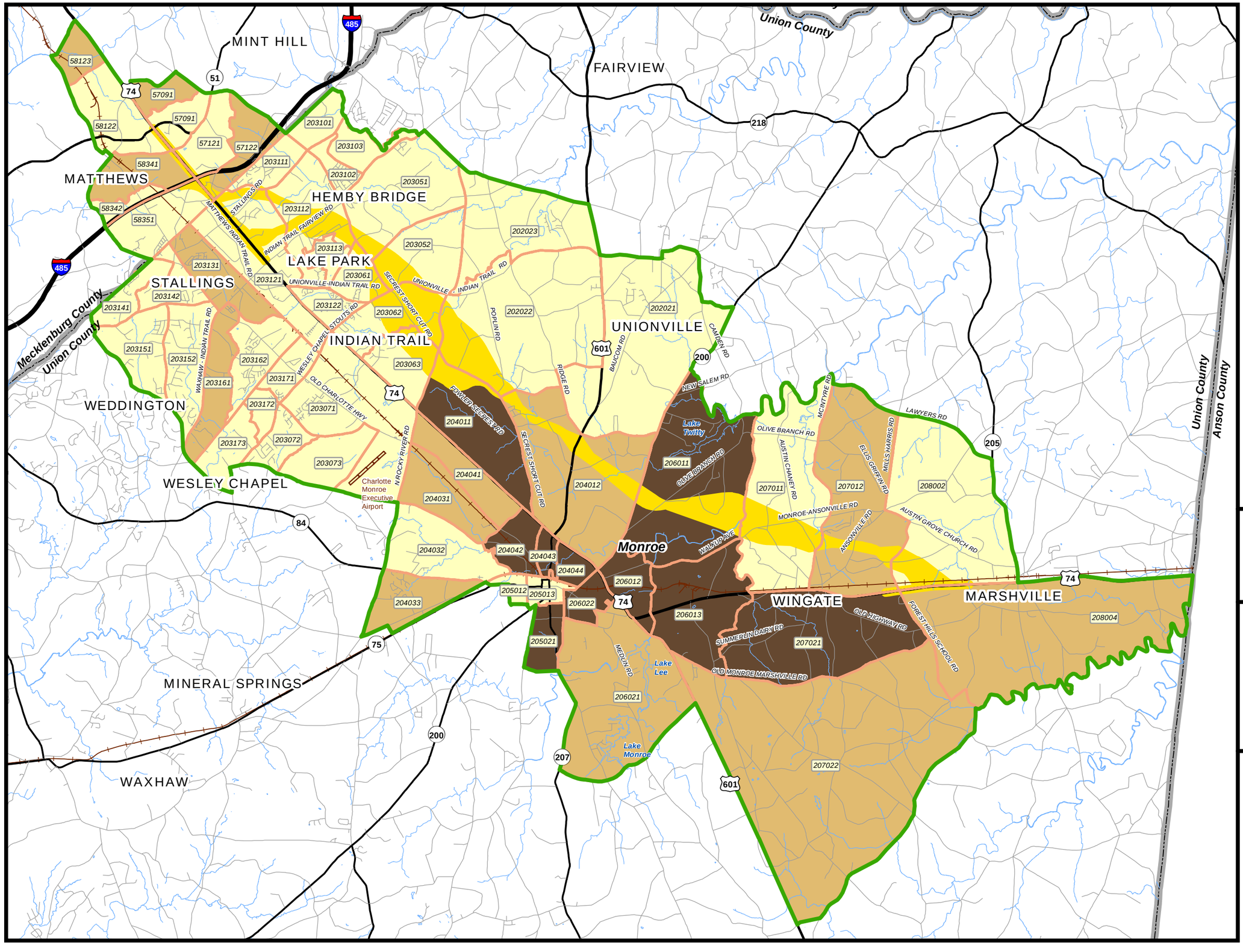
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

HISPANIC POPULATION IN THE DEMOGRAPHIC AREA

Figure 4-4

EAUpdate_PopChange2000_2010.mxd 04.25.13 JNL



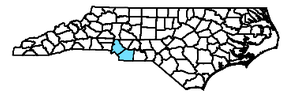
Legend

2010 Percentage Below Poverty Level by Census Block Group

- 0 - 9.99%
- 10 - 19.99%
- 20% or above
- 2010 Block Groups
- Demographic Study Area
- Corridor Study Area
- Interstate Highway
- US Highway
- NC State Highway
- Major Road
- Railroad
- River / Stream
- County Boundary

xxxxxx Census Block Group ID Number

Note: 207021 Symbolizes Census Tract 207.02 Block Group 1.



Mecklenburg and Union Counties
North Carolina Counties

Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI.
Map Printed May 2013.

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Miles

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

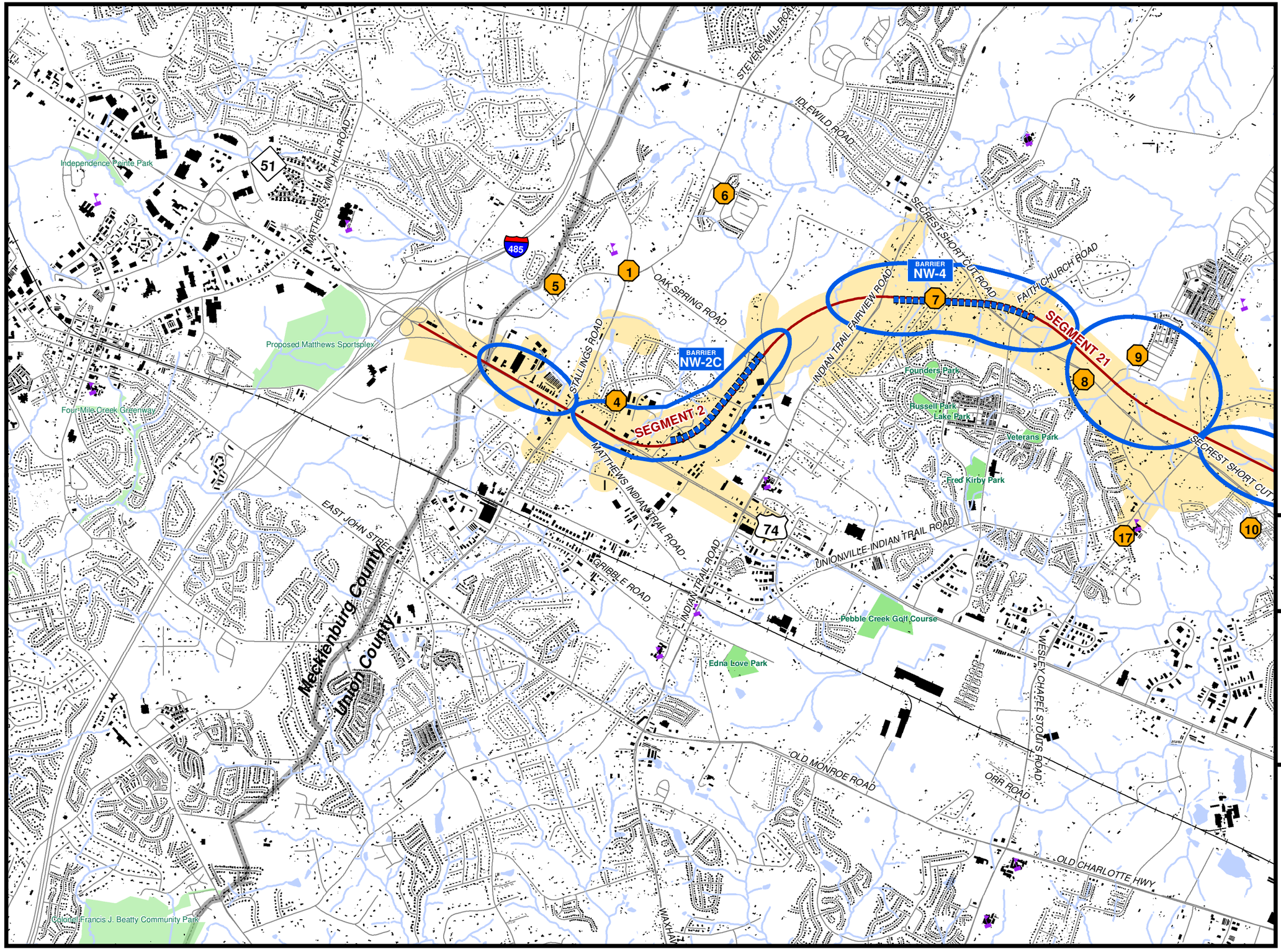
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

PERCENTAGE BELOW POVERTY LEVEL IN THE DEMOGRAPHIC AREA

Figure 4-5

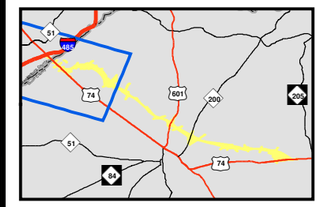
EAUpdate_PopChange2000_2010.mxd 04.25.13 JNL



Legend

- Noise Measurement Site
- Noise Barrier*
- Barrier Evaluation Area
- Alternative D Centerline
- Hydrology
- School
- Structure
- Park
- Railroad
- Thoroughfare
- Street
- Lake
- County Boundary
- Alternative D Study Corridor

*Noise barriers shown on this map are preliminary. The feasibility and reasonableness of potential noise barriers will be reassessed for the Preferred Alternative during final design.



