

**NC 24/27 TROY BYPASS**  
**From NC 24/27 Just West of SR 1138 (Dairy Road) to Just East of the Little River**  
**MONTGOMERY COUNTY, NORTH CAROLINA**  
**FEDERAL AID NO. STP-24(6)**  
**STATE PROJECT NO. 8.T551001**  
**TIP NO. R-623**

**Administrative Action**  
**Environmental Assessment**

**Submitted Pursuant to the**  
**National Environmental Policy Act**  
**42 U.S.C. 4332 (2)(c)**

**United States Department of Transportation**  
**Federal Highway Administration**  
**and**  
**North Carolina Department of Transportation**  
**Project Development and Environmental Analysis Branch**

1/17/07  
Date

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

12/22/06  
Date

Gregory J. Thorpe, PhD.  
FOR Gregory J. Thorpe, PhD.  
Branch Manager  
Project Development and Environmental Analysis Branch

The following persons may be contacted for additional information concerning this document:

Mr. John F. Sullivan, III, PE  
Division Administrator  
Federal Highway Administration  
310 New Bern Avenue, Suite 410  
Raleigh, NC 27601  
(919) 856-4346

Dr. Gregory J. Thorpe, PhD.  
Branch Manager  
NC Department of Transportation  
Project Development and Environmental Analysis Branch  
1548 Mail Service Center  
Raleigh, NC 27699-1548  
(919) 733-3141

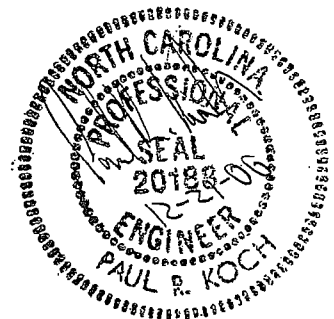
## NC 24/27 TROY BYPASS

From NC 24/27 Just West of SR 1138 (Dairy Road) to Just East of the Little River  
MONTGOMERY COUNTY, NORTH CAROLINA  
FEDERAL AID NO. STP-24(6)  
STATE PROJECT NO. 8.T551001  
TIP NO. R-623

### Administrative Action Environmental Assessment

December 2006

Documentation Prepared by:  
Stantec Consulting Services Inc.



12-21-06  
Date

Handwritten signature of Paul R. Koch.

Paul R. Koch, PE, AICP  
Project Manager  
Stantec Consulting Services Inc.

Documentation Prepared for:  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12/22/06  
Date

Handwritten signature of Jennifer Evans.

Jennifer Evans, PE  
Project Planning Engineer  
Project Development and Environmental Analysis Branch

12/22/06  
Date

Handwritten signature of Derrick Weaver.

Derrick Weaver, PE  
Project Engineer  
Project Development and Environmental Analysis Branch



## **PROJECT COMMITMENTS**

### **NC 24/27 TROY BYPASS**

**From NC 24/27 Just West of SR 1138 (Dairy Road) to Just East of the Little River  
MONTGOMERY COUNTY, NORTH CAROLINA  
FEDERAL AID NO. STP-24(6)  
STATE PROJECT NO. 8.T551001  
TIP NO. R-623**

In addition to the Section 404 Permit Conditions, Nationwide Permit Conditions, Regional Conditions, State Consistency Conditions, Section 401 Water Certification Conditions, and measures detailed in NCDOT's *Best Management Practices for the Protection of Surface Waters*, the following special commitments have been agreed to by the NCDOT:

#### **Project Development & Environmental Analysis Branch and Roadway Design Unit**

1. If Alternative B, C or D is selected as the Preferred Alternative, NCDOT will further evaluate minimization of impacts to a wetland near the proposed intersection with Pekin Road.
2. If Alternative E is selected as the Preferred Alternative, the NCDOT shall extend control of access for a minimum of 350 feet north and south along SR 1005 (Pekin Road) and utilize a superstreet intersection at this location. If these items become infeasible, NCDOT shall consult with the State Historic Preservation Office (HPO).
3. During subsequent public involvement, NCDOT will specifically present and describe the anticipated truck volumes and travel pattern changes along SR 1005 (Pekin Road).
4. Prior to conducting the intensive archaeological survey for the Preferred Alternative, NCDOT will obtain background information from previous studies prepared by Wake Forest University and the US Forest Service.
5. If Alternative B is selected as the Preferred Alternative, NCDOT will coordinate with the US Forest Service regarding the potential impact to the fire lookout tower within the proposed right-of-way.
6. NCDOT will provide a 25-foot corridor (from the toe of slope to the top of the bank) beneath the proposed bridges on the west side of the Little River to accommodate the Town of Troy's proposed greenway.

#### **Hydraulics Unit**

7. For the stream crossing designated as B5,C5,D5,E5 (as shown on Exhibit 4.10.1), NCDOT will evaluate a second culvert barrel (the currently proposed structure is a single 12x12 box culvert) to accommodate the floodplain and serve as a wildlife passage for small animals.

## **EXECUTIVE SUMMARY**

### **S.1 DESCRIPTION OF THE PROPOSED ACTION**

The North Carolina Department of Transportation (NCDOT) Draft 2007-2013 Transportation Improvement Program (TIP) includes the NC 24/27 Troy Bypass near Troy in Montgomery County, North Carolina. The project limits extend from NC 24/27 just west of SR 1138 (Dairy Road)/SR 1550 (Saunders Road) to just east of the Little River. This project is referred to as the NC 24/27 Troy Bypass and will involve the construction of a new four-lane divided roadway south of downtown Troy. NC 24/27 is designated as a strategic corridor, so this proposed project includes superstreet intersection configurations to minimize the use of signals. The facility will provide shoulders and a 46 -foot median with partial control of access. The approximate length of the project is 6.0 miles.

The purpose of the proposed project is to reduce traffic volumes and improve safety on NC 24/27 through the town of Troy. The proposed improvements will provide additional roadway capacity, accommodate projected traffic volumes, lessen congestion on main arteries in downtown Troy and provide better access to the highway. These improvements are consistent with a number of long-range plans including the North Carolina Intrastate System, the NC Strategic Corridors Program, the 1990 Troy Thoroughfare Plan, and the 2006 Town of Troy Transportation Plan.

### **S.2 OTHER GOVERNMENTAL ACTIONS REQUIRED**

Mitigation for wetland impacts would be required for the construction of any Build Alternative. It is anticipated that a Section 404 permit and a Section 401 Water Quality Certification (WQC) would be required. Section 404 permits authorize activities from the perspective of the US Army Corps of Engineers (USACE) and Section 401 permits are administered by the NC Division of Water Quality (DWQ). Other federal, state, or local permits, approvals, or authorizations may also be required.

### **S.3 ALTERNATIVES CONSIDERED**

**No-Build Alternative** – The No-Build Alternative is projected to result in a number of adverse traffic impacts on roadways in and around the project study area. As NC 24/27 currently provides levels-of-service (LOS) at or near capacity, operating at LOS E in the central business district of Troy and LOS D outside of town, the increased traffic predicted in the design year

(2030) is beyond the capacity of the two- and three-lane sections. Congestion worsens to LOS F in town and E outside of town in the design year. The projected traffic necessitates the roadway being widened to a multi-lane section throughout most of the corridor or the construction of a multi-lane bypass facility. The No Build Alternative would therefore not satisfy the purpose of and need for the proposed project.

***Improve Existing Alternative*** – The Improve Existing Alternative would involve roadway widening and intersection improvements along existing NC 24/27 to improve capacity and traffic flow. The Improve Existing Alternative has been eliminated from further study due primarily to public input regarding the impacts to residential and commercial properties in downtown Troy.

***Transportation System Management Alternative*** – Transportation System Management (TSM) improvements involve increasing the available capacity of the facility within the existing right-of-way with minimum capital expenditures and without reconstructing the existing facility. TSM improvements would not adequately address design year traffic demand and will therefore not satisfy the purpose and need for the project.

***Mass Transit Alternative*** – The project study area is not currently served by mass transit and there are currently no general public routes in Montgomery County. Implementation of mass transit or the expansion of existing transit services is not anticipated to be feasible or reasonable solution for design year traffic demand and therefore would not satisfy the purpose and need for the proposed project.

***Build Alternatives*** – The following paragraphs describe the alternatives to be carried forward for further study, as agreed upon by the NEPA/404 Merger Team on June 18, 2003. The development of these alternatives is discussed in Section 2.5.1. Exhibit 2.5.1 shows the Build Alternatives. The build alternatives share common northern and southern termini and all of the alternatives were aligned to avoid ponds, endangered Schweinitz's sunflower populations, and decrease wetland and stream impacts to the maximum extent possible.

***Alternative B*** – The corridor for Alternative B starts on existing NC 24/27 approximately 1,500 feet west of the intersection with SR 1138 ( Dairy Road)/SR 1550 ( Saunders Road). The alternative continues along NC 24/27 until it splits from the existing roadway in an east-southeast direction near Alexander and Oakhills Drives. The corridor then passes south of

Dogwood Avenue before turning east where it crosses SR 1005 (Pekin Road) south of Springdale Heights and SR 1553 (Roslyn Road) south of the Progress Energy powerline right-of-way. Alternative B then turns northeast and crosses SR 1554 (Troy-Candor Road) at the power line right-of-way. The alignment continues along this bearing for approximately 2,000 feet before turning east to meet with NC 24/27 just west of SR 1324 (Glen Road)/Holly Hills Drive. The corridor then continues east along NC 24/27 over the Little River bridge and ends at the existing four-lane divided section just east of the river.

**Alternative C** – The corridor for Alternative C follows the same alignment as Alternative B except for a section between SR 1553 (Roslyn Road) and the junction with NC 24/27. For this section, the alternative turns just north of east past SR 1553 (Roslyn Road), crossing SR 1554 (Troy-Candor Road) just south of the Progress Energy powerline right-of-way. This corridor continues in this direction, passing north of the Holly Hills neighborhood and connecting back to NC 24/27 just west of SR 1324 (Glen Road)/Holly Hills Drive.

**Alternative D** – The corridor for Alternative D follows the same alignment as Alternative C except for a section between SR 1005 (Pekin Road) and the junction with NC 24/27 on the east end of the project. For this section, the alternative turns southeast past SR 1005 (Pekin Road) and passes south of the end of SR 1553 (Roslyn Road), where it turns north to a northeast bearing. The corridor then continues in that direction, crossing SR 1554 (Troy-Candor Road) and the Progress Energy powerline right-of-way before turning east to join the Alternative C alignment west of the Holly Hills neighborhood.

**Alternative E** – The corridor for Alternative E follows the same alignment as Alternative D except for a section just beyond the split from NC 24/27 on the western end of the project to the alignment south of SR 1553 (Roslyn Road). For this section, Alternative E splits from the existing roadway in a southeast direction near Alexander and Oakhills Drives. The corridor then passes south of Dogwood Avenue in a parallel manner and continues southeast before starting to turn east near SR 1005 (Pekin Road). The alignment crosses SR 1005 (Pekin Road) just north of SR 1519 (Capelsie Road) and continues turning eastward. The alignment takes a sharper turn to a northeast heading approximately 1,500 feet south of the end of SR 1553 (Roslyn Road) and joins the Alternative D corridor past this point before crossing SR 1554 (Troy-Candor Road).

#### **S.4    SUMMARY OF IMPACTS**

Summary descriptions of impacts are provided in the following section. Qualitative impacts are discussed in general terms for all Build Alternatives, as the alternatives do not vary substantially. Table S.1 quantifies the impacts for each Build Alternatives based on preliminary designs.

***Relocations*** – It is estimated that Alternative B would displace thirteen (13) residences, ten (10) businesses, and one ( 1) non-profit organization; Alternative C would displace twelve (12) residences, ten (10) businesses, and one ( 1) non-profit organization; Alternative D would displace nine (9) residences, ten (10) business relocations, and one (1) non-profit organization; Alternative E would displace nine (9) residences, ten (10) businesses, and one (1) non-profit organization.

***Community Facilities*** – No community facility impacts are associated with the proposed project.

***Environmental Justice*** – Low-income or minority populations would not experience direct disproportional effects from Alternatives B, C, D, and E; however, the minority population along SR 1005 (Pekin Road) may experience Indirect and Cumulative Impacts from the additional heavy trucks (estimated to be approximately 268 trucks per day in 2030) anticipated to travel the two-lane road to access the bypass. Potential impacts may include residents perceiving the increased truck traffic as a negative effect on their quality of life and the aesthetics of the area.

These effects would include increases in truck traffic noise. It should be noted that although there will be a potential increase in truck traffic, this increase will be spread out during the daylight hours and not during the evening hours when truck noise would be most disruptive to adjacent residences. In an effort to minimize this potential impact, NCDOT met with the Town of Troy and local logging companies on September 13, 2004 to discuss the feasibility of routing heavy truck traffic from north of Troy along SR 1332 (Page Street) or SR 1324 (Glen Road) to access the bypass near its northern termini. Representatives from the two logging companies present at the meeting responded favorably to the proposed truck route.

***Indirect and Cumulative Impacts (ICI)*** – ICIs directly related to the proposed project are “encroachment-alteration effects” and include ICIs such as habitat fragmentation, increased imperviousness, vehicular pollution, and noise. These are the long-term impacts of the roadway itself. ICIs related to growth potentially induced by a transportation project are known as “indirect effects related to induced growth”. The proposed project is not anticipated to create substantial changes in population projections or future land use. Potential ICIs could result from the increased accessibility of the project study area, but the extent of these effects would be tempered by the project study area’s slow growth rate and the limited increase in access created by the project.

***Utilities*** – The project would cross water and sewer along Roslyn Road and a Progress Energy high kVA (kilovolt-amp) powerline near Troy-Candor Road. The powerline would be affected by the construction of the proposed project. The Build Alternatives may impact one or more of the existing towers and would require replacement of these towers outside of the right-of-way.

***Archaeological and Historic Architectural Resources*** – There are five properties within the project’s area of potential effect (APE) that are eligible for listing in the National Register of Historic Places. Two of these properties, the Wooley-Sanders House and the Neal Clark House, are within the proximity of Alternative E. Through coordination with the State Historic Preservation Office (HPO), it was determined Alternative E would have **No Adverse Effect** on the two eligible properties. Alternatives B, C, and D would have **No Effect** on the two eligible properties.

***Rare and Protected Species*** – Based on preliminary designs the proposed project may potentially affect a single Schweinitz’s sunflower plant within the right of way of Alternative B. Alternatives C, D, and E do not impact the Schweinitz’s sunflower. Because Alternative B is still a viable alternative at this point, formal Section 7 Consultation cannot be resolved at this time. This issue will be resolved after the Least Environmentally Damaging Practicable Alternative (LEDPA) is identified by the NEPA/404 Merger Team. Ongoing Section 7 consultation will involve future meetings between NCDOT, their representatives and USFWS to discuss actual impacts and evaluate avoidance and minimization measures. Avoidance and minimization of impacts to the species will be evaluated as design progresses.

**Biotic Communities** – Upland communities within the project study area are represented by four community types: Mesic Mixed Hardwood Forest, Dry Mesic Oak Hickory Forest, Maintained/Disturbed and Pine Plantation. The primary impact to these communities is the loss of riparian habitat and forest fragmentation. Project construction would result in direct loss of nesting, foraging and shelter habitat and render portions of the remaining habitat less suitable for many species due to roadway noise and fragmentation. The approximate forested land lost for each of the alternatives is: 148.3 acres for Alternative B, 180.9 acres for Alternative C, 189.4 acres for Alternative D, and 195.5 acres for Alternative E.

**Waters of the United States** – The delineated wetland community types found within the project study area includes headwater forest, wet seep and Piedmont bottomland hardwood forest. Waters within the project study area include the Little River, Warner Creek, Turkey Creek, and unnamed tributaries to Warner Creek, Turkey Creek, and the Little River. Wetland impacts for each alternative are as follows: 0.8 acres for Alternative B, 0.7 acres for Alternative C, 0.6 acres for Alternative D, and 0.5 acres for Alternative E. Stream impacts for each alternative are as follows: 4,889.1 linear feet for Alternative B, 5,276.2 linear feet for Alternative C, 5,360.5 linear feet for Alternative D, and 4,755.9 linear feet for Alternative E. Anticipated wetland and stream impacts are also shown in Table S.1.

**Water Quality** – The natural hydraulics of some waterbodies would be affected by construction of the proposed project. Impacts to water resources in the project study area are similar for all alternatives and are likely to result from activities associated with project construction, such as clearing and grubbing on streambanks, riparian buffer impacts, instream construction, fertilizers and pesticides used in revegetation, and pavement construction. Streams traversed by the new facility would be impacted as a result of bridge and/or culvert construction at stream crossings. Secondary impacts to water quality would occur through nonpoint source pollution runoff and sedimentation along the highway corridor.

**Riparian Buffers** – There are six major stream crossings associated with each of the alternatives; therefore, associated riparian buffer areas would be affected. At the time this document was prepared, no state buffer rules were in effect for the Yadkin-Pee Dee River Basin.

**Land Use** – Without an active catalyst for growth (e.g., economic development initiative, water/sewer expansion, attraction as a retirement community, etc.), Troy's population is projected to grow at a continuous rate, relatively uninfluenced by construction of the proposed

bypass. Therefore, the population projections for the No-Build and Build Scenarios are identical and minimal induced growth effects are anticipated as a result of the proposed project.

**Floodplains** – The 100-year floodplain would be traversed by all of the Build Alternatives. The approximate floodplain acreage impacted for each of the alternatives is: 4.4 acres for Alternative B, 4.4 acres for Alternative C, 4.4 acres for Alternative D, and 5.0 acres for Alternative E.

**Farmlands** – The majority of the project study area's soils are characterized as prime and statewide important farmlands. A Farmland Conversion Impact Rating Form was submitted to the Natural Resources Conservation Service for the Build Alternatives and is included in Appendix A. The total scores for the Build Alternatives range from 113 to 119, as based on 250-foot corridors. These scores are deemed to be in compliance with the Farmland Protection Policy Act (FPPA). Further, the actual impacts based on construction limits would be less than the total amount of farmland within the project corridors.

**Hazardous Material Sites/Underground Storage Tanks** – There are two truck repair facilities within the corridors of Alternatives B, C, D, and E. These facilities have several aboveground storage tanks. Monetary and scheduling impacts resulting from these two sites are expected to be low risk.

**Air Quality** – The 1-hour and 8-hour carbon monoxide standards, as established by the National Ambient Air Quality Standards, are 35 parts per million (ppm) and 9 ppm, respectively. Based on predicted concentration levels, neither the 1-hour or 8-hour criteria would be exceeded by any of the alternatives for the proposed project.

**Noise** – Potential noise impacts were analyzed for the No-Build scenario and for four Build Alternatives (B, C, D, E). Alternatives B and C would have the greatest number of impacts, with 29 receivers affected for each alternative. Alternative D would create 18 impacts, and Alternative E would create the least impacts with 17.

For many of the impacted receivers, specifically those along existing NC 24/27, noise walls are not a viable option due to the need to maintain access to existing properties. It should be noted that impacts along these facilities occur with or without the proposed project. Two locations occurred among the Build Alternatives where impacted receivers are clustered and would not necessarily require an access break in a barrier. Based on a cost analysis, the construction of



noise walls at these locations was found to be unfeasible. Therefore, no noise walls are recommended for any of the alternatives.

**Mineral Resources** – There are no active mines or quarries within the project study area therefore; the proposed project would not pose any impacts to mining or mineral resources.

**Preliminary Cost Estimate** – The estimated construction and right-of-way costs for the project are \$49,100,000 for Alternative B, \$49,500,000 for Alternative C, \$56,400,000 for Alternative D, and \$49,200,000 for Alternative E. Comparative cost data for each Build Alternative is also shown in Table S.1.

## **S.5 RECOMMENDED ALTERNATIVE**

The Recommended Alternative will be identified after the NEPA/404 Merger Team meeting for Concurrence Point 3 (*Identification of the Least Environmentally Damaging Practicable Alternative*).

**TABLE S.1  
IMPACT SUMMARY TABLE**

| EVALUATION FACTOR                                 | ALTERNATIVES |            |            |            |
|---------------------------------------------------|--------------|------------|------------|------------|
|                                                   | B            | C          | D          | E          |
| <b>CONSTRUCTION FACTORS</b>                       |              |            |            |            |
| Mainline Length (miles)                           | 5.83         | 5.81       | 6.09       | 6.31       |
| Intersections                                     | 9            | 9          | 8          | 8          |
| Railroad Crossings                                | 0            | 0          | 0          | 0          |
| Construction Cost (millions)                      | 44,700,000   | 45,200,000 | 52,500,000 | 45,200,000 |
| Right of Way Cost (millions)                      | 4,400,000    | 4,300,000  | 4,000,000  | 4,000,000  |
| Total Cost (millions)                             | 49,100,000   | 49,500,000 | 56,400,000 | 49,200,000 |
| <b>SOCIOECONOMIC FACTORS</b>                      |              |            |            |            |
| Residential Relocations                           | 13           | 12         | 9          | 9          |
| Business Relocations                              | 10           | 10         | 10         | 10         |
| Non-profit relocations                            | 1            | 1          | 1          | 1          |
| Schools/Parks Impacted                            | 0/0          | 0/0        | 0/0        | 0/0        |
| Churches/Cemeteries Displaced                     | 0/0          | 0/0        | 0/0        | 0/0        |
| Receptors Impacted by Noise                       | 29           | 29         | 18         | 17         |
| <b>INFRASTRUCTURE FACTORS</b>                     |              |            |            |            |
| Major Utility Line Crossings – High KVA Powerline | 2 Towers     | 1 Tower    | 2 Towers   | 2 Towers   |
| Natural Gas Line Crossings                        | 0            | 0          | 0          | 0          |
| Sewer/Water Line Crossings                        | 1            | 1          | 1          | 1          |
| <b>CULTURAL RESOURCE FACTORS</b>                  |              |            |            |            |
| Potential Archaeological Sites <sup>1</sup>       | TBD          | TBD        | TBD        | TBD        |
| Recorded Archaeological Sites <sup>1</sup>        | TBD          | TBD        | TBD        | TBD        |
| Historic Properties Effected                      | 0            | 0          | 0          | 0          |
| <b>NATURAL RESOURCE FACTORS</b>                   |              |            |            |            |
| Protected Species Impacted <sup>2</sup>           | 1            | 0          | 0          | 0          |
| Stream Crossings <sup>3</sup>                     | 6            | 6          | 6          | 6          |
| Upland Natural Systems – acres                    | 148.3        | 180.9      | 189.4      | 195.5      |
| Wetland Systems – acres <sup>4</sup>              | 0.8          | 0.7        | 0.6        | 0.5        |
| Stream Impacts – linear feet <sup>5</sup>         |              |            |            |            |
| Relocation Impacts                                | 2,528.9      | 3,446.8    | 3,356.7    | 3,363.2    |
| Culvert Impacts                                   | 563.4        | 573.8      | 563.4      | 584.4      |
| Total Linear Feet of Impact                       | 3,092.3      | 4,020.6    | 3,920.1    | 3,947.6    |
| <b>LAND USE FACTORS<sup>5</sup></b>               |              |            |            |            |
| Rural Residential – acres                         | 85.6         | 61.9       | 55.5       | 54.6       |
| Commercial – acres                                | 5.8          | 5.8        | 5.8        | 5.8        |
| Industrial – acres                                | 0            | 0          | 0          | 0          |
| Agricultural/Pasture – acres                      | 7.1          | 7.1        | 7.1        | 10.1       |
| Open – acres <sup>6</sup>                         | 98.8         | 99.1       | 114.4      | 119.1      |
| <b>PHYSICAL FACTORS</b>                           |              |            |            |            |
| Floodplains – acres                               | 4.4          | 4.4        | 4.4        | 5.0        |
| Farmland – acres <sup>7</sup>                     | 79.2         | 77.7       | 84.4       | 94.2       |
| Hazardous Materials Sites                         | 2            | 2          | 2          | 2          |
| Exceedances of CO NAAQS                           | 0            | 0          | 0          | 0          |

- Notes: 1 An intensive archaeological survey will be conducted for the Preferred Alternative.  
2 Impacts refer to a single Schweinitz's sunflower stem.  
3 Based on number of major drainage structures.  
4 Impacts based on construction limits plus 10 feet.  
5 Impacts based on construction limits.  
6 Disturbed, abandoned, and/or undeveloped land.  
7 Includes prime and statewide important farmlands.

## TABLE OF CONTENTS

| SECTION                                                         | PAGE       |
|-----------------------------------------------------------------|------------|
| <b>1.0 PURPOSE AND NEED FOR PROJECT .....</b>                   | <b>1-1</b> |
| 1.1 INTRODUCTION .....                                          | 1-1        |
| 1.2 PROPOSED ACTION .....                                       | 1-1        |
| 1.3 SUMMARY OF PROJECT NEED .....                               | 1-2        |
| 1.4 SUMMARY OF PROJECT PURPOSE.....                             | 1-5        |
| 1.5 PROJECT SETTING .....                                       | 1-5        |
| 1.6 SYSTEM LINKAGE.....                                         | 1-6        |
| 1.6.1 Existing Road System.....                                 | 1-6        |
| 1.6.2 Other Modes Of Transportation .....                       | 1-6        |
| 1.7 SOCIAL AND ECONOMIC CONDITIONS .....                        | 1-7        |
| 1.7.1 Existing Development .....                                | 1-7        |
| 1.7.2 Future Development .....                                  | 1-7        |
| 1.8 TRANSPORTATION PLANS.....                                   | 1-8        |
| 1.9 ROADWAY CAPACITY .....                                      | 1-11       |
| 1.10 ACCIDENT ANALYSIS.....                                     | 1-12       |
| 1.11 SUMMARY .....                                              | 1-17       |
| <b>2.0 ALTERNATIVES .....</b>                                   | <b>2-1</b> |
| 2.1 NO-BUILD ALTERNATIVE .....                                  | 2-1        |
| 2.2 IMPROVE EXISTING ALTERNATIVE .....                          | 2-1        |
| 2.3 TRANSPORTATION SYSTEM MANAGEMENT ALTERNATIVE .....          | 2-1        |
| 2.4 MASS TRANSIT ALTERNATIVE .....                              | 2-2        |
| 2.5 BUILD ALTERNATIVE.....                                      | 2-2        |
| 2.5.1 Preliminary Build Alternatives .....                      | 2-2        |
| 2.5.2 Build Alternatives Carried Forward for Further Study..... | 2-3        |
| 2.6 ROADWAY DESIGN CRITERIA .....                               | 2-4        |
| 2.7 BUILD ALTERNATIVE COST ESTIMATES.....                       | 2-8        |

|        |                                                                           |       |
|--------|---------------------------------------------------------------------------|-------|
| 2.8    | TRAFFIC CAPACITY FOR THE BUILD ALTERNATIVE.....                           | 2-8   |
| 2.8.1  | Segment Analysis .....                                                    | 2-14  |
| 2.8.2  | Intersection Analysis .....                                               | 2-14  |
| 2.8.3  | General Observations.....                                                 | 2-24  |
| 2.9    | PREFERRED ALTERNATIVE.....                                                | 2-26  |
| 3.0    | GENERAL CHARACTERISTICS OF THE PROJECT AREA AND VICINITY .....            | 3-1   |
| 4.0    | AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES.....                  | 4-1   |
| 4.1    | LAND USE.....                                                             | 4-1   |
| 4.1.1  | Existing Land Use.....                                                    | 4-1   |
| 4.1.2  | Development Trends .....                                                  | 4-1   |
| 4.1.3  | Consistency with Land Use and Transportation Plans.....                   | 4-2   |
| 4.2    | FARMLANDS .....                                                           | 4-2   |
| 4.3    | SOCIAL ENVIRONMENT .....                                                  | 4-6   |
| 4.3.1  | Population Characteristics .....                                          | 4-6   |
| 4.3.2  | Employment and Economic Characteristics.....                              | 4-11  |
| 4.3.3  | Neighborhoods and Community Cohesion .....                                | 4-13  |
| 4.3.4  | Travel Patterns and Accessibility .....                                   | 4-13  |
| 4.3.5  | Schools.....                                                              | 4-14  |
| 4.3.6  | Churches and Cemeteries .....                                             | 4-17  |
| 4.3.7  | Police and Fire Stations,<br>Rescue Squads and Emergency Management ..... | 4-17  |
| 4.3.8  | Businesses .....                                                          | 4-18  |
| 4.3.9  | Parks and Recreation .....                                                | 4-18  |
| 4.3.10 | Specific Social Groups.....                                               | 4-19  |
| 4.4    | RIGHT OF WAY AND RELOCATION IMPACTS.....                                  | 4-19  |
| 4.5    | INDIRECT AND CUMULATIVE EFFECTS .....                                     | 4-22  |
| 4.6    | ENVIRONMENTAL JUSTICE.....                                                | 4-25  |
| 4.7    | AIR QUALITY.....                                                          | 4-27  |
| 4.8    | NOISE ANALYSIS .....                                                      | 4-41  |
| 4.9    | NATURAL RESOURCES .....                                                   | 4-55  |
| 4.9.1  | Biotic Communities .....                                                  | 4-55  |
| 4.9.2  | Physiography and Soils .....                                              | 4-63  |
| 4.9.3  | Wetlands.....                                                             | 4-64  |
| 4.9.4  | Water Resources .....                                                     | 4-82  |
| 4.9.5  | Riparian Buffers .....                                                    | 4-98  |
| 4.9.6  | Rare and Protected Species .....                                          | 4-98  |
| 4.9.7  | Mitigation and Permitting .....                                           | 4-109 |

|            |                                                                 |            |
|------------|-----------------------------------------------------------------|------------|
| 4.10       | HYDRAULIC IMPACTS .....                                         | 4-113      |
| 4.11       | FLOODPLAINS .....                                               | 4-117      |
| 4.12       | CULTURAL RESOURCES .....                                        | 4-117      |
|            | 4.12.1 Historic Architecture .....                              | 4-117      |
|            | 4.12.2 Archaeology .....                                        | 4-121      |
| 4.13       | HAZARDOUS MATERIAL SITES<br>AND UNDERGROUND STORAGE TANKS ..... | 4-121      |
| 4.14       | MINERAL RESOURCES .....                                         | 4-122      |
| 4.15       | ENERGY .....                                                    | 4-122      |
| 4.16       | VISUAL IMPACTS .....                                            | 4-122      |
| 4.17       | UTILITIES .....                                                 | 4-123      |
|            | 4.17.1 Electric Power Transmission .....                        | 4-123      |
|            | 4.17.2 Water and Sewer Facilities .....                         | 4-123      |
|            | 4.17.3 Natural Gas Service & Other Pipelines .....              | 4-123      |
|            | 4.17.4 Communications .....                                     | 4-124      |
| 4.18       | CONSTRUCTION IMPACTS .....                                      | 4-124      |
|            | 4.18.1 Air Quality .....                                        | 4-124      |
|            | 4.18.2 Noise .....                                              | 4-125      |
|            | 4.18.3 Water Quality .....                                      | 4-125      |
|            | 4.18.4 Maintenance of Traffic .....                             | 4-125      |
|            | 4.18.5 Construction Materials and Waste .....                   | 4-126      |
| 4.19       | SUMMARY OF IMPACTS .....                                        | 4-126      |
| <b>5.0</b> | <b>COMMENTS AND COORDINATION .....</b>                          | <b>5-1</b> |
| 5.1        | AGENCY COORDINATION .....                                       | 5-1        |
|            | 5.1.1 Scoping Letter .....                                      | 5-1        |
|            | 5.1.2 NEPA/404 Merger Process .....                             | 5-2        |
| 5.2        | PUBLIC INVOLVEMENT .....                                        | 5-3        |

---

## APPENDICES

---

### A. COORDINATION

- A.1 Agency Comments
- A.2 NEPA/404 Merger Team Concurrence
- A.3 Farmland Conversion Impact Rating Form (USDA Form AD-1006)
- A.4 Relocation Report
- A.5 USACE Jurisdictional Determination
- A.6 North Carolina State Historic Preservation Office Concurrence
- A.7 Newsletters

### B. REFERENCES

- B.1 References

| EXHIBITS                                                                                 | PAGE  |
|------------------------------------------------------------------------------------------|-------|
| Exhibit 1.2.1 Project Location .....                                                     | 1-3   |
| Exhibit 1.7.1 Town of Troy Current Zoning .....                                          | 1-9   |
| Exhibit 1.9.1 Estimated ADT Volumes Existing/2030 (No Build) Conditions.....             | 1-13  |
| Exhibit 1.9.2 Estimated 2030 ADT Volumes with Proposed Bypass .....                      | 1-15  |
| Exhibit 2.5.1 Build Alternatives .....                                                   | 2-5   |
| Exhibit 2.6.1 Typical Section.....                                                       | 2-9   |
| Exhibit 2.6.2 Intersection Configurations.....                                           | 2-11  |
| Exhibit 2.8.1 Existing Lane Configuration and Traffic Control .....                      | 2-19  |
| Exhibit 2.8.2 Proposed Lane Configuration and Traffic Control for Alternatives B-E ..... | 2-21  |
| Exhibit 4.1.1 Existing Land Use and Community Features .....                             | 4-3   |
| Exhibit 4.2.1 Farmlands.....                                                             | 4-7   |
| Exhibit 4.3.1 Proposed Truck Travel Patterns Alternatives B-E .....                      | 4-15  |
| Exhibit 4.7.1 Air Quality Receptor Locations.....                                        | 4-31  |
| Exhibit 4.8.1a-d Noise Receivers and Associated Impacts .....                            | 4-43  |
| Exhibit 4.9.1a Natural Resources .....                                                   | 4-57  |
| Exhibit 4.9.1b Terrestrial Communities .....                                             | 4-59  |
| Exhibit 4.9.2 Soils Mapping .....                                                        | 4-67  |
| Exhibit 4.9.3a-f Delineated Wetlands.....                                                | 4-69  |
| Exhibit 4.9.4a-f Streams .....                                                           | 4-83  |
| Exhibit 4.9.5a-b Sunflower Locations.....                                                | 4-103 |
| Exhibit 4.10.1 Major Stream Crossings.....                                               | 4-115 |
| Exhibit 4.11.1 Floodplains .....                                                         | 4-119 |

| <b>TABLES</b> | <b>PAGE</b>                                                                                                |
|---------------|------------------------------------------------------------------------------------------------------------|
| Table 1.9.1   | Existing and Projected Traffic Volumes .....1-12                                                           |
| Table 1.10.1  | Accident Rate Summary for the Project Study Area .....1-17                                                 |
| Table 2.6.1   | Roadway Design Criteria ..... 2-7                                                                          |
| Table 2.7.1   | Build Alternative Cost Estimates .....2-8                                                                  |
| Table 2.8.1   | Highway Segment Level-of-Service .....2-14                                                                 |
| Table 2.8.2   | Intersection Level of Service and Delay for 2000 Existing And 2030<br>No-Build Traffic Conditions.....2-15 |
| Table 2.8.4   | Comparison of Volume Reductions Due to the Bypass .....2-25                                                |
| Table 2.8.5   | Comparison of Daily Truck Volumes .....2-26                                                                |
| Table 2.8.3   | Intersection Level of Service and Delay for 2030 Build Traffic Conditions ....2-16                         |
| Table 4.2.1   | Prime, Unique, and Statewide Important Farmlands .....4-2                                                  |
| Table 4.2.2   | Farmland and Conversion Impacts.....4-5                                                                    |
| Table 4.3.1   | Population Trends (1970 – 2000).....4-9                                                                    |
| Table 4.3.2   | Racial Characteristics .....4-10                                                                           |
| Table 4.3.3   | Age Characteristics.....4-10                                                                               |
| Table 4.3.4   | Employment and Economic Data .....4-11                                                                     |
| Table 4.3.5   | Occupational Data .....4-12                                                                                |
| Table 4.5.1   | Summary of Indirect and Cumulative Impacts Associated<br>with the Build Scenario.....4-24                  |
| Table 4.7.1   | MOBILE5A/CAL3QHC Input Parameters .....4-30                                                                |
| Table 4.7.2   | CO Concentrations .....4-33                                                                                |
| Table 4.8.1   | Ambient Noise Levels .....4-42                                                                             |
| Table 4.8.2   | Noise Abatement Criteria .....4-51                                                                         |
| Table 4.8.3   | Noise Level Impact Summary .....4-52                                                                       |
| Table 4.8.4   | Noise Level Increase Summary .....4-52                                                                     |
| Table 4.9.1   | Upland Natural Community Impacts.....4-56                                                                  |
| Table 4.9.2   | Descriptions of Soil Series .....4-64                                                                      |
| Table 4.9.3   | Wetland Impacts .....4-65                                                                                  |
| Table 4.9.4   | Impacts to Water Resources .....4-96                                                                       |
| Table 4.9.5   | Federally Protected Species for Montgomery County.....4-99                                                 |
| Table 4.9.6   | Federal Species of Concern for Montgomery County .....4-107                                                |
| Table 4.10.1  | Major Drainage Structures .....4-114                                                                       |
| Table 4.19.1  | Impact Summary Table .....4-127                                                                            |

## **1.0 PURPOSE AND NEED FOR PROJECT**

### **1.1 INTRODUCTION**

The North Carolina Department of Transportation (NCDOT) Draft 2007-2013 Transportation Improvement Program (TIP) includes the NC 24/27 Troy Bypass near Troy in Montgomery County, North Carolina. The project limits extend from NC 24/27 just west of SR 1138 to just east of the Little River. This environmental document was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and is intended for use by both decision-makers and the public. It includes the disclosure of relevant environmental information regarding the proposed project and conforms to the methodologies and requirements detailed in North Carolina General Statute 133A, Sections 1 through 13 as well as the Federal Highway Administration's (FHWA) technical advisory, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA, 1987).

### **1.2 PROPOSED ACTION**

The proposed action involves improvements to NC 24/27 through the Town of Troy. The project limits, shown in Exhibit 1.2.1, extend from NC 24/27 just west of SR 1138 (Dairy Road)/SR 1550 (Saunders Road)) to just east of the Little River. This project is referred to as the NC 24/27 Troy Bypass and would involve the construction of a new four-lane divided bypass south of downtown Troy. The facility would provide shoulders and a 46-foot median with partial control of access facilities. NC 24/27 is designated as a strategic corridor, so this proposed project includes superstreet intersection configurations to minimize the use of signals. The facility will provide shoulders and a 46-foot median with partial control of access. The approximate length of the project is 6.0 miles. The project is scheduled for construction beginning in 2012.

**NEPA/404 Merger Process** – In an effort to streamline environmental review, the NCDOT, FHWA, and the US Army Corps of Engineers (USACE) developed an interagency agreement integrating the environmental screening requirements of the National Environmental Policy Act (NEPA) and the USACE Section 404 permitting process.

The NEPA/404 Merger Process allows federal and state environmental regulatory and resource agencies to participate in the transportation decision making process. The NEPA/404 Merger Process is structured with milestones called “concurrence points” that occur at key decision



points in the NEPA process. The NEPA/404 Merger Team meets and discusses each of the following concurrence points: 1) Purpose & Need; 2) Alternatives for Detailed Study; 3) Identification of the Least Environmentally Damaging Practicable Alternative (LEDPA); and, 4) Impact Avoidance and Minimization.

Concurrence Point 2 has one sub-point: 2A, in which the NEPA/404 Merger Team decides on bridge locations and the approximate bridge lengths for each detailed study alternative. Concurrence Point 4 includes three sub-points, 4A, 4B, and 4C, which focus on the project's alignment, hydraulic design, and permit drawings. Concurrence Points 3 and 4A occur after the distribution of the environmental document and the Public Hearing and are the final concurrence points included in the NEPA process. Concurrence Points 4B and 4C occur during the final design and permitting phases of the project.

The proposed project is being developed through the NEPA/404 Merger Process to ensure systematic evaluation of the project plus avoidance and minimization of all potential impacts. This document contains the signature forms and results of decisions made at meetings for Concurrence Points 1, 2, and 2A. The remaining concurrence points will be discussed prior to the completion of the environmental analysis and permitting phases.

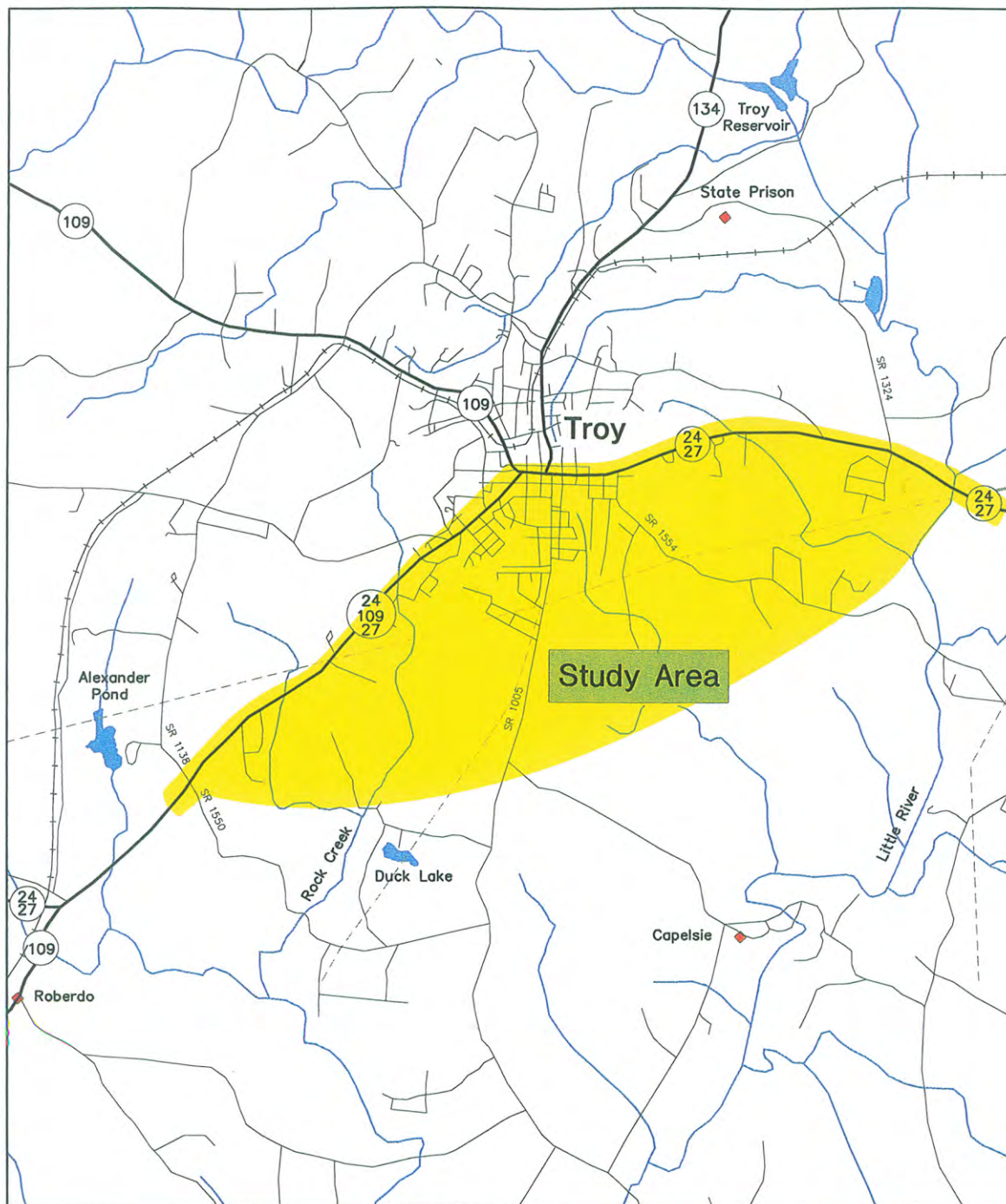
### **1.3 SUMMARY OF PROJECT NEED**

The purpose of the proposed project is to reduce traffic volumes and improve safety on NC 24/27 through the Town of Troy. The proposed improvements will provide additional roadway capacity, accommodate projected traffic volumes, lessen congestion on main arteries in downtown Troy and provide better access to the highway (NCDOT, 2001).

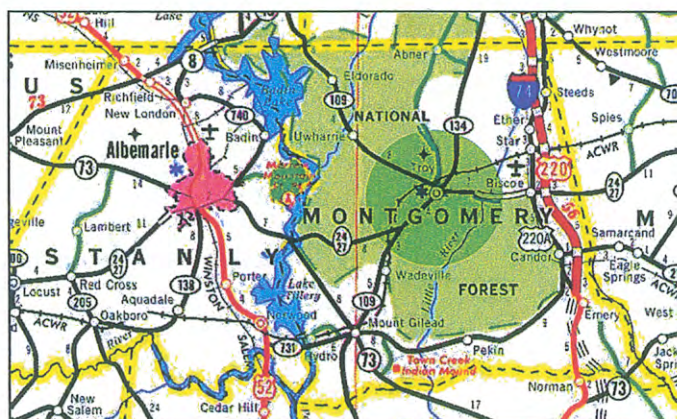
The primary need for the proposed action is based on current and anticipated future traffic volumes, improved accessibility for local traffic, high volumes of heavy truck traffic through town, and safety. Each of these elements is listed below:

#### **High Traffic Volumes:**

- Year 2000 average daily traffic (ADT) volumes on NC 24/27 through the study area range from 10,000 to 17,200 vehicles per day (vpd).
- Travel analysis conducted for the 1987 Troy Bypass Feasibility Study (NCDOT, 1987) estimated that from 25% to 50% of the traffic on NC 24/27 in the project study area is



Montgomery County



# **NC 24/27 Improvements** **SR 1138 to East of Little River TIP NO. R-623** **Montgomery County, North Carolina**

**Project Location**  
**NTS**  
**Exhibit 1.2.1**

is through traffic. In the time elapsed since 1987, there have not been sufficient changes in land use patterns or population growth in the project area or its surrounding region that would alter travel patterns or the through-traffic percentage.

- Design year 2030 traffic volumes are estimated to be between 18,800 and 34,800 vpd.
- If no improvements are made, all of the studied intersections in the study area will have a level-of-service (LOS) F. Further discussion of this analysis is available in Section 2.8.2.

**Truck Percentage:**

- Truck percentages along NC 24/27 range from 7% of the vehicle mix west of Main Street to 10% east of Main Street.

**Safety:**

- A high number of accidents occurred within the municipal boundaries of Troy near the intersection of NC 109 Business with NC 24/27 and near the intersection of NC 134 and NC 24/27. Further discussion of this analysis is available in Section 1.10.
- Accident rates could potentially increase as a result of deteriorating traffic service and increased congestion through the design period.

## **1.4 SUMMARY OF PROJECT PURPOSE**

The purpose of the proposed project is to reduce traffic volumes and improve safety on NC 24/27 through the Town of Troy. The proposed improvements would provide additional roadway capacity, accommodate projected traffic volumes, lessen congestion on main arteries in downtown Troy, and provide better access to the highway.

## **1.5 PROJECT SETTING**

The project study area, shown in Exhibit 1.2.1, runs from NC 24/27 just west of SR 1138 (Dairy Road)/SR 1550 (Saunders Road)) to just east of the Little River. Troy, which is in relatively close proximity to the Uwharrie National Forest, is located in the center of Montgomery County, approximately 70 miles east of Charlotte and 55 miles south of Greensboro. NC 24/27 is the main east-west route through this portion of the state. The proposed project would provide a four-lane divided roadway through the area.

## **1.6 SYSTEM LINKAGE**

### **1.6.1 Existing Road System**

The Town of Troy relies mainly on NC 24/27 for east-west travel. Existing NC 24/27 passes through the Town of Troy and is a two-lane rural highway characterized by high traffic volumes, a large number of trucks, and a high proportion of through-traffic.

**Local System:** NC 24/27 is the main east-west route through this portion of the state. Locally, NC 24/27 connects Troy with Biscoe to the east and Albemarle to the west.

**Regional System:** NC 24/27 is classified as a minor arterial and runs as a combined route from Charlotte to just west of Fayetteville before diverging. NC 27 travels on to Benson, where it connects with I-95. NC 24 passes through Jacksonville on its way to the coast where it meets US 70 in Morehead City.

**Interstate System:** No interstate facilities traverse Montgomery County.

### **1.6.2 Other Modes of Transportation**

The project study area has limited access to integrated modes of transportation. These modes are discussed in the following paragraphs.

**Railroad :** There is no rail passenger service in the Town of Troy; however, passenger service is available at an AMTRAK Station in Southern Pines, approximately 45 miles to the east.

**Airports:** The nearest commercial airport to the project study area is the Piedmont Triad International Airport, which is located between the Cities of Greensboro, Winston-Salem and High Point, approximately 60 miles northwest of Troy. The airport has a 10,000-foot runway and provides jet and commuter services to 16 cities and over 89 daily non-stop flights to the nation's top hubs. The Montgomery County Airport, located in Star has a 3,500 x 60 foot runway, which is open to the public. An average of 92 planes per week use this airport.

**Transit:** There are currently no general public routes in Montgomery County. There are, however, dial-a-ride services available for some authorized residents. Ridesharing Services and Vanpooling of the Piedmont (RSVP) also coordinates commuter transportation services for

the Piedmont Triad region and surrounding areas, including Montgomery County. These services provide specialized needs and do not constitute a significant percentage of travel within Montgomery County.

## **1.7 SOCIAL AND ECONOMIC CONDITIONS**

### **1.7.1 Existing Development**

Within Troy there is a diverse mix of land uses. Basic land use categories include residential, commercial/office/institutional, industrial, general business, neighborhood business, central business, and residential redevelopment. Residential homes border NC 24/27 in the eastern end of the project study area. Commercial businesses, the county courthouse, and several gas stations are located in the middle of the project study area in downtown Troy. Commercial businesses, fast food restaurants, gas stations, and a hotel are located just west of downtown. Residential homes and scattered businesses are located at the western end of the project study area. Forested land comprises the major land use outside of Troy's town limits. Scattered residences are located in the northern portion of the project study area. The southern portion of the project study area consists of scattered single-family residences and large tracts of undeveloped forestland. Existing zoning boundaries for the Town are shown on Exhibit 1.7.1.

### **1.7.2 Future Development**

Local planners anticipate that travel and tourism will be a future growth industry for Montgomery County. The county is bordered on the west by the Yadkin/Pee Dee River, which has developed into a recreational area and includes upscale housing and a premier golf course. The Uwharrie National Forest attracts over one million visitors per year and the county is beginning to promote travel and tourism to the area to capitalize upon this natural resource. New commercial and industrial development is occurring along NC 24/27 east of Troy. This growth includes a hotel, Food Lion grocery store, Wal-mart and strip shopping center. Another widening project between US 220A and US 220 on NC 24/27 in Biscoe will connect with the existing five-lane section. Recently, the Town of Troy annexed a portion of Roslyn Road, south of the town, and installed a new sewer pump station on that road. Although the Town of Troy does not have a formal land use plan, the Town acquired land, located along NC 24/27 just north of the western terminus of the proposed bypass and shown in Exhibit 4.1.1, to be used as Troy's Business Park. The Town has also adopted an Economic Development Incentive to encourage new business in the area. Additionally, the Town is in the planning stages of a

streetscape project that proposes to revitalize the downtown and encourage future economic growth. As discussed in Section 4.1.3, the proposed bypass is consistent with Troy land use objectives.

## **1.8 TRANSPORTATION PLANS**

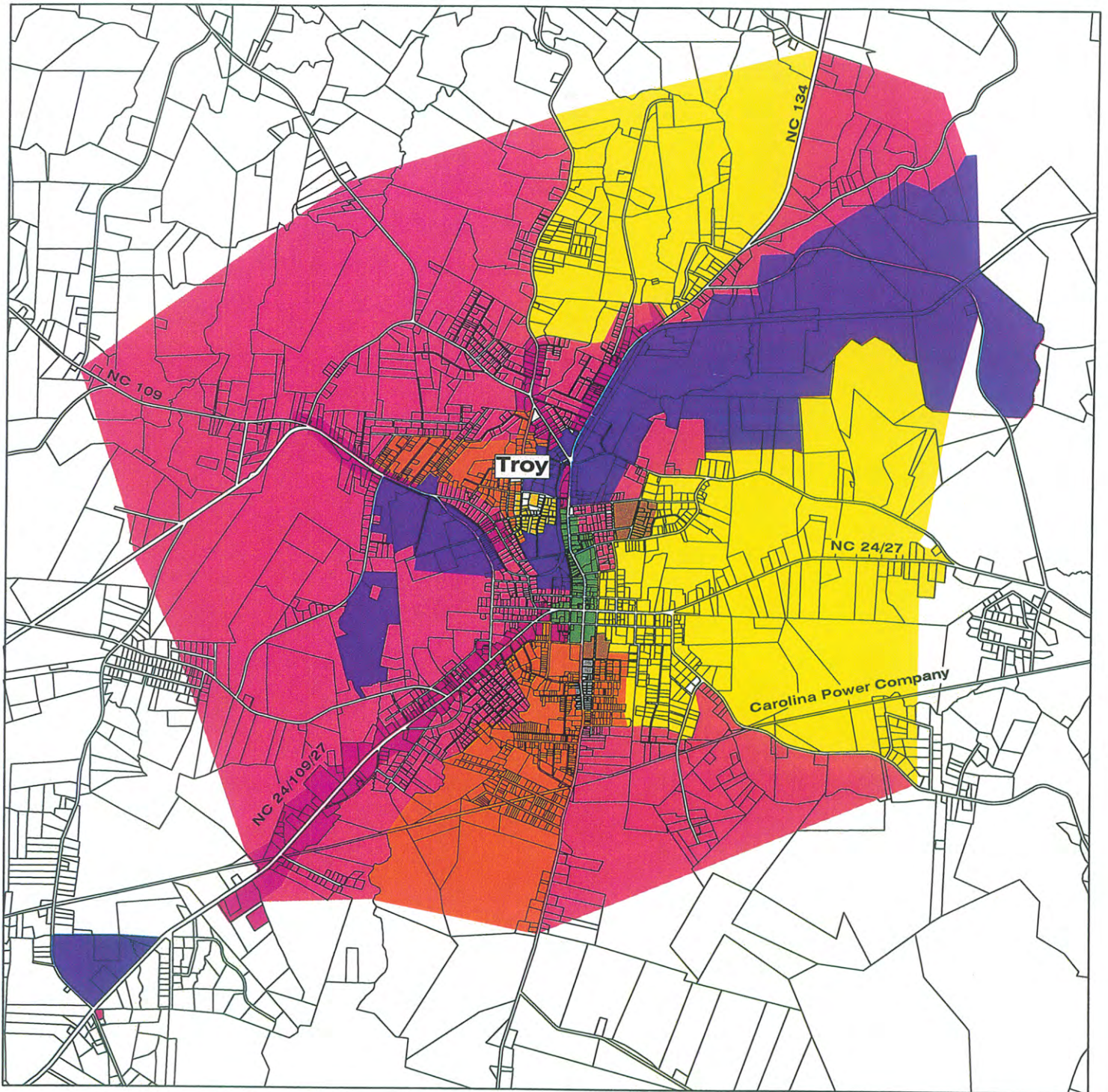
The proposed project is included in the NCDOT Draft 2007-2013 TIP and is included in the Town of Troy's Thoroughfare Plan. The NC 24/27 Improvements are consistent with the development goals of the Town of Troy and, by connecting with other existing and proposed multi-lane sections, would provide a continuous multi-lane facility through Montgomery County. As discussed in Section 4.1.3, these improvements are also consistent with the NC Strategic Highway Corridors Program and the NC Intrastate System.

***NCDOT Transportation Improvement Program (TIP)*** – In addition to the proposed Troy Bypass (R-623), there is another nearby project in the State TIP involving NC 24/27. Project No. R-2527, widening of NC 24/27 to a multi-lane facility from east of the Pee Dee River to the Troy Bypass. The project is currently in the planning and design stages with mitigation scheduled for 2008, right-of-way purchase scheduled for 2009, and construction scheduled for post year (beyond 2012). In addition, there are several rail safety projects and bridge replacement projects, funded for construction, in the vicinity of the proposed project.

***Troy Transportation Plan*** – The 2006 Town of Troy Transportation Plan evaluates the present and future transportation needs of the town and recommends improvements to provide an efficient transportation system within the 2005-2030 planning period. The Transportation Plan describes the benefits of the Troy Bypass as reducing the through trips and truck traffic through town on existing NC 24/27.

***NC Strategic Corridors Program*** – The NC 24/27 Improvements are also part of the NC Strategic Highway Corridors program. In September 2004, the NCDOT, NC Department of Commerce, and NC Department of Environment and Natural Resources (NCDENR) adopted the Strategic Highway Corridor planning program, which placed a renewed focus on upgrading and preserving North Carolina's existing transportation system. The program's goals are to protect the mobility and connectivity of critical highway facilities while utilizing existing facilities to the maximum extent possible, and fostering economic prosperity by moving goods quickly and efficiently throughout the state. The section of NC 24/27 studied for this project is





#### LEGEND



General Business  
 Central Business  
 Industrial

Office/Institutional  
 Neighborhood Business  
 R-6 (7 units per acre)

R-8 (5 units per acre)  
 R-15 (3 units per acre)  
 RR-75 (Residential Redevelopment)



**NC 24/27 Improvements**  
 SR 1138 to East of Little River TIP NO. R-623  
 Montgomery County, North Carolina

Town of Troy  
 Zoning  
 Boundaries  
 NTS  
 Exhibit 1.7.1



designated as an expressway in the Strategic Highway Corridor Plan. By facilitating the flow of through-traffic, the purpose of the proposed bypass would improve intrastate mobility and connectivity and therefore support the goals of the NC Strategic Corridors Program.

***Intrastate System*** – The proposed NC 24/27 Improvements are part of the North Carolina Intrastate System, which was enacted by the Highway Trust Fund Act of 1989 (North Carolina General Statute 136-175 through 136-189) to provide high-speed, safe travel service throughout the state. The proposed project is part of the improvements to NC 24, with the goal of providing a four-lane highway from Charlotte to Morehead City.

## **1.9 ROADWAY CAPACITY**

The adequacy of the existing system was evaluated based on its capacity to handle projected design year traffic volumes. The accepted methodology for this evaluation is to compare projected traffic volumes with roadway capacity and compute the volume-to-capacity ratio (v/c). The v/c ratio, in addition to other indicators such as projected speed and intersection delay, is used to find and report the facility's level-of-service (LOS).