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

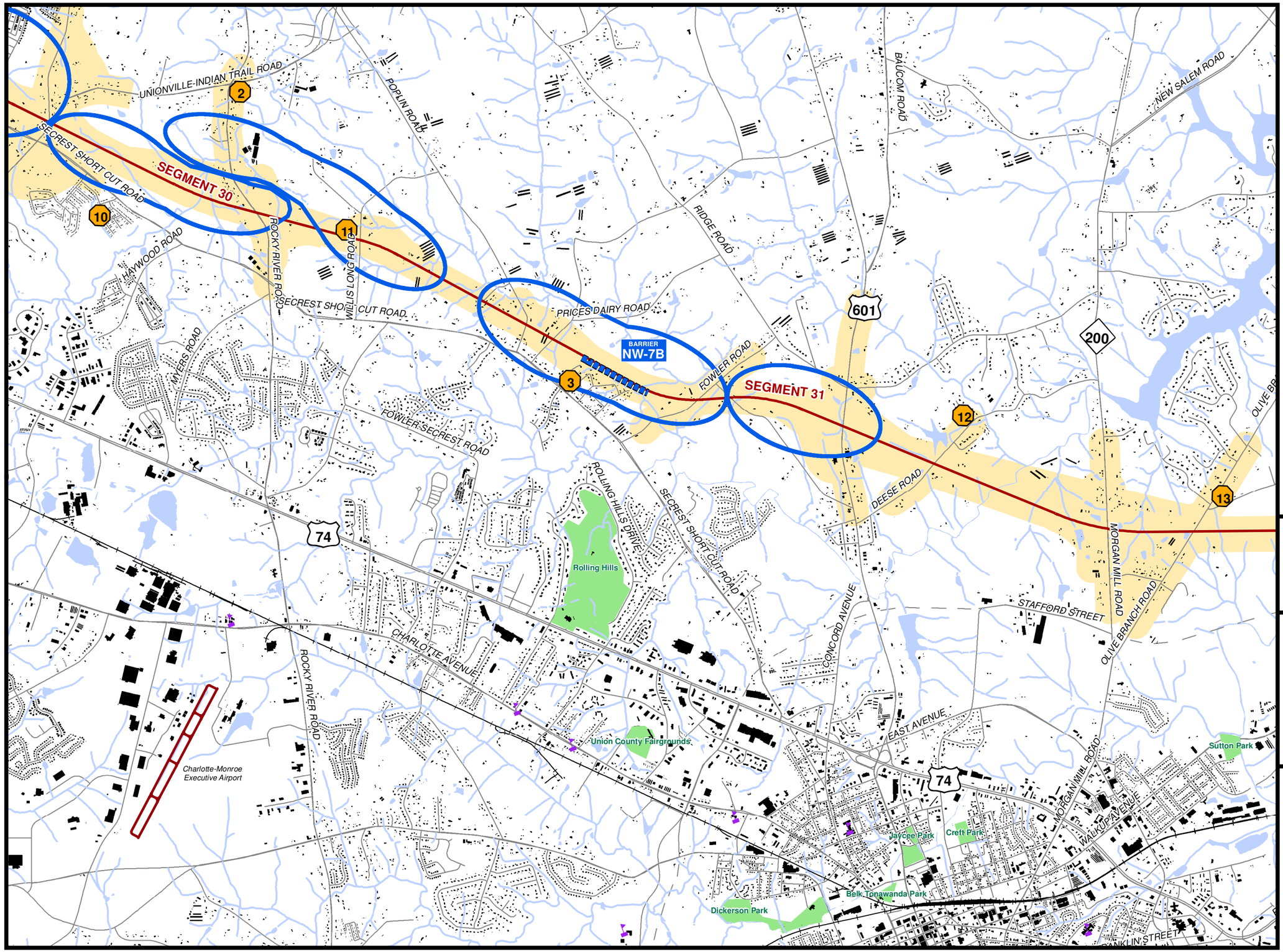
Mecklenburg County and Union County

MONROE CONNECTOR/ BYPASS

UPDATED NOISE IMPACT ASSESSMENT INFORMATION

Figure 4-6a

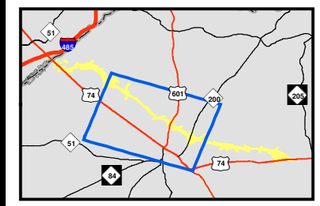
EA/update_NoiseImpactAssessInfo.mxd 04-29-13 JNL



Legend

- Noise Measurement Site
- Noise Barrier*
- Barrier Evaluation Area
- Alternative D Centerline
- Hydrology
- School
- Structure
- Park
- Railroad
- Thoroughfare
- Street
- Lake
- County Boundary
- Alternative D Study Corridor

*Noise barriers shown on this map are preliminary. The feasibility and reasonableness of potential noise barriers will be reassessed for the Preferred Alternative during final design.



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

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Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

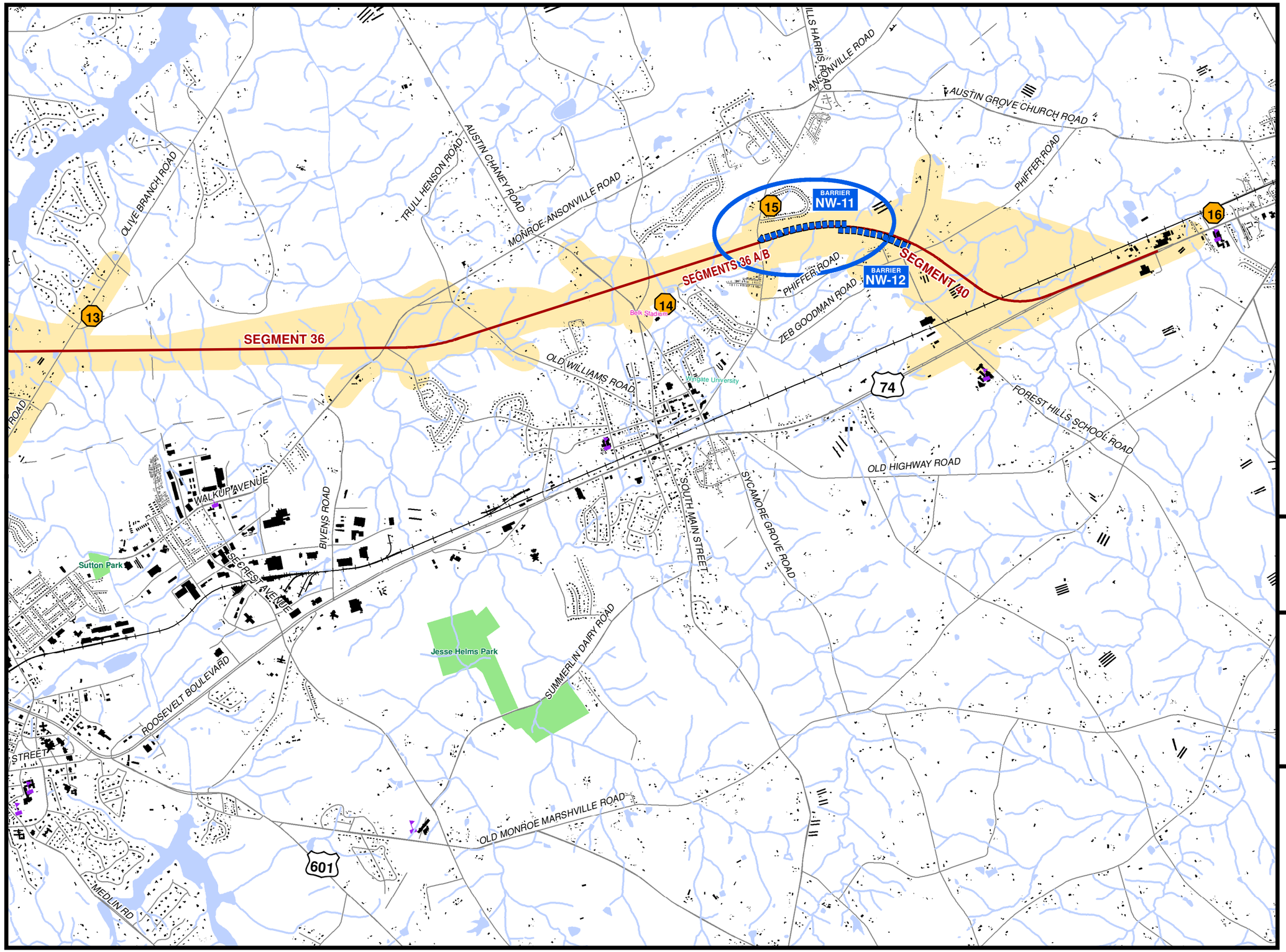
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

UPDATED NOISE IMPACT ASSESSMENT INFORMATION

Figure 4-6b

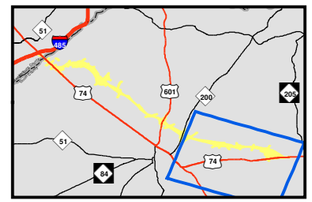
EAUpdate_NoiseImpactAssessInfo.mxd 04-29-13 JNL



Legend

- Noise Measurement Site
- Noise Barrier*
- Barrier Evaluation Area
- Alternative D Centerline
- Hydrology
- School
- Structure
- Park
- Railroad
- Thoroughfare
- Street
- Lake
- County Boundary
- Alternative D Study Corridor

*Noise barriers shown on this map are preliminary. The feasibility and reasonableness of potential noise barriers will be reassessed for the Preferred Alternative during final design.



Source: Mecklenburg County and Union County GIS.
Map Printed May 2013.

N

0 1,500 3,000
Feet

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

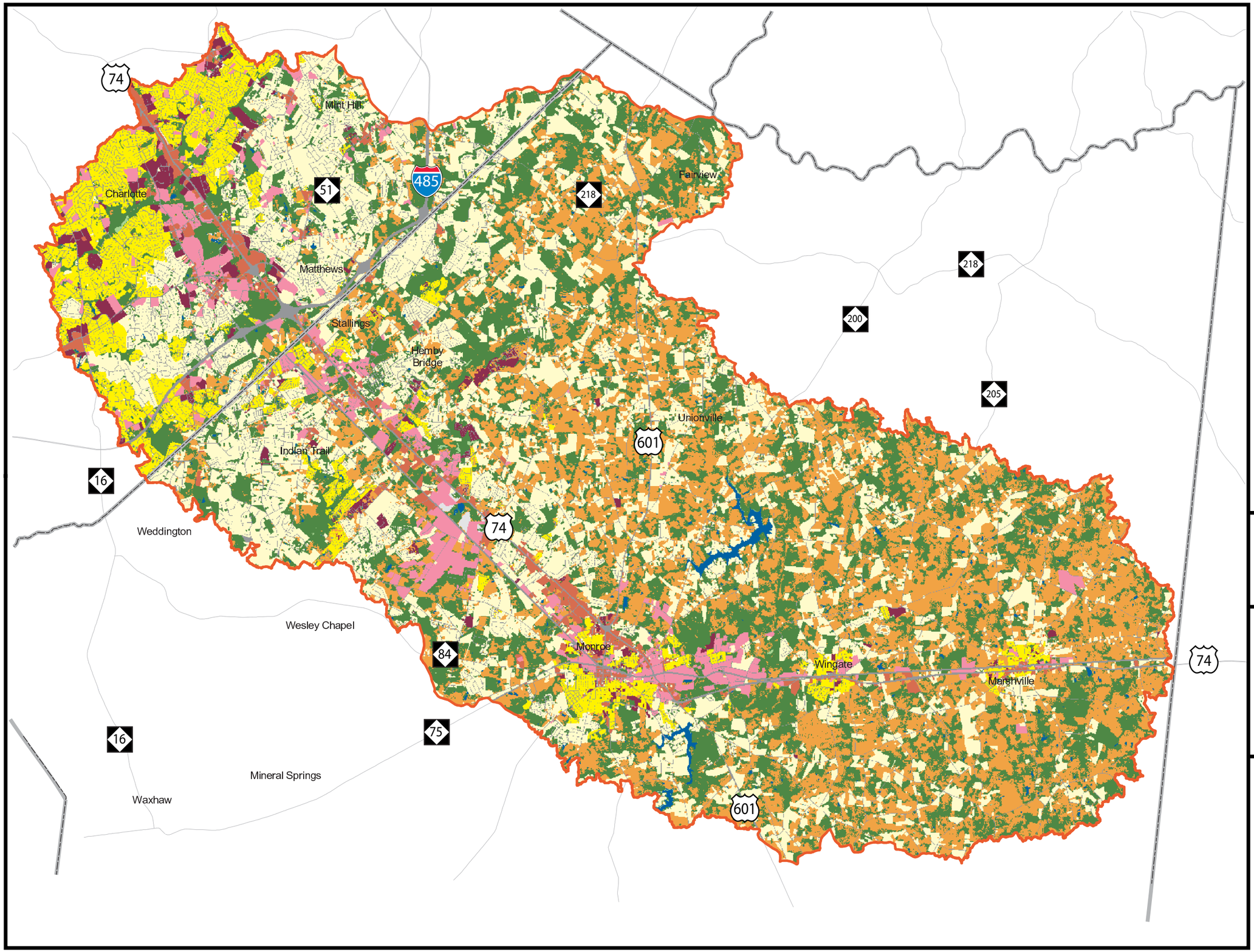
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

UPDATED NOISE IMPACT ASSESSMENT INFORMATION

Figure 4-6c

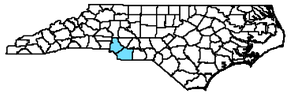
EAUpdate_NoiseImpactAssessInfo.mxd 04-29-13 JNL



Legend

Existing Land Use

- Agricultural Fields
- Barren
- Commercial
- Forested
- Other Natural
- High Density Residential
- Industrial/Office/Institutional
- Low Density Residential
- Medium Density Residential
- Open Water
- Transportation
- FLUSA Boundary



Mecklenburg and Union Counties
North Carolina Counties

Source: Draft Indirect and Cumulative Effects Quantitative Analysis Report from Michael Baker Engineering, Inc., August 2013. Map Printed August 2013.