The LOS may range from A to F where LOS A is a low v/c indicating smooth free-flowing traffic and LOS F has a high v/c indicating the worst-case scenario with high congestion and a complete breakdown of traffic flow. Levels-of-service A through C are desired levels, although LOS D is considered acceptable for urban facilities. Traffic conditions exceeding LOS D (E and F) are deemed unacceptable. These undesirable LOS conditions represent substantial travel delay, increased crash potential, and inefficient motor vehicle operation. Table 1.9.1 shows the base year (2000) traffic volumes and the No-Build traffic volumes for the design year (2030). Exhibit 1.9.1 shows the base year and 2030 No Build ADT. Exhibit 1.9.2 shows the design year (2030) ADT.

***Existing Conditions*** – The NC 24/27/109 corridor travels through the central business district of Troy and serves as a major thoroughfare in Montgomery County. There is a large volume of regional through traffic, including a high percentage of trucks. Currently this roadway is a two-lane section with a posted speed limit of 45 miles per hour (mph). As discussed in Section 2.8.2, intersection analyses were performed at seven existing intersections. Two of these intersections are currently signalized, while the rest of the intersections are unsignalized with stop-control at the minor street approach. Intersection analyses showed four of the seven



intersections to operate at unacceptable LOS during both the AM and PM peak periods. Arterial segment analysis, shown in Table 2.8.1, of the existing NC 24/27 corridor showed that the segment was operating at LOS A under base year conditions.

**TABLE 1.9.1**  
**EXISTING AND PROJECTED TRAFFIC VOLUMES**  
AVERAGE DAILY TRAFFIC (ADT)

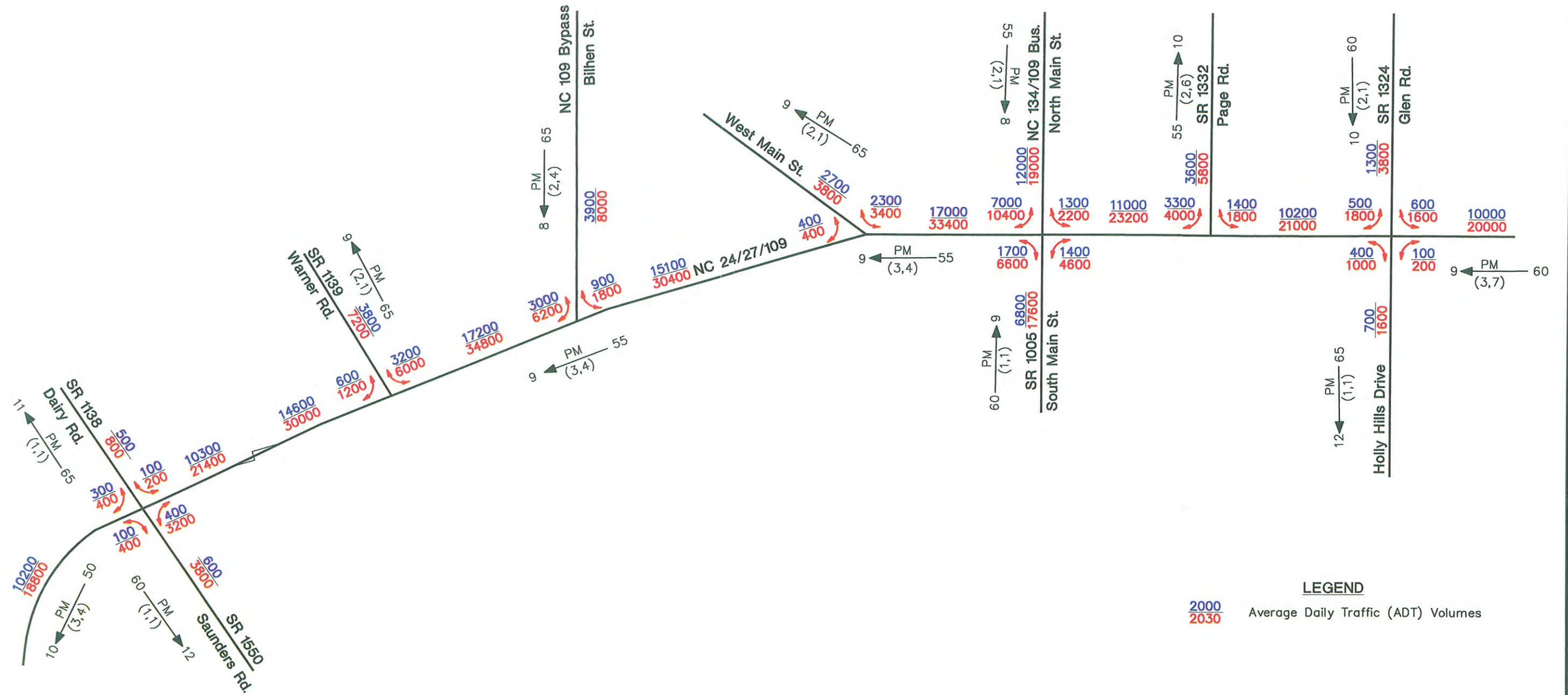
| SEGMENT                                                            | BASE YEAR<br>2000 | NO-BUILD<br>2030 |
|--------------------------------------------------------------------|-------------------|------------------|
| NC 24/27/109 west of SR 1138 (Dairy Road.)/SR 1550 (Saunders Road) | 10,200            | 18,800           |
| NC 24/27/109 east of SR 1138 (Dairy Road.)/SR 1550 (Saunders Road) | 10,300            | 21,400           |
| NC 24/27/109 west of SR 1139 (Warner Road)                         | 14,600            | 30,000           |
| NC 24/27/109 east of SR 1139 (Warner Road)                         | 17,200            | 34,800           |
| NC 24/27/109 east of NC 109 Bypass (Bilhen Street)                 | 15,100            | 30,400           |
| NC 24/27/109 east of W. Main Street                                | 17,000            | 33,400           |
| NC 24/27/109 east of NC 134/109 Bus (N. Main Street)               | 11,000            | 23,200           |
| NC 24/27/109 east of SE 1332 (Page Road)                           | 10,200            | 21,000           |
| NC 24/27/109 east of SE 1324 (Glen Road/Holly Hill Dr.)            | 10,000            | 20,000           |

**Future Conditions** – For the year 2030, traffic conditions are anticipated to deteriorate in the project study area as traffic increases. All the existing intersections operate at unacceptable LOS during both the AM and PM peak periods, under the 2030 conditions. Under future conditions, segment analysis (Table 2.8.1) shows that the NC 24/27 corridor will operate at LOS C in 2030 with no improvements.

### 1.10 ACCIDENT ANALYSIS

Crash data for the period of July 1, 2003 through June 30, 2006 was used to analyze crash potential along the current route. The analysis focused on the section of NC 24/27 from SR 1138 (Dairy Road)/SR 1550 (Saunders Road) to Bridge No. 32 over the Little River. The length of the studied segment is 5.45 miles.

For the study period, there were a total of 143 crashes, one of which resulted in fatalities. Forty-four of the crashes involved injuries (31% of total crashes) and 99 crashes (69%) resulted in property damage only. One crash (1%) involved alcohol and/or drugs. The estimated cost of property damage from these crashes totaled \$576,150.00. The largest percentage of crashes occurred in Troy near the intersections of NC 109 Business and NC 24/27, SR 1138 (Dairy Road)/ SR 1550 (Saunders Road) and NC 24/27, SR 1613 (Alexander Road) and NC 24/27, and SR 1324 (Glen Road) and NC 24/27.



**LEGEND**  
2000  
2030  
Average Daily Traffic (ADT) Volumes

**Forecast Key**

$K_{30} \frac{AM/PM}{(DUAL, TTST)} \rightarrow DIR \%$

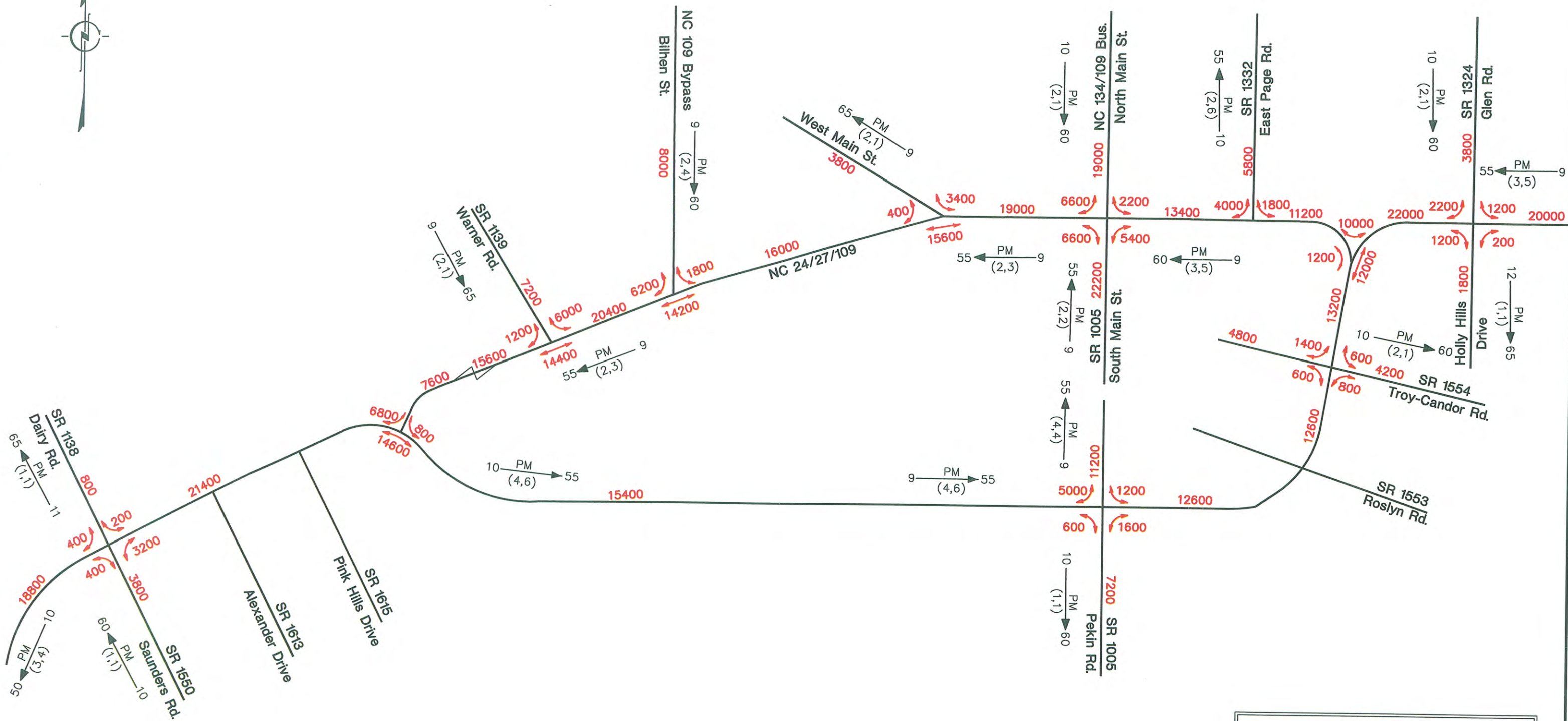
AM/PM = Time of Peak  
K<sub>30</sub> = 30th Highest Hourly Volume Factor  
DIR % = % of Flow in Peak Direction  
DUAL = % DUAL  
TTST = % TTST  
-1 = Less than 100



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Estimated ADT Volumes  
2000/2030 (No Build) Conditions  
NTS  
Exhibit 1.9.1





**Forecast Key**

$$K_{30} \frac{AM/PM}{(DUAL, TTST)} \rightarrow DIR \%$$

AM/PM = Time of Peak

$K_{30}$  = 30th Highest Hourly Volume Factor

DIR % = % of Flow in Peak Direction

DUAL = % DUAL

TTST = % TTST

-1 = Less than 100



**Legend**

XXX = Average Daily Traffic in Hundreds

# NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Estimated 2030 ADT Volumes  
with Proposed Bypass  
NTS  
Exhibit 1.9.2

The most prevalent types of crashes occurring along the studied segment are: rear end collisions (36%); left turn-different roadway collisions (5%); angle collisions (22%); and crashes where the vehicle ran into an animal (9%). The potential for these types of crashes occurring on the existing roadways may increase with growth in traffic volumes and the associated deterioration in level of service.

Accident rates are calculated relative to the AADT volumes and the length of the studied segment. The total crash rate for the studied segment was compared to the 2003-2005 Standard Statewide Crash Rates for all North Carolina routes. The total accident rate for the studied section was 166.85 crashes per 100 million vehicle miles (MVM), which was less than the statewide average for all two-lane undivided North Carolina routes of 208.07. The fatal accident rate for the studied segment was lower than the statewide average of 1.97 because there was only one fatal crash during the studied period. As traffic volumes and congestion increase along this route, potential increases in crash rates are anticipated. Therefore, a substantial decrease in crashes over time is anticipated as a result of the construction of a four-lane divided bypass facility with partial control of access. By comparison, this type of facility has a statewide average crash rate of 210.46 crashes per 100 MVM. Crash rates resulting from this analysis, including fatal and non-fatal injury crashes, are compared to statewide averages (2003-2005) in Table 1.10.1.

**TABLE 1.10.1  
ACCIDENT RATE SUMMARY FOR THE PROJECT STUDY AREA**

| <b>FACILITY</b>                                                                                | <b>TOTAL<br/>CRASH<br/>RATE</b> | <b>FATAL<br/>CRASH<br/>RATE</b> | <b>NON- FATAL<br/>INJURY RATE</b> |
|------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|-----------------------------------|
| <b>Statewide Average:</b><br>All Two-Lane Undivided NC Routes                                  | <b>208.07</b>                   | <b>1.97</b>                     | <b>78.27</b>                      |
| <b>Statewide Average:</b><br>All Four-Lane Divided with Partial Control of Access<br>NC Routes | <b>210.46</b>                   | <b>0.97</b>                     | <b>67.52</b>                      |
| <i>Accident Rates for NC 24/27 Study Corridor</i>                                              | <i>166.85</i>                   | <i>1.17</i>                     | <i>50.17</i>                      |

## 1.11 SUMMARY

Existing NC 24/27 through Troy in Montgomery County is a two-lane rural highway characterized by high traffic volumes, a large number of trucks, and a high proportion of through-traffic. Without improvements, future traffic volumes are expected to result in increased congestion and decreased safety through Troy. The proposed bypass would provide a more efficient route for trucks and through-traffic.

## **2.0 ALTERNATIVES**

### **2.1 NO-BUILD ALTERNATIVE**

In accordance with the NEPA and FHWA guidelines, the environmental consequence of taking no action to meet future travel demand is given full consideration. The No-Build Alternative also provides a baseline condition with which to compare the improvements and consequences associated with each construction alternative.

The No-Build Alternative would result in economic and quality of life impacts related to projected roadway deficiencies. The No-Build Alternative is projected to result in a number of adverse traffic impacts on roadways in and around the project study area and would not improve the safety and traffic flow on NC 24/27. The No-Build Alternative would not satisfy the purpose of and need for the proposed project.

### **2.2 IMPROVE EXISTING ALTERNATIVE**

The Improve Existing Alternative (preliminary Build Alternative A) would involve roadway widening and intersection improvements along the existing NC 24/27 to improve capacity and traffic flow. The widening would consist of a multi-lane highway, with a four-lane divided section from west of SR 1138 (Dairy Road)/SR 1550 (Saunders Road) to Wildwood Lane, a five-lane section including a two-way left-turn lane through the Town of Troy from Wildwood Lane east to 0.25-mile past Taft Street, then returning to a four-lane divided section to east of the Little River. Typically, the proposed cross-section would provide a 30-foot grass median for the divided portion. The Improve Existing Alternative was eliminated from further study due to potential impacts to residential and commercial properties in downtown Troy and considerable adverse public comments regarding these impacts.

### **2.3 TRANSPORTATION SYSTEM MANAGEMENT ALTERNATIVES**

Transportation System Management (TSM) improvements involve increasing the available capacity of the facility within the existing right-of-way with minimum capital expenditures and without reconstructing the existing facility. Items such as the addition of turn lanes, striping, signing, signalization, and minor realignments are examples of TSM physical improvements. Traffic law enforcement, speed restrictions, access control, and signal timing changes are examples of TSM operational improvements. TSM improvements would not adequately address design year traffic demand and will therefore not satisfy the purpose and need for the project.

## **2.4 MASS TRANSIT ALTERNATIVE**

The project study area is not currently served by mass transit. There are currently no general public routes in Montgomery County primarily due to lack of demand resulting from the dispersal of residential areas and employment centers. Although Dial-a-ride and Ridesharing Services and Vanpooling of the Piedmont (RSVP) coordinate commuter transportation services for Montgomery County, these services provide specialized needs and do not serve a significant percentage of travel within Montgomery County. Implementation of mass transit or the expansion of existing transit services is not anticipated to be a feasible or reasonable solution for design year traffic demand and therefore would not satisfy the purpose and need for the proposed project.

## **2.5 BUILD ALTERNATIVES**

Four Build Alternatives, all involving a multi-lane bypass to the south of Troy, were developed to meet the project's purpose and need. The Build Alternatives were developed within a 250-foot corridor, which was referenced when assessing both quantitative and qualitative impacts.

These Build Alternatives are all located within the study area south of the Town of Troy from west of the intersection of NC 24/27 with SR 1138 (Dairy Road), to east of the Little River. This study area was established at the May 16, 2001 Merger Team meeting (discussed in Section 5) at which the need to study alternatives north of the Town was discussed and eliminated. Upon reviewing aerial photography and constraints mapping, it was discussed that any alternatives north of NC 24/27 would; cause substantial impacts to existing development, require two railroad crossings, and create a longer travel distance than the existing NC 24/27 alignment. Based on these factors, the study area south of Troy, shown in Exhibit 1.2.1, was established and the alternatives discussed in the following section were developed.

### **2.5.1 Preliminary Build Alternatives**

This section describes the preliminary Build Alternatives that were presented to the NEPA/404 Merger Team on September 17, 2003. As a result of this meeting, these alternatives were modified to avoid and/or minimize impacts to the human and natural environment. A discussion of the Build Alternatives that were carried forward for further study is contained in Section 2.5.2.

With the exception of Alternative A (discussed in Section 2.2), the Build Alternatives share common northern and southern termini originating at existing NC 24/27, approximately 1,500 feet west of the intersection with SR 1138 (Dairy Road) and SR 1550 (Saunders Road). The alternatives extend eastward diverging southward to varying degrees then converge with NC

24/27 just west of SR 1324 (Glen Road/Holly Hills Drive). The Build Alternatives continue east along NC 24/27 over the Little River bridge and terminate along the existing four-lane, divided section just east of the Little River.

## **2.5.2 Build Alternatives Carried Forward for Further Study**

As a result of the NEPA/404 Merger Team meeting on September 17, 2003, the preliminary Build Alternatives were modified to avoid and/or minimize potential impacts. The Build Alternatives carried forward for further study are shown in Exhibit 2.5.1.

The alignments for all of the alternatives were shifted in order to avoid ponds, endangered Schweinitz's sunflower populations, and decrease wetland and stream impacts to the maximum extent possible. Additionally, it was proposed that the Warner Creek crossing be a bridge in order to span the floodplains associated with this stream. The signature form for Concurrence Point 2, dated August 27, 2004 is contained in Appendix A.2. The following paragraphs provide descriptions of the alternatives selected for detailed study.

**Alternative B** – The corridor for Alternative B starts on existing NC 24/27 approximately 1,500 feet west of the intersection with SR 1138 (Dairy Road)/SR 1550 (Saunders Road). The alternative continues along NC 24/27 until it diverges from the existing roadway in an east-southeast direction near Alexander and Oakhills Drives. The corridor then passes south of Dogwood Avenue before turning east where it crosses SR 1005 (Pekin Road) south of Springdale Heights and SR 1553 (Roslyn Road) south of the Progress Energy powerline right-of-way. Alternative B then turns northeast and crosses SR 1554 (Troy-Candor Road) at the powerline right-of-way. The alternative continues along this bearing for approximately 2,000 feet before turning east to converge with NC 24/27 just west of SR 1324 (Glen Road)/Holly Hills Drive. The corridor then extends east along NC 24/27 over the Little River bridge and ends at the existing four-lane divided section just east of the river.

**Alternative C** – The corridor for Alternative C follows the same alignment as Alternative B except for a section between SR 1553 (Roslyn Road) and the junction with NC 24/27. For this section, the alternative turns just north of east past SR 1553 (Roslyn Road), crossing SR 1554 (Troy-Candor Road) just south of the Progress Energy powerline right-of-way. This corridor continues in this direction, passing north of the Holly Hills neighborhood and connecting back to NC 24/27 just west of SR 1324 (Glen Road)/Holly Hills Drive.

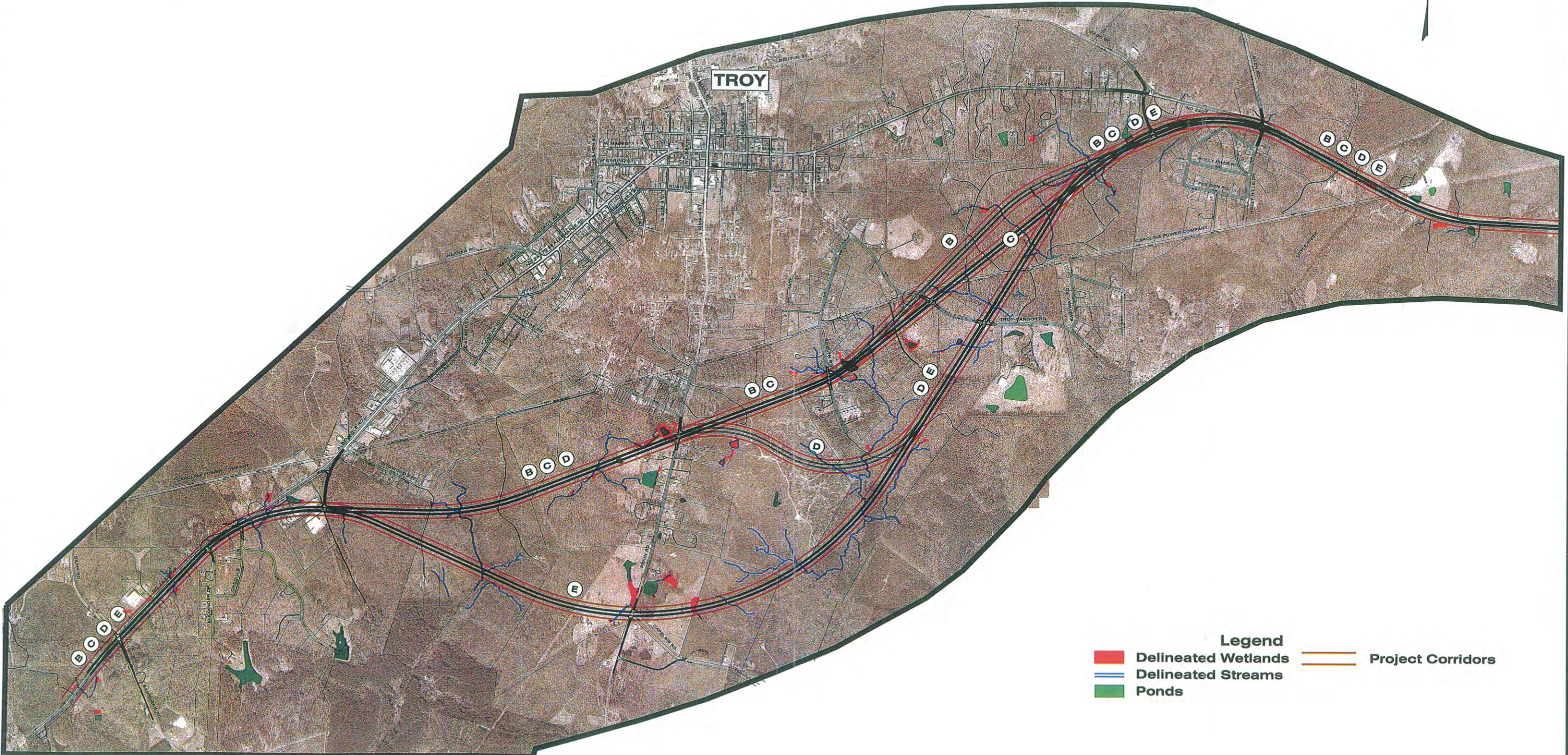
**Alternative D** – The corridor for Alternative D follows the same alignment as Alternative C except for a section between SR 1005 (Pekin Road) and the junction with NC 24/27 on the east end of the project. For this section, the alternative turns southeast past SR 1005 (Pekin Road) and passes south of the end of SR 1553 (Roslyn Road), where it turns north to a northeast bearing. The corridor then continues northeast, crossing SR 1554 (Troy-Candor Road) and the Progress Energy powerline right-of-way before turning east to join the Alternative C alignment west of the Holly Hills neighborhood.

**Alternative E** – The corridor for Alternative E follows the same alignment as Alternative D except for a section just beyond the split from NC 24/27 on the western end of the project to the alignment south of SR 1553 (Roslyn Road). For this section, Alternative E diverges from the existing roadway in a southeast direction near Alexander and Oakhills Drives. The corridor then turns south and parallels Dogwood Avenue, continuing southeast before turning east near SR 1005 (Pekin Road). The corridor crosses SR 1005 (Pekin Road) just north of SR 1519 (Capelsie Road) and continues turning eastward. Alternative E takes a sharper turn to the northeast, approximately 1,500 feet south of the end of SR 1553 (Roslyn Road) and joins the Alternative D corridor before crossing SR 1554 (Troy-Candor Road).

## **2.6 ROADWAY DESIGN CRITERIA**

The Build Alternatives are each proposed as a four-lane, median-divided, partial control of access facility on new location from NC 24/27 just west of SR 1138 (Dairy Road)/SR 1550 (Saunders Road) to NC 24/27 just east of the Little River. NC 24/27 is included in the North Carolina Strategic Corridor Plan within which it is specifically designated as an expressway. The expressway designation carries the goal of reducing signalized intersections along the facility to the extent possible. The purpose of a superstreet is to improve vehicular mobility and safety by limiting the number of points where vehicles can collide when making traffic maneuvers. This design reduces the potential for collisions by limiting the number of left-turns and moves traffic through an intersection more efficiently, ultimately translating into shorter travel times. Superstreet configurations are therefore proposed because they satisfy the goal of minimizing potential signalized intersection locations by eliminating left turns from the side streets. Compared to conventional intersections, the elimination of left turns substantially reduces the number of potential conflict points and the severity of accidents. Because the projected traffic volumes do not warrant interchanges, the superstreet configurations also allow a cost effective option for eliminating left-turning movements and signals along the facility,





- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Build Alternatives  
NTS  
Exhibit 2.5.1



without incurring the structure costs and footprint impacts associated with an interchange. The Strategic Highway Corridors program encourages interchanges for major street connections and at-grade unsignalized intersections for minor streets. As previously mentioned, the traffic projections do not warrant interchanges and all side streets along the bypass can be considered minor. Therefore, a superstreet design is proposed for this project. Further information on this program can be found in Section 1.8.

In addition to superstreet configured intersections, the facility will provide shoulders and a 46-foot median with partial control of access. The approximate length of the project is 6.0 miles. The design speed is 60 miles per hour (mph). A maximum grade for most of the project is 4.0%. Partial control of access is recommended. The design criteria are shown in Table 2.6.1. The typical section for the mainline is shown in Exhibit 2.6.1.

**TABLE 2.6.1  
ROADWAY DESIGN CRITERIA**

|                             |                                                     |                                                          |
|-----------------------------|-----------------------------------------------------|----------------------------------------------------------|
| <b>Classification</b>       | L-line: Rural arterial, Y-lines: Collectors, locals |                                                          |
| <b>Type of Terrain</b>      | Rolling                                             |                                                          |
| <b>Type of Facility</b>     | Four-lane with shoulder divided rural arterial      |                                                          |
| <b>Design Speed</b>         | L-line: 60 mph, Y-lines: 30 mph minimum             |                                                          |
| <b>Pavement Widths</b>      | L-line                                              | 12 ft, minimum 12 ft turn lane widths                    |
|                             | Y-lines                                             | Variable, minimum 10 ft turn lane widths                 |
| <b>Median Width</b>         | 46 ft                                               |                                                          |
| <b>Horizontal Curvature</b> | L-line                                              | Minimum Radius: 60 mph → 1205 ft                         |
|                             | Y-lines                                             | Minimum Radius: Y varies depending on -Y- classification |
| <b>Vertical Curvature</b>   | L-line                                              | Vertical Curvature Rate: Crest K = 151 Sag K = 136       |
|                             | Y-lines                                             | Varies depending on -Y- classification                   |
| <b>Grades</b>               | L-line                                              | 4.0% maximum*                                            |
|                             | Y-lines                                             | Variable depending on -Y- classification                 |
| <b>Superelevation</b>       | L-line                                              | 8% maximum (Normal Crown 2%)                             |
|                             | Y-lines                                             | 6% maximum                                               |

Note:\* Design exception at the Little River for 6% grade.

As discussed in Section 1.8, the proposed project is part of North Carolina's Strategic Corridors program. This project has been recommended as an expressway, which, by definition has no traffic signals. However, in discussions with NCDOT Roadway Design Division, Planning and Development and Construction Management, the reasonableness of interchanges at the termini and at Pekin Road were evaluated. Due to the anticipated additional construction, right-of-way costs and footprint impacts, it was determined that interchanges would not be considered at any

location along the proposed bypass. Additionally, the design year traffic volumes do not warrant interchanges.

As shown in Exhibit 2.6.2, five intersections associated with the build alternatives are proposed using a superstreet configuration, which restricts left turns along the new roadway and from side streets. To make a left turn, traffic is directed to a designated U-turn location, where travelers must make a U-turn then right-turn to access side streets. Superstreet configurations are proposed for intersections at SR 1138 (Dairy Road), NC 24/27/109, SR 1005 (Pekin Road), Page Street, and SR 1324/SR 1586 (Glen Road/Holly Hills Road). Intersections at SR 1613 (Alexander Drive) and Oak Hills Drive are proposed as right-in/right-out only. Left turns would be permitted at the SR 1554 (Troy Candor Road) intersection.

## 2.7 BUILD ALTERNATIVE COST ESTIMATES

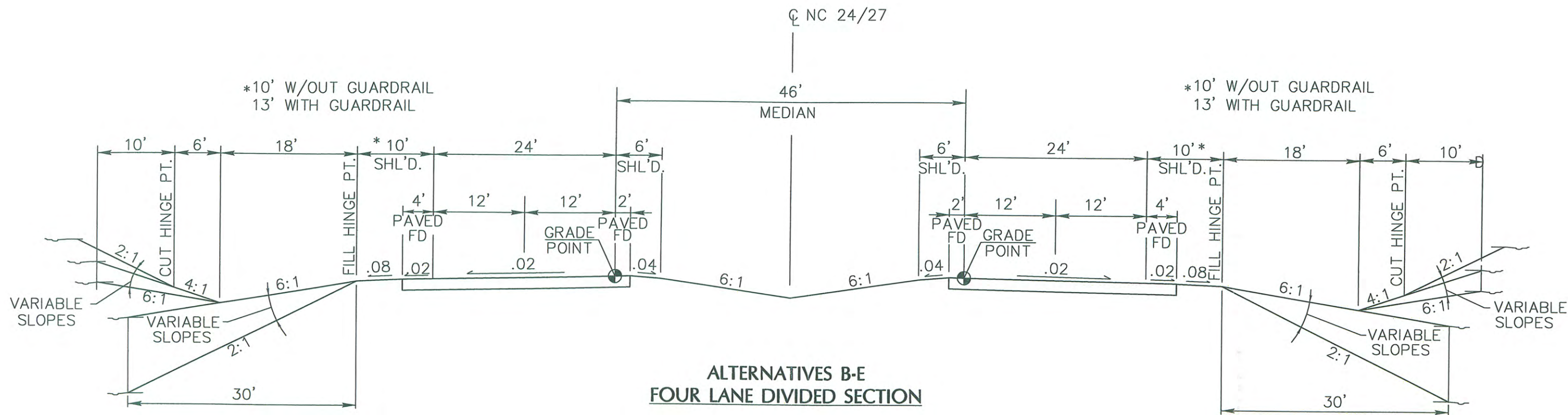
Table 2.7.1 shows the preliminary cost estimates for the Build Alternatives.

**TABLE 2.7.1  
BUILD ALTERNATIVE COST ESTIMATES**

|                                            | ALTERNATIVES        |                     |                     |                     |
|--------------------------------------------|---------------------|---------------------|---------------------|---------------------|
|                                            | B                   | C                   | D                   | E                   |
| <b>Roadway Construction</b>                | \$39,387,800        | \$39,888,200        | \$47,040,200        | \$41,304,100        |
| <b>Structure and Utility Construction</b>  | \$5,312,200         | \$5,311,800         | \$5,459,800         | \$3,895,900         |
| <b>Total Construction Cost</b>             | <b>\$44,700,000</b> | <b>\$45,200,000</b> | <b>\$52,500,000</b> | <b>\$45,200,000</b> |
| <b>Right-of-Way and Utility Relocation</b> | \$4,400,000         | \$4,300,000         | \$3,900,000         | \$4,000,000         |
| <b>TOTAL COSTS</b>                         | <b>\$49,100,000</b> | <b>\$49,500,000</b> | <b>\$56,400,000</b> | <b>\$49,200,000</b> |

## 2.8 TRAFFIC CAPACITY FOR THE BUILD ALTERNATIVE

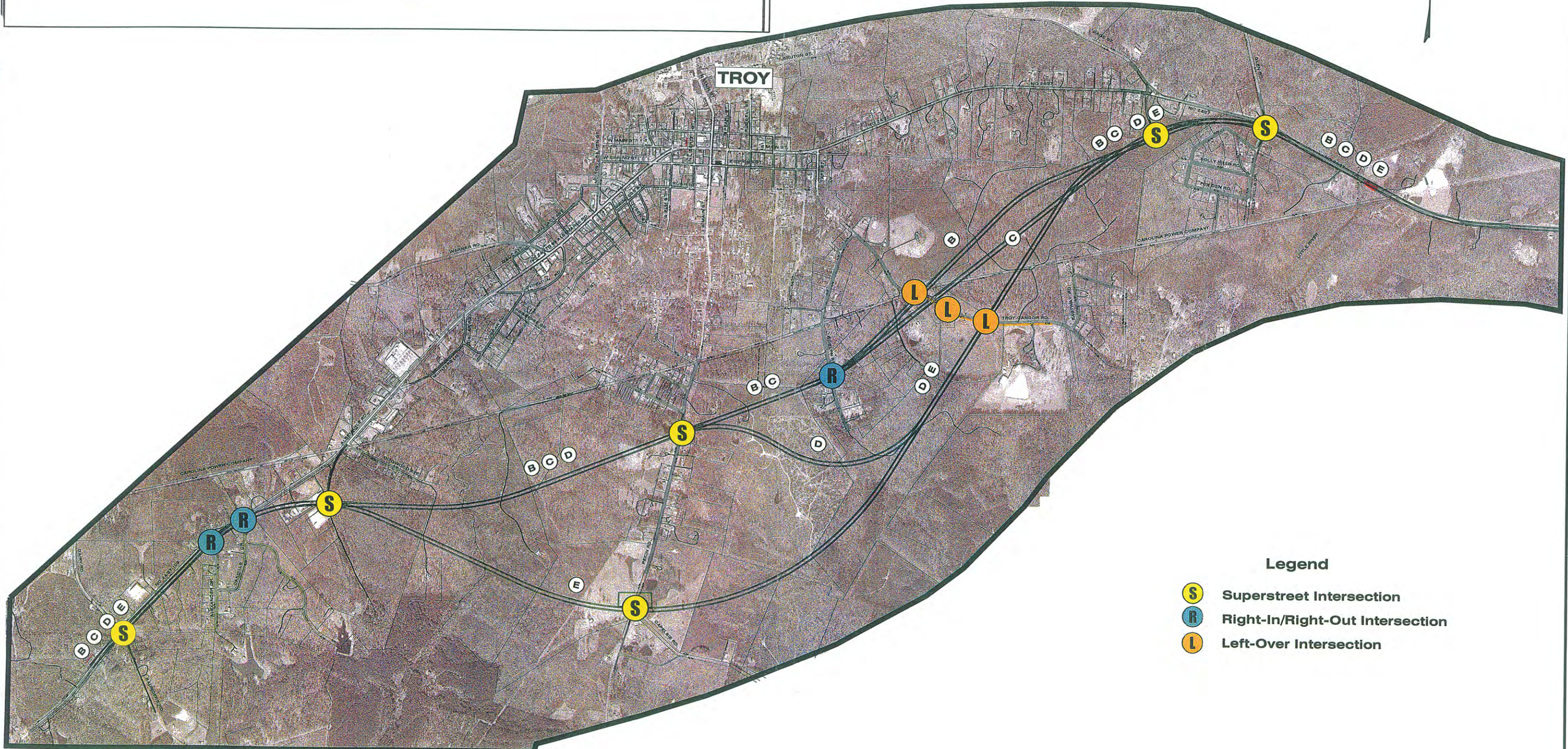
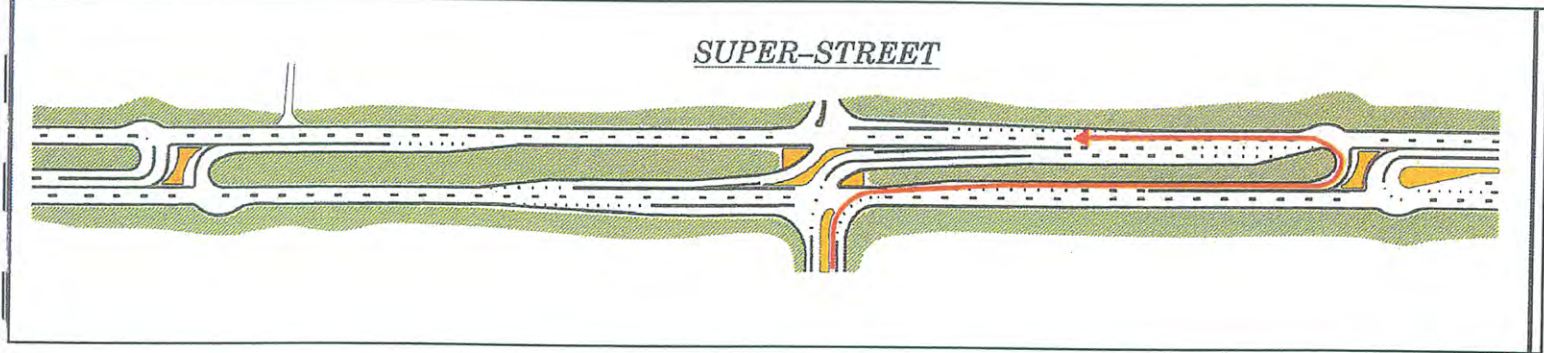
Capacity analyses were initially calculated using 2000 existing volumes and a 2025 design year. Due to the progress of the study and the time elapsed since the initial calculations, it was decided to update the analyses for a design year of 2030. Since there have been not sufficient changes in land use patterns or population growth to affect the base year traffic forecast volumes or travel patterns, the base year volumes were not re-evaluated.



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Typical Section  
NTS  
Exhibit 2.6.1





**Legend**

- S Superstreet Intersection
- R Right-In/Right-Out Intersection
- L Left-Over Intersection



**NC 24/27 Improvements**  
 TIP No. R-623  
 Montgomery County, North Carolina

Intersection  
 Configurations  
 NTS  
 Exhibit 2.6.2



The design concepts also evolved due to the recent designation of NC 24/27 as a NC Strategic Corridor. This program is discussed in Section 1.8. The Strategic Corridor designation requires a minimization of signalized intersections and access points. Therefore, the analyses reflect the change from a conventional corridor to a superstreet concept.

Five intersections associated with the Build Alternatives are proposed using a superstreet configuration, which restricts left turns along the new roadway and from side streets. To make a left turn, traffic is directed to a designated U-turn location, where travelers must make a U-turn then right-turn to access side streets. Superstreet configurations are proposed for intersections at SR 1138 (Dairy Road)/SR 1550 (Saunders Road), NC 24/27/109, SR 1005 (Pekin Road), Page Street, and SR 1324/SR 1586 (Glen Road/Holly Hills Road). Intersections at SR 1613 (Alexander Drive) and Oak Hills Drive are proposed as right-in/right-out only. Left turns would be permitted at the SR 1554 (Troy-Candor Road) intersection. There are four separate Build Alternatives designated as Alternatives B, C, D, and E; however all four share the same termini, intersect the same streets, and have identical traffic volumes. Therefore, the traffic analysis addresses the alignments collectively as one Build Alternative.

Due to the elapsed time and Strategic Corridor designation, it was decided to update the design year to 2030 and revise the Build scenario to be consistent with the superstreet concept. The base year (2000) analysis was not revised for the no-build conditions. For the purpose of this analysis, Year 2030 volumes were extrapolated from the forecast using a straight-line growth computation. Volumes were expressed as Average Annual Daily Traffic (AADT). Exhibit 1.9.1 shows the base year and design year No-Build traffic volumes. Exhibit 1.9.2 shows the design year Build traffic volumes. Using the factors provided, the AADT was converted to AM and PM peak volumes, based on the given peak hour factors, directional distributions, and turn movement percentages. The traffic volumes entering and exiting each intersection were then calculated to create a representative system of area traffic during the AM and PM peak hours.

These peak hour volumes were incorporated in the capacity analyses for proposed project using Highway Capacity Software (HCS2000) to determine the Level-of-Service (LOS) and delay by approach for each unsignalized intersection. The traffic analysis program Synchro<sup>®</sup> (Version 6) was used to optimize existing and proposed traffic signals as well as to utilize Highway Capacity Manual (HCM2000) methods to determine the LOS at signalized intersections in the base and future years.

Mainline and intersection capacity analyses were performed to determine the LOS for the area for both the No-Build and Build scenarios. For the purpose of this report, NC 24/27/109 is designated as an east-west facility. In addition to the intersections shown in the original traffic forecast, traffic volumes for the intersection of NC 24/27 Bypass and Troy-Candor Road were estimated for the 2030 Build scenario. Roslyn Road was not included in the analysis, however, due to low traffic volumes for the existing conditions. Based on Strategic Corridor design parameters, minor street intersections like Roslyn Road, would be converted to right-in/right-out intersections. The existing intersection of SR 1150 (River Road) and NC 109 is east of the project limits of the proposed project and is not included in this analysis.

### **2.8.1 Segment Analysis**

The LOS along the existing and proposed corridors is primarily controlled by the intersections; however, to ensure that the entire corridor is studied completely, an arterial analysis was conducted for the highway segments with the highest volumes. Table 2.8.1 shows the results of this analysis which predict the existing NC 24/27/109 to operate at LOS C even without the bypass. As mentioned previously however, there are several intersections along this corridor which are the controlling elements for LOS and subsequent sections demonstrate that these intersections will not provide adequate LOS without improvement.

**TABLE 2.8.1  
HIGHWAY SEGMENT LEVEL-OF-SERVICE**

|                                                                  | EXISTING<br>2000 | NO-BUILD<br>2030 | BUILD ALTERNATIVE 2030    |                        |
|------------------------------------------------------------------|------------------|------------------|---------------------------|------------------------|
|                                                                  |                  |                  | WITHOUT<br>IMPROVEMENTS * | WITH<br>IMPROVEMENTS * |
| NC 24/27/109 from SR 1139 (Warner Road) to SR 1332 (Page Street) | A                | C                | A                         | A                      |
| Proposed NC 24/27 Bypass                                         | -                | -                | A                         | A                      |

NOTE: “\*” denotes intersection signalization or geometric improvements recommended in Section 2.8.2. Level-of-service ratings are defined in Section 1.9.

### **2.8.2 Intersection Analyses**

All unsignalized intersections within the study area were analyzed using HCS. For any unsignalized intersection having a LOS D or lower, geometric improvements were tested to improve LOS prior to the recommendation of signalization. Synchro<sup>®</sup> (Version 6) was utilized to determine the optimal geometric design and signal timing for signalized intersections and intersections with failing LOS under unsignalized conditions.



The results of the intersection analyses are shown in Tables 2.8.2 and 2.8.3. Table 2.8.2 shows the existing (2000) and 2030 no-build traffic conditions for the AM and PM peak hours. Table 2.8.3 shows the AM and PM peak hour conditions for the Build scenario. The analysis is arranged beginning with the intersection of NC 24/27/109 with SR 1138 (Dairy Road)/SR 1550 (Saunders Road) and moving eastward across the project. Existing lane configurations are shown in Exhibit 2.8.1. Exhibit 2.8.2 shows the proposed lane configurations.

**TABLE 2.8.2  
INTERSECTION LEVEL-OF-SERVICE AND DELAY  
FOR 2000 EXISTING AND 2030 NO-BUILD TRAFFIC CONDITIONS**

| INTERSECTION                                                                                                                                               | EXISTING 2000 |              |         |              | NO-BUILD 2030 |              |         |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|---------|--------------|---------------|--------------|---------|---------------|
|                                                                                                                                                            | AM PEAK       |              | PM PEAK |              | AM PEAK       |              | PM PEAK |               |
|                                                                                                                                                            | LOS           | Delay (sec)  | LOS     | Delay (sec)  | LOS           | Delay (sec)  | LOS     | Delay (sec)   |
| <b>NC 24/27/109 at SR 1138 (Dairy Road)/SR 1550 (Saunders Road) – Unsignalized</b><br><i>Northbound: SR 1550</i><br><i>Southbound SR 1138</i>              | C<br>C        | 18.2<br>19.5 | C<br>C  | 17.7<br>18.4 | F<br>F        | >250<br>>250 | F<br>F  | > 250<br>>250 |
| <b>NC 24/27/109 at SR 1139 (Warner Road) – Unsignalized</b><br><i>Southbound: SR 1138 (Warner Road)</i>                                                    | F             | > 250        | F       | > 250        | F             | > 250        | F       | > 250         |
| <b>NC 24/27/109 at NC 109 (Bilhen Street) – Signalized</b>                                                                                                 | B             | 13.7         | C       | 22.4         | F             | > 250        | F       | > 250         |
| <b>NC 24/27 at W. Main Street – Unsignalized</b><br><i>Southbound: W. Main Street</i>                                                                      | F             | > 250        | F       | > 250        | F             | > 250        | F       | > 250         |
| <b>NC 24/27/109 at NC 109 BUS/NC 134 (N. Main Street) – Signalized</b>                                                                                     | D             | 51.9         | E       | 75.9         | F             | > 250        | F       | > 250         |
| <b>NC 24/27 at SR 1332 (Page Road) – Unsignalized</b><br><i>Southbound: SR 1332 (Page Road)</i>                                                            | E             | 35.7         | D       | 28.2         | F             | > 250        | F       | > 250         |
| <b>NC 24/27 at SR 1324 (Glen Road)/Holly Hills Drive – Unsignalized,</b><br><i>Northbound: Holly Hills Drive</i><br><i>Southbound: SR 1324 (Glen Road)</i> | C<br>D        | 21.8<br>27.3 | C<br>C  | 24.1<br>24.1 | F<br>F        | >250<br>>250 | F<br>F  | > 250<br>>250 |

**NC 24/27/109 & SR 1138 (Dairy Road)/SR 1550 (Saunders Road)** – The intersection of NC 24/27/109 and S R 1138 ( Dairy Road)/SR 1550 ( Saunders Road) is currently two-way stop controlled. The 2030 Build Scenario assumes a superstreet configuration with “left-over” at the intersection of NC 24/27/109 and SR 1138/SR 1550, permitting all movements from the main street but only right turns from the minor street. Median breaks located east and west of the primary intersections allows U-turn movements for vehicles intended to make left-turn or

through movement from the minor street approaches of SR 1138 (Dairy Road)/SR 1550 (Saunders Road).

**TABLE 2.8.3  
INTERSECTION LEVEL-OF-SERVICE AND DELAY  
FOR 2030 BUILD TRAFFIC CONDITIONS**

| INTERSECTION                                                                                                                                                | INTERSECTION TYPE | AM PEAK |              | PM PEAK |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------|--------------|---------|--------------|
|                                                                                                                                                             |                   | LOS     | Delay (sec)  | LOS     | Delay (sec)  |
| <b>Eastbound NC 24/27/109 at SR 1138 (Dairy Road) – Unsignalized</b><br><i>Northbound: SR 1138 (Dairy Road)</i><br><i>Eastbound left-turn: NC 24/27/109</i> | Superstreet       | B<br>C  | 12.2<br>22.1 | B<br>C  | 11.9<br>22.5 |
| <b>Westbound NC 24/27/109 at SR 1550 (Saunders Road) – Signalized</b>                                                                                       | Superstreet       | B       | 16.8         | B       | 18.4         |
| <b>Eastbound NC 24/27/109 at SR 1138/1550 – Unsignalized</b><br><i>Western U-turn approach</i>                                                              | Superstreet       | B       | 13.2         | B       | 13.5         |
| <b>Westbound NC 24/27/109 at SR 1138/1550 – Unsignalized</b><br><i>Eastern U-turn approach</i>                                                              | Superstreet       | B       | 13.0         | B       | 12.8         |
| <b>NC 24/27/109 at Westbound Bypass Western Terminus – Signalized</b>                                                                                       | Superstreet       | B       | 12.2         | B       | 11.5         |
| <b>NC 24/27/109 at Eastbound Bypass Western Terminus – Unsignalized</b><br><i>Western U-turn approach</i>                                                   | Superstreet       | B       | 13.4         | B       | 13.6         |
| <b>NC 24/27/109 at SR 1139 (Warner Road) – Unsignalized</b><br><i>Southbound: SR 1139 *</i>                                                                 | Conventional      | F       | > 250        | F       | > 250        |
| <b>NC 24/27/109 at NC 109 (Bilhen Street) – Signalized</b>                                                                                                  | Conventional      | B       | 16.7         | C       | 28.8         |
| <b>NC 24/27 at West Main Street – Unsignalized</b><br><i>Southbound: W. Main Street *</i>                                                                   | Conventional      | F       | > 250        | F       | > 250        |
| <b>NC 24/27 at NC 109 BUS/NC 134 (North Main Street) – Signalized *</b>                                                                                     | Conventional      | F       | > 250        | F       | > 250        |
| <b>Eastbound Bypass at SR 1005 (S. Main Street/Pekin Road) – Unsignalized,</b><br><i>Northbound: Pekin Road</i><br><i>Eastbound: EB Bypass</i>              | Superstreet       | C<br>D  | 21.0<br>26.7 | C<br>C  | 21.1<br>16.8 |
| <b>Westbound Bypass at SR 1005 (S. Main Street/Pekin Road) – Signalized</b>                                                                                 | Superstreet       | B       | 13.7         | B       | 10.7         |
| <b>Eastbound Bypass at SR 1005 (S. Main/Pekin Road) – Unsignalized</b><br><i>Western U-turn approach</i>                                                    | Superstreet       | C       | 17.9         | C       | 18.1         |
| <b>Westbound Bypass at SR 1005 (S. Main Street/Pekin Road) – Unsignalized</b><br><i>Eastern U-turn approach</i>                                             | Superstreet       | C       | 19.5         | B       | 13.4         |
| <b>Eastbound Bypass at Troy-Candor Road – Unsignalized,</b><br><i>Northbound: Troy-Candor Road</i><br><i>Eastbound: Eastbound Bypass</i>                    | Superstreet       | C<br>B  | 17.7<br>14.1 | C<br>B  | 20.3<br>13.9 |
| <b>Westbound Bypass at Troy-Candor Road – Unsignalized,</b><br><i>Southbound: Troy-Candor Road</i><br><i>Westbound: Westbound Bypass</i>                    | Superstreet       | C<br>B  | 21.1<br>14.5 | C<br>C  | 16.4<br>15.1 |

**TABLE 2.8.3 (cont.)  
INTERSECTION LEVEL-OF-SERVICE AND DELAY  
FOR 2030 BUILD TRAFFIC CONDITIONS**

| INTERSECTION                                                                                                         | INTERSECTION TYPE | AM PEAK |             | PM PEAK |             |
|----------------------------------------------------------------------------------------------------------------------|-------------------|---------|-------------|---------|-------------|
|                                                                                                                      |                   | LOS     | Delay (sec) | LOS     | Delay (sec) |
| <b>Eastbound Bypass at Troy-Candor – Unsignalized Western U-turn approach</b>                                        | Superstreet       | B       | 12.3        | C       | 15.6        |
| <b>Westbound Bypass at Troy-Candor – Unsignalized Eastern U-turn approach</b>                                        | Superstreet       | B       | 14.8        | B       | 12.1        |
| <b>NC 24/27 at SR 1332 (Page Road) – Unsignalized Southbound: SR 1332 (Page Road) *</b>                              | Conventional      | F       | > 250       | F       | > 250       |
| <b>NC 24/27 at Westbound Bypass Eastern Terminus – Signalized</b>                                                    | Superstreet       | C       | 20.3        | B       | 16.1        |
| <b>NC 24/27 at Western Bypass Eastern Terminus – Signalized Western U-turn</b>                                       | Superstreet       | C       | 23.2        | B       | 16.6        |
| <b>Eastbound NC 24/27 at Holly Hills Drive – Unsignalized, Northbound: Holly Hills Drive Eastbound: NC 24/27/109</b> | Superstreet       | C       | 15.2        | B       | 12.4        |
|                                                                                                                      |                   | C       | 24.4        | C       | 20.6        |
| <b>Westbound NC 24/27 at SR 1324 (Glen Road) – Signalized</b>                                                        | Superstreet       | B       | 11.1        | B       | 11.5        |
| <b>Eastbound NC 24/27 at SR 1324 (Glen Road)/Holly Hills Drive – Unsignalized, Western U-turn approach</b>           | Superstreet       | B       | 14.3        | B       | 13.5        |
| <b>Westbound NC 24/27 at SR 1324 (Glen Road)/Holly Hills Drive – Unsignalized Eastern U-turn approach</b>            | Superstreet       | B       | 14.1        | B       | 14.3        |

NOTE: “\*\*” denotes intersection signalization or geometric improvements are required, but further analysis for these intersections is not included in the scope of this project.

The proposed geometry for the superstreet intersection system consisting of the intersection of NC 24/27/109 and SR 1138 (Dairy Road)/SR 1550 (Saunders Road) and the east and west median U-turns are as follows: northbound approach of SR 1550 (Saunders Road) provides one right-turn lane; southbound approach of SR 1138 (Dairy Road) provides one right-turn lane; eastbound approach of NC 24/27/109 provides one left- turn lane, one through lane and one through/right shared lane; westbound approach of NC 24/27/109 provides one left- turn lane, one through lane and one through/right shared lane; at the west U-turn the eastbound approach of NC 24/27/109 provides two through lanes, while the westbound approach provides one U- turn lane and two through lanes; and, at the east U-turn the eastbound approach of NC 24/27/109 provides one U- turn lane and two through lanes, while the westbound approach provides two through lanes. A traffic signal is assumed at the intersection of eastbound NC 24/27 Bypass and northbound Saunders Road. All the other intersections of this superstreet system would operate at acceptable LOS as unsignalized intersections.

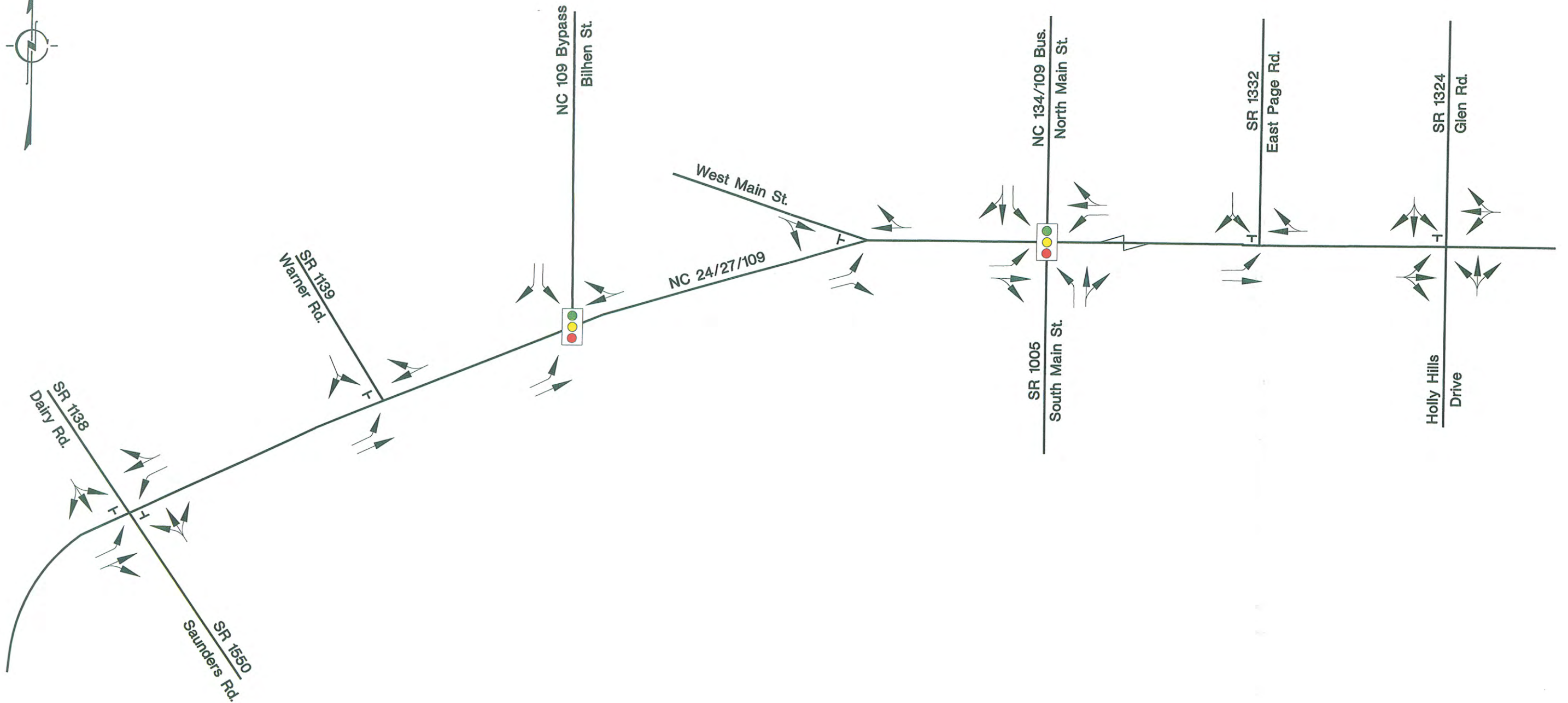
**NC 24/27/109 & NC 109 (Bilhen Street)** – The intersection of NC 24/27/109 and NC 109 (Bilhen Street) is currently signalized. This intersection would operate at an acceptable LOS in the Build scenario and at a failing LOS in the No-Build scenario.

**NC 24/27 & West Main Street** – The intersection of NC 24/27 and West Main Street is currently stop controlled on the minor leg (West Main Street). With the construction of the proposed bypass, there would be a reduction in through traffic volumes on the existing NC 24/27, but this reduction in through traffic volumes is not sufficient to improve LOS or delay at this intersection. With signalization, this intersection would operate at LOS of B in the AM peak period and A in the PM peak period under the 2030 Build conditions. Therefore, traffic volumes at this intersection should be monitored for signalization purposes.

**NC 24/27 & NC 109 Business/NC 134-N. Main Street** – The intersection of NC 24/27 and NC 109 Business/NC 134-N. Main Street is currently signalized. Analysis of this intersection shows failing conditions for future scenarios. The construction of the bypass alone would not provide enough traffic relief at this intersection to provide LOS D or better. Due to physical constraints in each quadrant of the intersection, the addition of through or turn lanes would be difficult. However, geometric improvements should be considered in the future if traffic volumes increase and cause a failing LOS.

**Proposed NC 24/27 Bypass & SR 1005 (S. Main Street/Pekin Road)** – The proposed geometry for the superstreet intersection system consisting of the intersection of proposed Bypass with SR 1005 (S. Main Street/Pekin Road) and the east-west median U-turns is as follows: northbound approach of Pekin Road provides one right-turn lane; southbound approach of South Main Street provides dual right-turn lanes; eastbound approach of NC 24/27 Bypass provides one left-turn lane, one through lane, and one through-right shared lane; westbound approach of NC 24/27 Bypass provides one left-turn lane, one through lane, and one through/right shared lane; at the west U-turn the eastbound approach of NC 24/27 Bypass provides two through lanes, while the westbound approach provides one U-turn lane and two through lanes; and, at the east U-turn the eastbound approach of NC 24/27 Bypass provides one U-turn lane and two through lanes, while the westbound approach provides two through lanes.





Legend



Stop Sign

Traffic Signal



## NC 24/27 Improvements

TIP No. R-623

Montgomery County, North Carolina

Existing Lane and Traffic  
Control Configuration  
NTS  
Exhibit 2.8.1



Due to the high traffic volumes at the southbound approach of South Main Street, dual right-turn lanes and a traffic signal is assumed at the intersection of westbound NC 24/27 Bypass and South Main Street. All the other intersections of this superstreet system would operate at acceptable LOS as unsignalized intersections.

***Proposed NC 24/27 Bypass & Troy-Candor Road*** – Because Troy-Candor Road is a major roadway that intersects with the proposed bypass, traffic volumes for 2030 Build conditions were projected for this intersection. The proposed geometry for the superstreet intersection and east-west median U-turns are as follows: northbound approach of Troy-Candor Road provides one right-turn lane; southbound approach of Troy-Candor Road provides one right-turn lane; eastbound approach of NC 24/27 Bypass provides one left-turn lane, one through lane, and one through-right shared lane; westbound approach of NC 24/27 Bypass provides one left-turn lane, one through lane, and one through-right shared lane; at the west U-turn the eastbound approach of NC 24/27 Bypass provides two through lanes, while the westbound approach provides one U-turn lane and two through lanes; and, at the east U-turn the eastbound approach of NC 24/27 Bypass provides one U-turn lane and two through lanes, while the westbound approach provides two through lanes.

The unsignalized primary intersection and the two median openings east and west of the primary intersections would operate at acceptable LOS and delay during both the AM and PM peak periods under the 2030 Build conditions.

***NC 24/27 & SR 1332 (Page Road)*** – The intersection of NC 24/27 and SR 1332 (Page Road) is currently stop controlled on the minor leg (Page Road). With the construction of the proposed bypass, there would be a reduction in through traffic volumes on the existing NC 24/27, but this reduction in through traffic volumes is not sufficient to improve LOS or delay at this intersection.

With signalization this intersection would operate at LOS of B in both the AM and PM peak periods under the 2030 Build conditions. Therefore, traffic volumes at this intersection should be monitored for signalization.

***NC 24/27/109 & Proposed NC 24/27 Bypass (Eastern Terminus)*** – For purposes of this intersection, “existing” NC 24/27 is considered to be a north-south roadway. Based on the high southbound right-turning traffic volumes, the primary intersection of NC 24/27/109 and the



proposed Bypass and the west U-turn are signalized. The proposed geometry for the superstreet intersection and west median U-turn is as follows: southbound approach of NC 24/27/109 provides with dual right turn lanes; eastbound approach of NC 24/27 Bypass provides with one left-turn lane and two through lanes; westbound approach of NC 24/27 Bypass provides with one through lane and one through-right shared lane; and, at the west U-turn the eastbound approach of NC 24/27/109 provides two through lanes, while the westbound approach provides one U-turn lane and two through lanes.

***NC 24/27 & SR 1324 (Glen Road/Holly Hills Drive)*** – The intersection of NC 24/27 & SR 1324 is currently stop controlled on the minor legs of Glen Road and Holly Hills Drive. Analysis of this intersection shows failing conditions for the future No-Build scenario. No combination of geometric improvements would raise the intersection LOS to D under the No-Build scenario.

Under the proposed Build conditions, superstreet configuration is assumed for this intersection. The proposed geometry for the superstreet intersection system consisting of the intersection of NC 24/27/109 and SR 1324 (Glen Road/Holly Hills Drive) and the east-west median U-turns are as follows: northbound approach of Holly Hill Drive provides one right turn lane; southbound approach of Glen Road provides one right turn lane; eastbound approach of NC 24/27 provides one left-turn lane, one through lane, and one through/right shared lane; westbound approach of NC 24/27 provides one left-turn lane, one through lane, and one through/right shared lane; at the west U-turn the eastbound approach of NC 24/27/109 provides two through lanes, while the westbound approach provides one U-turn lane and two through lanes; and, at the east U-turn the eastbound approach of NC 24/27/109 provides one U-turn lane and two through lanes, while the westbound approach provides two through lanes.

The high traffic volumes on the westbound NC 24/27 causes eastbound left-turn approach to operate at unacceptable LOS during the AM and PM peak periods, under the 2030 Build conditions, therefore, to improve LOS at this intersection a traffic signal is recommended. The rest of the intersections of this superstreet system would operate at acceptable LOS as unsignalized intersections.

### **2.8.3 General Observations**

There is expected to be a reduction in 2030 traffic volumes along the section of existing NC 24/27/109 from SR 1138 (Warner Road) to SR 1332 (Page Street) due to the proposed bypass.



However, all intersections along the existing NC 24/27/109 corridor except for the signalized intersection of NC 24/27/109 with NC 109 (Bilhen Street) would still experience failing LOS in 2030 without further improvements. The existing stop-controlled intersections along NC 24/27/109 analyzed in this report would require signalization and, in some cases, geometric improvements may be necessary in order to provide a LOS of D or better. Even though the construction of the proposed bypass does not alleviate all traffic congestion issues along the existing corridor, it would reduce the amount of through-trips and lower the volume of truck traffic that travels through the downtown area. The proposed bypass, and the effect it has on through-trips and truck traffic, should help to alleviate conditions at high crash locations along the existing corridor, resulting in improved safety for the traveling public. Although the analysis of these intersections results in a failing LOS, there will be a reduction in traffic volumes approaching the intersections as shown in Table 2.8.4. The reduction in volumes is due to the shifting of through traffic to the bypass, consistent with the Purpose and Need. Although still operating at undesirable LOS, traffic flow will be improved at these locations due to the through-trip reduction.

**TABLE 2.8.4  
COMPARISON OF VOLUME REDUCTIONS DUE TO THE BYPASS**

| Intersection                         | 2030 No Build: Volume Through Intersection (vph) |         | 2030 Build: Volume Through Intersection (vph) |         |
|--------------------------------------|--------------------------------------------------|---------|-----------------------------------------------|---------|
|                                      | AM Peak                                          | PM Peak | AM Peak                                       | PM Peak |
| NC 24/27/109 at SR 1139 (Warner Rd.) | 4680                                             | 3928    | 1663                                          | 2920    |
| NC 24/27 at W. Main St.              | 4106                                             | 3419    | 2752                                          | 2122    |
| NC 24/27 at NC 134                   | 5145                                             | 5090    | 5090                                          | 4409    |
| NC 24/27 at SR 1332 (Page Rd.)       | 3440                                             | 3257    | 3277                                          | 2529    |

#### Heavy Truck Origin and Destination Study

A video data collection study was conducted at two locations along NC 24/27 in November 2004 and June 2005 during peak traffic periods to determine the percentage of heavy trucks (greater than two axles) that travel south on North Main Street then west on NC 24/27 out of town, in contrast to the percentage of heavy trucks with destinations along NC 24/27 in town. This data was collected to develop a reasonable predictor for determining the amount of heavy truck traffic that would travel from North Main Street along Pekin Road to access the proposed bypass. The study was not conducted on holidays and it should be noted that heavy truck traffic through the area is non-seasonal. Based on the study results, it was determined that 64% of the heavy trucks turning at Main Street are continuing west out of town along NC 24/27. It is reasonable then to infer that once the proposed bypass is completed, 64% of the projected

trucks with origins and destinations north and west of Troy will use SR 1005 (Pekin Road) to access the bypass. Based on calculations using the results of the video data collection study, at least 120 trucks per day are expected to utilize this two-lane roadway. Since the 2003 traffic forecast actually predicts 268 additional trucks per day, the origin and destination study verifies that the forecast accounts for this anticipated travel pattern change. Table 2.8.5 illustrates the expected daily truck volumes due to the construction of the bypass.

**TABLE 2.8.5**  
**COMPARISON OF DAILY TRUCK VOLUMES**

| Facility             | 2000 Daily Truck Volumes | 2030 Daily Truck Volumes |       |
|----------------------|--------------------------|--------------------------|-------|
|                      |                          | No-Build                 | Build |
| SR 1005 (Pekin Rd.)  | 68                       | 176                      | 444   |
| NC 134 (N. Main St.) | 120                      | 190                      | 190   |

## **2.9 PREFERRED ALTERNATIVE**

The Preferred Alternative will be identified after the NEPA/404 Merger Team meeting for Concurrence Point 3 (*Identification of the Least Environmentally Damaging Practicable Alternative*).

### **3.0 GENERAL CHARACTERISTICS OF THE PROJECT STUDY AREA AND VICINITY**

Montgomery County was formed in 1779 from Anson County and named in honor of Richard Montgomery, an American Revolutionary War general killed in 1775 while attempting to capture Quebec City, Canada. Montgomery County is located in the southern portion of the state and is bounded by Moore, Richmond, Stanly, Davidson and Randolph Counties. Montgomery County has a land area of 491.42 square miles and the elevation of the project study area ranges from approximately 450 feet to 690 feet above sea level. Montgomery County encompasses both the Uwharrie Mountain Range in the western part of the county and portions of the Sandhills in the east. The Yadkin-Pee Dee River forms the western border of Montgomery County. Another major river in the county is the Little River, which borders the eastern boundaries of the project study area east of the Town of Troy.

Troy is approximately 55 miles south of Greensboro and approximately 70 miles east of Charlotte and is located in the middle of Montgomery County. Troy is adjacent to the Uwharrie National Forest, which provides recreational activities for the area including camping, hiking, hunting, water skiing, boating and fishing. One tradition says the town was named after J.B. Troy, state legislator; another says it was named for Robert Troy, a member of the House of Commons. In 1844, Troy was established as the county seat of Montgomery County. In 1852, Angus McCaskill, one of the early settlers, donated a tract of 50 acres to the community to serve as the town proper. Until a legislative decree changed the name, the community was known as West's Oldfield. That same decree also located the courthouse in the new community and made Troy the business center of the county. Troy prospered in the 1890's with the arrival of the Asheboro and Aberdeen Railroad. This prosperity continued into the first decades of the twentieth century with textiles and timber comprising a large portion of the economy. After World War II, population growth and industrial growth diminished in Troy and in recent decades Troy's economic base has suffered as textile and timber industries have declined.

***Project Study Area*** – The project study area, shown in Exhibit 1.2.1, encompasses an area from east of the Little River, through the Town of Troy, to the intersection of NC 24/27 with SR 1138. NC 24/27 is the main east-west route through the project study area.

The project lies within the Yadkin-Pee Dee River Basin [USGS Hydrologic Unit (HU) 03040104, NCDWQ Subbasin 03-07-15], which encompasses six major reservoirs, the Pee Dee Wildlife

Refuge and the Uwharrie National Forest. Waters within the project study area include the Little River, Warner Creek, Turkey Creek, and unnamed tributaries to Warner Creek, Turkey Creek, and the Little River. Wetland community types found within the project study area include headwater forest, wet seep, and Piedmont bottomland hardwood forest. Additionally, there are several naturalized open-water ponds with associated wetlands.



## **4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

This section of the report presents a discussion on the existing conditions and the probable effects, both positive and negative, for the Build Alternatives.

### **4.1 LAND USE**

The following sections describe the existing land use in the area, anticipated land use trends, the consistency of the proposed action with local plans and policies, and the potential effects of the proposed action.

#### **4.1.1 Existing Land Use**

The project study area encompasses approximately 8.8 square miles. Land use in the project study area is generally mixed, with undeveloped and rural residential uses dominating most areas. Commercial uses are concentrated along NC 24/27 through downtown and west of Troy. Restaurants, gas stations, and a hotel are located along this portion of NC 24/27. East of Troy, residential use is predominant along NC 24/27.

The southern and southeastern portions of the project study area are primarily undeveloped and are currently in use as managed pinelands. These undeveloped areas also contain rural residences and several small neighborhoods. The northeastern portion of the project study area contains a mix of commercial and residential development within the Troy town limits. The corridors of the Build Alternatives are located south of Troy and occur predominantly on undeveloped land. Existing land use is shown in Exhibit 4.1.1.

#### **4.1.2 Development Trends**

There is minimal growth occurring within the project study area; however, new commercial development is occurring east of the project study area along NC 24/27, near the Town of Biscoe. This development includes a new hotel, Food Lion grocery store, Wal-Mart, and strip shopping center with restaurants and retail services.

Travel and tourism is a future growth industry for Montgomery County. The county is bordered on the west by the Yadkin/Pee Dee River, which has developed into a recreational area that includes upscale housing and a premier golf course. The Uwharrie National Forest attracts over one million visitors per year and the county is beginning to promote travel and

tourism to the area to capitalize upon this natural resource. Another widening project between US 220A and US 220 on NC 24/27 in Biscoe will connect with the existing five-lane section. Recently, the Town of Troy annexed a portion of Roslyn Road, south of the town, and installed a new sewer pump station on that road. The Town has also acquired land to be used as an industrial park and adopted an Economic Development Incentive to encourage new business in the area. Additionally, the Town is in the planning stages of a streetscape project that proposes to revitalize the downtown and encourage future economic growth.

#### **4.1.3 Consistency with Land Use and Transportation Plans**

The proposed project is included in the NCDOT Draft 2007-2013 TIP and is included in the Town of Troy Transportation Plan, NC Intrastate Program, and the NC Strategic Highway Corridors Program. The proposed NC 24/27 Troy Bypass project is consistent with the development goals of the Town of Troy and will connect to other existing and multi-lane sections, which will provide a continuous multi-lane facility through Montgomery County as part of the intrastate system. Construction of the proposed bypass is consistent with the Town of Troy's Economic Development Initiative, as it would facilitate safe and efficient travel through the area.

## **4.2 FARMLANDS**

In accordance with the Federal Farmland Protection Policy Act (FPPA) and State Executive Order 96, the impact of the proposed action on prime, unique, and statewide important farmlands has been assessed. Table 4.2.1 lists farmland soils in the project study area.

**TABLE 4.2.1  
PRIME, UNIQUE, AND STATEWIDE IMPORTANT FARMLANDS**

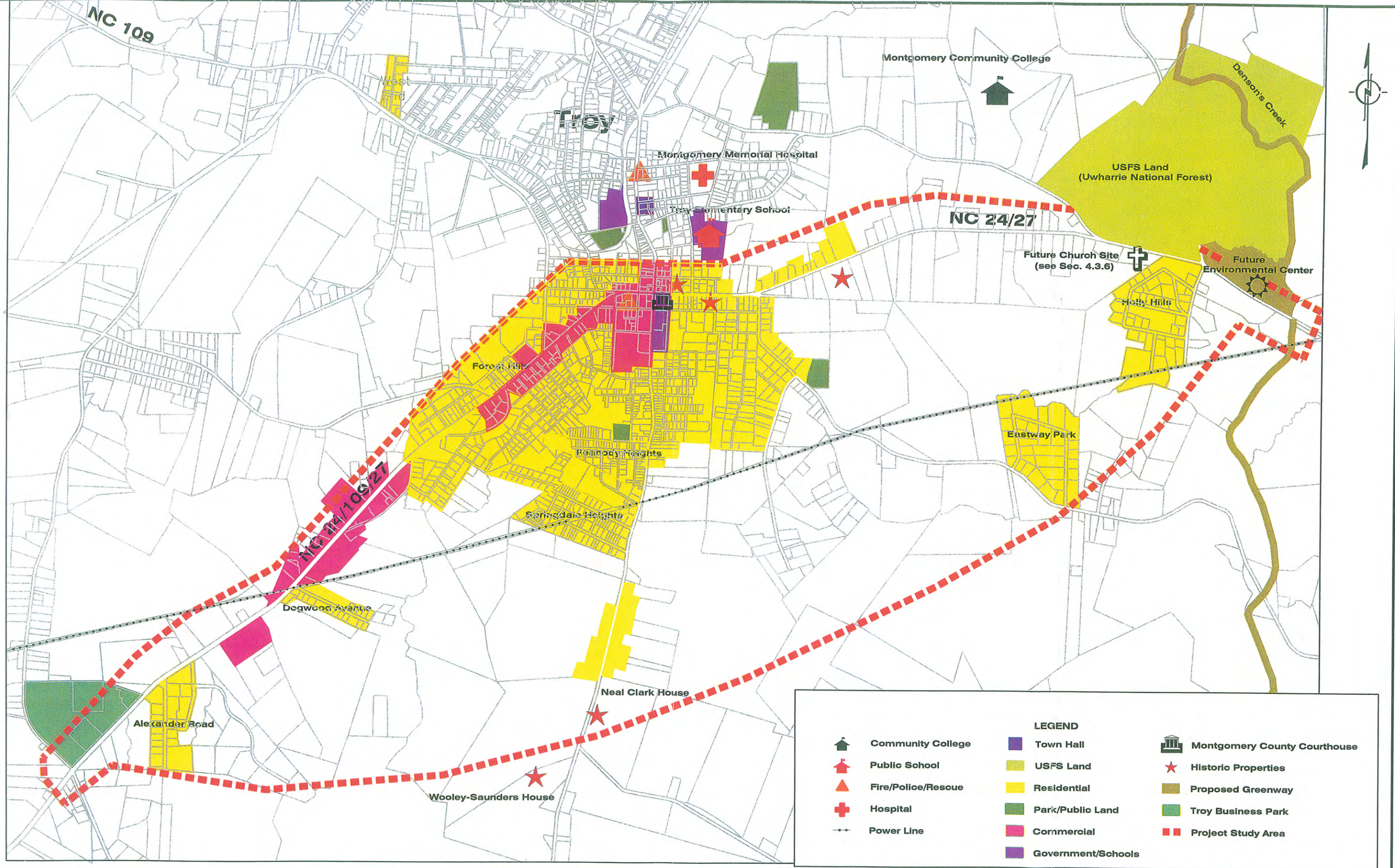
| SOIL TYPE                          | FARMLAND CODE <sup>1</sup> | TOTAL ACRES IMPACTED PER MAP UNIT (PER ALT.) |              |              |              |
|------------------------------------|----------------------------|----------------------------------------------|--------------|--------------|--------------|
|                                    |                            | ALT. B                                       | ALT. C       | ALT. D       | ALT. E       |
| Herndon silt loam, 2-8% slopes     | P1                         | 51.63                                        | 50.83        | 58.78        | 59.84        |
| Herndon silt loam, 8-15% slopes    | S1                         | 21.95                                        | 21.20        | 26.68        | 28.72        |
| Georgeville silt loam, 2-8% slopes | P1                         | 5.64                                         | 5.64         | 6.98         | 5.59         |
| <b>TOTAL ACREAGE</b>               | --                         | <b>79.22</b>                                 | <b>77.67</b> | <b>92.44</b> | <b>94.15</b> |

NOTE: Impacts based on right-of-way.

1 P1 - All areas are prime farmland.

S1 - All areas are farmland of statewide importance.





## NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Existing Land Use and  
Community Features  
NTS  
Exhibit 4.1.1



As defined by the US Council on Environmental Quality (1976), prime farmland is land having the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. These soils have the quality, growing season and moisture supply needed to economically produce sustained high yields of crops when properly managed. Prime farmland includes cropland, pastureland, rangeland and forestland; but not land converted to urban, industrial, transportation or water uses. Unique farmlands are those whose value is derived from their particular advantages for growing specialty crops. Statewide and locally important farmlands are defined by the appropriate state or local agency.

To determine farmland impacts in rural and/or agricultural areas, the FPPA requires the submittal of a Farmland Conversion Impact Rating Form (US Department of Agriculture [USDA] Form AD-1006) to the Natural Resource Conservation Service (NRCS). The relative value of the site's farmland is determined by the NRCS on a scale from 0 to 100. This score is summed with site assessment points which rank non-soil related criteria such as the potential for impact on the local agricultural economy if the land is converted to non-farm use and compatibility with existing agricultural use. These points range from 0 to 160, therefore, a total cumulative rating of 260 points is possible. Sites receiving a total score of 160 or more should be given increasingly higher levels of consideration for protection. Sites receiving a total score less than 160 should be given a minimal level of consideration for protection (7 CFR 658.4). A Farmland Conversion Impact Rating Form was submitted to the NRCS for the Build Alternative corridors and is included in Appendix A.3. Table 4.2.2 summarizes the anticipated farmland impacts for each alternative. Exhibit 4.2.1 shows the prime farmland and farmland of statewide importance within the alignments of the Build Alternatives.

**TABLE 4.2.2  
FARMLAND CONVERSION IMPACTS**

| FARMLAND TYPE                                        | ALTERNATIVES |              |              |              |
|------------------------------------------------------|--------------|--------------|--------------|--------------|
|                                                      | ALT. B       | ALT. C       | ALT. D       | ALT. E       |
| Prime & Unique Farmland (ac)                         | 57.27        | 56.47        | 65.76        | 65.43        |
| Statewide Important Farmland (ac)                    | 21.95        | 21.20        | 26.68        | 28.72        |
| <b>Total Farmland Acres in Corridor</b>              | <b>79.22</b> | <b>77.67</b> | <b>92.44</b> | <b>94.15</b> |
| Percent of Farmland in County to be Converted        | 0.04         | 0.04         | 0.04         | 0.04         |
| <b>Total Impact Rating (Scale of 0 - 260 Points)</b> | <b>113</b>   | <b>113</b>   | <b>117</b>   | <b>119</b>   |

NOTE: Acreage is based on right-of-way. Actual construction impacts would be less than the acreage shown above.  
SOURCE: USDA Natural Resources Conservation Service Form AD-1006

The total scores for each alternative range from 113 to 119 and are in compliance with the FPPA. Further, the actual impacts based on construction limits would be less than the total amount of farmland within the 250-foot corridors.

### **4.3 SOCIAL ENVIRONMENT**

Community facilities and services provide emergency, health, educational, recreational, and spiritual support for local areas and include public and private services such as fire stations, local playgrounds, schools, churches, cemeteries, hospitals, etc. The following sections describe the resources serving the Troy community. Prominent community features are shown in Exhibit 4.1.1

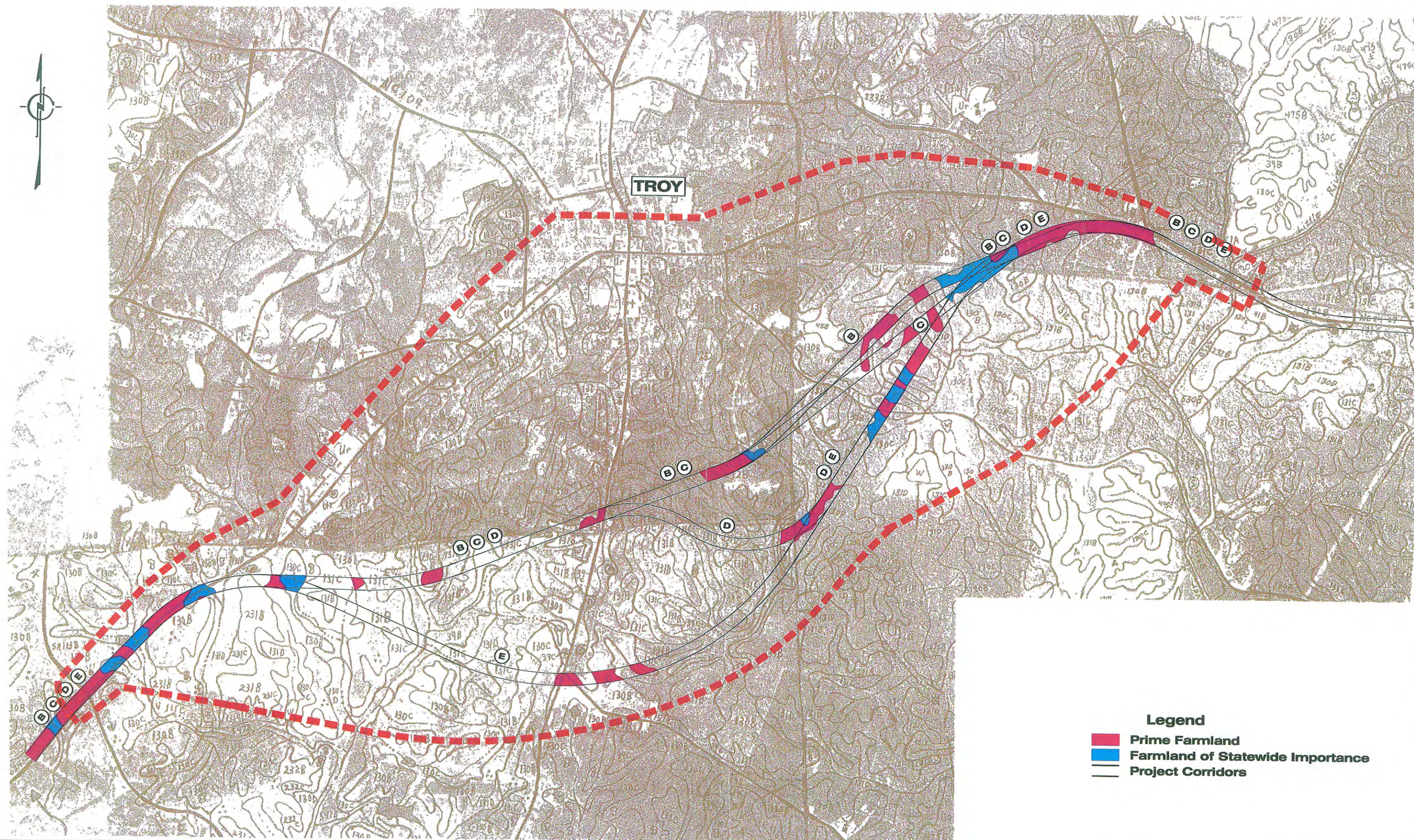
#### **4.3.1 Population Characteristics**

According to the 2000 US Census, there are 26,822 people, 9,848 households, and 7,189 families residing in Montgomery County. The population density is 55 people per square mile. In Montgomery County, the estimated population was 23,359 residents in 1990 and 26,822 residents in 2000 – a 14.8% increase over the 10-year period. The population of Montgomery County has experienced variable growth over the last twenty years with most of the growth occurring in the western part of the county. Much of this growth occurred in unincorporated areas of the county, as most municipalities did not experience large population increases. The largest municipal growth occurred in the Town of Biscoe, which grew 13.6% from 1990 to 2000 by the addition of 204 residents.

The County is currently growing at a rate that is less than the growth of the State of North Carolina as a whole, which has grown 21.4 percent over the last decade, as shown in Table 4.3.1. The Town of Troy experienced a boom in growth from 1980 to 1990; however, in the last decade the population has grown only 1.2%. According to the 2000 Census, there are 3,430 people, 1,108 households, and 710 families residing in Troy.

The addition of 685 new residents between 1980 and 1990 created a 25.4% population increase in Troy. This growth did not continue in the following decade, as only 43 new residents were added between 1990 and 2000. Troy's population recently grew through the annexation of a portion of Roslyn Road, south of the town.





- Legend**
- Prime Farmland
  - Farmland of Statewide Importance
  - Project Corridors



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Farmlands  
NTS  
Exhibit 4.2.1



**TABLE 4.3.1  
POPULATION TRENDS  
(1970–2000)**

| <b>GROWTH TRENDS</b>      | <b>TROY</b> | <b>MONTGOMERY COUNTY</b> | <b>NORTH CAROLINA</b> |
|---------------------------|-------------|--------------------------|-----------------------|
| 1970 Population           | 2,429       | 19,267                   | 5,084,411             |
| 1980 Population           | 2,702       | 22,469                   | 5,880,095             |
| 1990 Population           | 3,387       | 23,359                   | 6,632,448             |
| % <i>Growth 1980-1990</i> | 25.4%       | 4%                       | 12.8%                 |
| 2000 Population           | 3,430       | 26,822                   | 8,049,313             |
| % <i>Growth 1990-2000</i> | 1.2%        | 14.8%                    | 21.4%                 |
| 2010 population           | --          | 30,111                   | 9,491,372             |
| % <i>Growth 2000-2010</i> | --          | 12.3%                    | 17.9%                 |

NOTES: “—” Not available

SOURCE: 2000 US Census and the North Carolina Office of State Planning.

The racial composition of Montgomery County is 70.1% White, 22.1% African American, 0.4% Native American, 1.6% Asian/Pacific Islander, 5.7% from other races, and 1.3% from two or more races. The Hispanic population comprises 4.12% of the population in the county. The Town of Troy’s total population is approximately 39% African-American which is significantly above the state average. Other minority populations include Asian/Pacific Islanders, which represent approximately 3% of the total population, and a Native American population of less than 1%. With the exception of Troy’s African-American community, the racial characteristics of Troy and Montgomery County are relatively comparable to the racial characteristics of North Carolina, as shown in Table 4.3.2.

As stated in the previous paragraphs, Troy’s total population is approximately 39.0% African-American which is 17.4% above state average. Another subgroup that is substantially above state average is institutionalized persons. Approximately 827 people are housed in-group quarters, comprising 24.2% of the Town’s total population. This high percentage is due to the presence of the Southern Correctional Institution. Other institutionalized populations include elderly persons residing in nursing homes, which make up approximately 12% of the total percentage of institutionalized persons. The main percentage of elderly is located northeast of downtown Troy near the Montgomery County Country Club and along NC 24/27 east of downtown Troy.

**TABLE 4.3.2  
RACIAL CHARACTERISTICS**

| RACIAL GROUP             | TROY       |            | MONTGOMERY COUNTY |            | NORTH CAROLINA |            |
|--------------------------|------------|------------|-------------------|------------|----------------|------------|
|                          | POPULATION | % OF TOTAL | POPULATION        | % OF TOTAL | POPULATION     | % OF TOTAL |
| White                    | 1,867      | 54.0%      | 18,527            | 70.1%      | 5,804,656      | 72.1%      |
| African-American         | 1,337      | 39.0%      | 5,918             | 22.1%      | 1,737,545      | 21.6%      |
| Native American/ Alaskan | 25         | 0.7%       | 108               | 0.4%       | 99,551         | 1.2%       |
| Asian/Pacific Islander   | 39         | 1.1%       | 443               | 1.6%       | 117,672        | 1.5%       |
| Other                    | 114        | 3.3%       | 1,542             | 5.7%       | 186,628        | 2.3%       |
| Multi-racial             | 48         | 1.4%       | 345               | 1.3%       | 103,260        | 1.38%      |
| Hispanic (of any race)   | 1,138      | 4.30%      | 5368              | 4.12%      | 378,963        | 4.71%      |

SOURCE: 2000 US Census

Table 4.3.3 contains age demographic data for Troy, Montgomery County, and North Carolina as determined by the 2000 US Census. The two largest age groups in Troy and Montgomery County are the 25-34 and 35-44 ranges. These groups collectively represent 26.0% of Troy's population and 28.4% of Montgomery County's population. This characteristic is consistent with statewide age distributions as well. Troy and Montgomery County are also consistent with North Carolina in the younger age groups, particularly those under 5 years. The median age in Troy is 33.5 years and 37 years in Montgomery County, which is consistent with the North Carolina value of 35.3 years.

**TABLE 4.3.3  
AGE CHARACTERISTICS**

| AGE GROUP     | TROY         |             | MONTGOMERY COUNTY |             | NORTH CAROLINA   |             |
|---------------|--------------|-------------|-------------------|-------------|------------------|-------------|
|               | NUMBER       | % OF TOTAL  | NUMBER            | % OF TOTAL  | NUMBER           | % OF TOTAL  |
| Under 5 years | 221          | 6.4%        | 1,835             | 6.8%        | 539,509          | 6.70%       |
| 5-9 Years     | 222          | 6.5%        | 1,902             | 7.1%        | 562,553          | 6.99%       |
| 10-14 Years   | 182          | 5.3%        | 1,782             | 6.6%        | 551,367          | 6.85%       |
| 15-19 Years   | 192          | 5.6%        | 1,801             | 6.7%        | 539,931          | 6.71%       |
| 20-24 Years   | 304          | 8.9%        | 1,761             | 6.5%        | 577,509          | 7.17%       |
| 25-34 Years   | 672          | 19.6%       | 3,700             | 13.8%       | 1,213,415        | 15.07%      |
| 35-44 Years   | 528          | 15.4%       | 3,954             | 14.7%       | 1,287,120        | 15.99%      |
| 45-54 Years   | 363          | 10.6%       | 3,664             | 13.7%       | 1,085,150        | 13.48%      |
| 55-59 Years   | 113          | 3.3%        | 1,484             | 5.5%        | 400,207          | 4.97%       |
| 60-64 Years   | 104          | 3%          | 1,194             | 4.5%        | 323,505          | 4.02%       |
| 65-74 Years   | 242          | 7.1%        | 2,009             | 7.6%        | 533,777          | 6.63%       |
| 75-84 Years   | 211          | 6.1%        | 1,334             | 5%          | 329,810          | 4.10%       |
| 85+ Years     | 76           | 2.2%        | 402               | 1.5%        | 105,461          | 1.31%       |
| <b>Total</b>  | <b>3,430</b> | <b>100%</b> | <b>26,822</b>     | <b>100%</b> | <b>8,049,314</b> | <b>100%</b> |

SOURCE: 2000 US Census

#### **4.3.2 Employment and Economic Characteristics**

As of November 2005, Montgomery County's unemployment rate was 1.3% higher than the statewide average. In 2004, 223 new jobs were created in the county, in contrast to 282 jobs lost during the same period. From January 2005 through May 2005, 77 new jobs were created and 120 jobs were lost. The county's relatively high unemployment rate may be correlated to the recent shift in the labor market. In 2004, manufacturing comprised 48.0% of the county's employment; in 2005, it constituted 41.0% of employment and had decreased by 338 employees.

Compared to statewide averages, per capita incomes are lower for Troy and Montgomery County residents. Troy and Montgomery County also have a higher percent of people living in poverty than the statewide average. Table 4.3.4 shows comparative employment and economic data.

**TABLE 4.3.4  
EMPLOYMENT AND ECONOMIC DATA**

|                                                                                                        | <b>TROY</b> | <b>MONTGOMERY<br/>COUNTY</b> | <b>NORTH<br/>CAROLINA</b> |
|--------------------------------------------------------------------------------------------------------|-------------|------------------------------|---------------------------|
| <b>Unemployment Rate (November 2005)</b><br>Source: US Department of Labor, Bureau of Labor Statistics | ---         | 6.5%                         | 5.2%                      |
| <b>Per Capita Income (2000)</b><br>Source: US Bureau of the Census.                                    | \$16,504    | \$18,423                     | \$20,307                  |
| <b>Percent of Persons Living in Poverty (2000)</b><br>Source: US Bureau of the Census.                 | 24.8%       | 15.4%                        | 12.3%                     |

As shown in Table 4.3.5, manufacturing represents the largest employment sector in Montgomery County. Health care and social assistance also comprise a large portion of the labor market.

The largest component of Montgomery County's economic base is manufacturing. Other important industries in the county include lumber and wood products, furniture manufacturing, apparel and industrial machinery and equipment. Among the largest employers in Montgomery County are Realistic Furniture, Inc. (740 employees), Montgomery County Schools (610 employees), Citation/Foundry Service (445 employees) Capel, Inc. (388 employees), and Jordan Lumber & Supply, Inc. (385 employees). As stated in Section 4.1.3, the proposed bypass would be consistent with the Town of Troy's Economic Development Initiative, as it



would facilitate safe and efficient travel through the area and foster the utilization of the Troy Business Park. Although the proposed bypass would displace ten (10) retail and/or service-based businesses, there are commercial facilities available in the area for these relocated businesses.

**TABLE 4.3.5  
OCCUPATIONAL DATA**

| OCCUPATION                                  | PERCENT OF WORKFORCE |                |
|---------------------------------------------|----------------------|----------------|
|                                             | MONTGOMERY COUNTY    | NORTH CAROLINA |
| Manufacturing                               | 41.0%                | 15.0%          |
| Retail Trade                                | 7.8%                 | 11.8%          |
| Health Care and Social Assistance           | 14.2%                | 12.5%          |
| Accommodation and Food Services             | 1.9%                 | 8.0%           |
| Public Administration and Waste Services    | 8.5%                 | 11.6%          |
| Construction                                | 4.0%                 | 5.9%           |
| Wholesale Trade                             | 1.3%                 | 4.4%           |
| Professional and Technical Services         | 1.1%                 | 4.0%           |
| Finance and Insurance                       | 1.3%                 | 3.7%           |
| Transportation and Warehousing              | 1.4%                 | 3.6%           |
| Other Services <sup>1</sup>                 | 1.3%                 | 2.6%           |
| Information <sup>2</sup>                    | 0.9%                 | 1.9%           |
| Company/Enterprise Management               | 1.7%                 | 1.7%           |
| Arts, Entertainment, and Recreation         | 1.4%                 | 1.2%           |
| Real Estate, Renting, and Leasing           | 0.3%                 | 1.3%           |
| Educational Services                        | 8.4%                 | 9.3%           |
| Agriculture, Forestry, Fishing, and Hunting | 1.3%                 | 0.8%           |
| Utilities                                   | 1.7%                 | 0.4%           |
| Mining                                      | 0.0%                 | 0.1%           |
| Other                                       | 0.3%                 | 0.3%           |
| <b>TOTAL</b>                                | <b>100.0%</b>        | <b>100.0%</b>  |

SOURCE: NCEDIS, June 2005.

NOTES: 1 "Other Services" comprises establishments engaged in providing services not specifically provided for elsewhere in the classification system (e.g., equipment and machinery repairing, dry cleaning services, death care services).

2 "Information" comprises establishments engaged in the following processes: producing and distributing information and cultural products; providing the means to transmit or distribute these products as well as data or communications; and, processing data.

Recent sales tax data indicates that the Town of Biscoe is developing as a regional commercial center for the area. As mentioned previously, relatively new commercial development has occurred in Biscoe, which includes a hotel, Food Lion grocery store, Wal-Mart and strip shopping center. Limited data was available for sales in Troy and Biscoe; however, available data indicates that the sales tax revenue for Biscoe has substantially increased in recent years. From 2003 to 2004, the local option sales tax revenue for Biscoe increased by 96.6%. During the same period, Troy's local option sales tax revenue increased by 13.2%. Although Biscoe's

local option sales tax revenue experienced a decrease in previous years, an overall increase of 51.9% was experienced from 2000 to 2005; Troy's local option sales tax increased by 36.8% for the same period. Biscoe's population growth has been rather steady over the last thirty years, which may indicate that county residents are traveling to Biscoe for retail goods and services, but not relocating to the town.

#### **4.3.3 Neighborhoods and Community Cohesion**

Residential land uses within the project study area are primarily single-family, residential neighborhoods. The major subdivisions are located within the limits of the Town of Troy and along the NC 24/27 corridor and include Holly Hills, Alexander Road, Dogwood Avenue, Springdale Heights, and Eastway Park. Other major subdivisions located west of Troy include West End, Westover Heights, Harris Heights and Country Club Acres. Large lot residential development erected after World War II is located on the eastern outskirts of Troy. South of Troy, the area is rural with scattered single family residences.

Residential redevelopment is also occurring in Troy. The Troy Neighborhood Redevelopment Corporation was created to oversee the redevelopment project for the Town. The Smitherman Village Redevelopment Project is a rent-to-own program that provides the opportunity for low to moderate income individuals to own a quality home. During the rental period, each participant must undergo a series of training classes to prepare for home ownership. Currently four homes have been built under the program.

The Build Alternatives do not traverse or directly affect the access to any existing neighborhoods nor to the redevelopment efforts listed above. Changes in travel patterns along SR 1005 (Pekin Road) have the potential to increase truck traffic noise along the road; however, this noise potential impact is not anticipated to create long-term, adverse impacts to the neighborhood or alter community cohesion. The change in travel patterns and its effects are discussed further in Sections 4.3.4 and 4.6.

#### **4.3.4 Travel Patterns and Accessibility**

Given that this project is on new location, the travel patterns of the region would be altered by the construction of the proposed project. The proposed bypass would affect travel patterns by creating an alternate travel route, reducing motorists' dependence on the heavily traveled NC 24/27 through downtown Troy. This change would result in decreased travel times for through-

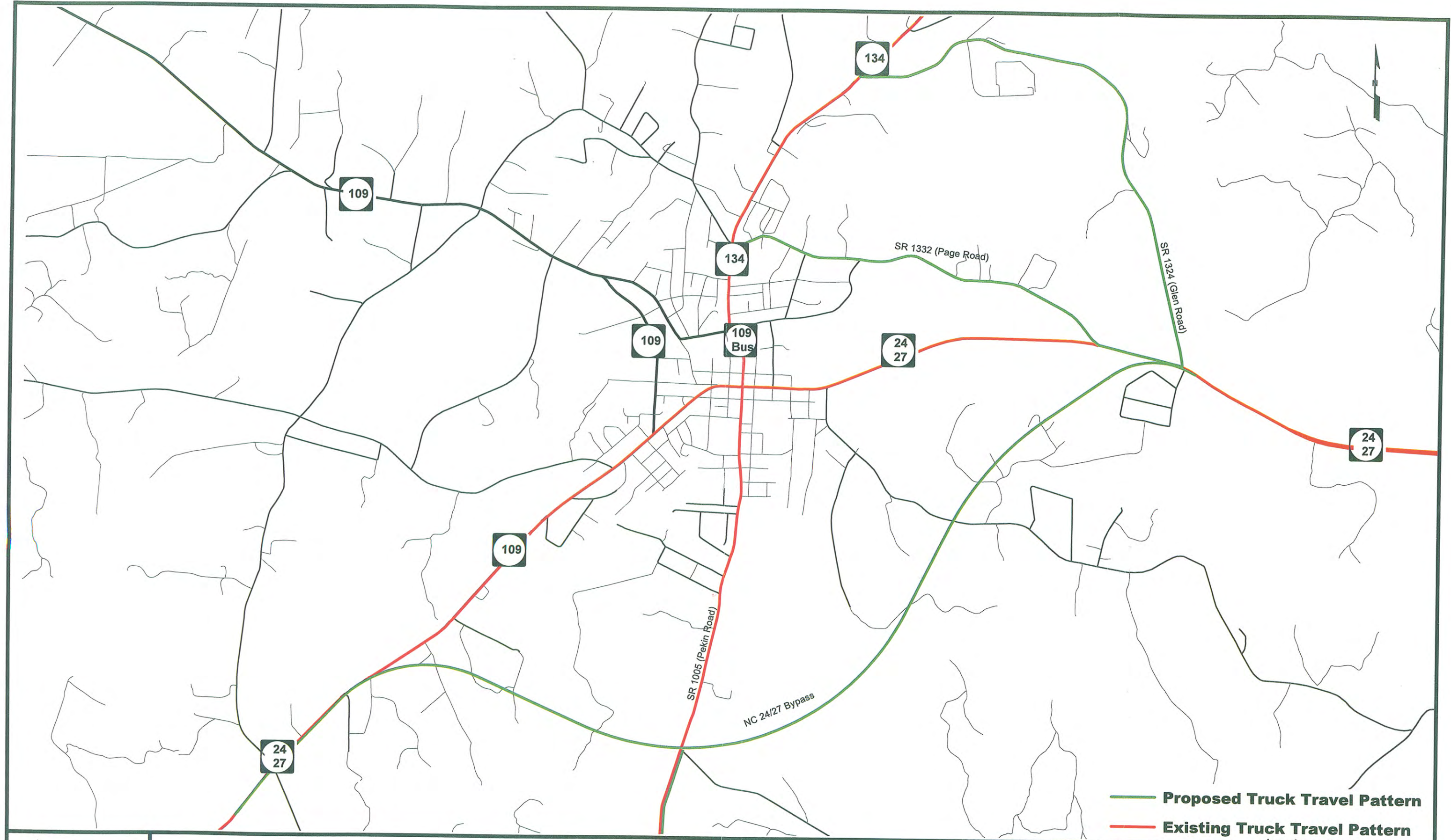
traffic and would reduce accident potential and congestion on NC 24/27 through Troy. No substantial change to the travel patterns of local traffic is anticipated.

The travel patterns of truck traffic are anticipated to change in response to the proposed project, as commercial vehicle operators may choose to travel the proposed bypass in lieu of existing NC 24/27. It is most likely that heavy trucks traveling south on North Main Street to and from the west on NC 24/27 will utilize Pekin Road to access the bypass. Exhibit 4.3.1 shows the potential truck traffic travel pattern changes for the project study area.

As discussed in Section 2.8.3, it is estimated that once the proposed bypass is completed, approximately 268 trucks per day in 2030 are expected to utilize this two-lane roadway. It should be noted that the truck volume projections are based on a 24-hour day. In addition, truck traffic does not exhibit typical peaking behavior. Rather, the truck volumes are anticipated to be somewhat evenly distributed over the 24-hour period. The potential for this effect is identical for all the Build Alternatives, as they all would include an intersection south of Troy at SR 1005 (Pekin Road). The effects of this travel pattern change and minimization measures are discussed in Section 4.6.

#### **4.3.5 Schools**

The Montgomery County School System is comprised of four elementary schools, one alternative school, three middle schools, and two high schools. Within the project study area, elementary students attend either Troy Elementary School (Grades K-5) or Page Street Elementary (Grades 3-5). The Anchor Alternative School, located outside the town limits in Biscoe, NC provides programs to support and improve the performance and success of students with disabilities. Middle and high school students attend West Middle School and West Montgomery High School, which are located just outside the town limits. The Montgomery County Schools provide both technical/vocational and academic programs. Private schools in the area include Wescare Christian Academy, which serves primary and middle school students.



**NC 24/27 Improvements**  
TIP No. 623  
Montgomery County, North Carolina

— Proposed Truck Travel Pattern  
— Existing Truck Travel Pattern

**Proposed Truck Travel Pattern**  
**Alternatives B-E**  
**Exhibit 4.3.1**



Montgomery Community College (MCC), a post-secondary institution serving this area of the state, is also located in Troy. MCC is located on Page Street, just north of NC 134 and N C 24/27. The college has received national acclaim for its specialty programs in areas such as gunsmithing, taxidermy, and pottery. In recent years, MCC has been approved to offer a Licensed Practicing Nurse (LPN) program, and a one -year college transfer program. The Continuing Education Department offers in-plant business and industry training, training in fire, rescue, and law enforcement, and personal enrichment programs.

Four childcare facilities occur within the project study area including A Brighter World Child Care Center, Little Angels Learning Center, Little Friends of Troy Daycare and Wescare Center for Children. All of these childcare providers have indoor and outdoor facilities.

Montgomery County also has an award-winning county public library system, which is headquartered in Troy on West Main Street. Completion of the bypass will provide safer, more efficient transportation to and from schools within the area.

None of these facilities will be directly affected by the proposed project.

#### **4.3.6 Churches and Cemeteries**

Churches of various denominations are located within the project study area. There are also cemeteries throughout the project study area. Some of these are directly associated with churches or mortuaries and others are private family plots located on residential land. None of the existing churches and cemeteries would be affected by construction of the proposed project. At the northern end of the project the Build Alternatives converge with existing NC 24/27 through a parcel of land that has been purchased for future use as a church site (Exhibit 4.3.1). Due to the constraints on either side of this parcel, including existing residences and neighborhoods, the parcel would be unavoidably impacted and would no longer be suitable as a site for the proposed church.

#### **4.3.7 Police and Fire Stations, Rescue Squads and Emergency Management**

The Troy Police Department is currently staffed by ten full-time and six part-time officers. The main police station is located on North Main Street. A satellite office is located at Holt Circle. Troy is also served by a volunteer fire department, which is funded by the Town and Montgomery County.

The fire station is located on North Main Street and is the first organized fire department in Montgomery County.

Construction of the proposed project would have minor, temporary effects on emergency response times due to possible delays caused by construction and traffic related to construction. Upon completion, the proposed project would aid in the reduction of emergency response times within portions of the project study area and vicinity.

#### **4.3.8 Businesses**

There are ten business relocations associated with each Alternative. Minor, temporary construction impacts at the project termini with NC 24/27 may temporarily affect the accessibility of existing businesses. However, no long-term or substantial impacts are anticipated.

#### **4.3.9 Parks and Recreation**

Portions of the Uwharrie National Forest are located near the project study area. The Uwharrie National Forest was purchased by the federal government in 1931 during the Great Depression and was first known as the Uwharrie Reservation. In 1961, President John F. Kennedy proclaimed these federal lands in Montgomery, Randolph, and Davidson Counties the Uwharrie National Forest. It is one of the most recently formed in the National Forest System and comprises 50,189 acres.

Troy's local park system includes six separate facilities. All of the parks are open year round from sunrise to sunset. The Montgomery County Country Club is located north of the Town of Troy and includes an 18-hole semi-private golf course. The proposed project would not impact any publicly owned recreation area or wildlife refuge.

Troy is currently working to protect the Densons Creek area through a local greenway project initiative. As part of this project, an environmental education center will be created along this trail. In conjunction with the greenway project, the Town is working on restoring the dam on Old City Lake (located outside of the project study area). In cooperation with the North Carolina Clean Water Management Trust Fund, the Town is establishing a greenway trail that will connect NC 24/27 with NC 134. The proposed project will not impact the greenway project. Access for the greenway will be provided under the bridge openings on the west side of the Little River (see project commitments).

### Fire Towers

The U.S. Forest Service and the state forestry department maintain fire lookout towers around the state. Their chief purpose is to provide first alert reports on wildfires. There is one fire lookout tower within the right of way of Alternative B that would be affected by the project. This fire tower is located on a high point on privately owned undeveloped land off of Pekin Road. NCDOT would coordinate with the U.S. Forest Service and the property owners regarding the relocation of this tower.

#### **4.3.10 Specific Social Groups**

No specific social groups would be impacted by the proposed project. There are no cultural centers or singularly ethnic neighborhoods located within the project study area. The proposed extension would benefit all social groups in the surrounding areas by improving the traffic safety in the project study area and vicinity.

### **4.4 RIGHT OF WAY AND RELOCATION IMPACTS**

Relocation studies estimated the number of residential and business relocations that would result from construction of the Build Alternatives. The relocation report is included in Appendix B.3 of this document. The results of this report indicate that there would be 13 residential relocations, 10 business relocations and 1 non-profit relocation for Alternative B; 12 residential relocations, 10 business relocations and 1 non-profit relocation for Alternative C; 9 residential relocations, 10 business relocations and 1 non-profit relocation for Alternative D; and 9 residential relocations, 10 business relocations and 1 non-profit relocation for Alternative E. Displacement impacts would be mitigated through implementation of the relocation assistance programs described below.

**Relocation Assistance:** It is the policy of the NCDOT to ensure that comparable replacement housing for residents and suitable locations for displaced businesses would be available prior to construction of projects.

The NCDOT has three programs available to minimize the inconvenience of relocation: Relocation Assistance, Relocation Moving Payments, and Relocation Replacement Housing Payments or Rent Supplement. With the Relocation Assistance Program, experienced NCDOT staff would be available to provide displaced residents and businesses with information pertaining to financing and housing programs and the availability and prices of homes, apartments, or businesses for sale

and rent. The Relocation Moving Payments Program generally provides payment of actual moving expenses encountered during relocation.

Where displacement would force an owner or tenant to purchase or rent property of higher cost or to lose a favorable financing arrangement (in cases of ownership), the Relocation Replacement Housing Payments and Rent Supplement Program would compensate up to \$22,500 to owners who are eligible and qualify, and up to \$5,250 to tenants who are eligible and qualify.

The relocation program established for the proposed action would be conducted in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and the North Carolina Relocation Assistance Act (GS 133-5 through 133-18). The program is designed to provide assistance to displaced persons in relocating to a replacement site in which to live or do business. At least one relocation officer is assigned to each highway project for this purpose.

The relocation officer determines the needs of displaced families, individuals, businesses, nonprofit organizations, and farm operations for advisory services without regard to race, color, religion, gender, or national origin. The NCDOT would schedule its work to allow ample time, prior to displacement, for negotiations and possession of replacement housing, which meets decent, safe, and sanitary standards. Those who are displaced are given at least a 90-day written notice after NCDOT purchases the property. Relocation of displaced persons and businesses would be offered in areas not generally less desirable in regard to public utilities and commercial facilities. Rent and sales prices of replacement property offered would be within the financial means of the families and individuals displaced and would be reasonably accessible to their places of employment. The relocation officer would assist owners of displaced residences, businesses, nonprofit organizations and farm operations in searching for and moving to replacement property.

All residential tenants and owner-occupants who may be displaced would receive an explanation regarding available options, such as: (1) purchase of replacement housing, (2) rental of replacement housing, either private or public, or (3) moving existing owner-occupant housing to another site (if possible). The relocation officer would also supply information concerning other state and federal programs offering assistance to displaced persons and



would provide other advisory services as needed in order to minimize hardships to displaced persons in adjusting to a new location.

The Moving Expenses Payments Program is designed to compensate for the costs of moving personal property from homes, businesses, nonprofit organizations and farm operations acquired for a highway project. Under the Replacement Program for Owners, NCDOT would participate in reasonable incidental purchase payments for replacement dwellings such as attorneys' fees, surveys, appraisals, and other closing costs. If applicable, the NCDOT also makes a payment for any increased interest expenses for replacement housing payments, increased interest payments, and incidental purchase expenses. Reimbursement to owner-occupants for replacement housing payments, increase interest payments, and incidental expenses may not exceed a combined total of \$22,500, except under the Last Resort Housing Provision.

A displaced tenant may be eligible to receive a payment to rent a replacement dwelling or to make a down payment, including incidental expenses, on the purchase of a replacement dwelling. This payment would not exceed \$5,250. The down payment is based upon what the state determines is required when the rent supplement exceeds \$5,250. It is the state's policy that no person would be displaced by the NCDOT's federally-assisted construction projects unless and until comparable or adequate replacement housing has been offered or provided for each person displaced within a reasonable period of time prior to displacement. No relocation payment received would be considered as income for the purposes of the Internal Revenue Code of 1954 or for the purposes of determining eligibility or the extent of eligibility of any person for assistance under the Social Security Act or any other federal law.

Last Resort Housing is a program used when comparable replacement housing is not available or when it is unavailable within the displacee's financial means, and the replacement payment exceeds the federal and state legal limitations. This program allows broad latitude in methods of implementation by the state so that decent, safe, and sanitary replacement housing can be provided. Since opportunities for replacement housing appear adequate within the study area, it is not likely that the Last Resort Housing Program would be necessary for the proposed project. However, this program would still be considered as mandated by State law.

#### 4.5 INDIRECT AND CUMULATIVE IMPACTS

State regulations define environmental effects to include indirect and cumulative impacts [01 NCAC 25 .0108(b)(3)]; therefore, an Indirect and Cumulative Impact (ICI) Assessment was developed to provide comprehensive information on the potential long-term, induced impacts of the proposed project. This analysis was conducted in accordance with federal CEQ regulations and follows the systematic procedures contained in *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina* (NCDOT/NCDENR, 2001).

Indirect effects are defined as “impacts on the environment which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable” (40 CFR 3 1508.8). Induced development or altered growth patterns are typically the most common forms of indirect impacts. The rate and type of development usually coincide with other factors such as zoning and the availability of electricity and water service. Cumulative impacts are defined as those “...which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 3 1508.7).

The following paragraphs summarize the projections described in the *Indirect and Cumulative Impact Assessment* prepared for the NC 24/27 Improvements (NCDOT, 2006c) and reference two scenarios created for the analysis: the No-Build and Build Scenarios.