N

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Miles

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

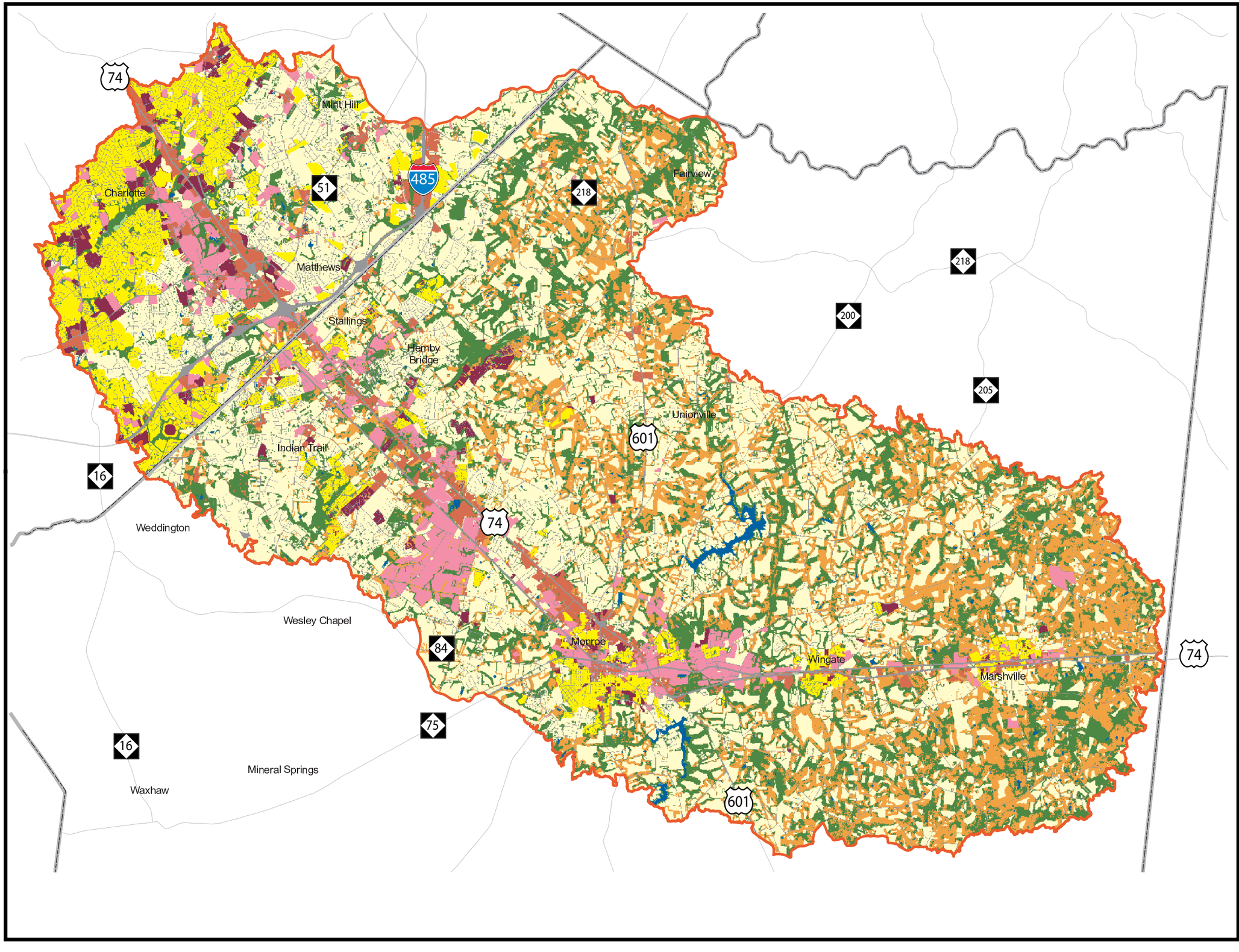
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

UPDATED 2010 BASELINE LAND USE SCENARIO

Figure 4-7

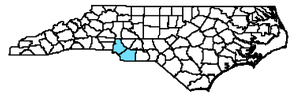
EA_Update_LandUse.ai 08.27.13 JNL



Legend

No Build Land Use

- Agricultural Fields
- Barren
- Commercial
- Forested
- Other Natural
- High Density Residential
- Industrial/Office/Institutional
- Low Density Residential
- Medium Density Residential
- Open Water
- Transportation
- FLUSA Boundary



Mecklenburg and Union Counties
North Carolina Counties

Source: Draft Indirect and Cumulative Effects Quantitative Analysis Report from Michael Baker Engineering, Inc., August 2013. Map Printed August 2013.

N

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

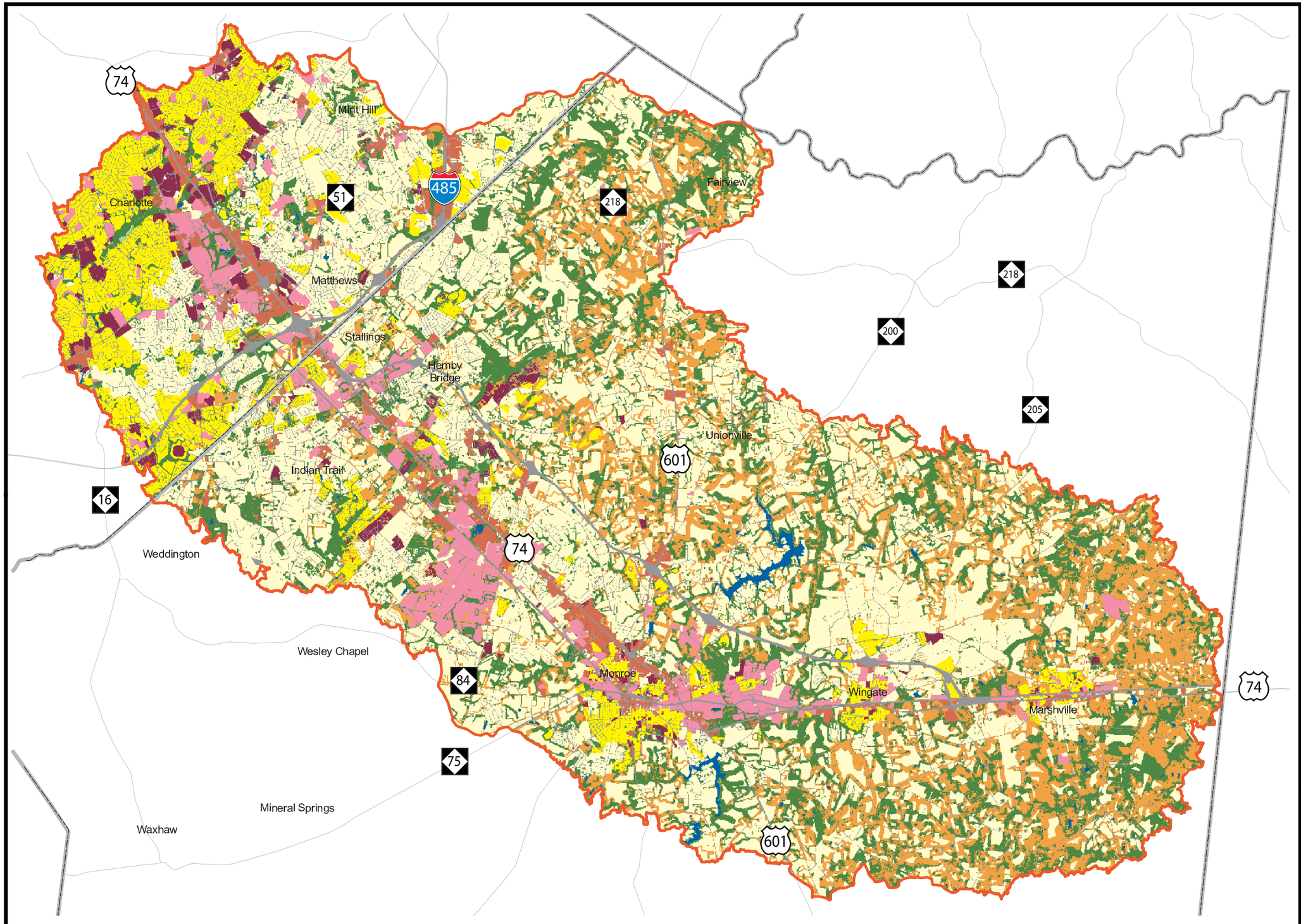
Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

UPDATED 2030 NO-BUILD LAND USE SCENARIO

Figure 4-8

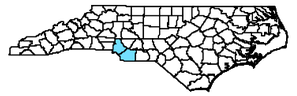
EA_Update_LandUse.ai 08.27.13 JNL



Legend

No Build Land Use

- Agricultural Fields
- Barren
- Commercial
- Forested
- Other Natural
- High Density Residential
- Industrial/Office/Institutional
- Low Density Residential
- Medium Density Residential
- Open Water
- Transportation
- FLUSA Boundary



Mecklenburg and Union Counties
North Carolina Counties

Source: Draft Indirect and Cumulative Effects Quantitative Analysis Report from Michael Baker Engineering, Inc., August 2013. Map Printed August 2013.

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NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

Mecklenburg County and
Union County

MONROE CONNECTOR/ BYPASS

UPDATED 2030 BUILD LAND USE SCENARIO

Figure 4-9

EA_Update_LandUse.ai 08.27.13 JNL

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5. COMMENTS AND COORDINATION

This section describes coordination efforts with the public, as well as federal, state, and local agencies, that have taken place since the Final EIS was published in May 2010.

5.1 COMMENTS ON THE FINAL EIS

The Final EIS for the project was approved on May 25, 2010 and circulated to environmental resource and regulatory agencies. A Notice of Availability of the Final EIS for the Monroe Connector/Bypass project was published in the Federal Register on June 11, 2010 (Federal Register Volume 75, No. 112, page 33300). The Final EIS was made available for public review at local libraries and government offices as listed in Section 5.5 of the Final EIS. Chapter 5 of the Final EIS includes a full list of agencies and organizations that received copies of the document. The Final EIS in its entirety was also made available for download on the project Web site. The review period ended on July 12, 2010.