##### Highlights of the Assessment

Based on the design of the proposed bypass and the results of nationwide bypass studies, potential ICIs for the Build Scenario were assessed upon, among other factors, the following premises:

- The main function of the proposed project would be to provide additional roadway capacity through the county and to improve safety and traffic flow on NC 24/27, primarily by diverting through-travelers and truck traffic around the Town of Troy;
- The proposed bypass would not overtly contribute to the project study area’s growth, as it would foster through-travel rather than provide substantial economic development opportunities. Partial control of access and the use of superstreet

intersections along the proposed bypass would aid in maintaining traffic flow as well as limit the accessibility and attractiveness of adjacent land;

- Potential adverse economic effects of the bypass would be minimized by the size of Troy's population and its relative attraction as a destination for area residents. Although travel-oriented businesses are more likely to be adversely affected by a reduction in drive-by traffic, Troy's status as a destination for local residents would minimize adverse effects to downtown businesses; and,
- The Town of Troy provides water and sewer within town, but does not plan to expand service to undeveloped and rural portions of the project study area (Town of Troy, 2005). This factor would largely inhibit growth along the bypass.

Without an active catalyst for growth (e.g., economic development initiative, water/sewer expansion, attraction as a retirement community, etc.), Troy's population is projected to grow at a very gradual but constant rate (an average growth rate of 8.9% per decade from 2000 to 2030), relatively uninfluenced by construction of the proposed bypass. Therefore, the population projections for the No-Build and Build Scenarios are identical and minimal induced growth effects are associated with the proposed project.

The bypass would reduce travel time between the towns of Troy and Biscoe, which would expand the service area for commercial development along NC 24/27, near Biscoe. Reduced travel time to Biscoe's retail centers would increase the project study area's attractiveness as a residential location. Therefore, in conjunction with the increased accessibility to retail centers east of Troy, the proposed bypass may influence the distribution of growth in the county.

Nationwide studies of bypassed communities indicate that retail flight typically does not occur and is minimal at best. A study conducted by the Wisconsin Department of Transportation (WisDOT) found that there is little adverse impact to the overall economies of most communities, but that smaller communities (less than 1,000 people) are more likely to experience adverse effects. Smaller communities do not have the same attractions as larger communities and are not considered "destinations" for the region. Medium (2,000 to 5,000 people) and large (greater than 5,000 people) communities typically have a complete K-12 school system, a large clinic or hospital, government offices, churches, and parks, as well as

retail and other services that define the communities as commercial and cultural centers (WisDOT, 1998). A University of Kentucky study of bypassed communities also found that retail flight typically does not occur and that only 7.6% of businesses located in bypassed areas relocate to bypasses. The study concluded that although the opening of a bypass was found to reduce aggregate retail sales, it was not found to affect retail employment, total employment, or population. This study cited previous literature that concluded that travel-oriented businesses were most likely to be affected by bypasses and were therefore most likely to relocate or be replaced along the bypass itself (UK, 2001).

The majority of Troy's businesses are supported by local traffic; therefore, it is anticipated that the effects on downtown eateries and commercial services would be minimal. In contrast to the No-Build Scenario, maintaining accessibility to downtown attractions by reducing through-traffic may actually provide economic benefits to local businesses. Without the proposed bypass, potential visitors to the downtown area may be deterred by perceived problems such as noisy truck traffic, the potential for damage to parked vehicles, and pedestrian safety (Gillis, 1994).

#### Indirect and Cumulative Impact Summary

Potential ICIs can be categorized by whether they are caused by the proposed project or development caused by the project. ICIs directly related to a proposed transportation project are "encroachment-alteration effects" and include ICIs such as habitat fragmentation, increased imperviousness, vehicular pollution, and noise. These are the long-term impacts of the roadway itself. The Build Scenario would create encroachment-alteration effects as summarized in Table 4.5.1.

**TABLE 4.5.1  
SUMMARY OF INDIRECT AND CUMULATIVE IMPACTS  
ASSOCIATED WITH THE BUILD SCENARIO**

| IMPACT TYPE                     |                                   | POTENTIAL IMPACT? |    | POTENTIAL RESULT                                               |
|---------------------------------|-----------------------------------|-------------------|----|----------------------------------------------------------------|
|                                 |                                   | YES               | NO |                                                                |
| ENCROACHMENT-ALTERATION EFFECTS |                                   |                   |    |                                                                |
| Ecosystem Related               | Habitat fragmentation/degradation | X                 |    | Fragmentation of undeveloped areas primarily south of project. |
|                                 | Ecosystem disturbance             | X                 |    | Increased human presence.                                      |
|                                 | Natural process disruption        |                   | X  |                                                                |
|                                 | Air quality                       |                   | X  |                                                                |



**TABLE 4.5.1 (cont.)  
SUMMARY OF INDIRECT AND CUMULATIVE IMPACTS  
ASSOCIATED WITH THE BUILD SCENARIO**

| IMPACT TYPE                                       |                                   | POTENTIAL IMPACT? |    | POTENTIAL RESULT                                                                                                                                                          |
|---------------------------------------------------|-----------------------------------|-------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   |                                   | YES               | NO |                                                                                                                                                                           |
| Socio-economic or Land Use Related                | Water quality                     | X                 |    | Vehicle-related pollution.                                                                                                                                                |
|                                                   | Noise                             | X                 |    | Increased heavy truck traffic along SR 1005 (Pekin Road). Noise analysis does not recommend noise abatement.                                                              |
|                                                   | Other                             |                   | X  |                                                                                                                                                                           |
|                                                   | Community cohesion/stability      |                   | X  |                                                                                                                                                                           |
|                                                   | Alteration of travel patterns     | X                 |    | Decreased traffic volumes through downtown Troy.                                                                                                                          |
|                                                   | Quality-of-life                   | X                 |    | Increased by improved safety and accessibility through Troy. Potential diminish on SR 1005 (Pekin Road) due to increased truck volumes.                                   |
|                                                   | Historic resources                | X                 |    | Increased traffic near historic property (Alternative E only).                                                                                                            |
|                                                   | Aesthetics                        | X                 |    | Minimal visual impacts.                                                                                                                                                   |
|                                                   | Other                             |                   | X  |                                                                                                                                                                           |
| <b>INDUCED GROWTH EFFECTS</b>                     |                                   |                   |    |                                                                                                                                                                           |
| Serves specific development                       |                                   |                   | X  |                                                                                                                                                                           |
| Stimulates complementary development              |                                   | X                 |    | May spur growth of small, satellite commercial areas at bypass intersections.                                                                                             |
| Influences location decisions                     |                                   | X                 |    | May influence the distribution of growth in the county.                                                                                                                   |
| <b>INDIRECT EFFECTS RELATED TO INDUCED GROWTH</b> |                                   |                   |    |                                                                                                                                                                           |
| Ecosystem Related                                 | Habitat fragmentation/degradation | X                 |    | Animals would move out of areas newly inhabited by humans.                                                                                                                |
|                                                   | Ecosystem disruption              |                   | X  |                                                                                                                                                                           |
|                                                   | Natural process disruption        |                   | X  |                                                                                                                                                                           |
|                                                   | Air quality                       |                   | X  |                                                                                                                                                                           |
|                                                   | Water quality                     | X                 |    | Minimal increased imperviousness effects. Rocky Creek (a HQW) is not anticipated to be adversely affected by any residential growth associated with the proposed project. |
|                                                   | Noise                             |                   | X  |                                                                                                                                                                           |
|                                                   | Other                             |                   | X  |                                                                                                                                                                           |
| Socio-economic Related                            | Community cohesion/stability      |                   | X  |                                                                                                                                                                           |
|                                                   | Alteration of travel patterns     |                   | X  |                                                                                                                                                                           |
|                                                   | Quality-of-life                   |                   | X  |                                                                                                                                                                           |
|                                                   | Historic resources                | X                 |    | Relatively low potential to stimulate commercial growth at intersection with SR 1005 (Pekin Road) (Alternative E only).                                                   |
|                                                   | Aesthetics                        |                   | X  |                                                                                                                                                                           |
|                                                   | Other                             |                   | X  |                                                                                                                                                                           |

#### 4.6 ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice to Minority and Low-Income Populations* and the United States Department of Transportation (USDOT) Order 5610.2, *Final Order to Address Environmental Justice in Minority Populations and Low-Income*

*Populations* have been set forth to (1) avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations; (2) ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and, (3) prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations (FHWA, 2000). The following discussion was developed to identify and address potential impacts to minority or low-income populations.

To determine the presence of minority populations within the project study area, 2000 U S Bureau of the Census (USBOC) demographic databases were reviewed. The BOC database illustrates minority population variation within individual census tracts, which allows for a more precise analysis of the project study area.

Troy's African-American population is 39.0% of the total population, which is approximately 17.4% higher than statewide averages. Approximately 21.7% (290 residents) of this minority population is concentrated in the census blocks of southern Troy and south along SR 1005 (Pekin Road). According to 2000 USBOC data, 79.7% (290 out of 364 residents) are African-American. At the census block level, African-Americans comprise an average 90.3% of each census block (based on ten census blocks in residential use, ranging between 26.6% and 100%). Most of the census blocks comprised entirely of African-Americans are located in southern Troy along SR 1005 (Pekin Road). The census block with the smallest composition of African-American residents (38 of 143 residents) extends east from SR 1005 (Pekin Road) to include predominantly white populations along SR 1553 (Roslyn Road) and SR 1554 (Troy-Candor Road). Although the two census blocks south of Troy are rather large, much of the land is undeveloped with residential properties typically bordering existing roads. It is reasonable, therefore, to infer that the majority of African-Americans in the two larger census blocks live along SR 1005 (Pekin Road).

As discussed in Sections 2.8.3 and 4.3.4, it is likely that heavy trucks traveling south on North Main Street (estimated to be approximately 268 trucks per day in 2030) will utilize SR 1005 (Pekin Road) to access the proposed bypass. Potential impacts may include residents perceiving the increased truck traffic as a negative effect on their quality of life and the aesthetics of the area. It should be noted that although there will be a potential increase in truck traffic, this increase will be spread out during the daylight hours and not during the evening

hours when truck noise would be most disruptive to adjacent residences. As treated in the technical advisory, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA, 1987), the alteration of travel patterns is considered a direct impact; it is the effects of these altered travel patterns that can create ICIs (NCDOT/NCDENR, 2001). Therefore, truck traffic noise is treated as an indirect effect of the travel pattern change.

In an effort to minimize this potential impact, NCDOT met with the Town of Troy and local logging companies on September 13, 2004 to discuss the feasibility of routing heavy truck traffic traveling to and from the west of Troy along the bypass and SR 1332 (Page Street) or SR 1324 (Glen Road) in lieu of SR 1005 (Pekin Road) and the downtown area. Representatives from the two logging companies present at the meeting responded favorably to the proposed truck route. Routing trucks along this path would minimize the amount of trucks using Pekin Road and minimize the associated impacts to residences along this corridor. This proposed routing is shown in Exhibit 4.3.1.

A key component of environmental justice analysis under NEPA is to ensure the full and fair participation of all potentially affected communities (FHWA, 2000) (CEQ, 1997). As discussed in Section 5.2, two Citizens Informational Workshops have been held for the project thus far (January 23, 2001 and June 24, 2003). Because the analyses and results presented in this environmental document were generated after these two workshops, the information contained in this section will be presented at future Citizens Informational Workshops and at any small group meetings with citizens of this area. In accordance with guidance on the implementation of EO 12898, NCDOT will “provide opportunities for effective community participation... including identifying the potential effects and mitigation measures, in consultation with the affected communities, and improving the accessibility of public meetings, crucial documents, and notices” (CEQ, 1997). Coordination of this nature will be ongoing throughout the environmental study process.

#### **4.7 AIR QUALITY**

The project is located in Montgomery County, which has been determined to comply with the National Ambient Air Quality Standards. The proposed project is located in an attainment area; therefore, 40 CFR Parts 51 and 93 are not applicable. This project is not anticipated to create any

adverse effects on the air quality of this attainment area. This section summarizes information contained in the *Air Quality Analysis Report* (NCDOT, 2006d), prepared for the proposed NC 24/27 Improvements. Section 176(c) of the 1990 Clean Air Act Amendments (CAAA) requires that transportation plans, programs, and projects conform to the intent of the state air quality implementation plan (SIP). The current SIP does not contain any transportation control measures for Montgomery County.

Air pollution is the result of industrial emissions and emissions from internal combustion engines. The impact to air quality resulting from the construction of a new highway or from improvements to an existing highway can range from aggravating existing air pollution problems to improving the ambient air conditions. The following paragraphs address the anticipated effects on local air quality resulting from the proposed project. These effects are discussed for the known emissions associated with motor vehicles which include carbon monoxide (CO), nitrogen oxide (NO), hydrocarbons (HC), particulate matter, sulfur dioxide (SO<sub>2</sub>), and lead (Pb) (listed in order of decreasing rate). Each of these emissions is described below:

***Carbon Monoxide*** – The primary pollutant emitted from automobiles is carbon monoxide. Automobiles are considered to be the major source of CO in the project study area. For these reasons, the analysis presented is concerned with determining expected carbon monoxide levels in the vicinity of the project.

***Hydrocarbons and Nitrogen Oxides*** – Automobiles are generally regarded as sources of hydrocarbons and nitrogen oxides. Hydrocarbons and nitrogen oxides emitted from cars are carried into the atmosphere where they react with sunlight to form ozone and nitrogen dioxide. It is the ozone and nitrogen dioxide that are of concern and not the precursor hydrocarbons and nitrogen oxide. Urban areas as a whole are regarded as sources of hydrocarbons, not individual streets and highways. The emissions of all sources in an urban area mix together in the atmosphere, and in the presence of sunlight, the mixture reacts to form ozone, nitrogen dioxide, and other photochemical-oxidants. The best example of this type of air pollution is the smog that forms in Los Angeles, California.

***Particulate Matter and Sulfur Dioxide*** – Automobiles are not generally regarded as significant sources of particulate matter and sulfur dioxide. Nationwide, highway sources account for less than 7% of particulate matter emissions and less than two percent of sulfur dioxide emissions.



Particulate matter and sulfur dioxide emissions are predominately the result of non-highway sources (e.g., industrial, commercial, and agricultural). Because emissions of particulate matter and sulfur dioxide from cars are very low, there is no reason to suspect that traffic on the project would cause air quality standards for particulate matter and sulfur dioxide to be exceeded.

**Lead** – Automobiles emit lead as a result of burning gasoline containing tetraethyl lead, which is added by refineries to increase the octane rating of the fuel. New cars with catalytic converters burn unleaded gasoline eliminating lead emissions. Also, the United States Environmental Protection Agency (USEPA) has required the reduction of the lead content of leaded gasoline. The composite average lead content of gasoline in 1974 was 0.528 grams per liter; in 1989, this composite average had dropped to 0.003 grams per liter. The Clean Air Act Amendments of 1990 make the sale, supply, or transport of leaded gasoline or lead additives unlawful after December 31, 1995. Because of these reasons, it is not expected that traffic on the proposed project would cause the NAAQS for lead to be exceeded.

**Carbon Monoxide Microscale Analysis** – A micro-scale air quality analysis was performed to determine future CO concentrations resulting from the proposed highway improvements. "CAL3QHC (2.0) - A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections" was used to predict the CO concentration at the nearest sensitive receptors to the project. The analysis included the free-flow mainline section and the signalized intersections at the project termini. Inputs into the mathematical model to estimate hourly CO concentrations consisted of a level roadway under normal conditions with predicted traffic volumes, vehicle emission factors, and meteorological parameters. The traffic volumes are based on the highest peak hour from average weekday traffic projections. The modeling analysis was performed for a "worse case" condition using 360 wind directions at ten (10) degree intervals to determine the highest CO concentrations. Carbon monoxide vehicle emission factors were calculated for the years 2005, 2010 and 2030 using the EPA publication "Mobile Source Emission Factors" and the accompanying MOBILE 6 mobile source emissions computer model. Table 4.7.1 provides the input parameters for the MOBILE6 and CAL3QHC.

Receptor sites in the project study area represent locations where the highest CO concentrations can be expected and human activity is anticipated. Six receptor sites were chosen to represent "worst case" conditions either along existing roadways or adjacent to the project corridor. Exhibit 4.7.1 shows the receptor locations.

The 1-hour background CO concentration for the project area was estimated to be 2.9 parts per million (ppm) for undeveloped areas, as recommended in “Guidelines for Evaluating the Air Quality Impacts of Transportation Facilities” (October 2005) prepared by the NCDENR Division of Air Quality. The 8-hour CO concentration was calculated by multiplying the 1-hour CO concentration by a statewide average persistence factor of 0.79.

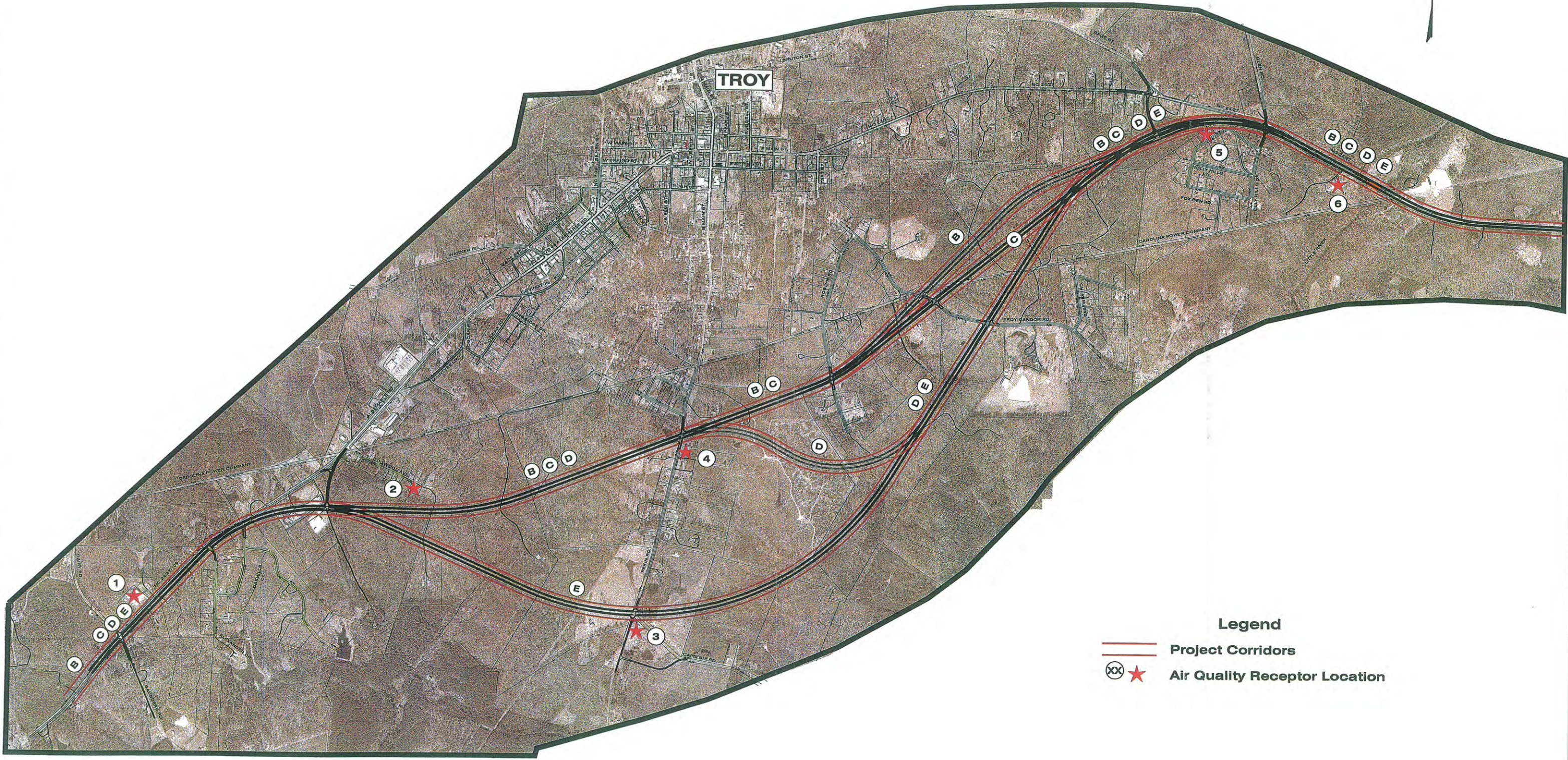
Table 4.7.2 shows the base 2005 and the predicted 2010 and 2030 one-hour and eight-hour CO concentrations for the No-Build and Build Alternatives at the selected receptors. Receptor 1 represents locations in the vicinity of the western terminus of the project. Receptors 2, 3, 4 and 5 represent residential locations near the proposed alternatives. Receptor 6 represents locations in the vicinity of the eastern terminus of the proposed project.

**TABLE 4.7.1  
MOBILE6/CAL3QHC INPUT PARAMETERS**

| <b>MOBILE6</b>           |                                                                                 |
|--------------------------|---------------------------------------------------------------------------------|
| <b>PARAMETER</b>         | <b>INPUT</b>                                                                    |
| Region                   | Low Altitude                                                                    |
| Anti-Tampering Program   | Yes                                                                             |
| Inspection/Maintenance   | No                                                                              |
| Ambient Temperature      | 40.3°F                                                                          |
| Traffic Speeds           | Posted or Capacity Based                                                        |
| Vehicle Mix              | Default                                                                         |
| Calendar Years           | 2005, 2010 and 2030                                                             |
| Operating Mode           | 20.6% Non-Catalytic Cold Start<br>27.3% Hot Start<br>20.6% Catalytic Cold Start |
| ASTM Class               | C                                                                               |
| <b>CAL3QHC</b>           |                                                                                 |
| <b>PARAMETER</b>         | <b>INPUT</b>                                                                    |
| Averaging Time (ATIM)    | 60 minutes                                                                      |
| Settling Velocity (VS)   | 0 cm/sec                                                                        |
| Deposition Velocity (VD) | 0 cm/sec                                                                        |
| Source Height (HL)       | 0                                                                               |
| Wind Speed (U)           | 1.0 Meter/Second                                                                |
| Wind Direction           | 0° - 360° @ 10° Intervals                                                       |
| Stability Class (CLAS)   | Class D – Rural                                                                 |
| Mixing Height (MIXH)     | 1000 Meters                                                                     |
| Receptor Locations       | See Exhibit                                                                     |
| Receptor Height (ZR)     | 1.8 Meters (6 Feet)                                                             |
| Surface Roughness        | 200 cm                                                                          |
| Background Concentration |                                                                                 |
| 1-Hour                   | 2.9 Parts Per Million                                                           |
| 8-Hour                   | 2.3 Parts Per Million                                                           |
| Traffic Volumes          | Peak Hour Projections                                                           |

SOURCE: Guidelines for Evaluating the Air Quality Impacts of Transportation Facilities, October 2005, NCDENR, Division of Air Quality (and revised section for Mobile 6).





**Legend**

-  Project Corridors
-  Air Quality Receptor Location



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Air Quality  
Receptor Locations  
NTS  
Exhibit 4.7.1



**Results** – Results were calculated for the Build scenarios along each alternative and for both the No-Build and Build scenarios. The 1-hour and 8-hour concentration standards, as established by the National Ambient Air Quality Standards, are 35 ppm and 9 ppm, respectively. In situations where receptors were greater than 1,000 feet from an alternative, no effect is anticipated and only the background concentration is reported. These concentration standards are not exceeded in any of the scenarios.

**TABLE 4.7.2  
CO CONCENTRATIONS**

| ALTERNATIVE              | YEAR | 1-hour/8-hour<br>(Parts per million) |         |         |         |         |         |
|--------------------------|------|--------------------------------------|---------|---------|---------|---------|---------|
|                          |      | RECEPTOR NUMBER                      |         |         |         |         |         |
|                          |      | 1                                    | 2       | 3       | 4       | 5       | 6       |
| Existing (2005 No-Build) | 2005 | 3.1/2.4                              | 2.9/2.3 | 2.9/2.3 | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 |
| Alternative B            | 2005 | 3.2/2.5                              | 2.9/2.3 | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 3.1/2.4 |
| Alternative C            | 2005 | 3.1/2.4                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative D            | 2005 | 3.1/2.4                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 3.0/2.4 | 3.1/2.4 |
| Alternative E            | 2005 | 3.2/2.5                              | 2.9/2.3 | 3.1/2.4 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative B            | 2010 | 3.2/2.5                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative C            | 2010 | 3.1/2.4                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative D            | 2010 | 3.1/2.4                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative E            | 2010 | 3.1/2.4                              | 2.9/2.3 | 3.1/2.4 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative B            | 2030 | 3.2/2.5                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 3.0/2.4 | 3.1/2.4 |
| Alternative C            | 2030 | 3.1/2.4                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative D            | 2030 | 3.1/2.4                              | 2.9/2.3 | 2.9/2.3 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |
| Alternative E            | 2030 | 3.1/2.4                              | 2.9/2.3 | 3.1/2.4 | 3.1/2.4 | 2.9/2.3 | 3.1/2.4 |

The project is located in Montgomery County, which has been determined to comply with the National Ambient Air Quality Standards. The proposed project is located in an attainment area; therefore, 40 CFR Parts 51 and 93 are not applicable. This project is not anticipated to create any adverse effects on the air quality of this attainment area.

In accordance with 40 CFR 93.126, this project is an air quality neutral project. It is not required to be included in the regional emissions analysis (if applicable). Therefore, project-level PM 2.5 and CO analyses are not required.

**Mobile Source Air Toxics (MSATs) Impact Analysis** – In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air

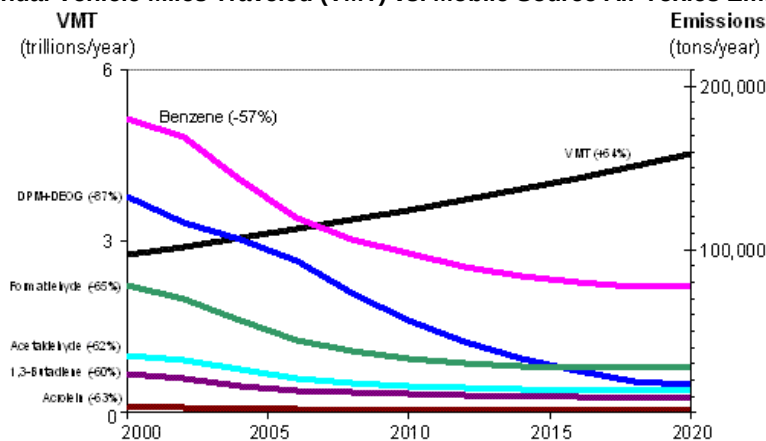


toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

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

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

**U.S. Annual Vehicle Miles Traveled (VMT) vs. Mobile Source Air Toxics Emissions, 2000-2020**



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: Highway Statistics 2000, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO<sub>4</sub> from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

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

#### Unavailable or Incomplete Information

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

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

rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

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

- **Dispersion:** The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.
- **Exposure Levels and Health Effects:** Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties

associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

#### *Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs*

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

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

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

- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation routes of exposure.



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

There have been other studies that address MSAT health impacts in proximity to roadways.<sup>1</sup> The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

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

Relevance of unavailable or incomplete information to evaluating reasonably foreseeable significant adverse impacts on the environment, and evaluation of impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects,

the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

In this document, NCDOT has provided a qualitative assessment of MSAT emissions relative to the various alternatives, and has acknowledged that all of the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at: [www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm](http://www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm).

For each alternative in the EA, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives is slightly higher than that for the No Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT will lead to higher MSAT emissions for the preferred alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's

MOBILE6 emissions model, emissions of all of the priority MSATs, except for diesel particulate matter, decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Because the estimated VMT under each of the 4 Alternatives presented in the EA are nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Additional travel lanes contemplated as part of the Build Alternatives will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSATs could be higher under the eventual Preferred Alternative than the No Build Alternative. These localized increases in MSAT concentrations would likely be most pronounced along the expanded roadway sections where no roadway currently exist (east and west of South Main Street) and along the sides of existing NC 24-27 to which widening occurs. That is, along the north side of existing NC 24-27 when widening occurs to the north and along the south side when widening occurs to the south. However, as discussed above, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models. In sum, when a highway is widened and, as a result, moves closer to receptors, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from them, i.e., through downtown Troy. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will, over time, cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

The qualitative assessment presented above is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*. The findings of this study can be found at [www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemiissions.htm](http://www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemiissions.htm).

#### **4.8 NOISE ANALYSIS**

This section summarizes information contained in the *Noise Impacts Analysis Report* (NCDOT, 2006e), prepared for the proposed NC 24/27 Improvements.

***Ambient and Future Noise Levels*** – A noise analysis was performed to determine the effect of the proposed project on noise levels in the immediate project study area and to investigate both the need for and the feasibility of noise abatement. The investigation includes an inventory of existing noise sensitive land uses and a field survey of ambient (existing) noise levels in the study area. It also includes a comparison of predicted and ambient noise levels to determine if traffic noise impacts can be expected from the proposed project. Traffic noise impacts are determined from the current procedures for the abatement of highway traffic noise and construction noise, appearing as Part 772, Title 23 of the Code of Federal Regulations.

The methodology used to predict future noise levels in this study is the Federal Highway Administration Traffic Noise Model, version 2.5 (FHWA TNM). TNM uses the traffic volumes, type of vehicles on the planned roadway, their speeds, the physical characteristics of the road (curves, hills, depressions, elevations, etc.), receiver location and height, terrain, ground cover type, and, if applicable, barrier type, barrier ground elevation, and barrier top elevation to predict the future noise levels.

For areas adjacent to existing roadways, ambient noise was estimated using TNM 2.5. For comparison, 13 locations were also measured using a Rion NL-21 Integrating Sound-Level Meter and Analyzer. These measurements were taken at several locations near the east and west termini as well as locations along Pekin and Roslyn Roads and neighborhood subdivisions. Table 4.8.1 lists the ambient noise levels at these locations. Exhibits 4.8.1a – 4.8.1d show the location of each measurement location.



**TABLE 4.8.1**  
**AMBIENT NOISE LEVELS**  
(Hourly A-Weighted Sound Level - decibels (dBA))

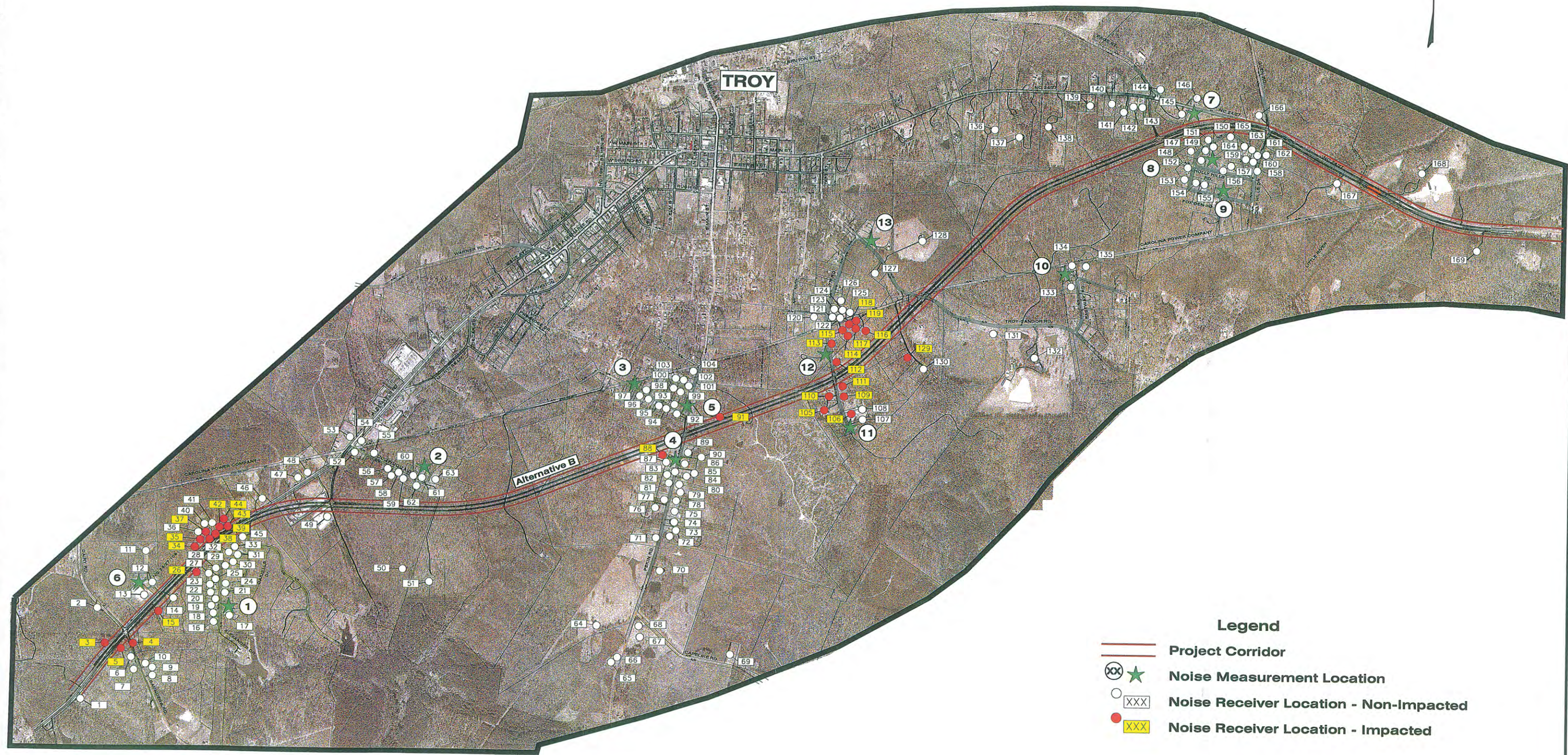
| SITE NO. | LOCATION                              | DISTANCE FROM ROADWAY (ft) | NOISE LEVEL (dBA) |
|----------|---------------------------------------|----------------------------|-------------------|
| 1        | New Covenant Church                   | NA                         | 45.2              |
| 2        | Dogwood Avenue (subdivision)          | NA                         | 64.9              |
| 3        | Springdale Heights Road (subdivision) | NA                         | 44.4              |
| 4        | Pekin Road (west side)                | 25                         | 59.2              |
| 5        | Pekin Road (east side)                | 25                         | 62.0              |
| 6        | NC 24/27 (west end)                   | 25                         | 74.4              |
| 7        | NC 24/27 (east end)                   | 25                         | 74.1              |
| 8        | Fox Den Road (subdivision)            | NA                         | 53.3              |
| 9        | Fox Run Road (subdivision)            | NA                         | 48.7              |
| 10       | Eastway Road (subdivision)            | NA                         | 46.2              |
| 11       | Roslyn Road (east side)               | NA                         | 51.4              |
| 12       | Roslyn Road (west side)               | NA                         | 52.6              |
| 13       | Taft Street                           | 25                         | 63.2              |

The noise predictions made in this report are based on traffic projections for either the base year or design year. Design hour and level-of-service “C” volumes were compared for the proposed design. Noise levels from the TNM model were used to evaluate impacts although the noise levels measured in the field were higher in most cases. There is an unusual amount of logging in the project study area and the high number of logging trucks and logging operations in the background of some sites resulted in higher readings, especially along NC 24/27. Vehicle percentages were adjusted to adequately reflect counted vehicles during the measured time periods on existing NC 24/27 and the proposed bypass.

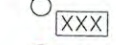
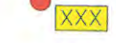
The basic approach involved creating a network of roadways and receivers for both the existing and proposed scenarios. Receivers were assigned to locations of anticipated human activity; primarily to the exterior areas of residences and apartment complexes. To evaluate the receivers, TNM was used to predict design year noise levels and determine potential impacts for both the No-Build and Build scenarios. These scenarios are discussed in the following section.

**Traffic Noise Impact Analysis** – To determine if highway noise levels are compatible with various land uses, the Federal Highway Administration (FHWA) has developed noise abatement criteria and procedures to be used in the planning and design of highways. These abatement criteria and procedures are set forth in accordance with Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, FHWA, Procedures for Abatement of Highway Traffic Noise and Construction Noise.





**Legend**

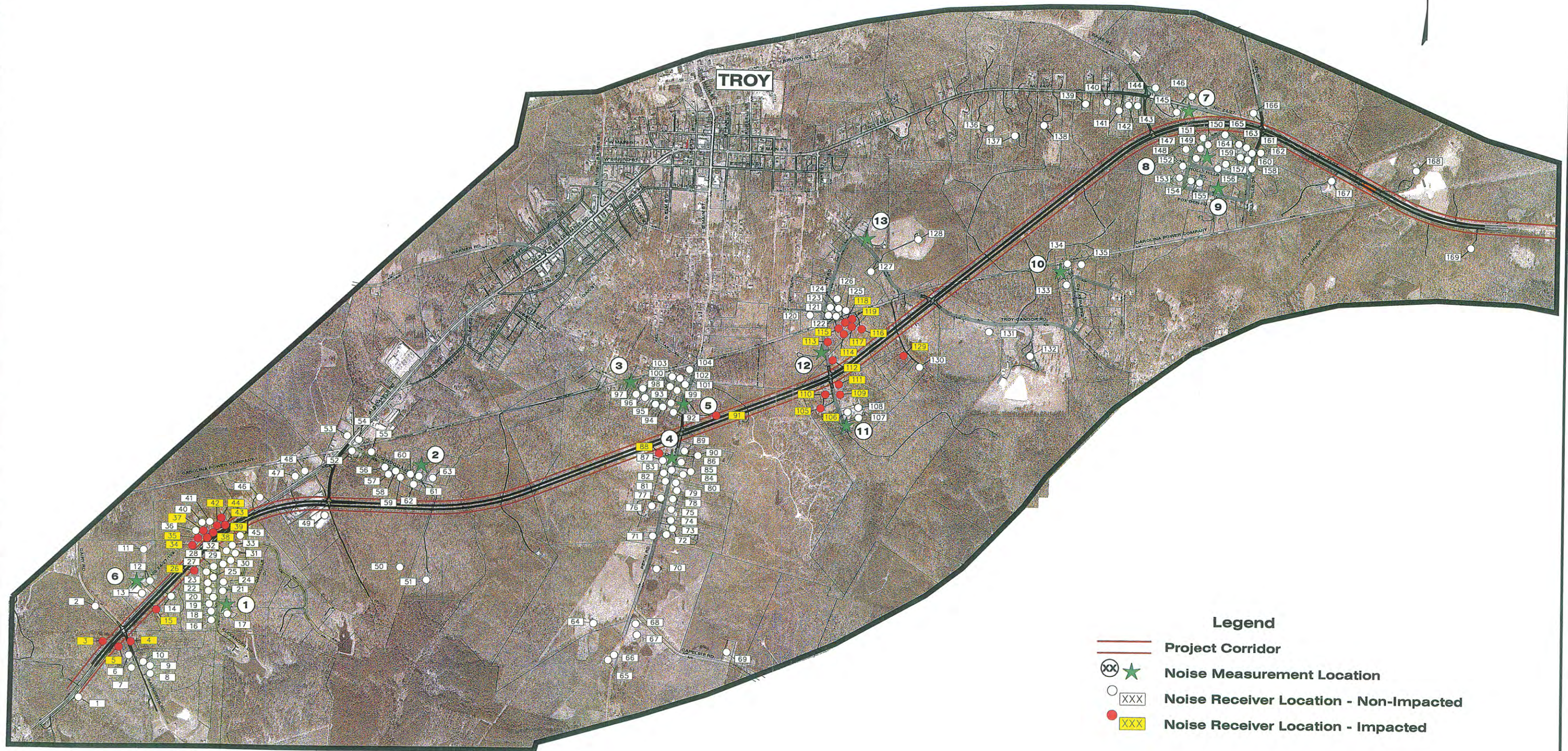
-  Project Corridor
-  Noise Measurement Location
-  Noise Receiver Location - Non-Impacted
-  Noise Receiver Location - Impacted



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Noise Receivers and Associated  
Impacts (Alternative B)  
NTS  
Exhibit 4.8.1a





#### Legend

- Project Corridor
- Noise Measurement Location
- Noise Receiver Location - Non-Impacted
- Noise Receiver Location - Impacted
- Noise Receiver Location - Impacted

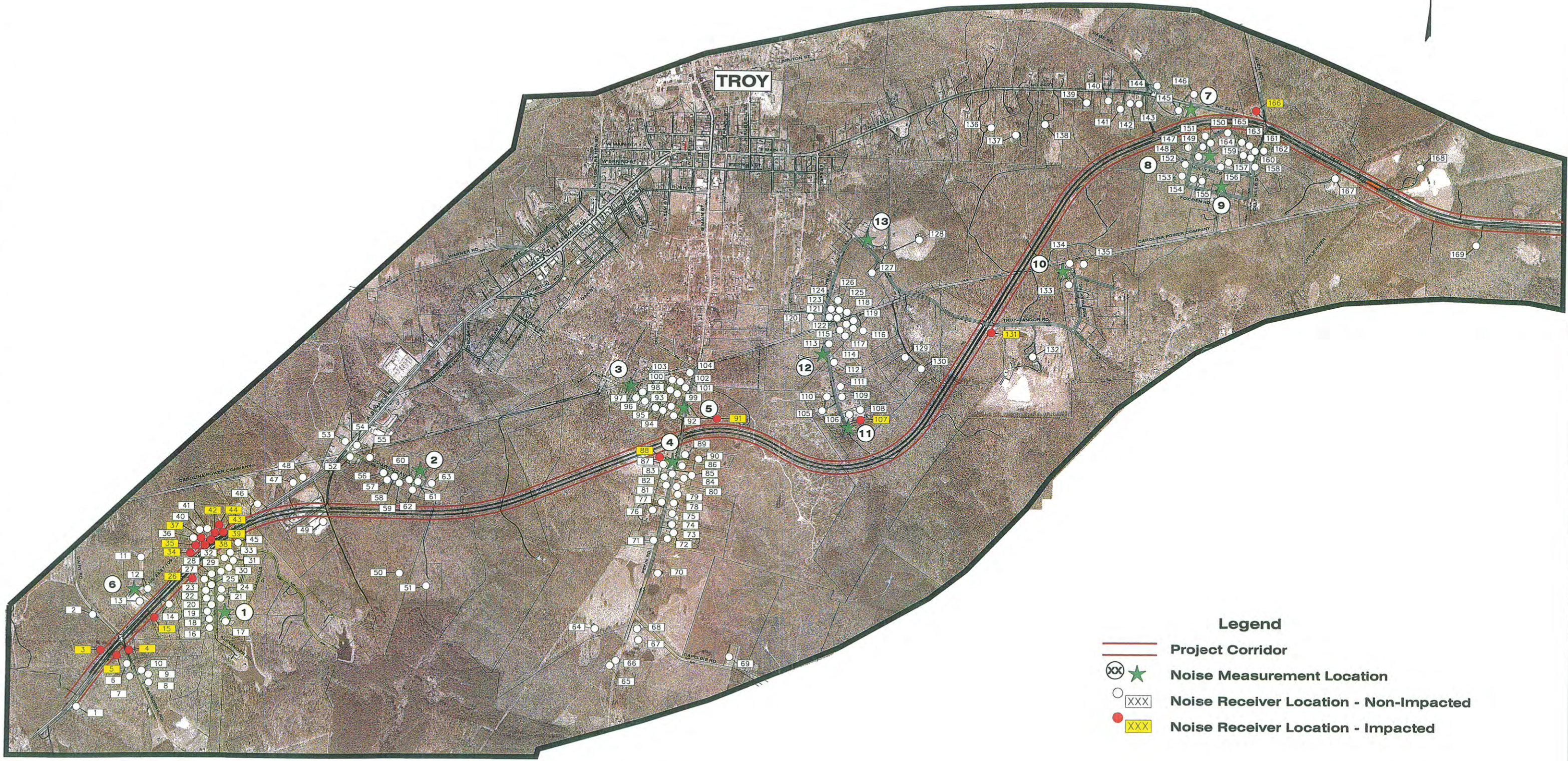


## NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Noise Receivers and Associated  
Impacts (Alternative C)  
NTS  
Exhibit 4.8.1b



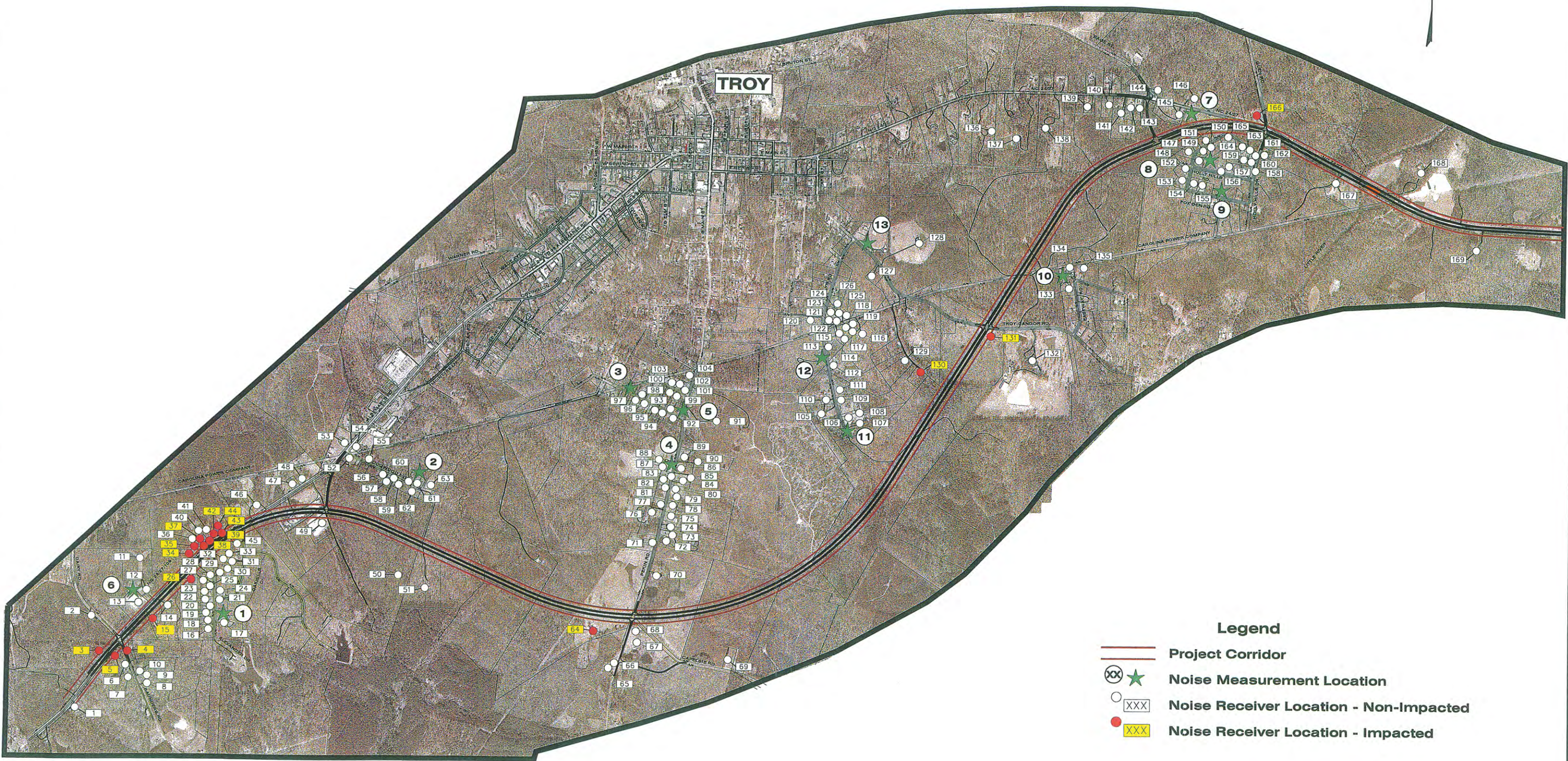


# NC 24/27 Improvements

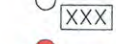
TIP No. R-623  
Montgomery County, North Carolina

Noise Receivers and Associated  
Impacts (Alternative D)  
NTS  
Exhibit 4.8.1c





**Legend**

-  Project Corridor
-  Noise Measurement Location
-  Noise Receiver Location - Non-Impacted
-  Noise Receiver Location - Impacted



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Noise Receivers and Associated  
Impacts (Alternative E)  
NTS  
Exhibit 4.8.1d



A summary of the noise abatement criteria for various land uses is presented in Table 4.8.2. One factor for considering traffic noise mitigation is when future noise levels either approach or exceed the criteria levels for each activity category. Title 23 CFR, Section 772.11a states, "In determining and abating traffic noise impacts, primary consideration is to be given to exterior areas. Abatement will usually be necessary only where frequent human use occurs and a lowered noise level would be of benefit."

The NCDOT Noise Abatement Guidelines state that noise abatement must be considered when either of the following conditions exists:

1. The predicted design year noise levels approach (reach 1 dBA less than) or exceed the FHWA Noise Abatement Criteria (NAC) contained in 23 CFR 772 (see Table 4.8.2), or
2. The predicted design year noise levels approach or exceed those measurements shown for the appropriate activity category, as shown in Table 4.8.2. NCDOT defines "approach" to be within 1 dB A of the Leq(h) value for the activity categories.

Consideration for noise abatement measures can be applied to receivers that fall in either category.

**TABLE 4.8.2**  
**NOISE ABATEMENT CRITERIA**  
(Hourly A-Weighted Sound Level - decibels (dBA))

| ACTIVITY CATEGORY | Leq(h)        | DESCRIPTION OF ACTIVITY CATEGORY                                                                                                                                                                                            |
|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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                 | 67 (Exterior) | Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.                                                                           |
| C                 | 72 (Exterior) | Developed lands, properties, or activities not included in Categories A or B above.                                                                                                                                         |
| D                 | ---           | Undeveloped lands.                                                                                                                                                                                                          |
| E                 | 52 (Interior) | Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.                                                                                                                 |

SOURCE: Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, Federal Highway Administration (FHWA), *Procedures for Abatement of Highway Traffic Noise and Construction Noise*.

Physical measures to abate anticipated traffic noise levels can often be applied with a measurable degree of success by the application of solid mass, attenuable measures to effectively detract, absorb, and reflect highway traffic noise emissions. Solid mass, attenuable measures may include earth berms or artificial abatement walls.

TNM was utilized to determine the number of land uses (by type) which, during the peak hour in the design year, would be considered impacts based on NCDOT guidelines. For the entire project area, 169 Category B land use receivers were analyzed.

**Results** – According to the analysis, it is anticipated that 2030 traffic volumes will result in 17 impacted receivers for the No-Build Alternative, 29 impacts for Alternative B, 29 impacts for Alternative C, 18 impacts for Alternative D, and 17 impacts for Alternative E. Most of these impacts occurred because predicted noise levels meet or exceed the NAC and experience substantial noise level increases.

Table 4.8.3 shows a summary of impacts predicted for each alternative and Table 4.8.4 summarizes the number and degree of noise level increases predicted for each alternative.

**TABLE 4.8.3  
NOISE LEVEL IMPACT SUMMARY**

|          | APPROACH OR<br>EXCEED NAC | SUBSTANTIAL INCREASE<br>VS. EXISTING NOISE<br>LEVELS | TOTAL NUMBER<br>RECEIVER IMPACTS |
|----------|---------------------------|------------------------------------------------------|----------------------------------|
| No-Build | 17                        | 0                                                    | 17                               |
| Alt. B   | 15                        | 16                                                   | 29                               |
| Alt. C   | 15                        | 16                                                   | 29                               |
| Alt. D   | 15                        | 4                                                    | 18                               |
| Alt. E   | 15                        | 3                                                    | 17                               |

NOTE: Total impacts account for those that satisfy both categories.

**TABLE 4.8.4  
NOISE LEVEL INCREASE SUMMARY**  
(Number of receivers per alternative experiencing listed noise level increases)

|          | <1 | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | >15 |
|----------|----|-----|-----|-----|-----|------|-------|-------|-----|
| No-Build | 0  | 36  | 133 | 0   | 0   | 0    | 0     | 0     | 0   |
| Alt. B   | 31 | 27  | 48  | 18  | 5   | 9    | 6     | 9     | 16  |
| Alt. C   | 31 | 26  | 47  | 19  | 7   | 10   | 8     | 5     | 16  |
| Alt. D   | 35 | 21  | 47  | 15  | 24  | 10   | 6     | 7     | 4   |
| Alt. E   | 27 | 38  | 52  | 16  | 17  | 8    | 5     | 3     | 3   |



In an attempt to minimize anticipated noise impacts, the following noise abatement measures were considered:

#### Horizontal and Vertical Alignment

The alternative corridors were designed to maximize distance from existing residential properties to the extent possible in order to minimize potential noise impacts. Further adjustments of the horizontal or vertical alignments would likely impact wetland areas or compromise the design standards. Therefore no further changes to the horizontal or vertical alignments to reduce noise impacts are recommended.

#### Buffer Areas

For the most part, areas between the proposed corridors and existing development are forested due to the amount of undeveloped land within the project study area. Therefore, buffers already exist. New buffer areas are not considered a reasonable noise abatement measure for this project.

#### Traffic Management Measures

Because of the anticipated type of traffic along this road (high percentage of home-to-work trips and regional commercial traffic) and few signalized intersections, traffic management measures are not considered a reasonable noise abatement measure for this project.

#### Insulating Public/Non-Profit Structures

The affected properties are neither non-profit nor public entities.

#### Earth Berms

At this point in the planning process, any locations warranting evaluation of noise abatement barriers were addressed with the evaluation of noise walls. Earth berms could be used in place of, or in combination with, walls if adequate right-of-way exists. Since no walls are recommended for this project, further evaluation of earth berms was not warranted.

#### Noise Walls

For many of the impacted receivers, specifically those along existing NC 24/27, noise walls are not a viable option due to the need to maintain access to existing properties. It should be noted that impacts along these facilities occur with or without the proposed project. Two locations

occurred among the Build Alternatives where impacted receivers are clustered and would not necessarily require an access break in a barrier. These locations, where noise walls were evaluated, are described below:

- Alternative B: A noise wall was evaluated on the north side of the bypass across Roslyn Road with the intent of protecting 8 impacted receivers. In order to provide a barrier with no access break, it would be necessary to cul-de-sac Roslyn Road north of Alternative B. Analysis showed that a noise wall at this location would protect (provide a minimum of 5 dBA reduction) 5 receivers. However the wall, which would range in height from 16 to 20 feet over a distance of 2,220 feet, would result in an estimated cost of \$129,366 per receiver. This cost exceeds the NCDOT threshold of \$35,000 per benefited receiver. Even including an incremental increase of \$500 per receiver per dBA average increase in the predicted exterior noise levels of the impacted receptors of the area ( $\$500 \times 5.4 = \$2,700$ ) did not bring the cost within the NCDOT threshold ( $\$35,000 + \$2,700 = \$37,700$ ). Therefore, a wall at this location is not considered reasonable.
- Alternative C: A noise wall was evaluated on the north side of the bypass across Roslyn Road with the intent of protecting 8 impacted receivers. In order to provide a barrier with no access break, it would be necessary to cul-de-sac Roslyn Road north of Alternative C. Analysis showed that a noise wall at this location would protect (provide a minimum of 5 dBA reduction) 2 receivers. However the wall, which would be 20 feet high over a distance of 3,237 feet, would result in an estimated cost of \$485,565 per receiver. This cost exceeds the NCDOT threshold of \$35,000 per benefited receiver. Even including an incremental increase of \$500 per receiver per dBA average increase in the predicted exterior noise levels of the impacted receptors of the area ( $\$500 \times 5.0 = \$2,500$ ) did not bring the cost within the NCDOT threshold ( $\$35,000 + \$2,500 = \$37,500$ ). Therefore, a wall at this location is not considered reasonable.

**Summary of Potential Noise Impacts** – Potential noise impacts were analyzed for the No-Build scenario and for four Build Alternatives (B, C, D, E). The analysis included 169 receivers and resulted in the number of anticipated impacts based on 2030 traffic projections to range from 17 to 29 impacts depending on the alternative. Noise walls were analyzed in two locations, of which both were found to be unreasonable based on a cost analysis. Alternatives B and C would have the greatest number of impacts, with 29 receivers each affected.

Alternative D would create 18 impacts, and Alternative E would create the least impacts with 17. It should be noted that 17 impacts occur in the No-Build scenario.

## **4.9 NATURAL RESOURCES**

The following paragraphs summarize sections from the *Natural Resources Technical Report*, prepared for the proposed NC 24/27 Improvements (NCDOT, 2004). Indirect and cumulative impacts to natural resources are briefly discussed in Section 4.5 and discussed in detail in the technical report, *Indirect and Cumulative Impact Assessment* (NCDOT, 2006c) prepared for the NC 24/27 Improvements.

### **4.9.1 Biotic Communities**

Living systems described in the following sections include communities of associated plants and animals. These descriptions refer to the dominant flora and fauna in each community and the relationship of these biotic components. Classification of plant communities is based on a system used by the North Carolina Natural Heritage Program (NCNHP) (Schafale and Weakley, 1990). If a community is modified or otherwise disturbed such that it does not fit into a NCNHP classification, it is given a name that best describes current characteristics (e.g., maintained/disturbed). Aquatic community classification is based on the system developed and used by the United States Fish and Wildlife Service (USFWS), as detailed in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979). Scientific nomenclature and common names (when applicable) are used for the plant and animal species described. Subsequent references to the same species include the common name only. Exhibit 4.9.1a shows the natural resources located within and in the vicinity of the project study area.

### **Terrestrial Communities**

Terrestrial communities in the project study area are represented by four major community types: maintained/disturbed, mesic mixed hardwood forest, dry mesic oak hickory forest, and pine plantation. Table 4.9.1 shows the anticipated impacts to the upland natural communities. Terrestrial community types are briefly discussed in the following paragraphs. Exhibit 4.9.1b shows the terrestrial communities in the project study area.

***Maintained/Disturbed Upland Communities:*** Maintained/disturbed areas include roadside shoulders, power line right-of-way, agriculture, and residential and business landscaping. Many plant species are adapted to these disturbed and regularly maintained areas.



**Mesic Mixed Hardwood Forest:** This community is dominated by beech (*Fagus grandifolia*), northern red oak (*Quercus rubra*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*) and sweetgum (*Liquidambar styraciflua*) in the canopy. Dogwood (*Cornus florida*) is a common understory species. Blueberry (*Vaccinium* sp.) is a common shrub species. Poison ivy (*Toxicodendron radicans*) and greenbrier (*Smilax* sp.) also occur in this community.

**TABLE 4.9.1  
UPLAND NATURAL COMMUNITY IMPACTS**

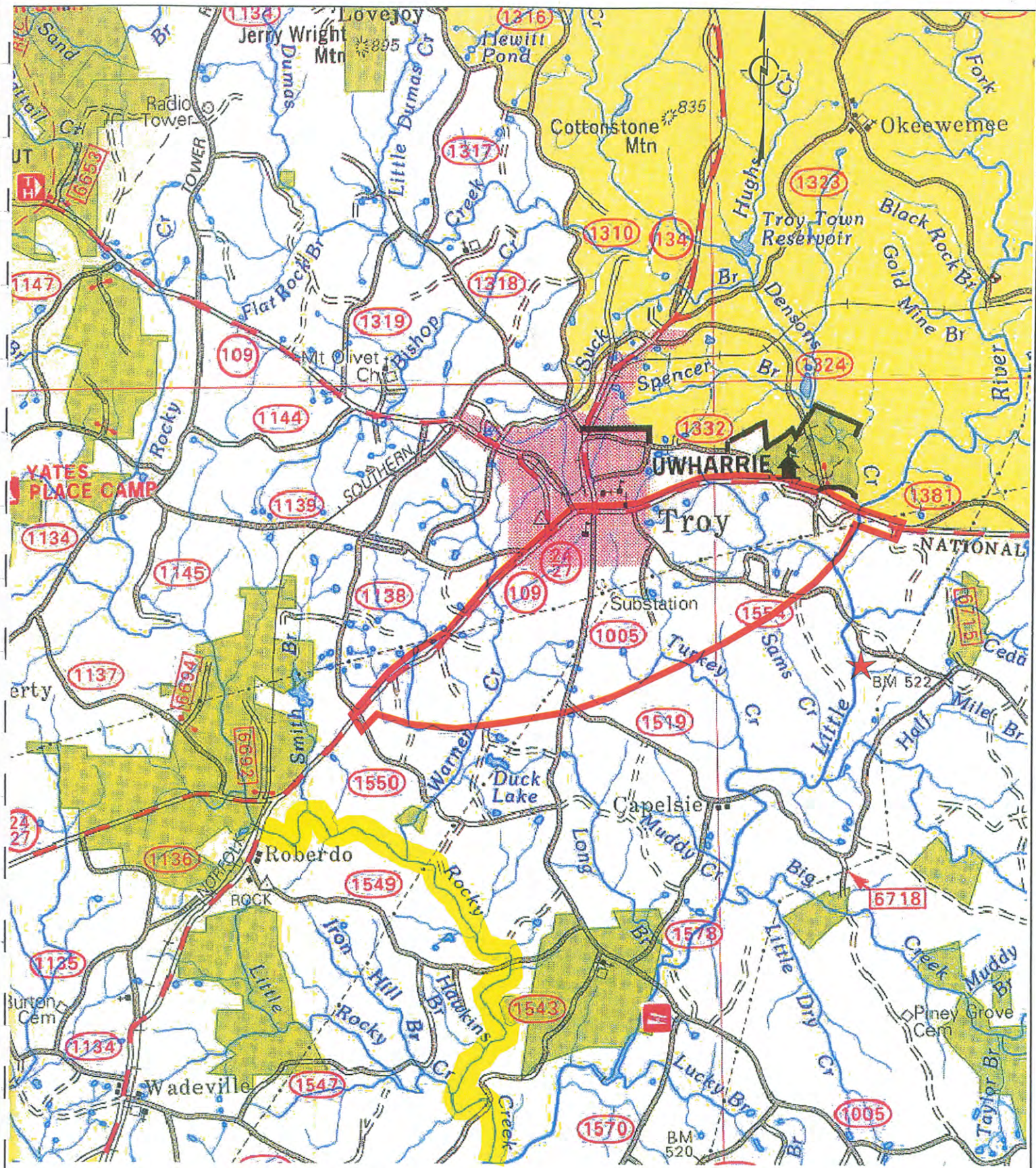
| COMMUNITY DESIGNATION        | IMPACTS PER ALTERNATIVE (ACRES) |              |              |              |
|------------------------------|---------------------------------|--------------|--------------|--------------|
|                              | B                               | C            | D            | E            |
| Maintained/Disturbed         | 69.1                            | 98.3         | 102.7        | 91.2         |
| Mesic Mixed Hardwood Forest  | 51.7                            | 62.9         | 69.5         | 75.6         |
| Dry Mesic Oak Hickory Forest | 26.2                            | 15.0         | 10.4         | 10.4         |
| Pine Plantation              | 1.3                             | 4.7          | 6.8          | 18.3         |
| <b>TOTAL</b>                 | <b>148.3</b>                    | <b>180.9</b> | <b>189.4</b> | <b>195.5</b> |

NOTES: Impact estimates based on right-of-way of each alternative. Natural communities determined from aerial photography, USGS topographic mapping, and field truthing.

**Dry Mesic Oak Hickory Forest:** This community occurs in the topographic moisture gradient between Dry Oak Hickory Forest and Mesic Mixed Hardwoods. This community is dominated by mixtures of oaks and hickories, with white oak being the predominant species. Other species include northern red oak, black oak (*Quercus velutina*), mockernut hickory (*Carya alba*), red hickory (*Carya ovalis*) and pignut hickory (*Carya glabra*). *Pinus* species, tulip poplar and sweetgum are also common. Understory species include red maple, dogwood, American holly (*Ilex opaca*), sourwood (*Oxydendrum arboreum*), and black gum (*Nyssa sylvatica*). Shrubs include downy arrowwood (*Viburnum rafinesquianum*), deerberry (*Vaccinium stamineum*), lowbush blueberry (*Vaccinium pallidum*), and American strawberry bush (*Euvonymus americana*). Poison ivy and greenbrier also occur in this community. Some of these areas have been clear-cut in the past, increasing the amount of pine and weedy hardwoods such as red maple and sweetgum.

**Pine Plantation:** Pine plantations are located in several areas within the project study area. The majority of these areas are not currently being managed for timber, however there are some managed Christmas tree farms. The sites are generally planted with loblolly pine (*Pinus taeda*) and short-leaf pine (*Pinus echinata*). Some areas contain hardwood saplings in the





LEGEND

Uwharrie National Forest Land
  Study Area Boundary
  Streams
  High Quality Waters
  Natural Heritage Element



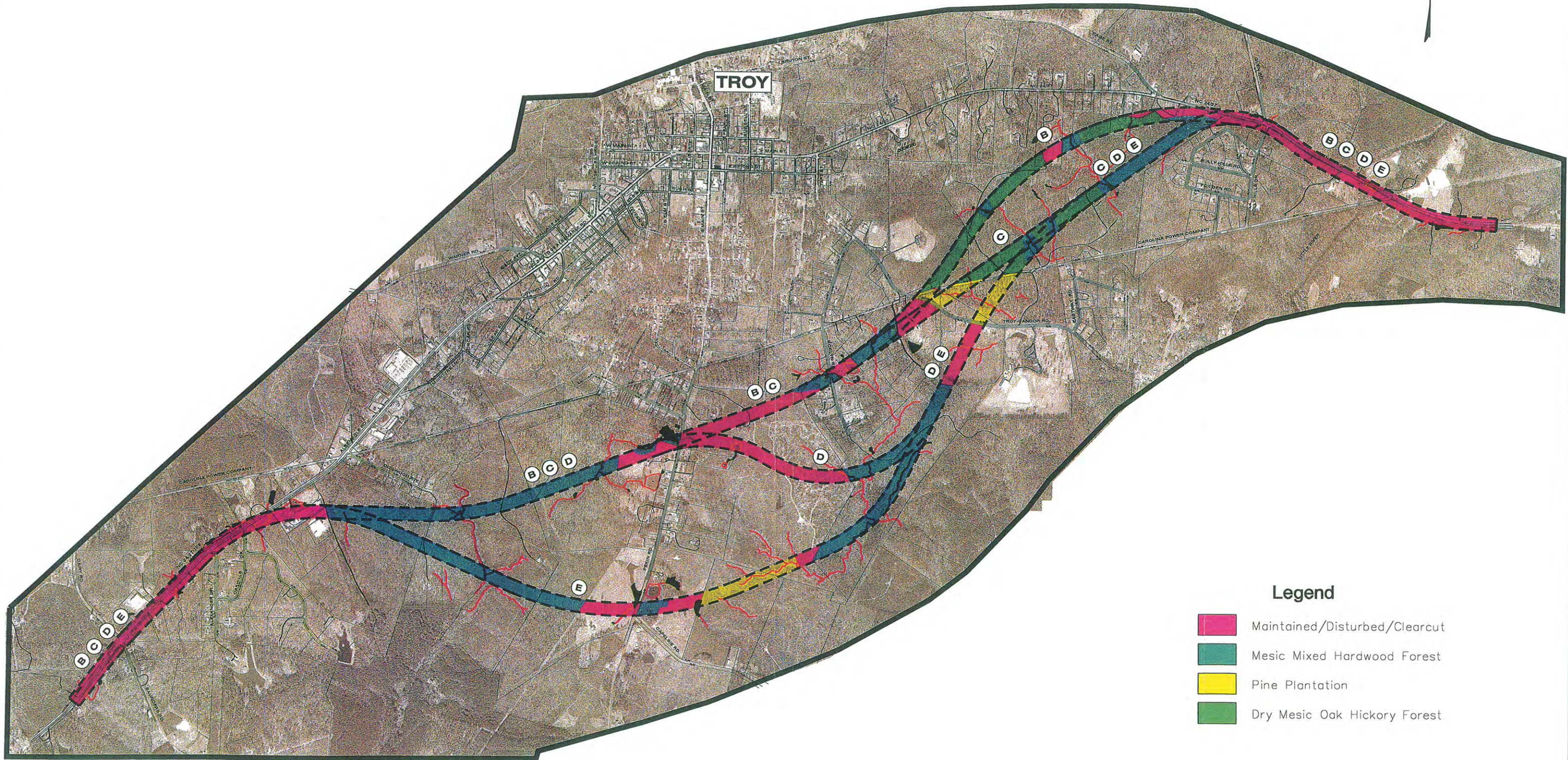
# **NC 24/27 Improvements**

TIP No. R-623

Montgomery County, North Carolina

Natural  
 Resources  
 NTS  
 Exhibit 4.9.1a





**Legend**

- Maintained/Disturbed/Clearcut
- Mesic Mixed Hardwood Forest
- Pine Plantation
- Dry Mesic Oak Hickory Forest

**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Terrestrial  
Communities  
NTS  
Exhibit 4.9.1b





understory such as red maple, sweetgum, and white oak. These areas also have sparse understory and shrub layers.

**Wildlife** – A combination of open, developed land, edge habitat and intact forests along stream drainages provide ample habitat to support viable populations of common wildlife species. Wildlife observations were made in conjunction with the investigation of biotic communities. In addition to observed species, the wildlife assessment was made considering species common to the existing habitats within the project study area. During field surveys, evidence of and direct sightings of animal species were recorded. These species are identified in the following paragraphs with an asterisk.

Resident roadside fauna is limited by continual habitat disturbance and consists mainly of small animals. Species such as eastern harvest mouse (*Reithrodontomys humulis*) and white-footed mouse (*Peromyscus leucopus*) have shown to be more abundant in roadside right-of-ways than in adjacent habitats. Insects, earthworms, and other invertebrates are also abundant in roadside habitats. Roadsides are utilized primarily as a travel corridor between other habitats, or as a foraging zone for species of adjacent woodlands. Foraging opportunities offered by roadside habitats include seeds, fruits and insects, as well as other small animals (rodents, etc.). Eastern box turtles\* (*Terrapene carolina*), American toads\* (*Bufo americanus*), bullfrogs (*Rana catesbeiana*), gray treefrogs (*Hyla versicolor*) and five-lined skinks\* (*Eumeces fasciatus*), also frequent disturbed or open areas dominated by herbaceous vegetation, which provide foraging and nesting habitat. Snakes such as the black racer\* (*Coluber constrictor*) and eastern garter\* (*Thamnophis sirtalis*) may enter these habitats to feed on small mammals and insects.

Mammals commonly found in the region include the hispid cotton rat (*Sigmodon hispidus*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), least shrew (*Cryptotis parva*), and eastern mole (*Scalopus aquaticus*). Eastern harvest mouse, golden mouse (*Peromyscus nuttalli*), eastern mole (*Scalopus aquaticus*), meadow vole (*Microtus pennsylvanicus*) and Eastern grey squirrels\* (*Sciurus carolinensis*) are common inhabitants. The Virginia opossum (*Didelphis virginiana*), raccoon\* (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), eastern cottontail (*Sylvilagus floridanus*), and white-tailed deer\* (*Odocoileus virginianus*) are also common.

During the field survey, signs of white-tailed deer, raccoons, moles (*Scalopus aquaticus*), and gray squirrels were observed in numerous locations. Eastern phoebe\* (*Sayornis phoebe*), mourning dove\* (*Zenaida macroura*), house sparrow\* (*Passer domesticus*), Eastern bluebird\* (*Sialia sialis*), brown thrasher\* (*Toxostoma rufum*), Northern cardinal\* (*Cardinalis cardinalis*), American robin\* (*Turdus migratorius*), downy woodpecker\* (*Picoides pubescens*), and turkey vulture (*Cathartes aura*) were observed during the site visits. Avian predator species likely to occur in the project study area include the eastern screech-owl (*Otus asio*), red-shoulder hawk\* (*Buteo lineatus*), and red-tailed hawk (*Buteo jamaicensis*).

**Aquatic Communities** – The streams in the project study area include Warner Creek, Turkey Creek, Little River and unnamed tributaries to the aforementioned streams. Fish species that are likely to be found in the creeks in the project study area include bluehead chub (*Nocomis leptocephalus*), rosieside dace (*Clinostomus funduloides*), mottled sculpin (*Cottus bairdi*), and blacknose dace (*Rhinichthys atratulus*). Substrate elements (e.g., leaves, sticks, gravel etc) were visually inspected for evidence of invertebrates. Pollution sensitive species, such as mayflies (Ephemeroptera), stoneflies (Plecoptera) and caddisflies (Tricoptera) were present in many of the streams in the project study area. A number of unidentified minnows were observed in many of the perennial streams along with the three-lined salamander (*Eurycea guttolineata*), pickerel frog (*Rana palustris*), northern dusky salamander (*Desmognathus fuscus*) and the northern water snake (*Nerodia sipedon*).

**Summary of Impacts to Biotic Resources** – Loss of habitat is the primary impact to biotic communities in the project study area. Biotic community impacts resulting from project construction are addressed in subsequent paragraphs.

As shown in Table 4.9.1, the Mesic Mixed Hardwood Forest, Dry Mesic Oak Hickory Forest, Maintained/Disturbed and Pine Plantation communities would be affected by the proposed project. The Mesic Mixed Hardwood Forest and the Dry Mesic Oak Hickory Forest serve as nesting, foraging, and shelter habitat for fauna. The primary impact to upland communities is the loss of riparian habitat and forest fragmentation. Project construction would result in direct loss of nesting, foraging and shelter habitat and render portions of the remaining habitat less suitable for many species due to roadway noise and fragmentation.

Effects on resident wildlife from the project may include roadkills, habitat destruction, forest fragmentation, edge effects, exotic species invasions, interruption of natural wildlife travel corridors and pollution. Impacts to wildlife resources are typically proportional to impacts to forested areas particularly large, contiguous land tracts that provide nesting and foraging habitat. Since the alternatives are predominantly on new location, the construction would fragment natural communities and render portions of the remaining habitat less suitable for many species due to roadway noise and fragmentation.

Impacts to aquatic communities may result from the placement of bridges or culverts and the physical disturbance of the aquatic habitat. Activities such as tree removal, grubbing, as well as the construction of bridge and approach work will likely result in an increase in sediment loads and water temperatures and a decrease in dissolved oxygen. Construction activities can also increase the possibility of toxins, such as engine fluids and particulate matter, entering the waterways. The combination of these factors can potentially cause the displacement and mortality of fish and local populations of invertebrates, which inhabit these areas.

#### **4.9.2 Physiography and Soils**

**Topography** – The project site lies within the Carolina Slate Belt of the Piedmont Physiographic Province, which is characterized by felsic metavolcanic rock. The general topography of the Piedmont is characterized by gently sloping hills, interrupted by floodplains with gently sloping to steeply sloping sides and includes some relatively low mountains including the South Mountain and the Uwharrie Mountains. Elevations in the project vicinity range from approximately 400 to 690 feet above mean sea level (msl). The elevation in the project study area varies from approximately 450 to 690 feet above msl.

**Soils** – Soils associated with the fine-grained rocks of the Carolina Slate Belt comprise about 12% of soils that have been mapped in the Piedmont. Major soils include Badin, Georgeville, Herndon, Mayodan, Nason, and Tatum. Within the Carolina Slate Belt, interfluvial areas are irregular, and sharp topographic breaks are common. Deep soils generally occupy more gently sloping parts of the region, and shallow soils occur on convex parts of the landscape. Valley sides are short (Daniels et al., 1984). The fine grain size of the rocks associated with the Carolina Slate Belt results in soils with higher silt and very fine sand contents than the rest of the Piedmont.

The most current soil survey available for Montgomery County was conducted in 1930. The county is currently being re-surveyed and soil sheets are available for portions of the county that have been mapped. At the time this document was prepared, the initial mapping for the project



study area had been done, however, an up dated soil survey has not been published. Therefore, available draft soils mapping and the 1930 soil survey data was used for this analysis. Soil series found within the project study area are detailed in the following paragraphs. Individual soil map units are shown in Exhibit 4.9.2 and described in Table 4.9.2.

**TABLE 4.9.2  
DESCRIPTION OF SOIL SERIES**

| SOIL SERIES | DESCRIPTION                                                                                                                                                                                                                                                                                                     |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Herndon     | Found in gently sloping to moderately steep Piedmont Uplands. Slope gradients generally are 2 to 15 percent but range up to 25 percent. The soil texture ranges from very fine sandy loam to gravelly silty loam.                                                                                               |
| Georgeville | Very deep, moderately permeable soils found on gently sloping to moderately steep Piedmont uplands. Slopes are generally 6 to 12 percent but range from 2 to 30 percent. The Georgeville silty clay loam ranks high as an agricultural soil and is one of the county's best soils for wheat and corn production |
| Orange      | Deep and somewhat poorly to moderately well drained. They are found on nearly level to strongly sloping uplands of the southern Piedmont with slopes ranging from 0 to 15 percent.                                                                                                                              |
| Congaree    | Deep, well to moderately well drained, moderately permeable loamy soils with slopes ranging from 0 to 4 percent. These soils are found on flood plains or at the base of slopes. The Congaree silt loam is one of the county's most fertile and productive soils, with corn and hay as the principle crops.     |

SOURCE: US Department of Agriculture (USDA). Draft Soil Mapping for Montgomery County. Soil Conservation Service.

The Herndon silt loam series are the most prevalent soils within the project study area and consist of very deep, well-drained, moderately permeable soils that formed in material weathered from fine-grained metavolcanic rock of the Carolina Slate Belt. The soil series described in Table 4.9.2 are not classified as hydric [wetland] soils (USDA, 1989). Some of the soils previously described are classified as prime, unique, or statewide important farmlands. Herndon silt loam (2-8% slopes) and Georgeville silt loam (2-8% slopes) are classified as prime farmland. Herndon silt loam (8-15% slopes) soils are classified as statewide important farmland.

#### **4.9.3 Wetlands**

Surface waters and wetlands fall under the broad category of "Waters of the United States" as defined in Title 33 of the Code of Federal Regulations (CFR) Part 328.3, 1987 Guidelines. Wetlands are found in the transitional zone between terrestrial and aquatic habitats and are influenced to varying degrees by both. Wetlands are areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically

adapted to life in saturated conditions. Any action that proposes to fill into these areas falls under the jurisdiction of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act. Wetland delineations were conducted in July and August 2003 using methods outlined in the 1987 Corps of Engineers Wetlands Delineation Manual (USACE, 1987). The delineated wetland community types found within the project study area includes headwater forest, wet seep and Piedmont bottomland hardwood forest. Additionally, there were several naturalized, man-made, open-water ponds that had wetlands associated with them.

Delineated wetlands are shown in Exhibits 4.9.3a – 4.9.3f. Table 4.9.3 shows the anticipated impacts to each wetland community type for each of the Build Alternatives. The USACE Jurisdictional Determination is included in Appendix A.4. The wetland communities are described in further detail in the following paragraphs.

**Headwater Forest:** Within the project study area, the headwater forest community type is generally associated with the floodplains of small streams. Typical vegetation includes sweetgum, tulip poplar, red maple, tag alder (*Alnus serrulata*), cinnamon fern (*Osmunda cinnamomea*), Virginia chain fern (*Woodwardia virginica*) and netted chain fern (*Woodwardia areolata*).

**TABLE 4.9.3  
WETLAND IMPACTS**

| ID | Plant Community <sup>1</sup> | Soil Series | Wetland Classif. <sup>2,3</sup> | Wetland Rating Score <sup>4</sup> | Total Area of Wetland (ac) | Impacts Per Alternative <sup>5</sup> |       |      |      |
|----|------------------------------|-------------|---------------------------------|-----------------------------------|----------------------------|--------------------------------------|-------|------|------|
|    |                              |             |                                 |                                   |                            | B                                    | C     | D    | E    |
| 1  | Seep                         | Herndon     | PF01A                           | 37                                | 0.09                       | --                                   | --    | --   | --   |
| 2  | Seep                         | Herndon     | PF01A                           | 37                                | 0.09                       | --                                   | --    | --   | --   |
| 3  | Bottomland Hardwood          | Herndon     | PF01A                           | 38                                | 0.09                       | --                                   | --    | --   | --   |
| 4  | Disturbed                    | Herndon     | PF01A                           | 19                                | 0.05                       | --                                   | --    | --   | --   |
| 5  | Seep                         | Herndon     | PF01A                           | 57                                | 0.07                       | 0.02                                 | 0.02  | 0.02 | 0.02 |
| 6  | Seep                         | Herndon     | PF01A                           | 57                                | 0.05                       | --                                   | --    | --   | --   |
| 7  | Seep                         | Herndon     | PF01A                           | 53                                | 0.01                       | --                                   | --    | --   | --   |
| 8  | Disturbed                    | Herndon     | PF01Ad                          | 49                                | 0.01                       | 0.01                                 | 0.01  | 0.01 | 0.01 |
| 9a | Seep                         | Herndon     | PF01Ad                          | 53                                | 0.03                       | 0.05                                 | 0.05  | 0.05 | 0.05 |
| 9b | Seep                         | Herndon     | PF01A                           | 53                                | 0.05                       | --                                   | --    | --   | --   |
| 10 | Seep                         | Herndon     | PF01A                           | 15                                | 0.02                       | 0.01                                 | 0.01  | --   | --   |
| 11 | Seep                         | Herndon     | PUBHh <sup>2</sup>              | 53                                | 0.04                       | 0.002                                | 0.002 | 0.01 | 0.02 |
| 12 | Bottomland Hardwood          | Herndon     | PUBHh <sup>2</sup>              | 61                                | 0.43                       | --                                   | --    | --   | --   |
| 13 | Wetland around pond          | Herndon     | PUBHh <sup>3</sup>              | 31                                | 0.04                       | --                                   | --    | --   | --   |
| 14 | Seep                         | Herndon     | PF01A <sup>3</sup>              | 41                                | 0.01                       | --                                   | --    | --   | --   |
| 15 | Seep                         | Herndon     | PF01A <sup>3</sup>              | 36                                | 0.02                       | --                                   | --    | --   | --   |
| 16 | Headwater                    | Herndon     | PF01A <sup>3</sup>              | 57                                | 0.09                       | --                                   | --    | --   | --   |

**TABLE 4.9.3 (cont.)  
WETLAND IMPACTS**

| ID            | Plant Community <sup>1</sup> | Soil Series      | Wetland Classification <sup>2</sup> | Wetland Rating Score <sup>3</sup> | Total Area of Wetland (ac) | Impacts Per Alternative <sup>3</sup> |             |             |             |
|---------------|------------------------------|------------------|-------------------------------------|-----------------------------------|----------------------------|--------------------------------------|-------------|-------------|-------------|
|               |                              |                  |                                     |                                   |                            | B                                    | C           | D           | E           |
| 17            | Seep                         | Herndon          | PF01A <sup>3</sup>                  | 57                                | 0.05                       | --                                   | --          | --          | --          |
| 18            | Seep                         | Herndon          | PF01A <sup>3</sup>                  | 41                                | 0.01                       | --                                   | --          | --          | --          |
| 19            | Headwater                    | Herndon          | PUBHh <sup>3</sup>                  | 33                                | 0.03                       | --                                   | --          | --          | --          |
| 20            | Seep                         | Herndon          | PUBHh <sup>2</sup>                  | 36                                | 0.10                       | 0.001                                | 0.001       | 0.004       | --          |
| 21            | Headwater                    | Herndon          | PUBHh <sup>3</sup>                  | 46                                | 0.26                       | 0.005                                | 0.005       | 0.13        | --          |
| 22            | Wetland around pond          | Herndon          | PUBHh <sup>2</sup>                  | 72                                | 0.84                       | 0.49                                 | 0.48        | 0.35        | --          |
| 23            | Seep (assoc. with pond)      | Herndon          | PUBHh <sup>3</sup>                  | 25                                | 0.07                       | --                                   | --          | --          | --          |
| 24            | Headwater (very disturbed)   | Herndon          | PF01Ad <sup>3</sup>                 | 17                                | 0.02                       | --                                   | --          | --          | --          |
| 25            | Wetland around pond          | Herndon          | PUBHh <sup>2</sup>                  | 22                                | 0.83                       | --                                   | --          | --          | --          |
| 26            | Seep                         | Herndon          | PUBHh <sup>2</sup>                  | 27                                | 0.02                       | --                                   | --          | --          | --          |
| 27            | Headwater                    | Herndon          | PUBHh <sup>3</sup>                  | 27                                | 0.73                       | --                                   | --          | --          | --          |
| 28            | Headwater                    | Herndon          | PF01A <sup>3</sup>                  | 28                                | 0.61                       | --                                   | --          | --          | 0.33        |
| 29            | Wetland around pond          | Herndon          | PUBHh <sup>2</sup>                  | 28                                | 0.22                       | --                                   | --          | --          | --          |
| 30            | Wetland around pond          | Herndon          | PUBHh <sup>2</sup>                  | 28                                | 0.27                       | --                                   | --          | --          | --          |
| 31            | Headwater                    | Herndon          | PF01A <sup>3</sup>                  | 47                                | 0.01                       | --                                   | --          | --          | --          |
| 32            | Bottomland Hardwood          | Callison-Secrest | PF01A <sup>3</sup>                  | 58                                | 0.11                       | --                                   | --          | --          | --          |
| 33            | Headwater                    | Herndon          | PF01A <sup>3</sup>                  | 39                                | 0.06                       | --                                   | --          | --          | --          |
| 34            | Seep                         | Herndon          | PF01A <sup>3</sup>                  | 54                                | 0.11                       | --                                   | --          | --          | --          |
| 35            | Seep                         | Herndon          | PF01A <sup>3</sup>                  | 54                                | 0.01                       | --                                   | --          | --          | --          |
| 36            | Seep                         | Herndon          | PF01A <sup>3</sup>                  | 54                                | 0.09                       | 0.06                                 | 0.04        | --          | --          |
| 37            | Headwater above pond         | Georgeville      | PUBHh <sup>2</sup>                  | 33                                | 0.30                       | --                                   | --          | --          | --          |
| 38            | Seep                         | Georgeville      | PF01A <sup>3</sup>                  | 54                                | 0.12                       | --                                   | --          | --          | --          |
| 39            | Wetland around pond          | Herndon          | PF01A <sup>3</sup>                  | 32                                | 0.31                       | --                                   | --          | --          | --          |
| 40            | Seep                         | Callison-Secrest | PF01A <sup>3</sup>                  | 49                                | 0.04                       | --                                   | --          | --          | --          |
| 41            | Wetland around pond          | Herndon          | PUBHh <sup>3</sup>                  | 34                                | 0.10                       | --                                   | --          | --          | --          |
| 42            | Bottomland Hardwood          | Georgeville      | PF01A <sup>3</sup>                  | 56                                | 0.04                       | --                                   | --          | --          | --          |
| 43            | Seep                         | Herndon          | PF01A <sup>3</sup>                  | 45                                | 0.02                       | --                                   | --          | --          | --          |
| 44            | Seep                         | Herndon          | PF01A <sup>3</sup>                  | 45                                | 0.19                       | --                                   | --          | --          | --          |
| 45            | Headwater                    | Herndon          | PF01A <sup>2</sup>                  | 42                                | 0.07                       | 0.04                                 | --          | --          | --          |
| 46            | Headwater                    | Herndon          | PF01A <sup>2</sup>                  | 42                                | 0.03                       | 0.03                                 | --          | --          | --          |
| 47            | Headwater                    | Herndon          | PF01A2                              | 41                                | 0.18                       | --                                   | --          | --          | --          |
| 48            | Bottomland Hardwood          | Herndon          | PF01A <sup>2</sup>                  | 45                                | 0.13                       | --                                   | --          | --          | --          |
| 49            | Bottomland Hardwood          | Herndon          | PF01A <sup>3</sup>                  | 37                                | 0.03                       | --                                   | --          | --          | --          |
| 50            | Bottomland Hardwood          | Herndon          | PF01A <sup>3</sup>                  | 23                                | 0.05                       | 0.05                                 | 0.05        | 0.05        | 0.05        |
| 51            | Seep (disturbed)             | Herndon          | PF01Ad <sup>3</sup>                 | 20                                | 0.33                       | --                                   | --          | --          | --          |
| <b>TOTALS</b> |                              |                  |                                     |                                   |                            | <b>0.75</b>                          | <b>0.66</b> | <b>0.62</b> | <b>0.47</b> |

NOTES: Impacts based on wetland delineations, surveyed wetland boundaries and aerial photography.

1 As defined in Shafale, M.P. and A.S. Weakly (1990).

2 As identified on National Wetland Inventory Mapping (USFWS, 2003) and defined in Cowardin et al. (1979). PUBHh denotes farm or golf course ponds that are irregular in outline, located near the headwaters of small drainages where the flow of water has been obstructed by human-made dams. The lower case "h" modifier is applied to upstream wetlands that are affected by impoundment. PFO1A denotes bottomland forests in the mountains and piedmont where the streamflow is moderate and alluvium is fairly well-drained (NCDENR, 1988).

3 Wetlands without a Cowardin designation were classified in general accordance with Cowardin et al. (1979). Wetlands were evaluated based on vegetation, visible hydrology, and geography.

4 Source: NCDWQ Wetland Rating Worksheet. (Generally, a score of 0-33 = low quality wetlands, 33-66 = medium quality wetlands, > 66 = high quality wetlands.)

5 Estimate of impacts based on construction limits plus 10 feet.









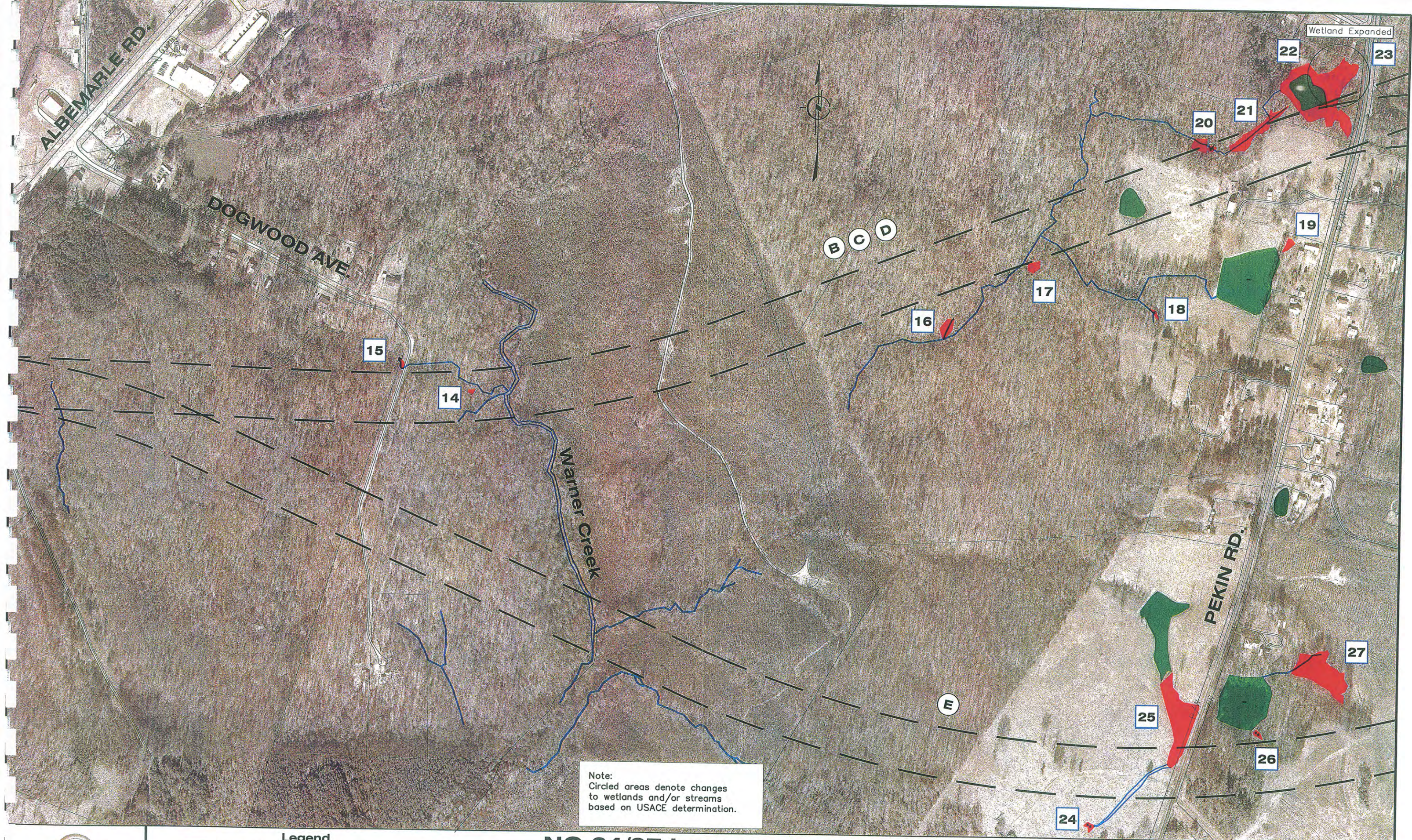
**Legend**

|  |                     |  |                   |
|--|---------------------|--|-------------------|
|  | Delineated Wetlands |  | Project Corridors |
|  | Delineated Streams  |  |                   |
|  | Ponds               |  |                   |

**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Delineated Wetlands  
NTS  
Exhibit 4.9.3a



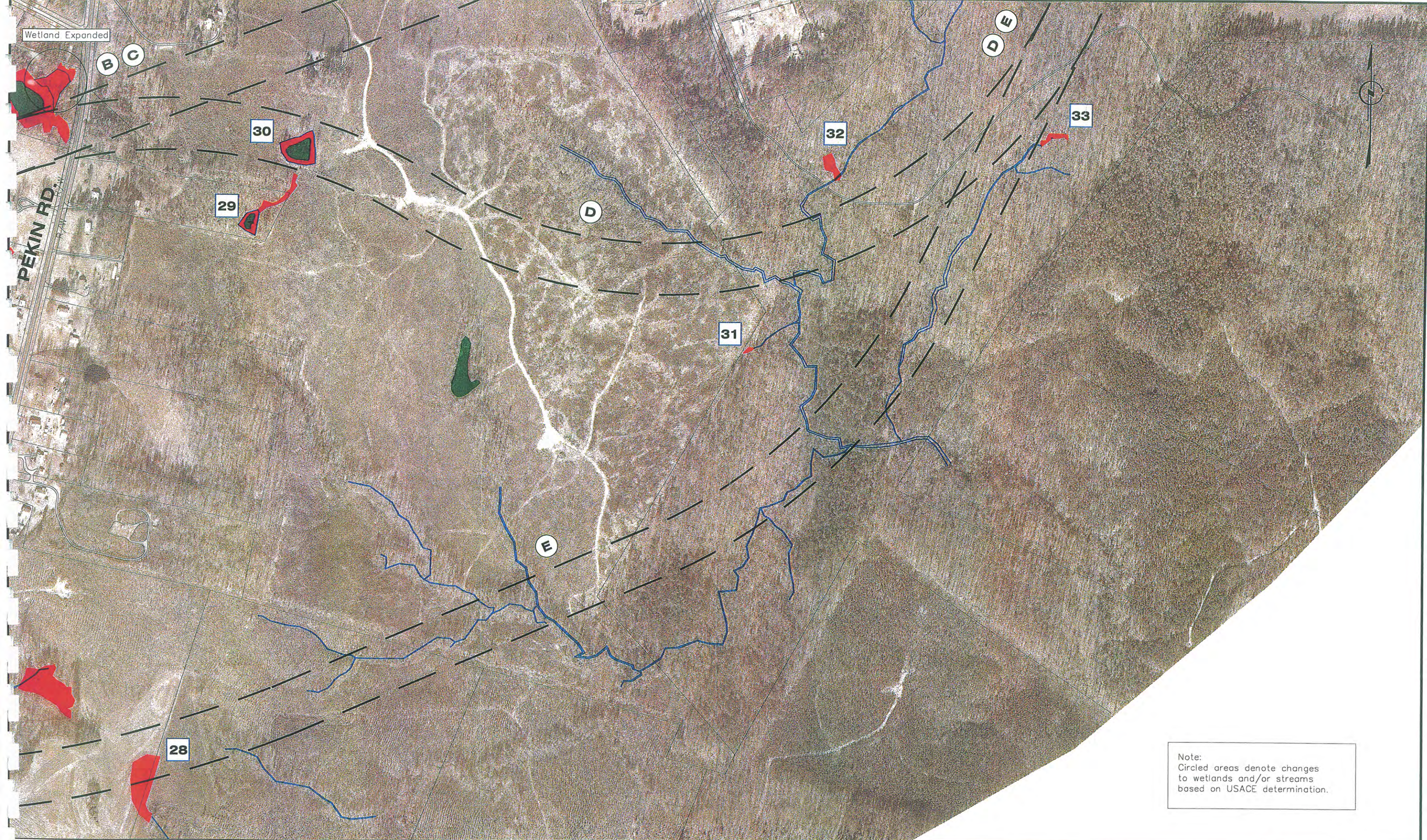


- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors

**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Delineated Wetlands  
NTS  
Exhibit 4.9.3b





Wetland Expanded

PEKIN RD.

Note:  
Circled areas denote changes  
to wetlands and/or streams  
based on USACE determination.



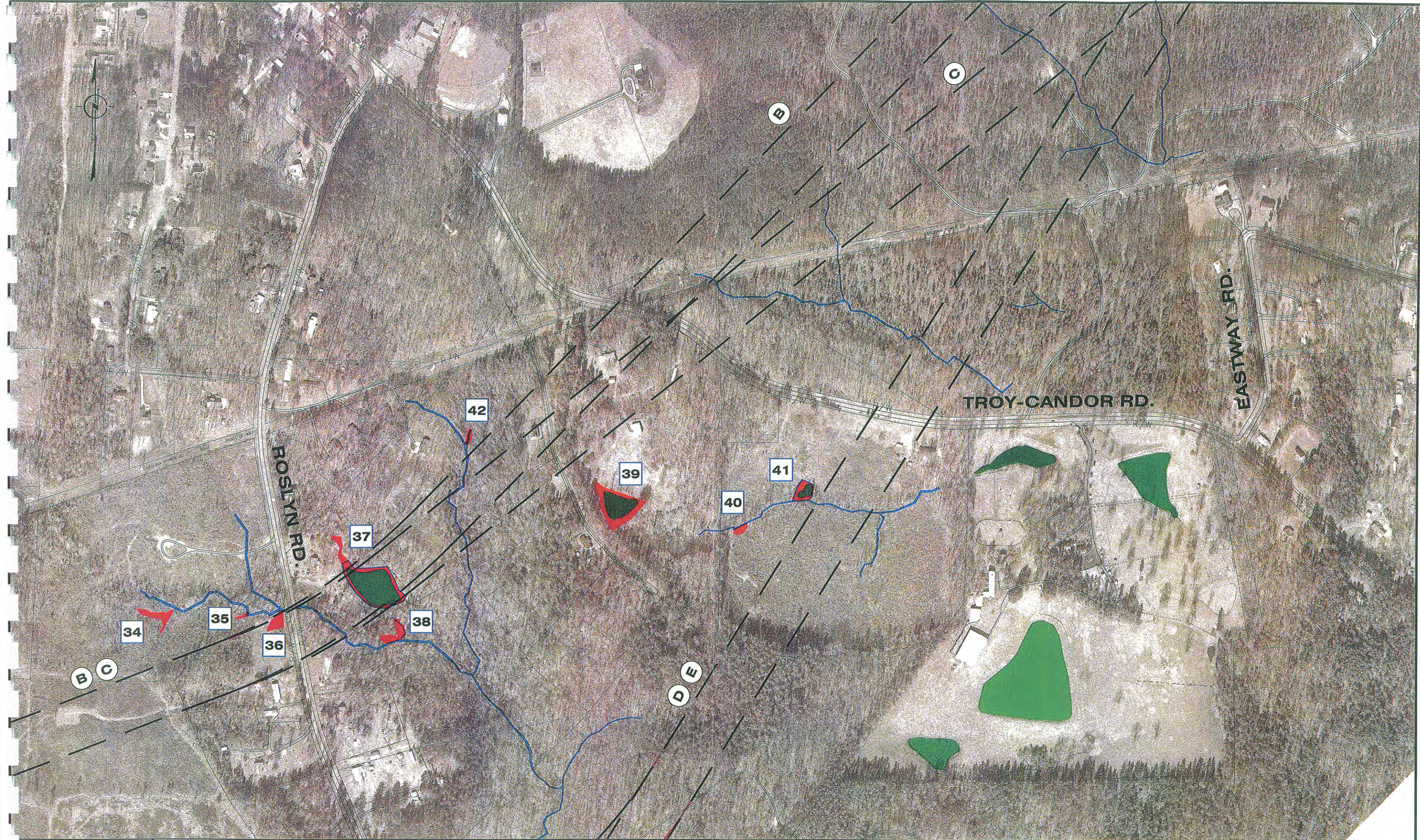
- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors

# NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Delineated Wetlands  
NTS  
Exhibit 4.9.3c





- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors

**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Delineated Wetlands  
NTS  
Exhibit 4.9.3d





**Legend**

|                                                                                     |                     |                                                                                     |                   |
|-------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------|-------------------|
|  | Delineated Wetlands |  | Project Corridors |
|  | Delineated Streams  |                                                                                     |                   |
|  | Ponds               |                                                                                     |                   |

## NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Delineated Wetlands  
NTS  
Exhibit 4.9.3e





- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors

## NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Delineated Wetlands  
NTS  
Exhibit 4.9.3f



**Wet Seep:** Seeps generally occur where the ground water intersects the surface and usually occur at the base of slopes, but they may also occur on the edge of other types of wetlands. The hydrology in these wetlands depends on the size of the watershed that supplies water to them. Within the project study area, these wetlands exist as small areas in moist forests near streams.

Typical vegetation varies and can be similar to that in adjacent wetlands. Within the project study area, typical vegetation in these wet seeps include red maple, sweet gum, cinnamon fern, chain fern (*Woodwardia* spp.), false nettle (*Boehmeria cylindrica*) and a variety of rushes (*Juncus* spp.) and sedges (*Carex* spp.). Herb cover in these wetlands varied from fairly dense to sparse.

**Piedmont Bottomland Hardwood Forest:** The Piedmont bottomland hardwood forest community type is associated with floodplain ridges and terraces other than active levees adjacent to the river channel. The bottomland hardwood forest community occurs higher in the watershed than the swamp forests and typically has more diverse vegetation and a well-developed herb layer.

Typical vegetation includes sweetgum, swamp chestnut oak (*Quercus michauxii*), cherrybark oak (*Quercus pagoda*) tulip poplar, red maple, bitternut hickory (*Carya cordiformis*), shagbark hickory (*Carya ovata*), green ash (*Fraxinus pennsylvanica*) and American elm (*Ulmus americana*). Understory trees include ironwood (*Carpinus caroliniana*), common pawpaw (*Asimina triloba*), dogwood, and American holly. Vines are typically prominent and include poison ivy, *Smilax* spp. and *Vitis* spp. Herbs include false nettle, Christmas fern (*Polystichum acrostichoides*), *Carex* spp., honewort (*Cryptotaenia canadensis*), jumpseed (*Polygonum virginianum*), Jack-in-the-Pulpit (*Arisaema triphyllum*), *Viola* spp., golden ragwort (*Senecio aureus*), Virginia wild rye (*Elymus virginicus*), bluestem goldenrod (*Solidago caesia*), heartleaf aster (*Aster divaricatus*), fish-on-a-string (*Chasmanthium latifolium*) and slender spikegrass (*Chasmanthium laxum*).

**Wetlands Associated with Ponds:** Grasses, cattails, and similar herbaceous vegetation generally dominate these wetlands, although a few of these areas have a maturing shrub and tree layer. These wetland areas provide valuable amphibian habitat.

**Summary of Anticipated Impacts to Wetlands:** Although wetland impacts from the proposed project are expected to be minimal, impacts resulting from the proposed project may affect the

following wetland functions: sediment retention, flood flow retention, plant and animal species richness, loss of streambank stabilization, habitat diversity and, pollutant removal.

#### **4.9.4 Water Resources**

**Surface Waters:** The proposed project lies within the Yadkin-Pee Dee River Basin (USGS Hydrologic Unit 03040104, NCDWQ Subbasin 03-07-15) within the Upper Pee Dee River watershed. Waters within the project study area include the Little River, Warner Creek, Turkey Creek, and unnamed tributaries to Warner Creek, Turkey Creek, and the Little River. Surface waters delineated within the project study area are identified in Exhibits 4.9.4a – 4.9.4f.

The streams within the project study area generally have well-defined banks. The height of the banks above the channels varies from 1.0 to 8.0 feet. Within the project study area, the streambeds range from 2.0 to 10.0 feet in width. The depth of the creeks ranged from several inches to over 2.0 feet. The substrate of the streams in the project study area consisted of sand with gravel in the smaller tributaries and coarse sand with cobbles in the larger streams such as Warner Creek. Detailed information about each stream can be found in the *Natural Resources Technical Report* for the NC 24/27 Improvements (NCDOT, 2004).

Best Usage Classifications are assigned for each surface water body by the NCDWQ, in accordance with *Procedures for Assignment of Water Quality Standards* (15A NCAC 2B .0100) and *Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina* (15A NCAC 2B .0200), as adopted by the North Carolina Environmental Management Commission. These classifications serve to protect water quality by governing the uses of the water resource. In accordance with 15A NCAC 2B.0311, the NCDWQ has classified state surface waters based on "best usage" for each water body. Within the project study area, the classification for Little River, Warner Creek and Turkey Creek is "C". Class "C" waters are suitable for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, and agriculture. The classification date and index number for Warner Creek is 9/01/74, 13-25-30-2 and for Turkey Creek is 9/01/74, 13-25-25.

Warner Creek flows into Rocky Creek approximately 1.3 miles downstream of the project study area. Rocky Creek is a major tributary to the Little River and is classified as "C , HQW" from NC 27 to the Little River. High Quality Waters (HQW) is a supplemental classification intended to protect waters with quality higher than state water quality standards. No HQWs classified as





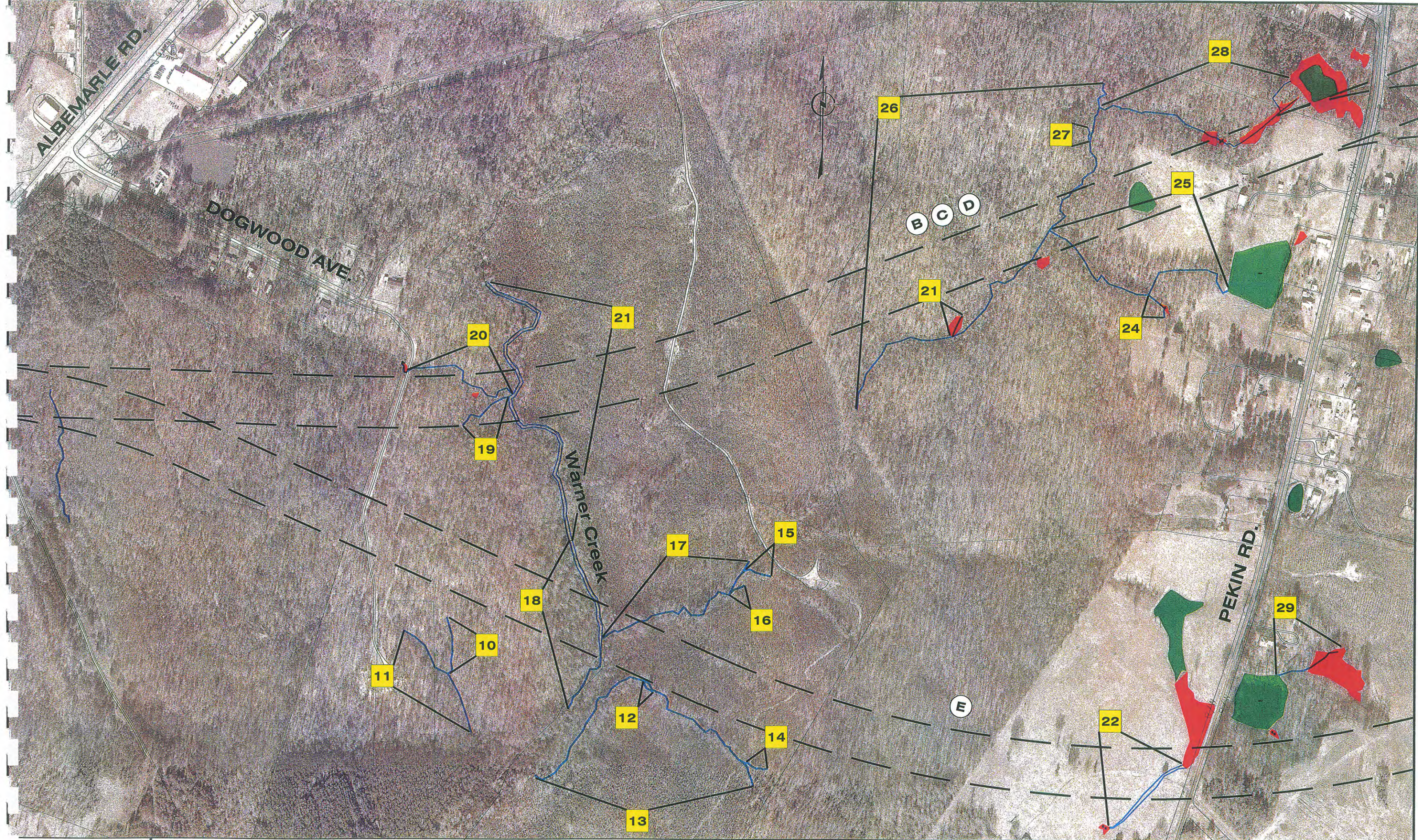
- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors

# NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Delineated  
Streams  
NTS  
Exhibit 4.9.4a





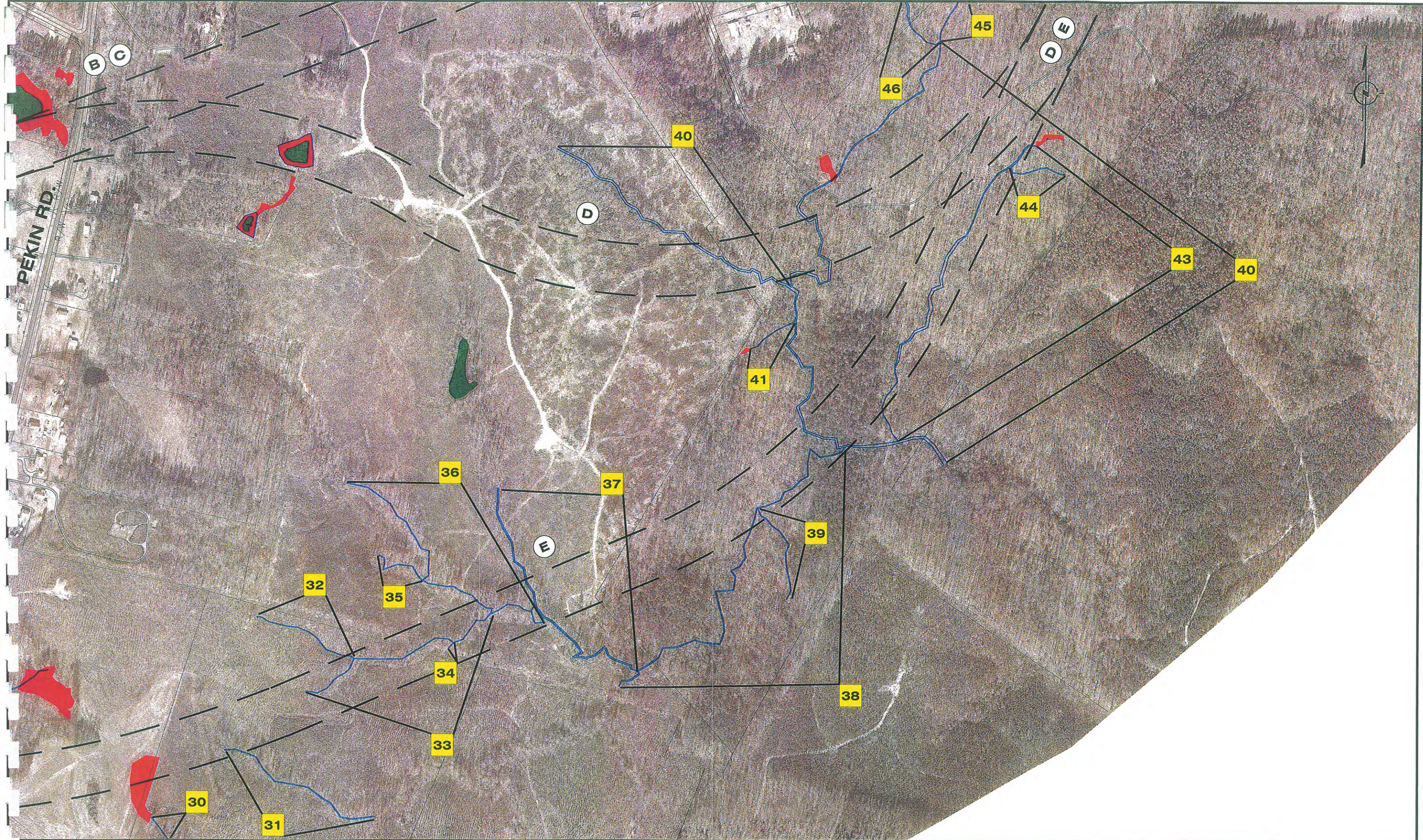
- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors

## NC 24/27 Improvements

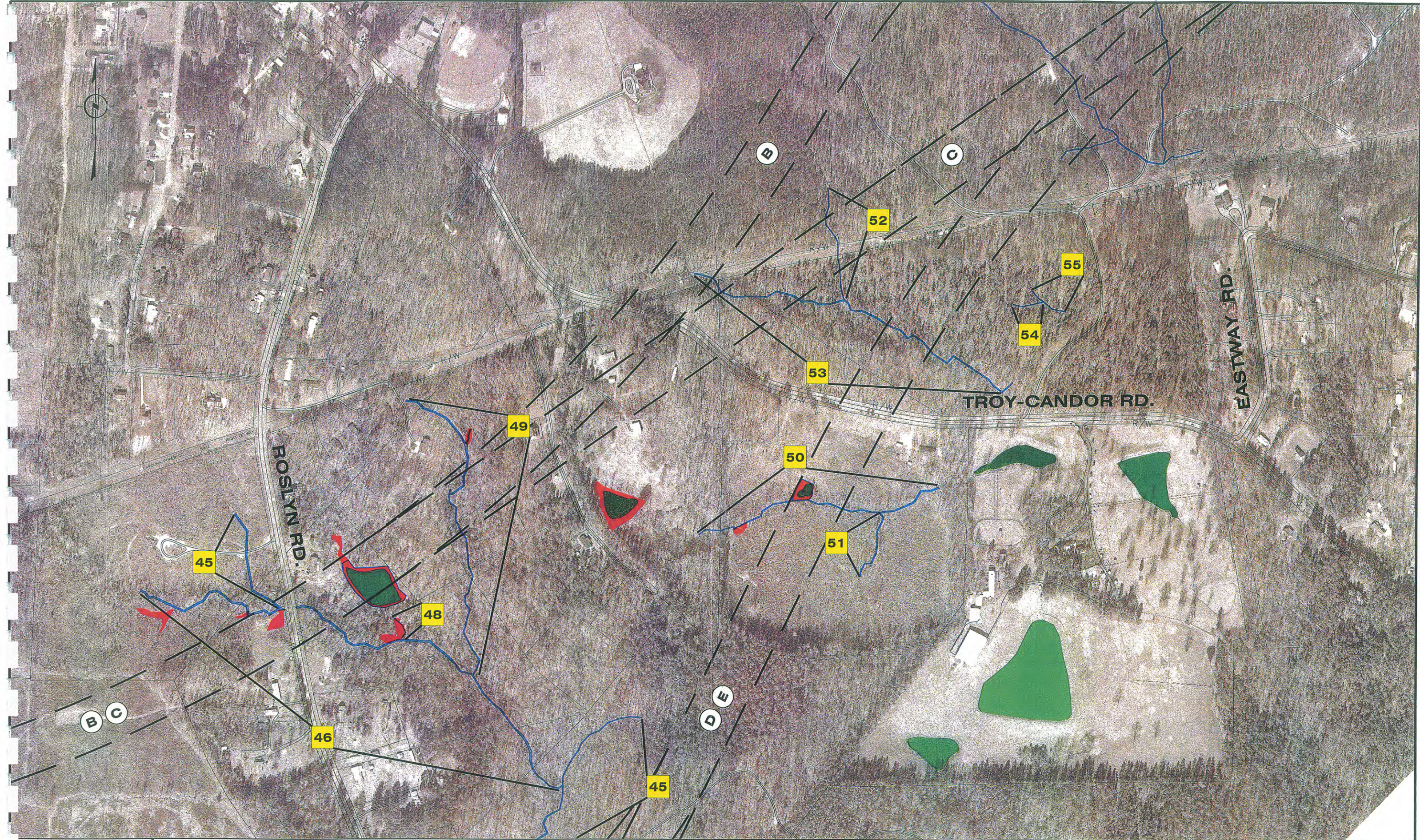
TIP No. R-623  
Montgomery County, North Carolina