Comments on the Final EIS were received from the following federal and state resource agencies:

NC Department of Environment and Natural Resources (NCDENR) – July 15, 2010

NC Wildlife Resources Commission – July 13, 2010

NCDENR Division of Water Quality – June 28, 2010

NC Department of Cultural Resources, State Historic Preservation Office – July 12, 2010

US Environmental Protection Agency – Region – July 15, 2010

NC Department of Crime Control and Public Safety, Floodplain Management Program – July 9, 2010

US Fish and Wildlife Service – July 29, 2010

Comments were also received from one citizen group, and one citizen:

Southern Environmental Law Center – June 25, 2010

Ed Eason – June 29, 2010

Copies of these letters are included in **Appendix A-2**. Summaries of the substantive comments and responses to those comments are included in **Appendix A-2** in **Tables A-5** through **A-13**. Please note that responses to these comments were also included in the Record of Decision (ROD) that was rescinded in July 2012. Those responses have been updated for this document based on new information and studies that have been prepared since the ROD was published.

5.2 PUBLIC INVOLVEMENT AND AGENCY COORDINATION AFTER THE FINAL EIS

Public involvement activities conducted prior to the circulation of the Draft EIS are detailed in Section 9 of the Draft EIS. Public involvement activities that took place after the Draft EIS, but prior to the Final EIS are detailed in Section 3 of the Final EIS. The continued involvement of the public is an integral part of the planning process for the Monroe Connector/Bypass project. The public involvement program since the Final EIS was published in May 2010 has included Citizens Update Workshops and agency meetings, as described below.

5.2.1 CITIZENS UPDATE WORKSHOPS

In 2012, two Citizens Update Workshops took place from 5:00 pm to 8:00 pm on June 18 (at Next Level Church in Stallings) and June 19 (at the Union County Agricultural Center in Monroe). Both meetings included a formal presentation at 6:00 pm. The presentation described the project's legal proceedings, status of the right-of-way process, and the next steps. The presentation lasted about 40 minutes and was followed by a question and answer session. The presentation was repeated following the question and answer session for individuals who missed the first presentation. Project team members were available to answer one-on-one questions before and after the presentation.

A total of 207 citizens signed in at the workshops (102 in Stallings and 105 in Monroe). At the meeting in Stallings, one comment form was submitted to state support for the project. Six citizens asked questions following the presentation – four related to the right-of-way acquisition process and two related to the lawsuit. At the meeting in Monroe, four comment forms were submitted – three in support of the project and voicing frustration with the delay, and one with a suggestion to widen NC 218. Eight citizens asked questions following the presentation – two about the right-of-way acquisition process, three about the lawsuit, and three about the studies and assumptions used in the EIS.

The workshop summary and comment forms are included in **Appendix A-3**.

5.2.2 COMMENTS RECEIVED AFTER THE FINAL EIS

Correspondence from the Southern Environmental Law Center (SELC) was received on November 30, 2012, and March 6, 2013. In addition, the SELC released a report to the public on July 24, 2013 titled, *A Closer Look at US 74: Challenges & Opportunities*. This report was prepared by O'Connell & Lawrence, Inc on SELC's behalf. These documents and responses to these documents are included in **Appendix A-1**.

5.2.3 SMALL GROUP MEETINGS

Since the Final EIS, the project study team met with several organizations and agencies to provide updates on the project or make a presentation about the project at the request of community groups. The following organizations requested or participated in small group meetings about the project. At these meetings, NCDOT provided a brief history of project activities which have occurred since May 2010, including reasons the Record of Decision was rescinded. The presentations also shared plans to move the project forward, and NCDOT representatives answered questions from attendees. The meeting dates and groups involved are listed below:

- 07/19/12 Rocky River RPO Technical Advisory Committee (TAC)
- 08/06/12 Union County Board of County Commissioners
- 09/24/12 Stallings Town Council (follow-up correspondence from Mayor Paxton is included in **Appendix C**)
- 10/02/12 Monroe City Council
- 09/10/13 Rocky River RPO Technical Coordinating Committee (TCC)
- 09/19/13 Rocky River RPO TAC
- 10/22/13 Indian Trail Town Council

The presentation to the Stallings Town Council also included overview information about the *US 74 Corridor Study* (Stantec, July 2007) prepared for NCDOT – Division 10.

5.3 AGENCY COORDINATION

5.3.1 Coordination with MUMPO

NCDOT presented project updates to the MUMPO TCC on August 2, 2012 and to the MUMPO Board on September 19, 2012 and May 21, 2013. These meetings are summarized in **Table 5-1**.

TABLE 5-1: MUMPO Meeting Summaries

Meeting Date	Meeting Purpose and Summary
08/02/12	NCDOT gave a presentation to the TCC to highlight the history of the project, focusing on the environmental review and the lawsuit filed by the Southern Environmental Law Center. The presentation went on to outline NCDOT's next steps for resolving the issues presented in the lawsuit in order to continue the project.
09/19/12	NCDOT provided a review of the NEPA study timeline and lawsuit timeline to the MUMPO Board. An explanation was provided of the lawsuit issues and rulings by the District Court and the 4th Circuit Court of Appeals. The presentation also provided an overview of current activities, discussed ongoing outreach activities, and presented future activities and the anticipated schedule.
5/21/13	NCDOT and FHWA provided the MUMPO Board with a review of the results of the draft updated Indirect and Cumulative Effects analysis, including land use change analysis results and the use of MUMPO's data and models in the analysis. NCDOT and FHWA stated that they wanted MUMPO's review and comments on the analysis. A presentation was given that focused on land use changes within Union County and the potential effects on water quality, the Carolina heelsplitter, and its critical habitat.

5.3.2 Agency Meetings

Seven agency meetings have been held regarding the Monroe Connector/Bypass project since the Final EIS was published. **Table 5-2** provides a summary of each meeting. Meeting minutes are provided in **Appendix C**.

TABLE 5-2: Agency Meeting Summaries

Meeting Date	Meeting Purpose and Summary
07/18/12	Provided a summary of the legal proceedings and an update on construction, right-of-way process, and environmental permits. Baker Engineering gave a presentation on the Indirect and Cumulative Effects Analysis and further explanation of the issues involved in the litigation. NCDOT identified areas where additional documentation and explanation are warranted and gave an update on public involvement activities.
09/12/12	The consultant team provided an update on activities currently underway and ongoing outreach activities. Baker distributed a draft memo analyzing historic and future growth in the Charlotte region for review. The purpose and need for the project was reviewed and the next steps were discussed.
10/17/12	Preliminary results of the updated Indirect and Cumulative Effects Analysis were presented. Updates were presented on the protected plant species surveys (no new populations found) and the noise analysis.

TABLE 5-2: Agency Meeting Summaries

Meeting Date	Meeting Purpose and Summary
11/08/12	Additional results of the updated Indirect and Cumulative Effects Analysis were presented. The results of the travel time factor reassessment work to remove all instances of the Monroe Connector/Bypass project from the MUMPO land use model were presented, as well as an overview of interviews with local officials and identified changes in planned land use.
02/19/13	NCDOT and FHWA met with representatives from the US Army Corps of Engineers (USACE) to provide an update on the project and discuss a letter from the Southern Environmental Law Center to USACE regarding the suspended USACE permit for the project. A presentation was given that covered the US Court of Appeals decision, the Indirect and Cumulative Effects analysis, and the schedule for advancing the project.
02/20/13	NCDOT met with a new representative (Mr. Alan Johnson) assigned to the project from NCDWQ to review the project, the US Court of Appeals decision, the Indirect and Cumulative Effects Analysis, and the schedule for advancing the project. Comments and questions regarding the project received from Mr. Johnson are included in **Appendix C**, along with NCDOT's responses to his questions.
07/10/13	NCDOT and FHWA met with representatives from USFWS to discuss the project's current status and findings from work completed on the Indirect and Cumulative Effects Analysis.

6. LIST OF PREPARERS

Section 6 includes a list of the principal participants in the preparation of this Draft Supplemental Final EIS and associated supporting documentation.

6.1 FEDERAL HIGHWAY ADMINISTRATION

George Hoops, PE Major Projects Engineer	MS in Transportation Engineering, BS in Civil Engineering with 22 years of experience in NEPA documentation, design, and construction.

6.2 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

Tristram Ford Community Planner	BS in Political Science (City and County Mgmt.) and minors in City and Regional Planning and Geography. 12 years of experience within NCDOT Division of Bicycle and Pedestrian Transportation and PDEA including community impact assessment and indirect and cumulative effects analysis.
Jennifer Harris, PE Project Development / Turnpike Section Head	BS in Civil Engineering with 13 years of experience in transportation, project development, impact analysis, public involvement, and NEPA analysis.
Colin Mellor, LG Environmental Supervisor	MS in Geology. Fourteen years of experience with NCDOT, seven as an Engineering Geologist, and seven analyzing Indirect and Cumulative Impacts.
Gregory Smith Noise and Air Quality Supervisor	BA in Geology and Business Management with 28 years of experience in transportation, engineering geology, geotechnical and environmental engineering, hazardous waste management, air quality, and traffic noise
Michael Turchy Environmental Supervisor	BA in Geology with 11 years of experience in natural resource documentation including wetland delineations, stream determinations, protected species evaluation and consultation, environmental permitting and coordination with State and Federal agencies.

TRANSPORTATION PLANNING BRANCH

Jamal Alavi, PE, CPM Metrolina Planning Group Supervisor	BS in Civil Engineering with 21 years of experience within NCDOT in transportation engineering and planning, systems analysis, MPO/RPO coordination, public involvement, traffic forecasting, travel demand modeling and air quality conformity analysis.

NORTH CAROLINA TURNPIKE AUTHORITY

Donna Keener, PE Engineer Director	BS in Civil Engineering with 25 years of experience in transportation engineering, including roadway and drainage design, highway capacity analysis, and traffic control design. (Note: Ms. Keener was an employee of HNTB while working on this project.)

6.3 PRIVATE CONSULTING FIRMS

HNTB (NCTA GENERAL ENGINEERING CONSULTANT)

Spencer Franklin, PE Traffic Engineering Project Manager	BS in Civil Engineering with 17 years of experience in signal design, ITS design, traffic analysis, access management and traffic control design.
Bradley Reynolds, PE Transportation Project Engineer	Master of Business Administration and BS in Civil Engineering with 10 years of experience in transportation engineering, including traffic forecasting and traffic analysis.
Tracy Roberts, AICP Senior Transportation Planner	MS in Public Administration and BS in Urban and Regional Planning with 18 years of experience in NEPA studies and municipal planning, and air quality and noise analysis.

ATKINS (NEPA TECHNICAL ANALYSIS, AND SEIS PREPARATION)

Thomas Brad Allen Senior Scientist	BS in Environmental Science and MS in Environmental Resource Engineering with 10 years of experience in ecological assessment, wetland science, GIS analysis, and computer modeling. Participated in water quality monitoring.
Kimberly Bereis, AICP Senior Planner	BS in Environmental Studies (minor in Biology) and MSP in Urban and Regional Planning with 15 years of experience in transportation planning and NEPA studies/documentation. Responsible for preparation of various EIS sections.
Amanda Boyd Technician I	BA in Literature with 13 years of experience in graphics preparation. Responsible for graphics preparation and GIS impact assessment.

Carl Gibilaro, PE Project Manager	BS in Civil Engineering with 24 years of experience in NEPA documentation. Overall manager for preparation of the EIS.
Jill Gurak, PE, AICP NEPA Task Leader	BS in Mechanical Engineering with 24 years of experience in NEPA studies. Responsible for quality control for the EIS and air quality and noise impact assessments.
Thomas Kelly, PE Senior Engineer	BS Civil Engineering with 10 years of experience. Responsible for quality control of the Traffic Operations Technical Memorandum.
James Lawson Technical Coordinator II	BA in Psychology, AA in Civil Engineering with 25 years of experience. Responsible for graphics coordination, preparation of graphics and exhibits, and impact calculations.
Jennifer Noonkester Senior Planner	MS in Urban and Regional Planning, and BS in Natural Resource Management, with 9 years of experience. Responsible for research and preparation of various EIS sections.
David O'Loughlin Senior Scientist	BS in Computer Science and MS in Forestry with over seven years of experience in natural resource research, assessment, and wetland science, along with 18 years of experience in computer programming. Participated in water quality modeling.

MICHAEL BAKER ENGINEERING (INDIRECT AND CUMULATIVE EFFECTS)

Ken Gilland, PG Senior Environmental Scientist	BA in Geology with 21 years of experience in environmental sciences. Responsible for the overall management of the Indirect and Cumulative Effects Quantitative Analysis, led background information and interview tasks.
Lorna Parkins, AICP Planner, Project Manger	MS in Applied Economics and BA in Urban Affairs in Planning with 25 years of experience in transportation planning focused on the interactions between transportation and land use. 18 years of experience conducting quantitative Indirect and Cumulative Effects analyses. Responsible for methodology and quality control of the quantitative ICE analysis.
Scudder Wagg, AICP Planner, Project Manager	BA, MUPP, with 8 years of experience as a planner. Responsible for land use assessment and led methodology tasks, assisted with interview tasks and coordination with localities. Managed GIS data collection and use tasks.

THE CATENA GROUP (BIOLOGICAL REVIEW)

Michael Wood, LSS Principal	MS in Soil Science and BS in Recreation Management with 19 years of experience coordinating environmental permitting projects with regulatory agencies. Provided overall management of development of the Biological Assessment.
Tim Savidge, MS Environmental Supervisor	MS in Marine Biology/Biological Oceanography and BS in Biology with 25 years of experience conducting ecological and environmental impact studies, with eighteen years experience preparing Biological Assessments and coordinating with regulatory agencies. Gathered and reviewed environmental baseline data, evaluated potential impacts to Carolina heelsplitter and Critical Habitat.
Nancy Scott, MS Environmental Permitting/ Policy Specialist	MEM in Water Resources with an emphasis on water quality and stormwater management and BS in Environmental Science. Experience conducting environmental studies, preparing environmental documents and coordinating with regulatory agencies. Researched project history and environmental baseline, drafted BA document.

7. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT

7.1 FEDERAL AGENCIES

- US Environmental Protection Agency
- US Department of Transportation
- US Department of the Interior
- US Department of Commerce
- US Department of Agriculture
- US Department of Energy
- Federal Rail Administration
- Federal Emergency Management Agency
- Office of Management and Budget

7.2 REGIONAL OFFICES OF FEDERAL AGENCIES

- Regional Representative of the Secretary of Transportation (USDOT)
- US Environmental Protection Agency
- US Department of Housing and Urban Development
- US Army Corps of Engineers
- US Fish and Wildlife Service
- Federal Emergency Management Agency
- General Services Administration

7.3 STATE AGENCIES

- North Carolina Department of Human Resources
- North Carolina Department of Environment and Natural Resources
- North Carolina Wildlife Resources Commission
- North Carolina Department of Cultural Resources
- North Carolina Department of Public Instruction
- North Carolina Department of Commerce – Travel and Tourism Division
- North Carolina Department of Economic and Community Development
- State Clearinghouse
- Attorney General

7.4 LOCAL GOVERNMENTS AND AGENCIES

- Charlotte Regional Transportation Planning Organization
- Charlotte Department of Transportation
- Charlotte-Mecklenburg Schools
- Union County Public Schools
- Union County – Board of County Commissioners
- Mecklenburg County – Board of County Commissioners
- Charlotte-Mecklenburg Planning Department
- Union County Planning Department
- Town of Hemby Bridge – Town Council
- City of Monroe – City Council
- Town of Cornelius – Town Council
- Town of Davidson – Town Council
- Town of Huntersville – Town Council
- Town of Indian Trail – Town Council
- Town of Matthews – Town Council
- Town of Marshville – Town Council
- Town of Mint Hill – Town Council
- Town of Pineville – Town Council
- Town of Stallings – Town Council
- Town of Unionville – Town Council
- Town of Waxhaw – Town Council
- Town of Weddington – Town Council
- Town of Wingate – Town Council
- Village of Lake Park – Village Council
- Village of Wesley Chapel – Village Council
- Charlotte Monroe Executive Airport
- Rocky River Rural Planning Organization
- Charlotte Chamber of Commerce
- Matthews Chamber of Commerce
- Union County Chamber of Commerce

7.5 PUBLIC REVIEW LOCATIONS

- NCDOT Division 10 office (Albemarle)
- Charlotte-Mecklenburg Planning Department
- Monroe Planning Department
- Stallings Planning Department
- Indian Trail Planning Department
- Matthews Branch Library – Matthews
- Monroe Library – Monroe
- Union West Library – Indian Trail
- Edwards Memorial Library – Marshville

The Draft Supplemental Final EIS in its entirety is also available for download from the project Web site: www.ncdot.gov/projects/monroeconnector.