Delineated  
Streams  
NTS  
Exhibit 4.9.4b







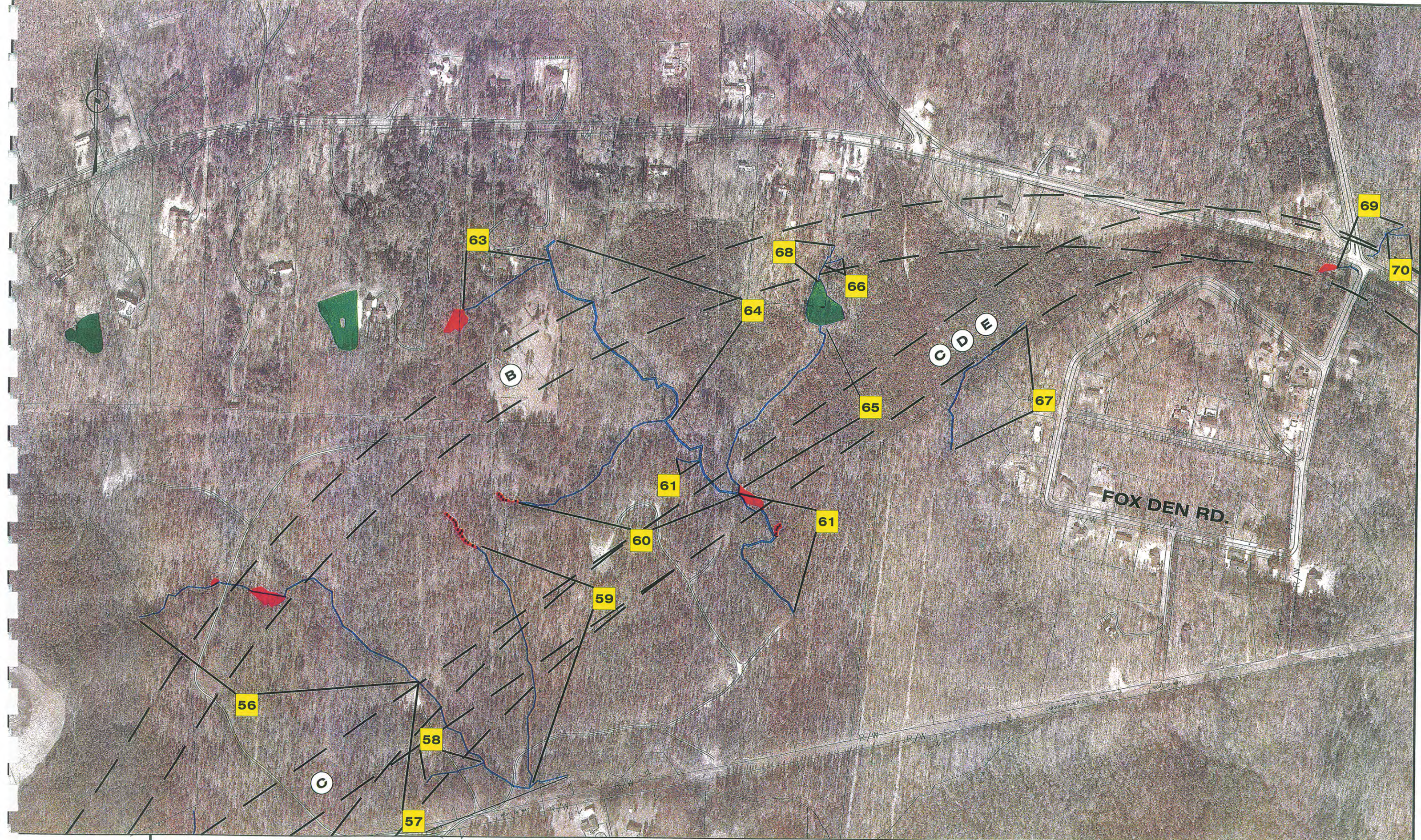


- Legend**
- Delineated Wetlands
  - Delineated Streams
  - Ponds
  - Project Corridors

**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Delineated  
Streams  
NTS  
Exhibit 4.9.4d



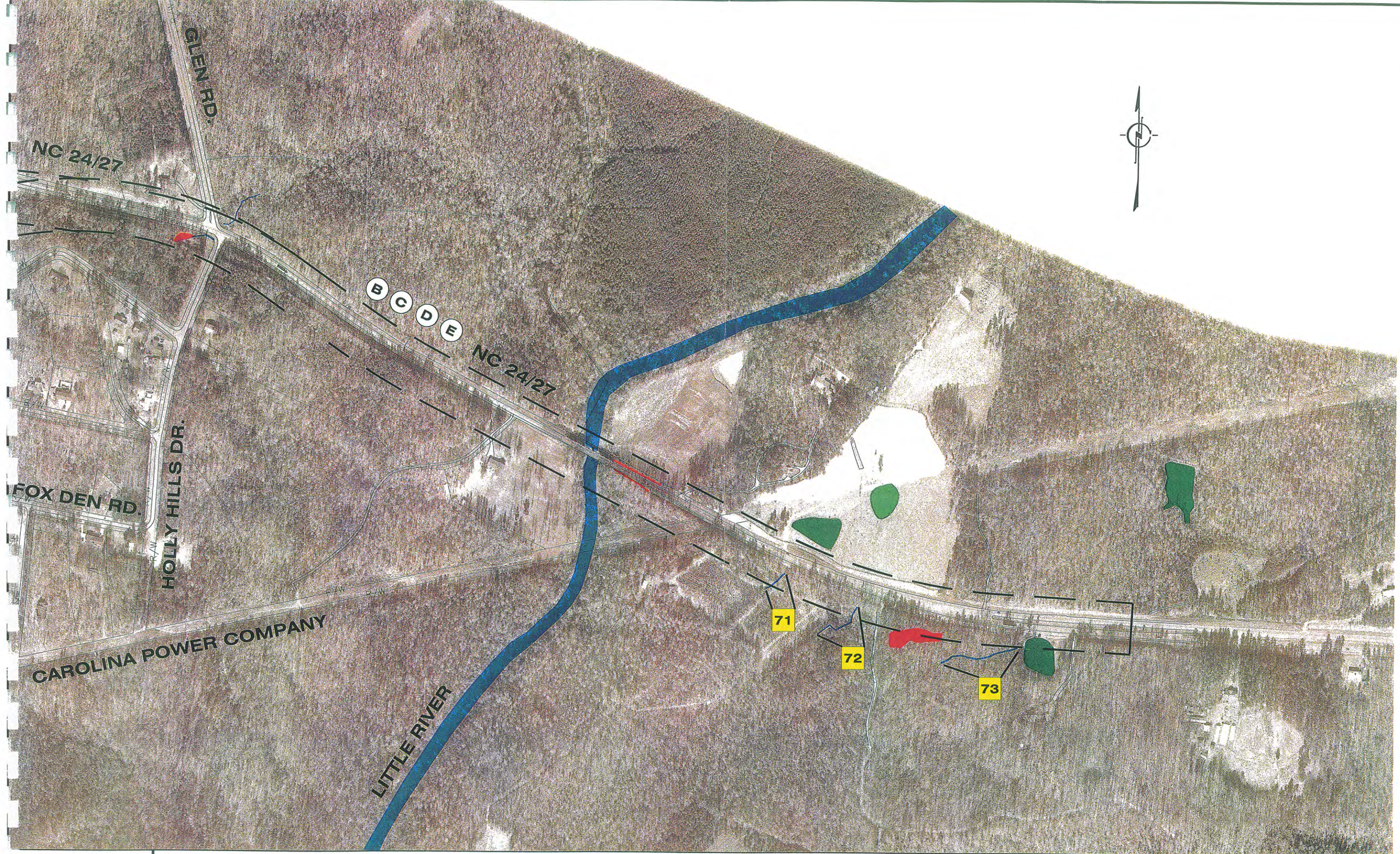


- Legend**
- █ Delineated Wetlands
  - █ Delineated Streams
  - █ Ponds
  - Project Corridors

**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Delineated  
Streams  
NTS  
Exhibit 4.9.4e





- Legend**
- █ Delineated Wetlands
  - █ Delineated Streams
  - █ Ponds
  - Project Corridors

## NC 24/27 Improvements

TIP No. R-623  
Montgomery County, North Carolina

Delineated  
Streams  
NTS  
Exhibit 4.9.4f



Water Supplies (WS-I: undeveloped watershed, or WS-II: predominately undeveloped watersheds) or Outstanding Resource Waters (ORW) occur within 1.0 mile of the project study area. At the time this document was prepared, these waterbodies appeared to support their best usage classification.

Section 303(d) of the Clean Water Act (CWA) requires states to develop a list of waters not meeting federal water quality standards or which have impaired uses. Listed waters must be prioritized, and a management strategy or total maximum daily load (TMDL) must subsequently be developed for all listed waters. Warner Creek, Turkey Run and the Little River are not listed on the 2003 or 2004 North Carolina 303(d) list of impaired waterbodies (NCDENR, 2003b and 2004).

Point sources, such as wastewater dischargers, located throughout North Carolina are permitted through the National Pollutant Discharge Elimination System (NPDES) program. The NC Division of Environmental Management NPDES report lists no permitted dischargers located on water resources that cross the project study area. No NPDES permitted dischargers are located in or directly upstream of the project study area.

The Basinwide Monitoring Program, managed by the NCDWQ, is part of an ongoing ambient water quality monitoring program that addresses long-term trends in water quality. The program monitors ambient water quality by sampling at fixed sites for selected benthic macroinvertebrates, which are sensitive to water quality conditions. Samples are evaluated on the number of pollution intolerant taxa present [Ephemeroptera, Plecoptera, Trichoptera (EPT)] and a taxa richness value (EPT S) is calculated. A biotic index value is also calculated for the sample that summarizes tolerance data for all species in each collection. The two rankings are given equal weight in final site classification. The biotic index and taxa richness values primarily reflect the effects of chemical pollution and are a poor measure of the effects of such physical pollutants as sediment. Stream and river reaches are assigned a final bioclassification of either Excellent, Good, Good/Fair, Fair or Poor. According to the information obtained from the Yadkin-Pee Dee River Basinwide Water Quality Management Plan (1998), the NCDWQ has no sampling stations within the project study area. cursory sampling of the water resources in the project study area generally revealed a diverse benthic community that included crayfish, mollusks, and a variety of EPT taxa.

Table 4.9.4 shows the anticipated impacts to water resources for each of the Build Alternatives.



**TABLE 4.9.4**  
**IMPACTS TO WATER RESOURCES**

|                                    | IMPACTS PER ALTERNATIVE |                |                |                |
|------------------------------------|-------------------------|----------------|----------------|----------------|
|                                    | B                       | C              | D              | E              |
| <b>Streams (linear feet)</b>       |                         |                |                |                |
| Relocation Impacts                 | 2,528.9                 | 3,446.8        | 3,356.7        | 3,363.2        |
| Culvert Impacts                    | 563.4                   | 573.8          | 563.4          | 584.4          |
| <b>Total Linear Feet of Impact</b> | <b>3,092.3</b>          | <b>4,020.6</b> | <b>3,920.1</b> | <b>3,947.6</b> |
| <b>Pond (acres)</b>                | <b>0.9</b>              | <b>0.9</b>     | <b>0.7</b>     | <b>0.2</b>     |

Note: Stream impact estimates based on construction limits. Detailed information about each stream can be found in the *Natural Resources Technical Report* for the NC 24/27 Improvements (NCDOT, 2004).

**Groundwater:** In the southern Piedmont region, the ground water system is an unconfined two-layer system composed of a zone of saprolite underlain by fractured bedrock (Le Grand, 1988). The saprolite layer consists of highly weathered crystalline rock and averages 20 m in thickness. Studies have shown that the saprolite layer is an integral part of the ground water system and acts as an important water storage zone for the deeper fractures (Brackett et al., 1991; Cressler et al., 1983; Radtke et al., 1986; Rose, 1992). Recharge occurs throughout the uplands in this shallow groundwater system. Most of the productive aquifers in the surficial aquifer system consist of valley-fill deposits of coarse-grained glacial or alluvial deposits, or both, and contain water under mostly unconfined conditions. The valley-fill aquifers receive most of their recharge from runoff of precipitation that falls on the surrounding uplands that are underlain by till or bedrock, both of which are less permeable than the valley-fill deposits. Some recharge is by infiltration of precipitation that falls directly on the valley-fill aquifers, and some is by inflow from adjacent bedrock.

In general, shallow, permeable water table aquifers are the most susceptible to contamination, but susceptibility of all aquifers to contamination is determined largely by such site-specific characteristics as:

- distance from the contamination source to the aquifer and residence time of the water in the unsaturated zone;
- presence of clay and organic matter in the unsaturated zone materials;
- potential of a particular contaminant to biodegrade and decompose;
- amount of precipitation, which affects recharge and the rate at which contaminants move downward; and,
- evapotranspiration, which in recharge areas may decrease the amount of water that moves downward to the aquifer.



Potential short-term groundwater impacts associated with construction of the Build Alternatives include an increase in impervious surfaces in the recharge area and potential groundwater quality impacts due to spills of paints, fuels, oils, and greases. Any wells located within the roadway right of way would need to be removed.

Construction of the Build Alternatives would contribute to a cumulative decrease in available recharge area for aquifers in the vicinity of the project study area; however, it is not expected to substantially impact aquifer recharge volumes.

***Summary of Anticipated Impacts to Water Resources:*** Impacts to water resources in the project study area are likely to result from activities associated with project construction, such as clearing and grubbing on streambanks, riparian buffer impacts, instream construction, fertilizers and pesticides used in revegetation, and pavement construction. Streams traversed by the new facility would be impacted as a result of bridge and/or culvert construction at stream crossings. During roadway construction, there is usually a direct correlation between the amount of suspended particles in the stream channel with the amount of clearing and grubbing activity, embankment modification, and project duration. Physical characteristics of the stream, such as changes in flow rate and stream course, can occur. This may lead to increased streambank scour and erosion. Several naturalized man-made ponds would also be impacted by the new facility.

Other impacts associated with roadway construction activities may potentially include:

- Increased sedimentation and siltation;
- Increased erosion in the project study area;
- Changes in light incidence and water clarity due to increased turbidity;
- Changes in the dissolved oxygen (DO) levels;
- Increased nutrient loading during construction via runoff from exposed areas;
- Increased potential for release of toxic compounds such as fuel and oil from construction equipment and other vehicles;
- Pesticides, herbicides, and fertilizers used in highway landscaping activities could be blown or washed into streams and creeks by wind or precipitation; and,
- Alteration of stream discharge due to silt loading and changes in surface and groundwater drainage patterns.



Stormwater runoff from the surrounding residential, agricultural, and commercial properties as well as the roads in the project study area may reach the creeks and cause water quality degradation through the addition of oil or gas residuals, particulate matter, fertilizers, fecal coliforms, or other sources of contamination.

Sedimentation is the most serious impact to the stream channels that would be crossed. Sedimentation changes in physical characteristics of the stream and causes changes in flow rate and stream course, which may lead to increased streambank scour and erosion. Sedimentation also leads to increased turbidity of the water column. Removal of the riparian vegetation could result in decreases in dissolved oxygen and temperature instability of the stream. Other impacts may include alteration of water levels and flows due to interruptions and additions to surface and ground water flow from construction, increased nutrient loading during construction via runoff to exposed areas and increased concentration of toxic compounds from highway runoff, construction, toxic spills, and increased vehicular use.

In order to minimize potential impacts to water resources in the project study area, NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters should be strictly enforced during the construction phase of the project (NCDOT, 1997). Additionally, limiting instream activities and revegetating stream banks immediately following the completion of grading can further reduce impacts and minimize stormwater runoff and sediment loading into the waterway.

#### **4.9.5 Riparian Buffers**

There are six stream crossings associated with the proposed project; therefore, associated riparian buffer areas would be affected. At the time this document was prepared, no state buffer rules were in effect for the Yadkin-Pee Dee River Basin.

#### **4.9.6 Rare and Protected Species**

Some populations of plants and animals have been or are in the process of decline due to factors such as natural forces, competition from introduced species, or human related impacts such as destruction of habitat. Rare and protected species listed for Montgomery County and any likely impacts to these species as a result of the proposed project construction are discussed in the following sections.



**Federally Protected Species:** Plants and animals with federal classification of Endangered (E), Threatened (T), Proposed Endangered (PE), and Proposed Threatened (PT) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended.

In addition to conducting literature reviews and field surveys of the project study area, the database maintained by the NCNHP was reviewed for occurrences of protected species. The most current USFWS list (USFWS, 2006) and NCNHP list (NCDENR, 2006) were referenced during the preparation of this document.

A review of the USFWS database (latest update March 29, 2006) of protected species revealed several federally protected species within the project vicinity. Table 4.9.5 lists the federally protected species of Montgomery County and summarizes the preferred habitat of each species. A detailed discussion of protected species habitat and behavior can be found in the *Natural Resources Technical Report* (NCDOT, 2004), prepared for the NC 24/27 Improvements. The biological conclusions of each protected species investigation are contained in the following paragraphs.

**TABLE 4.9.5  
FEDERALLY-PROTECTED SPECIES FOR MONTGOMERY COUNTY**

| SCIENTIFIC NAME                 | COMMON NAME             | FEDERAL STATUS | STATE STATUS | PREFERRED HABITAT                                                                                                                                         | HABITAT PRESENT? |
|---------------------------------|-------------------------|----------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <i>Felis concolor cougar</i>    | Eastern cougar          | E              | E            | Large undisturbed wilderness areas.                                                                                                                       | No               |
| <i>Haliaeetus leucocephalus</i> | Bald eagle              | T              | E            | Riverine system, maritime evergreen forest.                                                                                                               | No               |
| <i>Picoides borealis</i>        | Red-cockaded woodpecker | E              | E            | Wet pine flatwoods, Pine savanna.                                                                                                                         | No               |
| <i>Echinacea laevigata</i>      | Smooth coneflower       | E              | E-SC         | Open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line right-of-ways.                                                      | Yes              |
| <i>Helianthus schweinitzii</i>  | Schweinitz's sunflower  | E              | E            | Roadside right-of-ways, clearings and edges of upland woods on moist to dry clays, clay-loams, or sandy clay-loams that often have a high gravel content. | Yes              |

**NOTES:**

LT -denotes Threatened (a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range).

LE - denotes Endangered (a species in danger of extinction throughout all or a significant portion of its range).

E - denotes Endangered (any native or once-native species of wild animal whose continued existence as a viable component of the State's fauna is determined by the WRC to be in jeopardy) or (any species or higher taxon of plant whose continued existence as a viable component of the State's flora is determined to be in jeopardy).

SC - denotes Special Concern (species which are very rare in North Carolina, generally with 1-20 populations in the state and which require monitoring).



### **Eastern cougar (*Felis concolor couguar*)**

**Biological Conclusion: *No Effect*.** The Eastern cougar is a large, unspotted, long-tailed cat. The body and legs are a uniform tawny color with a pale reddish to reddish-white underside. The inside of the cougar's ears is light-colored with blackish color behind the ears. They feed primarily on deer, but their diet may also include small mammals, wild turkeys, and domestic livestock. No preference for specific habitat has been noted. The primary need is for a large wilderness area with an adequate food supply. Male cougars of other subspecies have been observed to occupy a range of 25 square miles and greater. Female ranges vary from 5 to 20 square miles.

The proposed project is located near residential and commercial areas. Given the cougar's need for large undisturbed habitat, it is unlikely that this species would be found within the project study area. Additionally, a search of the NCNHP database showed no recorded occurrences of this species within the project vicinity.

### **Bald eagle (*Haliaeetus leucocephalus*)**

**Biological Conclusion: *No Effect*.** Adult bald eagles have white heads and tails, a brownish body, and yellow bills, eyes and feet. The juvenile birds have a dark brown body, tail, and head irregularly blotched with white. Bald eagles forage along the coast, rivers, and large lakes. Nests are located in the forks of tall trees, usually pines and are usually remote from human activity. Nesting sites are usually less than one mile from feeding areas and are located adjacent to a clear flight path and open view of the surrounding area. The bald eagle typically feeds on fish; however, waterfowl, muskrats, rabbits, squirrels and carrion are common items of their diet.

The Little River, located east of the project study area, may provide foraging habitat for the bald eagle; however, no bald eagles or nests were observed during field surveys conducted in July and August 2003. Large portions of the project study area have been disturbed by logging or are residentially and commercially developed, making it unlikely bald eagle nesting habitat. Given the lack of sufficient nesting habitat within the project study area and its vicinity and the absence of recorded occurrences in the NCNHP database, it is expected that the proposed project will not affect the bald eagle.



### **Red-cockaded woodpecker (*Picoides borealis*)**

**Biological Conclusion: *No Effect*.** The preferred nesting habitat of the red-cockaded woodpecker is open stands of pines with a minimum age of 60 to 120 years. Longleaf pines (*Pinus palustris*) are preferred for nesting; however, other mature pines such as loblolly pine may be utilized. Typical nesting areas, or territories, are pine stands of approximately 200 acres; however, nesting has been reported in stands as small as 60 acres. Preferred foraging habitat is pine and pine-hardwood stands of 80 to 125 acres with a minimum age of 30 years and a minimum diameter of 10 inches. The red-cockaded woodpecker utilizes these areas to forage for insects such as ants, beetles, wood-boring insects, caterpillars, as well as seasonal wild fruit.

Field surveys conducted during July and August 2003 determined that there are no observed significant stands of pines greater than 30 years old within the project study area. The forested land in the project study area mainly consists of oak-hickory forest and riparian forest. The pine plantations within the project study area are generally too small to support red-cockaded woodpeckers. A search of the NCNHP database showed no recorded occurrences of this species within the project vicinity.

### **Smooth coneflower (*Echinacea laevigata*)**

**Biological Conclusion: *No Effect*.** The habitat of smooth coneflower is open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and powerline right-of-ways. Optimal sites are characterized by abundant sunlight and little competition in the herbaceous layer. Potential habitat exists for this plant along the roadsides of NC 24/27, the Progress Energy powerline easement and numerous clear-cut areas. A search of the NCNHP database showed no recorded occurrences of this species within the project vicinity.

As part of the environmental analysis, field surveys were conducted for the smooth coneflower within the corridor limits of the proposed Build Alternatives during the flowering period (July 2003). The surveys did not identify any smooth coneflower populations. Additionally, a review of the NCNHP database of rare species and unique habitats revealed no recorded occurrences of this plant within the project vicinity.



### **Schweinitz's sunflower (*Helianthus schweinitzii*)**

**Biological Conclusion:** The project *May Affect-Is Likely To Adversely Affect* the Schweinitz's sunflower if Alternative B is selected as the Preferred Alternative. Potential habitat exists for the sunflower along the roadside of NC 24/27, the Progress Energy powerline easement, and clear-cut areas. A search of the NCNHP database showed two recorded occurrences of this species near the project vicinity. One occurrence is located approximately 1,200 feet north of the project study area near the Montgomery County Community College on SR 1332 (Page Road). The second occurrence is located approximately 1.5 miles northwest of the project study area near the railroad tracks.

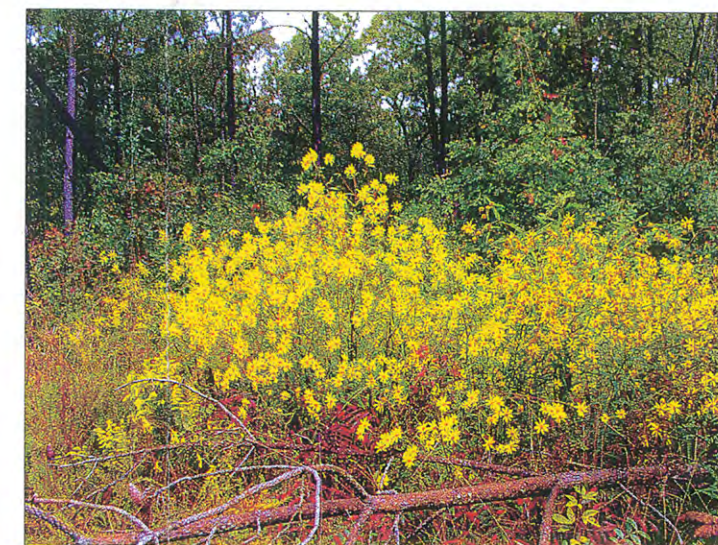
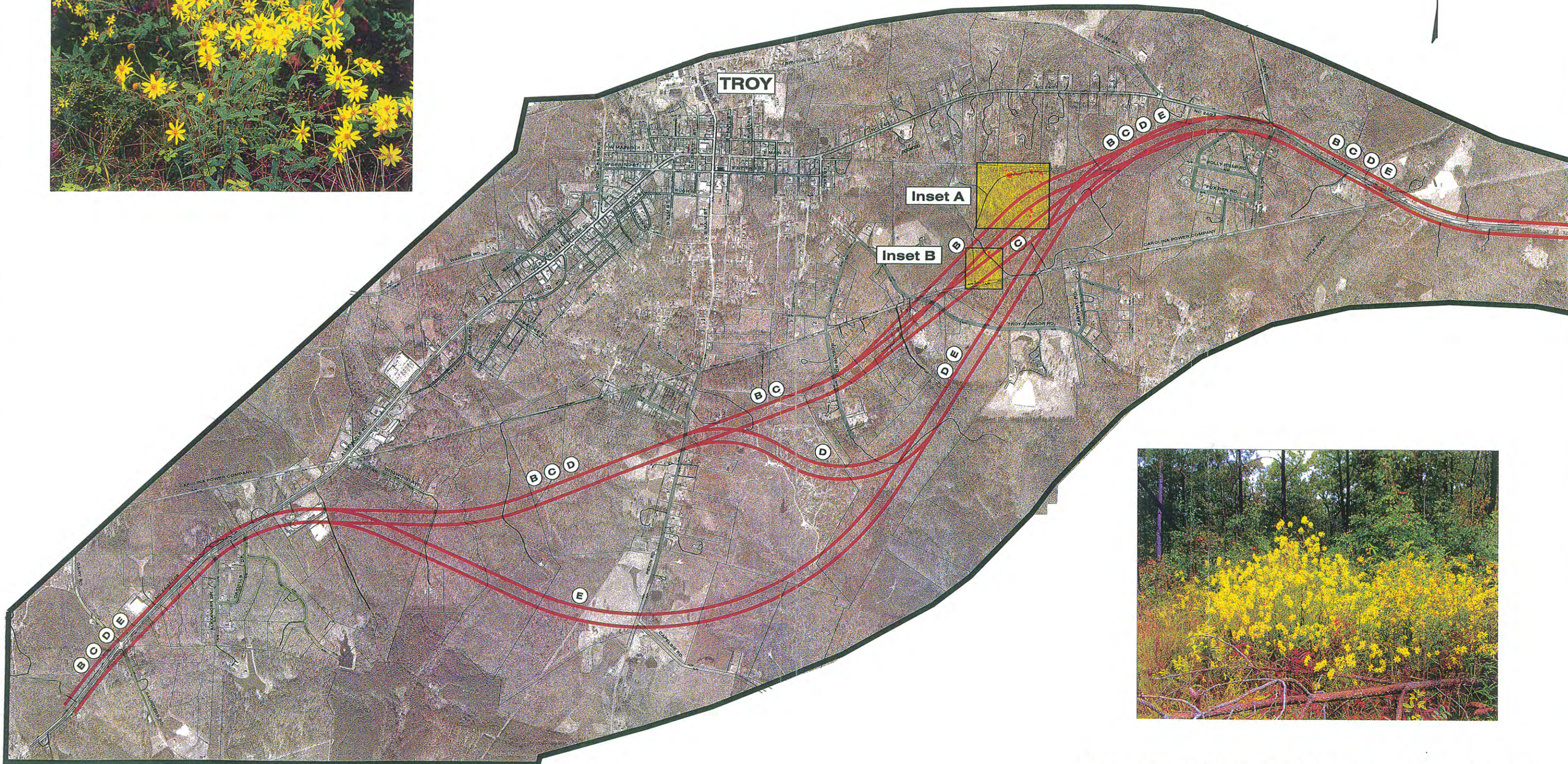
As part of the environmental analysis, field surveys were conducted for the Schweinitz's sunflower within the corridor limits of the proposed Build Alternatives during the flowering period (September/October 2003). The Schweinitz's sunflower was observed within the corridors of the Build Alternatives in the northern portion of the project study area. Populations ranging from isolated, individual stems to over 300 stems at a single location. A total of 1,324 individual stems were identified during the survey. The location of each stem was recorded using global positioning system (GPS) survey equipment. Exhibits 4.9.5a – 4.9.5b show the Schweinitz's sunflower locations.

Based on the results of the field survey, it was determined that Section 7 Consultation would be required. The project team met with USFWS representatives in the field on October 16, 2003 to verify the identified populations and discuss possible alternatives that would avoid and minimize impacts to the species. Based on preliminary designs there may be a potential impact to a single Schweinitz's sunflower plant within the right-of-way of Alternative B. Because Alternative B is a viable alternative at this point, formal Section 7 Consultation cannot be resolved at this time. This issue will be resolved after the Least Environmentally Damaging Practicable Alternative (LEDPA) is identified by the NEPA/404 Merger Team.

Ongoing Section 7 consultation will involve future meetings between NCDOT, their representatives and USFWS to discuss actual impacts and evaluate avoidance and minimization measures.

**Candidate Species:** The Georgia aster (*Symphyotrichum georgianus*) and Yadkin River goldenrod (*Solidago plumosa*) are currently listed (as of March 2006) as candidate species for





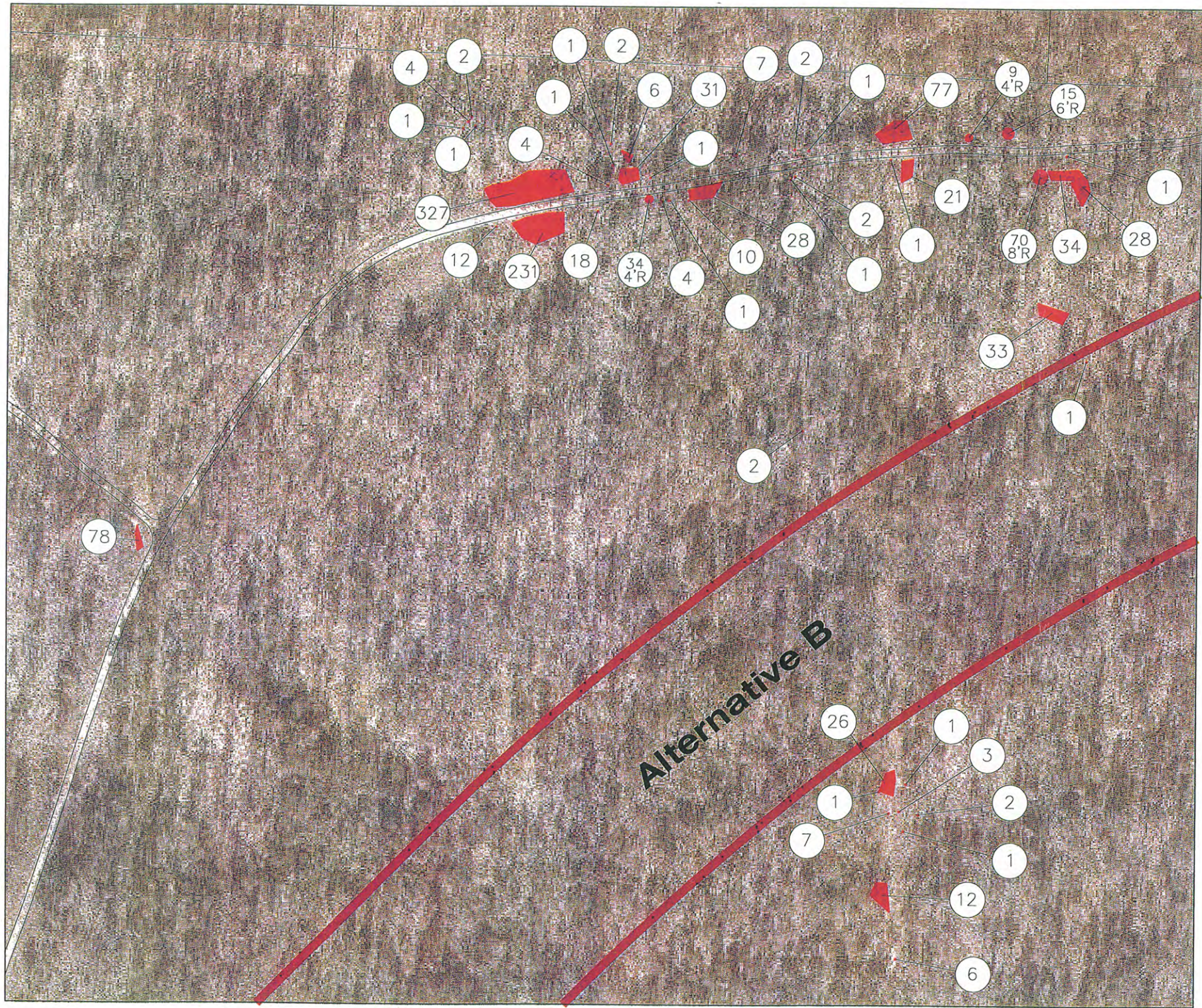
Note: See Exhibit 4.9.5b for Inset A and Inset B

# **NC 24/27 Improvements** TIP No. R-623 Montgomery County, North Carolina

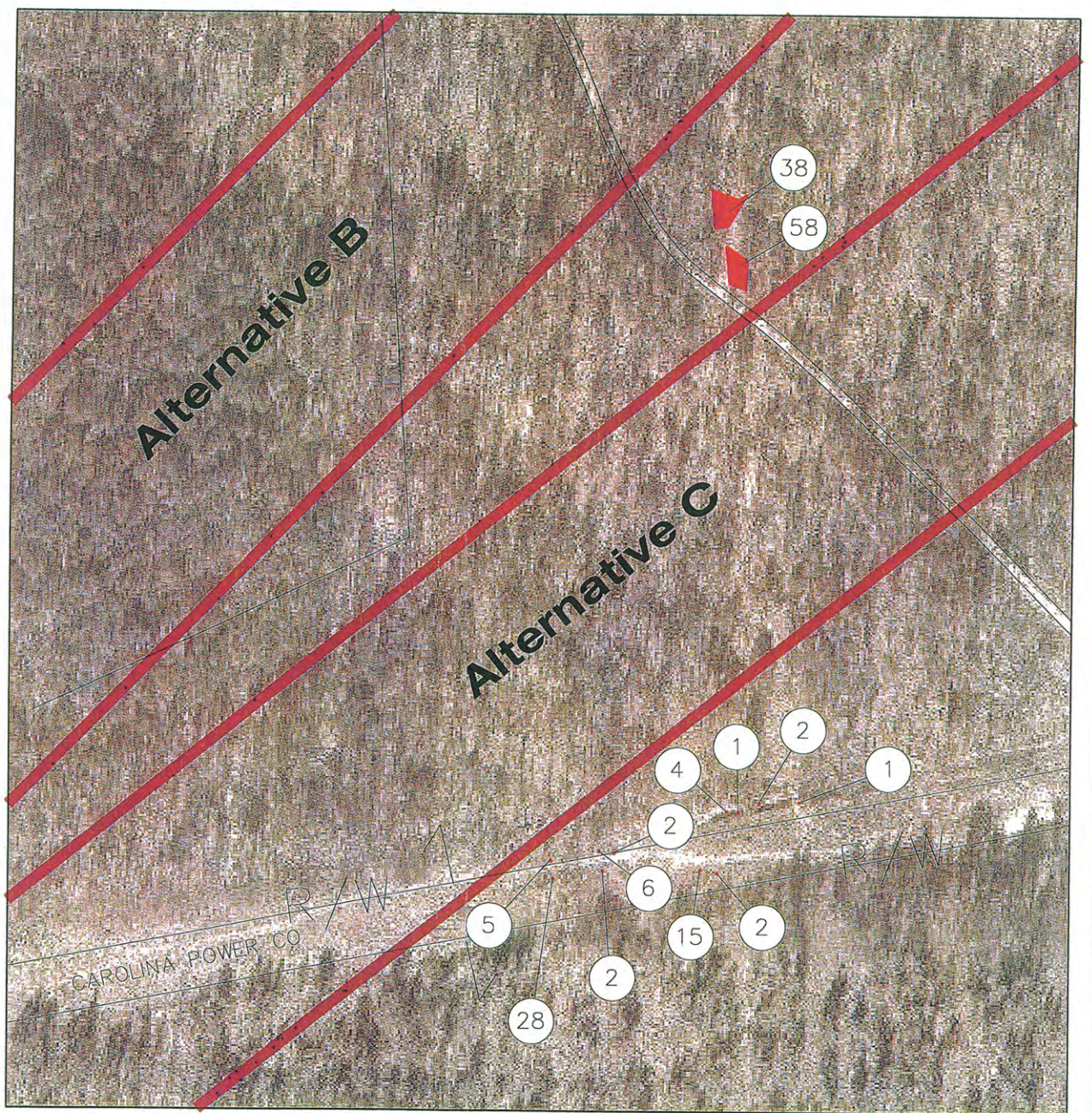
Sunflower Location  
Index  
NTS  
Exhibit 4.9.5a







**Inset A**



**Inset B**

**LEGEND**

Schweinitz's Sunflower Delineated Areas

XX Number of Plants per Location





Montgomery County. The Candidate classification is reserved for species that are under consideration for protection and have sufficient information to support listing. The Georgia aster normally blooms from early October through mid-November. The habitat for this species is generally found along roadsides and within utility right of ways.

The Yadkin River goldenrod normally blooms from April through the first frost and is found in open, thin woods with sandy soils. A survey for the Georgia aster was conducted in conjunction with the Smooth coneflower/Schweinitz's sunflower survey. The Georgia aster was not identified during this survey. The Yadkin River goldenrod is endemic to the Yadkin River and therefore no surveys will be conducted.

**Federal Species of Concern:** Federal Species of Concern (FSC) are not afforded federal protection under the Endangered Species Act and are not subject to any of its provisions, including Section 7, until they are formally listed or proposed as Threatened or Endangered. However, the status of these species is subject to change, and are included for consideration. A FSC is defined as a species that is under consideration for listing but for which there is insufficient information to support listing.

A review of the USFWS database and NCNHP database of rare species and unique habitats shows eleven recorded occurrences of FSCs within the project vicinity. The Atlantic pigtoe (*Fusconaia masoni*) and Carolina creekshell (*Villosa vaughaniana*) have been found in the Little River approximately 1.0 mile east of the project study area. Table 4.9.6 lists FSCs for Montgomery County with the associated state classifications.

**TABLE 4.9.6  
FEDERAL SPECIES OF CONCERN FOR MONTGOMERY COUNTY**

| SPECIES                                                                          | STATE STATUS | HABITAT AVAILABILITY? |
|----------------------------------------------------------------------------------|--------------|-----------------------|
| <b>Vertebrates</b>                                                               |              |                       |
| Northern pine snake ( <i>Pituophis melanoleucus melanoleucus</i> )               | SC           | Yes                   |
| American eel ( <i>Anguilla rostrata</i> )                                        | --           | No                    |
| Carolina darter – central piedmont population ( <i>Etheostoma collis</i> pop. 1) | SC           | Yes                   |
| Pinewoods darter ( <i>Etheostoma mariae</i> )                                    | SC           | Yes                   |
| Carolina redbreast ( <i>Moxostoma</i> sp. 2)                                     | --           | Yes                   |
| Sandhills chub ( <i>Semotilus lumbee</i> )                                       | SC           | Yes                   |



**TABLE 4.9.6 (cont.)  
FEDERAL SPECIES OF CONCERN FOR MONTGOMERY COUNTY**

| SPECIES                                            | STATE STATUS | HABITAT AVAILABILITY? |
|----------------------------------------------------|--------------|-----------------------|
| <b><i>Invertebrates</i></b>                        |              |                       |
| Brook floater ( <i>Alasmidonta varicosa</i> )      | --           | Yes *                 |
| Atlantic pigtoe ( <i>Fusconaia masoni</i> )        | E            | Yes *                 |
| Yellow lampmussel ( <i>Lampsilis cariosa</i> )     | E            | Yes *                 |
| Savannah lilliput ( <i>Toxolasma pullus</i> )      | E            | Yes *                 |
| Carolina creekshell ( <i>Villosa vaughaniana</i> ) | E            | Yes *                 |
| <b><i>Plants</i></b>                               |              |                       |
| Ravine sedge ( <i>Carex impresinervia</i> )        | SR-T         | No                    |
| Bog oatgrass ( <i>Danthonia epilis</i> )           | SR-T         | No                    |
| Piedmont aster ( <i>Eurybia mirabilis</i> )        | SR-T         | No                    |
| Bog spicebush ( <i>Lindera subcoriacea</i> )       | T            | No                    |

SOURCE: USFWS, March 2006.

NOTES: \* denotes habitat availability within the Little River, which is within the downstream vicinity of the project study area.  
T denotes Threatened (a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range).  
E denotes Endangered (any native or once-native species of wild animal whose continued existence as a viable component of the State's fauna is determined by the WRC to be in jeopardy or any species or higher taxon of plant whose continued existence as a viable component of the State's flora is determined to be in jeopardy).  
SC denotes Special Concern (species which are very rare in North Carolina, generally with 1-20 populations in the state and which require monitoring).  
SR denotes Significantly Rare (Species that are very rare in North Carolina, generally with 1-20 populations in the state. These species are generally more common somewhere else in their ranges, occurring in North Carolina peripherally to their main ranges, mostly in habitats which are unusual in North Carolina. Also included are some species with 20-100 populations in North Carolina, if they also have only 50-100 populations rangewide and are declining).  
-T denotes Throughout (These species are rare throughout their ranges, fewer than 100 populations total.)

**State Protected Species:** In North Carolina, certain species are protected under the North Carolina Endangered Species Act and the North Carolina Plant Protection and Conservation Act. The NC Wildlife Resource Commission (NCWRC) and the NC Department of Agriculture are responsible for enforcement and administering species protection. NCGS 113-331 to 113-337 (Article 25. Endangered and Threatened Wildlife and Wildlife Species of Special Concern) provides protection for faunal species while State-listed are legally protected under the Plant Protection and Conservation Act of 1979.

The NCNHP database notes several state threatened mussel species in the Little River, south of the Smitherman Dam. To date, the North Carolina Wildlife Resources Commission (NCWRC) has not listed critical habitat areas for state listed species. A review of the NCNHP database of rare species and unique habitats revealed no recorded occurrences of these mussel species within the project study area. Secondary impacts to aquatic communities resulting from the construction of the bridge over the Little River may include erosion and sediment deposition and increased turbidity as a result of clearing the slopes immediately



adjacent to the bridge and subsequent downstream runoff. The use of silt fences and turbidity curtains would aid in controlling erosion and sediment loss and reduce water turbidity. Procedures detailed in the NCDENR Division of Land Resources, Land Quality Section's *North Carolina Erosion and Sediment Control Planning and Design Manual* (NCDENR, 1993) should be adhered to during the installation of erosion and sediment control devices. Provided proper erosion and sediment control devices are employed, impacts due to increased turbidity are anticipated to be minimal.

***Summary of Anticipated Impacts to Protected Species:*** Based on preliminary designs the proposed project may potentially affect a single Schweinitz's sunflower plant within the right-of-way of Alternative B. Ongoing Section 7 consultation will involve future meetings between NCDOT, their representatives and USFWS to discuss actual impacts and evaluate avoidance and minimization measures. Avoidance and minimization of impacts to the species will be evaluated as design progresses.

#### **4.9.7 Mitigation and Permitting**

***Mitigation:*** The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy which embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of Waters of the United States, specifically wetlands. Mitigation of wetland impacts has been defined by the CEQ to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts (40 CFR 1508.20). Each of these three aspects (avoidance, minimization, and compensatory mitigation) must be considered sequentially. Avoidance, minimization, and compensatory mitigation are discussed below.

***Avoidance:*** Avoidance examines all appropriate and practicable possibilities of averting impacts to waters of the United States. According to a 1990 Memorandum of Agreement (MOA) between the US Environmental Protection Agency (USEPA) and the USACE, in determining "appropriate and practicable" measures to offset unavoidable impacts, such measures should be appropriate to the scope and degree of those impacts and practicable in terms of cost, existing technology, and logistics in light of overall project purposes.

The preliminary design alignment of each Build Alternative was developed to avoid wetland impacts to the maximum extent practicable.



**Minimization:** Minimization includes examination of appropriate and practicable steps to reduce adverse impacts to waters of the United States. Implementation of these steps will be required through project modifications and permit conditions. Minimization typically focuses on decreasing the footprint of the proposed project through reduction of median widths, right-of-way widths, fill slopes and/or road shoulder widths.

At locations where wetland impacts are likely, the preliminary design of each Build Alternative was developed to preserve the largest amount of contiguous wetland area. Other potential minimization measures include the bridging of wetland systems, and reducing median widths and side slopes in wetland areas. The feasibility of these techniques should be evaluated as design progresses.

At the March 22, 2005 meeting for Concurrence Point 2A, minimization of impacts to a wetland near the proposed intersection with Pekin Road was discussed. If Alternative B, C or D is selected as the NCDOT Preferred Alternative, further evaluation of minimization at this location will be conducted.

**Compensatory Mitigation:** Compensatory mitigation is not normally considered until anticipated impacts to Waters of the United States have been avoided and minimized to the maximum extent possible. Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts that remain after all appropriate and practicable minimization has been required. Compensatory actions often include restoration, creation and enhancement of Waters of the United States.

Impact thresholds for mitigation are different for the USACE and the NCDWQ. USACE requires compensatory mitigation for impacts to wetlands and streams. The NCDWQ may require compensatory mitigation for wetland impacts. Compensatory mitigation for the proposed project would be provided through the Ecosystem Enhancement Program (EEP). The EEP was established on July 22, 2003 through a Memorandum of Agreement (MOA) between the NCDOT, NCDENR, and USACE. In all cases, compensatory mitigation would be provided in sufficient quantity and quality to offset project impacts in accordance with the requirements of the CWA of 1970, as amended. As shown in Table 4.9.3, wetland impacts range from 0.47 acres to 0.75 acre and would require mitigation.



**Permitting:** The proposed construction would result in several activities requiring environmental regulatory permits from state and federal agencies. A list of these permits, organized by issuing agency, is provided below. The NCDOT would obtain all necessary permits prior to construction.

*United States Army Corps of Engineers*

**Section 404 Permit:** A permit from the USACE is required for any activity in water or wetlands that would discharge dredged or fill materials into Waters of the United States and adjacent wetlands (33 USC 1344). These regulations are promulgated in the federal Water Pollution Control Act Amendments of 1972 and Section 404 of the Clean Water Act (CWA) of 1977 (33 CFR 323). The Section 404 permitting process includes steps for review and approval by the USFWS, National Marine Fisheries Service (NMFS), and the US Environmental Protection Agency (USEPA). To obtain permit approval, impacts to wetlands must be mitigated through avoidance, minimization, and compensation measures in accordance with the MOA between the USEPA and USACE concerning the determination of mitigation under the CWA Section 404(b)(1) Guidelines (February, 1990). For discharges with minimal adverse impacts, the USACE may issue a Nationwide Permit, in lieu of a Section 404 permit. Additionally, a Section 404 Permit is not issued without the associated state action of a Section 401 Water Quality Certification.

*United States Fish and Wildlife Service*

**Section 404 and Section 10 Permit Review:** Through the Fish and Wildlife Coordination Act (16 USC 661-667d), USFWS responsibilities include review of Section 404 and Section 10 Permits to determine a proposed project's impact on public fish and wildlife resources. The USFWS provides recommendations to the USACE on how the proposed project could avoid or minimize impacts to existing fish and wildlife resources and their habitats, including wetlands. The USFWS will provide recommendations on the 404 permit for this project.

**Section 7 Consultation:** Through the Endangered Species Act of 1973 (16 USC 1531-1544), consultation with the USFWS is required for any project that may impact endangered or threatened plants and animals and their Designated Critical Habitat. Due to anticipated impacts to the Schweinitz's sunflower, Section 7 consultation will be required for this project.



#### North Carolina Division of Water Quality

**Section 401 Water Quality Certification (WQC):** Section 401 of the CWA delegates individual states the authority to approve projects that have the potential to impact Waters of the State or may otherwise violate North Carolina water quality standards detailed in 15A NCAC 2B .0200. A primary focus of the North Carolina 401 WQC is the protection of water quality through the protection of wetlands. Any activity which may result in discharge to navigable waters and which requires a federal permit must obtain a certification that such discharge would be in compliance with applicable state water quality standards (NCGS 143, Article 21) (15A NCAC 2B and 2H).

Permit requirements vary according to the type of activity proposed and the specific situation. For a project to receive a 401 WQC, several factors are considered. The intended purpose of the activity, any feasible alternatives to the proposed activity, plus all potential direct, indirect and cumulative water quality impacts are examined. Applications for wetland alterations may be denied or modified due to the special nature of a wetland or the functions that a wetland provides. The NCDWQ may waive, issue with conditions, or deny a 401 WQC. Certification is denied if the activity would have permanent adverse effects on existing or designated uses. Additionally, NCDWQ review is necessary for all projects that require any federal permit. If an Individual Section 404 permit is required by the USACE, an Individual Section 401 WQC is also required by the DWQ. A 401 WQC will be required for this project due to stream and wetland impacts.

#### North Carolina Division of Forest Resources

**Burning Permit:** A permit is required to start a fire in woodlands or within 500 feet of woodlands under the protection of the Division of Forest Resources (NCGS 113, Article 4C) (14 NCAC 9C .0200 through .0203). Thirty-day permits can be issued for highway construction.

#### North Carolina Division of Land Resources

**Sedimentation Pollution Control Act:** The North Carolina Sedimentation Pollution Control Act of 1973 is administered by the NCDENR, Division of Land Resources, Land Quality Section and requires sedimentation and erosion control devices at all construction sites, regardless of the amount of land to be disturbed. Sedimentation and erosion control devices are very site-specific and depend heavily on the grade and soil characteristics at each location. Sediment must be retained on site regardless of the devices employed to achieve this requirement. The *North*



*Carolina Erosion and Sediment Control Planning and Design Manual* (NCDENR, 1993) provides guidance for the installation of devices.

#### **4.10 HYDRAULIC IMPACTS**

Warner Creek, Turkey Creek, the Little River at NC 24/27, and their associated tributaries may be traversed by the new facility and would be impacted as a result of bridge and/or culvert construction at stream crossings. The riparian buffers along these streams would also be impacted. Potential impacts to water resources include the disruption of the substrate, increased sedimentation and siltation, and temporary decreases of dissolved oxygen. Clearing and grubbing activities, as well as bridge/culvert construction activities would impact the water resources. Most impacts would be temporary in nature during project construction and are likely to be limited to the project study area.

There are six major stream crossings proposed for each of the Build Alternatives. Major stream crossings (conveyances larger than 72 inches in diameter) are shown in Exhibit 4.10.1. Members of the NEPA/404 Merger Team held a field meeting on March 22, 2005 to discuss hydraulic structures for the proposed project. The NEPA/404 Merger Team agreed upon the major drainage structures recommended in this section. Table 4.10.1 lists the types and preliminary design sizes of the drainage structures proposed for each stream crossing. Additional stream crossings requiring conveyances less than 72 inches in diameter are considered minor drainage structures and would be identified during the final engineering design phase of the project. The preliminary sizing of all culvert crossings was designed for inlet control under a 50-year storm. The major drainage structure recommendations in this section are preliminary and subject to change during design finalization.

Each of the Build Alternatives would require replacement of the existing crossing of the Little River (Bridge No. 32) with dual bridges (stream crossing B-6, C-6, D-6 and E-6). The existing bridge is 262 feet in length and is comprised of five spans of reinforced concrete deck girders. The abutments are reinforced concrete spill through and the interior bents are reinforced concrete post and web. This bridge has a sufficiency rating of 67.6. The Town of Troy has requested that 25 feet be provided under the west end of the proposed bridges to allow construction of a greenway path adjacent to the river.

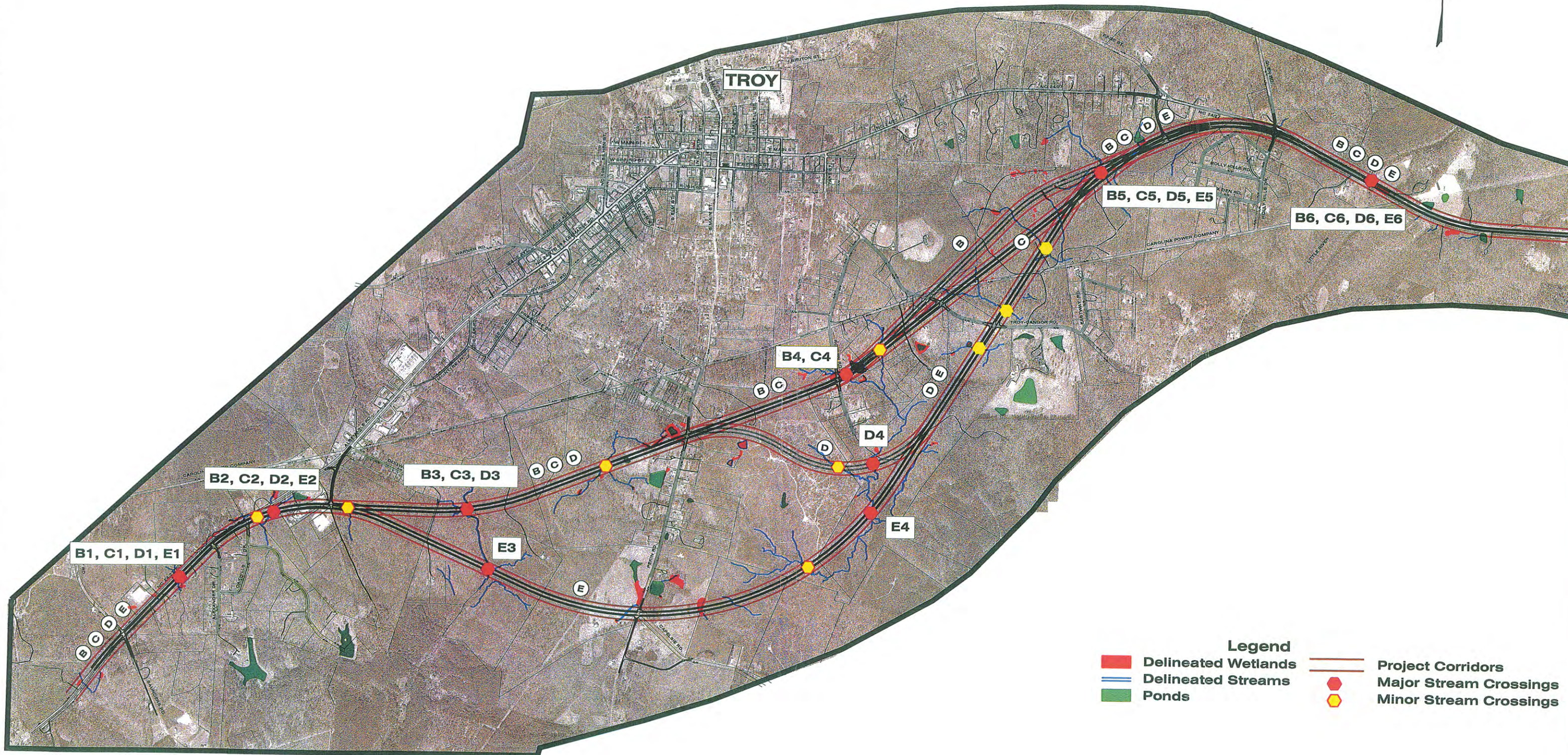


**TABLE 4.10.1  
MAJOR DRAINAGE STRUCTURES**

| <b>NUMBER<br/>(Exhibit 4.10.1)</b> | <b>ALTS.</b> | <b>STRUCTURE<br/>TYPE</b> | <b>STRUCTURE<br/>DIMENSIONS<br/>(ft)</b> | <b>DRAINAGE<br/>AREA<br/>(Sq. Mi)</b> | <b>STRUCTURE<br/>COST</b>  | <b>COST TO<br/>BRIDGE<br/>(Dual Bridges)</b> | <b>EXISTING DRAINAGE STRUCTURES</b>                                                                                        |
|------------------------------------|--------------|---------------------------|------------------------------------------|---------------------------------------|----------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| B-1, C-1<br>D-1, E-1               | B, C, D, E   | Single RCBC               | 9 x 8                                    | 0.3                                   | \$157,000                  | \$276,000<br>\$278,400                       | <b>Upstream:</b> 4 x 6 foot Single RCBC<br><b>Downstream:</b> None due to confluence of this tributary with Warner Creek   |
| B-2, C-2<br>D-2, E-2               | B, C, D, E   | Single RCBC               | 12 x 10                                  | 0.7                                   | \$432,200                  | \$448,000<br>\$532,000                       | <b>Upstream:</b> 6 x 6 foot Single RCBC<br><b>Downstream:</b> None due to confluence of this tributary with Warner Creek   |
| B-3, C-3<br>D-3                    | B, C, D      | Dual Bridges              | 417 x 32<br>392 x 32                     | 2.5                                   | \$1,068,000<br>\$1,005,600 | N/A                                          | <b>Upstream:</b> 7 x 7 foot Single RCBC<br><b>Downstream:</b> Two, 141 x 90 inch CMPA                                      |
| E-3                                | E            | Dual Bridges              | 218 x 32<br>218 x 32                     | 3.1                                   | \$558,400<br>\$558,400     | N/A                                          | <b>Upstream:</b> 7 x 7 foot Single RCBC<br><b>Downstream:</b> Two, 141 x 90 inch CMPA                                      |
| B-4, C-4                           | B, C         | Single RCBC               | 8 x 10                                   | 0.4                                   | \$150,700                  | \$459,200<br>\$369,600                       | <b>Upstream:</b> 60 inch Single CMP<br><b>Downstream:</b> None due to the confluence of Turkey Creek with the Little River |
| D-4                                | D            | Single RCBC               | 10 x 12                                  | 0.7                                   | \$292,200                  | \$502,400<br>\$531,200                       | <b>Upstream:</b> 60 inch Single CMP<br><b>Downstream:</b> None due to the confluence of Turkey Creek with the Little River |
| E-4                                | E            | Single RCBC               | 10 x 12                                  | 0.8                                   | \$214,100                  | \$540,000<br>\$458,400                       | <b>Upstream:</b> 60 inch Single CMP<br><b>Downstream:</b> None due to the confluence of Turkey Creek with the Little River |
| B-5, C-5<br>D-5, E-5               | B, C, D, E   | Single RCBC               | 12 x 12                                  | 0.9                                   | \$262,200                  | \$899,200<br>\$352,800*<br>\$492,800         | <b>Upstream:</b> 24 inch RCP<br><b>Downstream:</b> None due to the confluence of this tributary with the Little River.     |
| B-6, C-6<br>D-6, E-6               | B, C, D, E   | Dual Bridges              | 305 x 32<br>305 x 32                     | 149                                   | \$780,800<br>\$780,800     | N/A                                          | Existing bridge ~ 262 feet in length and comprised of 5 spans of reinforced concrete.                                      |

NOTES: Major drainage structures are defined as 72-inches in diameter or greater. Final structure sizes would be completed during final design.  
These bridges required due to tributary and stream alignment.