8. REFERENCES

Section 8 lists the various references and supporting documentation cited throughout the Draft Supplemental Final EIS. In addition, Section 8.3 includes a list of acronyms found throughout the Draft Supplemental Final EIS.

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List of North Carolina Important Farmlands, December, 2005

ftp://ftp-fc.sc.egov.usda.gov/NC/NCweb/Programs/soilsurvey

Soil Survey of Union County, North Carolina, January 1996

Soil Survey of Mecklenburg County, North Carolina, June 1980

Soil Survey of Union County, North Carolina, June 2009

Soil Survey of Mecklenburg County, North Caroilna, April 2009

http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

US Department of Transportation

Policy Guidance Concerning Recipients Responsibilities to Limited English Proficient Persons, 2005

US Environmental Protection Agency

1999 National Air Toxics Assessment (NATA)

http://www.epa.gov/ttn/atw/nata1999/

Clean Air Act Section 176(c), 40 CFR 93.116 and 40 CFR 93.123

Cleaner Diesels: Low Cost Ways to Reduce Emissions from Construction Equipment, March 2007

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

Control of Hazardous Air Pollutants from Mobile Sources, Volume 72, Number 37, pages 8427-8570, Published in the Federal Register on February 26, 2007

Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (66 CFR 17229), March 29, 2001

Draft Plan for Review of the Primary National Ambient Air Quality Standard for Carbon Monoxide, March 2008

Green Book Nonattainment Areas for Criteria Pollutants:

www.epa.gov/oar/oaqps/greenbk/

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

Integrated Risk Information Systems (IRIS): www.epa.gov/iris/

Latest Findings on National Air Quality – Status and Trends through 2006, January 2008

National Ambient Air Quality Standards: www.epa.gov/air/criteria.html

Ozone Attainment Federal Register, Vol. 77, No. 45, March 7, 2012
Federal Register, Vol. 77, No. 98, May 21, 2012
www.epa.gov/air/oaqps/greenbk/hindex.html

US Fish and Wildlife Service

Lists of Federally Protected Species for Union and Mecklenburg Counties, 2012:
www.fws.gov/raleigh/species/cntylist/nc_counties.html

8.2 SUPPORTING PROJECT DOCUMENTATION

The supporting project documentation listed below is technical memoranda and reports incorporated by reference into the Draft EIS, Final EIS, and Draft Supplemental Final EIS. These are available for review upon request by contacting NCDOT via email at monroe@ncdot.gov or via telephone at (800) 475-6402. Documents also available on the NCDOT Web site (www.ncdot.gov/projects/monroeconnector/) are marked with an asterisk *.

8.2.1 SUPPORTING PROJECT DOCUMENTATION PRIOR TO PUBLICATION OF THE DRAFT EIS

The supporting project documentation listed below is technical memoranda and reports created prior to publication of the Draft EIS in March 2009, and incorporated by reference into the Draft EIS.

1995, October	Phase II Architectural Survey and Evaluations of Eligibility for US 74 Bypass, Senator Jesse Helms Freeway (Monroe Bypass). Prepared by Mattson, Alexander & Associates.
1995, December	Archaeological Background Report – US 74 Monroe Bypass (R-2559) Study Area. Prepared by NCDOT.
1996, March	US 74 Monroe Bypass Environmental Assessment. Prepared by JBM Engineers & Planners.
2000, September	Phase II Survey of Historic Architectural Resources for the Monroe Connector. Prepared by Mattson, Alexander & Associates.
2003, October	Draft Environmental Impact Statement for US 74 Improvements I-485 to US 601. Prepared by PBS&J. (Rescinded by [Federal Register Notice, January 2006, Federal Register, Vol. 71, No 19, page 4958])
*2006, October	Proposed Monroe Connector Preliminary Traffic and Revenue Study. Prepared by Wilbur Smith Associates.
*2007, January	Monroe Connector/Bypass Notice of Intent.
*2007, October	Historic Architectural Resources Reconnaissance Report – Monroe Connector/Bypass. Prepared by NCDOT Historic Architecture Group.

2007, October Section 6002 Project Coordination Plan.

*2008, February Final Statement of Purpose and Need for the Monroe Connector/Bypass. Prepared by PBS&J.

*2008, March Existing and Year 2030 No-Build Traffic Operations Technical Memorandum. Prepared by PBS&J.

*2008, April Alternatives Development and Analysis Report. Prepared by PBS&J.

*2008, April GeoEnvironmental Impact Evaluation. Prepared by NCDOT Geotechnical Engineering Unit.

*2008, June Technical Memorandum for TIP Projects R-2559 & R-3329 US 74 Upgrade Scenario. Prepared by Wilbur Smith Associates.

*2008, June Traffic Forecasts for the No-Build Alternatives for the NCDOT State TIP Project No. R-3329 and NCDOT State TIP Project No. R-2559, Monroe Connector/Bypass Study. Prepared by Martin/Alexiou/Bryson.

*2008, September Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass. Prepared by Wilbur Smith Associates.

*2008, December Preliminary Hydraulic Technical Memorandum. Prepared by PBS&J.

*2008, December Natural Resources State Technical Report for the Monroe Connector/Bypass. Prepared by ESI.

*2009, January Monroe Connector/Bypass Relocation Reports. Prepared by Carolina Land Acquisition.

2009, January Monroe Connector/Bypass Alternative 3A-2013 AADT Build Toll Scenario. Prepared by HNTB.

*2009, January Indirect and Cumulative Effects Assessment. Prepared by HNTB

*2009, January Jurisdictional and Community Impacts for the Monroe Connector/Bypass. Prepared by ESI.

*2009, February Community Impact Assessment. Prepared by PBS&J.

*2009, February Year 2035 Build Traffic Operations Technical Memorandum. Prepared by PBS&J.

*2009, February Final Air Quality Technical Memorandum. Prepared by PBS&J.

2009, March Upgrade Existing US 74 Technical Memorandum. Prepared by HNTB and PBS&J.

8.2.2 SUPPORTING PROJECT DOCUMENTATION AFTER PUBLICATION OF THE DRAFT EIS

The supporting project documentation listed below are technical memoranda and reports created after publication of the Draft EIS in March 2009 for the Final EIS, and incorporated by reference into the Final EIS.

2009, March Monroe DEIS Cost Estimation Support Memo. Prepared by HNTB.

*2009, March Final Traffic Noise Technical Memorandum. Prepared by PBS&J.

*2009, April Final Year 2035 Build Traffic Operations Technical Memorandum. Prepared by PBS&J.

*2009, April	Update for Monroe Connector/Bypass Preliminary Traffic and Revenue Study. Prepared by Wilbur Smith Associates.
2009, April	Upgrade Existing US 74 Alternatives Study. Prepared by HNTB.
*2009, June	Freshwater Mussel Survey Report. Prepared by The Catena Group.
2009, July	2035 Build Toll Forecast, Segment 2 (Alternative 3A). Prepared by HNTB.
2009, August	Preferred Alternative Report. Prepared by PBS&J.
*2010, January	Traffic Noise Technical Memorandum Addendum. Prepared by PBS&J.
*2010, February	Review for Potential On-Site Mitigation. Prepared by ESI.
*2010, February	Final Addendum to Year 2035 Build Traffic Operations Technical Memorandum. Prepared by PBS&J.
2010, March	Final Archaeological Inventory and Evaluation for the US 74 Monroe Connector. Prepared by New South Associates.
2010, March	Revised Monroe Connector/Bypass No-Build Traffic Forecast Memo. Prepared by HNTB.
*2010, April	Monroe Connector/Bypass Service Road Study. Prepared by PBS&J.
*2010, April	Indirect and Cumulative Effects Quantitative Analysis. Prepared by Michael Baker Engineering, Inc.
*2010, April	Indirect and Cumulative Effects Water Quality Analysis, Prepared by PBS&J.
*2010, May	Biological Assessment for the Monroe Connector-Bypass Project (R-3329/R-2559). Prepared by The Catena Group.

8.2.3 SUPPORTING PROJECT DOCUMENTATION AFTER THE FINAL EIS

The supporting project documentation listed below are technical memoranda and reports created after publication of the Final EIS in May 2010 for the Draft Supplemental Final EIS, and incorporated by reference into the Draft Supplemental Final EIS.