- Legend**
- |                                                                                                           |                                                                                                              |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|  Delineated Wetlands |  Project Corridors      |
|  Delineated Streams  |  Major Stream Crossings |
|  Ponds               |  Minor Stream Crossings |



**NC 24/27 Improvements**  
TIP No. R-623  
Montgomery County, North Carolina

Major Stream  
Crossings  
NTS  
Exhibit 4.10.1



#### **4.11 FLOODPLAINS**

Regulatory floodplains were identified in accordance with Executive Order 11988 – Floodplain Management. The National Flood Insurance Program (NFIP) in conjunction with the NC Floodplain Mapping Program determined the regulatory floodways, floodplains, and other flood hazard areas for Montgomery County. The Federal Emergency Management Agency (FEMA) regulates activities associated within these designated areas.

As shown in Exhibit 4.11.1, all Build Alternatives would cross 100-year floodplains. All crossings were designed as close to 90° as possible to minimize impacts. Montgomery County is a participant in the National Flood Insurance Program. Floodplains located within the project area were identified using Federal Emergency Management Agency (FEMA) flood insurance rate maps. The proposed crossing of Warner Creek is within a Special Flood Hazard Area (Zone A). The existing bridge on NC 24/27 over the Little River is located at the upstream limit of a detailed Flood Insurance Study and is shown on Exhibit 4.11.1. The existing bridge would be replaced with dual bridges that would provide equal or greater hydraulic conveyance. A request will be submitted to the Federal Emergency Management Agency for the Flood Insurance Study HEC-2 data at this crossing. A Conditional Letter of Map Revision (floodway modification) would not be required.

#### **4.12 CULTURAL RESOURCES**

This project is subject to compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and implemented by the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 (36 CFR 800). Section 106 requires federal agencies to take into account the effect of their undertakings (federally-funded, licensed, or permitted) on properties included in or eligible for inclusion in the National Register of Historic Places and to afford the Advisory Council a reasonable opportunity to comment on such undertakings.

##### **4.12.1 Historic Architecture**

The results of the multi-phase historic architectural surveys are presented in Phase I Architectural Reconnaissance Survey For Troy Bypass Environmental Impact Statement (Mattson et al., 2000), and Historic Architectural Survey, N.C. Highway 24-27 Improvements (Mattson et al., 2005). All work performed during these investigations was conducted pursuant to the National Historic Preservation Act of 1966, as amended; the Advisory Council on Historic

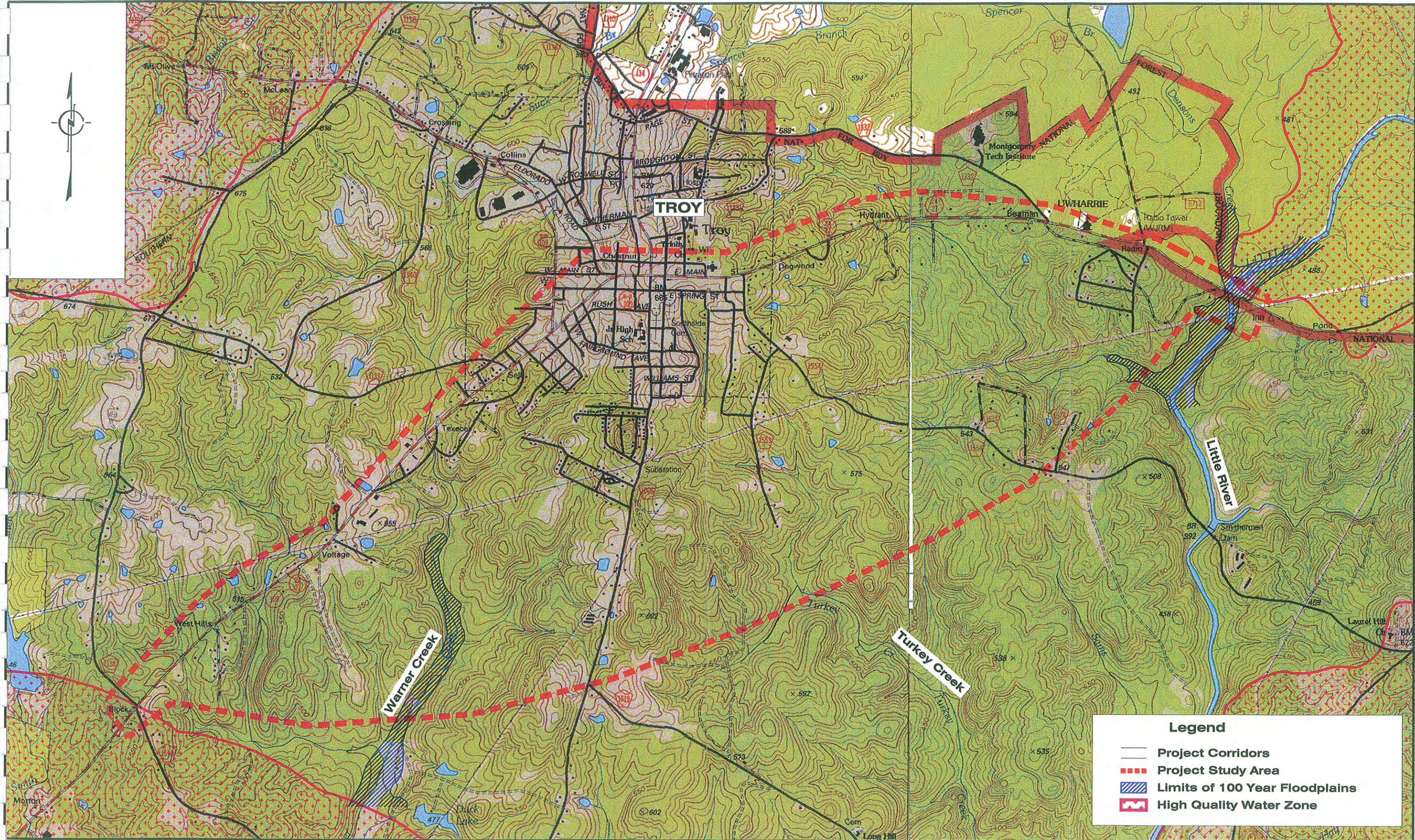


Preservation regulations on the "Protection of Historic Properties" (36 CFR 800); the Department of Transportation Act of 1966, as amended; the Department of Transportation regulations and procedures (23 CFR 771 and Technical Advisory T 6640.8A); and, the NCDOT's "Historic Architectural Resources, Survey Procedures and Report Guidelines" of October 2003.

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to make a "reasonable and good faith effort" to carry out appropriate identification efforts within the Area of Potential Effects (APE), which is defined as the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.4(b) and 800.16(d)). There are five properties within the project study area that are eligible for listing in the National Register of Historic Places, two of which are within the project's APE. The Wooley-Sanders House and the Neal Clark House are within the proximity of Alternative E. These properties are shown in Exhibit 4.1.1.

On February 15, 2006 NCDOT engineers and architectural historians met with FHWA and the State Historic Preservation Office (HPO) to discuss the effects of the Build Alternatives on the two eligible properties. At this meeting, HPO requested additional information on potential secondary and cumulative effects on the properties and evidence of coordination with property owners. After NCDOT architectural historians spoke with the property owner of the Neal Clark House (the owner of the abandoned Wooley Saunders house could not be located), a new effects meeting was convened on May 16, 2006. At that meeting, it was determined that Alternatives B, C, and D would have No Effect on the two eligible properties. Alternative E would have No Adverse Effect on the two eligible properties, due to the NCDOT proposal to extend control of access for a minimum of 350 feet north and south along SR 1005 (Pekin Road) and the use of a superstreet intersection, which would limit the accessibility of adjacent land. These access conditions are proposed in order to minimize the potential for redevelopment of adjacent properties to a highway-retail business type. The potential redevelopment of these adjacent properties was raised as a concern by HPO. Therefore the access conditions described above are also listed in the project commitments. The effects concurrence form is provided in Appendix A.6.





**NC 24/27 Improvements**  
 TIP No. R-623  
 Montgomery County, North Carolina

Floodplains  
 NTS  
 Exhibit 4.11.1



#### **4.12.2 Archaeology**

Per correspondence from the State Historic Preservation Officer (SHPO) dated December 28, 2000, contained in Appendix A.1, an intensive archaeological survey will be conducted for the Preferred Alternative. This correspondence requests that the NCDOT archaeological survey include discussion of aboriginal and historic land use in the area, as well as summaries of previous work, research questions, and field methods. The letter references recent research reports prepared by Wake Forest University and the US Forest Service and suggests that background information in these reports be utilized for the intensive archaeological survey for the Preferred Alternative.

#### **4.13 HAZARDOUS MATERIAL SITES AND UNDERGROUND STORAGE TANKS**

A site assessment and a search of environmental risk management databases was conducted for the project study area to identify sites of hazardous material use, storage and disposal, or potential sites of environmental contamination. These hazards may include, but are not limited to: underground storage tanks (USTs), hazardous waste sites, regulated landfills, and unregulated dumpsites.

The geoenvironmental analysis system identifies four general degrees of risk: No Risk, Low, Medium, and High. The degrees of risk are defined as follows:

- **No Risk** means that the observed conditions of the site, the state records, and the current and previous business activity does not support a contamination risk.
- **Low Risk** means that the business handles hazardous materials but has a clean appearance and no violations. An example of such a business might be a gas station with new underground storage tanks, monitoring wells, leak prevention system, no automotive maintenance, and a clean record in the environmental agency's files.
- **Medium Risk** indicates there is a higher concern or may include sites of known contamination. Medium risk sites may require some follow-up prior to right-of-way acquisition.
- **High Risk** suggests that additional studies are recommended and that soil and groundwater sampling and laboratory analysis may be required.

Sites where known spills or leakage have occurred may not necessarily present a high cause for concern if the environmental agencies are aware of the situation, enforcement actions are being taken, and remedial activities are either completed or underway.



The GeoEnvironmental Impact Evaluation identified two truck repair facilities within the corridors of Alternatives B, C, D, and E. These facilities are both located on NC 24/27 (Ablemarle Road) just west of Dogwood Avenue near the southern termini of the project. These facilities have several aboveground storage tanks. It is anticipated that monetary and scheduling impacts resulting from these sites will be low risk.

#### **4.14 MINERAL RESOURCES**

Industrial minerals are mined throughout North Carolina with a variety of igneous and metamorphic rocks being quarried in the Mountain and Piedmont counties for the production of crushed stone and dimension stone. Most dimension stone in North Carolina is produced from granite, argillite, quartzite, marble, and sandstone. Within Montgomery County, the Jacobs Creek Stone Company formerly quarried dark bluish-gray argillite. This granite is used for foundations, street curbing, paving, and monuments.

There are no active mines or quarries within the project study area therefore; the proposed project should not pose any impacts to mining or mineral resources.

#### **4.15 ENERGY**

Construction of any Build Alternatives would result in less total energy utilization than the No-Build Alternative. Construction of the facility would initially require the consumption of energy and resources that would not be used if the project were not constructed. Operation of the facility, however, would compensate for the energy lost during construction by increasing the efficiency of the region's roadway system. Increased energy efficiency on the new roadway and intersections would result in decreased vehicle delays, more efficient vehicle operation, and the diversion of traffic away from less efficient roadways.

#### **4.16 VISUAL IMPACTS**

Views of the project study area's landscapes from existing development, the proposed roadway, or future residences, do not present any visually sensitive areas that are of outstanding visual character. Views of the project study area are largely shaped by the forested areas interspersed with rural residences and agricultural fields. Views of the forested areas are rather nondescript, with low visual quality.



The proposed project is not anticipated to substantially alter the visual character of the project study area. Views from the proposed roadway would remain similar in nature to existing views within the project study area. Visual impacts would occur for those viewing the roadway; however, the aesthetic character of areas adjacent to the project corridor would not be substantially altered.

#### **4.17 UTILITIES**

The existing utilities in the project study area include water, sewer and utility poles that house power, television and telephone cables. Progress Energy provides electric power transmission for Troy. Telephone service is provided by Sprint. Water and sewer service is provided by Troy's Public Works Department. The Public Works Department is responsible for servicing water and sewer lines as well as maintenance and repair of Troy's streets and sidewalks, and providing yard and household waste pickup.

The proposed project may require the relocation of existing underground and overhead utilities with the possibility of short-term interruptions to service during construction. Overall, utility impacts are anticipated to be low. Each of the utilities is described in the following sections.

##### **4.17.1 Electric Power Transmission**

Progress Energy provides primary electric service to the project study area. A High kVA (kilovolt-amp) Carolina Power transmission line traverses the project study area, bisecting the Build Alternatives in the northern portion of the study area near Troy-Candor Road. This line would be affected by the construction of the proposed project. The Build Alternatives may impact one or more of the existing towers and would require replacement of these towers outside of the right-of-way.

##### **4.17.2 Water and Sewer Facilities**

Water and sewer lines located along Roslyn Road may temporarily be affected during construction as these lines may require short-term interruptions of service. The proposed project, however, would have no long-term impact on existing water and sewer lines.

##### **4.17.3 Natural Gas Service and Other Pipelines**

There are no natural gas lines located within the project study area. No impacts to gas lines are associated with the proposed project.



#### **4.17.4 Communications**

The proposed project may require the relocation of telephone lines along NC 24/27. Short-term interruptions to service may occur; however, these impacts would be temporary.

### **4.18 CONSTRUCTION IMPACTS**

The construction activities associated with building a new roadway would create environmental impacts. These impacts, generally short-term in nature, can be controlled, minimized, or mitigated through conformance with Best Management Practices (BMPs) and standard NCDOT procedures. Anticipated construction impacts are described below:

#### **4.18.1 Air Quality**

Construction activities could have a short-term impact on air quality, primarily during site preparation. Particulate matter (dust) is the pollutant of primary concern during the construction period. Dust would be generated during earth moving activities, handling of cement, asphalt, or aggregate, and equipment travel over unpaved haul roads. Wind erosion of exposed areas and material stockpiles would also generate particulate matter.

The amount of dust generated would vary, depending on the construction activity and local weather conditions. Where excess dust is anticipated to be a problem, effective dust control measures would be implemented in accordance with standard NCDOT procedures. Dust control would be the responsibility of the contractor and may include the following:

- Minimizing exposed earth surface
- Temporary and permanent seeding and mulching
- Watering work and haul areas during dry periods
- Covering, shielding, or stabilizing material stockpiles
- Using covered haul trucks

Emissions from construction equipment are regulated by federal standards. Any burning of cleared materials would be conducted in accordance with applicable state and local laws, regulations, and ordinances. Specifically, a Burning Permit from the N.C. Division of Forest Resources must be obtained for burning within woodlands or within 500 feet of woodlands under the protection of the Division of Forest Resources.



#### **4.18.2 Noise**

Construction of the project would result in temporary increases in noise levels within the vicinity of the project. Noise would be generated primarily from heavy equipment used to transport materials and to construct the roadway. Sensitive receptors located close to the construction activities may temporarily experience increased noise levels.

Regulating the hours of construction and equipping machinery with noise reduction devices can control construction noise. Certain construction activities could also be limited during the evening, weekends, and holidays. Storage and staging areas would be located as far from noise sensitive areas as practicable.

#### **4.18.3 Water Quality**

Stormwater runoff rates would increase slightly due to the increase in impervious roadway surface area. This is an unavoidable, long-term impact resulting from construction of any of the Build Alternatives. The proposed Build Alternatives also have the potential to temporarily degrade the quality of water in the surrounding streams as a result of soil erosion during construction.

Erosion and sedimentation caused by construction activities would affect drainage patterns and may create turbid conditions in waterbodies affected by the project. In accordance with the North Carolina Sedimentation Pollution Control Act (15A NCAC 4B .0001-.0027), an erosion control plan would be developed and implemented prior to construction. The plan would incorporate measures to control non-point source impacts as recommended in the NCDOT's *Best Management Practices for Protection of Surface Waters* (NCDOT, 1997). These Best Management Practices include, but are not limited to: using berms, dikes, silt barriers, and catch basins; vegetating or covering disturbed areas as soon as possible; and, conforming with proper clean-up practices.

#### **4.18.4 Maintenance Of Traffic**

During construction, all local and through traffic would be adequately and safely accommodated. All construction operations would be scheduled to keep traffic delay minimized, and the contractor should conform to the standards of the *Manual of Uniform Traffic Control Devices for Streets and Highways*. Construction would be performed to comply with all federal, state, and local laws governing safety, health, and sanitation. Procedures would apply all safeguards, safety devices, protective equipment, and any other action reasonably necessary to protect the life and health of employees on the job, the safety of the public, and the property in connection



with the performance of the work. The following items would be utilized, where necessary, to maintain public safety and the flow of traffic:

- Constructing and maintaining temporary detours, temporary structures, temporary approaches, crossings, and intersections with streets and roads, as well as using aggregates for the maintenance of traffic and water for use as a dust palliative;
- Furnishing flaggers, pilot trucks, and drivers; and,
- Furnishing, erecting, and maintaining warning devices such as signs, auxillary barriers, channelizing devices, hazard warning lights, barricades, flares, and reflective markers. If a street must be closed to traffic, traffic control devices would be illuminated during hours of darkness.

#### **4.18.5 Construction Materials And Waste**

All construction waste material generated during clearing, grubbing, and other construction phases would be removed from the project site and burned or disposed of by the contractor in accordance with state and local regulations. Litter and other general trash would be collected and disposed of at local landfill locations. NCDOT would require contractors to conduct historic, archaeological, wetland and threatened and endangered species surveys prior to approval and use of construction waste disposal and/or borrow sites identified for the proposed extension.

#### **4.19 SUMMARY OF IMPACTS**

Table 4.19.1 lists the engineering factors and anticipated environmental impacts associated with the Build Alternative. Impacts are based on right of way limits unless otherwise noted; construction impacts would be less than the impact quantities shown in Table 4.19.1.



**TABLE 4.19.1  
SUMMARY OF IMPACTS**

| EVALUATION FACTOR                                 | ALTERNATIVES |            |            |            |
|---------------------------------------------------|--------------|------------|------------|------------|
|                                                   | B            | C          | D          | E          |
| <b>CONSTRUCTION FACTORS</b>                       |              |            |            |            |
| Mainline Length (miles)                           | 5.83         | 5.81       | 6.09       | 6.31       |
| Intersections                                     | 9            | 9          | 8          | 8          |
| Railroad Crossings                                | 0            | 0          | 0          | 0          |
| Construction Cost (millions)                      | 44,700,000   | 45,200,000 | 52,500,000 | 45,200,000 |
| Right of Way Cost (millions)                      | 4,400,000    | 4,300,000  | 4,000,000  | 4,000,000  |
| Total Cost (millions)                             | 49,100,000   | 49,500,000 | 56,400,000 | 49,200,000 |
| <b>SOCIOECONOMIC FACTORS</b>                      |              |            |            |            |
| Residential Relocations                           | 13           | 12         | 9          | 9          |
| Business Relocations                              | 10           | 10         | 10         | 10         |
| Non-profit relocations                            | 1            | 1          | 1          | 1          |
| Schools/Parks Impacted                            | 0/0          | 0/0        | 0/0        | 0/0        |
| Churches/Cemeteries Displaced                     | 0/0          | 0/0        | 0/0        | 0/0        |
| Receptors Impacted by Noise                       | 29           | 29         | 18         | 17         |
| <b>INFRASTRUCTURE FACTORS</b>                     |              |            |            |            |
| Major Utility Line Crossings – High KVA Powerline | 2 Towers     | 1 Tower    | 2 Towers   | 2 Towers   |
| Natural Gas Line Crossings                        | 0            | 0          | 0          | 0          |
| Sewer/Water Line Crossings                        | 1            | 1          | 1          | 1          |
| <b>CULTURAL RESOURCE FACTORS</b>                  |              |            |            |            |
| Potential Archaeological Sites <sup>1</sup>       | TBD          | TBD        | TBD        | TBD        |
| Recorded Archaeological Sites <sup>1</sup>        | TBD          | TBD        | TBD        | TBD        |
| Historic Properties Effected                      | 0            | 0          | 0          | 0          |
| <b>NATURAL RESOURCE FACTORS</b>                   |              |            |            |            |
| Protected Species Impacted <sup>2</sup>           | 1            | 0          | 0          | 0          |
| Stream Crossings <sup>3</sup>                     | 6            | 6          | 6          | 6          |
| Upland Natural Systems – acres                    | 148.3        | 180.9      | 189.4      | 195.5      |
| Wetland Systems – acres <sup>4</sup>              | 0.8          | 0.7        | 0.6        | 0.5        |
| Stream Impacts – linear feet <sup>5</sup>         |              |            |            |            |
| Relocation Impacts                                | 2,528.9      | 3,446.8    | 3,356.7    | 3,363.2    |
| Culvert Impacts                                   | 563.4        | 573.8      | 563.4      | 584.4      |
| Total Linear Feet of Impact                       | 3,092.3      | 4,020.6    | 3,920.1    | 3,947.6    |
| <b>LAND USE FACTORS<sup>5</sup></b>               |              |            |            |            |
| Rural Residential – acres                         | 85.6         | 61.9       | 55.5       | 54.6       |
| Commercial – acres                                | 5.8          | 5.8        | 5.8        | 5.8        |
| Industrial – acres                                | 0            | 0          | 0          | 0          |
| Agricultural/Pasture – acres                      | 7.1          | 7.1        | 7.1        | 10.1       |
| Open – acres <sup>6</sup>                         | 98.8         | 99.1       | 114.4      | 119.1      |
| <b>PHYSICAL FACTORS</b>                           |              |            |            |            |
| Floodplains – acres                               | 4.4          | 4.4        | 4.4        | 5.0        |
| Farmland – acres <sup>7</sup>                     | 79.2         | 77.7       | 84.4       | 94.2       |
| Hazardous Materials Sites                         | 2            | 2          | 2          | 2          |
| Exceedances of CO NAAQS                           | 0            | 0          | 0          | 0          |

- Notes: 1 An intensive archaeological survey will be conducted for the Preferred Alternative.  
2 Impacts refer to a single Schweinitz's sunflower stem.  
3 Based on number of major drainage structures.  
4 Impacts based on construction limits plus 10 feet.  
5 Impacts based on construction limits.  
6 Disturbed, abandoned, and/or undeveloped land.  
7 Includes prime and statewide important farmlands.



## **5.0     COMMENTS AND COORDINATION**

### **5.1     AGENCY COORDINATION**

This section provides a summary of the agency coordination effort and public involvement process and includes a summary of the comments made at the January 23, 2001 and June 24, 2003 Citizens Informational Workshops. Subsequent environmental documents will include a summary of the comments received at the public hearing (to be held at a future date).

#### **5.1.1   Scoping Letter**

A scoping letter was mailed out on November 1, 2000, to local, state, and federal agencies, as well as the North Carolina State Clearinghouse, to solicit their comments on the scope of this environmental document. In accordance with NEPA, a solicitation of comments was also placed in the Environmental Bulletin. The following agencies were solicited for comment:

- Town of Troy, Mayor's Office, Town Manager's Office
- Montgomery County, County Manager's Office
- Piedmont Triad Council of Governments
- NCDENR, Department of Cultural Resources
- NCDENR, Division of Marine Fisheries
- NCDENR, Division of Parks and Recreation
- NCDENR, Division of Water Quality
- NC Wildlife Resources Commission
- US Army Corps of Engineers
- US Department of Agriculture
- US Fish and Wildlife Service
- US Geological Survey
- Federal Highways Administration
- Piedmont Triad Council of Governments

Responses to this scoping letter are included in Appendix A.1.



### **5.1.2 NEPA/404 Merger 01 Process**

As discussed in Section 1.2, the proposed project is being developed through the NEPA/404 Merger 01 Process to ensure a systematic evaluation of potential impacts to the human and natural environment. This document contains the signature forms and results of decisions made at meetings for Concurrence Points 1, 2 and 2A.

The NEPA/404 Merger Team for the NC 24/27 Improvements project includes the following agencies:

- Federal Highway Administration
- US Army Corps of Engineers
- US Environmental Protection Agency
- US Fish and Wildlife Service
- NC Department of Cultural Resources
- NC Department of Environment and Natural Resources, Division of Water Quality
- NC Department of Transportation
  - Project Development and Environmental Analysis Branch
  - Division 8
- NC Wildlife Resources Commission

#### **NEPA/404 Merger Team Meeting, March 8, 2001 (Concurrence Point 1)**

The NEPA/404 Merger Team met to discuss the purpose of and need for the proposed project so that agreement could be reached on Concurrence Point No. 1. As a result of this meeting the team concurred with the following purpose and need statement:

“The purpose of the project is to improve the safety and traffic flow on NC 24/27 by providing additional roadway capacity.”

#### **NEPA/404 Merger Team Meeting, May 16, 2001**

The purpose of this meeting was to discuss the proposed study area and address related questions raised at the first merger team meeting. The meeting focused on the following items: 1) discussing the study area to determine where field work needs to occur during the next phase of the project; 2) addressing study area-related questions raised at the March meeting; and, 3) presenting a case to avoid development of alternatives north of existing NC 24/27. Discussions



focused on justification for avoiding the evaluation of alternatives north of Troy and reaching consensus on defining the project study area to include the existing facility and the evaluation of alternatives south of Troy. The consensus of the team was to define the study area south of NC 24/27 and include further evaluations of the Improve Existing Alternative.

NEPA/404 Merger Team Meetings, September 17, 2003 and January 20, 2004 (Concurrence Point 2)

The purpose of these meetings was to discuss the preliminary alternatives and compare associated impacts so that agreement could be reached on Concurrence Point 2. At this meeting Alternative A (Improve Existing) was eliminated from further study due to the high number of relocations and the lack of support from the residents of Troy. As a result of this meeting, Alternatives B, C, D, and E were carried forward for further study.

NEPA/404 Merger Team Meeting, March 22, 2005 (Concurrence Point 2A)

The purpose of this meeting was to discuss proposed hydraulic crossings for the Build Alternatives so that agreement could be reached on Concurrence Point No. 2A. Section 4.10 discusses the major drainage structures agreed upon as a result of this meeting. In addition, the team requested the two following items be evaluated (also shown in Project Commitments):

- Minimization of impacts to a wetland near the proposed intersection with Pekin Road.
- For the stream crossing designated as B5,C5,D5,E5 (Tributary to Little River), evaluate a second culvert barrel versus a single 12x12 box culvert. The team requested consideration of a second barrel to accommodate the floodplain and serve as a wildlife passage for small animals.

## **5.2 PUBLIC INVOLVEMENT**

Coordination with local governments and the public was maintained through the preparation of this environmental document. Two Local Officials Informational Workshops, two Citizens Informational Workshops, and two small group meetings have been held to date to gather input on the proposed project and to disseminate information about the project. Newsletters were mailed to local officials and citizens to provide information about the project.



### **Mailing List**

A computerized mailing list consisting of state and federal environmental regulatory and resource agencies, elected officials, civic and business groups, local governmental agencies, and interested persons was compiled at the beginning of the environmental study and continually updated throughout the planning process. This list was and will continue to be used to distribute project information and to notify the public and local officials of upcoming meetings.

### **Newsletters**

Two newsletters (January 2001 and June 2003) have been distributed for this project. Additional newsletters will be distributed during the course of the project's planning phase. The newsletters contain information regarding the proposed extension and provide contact information for any additional questions.

### **Local Officials Meeting**

The Local Officials Meetings were held prior to the Citizens Informational Workshops. During the first Local Officials meeting (January 23, 2001), a description of the project was given, the purpose and need for the project discussed, and the current status of the project explained. Land suitability maps were displayed and environmental impact issues were discussed as well as design considerations.

During the second Local Officials Meeting (June 24, 2003) a short presentation was given to update the officials on the project progress. The mayor reported that he had received much opposition from his constituents on the Improve Existing Alternative (Alternative A). A county commissioner stated he was highly opposed to putting the highway through town because it would cause a loss in business.

### **Citizens Informational Workshops**

The First Citizens Informational Workshop was held on January 23, 2001 from 4:00 to 7:00 pm, at West Montgomery High School. The Local Officials Informational Meeting was held earlier the same day. The sign in sheet included 79 names. A total of 14 written comments were received during the workshop or mailed in following the workshop. Displays available for review included an aerial photograph and Geographic Information Systems (GIS) mapping showing environmental constraints such as wetland areas. Also, exhibits showing descriptions of the planning process, evaluation factors overview and proposed typical sections were available. Verbal comments



received during the workshop were overwhelmingly in favor of the project. The written comments are summarized below:

- Of the 14 written comments received during and after the workshop, 11 comments were in favor of the bypass and 3 were against it.
- Holly Hills residents are concerned about the bypass disrupting their close-knit community. They are against the proposed bypass in favor of other alternatives that would not affect their community. *{All of the alternatives converge just west of the Holly Hills neighborhood at NC 24/27. Although the alternatives are in close proximity to the neighborhood, they do not divide nor cause direct impacts within Holly Hills.}*
- Residents in favor of the bypass (rather than the proposed widening of 24/27) are concerned with the current heavy commercial traffic, the high traffic volume, and the high speeds of passing vehicles.
- Many residents offered other suggestions for a bypass, such as following the Progress Energy powerline right-of-way right of way, investigating a northern bypass nearing the State prison and the water treatment plant, and starting the project at the junction of NC 24/27/109 instead of SR 1138 (due to heavy accident rates in that area). *{Following an existing powerline right-of-way would not be feasible because it would require relocation of the entire power line right-of-way. A northern bypass was discussed and eliminated for reasons discussed in Section 2 – Build Alternatives. The western terminus connects with an adjacent improvement project on NC 24/27.}*
- Residents believe that widening the existing NC 24/27 would cause more accidents, would be dangerous for buses picking up school children, and would not alleviate traffic congestion. *{Widening NC 24/27 through town was eliminated at Concurrence Point 2.}*

A second Citizens Informational Workshop was held in the Cafeteria of the West Montgomery High School from 4:00 to 7:00 pm, June 24, 2003. The sign in sheet included 169 names. Forty-three written comments were received at the workshop and another twenty-eight were received by mail or email after the workshop. Some comments supported more than one alternative. The written comments received are summarized below:

- |                        |      |
|------------------------|------|
| • Prefer Alternative A | None |
| • Oppose Alternative A | 53   |
| • Prefer Alternative B | 2    |
| • Oppose Alternative B | 9    |



- Prefer Alternative C 9
- Oppose Alternative C 3
- Prefer Alternative D 5
- Oppose Alternative D 2
- Prefer Alternative E 18
- Oppose Alternative E 1
- Any Alternative except A 1
- Suggested a Northern Route 4

In addition to these written comments a petition was submitted with 546 signatures that were opposed to Alternative A. Overall, most felt there was a definite need for improvement but they would prefer a bypass that did not affect the character of their downtown area.

### **Small Group Meetings**

During the environmental study process, two small group meetings were held. A record of these meetings is summarized in the following paragraphs.

One meeting was held with local officials and other parties on November 20, 2002. Representatives from the following entities were in attendance: Town of Troy, Montgomery County Economic Development Commission, Fluor Corporation, NCDOT Project Development and Environmental Analysis Branch, and Stantec Consulting Services. The purpose of the meeting was to brief local officials and to gather their input on the proposed project.

The second meeting was held with Town officials and other representatives on September 13, 2004. Representatives from the following entities were in attendance: Town of Troy, local lumber companies, NCDOT Project Development and Environmental Analysis Branch, and Stantec Consulting Services. The meeting was held to discuss the current truck patterns through Troy and the feasibility of routing heavy truck traffic traveling to and from the west of Troy along the bypass and SR 1332 (Page Street) or SR 1324 (Glen Road) in lieu of SR 1005 (Pekin Road) and the downtown area. Representatives from the two logging companies present at the meeting responded favorably to the proposed truck route. Routing trucks along this path would minimize the amount of trucks using Pekin Road and minimize the associated impacts to residences along this corridor. Discussions on this topic can be found in Sections 2.8.3, 4.3.4 and 4.6.



# APPENDIX A.1

---

## AGENCY COMMENTS



|                              |                           |
|------------------------------|---------------------------|
| To: PAUL KOCH                | From: ELMER E. VANCE, JR. |
| Co./Dept: STANTEC CONSULTING | Co: POEA                  |
| Phone #: 851-6866            | Phone #: 733-7844         |
| Fax #: 851-7024              | Fax #:                    |

THE ARMY  
ENGINEERS

LINA 28402-1890

IN REPLY REFER TO

February 13, 2001

Regulatory Division

SUBJECT: Action ID 200100387; TIP Project No. R-623

Mr. William D. Gilmore, P.E., Manager  
Project Development & Environmental Analysis  
North Carolina Department of Transportation  
1548 Mail Service Center  
Raleigh, N.C. 27699-1548

Dear Mr. Gilmore:

Reference your November 1, 2000 letter requesting our scoping comments on the proposed NC 24-27 Troy Bypass from SR 1138 to East of the Little River, Montgomery County, North Carolina.

Based on information provided in the referenced letter and on a review of the available environmental data for Montgomery County, the proposed project may impact jurisdictional wetlands. In addition, the information you have provided indicate that the proposed project will cross Warner Creek, Turkey Creek, and several unnamed tributaries to these creeks. In addition, a portion of the study area is located along the Little River. More information is needed on the extent and location and community type of all the impacted wetlands before an environmental assessment can be made.

Department of the Army (DA) permit authorization, pursuant to Section 404 of the Clean Water Act of 1977, as amended, will be required for the discharge of dredged or fill material in waters of the United States or any adjacent wetlands in conjunction with this project, including disposal of construction debris. Pursuant to our mitigation policy, impacts to wetlands should first be avoided or minimized. We will then consider compensatory mitigation for unavoidable impacts. When final plans are completed, including the extent and location of any work in wetlands, our regulatory division would appreciate the opportunity to review these plans for project-specific determinations of DA permit requirements.



Should you have any questions, please contact Mr. David L. Timpy in the Wilmington Field Office at (910) 251-4634.

Sincerely,



E. David Franklin  
Chief, NCDOT Team  
Regulatory Division

Copies Furnished:

Mr. John Dorney  
North Carolina Dept. of Environment and Nat. Res.  
Water Quality Division  
1621 Mail Service Center  
Raleigh, North Carolina 27699-1621

Mr. David Cox  
Highway Coordinator  
North Carolina Wildlife Resources Commission  
1142 I-85 Service Road  
Creedmoor, North Carolina 27522

Mr. Garland Pardue  
U.S. Fish and Wildlife Service  
Fish and Wildlife Enhancement  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726



|                   |           |         |                   |            |   |
|-------------------|-----------|---------|-------------------|------------|---|
| Post-it* Fax Note | 7671      | Date    | Jan 17 '01        | # of pages | 3 |
| To                | Paul Koch | From    | Elmo Vance Jr.    |            |   |
| Co./Dept.         | STANTEC   | Co.     | PDEA              |            |   |
| Phone #           | 851-6666  | Phone # | 733-7844 ext. 262 |            |   |
| Fax #             | 851-7024  | Fax #   |                   |            |   |

Vance

**North Carolina Department of Cultural Resources**

James B. Hunt, Jr., Governor  
Betty Ray McCain, Secretary

Division of Archives and History  
William S. Price, Jr., Director

December 28, 2000

**MEMORANDUM**

To: William D. Gilmore, PE, Manager  
NCDOT, Project Development and Environmental Analysis Branch

From: David Brook *for David Brook*  
Deputy State Historic Preservation Officer

Re: Proposed NC 24/27 Troy Bypass from State Road 11382 East of the Little River,  
Federal Aid No. STP-24(6), State Project No. 8.T551001, TIP Project No. R-623,  
ER 01-8063 and 01-E-4220-0312

Thank you for your letter of November 1, 2000, concerning the above project.

Based upon previous work in this region we suggest an exception to the Memorandum of Understanding for new location highway corridors. Recently Wake Forest University completed reports for two, new- location NCDOT projects adjacent to Montgomery County. The background report for the US 52 (R-2903) project in Rowan, Cabarrus, and Stanley Counties and the survey report for the Randolph County US 311 (R-2606) project both include research questions. The background report for US 311, prepared by NCDOT in 1997, and the Uwharrie Management Plan, prepared in 1989, provide additional research questions and contexts relevant to a project near Troy.

Instead of preparing a separate background report for the subject project, we suggest using the background materials already available. This is an area rich in significant archaeological sites. Numerous sites are recorded in the project study area. It is likely unrecorded eligible sites are within the area. The Little River floodplain and adjacent landscape merit special attention. We recommend that an intensive archeological survey of the preferred alternative be conducted.

The survey report should include a summary of previous work, research questions, and field methods. The survey report should concentrate on interpreting the assemblages and sites discovered in a survey of the preferred alternative. This should be a comprehensive, synthetic, interpretative analysis that discusses aboriginal and historic land use in the area. Eligibility of sites would be assessed in the frameworks outlined in the US 52 and US 311 background reports, US 311 survey report, and the Uwharrie Management Plan. We recommend that a short popular interpretation be published and available at NCDOT rest areas, United States Forest Service (USFS) visitor centers, and other appropriate outlets.



Page 2 of 2

William Gilmore

December 28, 2000

The USFS, which is responsible for issuing the ARPA permit to conduct work associated with this project on federal property, would review the research design and field survey proposal as well as the survey report. We would be available to consult regarding the survey methods also.

We have conducted a search of our files and are aware of no structures of historical or architectural importance located within the planning area. However, since a comprehensive historical architectural inventory of has never been conducted, there may be structures of which we are unaware located within the planning area.

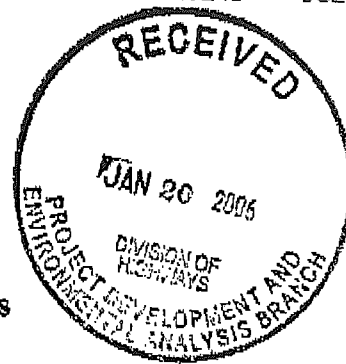
The above comments are made pursuant to Section 106 of National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, Environmental Review Coordinator, at 919/733-4763.

DB:kgc

cc: Rodney J. Snedeker  
Nicholas L. Graf  
ACOE, Asheville  
SCH





North Carolina Department of Cultural Resources  
State Historic Preservation Office

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor  
Lisbeth C. Evans, Secretary  
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History  
Division of Historical Resources  
David Brook, Director

January 17, 2006

MEMORANDUM

TO: Greg Thorpe, Ph.D., Director  
Project Development and Environmental Analysis Branch  
NCDOT Division of Highways

FROM: Peter Sandbeck *for Peter Sandbeck*

SUBJECT: Historic Architectural Survey Report, Highway 24-27 Improvements, Troy Bypass, R-0623, Montgomery County, ER01-8063

Thank you for your letter of November 10, 2005, transmitting the survey report by Richard Mattson of Mattson, Alexander, and Associates, Inc. for the above project.

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following property is listed and remains eligible for the National Register of Historic Places.

Montgomery County Courthouse

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following properties are eligible for the National Register of Historic Places under the criterion cited:

No. 2, Capel Family House, 205 East Main Street, Troy, is eligible for the National Register under Criterion B, for its association with the prominent Capel family in Troy. The Capels were important industrialists and civic leaders in the Piedmont and have lived continuously in the residence since 1883. The family founded the nationally known Capel braided rug manufacturing company.

We would like to request more information concerning Capel Rugs showroom building located northwest of the Capel House. The property appears to be historically associated with the Capel Family. Please evaluate the building in relation to the Capel House. If the showroom building has lost integrity or is outside the APE, this should be noted in the report. We will be able to concur on a proposed National Register boundary after we review the additional information.

ADMINISTRATION  
RESTORATION  
SURVEY & PLANNING

Location  
507 N. Blount Street, Raleigh NC  
515 N. Blount Street, Raleigh NC  
515 N. Blount Street, Raleigh, NC

Mailing Address  
4617 Mail Service Center, Raleigh NC 27699-4617  
4617 Mail Service Center, Raleigh NC 27699-4617  
4617 Mail Service Center, Raleigh NC 27699-4617

Telephone/Fax  
(919) 733-4763/733-8653  
(919) 733-6547/715-4801  
(919) 733-6545/715-4801



No. 3, Robert Terrell Poole House, south side of East Main Street (NC 24-27), roughly 0.25 mile east of Courthouse Square, Troy, is eligible for the National Register under Criterion C for architecture. The house stands as Troy's finest remaining Queen Anne dwelling and epitomizes the style in Montgomery County. We concur with the proposed National Register boundary as described and delineated in the survey report.

No. 4, Paul Russell House (Dogwood), south side, NC 24-27 (East Main Street), approximately one mile east of Courthouse Square, is eligible for the National Register under C for architecture. The house is a fine transitional Colonial Revival displaying Modernist strains, emphasizing form and geometry and general elimination of ornamentation. We concur with the proposed National Register boundary as described and delineated in the survey report.

No. 19, Wooley-Saunders House, west side SR 1005 at junction with SR 1519, 0.2 mile unpaved lane, Troy vicinity, is recommended as eligible for the National Register under Criterion C for architecture. Although abandoned and in need of repair, the house retains sufficient integrity to convey its significance as a remarkably stylish example of the Queen Anne in rural Montgomery County. We concur with the proposed National Register boundary as described and delineated in the survey report.

No. 21, the Neal Clark House, east side SR 1005, 0.2 mile north of junction with SR 1919, Troy vicinity, is eligible for the National Register under Criterion C for architecture. The small Queen Anne house is a notable for its retention of original exterior and interior decorative millwork and finishes. Although the house has been artificially sided and has replacement window sash, the small Queen Anne stands out among other local examples for the abundance of original decorative sawn work. The house and setting retain enough integrity to convey its architectural significance. The property includes three outbuildings, two of which contribute to the historic property. We concur with the proposed National Register boundary as described and delineated in the survey report.

For purposes of compliance with Section 106 of the National Historic Preservation Act, we concur that the following properties are not eligible for the National Register of Historic Places because they lack architectural or historical significance and (or) they no longer retain enough integrity to convey their significance:

Nos. 5 - 7; No. 20, and properties discussed in Appendices A and B.

Please note the Wade House, 214 North Main Street, Troy, was Study-listed in 2004, and appears to be within the Area of Potentials Effects for this project. Please include this property in your inventory.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Barley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

cc: Mary Pope Furr  
Richard Mattson, Mattson, Alexander and Associates, Inc.



State of North Carolina  
Department of Environment  
and Natural Resources  
Division of Water Quality



James B. Hunt, Jr., Governor  
Bill Holman, Secretary  
Kerr T. Stevens, Director

December 20, 2000

**MEMORANDUM**

To: William D. Gilmore, P.E., Manager  
NCDOT, Project Development and Environmental Analysis

Through: John Dorney, NC Division of Water Quality *JD*

From: Cynthia F. Van Der Wiele *cwv*

Subject: Comments for Proposed NC 24-27 Troy Bypass from SR 1138 to East of the Little River, Montgomery County, Federal Aid Project No. STP-24(6), State Project No. 8.T551001, TIP Project No. R-623.

This letter is in reference to your request for comments received November 23, 2000. Preliminary analysis of the project reveals that the proposed project will impact several streams in the Yadkin-Pee Dee River Basin: Warner Creek, Turkey Creek and its tributaries and the Little River. All of these streams have a water quality classification of C.

The Division of Water Quality requests that NCDOT consider the following environmental issues for the proposed project:

- A. There should be a discussion on mitigation plans for unavoidable impacts. If mitigation is required, it is preferable to present a conceptual (if not finalized) mitigation plan with the environmental documentation. While the NCDWQ realizes that this may not always be practical, it should be noted that for projects requiring mitigation, appropriate mitigation plans will be required prior to issuance of a 401 Water Quality Certification.
- B. DWQ prefers replacement of bridges with bridges. DOT should not install the bridge bents in the creek, to the maximum extent practicable. If the new structure is to be a culvert, it should be countersunk one foot, or to the maximum extent practicable, in order to allow unimpeded fish and other aquatic organisms passage through the crossing.
- C. When practical, the DWQ requests that bridges be replaced on the existing location with road closure. If a detour proves necessary, remediation measures in accordance with the NCDWQ requirements for General 401 Certification 2726/Nationwide Permit No. 33 (Temporary Construction, Access and Dewatering) must be followed.
- D. Wetland and stream impacts should be avoided (including sediment and erosion control structures/measures) to the maximum extent practical. If this is not possible, alternatives that minimize wetland impacts should be chosen.
- E. Borrow/waste areas should not be located in wetlands. It is likely that compensatory mitigation will be required if wetlands are impacted by waste or borrow.



- F. If foundation test borings are necessary; it should be noted in the document. Geotechnical work is approved under General 401 Certification Number 3027/Nationwide Permit No. 6 for Survey Activities.
- G. In accordance with the NCDWQ Wetlands Rules {15A NCAC 2H.0506(b)(6)}, mitigation will be required for impacts of greater than 150 linear feet to any single perennial stream and wetlands in excess of one acre. In the event that mitigation becomes required, the mitigation plan should be designed to replace appropriate lost functions and values. In accordance with the NCDWQ Wetlands Rules {15A NCAC 2H.0506 (h)(3)}, the Wetland Restoration Program may be available for use as stream mitigation.
- H. Sediment and erosion control measures should not be placed in wetlands.
- I. The 401 Water Quality Certification application will need to specifically address the proposed methods for stormwater management. More specifically, stormwater should not be permitted to discharge directly into the creek. Instead, stormwater should be designed to drain to a properly designed stormwater detention facility/apparatus.

Thank you for requesting our input at this time. The DOT is reminded that issuance of a 401 Water Quality Certification requires that appropriate measures be instituted to ensure that water quality standards are met and designated uses are not degraded or lost. If you have any questions or require additional information, please contact Cynthia Van Der Wiele at (919) 733.5715.

Pc: Steve Lund, U.S. Corps of Engineers, Asheville Field Office  
Marella Buncick, USFWS  
David Cox, NCWRC  
File Copy





## North Carolina Wildlife Resources Commission

Charles R. Fullwood, Executive Director

### MEMORANDUM

TO: Melba McGee  
Office of Legislative and Intergovernmental Affairs, DENR

FROM: David Cox, Highway Project Coordinator  
Habitat Conservation Program *David Cox*

DATE: December 11, 2000

SUBJECT: Request for information from the N. C. Department of Transportation (NCDOT) regarding fish and wildlife concerns for NC 24-27 Troy Bypass, from SR 1138 to east of the Little River, Montgomery County, North Carolina. TIP No. R-623, SCH Project No. 01-E-0312.

This memorandum responds to a request from Mr. William D. Gilmore of the NCDOT for our concerns regarding impacts on fish and wildlife resources resulting from the subject project. Biologists on the staff of the N. C. Wildlife Resources Commission (NCWRC) have reviewed the proposed improvements. Our comments are provided in accordance with certain provisions of the National Environmental Policy Act (42 U.S.C. 4332(2)(c)) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

We have no specific concerns regarding this project. However, to help facilitate document preparation and the review process, our general informational needs are outlined below:

1. Description of fishery and wildlife resources within the project area, including a listing of federally or state designated threatened, endangered, or special concern species. Potential borrow areas to be used for project construction should be included in the inventories. A listing of designated plant species can be developed through consultation with:

The Natural Heritage Program  
N. C. Division of Parks and Recreation  
1615 Mail Service Center  
Raleigh, N. C. 27699-1615  
(919) 733-7795



Memo

2

December 11, 2000

and,

NCDA Plant Conservation Program  
P. O. Box 27647  
Raleigh, N. C. 27611  
(919) 733-3610

2. Description of any streams or wetlands affected by the project. The need for channelizing or relocating portions of streams crossed and the extent of such activities.
3. Cover type maps showing wetland acreages impacted by the project. Wetland acreages should include all project-related areas that may undergo hydrologic change as a result of ditching, other drainage, or filling for project construction. Wetland identification may be accomplished through coordination with the U. S. Army Corps of Engineers (COE). If the COE is not consulted, the person delineating wetlands should be identified and criteria listed.
4. Cover type maps showing acreages of upland wildlife habitat impacted by the proposed project. Potential borrow sites should be included.
5. The extent to which the project will result in loss, degradation, or fragmentation of wildlife habitat (wetlands or uplands).
6. Mitigation for avoiding, minimizing or compensating for direct and indirect degradation in habitat quality as well as quantitative losses.
7. A cumulative impact assessment section which analyzes the environmental effects of highway construction and quantifies the contribution of this individual project to environmental degradation.
8. A discussion of the probable impacts on natural resources which will result from secondary development facilitated by the improved road access.
9. If construction of this facility is to be coordinated with other state, municipal, or private development projects, a description of these projects should be included in the environmental document, and all project sponsors should be identified.

Thank you for the opportunity to provide input in the early planning stages for this project. If we can further assist your office, please contact me at (919) 528-9886.

cc: USFWS, Raleigh



**INTERGOVERNMENTAL REVIEW - PROJECT COMMENTS**

After review of this project it has been determined that the ENR permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of the form. applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

Project Number: 01E-0312 Due Date: 12-11-00

| PERMITS                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SPECIAL APPLICATION PROCEDURES or REQUIREMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Normal Process Time<br>(statutory time limit) |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/>            | Permit to construct & operate wastewater treatment facilities, sewer system extensions & sewer systems not discharging into state surface waters.                                                                                                                                                                                                                                                                                                  | Application 90 days before begin construction or award of construction contracts. On-site inspection. Post-application technical conference usual.                                                                                                                                                                                                                                                                                                                                                                                                             | 30 days<br>(90 days)                          |
| <input type="checkbox"/>            | NPDES - permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.                                                                                                                                                                                                                                                                                                 | Application 180 days before begin activity. On-site inspection. Pre-application conference usual. Additionally, obtain permit to construct wastewater treatment facility granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit - whichever is later.                                                                                                                                                                                                                                                                        | 90-120 days<br>(N/A)                          |
| <input type="checkbox"/>            | Water Use Permit                                                                                                                                                                                                                                                                                                                                                                                                                                   | Pre-application technical conference usually necessary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30 days<br>(N/A)                              |
| <input type="checkbox"/>            | Well Construction Permit                                                                                                                                                                                                                                                                                                                                                                                                                           | Complete application must be received and permit issued prior to the installation of a well.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7 days<br>(15 days)                           |
| <input type="checkbox"/>            | Dredge and Fill Permit                                                                                                                                                                                                                                                                                                                                                                                                                             | Application copy must be served on each adjacent riparian property owner. On-site inspection. Pre-application conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.                                                                                                                                                                                                                                                                                                                | 55 days<br>(90 days)                          |
| <input type="checkbox"/>            | Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.0100, 2Q.0300, 2H.0600)                                                                                                                                                                                                                                                                                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60 days                                       |
| <input checked="" type="checkbox"/> | Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900                                                                                                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60 days<br>(90 days)                          |
| <input type="checkbox"/>            | Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 2D.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-733-0820.                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                               |
| <input type="checkbox"/>            | Complex Source Permit required under 15 A NCAC 2D.0800                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                               |
| <input checked="" type="checkbox"/> | The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres to be disturbed. Plan filed with proper Regional Office (Land Quality Sect.) At least 30 days before beginning activity. A fee of \$30 for the first acre and \$2000 for each additional acre or part must accompany the plan. <i>As normal for DOT</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 20 days<br>(30 days)                          |
| <input type="checkbox"/>            | The Sedimentation Pollution control Act of 1973 must be addressed with respect to the referenced Local Ordinance.                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (30 days)                                     |
| <input type="checkbox"/>            | Mining Permit                                                                                                                                                                                                                                                                                                                                                                                                                                      | On-site inspection usual. Surety bond filed with ENR. Bond amount varies with type mine and number of acres of affected land. Any acre mined greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.                                                                                                                                                                                                                                                                                                   | 30 days<br>(60 days)                          |
| <input type="checkbox"/>            | North Carolina Burning permit                                                                                                                                                                                                                                                                                                                                                                                                                      | On-site inspection by N.C. Division Forest Resources if permit exceeds 4 days                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1 day<br>(N/A)                                |
| <input type="checkbox"/>            | Special Ground Clearance Burning Permit - 22 counties in coastal N.C. with organic soils                                                                                                                                                                                                                                                                                                                                                           | On-site inspection by N.C. Division Forest Resources required "if more than five acres of ground clearing activities are involved. Inspections should be requested at least ten days before actual burn is planned."                                                                                                                                                                                                                                                                                                                                           | 1 day<br>(N/A)                                |
| <input type="checkbox"/>            | Oil Refining Facilities                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 90-120 days<br>(N/A)                          |
| <input type="checkbox"/>            | Dam Safety Permit                                                                                                                                                                                                                                                                                                                                                                                                                                  | If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to prepare plans, inspect construction, certify construction is according to ENR approved plans. May also require permit under mosquito control program. And a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of \$200.00 must accompany the application. An additional processing fee based on a percentage of the total project cost will be required upon completion. | 30 days<br>(60 days)                          |



# TOWN OF TROY

---

INCORPORATED 1852

ROY MANESS  
MAYOR

H.V. MASSENGILL  
MAYOR PRO-TEM

COMMISSIONERS:  
BRUCE HAMILTON  
PAIGE HARRIS  
JAMES HURLEY  
CHRIS WATKINS

From the Office of the Mayor . . .

July 10th, 2003

Mr. Michael Penney, PE  
Project Development & Environmental Analysis Branch  
NC Dept. of Transportation  
1548 Mail Service Center  
Raleigh, NC 27699-1548

**Re: TIP Project No. R-623 NC 24/27 Improvements**

Dear Mr. Penney,

We are writing to provide our input on the proposed Troy Bypass Project (TIP Project No. R-623). First of all, we are 100% in favor of a four-lane highway to Troy by improvements to NC Highway 24-27. We feel a four-lane highway from the west will improve our community's ability to grow and prosper. It is a much needed improvement that will enhance our economic development efforts. This project does not need to be postponed further and we ask that the improvements be expedited.

We have studied the options presented by DOT. We are adamantly opposed to "Alternate A" which is to widen the existing roadway through Troy. This option will do great damage to our town. It will wipe out many homes and businesses and change the character of our town in a negative way. Furthermore, creating a four-lane highway through town will not solve the traffic congestion problems that we have now which will continue to worsen.

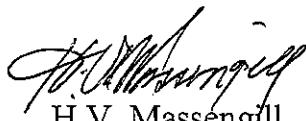
A bypass option is the preferred improvement to NC Highway 24-27. In considering the bypass alternates, we ask that the Town of Troy be given an opportunity by DOT for input on the proposed road location. It is our greatest concern and fear that we will lose existing businesses with the new road and we cannot afford to lose any business.

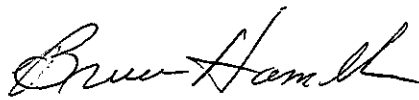


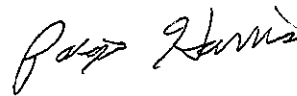
Thank you for the opportunity to provide input on this worthy project for our community. If any additional information is needed, please feel free to contact Town Manager Jamie Justice at (910) 572-3661.

Sincerely,

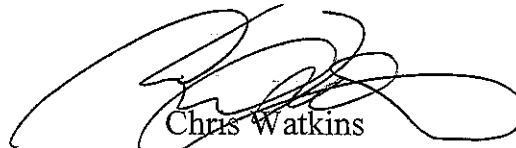
  
Roy Maness  
Mayor

  
H.V. Massengill  
Mayor Pro-Tem

  
Bruce Hamilton  
Commissioner

  
Paige Harris  
Commissioner

  
James Hurley  
Commissioner

  
Chris Watkins  
Commissioner

JJ/sm

Cc: G.R. Kindley, Division 8 Member, NC Board of Transportation  
Bill Rosser, Division Engineer, Division 8  
Kevin Hedrick, District Engineer, District 3  
Judy Stevens, Montgomery County EDC Director  
Billy Maness, Chairman of County Commission, Montgomery County  
NC Representative Pryor Gibson  
NC Senator Jerry Tillman  
File



# MONTGOMERY C O U N T Y



*A Golden Opportunity!*

Economic Development

910-572-2575

Chamber of Commerce

910-572-4300

July 17, 2003

Mr. Michael Penney, PE  
Project Development & Environmental Analysis Branch  
NC Department of Transportation  
1548 Mail Service Center  
Raleigh, NC 27699-1548

**RE: TIP Project No. R-623 NC 24/27 Improvements**

Dear Mr. Penney:

Thank you for the opportunity to provide input on the proposed Troy Bypass Project, (TIP Project # R-623). I believe this project is critical to our economic development efforts and should be a priority for our county.

I would like to express my opposition to "Alternate A" which is to widen the existing roadway through Troy. This option would eliminate many of the beautiful homes and prosperous businesses in its path and would have a very negative effect on the town. Additionally, a four-lane highway through town will not solve our current or future traffic congestion problems.