2010, August	Monroe Connector/Bypass Year 2035 Build Toll Alternative 3A Traffic Volume Projections. Prepared by HNTB.
2010, October	Final Report Proposed Monroe Connector/Bypass Comprehensive Traffic and Revenue Study. Prepared by Wilbur Smith and Associates.
2010, December	2008 and 2035 No-Build Traffic Forecasts. Prepared by HNTB.
2010, December	US 74 Corridor Analysis Scenarios. Prepared by HNTB. (Note: This document was finalized in October 2013 with no substantive changes.)
2012, October	Memo - Monroe/Connector/Bypass Updated Census Tables. Prepared by Atkins.
2013, May	Freshwater Mussel Survey Report Update. Prepared by The Catena Group.
2012, October	Updated T&E Plant Species Field Review. Prepared by Atkins.
2012, October	US 74 Corridor Study Overview. Prepared by HNTB.

2013, April — Cost Estimates for Preferred Alternative. Prepared by HNTB.

2013, April — Ground Penetrating Radar Survey at the Hasty-Fowler-Secrest Cemetery. Prepared by New South Associates.

2013, June — Crash Data for US 74 from I-485 to Forest Hills School Road for April 1, 2020 through March 31, 2013. Prepared by NCDOT Traffic Safety Unit.

2013, October — Draft Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species. Prepared by Michael Baker Engineering, Inc.

2013, October — Biological Assessment (draft). Prepared by The Catena Group.

2013, October — US 74 Corridor Travel Time Comparison. Prepared by HNTB.

2013, November — Union County Growth Factors Technical Report. Prepared by Michael Baker, Jr., Inc.

2013, November — Traffic Noise Analysis Update for the Monroe Connector/Bypass. Prepared by Atkins.

2013, November — Monroe Connector/Bypass Traffic Forecast Summary. Prepared by HNTB.

2013, November — Monroe Connector/Bypass (R-3329/R-2559) Indirect and Cumulative Effects Quantitative Analysis Update. Prepared by Michael Baker Engineering, Inc.

8.3 LIST OF ACRONYMS

The following is a list of commonly-used acronyms found throughout this Draft Supplemental Final EIS and associated appendices.

TABLE 8-1: List of Acronyms

Acronym	Definition	Acronym	Definition
AADT	Annual Average Daily Traffic	**AASHTO**	American Association of State Highway and Transportation Officials
ABT	Averaging, Banking, and Trading program	**AERMOD**	American Meteorological Society/Environmental Protection Agency Regulatory Model
APE	Area of Potential Effects	**AQ**	Air Quality
AST	Above Ground Storage Tank	**BA**	Biological Assessment
BEA	Barrier Evaluation Area	**BLVD**	Boulevard
BMP	Best Management Practices	**BRT**	Bus Rapid Transit
CAA	Clean Air Act	**CARE**	Citizens Against Route Eighteen
CASAC	Clean Air Scientific Advisory Committee	**CATS**	Charlotte Area Transit System
CDBG	Community Development Block Grant	**CEQ**	Council on Environmental Quality
CEQA	California Environmental Quality Act	**CFR**	Code of Federal Regulations
CIW	Citizens Informational Workshops	**CLGP**	Conformity Lapse Grace Period
CLOMR	Conditional Letter of Map Revision	**CO**	Carbon Monoxide
COG	Council of Governments	**CPCC**	Central Piedmont Community College
CRTPO	Charlotte Regional Transportation Planning Organization	**CWA**	Clean Water Act
DSA	Detailed Study Alternative	**E**	Endangered
EA	Environmental Assessment	**EEP**	Ecosystem Enhancement Program

TABLE 8-1: List of Acronyms

Acronym	Definition	Acronym	Definition
EIS	Environmental Impact Statement	**ENR**	Environment and Natural Resources
ESA	Endangered Species Act	**ETC**	Electronic Toll Collection
FBFM	Flood Boundary and Floodway Map	**FEMA**	Federal Emergency Management Agency
FHWA	Federal Highway Administration	**FIRM**	Flood Insurance Rate Maps
FLUSA	Future Land Use Study Area	**FONSI**	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act	**FSC**	Federal Species of Concern
FTA	Federal Transit Administration	**GAP**	Gap Analysis Program
GHG	Greenhouse Gas	**GIS**	Geographic Information Systems
HAP	Hazardous Air Pollutants	**HAPEM**	Hazardous Air Pollutant Exposure Model
HC	Hydrocarbons	**HOT**	High Occupancy Toll
HOV	High Occupancy Vehicles	**HPO**	Historic Preservation Office
HUC	Hydrologic Unit Code	**HUD**	United States Department of Housing and Urban Development
ICC	Inter-County Connector	**ICE**	Indirect and Cumulative Effects
IP	Individual Permit	**IRIS**	Integrated Risk Information System
LEDPA	Least Environmentally Damaging Practicable Alternative	**LFA**	Lead Federal Agency
LID	Low Impact Development	**LOMR**	Letter of Map Revision
LOS	Level of Service	**LRTP**	Long Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century	**MCAPCO**	Mecklenburg County Air Pollution Control Ordinance
MOA	Memorandum of Agreement	**MOU**	Memorandum of Understanding
MOVES	Motor Vehicle Emission Simulator	**MPH**	Mile Per Hour
MPO	Metropolitan Planning Organization	**MRM**	Metrolina Travel Demand Model
MSAT	Mobile Source Air Toxics	**MUMPO**	Mecklenburg-Union Metropolitan Planning Organization
MVEB	Motor Vehicle Emissions Budget	**NAAQS**	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment	**NC-CREWS**	North Carolina Coastal Region Evaluation of Wetland Significance
NCDENR	North Carolina Department of Environment and Natural Resources	**NCDENR-DAQ**	North Carolina Department of Environment and Natural Resources – Division of Air Quality
NC-DEH	North Carolina Department of Environment and Natural Resources – Division of Environmental Health	**NCDENR-DEH, PWSS**	North Carolina Department of Environment and Natural Resources – Division of Environmental Health, Public Water Supply Section
NCDENR-DWQ	North Carolina Department of Environment and Natural Resources – Division of Water Quality	**NCDOT**	North Carolina Department of Transportation
NCGS	North Carolina General Statues	**NCHRP**	National Cooperative Highway Research Program
NCTA	North Carolina Turnpike Authority	**NCWAM**	North Carolina Wetland Assessment Method
NCWRC	North Carolina Wildlife Resources Commission	**NEPA**	National Environmental Policy Act
NFIP	National Flood Insurance Program	**NHP**	Natural Heritage Program

TABLE 8-1: List of Acronyms

Acronym	Definition	Acronym	Definition
NOI	Notice of Intent	**NO_x**	Nitrogen Oxide
NPDES	National Pollutant Discharge Elimination System	**NRCS**	Natural Resource Conservation Service
NRHP	National Register of Historic Places	**NTP**	National Toxicology Program
NWI	National Wetland Inventory	**OSA**	Office of State Archaeology
PM	Particulate Matter	**PSA**	Preliminary Study Alternatives
ROD	Record of Decision	**ROW**	Right of Way
RPO	Rural Planning Organization	**SAFETEA-LU**	Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users
SC	Species of Concern	**SCH**	State Clearinghouse
SCS	Soil Conservation Service	**SE**	Socio-Economic
SELC	Southern Environmental Law Center	**SEPA**	State Environmental Policy Act
SHC	Strategic Highway Corridor	**SIP**	State Implementation Plan
SR	State Road	**STIP**	State Transportation Improvement Program
STRAHNET	Strategic Highway Network	**TAC**	Technical Advisory Committee
TAZ	Traffic Analysis Zone	**TCC**	Technical Coordinating Committee
TDM	Transportation Demand Management	**TEAC**	Turnpike Environmental Agency Coordination
TIP	Transportation Improvement Program	**TNM**	Traffic Noise Model
TOG	Total Organic Gas	**TSM**	Transportation System Management
USACE	United States Army Corps of Engineers	**USDA**	United States Department of Agriculture
USDOT	United States Department of Transportation	**USEPA**	United States Environmental Protection Agency
USFWS	Untied States Department of the Interior Fish and Wildlife Service	**UST**	Underground Storage Tank
VAD	Voluntary Agricultural Districts	**VHT**	Vehicle-Hours Traveled
VMT	Vehicle Miles Traveled	**VOC**	Volatile Organic Compounds
WRC	Wildlife Resources Commission		