In considering alternatives B through E I would ask that the Montgomery EDC be given opportunity for input on the proposed road location.

Thank you for the opportunity to provide input on this important project.

Sincerely,

A handwritten signature in cursive script, appearing to read "Judy Stevens".

Judy Stevens, Executive Director  
Montgomery Economic Development Corporation

Cc: G.R. Kindley, Division 8 Member, NC Board of Transportation  
Lee Matthews, Manager, Montgomery County  
NC Senator Jerry Tillman  
NC Representative Pryor Gibson



## APPENDIX A.2

---

NEPA/404 MERGER TEAM CONCURRENCE



**Section 404/NEPA Merger Project Team Meeting Agreement  
Concurrence Point No. 1 - Purpose and Need.**

**Project No./TIP No./Name/Description:**

8.T551001, R-623, NC 24/27, From west of SR 1138 to east of the Little River, Troy, Montgomery County, North Carolina

**Purpose and Need of Proposed Project:**

The purpose of the project is to increase safety and to provide additional capacity for NC 24/27 traffic which will reduce the impacts of through-traffic and heavy trucks in downtown Troy. (see purpose and need document dated January 2001)

The Project Team concurred on this date of March 8, 2001 with the purpose of and need for the proposed project as stated above.

USACE

[Signature]

NCDOT

[Signature]

USFWS

[Signature]

USFWS

[Signature]

NCDWQ

[Signature]

NCWRC

[Signature]

SHPO

[Signature]

FHWA

[Signature]



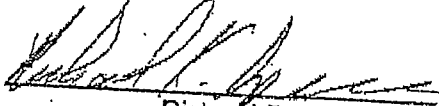
Section 404/NEPA Merger Project Team Meeting Agreement  
Concurrence Point No. 2  
Detailed Study Alternatives Carried Forward

Project No./TIP No./ Name/Description:

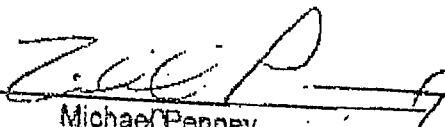
FA Project Number: STP-24(6)  
State Project Number: 8.T551001  
WBS Number: 34352.1.1  
TIP Number: R-0623  
Project Description: NC 24/27 Improvements, From SR 1138 to East of the Little River, Montgomery County, North Carolina

Based on a review of the proposed alternatives as presented September 17, 2003, and subsequent discussions with US Army Corps of Engineer representative in January 2004 the Project Team has concurred on this date of August 27, 2004 with the selection of new location Alternatives B, C, D, and E to be evaluated in detail for TIP No. R-0623.

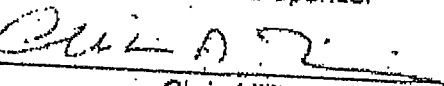
USACE

  
Richard Spencer

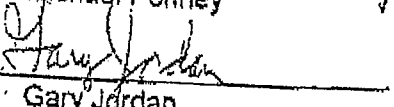
NCDOT

  
Michael Penney

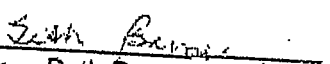
USEPA

  
Chris Militscher

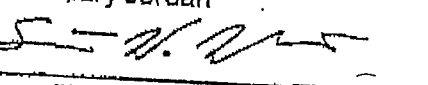
USFWS

  
Gary Jordan

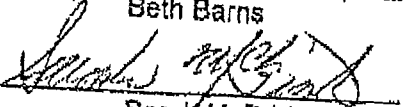
NCDWQ

  
Beth Barns

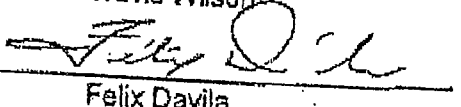
NCWRC

  
Travis Wilson

NCDCR

  
Sarah McBride

FHWA

  
Felix Davila



# NEPA/404 MERGER TEAM MEETING AGREEMENT

## Concurrence Point No. 2A: Bridging and Alignment Review

### PROJECT NO./TIP NO./ NAME/DESCRIPTION:

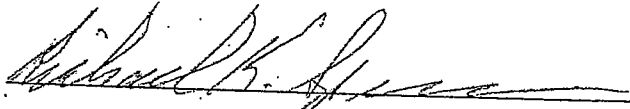
State Project Number: 8.T551001  
TIP Project Number: R-623  
TIP Description: NC 24/27 Improvements From SR 1138 to east of the Little River in Montgomery County

### HYDRAULIC RECOMMENDATIONS:

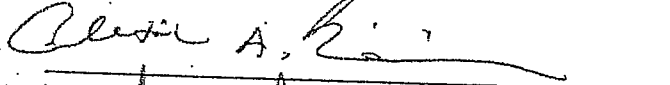
The number of recommended major drainage structures for each alternative is as follows: Alternative B (6); Alternative C (6); Alternative D (6); Alternative E (6). Final drainage structure sizes and elevations would be completed during final design, at which time additional hydraulic studies would be performed.

The Project Team has concurred on this date of March 22, 2005 with the bridging and alignment review of the all detailed study alternatives as shown on the attached exhibits and Table 3 (*Recommended Major Drainage Structures*). For the crossing designated as B5, C5, D5, E5, a second culvert barrel will be evaluated and sized during the Concurrence Point 4A meeting.

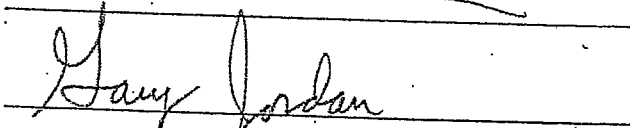
US Army Corps of Engineers



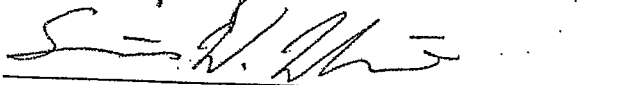
US Environmental Protection Agency



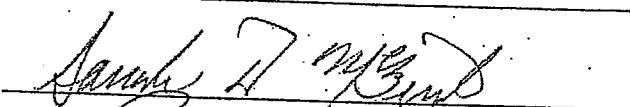
US Fish and Wildlife Services



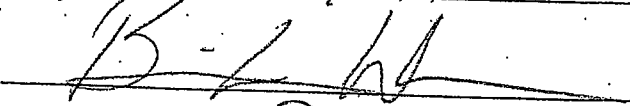
NC Wildlife Resources Commission



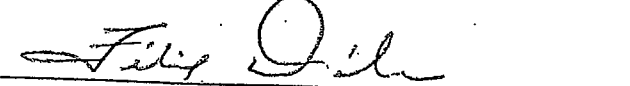
NC Department of Cultural Resources



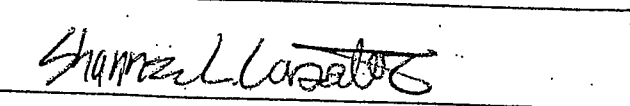
NC DENR - DWQ



Federal Highway Administration



NC Department of Transportation





## APPENDIX A.3

---

FARMLAND CONVERSION IMPACT RATING FORM (USDA FORM AD-1006)



# FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

NRCS-CPA-106  
(Rev. 1-91)

## PART I (To be completed by Federal Agency)

1. Name of Project NC 24127 Improvements 3. Date of Land Evaluation Request 5/23/05 4. Sheet 1 of 1  
2. Type of Project Transportation 5. Federal Agency Involved NA - State Project  
6. County and State Montgomery County, NC

## PART II (To be completed by NRCS)

Does the corridor contain any structures, utility lines, or other improvements? Yes ☒ No ☐  
If Yes, describe the structures, utility lines, or other improvements: ACAU WALTERS  
Is the corridor a public road? Yes ☒ No ☐  
If Yes, describe the road: CORN  
Is the corridor a public waterway? No ☐ Yes ☐  
If Yes, describe the waterway: MONTGOMERY COLESA  
Is the corridor a public utility line? No ☐ Yes ☐  
If Yes, describe the utility line: N/A  
Is the corridor a public structure? No ☐ Yes ☐  
If Yes, describe the structure: 194116063 49.4  
Is the corridor a public improvement? No ☐ Yes ☐  
If Yes, describe the improvement: 194047 56.4  
Is the corridor a public structure? No ☐ Yes ☐  
If Yes, describe the structure: 6-7-05

## PART III (To be completed by Federal Agency)

A. Total Acres To Be Converted Directly 79.22 Alternative Corridor For Segment  
B. Total Acres To Be Converted Indirectly, Or To Receive Services 77.67 Corridor B  
C. Total Acres In Corridor 84.98 Corridor C  
79.22 Corridor D  
77.67 Corridor E  
84.98 Corridor 44  
94.15

## PART IV (To be completed by NRCS) Land Evaluation Information

Is the corridor prime and/or unique farmland? Yes ☒ No ☐  
If Yes, describe the prime and/or unique farmland: 57.27  
Is the corridor of lower and/or impaired farmland? Yes ☒ No ☐  
If Yes, describe the lower and/or impaired farmland: 56.47  
Is the corridor of farmland in a critical zone? Yes ☒ No ☐  
If Yes, describe the farmland in a critical zone: 57.26  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 65.43  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 28.72  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 0.04  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 0.04  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 14  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 14  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 79  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 79  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 79  
Is the corridor of farmland in a flood plain? Yes ☒ No ☐  
If Yes, describe the farmland in a flood plain: 79

## PART V (To be completed by NRCS) Land Evaluation Information

Assessment Criteria (These criteria are explained in 7 CFR 658.5(c)) Maximum Points  
1. Area in Nonurban Use 15 9  
2. Perimeter in Nonurban Use 10 9  
3. Percent Of Corridor Being Farmed 20 11  
4. Protection Provided By State And Local Government 20 9  
5. Size of Present Farm Unit Compared To Average 10 1  
6. Creation Of Nonfarmable Farmland 25 0  
7. Availability Of Farm Support Services 5 0  
8. On-Farm Investments 20 10  
9. Effects Of Conversion On Farm Support Services 25 4  
10. Compatibility With Existing Agricultural Use 10 0  
TOTAL CORRIDOR ASSESSMENT POINTS 160 34  
34 34 38 40

## PART VI (To be completed by Federal Agency)

Relative Value Of Farmland (From Part V) 100 79  
Total Corridor Assessment (From Part VI above or a local site assessment) 160 34  
TOTAL POINTS (Total of above 2 lines) 260 113  
113 113 117 119

1. Corridor Selected: 2. Total Acres of Farmlands to be Converted by Project: 3. Date Of Selection: 4. Was A Local Site Assessment Used?  
5. Reason For Selection: YES ☐ NO ☐

Signature of Person Completing this Part:

DATE

NOTE: Complete a form for each segment with more than one Alternate Corridor



# APPENDIX A.4

---

## RELOCATION REPORT

# RELOCATION REPORT

North Carolina Department of Transportation  
RELOCATION ASSISTANCE PROGRAM

☒ E.I.S.

☒ CORRIDOR

☐ DESIGN

|                         |                                                                                          |              |            |           |   |    |           |
|-------------------------|------------------------------------------------------------------------------------------|--------------|------------|-----------|---|----|-----------|
| WBS:                    | 34352.1.1                                                                                | COUNTY       | Montgomery | Alternate | B | of | Alternate |
| I.D. NO.:               | R-0623                                                                                   | F.A. PROJECT |            |           |   |    |           |
| DESCRIPTION OF PROJECT: | NC Hwy 24/27 (Troy Bypass) from West of SR-1138 (Dairy Road) to East of the Little River |              |            |           |   |    |           |

| ESTIMATED DISPLACED |        |         |       |            | INCOME LEVEL |        |        |        |       |
|---------------------|--------|---------|-------|------------|--------------|--------|--------|--------|-------|
| Type of Displacees  | Owners | Tenants | Total | Minorities | 0-15M        | 15-25M | 25-35M | 35-50M | 50 UP |
| Residential         | 9      | 4       | 13    | 3          | 4            | 1      | 3      | 3      | 2     |
| Businesses          | 5      | 5       | 10    | 2          |              |        |        |        |       |
| Farms               |        |         |       |            |              |        |        |        |       |
| Non-Profit          |        | 1       | 1     | 0          |              |        |        |        |       |

| ANSWER ALL QUESTIONS |    |                                                                                                                |  |  |  |  |  |  |  |
|----------------------|----|----------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|
| Yes                  | No | Explain all "YES" answers.                                                                                     |  |  |  |  |  |  |  |
|                      | X  | 1. Will special relocation services be necessary?                                                              |  |  |  |  |  |  |  |
|                      | X  | 2. Will schools or churches be affected by displacement?                                                       |  |  |  |  |  |  |  |
| X                    |    | 3. Will business services still be available after project?                                                    |  |  |  |  |  |  |  |
| X                    |    | 4. Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc. |  |  |  |  |  |  |  |
|                      | X  | 5. Will relocation cause a housing shortage?                                                                   |  |  |  |  |  |  |  |
|                      | X  | 6. Source for available housing (list).                                                                        |  |  |  |  |  |  |  |
|                      | X  | 7. Will additional housing programs be needed?                                                                 |  |  |  |  |  |  |  |
| X                    |    | 8. Should Last Resort Housing be considered?                                                                   |  |  |  |  |  |  |  |
| X                    |    | 9. Are there large, disabled, elderly, etc. families?                                                          |  |  |  |  |  |  |  |
| X                    |    | 10. Will public housing be needed for project?                                                                 |  |  |  |  |  |  |  |
| X                    |    | 11. Is public housing available?                                                                               |  |  |  |  |  |  |  |
|                      | X  | 12. Is it felt there will be adequate DSS housing available during relocation period?                          |  |  |  |  |  |  |  |
|                      | X  | 13. Will there be a problem of housing within financial means?                                                 |  |  |  |  |  |  |  |
| X                    |    | 14. Are suitable business sites available (list source).                                                       |  |  |  |  |  |  |  |
|                      |    | 15. Number months estimated to complete                                                                        |  |  |  |  |  |  |  |

**REMARKS (Respond by Number)**

#3 Businesses being displaced are not unique & there is an adequate number of businesses offering the same or similar services.

#4 See Attachment

#6 Realtor.com 23 properties listed  
Rentnet.com 4 complexes listed

The Troy Housing Authority has available housing units. Area newspaper classified ads list adequate supply of housing available.

#8 Relocation experience on prior projects indicates that last resort housing will have to be considered. Especially in the lower & higher valued displacee categories.

#9 Review of the corridor(s) indicates that there will be large, disabled, elderly, etc. families & adequate housing will be available to accommodate the prospective displacees.

#10 Review of the corridor(s) indicates that public housing will be needed for project.

#11 The Troy Housing Authority has available housing units should public housing be needed.

#12 Sampling of Real Estate companies in Troy indicate adequate supply of residential (single family & rental units) as well as commercial listings are available.

#14 Sampling of Real Estate companies in Troy indicate

adequate supply of residential (single family & rental units) as well as commercial listings are available.

\*Residence at intersection with -Y6- burned and is a total loss.

\*Corridor hits a Communication & Fire Tower owned by the US Forestry Service (probably a lease agreement) on the Dorothy K. Caudle property.

|                                            |          |                        |         |
|--------------------------------------------|----------|------------------------|---------|
| <i>E. J. Rabens III</i>                    | 01/10/06 | <i>Andy Simpson</i>    | 1-13-06 |
| Edwin T. Rabens, III<br>Right of Way Agent | Date     | Relocation Coordinator | Date    |



# RELOCATION REPORT

North Carolina Department of Transportation  
RELOCATION ASSISTANCE PROGRAM

☒ E.I.S.

☒ CORRIDOR

☐ DESIGN

|                         |           |                                                                                          |            |           |   |    |           |
|-------------------------|-----------|------------------------------------------------------------------------------------------|------------|-----------|---|----|-----------|
| WBS:                    | 34352.1.1 | COUNTY                                                                                   | Montgomery | Alternate | C | of | Alternate |
| I.D. NO.:               | R-0623    | F.A. PROJECT                                                                             |            |           |   |    |           |
| DESCRIPTION OF PROJECT: |           | NC Hwy 24/27 (Troy Bypass) from West of SR-1138 (Dairy Road) to East of the Little River |            |           |   |    |           |

| ESTIMATED DISPLACED |        |         |       |            | INCOME LEVEL |        |        |        |       |
|---------------------|--------|---------|-------|------------|--------------|--------|--------|--------|-------|
| Type of Displacees  | Owners | Tenants | Total | Minorities | 0-15M        | 15-25M | 25-35M | 35-50M | 50 UP |
| Residential         | 8      | 4       | 12    | 3          | 4            | 2      | 2      | 2      | 2     |
| Businesses          | 5      | 5       | 10    | 2          |              |        |        |        |       |
| Farms               |        |         |       |            |              |        |        |        |       |
| Non-Profit          |        | 1       | 1     | 0          |              |        |        |        |       |

| ANSWER ALL QUESTIONS |    |                                                                                                                |  |  |  |  |  |  |  |
|----------------------|----|----------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|
| Yes                  | No | Explain all "YES" answers.                                                                                     |  |  |  |  |  |  |  |
|                      | X  | 1. Will special relocation services be necessary?                                                              |  |  |  |  |  |  |  |
|                      | X  | 2. Will schools or churches be affected by displacement?                                                       |  |  |  |  |  |  |  |
| X                    |    | 3. Will business services still be available after project?                                                    |  |  |  |  |  |  |  |
| X                    |    | 4. Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc. |  |  |  |  |  |  |  |
|                      | X  | 5. Will relocation cause a housing shortage?                                                                   |  |  |  |  |  |  |  |
|                      | X  | 6. Source for available housing (list).                                                                        |  |  |  |  |  |  |  |
| X                    |    | 7. Will additional housing programs be needed?                                                                 |  |  |  |  |  |  |  |
| X                    |    | 8. Should Last Resort Housing be considered?                                                                   |  |  |  |  |  |  |  |
|                      |    | 9. Are there large, disabled, elderly, etc. families?                                                          |  |  |  |  |  |  |  |
| X                    |    | 10. Will public housing be needed for project?                                                                 |  |  |  |  |  |  |  |
| X                    |    | 11. Is public housing available?                                                                               |  |  |  |  |  |  |  |
| X                    |    | 12. Is it felt there will be adequate DSS housing available during relocation period?                          |  |  |  |  |  |  |  |
|                      | X  | 13. Will there be a problem of housing within financial means?                                                 |  |  |  |  |  |  |  |
| X                    |    | 14. Are suitable business sites available (list source).                                                       |  |  |  |  |  |  |  |
|                      |    | 15. Number months estimated to complete                                                                        |  |  |  |  |  |  |  |

| VALUE OF DWELLING |   |          |   | DSS DWELLING AVAILABLE |    |          |    |
|-------------------|---|----------|---|------------------------|----|----------|----|
| Owners            |   | Tenants  |   | For Sale               |    | For Rent |    |
| 0-20M             | 4 | \$ 0-150 |   | 0-20M                  |    | \$ 0-150 |    |
| 20-40M            |   | 150-250  | 3 | 20-40M                 | 3  | 150-250  | 5  |
| 40-70M            |   | 250-400  | 1 | 40-70M                 | 5  | 250-400  | 10 |
| 70-100M           | 2 | 400-500  |   | 70-100M                | 8  | 400-500  | 10 |
| 100 UP            | 2 | 500 UP   |   | 100 UP                 | 6  | 500 UP   | 5  |
| TOTAL             | 8 |          | 4 |                        | 23 |          | 30 |

## REMARKS (Respond by Number)

- #3 Businesses being displaced are not unique & there is an adequate number of businesses offering the same or similar services.
- #4 See Attachment
- #6 Realtor.com 23 properties listed  
Rentnet.com 4 complexes listed
- The Troy Housing Authority has available housing units.
- Area newspaper classified ads list adequate supply of housing available.
- #8 Relocation experience on prior projects indicates that last resort housing will have to be considered. Especially in the lower & higher valued displacee categories.
- #9 Review of the corridor(s) indicates that there will be large, disabled, elderly, etc. families & adequate housing will be available to accommodate the prospective displacees.
- #10 Review of the corridor(s) indicates that public housing will be needed for project.
- #11 The Troy Housing Authority has available housing units should public housing be needed.
- #12 Sampling of Real Estate companies in Troy indicate adequate supply of residential (single family & rental units) as well as commercial listings are available.
- #14 Sampling of Real Estate companies in Troy indicate

RELOCATION?

16

adequate supply of residential (single family & rental units) as well as commercial listings are available.

\*Residence at intersection with -Y6- burned and is a total loss.

\*Corridor hits a Communication & Fire Tower owned by the US Forestry Service (probably a lease agreement) on the Dorothy K. Caudle property.

E. J. Rabens III

01/10/06

Edwin T. Rabens, III  
Right of Way Agent

Date

Andy Simpson  
Relocation Coordinator

1-13-06

Date

# RELOCATION REPORT

☒ E.I.S.

☒ CORRIDOR

☐ DESIGN

 North Carolina Department of Transportation  
 RELOCATION ASSISTANCE PROGRAM

|                         |           |                                                                                          |            |           |   |    |           |
|-------------------------|-----------|------------------------------------------------------------------------------------------|------------|-----------|---|----|-----------|
| WBS:                    | 34352.1.1 | COUNTY                                                                                   | Montgomery | Alternate | D | of | Alternate |
| I.D. NO.:               | R-0623    | F.A. PROJECT                                                                             |            |           |   |    |           |
| DESCRIPTION OF PROJECT: |           | NC Hwy 24/27 (Troy Bypass) from West of SR-1138 (Dairy Road) to East of the Little River |            |           |   |    |           |

## ESTIMATED DISPLACED

| Type of Displacees | Owners | Tenants | Total | Minorities |
|--------------------|--------|---------|-------|------------|
| Residential        | 5      | 4       | 9     | 2          |
| Businesses         | 5      | 5       | 10    | 2          |
| Farms              |        |         |       |            |
| Non-Profit         |        | 1       | 1     | 0          |

## INCOME LEVEL

| 0-15M | 15-25M | 25-35M | 35-50M | 50 UP |
|-------|--------|--------|--------|-------|
| 3     |        | 4      | 2      |       |

## VALUE OF DWELLING

| Owners  |   | Tenants  |   | DSS DWELLING AVAILABLE |          |
|---------|---|----------|---|------------------------|----------|
|         |   |          |   | For Sale               | For Rent |
| 0-20K   | 3 | \$ 0-150 |   | 0-20K                  | \$ 0-150 |
| 20-40K  |   | 150-250  | 3 | 20-40K                 | 150-250  |
| 40-70K  |   | 250-400  | 1 | 40-70K                 | 250-400  |
| 70-100K | 2 | 400-800  |   | 70-100K                | 400-800  |
| 100 UP  |   | 800 UP   |   | 100 UP                 | 800 UP   |
| TOTAL   | 5 |          | 4 | 23                     | 30       |

## ANSWER ALL QUESTIONS

| Yes | No | Explain all "YES" answers.                                                                                     |
|-----|----|----------------------------------------------------------------------------------------------------------------|
|     | X  | 1. Will special relocation services be necessary?                                                              |
|     | X  | 2. Will schools or churches be affected by displacement?                                                       |
| X   |    | 3. Will business services still be available after project?                                                    |
| X   |    | 4. Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc. |
|     | X  | 5. Will relocation cause a housing shortage?                                                                   |
|     | X  | 6. Source for available housing (list).                                                                        |
| X   |    | 7. Will additional housing programs be needed?                                                                 |
| X   |    | 8. Should Last Resort Housing be considered?                                                                   |
|     |    | 9. Are there large, disabled, elderly, etc. families?                                                          |
| X   |    | 10. Will public housing be needed for project?                                                                 |
| X   |    | 11. Is public housing available?                                                                               |
| X   |    | 12. Is it felt there will be adequate DSS housing available during relocation period?                          |
|     | X  | 13. Will there be a problem of housing within financial means?                                                 |
| X   |    | 14. Are suitable business sites available (list source).                                                       |
|     |    | 15. Number months estimated to complete                                                                        |

## REMARKS (Respond by Number)

#3 Businesses being displaced are not unique & there is an adequate number of businesses offering the same or similar services.

#4 See Attachment

#6 Realtor.com 23 properties listed  
Rentnet.com 4 complexes listed

The Troy Housing Authority has available housing units.

Area newspaper classified ads list adequate supply of housing available.

#8 Relocation experience on prior projects indicates that last resort housing will have to be considered. Especially in the lower & higher valued displacee categories.

#9 Review of the corridor(s) indicates that there will be large, disabled, elderly, etc. families & adequate housing will be available to accommodate the prospective displacees.

#10 Review of the corridor(s) indicates that public housing will be needed for project.

#11 The Troy Housing Authority has available housing units should public housing be needed.

#12 Sampling of Real Estate companies in Troy indicate adequate supply of residential (single family & rental units) as well as commercial listings are available.

#14 Sampling of Real Estate companies in Troy indicate

RELOCATION?

18

adequate supply of residential (single family & rental units) as well as commercial listings are available.

\*Residence at intersection with -YB- burned and is a total loss.

\*Corridor hits a Communication & Fire Tower owned by the US Forestry Service (probably a lease agreement) on the Dorothy K. Caudle property.

E. J. Rabens III

01/10/06

Edwin T. Rabens, III  
Right of Way Agent

Date

Andy Simpson

Relocation Coordinator

1-13-06

Date



# RELOCATION REPORT

☒ E.I.S.☒ CORRIDOR☐ DESIGN

North Carolina Department of Transportation  
RELOCATION ASSISTANCE PROGRAM

|                         |           |                                                                                          |            |           |   |    |           |
|-------------------------|-----------|------------------------------------------------------------------------------------------|------------|-----------|---|----|-----------|
| WBS:                    | 34352.1.1 | COUNTY                                                                                   | Montgomery | Alternate | E | of | Alternate |
| I.D. NO.:               | R-0623    | F.A. PROJECT                                                                             |            |           |   |    |           |
| DESCRIPTION OF PROJECT: |           | NC Hwy 24/27 (Troy Bypass) from West of SR-1136 (Dairy Road) to East of the Little River |            |           |   |    |           |

| ESTIMATED DISPLACED |        |         |       |            | INCOME LEVEL |        |        |        |       |
|---------------------|--------|---------|-------|------------|--------------|--------|--------|--------|-------|
| Type of Displacees  | Owners | Tenants | Total | Minorities | 0-15M        | 15-25M | 25-35M | 35-50M | 50 UP |
| Residential         | 5      | 4       | 9     | 3          | 4            | 1      | 2      | 2      |       |
| Businesses          | 5      | 5       | 10    | 2          |              |        |        |        |       |
| Farms               |        |         |       |            |              |        |        |        |       |
| Non-Profit          |        | 1       | 1     | 0          |              |        |        |        |       |

| ANSWER ALL QUESTIONS |    |                                                                                                                |  |  |  |  |  |  |  |
|----------------------|----|----------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|
| Yes                  | No | Explain all "YES" answers.                                                                                     |  |  |  |  |  |  |  |
|                      | X  | 1. Will special relocation services be necessary?                                                              |  |  |  |  |  |  |  |
|                      | X  | 2. Will schools or churches be affected by displacement?                                                       |  |  |  |  |  |  |  |
| X                    |    | 3. Will business services still be available after project?                                                    |  |  |  |  |  |  |  |
| X                    |    | 4. Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc. |  |  |  |  |  |  |  |
|                      | X  | 5. Will relocation cause a housing shortage?                                                                   |  |  |  |  |  |  |  |
|                      | X  | 6. Source for available housing (list).                                                                        |  |  |  |  |  |  |  |
| X                    |    | 7. Will additional housing programs be needed?                                                                 |  |  |  |  |  |  |  |
| X                    |    | 8. Should Last Resort Housing be considered?                                                                   |  |  |  |  |  |  |  |
| X                    |    | 9. Are there large, disabled, elderly, etc. families?                                                          |  |  |  |  |  |  |  |
| X                    |    | 10. Will public housing be needed for project?                                                                 |  |  |  |  |  |  |  |
| X                    |    | 11. Is public housing available?                                                                               |  |  |  |  |  |  |  |
| X                    |    | 12. Is it felt there will be adequate DSS housing available during relocation period?                          |  |  |  |  |  |  |  |
|                      | X  | 13. Will there be a problem of housing within financial means?                                                 |  |  |  |  |  |  |  |
| X                    |    | 14. Are suitable business sites available (list source).                                                       |  |  |  |  |  |  |  |
|                      |    | 15. Number months estimated to complete                                                                        |  |  |  |  |  |  |  |

| VALUE OF DWELLING |   |         |   |          |    |          |    |  |  | DSS DWELLING AVAILABLE |  |  |  |
|-------------------|---|---------|---|----------|----|----------|----|--|--|------------------------|--|--|--|
| Owners            |   | Tenants |   | For Sale |    | For Rent |    |  |  |                        |  |  |  |
| 0-20M             | 3 | \$0-150 |   | 0-20M    |    | \$0-150  |    |  |  |                        |  |  |  |
| 20-40M            |   | 150-250 | 3 | 20-40M   | 3  | 150-250  | 5  |  |  |                        |  |  |  |
| 40-70M            |   | 250-400 | 1 | 40-70M   | 6  | 250-400  | 10 |  |  |                        |  |  |  |
| 70-100M           | 2 | 400-600 |   | 70-100M  | 8  | 400-600  | 10 |  |  |                        |  |  |  |
| 100 UP            |   | 600 UP  |   | 100 UP   | 6  | 600 UP   | 5  |  |  |                        |  |  |  |
| TOTAL             | 5 |         | 4 |          | 23 |          | 30 |  |  |                        |  |  |  |

REMARKS (Respond by Number)

#3 Businesses being displaced are not unique & there is an adequate number of businesses offering the same or similar services.

#4 See Attachment

#6 Realtor.com 23 properties listed  
Rentnet.com 4 complexes listed

The Troy Housing Authority has available housing units.

Area newspaper classified ads list adequate supply of housing available.

#8 Relocation experience on prior projects indicates that last resort housing will have to be considered. Especially in the lower & higher valued displacee categories.

#9 Review of the corridor(s) indicates that there will be large, disabled, elderly, etc. families & adequate housing will be available to accommodate the prospective displacees.

#10 Review of the corridor(s) indicates that public housing will be needed for project.

#11 The Troy Housing Authority has available housing units should public housing be needed.

#12 Sampling of Real Estate companies in Troy indicate adequate supply of residential (single family & rental units) as well as commercial listings are available.

#14 Sampling of Real Estate companies in Troy indicate

adequate supply of residential (single family & rental units) as well as commercial listings are available.

\*Residence at intersection with -Y6- burned and is a total loss.

\*Corridor hits a Communication & Fire Tower owned by the US Forestry Service (probably a lease agreement) on the Dorothy K. Caudle property.

RELOCATION? 18

01/10/06

Edwin T. Rabens, III  
Right of Way Agent

Andy Sampson  
Relocation Coordinator

1-13-06

Date

# RELOCATION REPORT

North Carolina Department of Transportation  
RELOCATION ASSISTANCE PROGRAM

☒ E.I.S. ☒ CORRIDOR ☐ DESIGN

|                         |           |                                                                                          |            |           |         |    |         |           |
|-------------------------|-----------|------------------------------------------------------------------------------------------|------------|-----------|---------|----|---------|-----------|
| WBS:                    | 34352.1.1 | COUNTY                                                                                   | Montgomery | Alternate | B,C,D,E | of | B,C,D,E | Alternate |
| I.D. NO.:               | R-0623    | F.A. PROJECT                                                                             |            |           |         |    |         |           |
| DESCRIPTION OF PROJECT: |           | NC Hwy 24/27 (Troy Bypass) from West of SR-1138 (Dairy Road) to East of the Little River |            |           |         |    |         |           |

## #4 At Intersection of -Y4-

C&G Leasing (Heavy Equipment Repair Facility)  
Estimated Value of Building and Improvements Acquired: \$ 200,000.00  
Estimated Employees: 6 Minorities: 2  
Estimated Income: \$ 350,000.00

## Between Intersection of -Y3- and -Y4-

BFI Waste Industries  
Estimated Value of Building and Improvements Acquired: \$ 375,000.00  
Estimated Employees: 30 Minorities: 10  
Estimated Income: \$ 3,000,000.00

## Between Intersection of -Y1- and -Y2-

Veterinary Clinic  
Estimated Value of Buildings: \$ 350,000.00  
Employees: 8 Minorities: 2  
Estimated Income: \$ 500,000.00

## Strip Office Complex (Built on Property formerly owned by the Town of Troy)

Estimated Value of Buildings: \$ 175,000.00  
One (1) Owner-occupied Insurance Agency  
Employees: 3 Minorities: 1  
Estimated Income: \$ 250,000.00

One (1) Tenant  
Two (2) Employees  
Estimated Income: \$ 100,000.00

One (1) Tenant  
Two (2) Employees  
Estimated Income: \$ 100,000.00

Two (2) Vacant Spaces Available

Restaurant Site (Vacant and For Rent)  
Estimated Value of Land and Improvements: \$ 60,000.00

*Am Simpson*  
1-13-06



# APPENDIX A.5

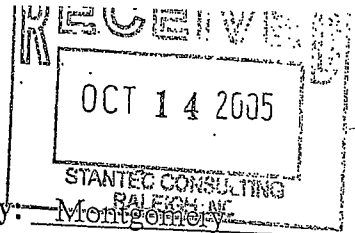
---

## USACE JURISDICTIONAL DETERMINATION

U.S. ARMY CORPS OF ENGINEERS  
Wilmington District

Action ID: 2004-01203

County: Montgomery



Notification of Jurisdictional Determination

Requestor:

Mr. Gregory J. Thorpe, Ph.D.  
Environmental Management Director  
Project Development & Environmental Analysis  
1548 Mail Service Center  
Raleigh, N.C. 27699-1548

Authorized Agent:

Ms. Andrea Dvorak-Grantz  
Stantec Consulting Services Inc.  
801 Jones Franklin Road  
Suite 300  
Raleigh, NC 27606

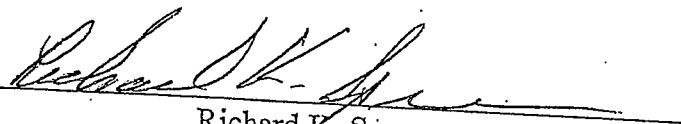
**Size and Location of Project (waterbody, Highway name/number, town, etc.):** TIP Project No. R-623, NC 24/27 Improvements from SR 1138 (Dairy Road) to east of Little River in Montgomery County, North Carolina.

**Basis for Determination:** Type 328.3(a)(5) waters of the United States, Tributaries to Little River, Pee Dee River Basin and Type 328.3(a)(7) wetlands based on positive identification of hydric soils, dominant hydrophytic vegetation (Greater than 50% FAC) and hydrology (Primary indicators).

On January 4, 2005 the undersigned inspected the Section 404 jurisdictional boundaries as field delineated by the NCDOT and/or its representatives for the subject NCDOT project/corridor. The project site was inspected and the delineated jurisdictional boundaries as identified on the attached plans were found to accurately reflect the limits of Corps jurisdiction. The field delineated jurisdictional limits, as shown on the attached plans dated February 9, 2005, can be relied on for project planning and impact assessment. This verification is valid for five (5) years from the date of this letter.

Any placement of dredged or fill material within the delineated jurisdictional limits will require Department of the Army authorization pursuant to Section 404 of the Clean Water Act, as amended (33 USC 1344). Any un-authorized placement of dredged or fill material within the delineated jurisdictional limits would be a violation of Section 301 of the Clean Water Act (33 USC 1311) and subject to enforcement action. If you have any questions regarding this verification or the Corps of Engineers' regulatory program, please contact Mr. Richard K. Spencer at 910-251-4172.

Project Manager Signature

  
Richard K. Spencer

Date October 11, 2005

Expiration Date October 11, 2010

CF: Art King, DEO, NCDOT Div. 8



## **APPENDIX A.6**

---

### **NC STATE HISTORIC PRESERVATION OFFICE CONCURRENCE**

Federal Aid # STP-24(6)

TIP # R-0623

County: Montgomery

CONCURRENCE FORM FOR ASSESSMENT OF EFFECTS

Project Description: NC 24-27 Improvements, Troy Bypass

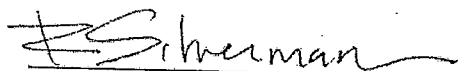
On May 16, 2006 representatives of

- ☒ North Carolina Department of Transportation (NCDOT)  
☒ Federal Highway Administration (FHWA)  
☒ North Carolina State Historic Preservation Office (HPO)  
☐ Other

Reviewed the subject project and agreed

- ☐ There are no effects on the National Register-listed property/properties located within the project's area of potential effect and listed on the reverse.
- ☐ There are no effects on the National Register-eligible property/properties located within the project's area of potential effect and listed on the reverse.
- ☐ There is an effect on the National Register-listed property/properties located within the project's area of potential effect. The property/properties and the effect(s) are listed on the reverse.
- ☒ There is an effect on the National Register-eligible property/properties located within the project's area of potential effect. The property/properties and effect(s) are listed on the reverse.

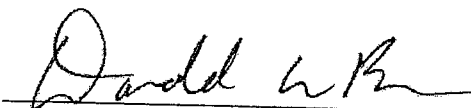
Signed:



Representative, NCDOT

05-16-2006

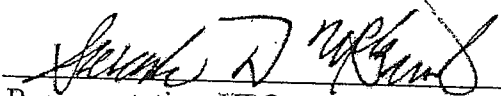
Date



FHWA, for the Division Administrator, or other Federal Agency

5-16-06

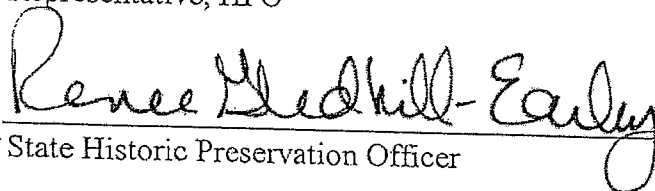
Date



Representative, HPO

5-16-06

Date



State Historic Preservation Officer

5-16-06

Date



Federal Aid # STP-24(6)

TIP # R-0623

County: Montgomery

Properties within the area of potential effect for which there is no effect. Indicate if property is National Register-listed (NR) or determined eligible (DE).

ALTS B, C, D  
NO EFFECT

Properties within the area of potential effect for which there is an effect. Indicate property status (NR or DE) and describe the effect.

ALT-E  
NO ADVERSE EFFECT TO  
- WOOLEY SAUNDERS HOUSE (DE)  
- NEAL CLARK HOUSE (DE)

~~ALTS B, C, D~~

Reason(s) why the effect is not adverse (if applicable).

- 350' controlled access either side
- Superstreet design for strategic corridor

Initialed:

NCDOT RUS

FHWA DR

HPO SDM

# APPENDIX A.7

---

NEWSLETTERS





# NC 24/27 Improvements

Newsletter No. 2

TIP No. R-623

June 2003

This newsletter is published by the North Carolina Department of Transportation (NCDOT) to inform citizens about the study of the proposed improvements to NC 24/27 near Troy.

## ***What Improvements Are Being Studied?***

The study area for the proposed project begins east of the Little River, includes the Town of Troy, and ends west of the intersection of NC 24/27 with (SR 1138) Shiloh Road/Dairy Road. The proposed improvements will provide additional roadway capacity and accommodate future traffic needs.

## ***Why Are Improvements Needed?***

This project is needed based on current and future traffic volumes and to improve safety on NC 24/27 through the Town of Troy. During the next twenty-five years traffic volumes on NC 24/27 will increase, causing greater congestion at the intersections in the study area. Over half of the traffic on NC 24/27 is through-traffic which does not stop in Troy. About 10% of the traffic on NC 24/27 are trucks. Accidents at some locations along NC 24/27, are currently higher than similar roads across the state. These are expected to increase as a result of traffic growth.

## ***What Alternatives Are Being Considered?***

The enclosed map shows the five preliminary alternatives under consideration. Alternative A calls for widening existing NC 27 to a combination of a four-lane median divided roadway and a five-lane roadway. Alternatives B through E involve constructing a new four-lane median divided roadway which

## ***What Is The Study Process?***

This study is being conducted according to the National Environmental Policy Act (NEPA), which requires federal agencies to analyze proposed projects for potential impacts to the human and natural environments. Section 404 of the Clean Water Act requires the avoidance of wetlands. Under an agreement with the U.S. Army Corps of Engineers, the Federal Highway Administration, and the NCDOT, NEPA and 404 have merged into a basic four-step process. These steps called concurrence points are:

*Concurrence Point #1 – Purpose and Need*

*Concurrence Point #2 – Alternatives Carried Forward*

*Concurrence Point #3 – Selected Alternative*

*Concurrence Point #4 – Impact Minimization*

This study is nearing Concurrence Point #2 (Alternatives Carried Forward). At this time several preliminary alternatives are being evaluated.

Based on input from the public, the resource and regulatory agencies, and on preliminary comparisons of impacts and costs, a decision will be made as to which alternatives are carried forward for detailed analysis.

## ***What's Been Done So Far?***

Since the first public workshop held in January 2001, layout of the preliminary alternatives have been developed, preliminary natural resources studies have been completed, and detailed historic architectural surveys were completed. The next important step will be gathering input on the preliminary alternatives at the upcoming Citizens Information Workshop.

## ***Why Should I Attend The Workshop?***

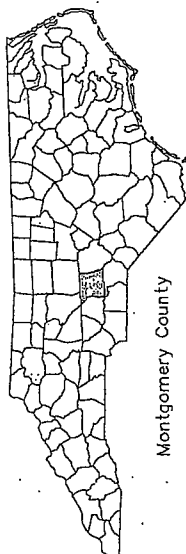
The project team will be asking for your input regarding the alternatives shown inside of this newsletter. Your opinions and suggestions will be a major factor in deciding which alternatives are carried forward for detailed evaluation. Project team members will be present to answer questions and provide any additional information you may need about the project.

## **CITIZENS INFORMATIONAL WORKSHOP**

The second Citizens Informational Workshop about the NC 24/27 Improvements will be held on June 24, 2003, between 4:00 and 7:00 pm in the West Montgomery High School Cafeteria at 147 Warrior Drive in Mt. Gilead.

The purpose of this workshop is to get citizens' input on the preliminary study alternatives. Maps showing the preliminary alternatives will be on display at the workshop. Members of the study team will be available to discuss the project and answer questions.

NCDOT will provide auxiliary aids and services for disabled persons who wish to participate in this workshop to comply with the American Disabilities Act. To receive special services, please contact Mr. Michael Penney at 1548 Mail Service Center, Raleigh, NC 27699-1548. (919) 722-3844 ext. 622. TDD: (919) 722-3844 ext. 622.



Montgomery County



North Carolina  
Department of Transportation

NC 24/27

## Improvements

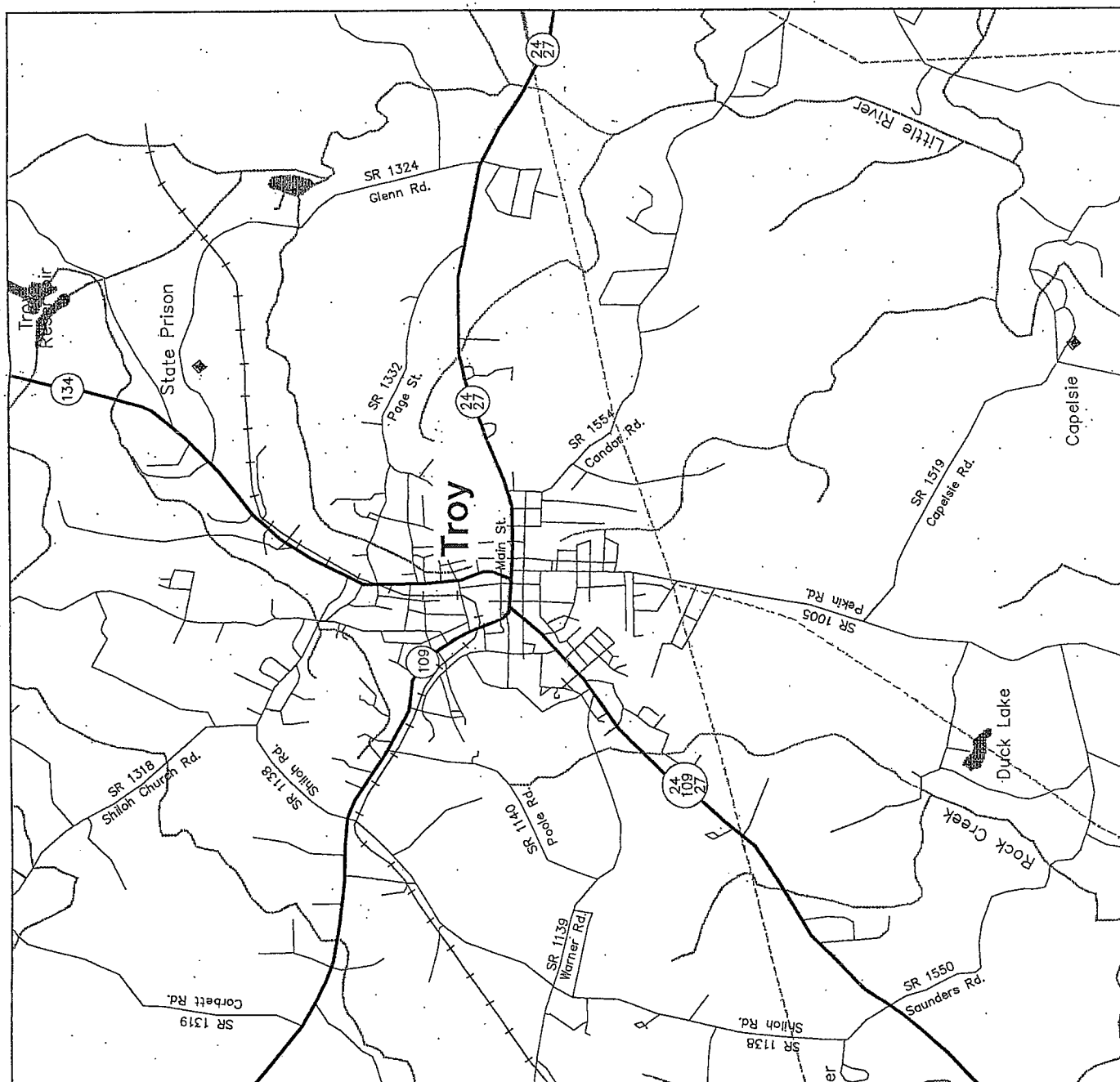
SR 1138 to East of Little River

TIP No. R-623

Montgomery County, North Carolina

## Project Study Area

Not to Scale





## **GET INVOLVED!!**

In addition to participating in the workshop, you are invited to:

**Arrange small group meetings.** The study team is available throughout the study process to meet and discuss the project through informal question and answer sessions with neighborhood groups and civic organizations.

**Call the project hotline.** Call the study's toll-free hotline at:

**1-800-349-3721** (hours of operation: 8AM – 5PM, Mon. – Fri.)

**Add your name to the mailing list.** If you would like to receive future newsletters or meeting notices, you may add your name to the mailing list at the workshop. If you are unable to attend the workshop, call the project hotline or write to one of the addresses below.

**Call or write the study team.** The toll-free project hotline provides direct contact between citizens and the NCDOT study team. Comments and suggestions will continue to be documented and considered during the entire study process.

You may contact the NC 24/27 Improvements Study Team or the NCDOT at the following addresses:

Mr. Michael Penney, PE  
Project Development & Environmental Analysis  
NC Department of Transportation  
1548 Mail Service Center  
Raleigh, NC 27699-1548  
☎ (919) 733-7844 ext. 260  
✉ mpenney@dot.state.nc.us

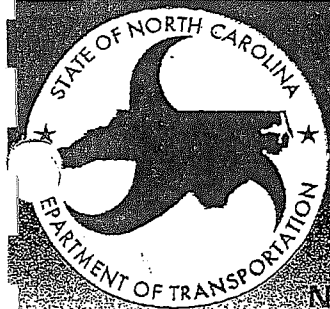
Mr. Paul Koch, PE  
NC 24/27 Improvements Study  
801 Jones Franklin Road, Ste. 300  
Raleigh, NC 27606  
☎ (800) 349-3721  
✉ pkoch@stantec.com

If you have transportation questions on other projects, call our customer service office at 1-877-DOT-4YOU or visit our website at [www.ncdot.org](http://www.ncdot.org)

---

North Carolina Department of Transportation  
Project Development & Environmental Analysis Branch  
1548 Mail Service Center  
Raleigh, NC 27699-1548

Please do not place a stamp here



# NC 24/27 Improvements

Newsletter No. 1

TIP No. R-623

January 2001

**T**his newsletter is published by the North Carolina Department of Transportation (NCDOT) to inform the public about the study of the proposed improvements to NC 24/27 near Troy.

## *What Improvements Are Being Studied?*

The study area for the proposed project runs from east of the Little River, through the Town of Troy, to west of the intersection of NC 24/27 with (SR 138) Shiloh Road/Dairy Road. The proposed improvements will provide additional roadway capacity and accommodate projected traffic volumes. Alternatives to be studied include improvements to existing facilities and construction on new location.

## *Why Are Improvements Needed?*

The primary need for this project is based on traffic volumes and safety on NC 24/27 through the Town of Troy. During the next twenty-five years traffic volumes on NC 24/27 are projected to exceed capacity for all intersections in the study area. Over half of the traffic is through-traffic making no stops in Troy. Trucks account for up to 10% of the total traffic. Accidents along NC 24/27, which are already occurring at higher than acceptable rates at some locations, are also expected to increase as a result of traffic growth over the next twenty-five years.

## *What is the Study Process?*

This study will conform to the NEPA/404 Merger Process. NEPA, the National Environmental Policy Act, requires federal agencies to analyze proposed projects for potential impacts to human and natural environment. It refers to a section of the Clean Water Act that requires avoidance of wetlands. Under an agreement with the U.S. Army Corps of Engineers, the

Federal Highway Administration, and the NCDOT, NEPA and 404 have been combined into a single four-step process. These steps called concurrence points are:

- Concurrence Point #1 – Purpose and Need*
- Concurrence Point #2 – Alternatives Carried Forward*
- Concurrence Point #3 – Selected Alternative*
- Concurrence Point #4 – Impact Minimization*

This study is now at Point #1 (Purpose and Need Statement) which may be the most important part of an environmental analysis. It establishes why NCDOT is proposing to spend taxpayers money on a project that could cause significant environmental impacts. The process of developing the purpose and need identifies specific criteria by which NCDOT may develop reasonable and feasible alternatives for the proposed project.

## *What's Been Done So Far?*

Initial data related to the affected environment, including natural and cultural resources and social and economic data, have been gathered along the existing route. The next important step will be gathering local input at the first **Citizens Informational Workshop**.

## *Why Should I Attend The Workshop?*

Project team members will be present to answer questions and provide information. But equally important, the team will be asking for your input regarding the need for improvements to NC 24/27, and to point out areas of local social, cultural and environmental importance where impacts would be undesirable. It is also a good way to get on the project mailing list and meet the project team members so that you may be kept up to date on the study's progress. This is your chance to make the project team aware of your concerns at the earliest stages of the study.

## CITIZENS INFORMATIONAL WORKSHOP

**T**he first Citizens Informational Workshop regarding the NC 24/27 Improvements will be held on January 23, 2001, between the hours of 4:00 and 7:00 PM in the West Montgomery High School Cafeteria located at 147 Warrior Drive in Mt. Gilead.

The purpose of this workshop is to inform citizens about the project and solicit their input. Maps showing the study area will be on display at the workshop. Members of the study team will be available to discuss the project and answer questions.

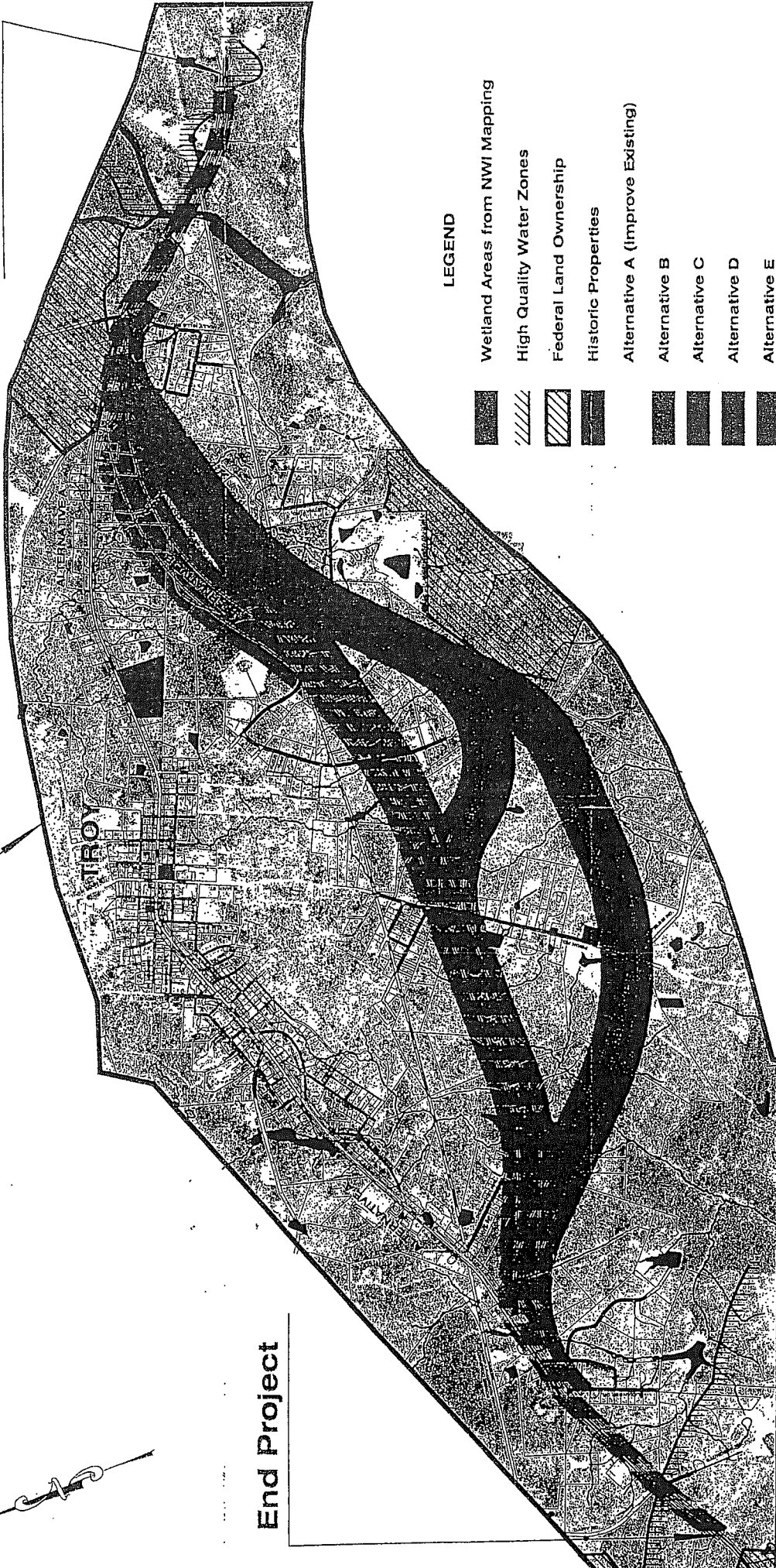
NCDOT will provide auxiliary aids and services for disabled persons who wish to participate in this workshop to comply with the American Disabilities Act. To receive special services, please contact Mr. Elmo Vance at 1548 Mail Service Center, Raleigh, NC 27699-1548, phone number (919) 733-7844 ext. 262, fax (919) 733-9794 or email: [eevance@dot.state.nc.us](mailto:eevance@dot.state.nc.us) as early as possible so that arrangements can be made.



Study Area

Begin Project

End Project



LEGEND

- Wetland Areas from NWI Mapping
- High Quality Water Zones
- Federal Land Ownership
- Historic Properties
- Alternative A (Improve Existing)
- Alternative B
- Alternative C
- Alternative D
- Alternative E

# NC 24/27 Improvements

TIP No. R-623

Montgomery County, North Carolina

scale : NTS



# GET INVOLVED !

In addition to participating in the workshop, you are invited to:

Arrange small group meetings. The study team will be available throughout the study process to meet and discuss the project through informal question and answer sessions with neighborhood groups and civic organizations.

Call the Project Hotline. Call the study's toll-free hotline at:

**1-800-349-3721**

Add your name to the mailing list. If you would like to receive future newsletters or meeting notices, you may sign up at the workshop. If you are unable to attend the workshop, call the project hotline at 1-800-349-3721 or write to one of the addresses below.

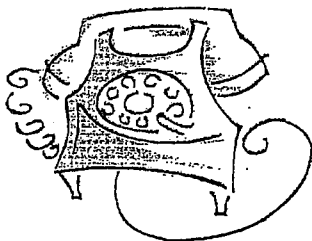
Call or write the study team. The toll-free project hotline provides direct contact between citizens and the NCDOT study team. Comments and suggestions will continue to be documented and considered during the entire study process.

You may contact the NC 24/27 Improvements Study Team or the NCDOT at the following addresses:

Mr. Elmo Vance  
NCDOT-PD & EA  
1548 Mail Service Center  
Raleigh, NC 27699-1548  
(919) 733-7844 ext. 262  
e-mail: [eevance@dot.state.nc.us](mailto:eevance@dot.state.nc.us)

or

Mr. Paul Koch, PE  
NC 24/27 Improvements Study  
801 Jones Franklin Rd., Suite 300  
Raleigh, NC 27606  
1-800-349-3721  
e-mail: [pkoch@stantec.com](mailto:pkoch@stantec.com)



If you have transportation questions on other projects, call our customer service office at 1-877-DOT-4YOU or visit our website at [www.dot.state.nc.us](http://www.dot.state.nc.us).



North Carolina Department of Transportation  
Project Development and Environmental Analysis Branch  
1548 Mail Service Center  
Raleigh, NC 27699-1548



# APPENDIX B.1

---

## REFERENCES

## **REFERENCES**

- American Association of State Highways and Transportation Officials, Washington, DC, 1994. Policy on Geometric Design of Highways and Streets.
- Brackett, D.A., W.M. Steele, T.J. Schmitt, R.L. Atkins, M.F. Kellam, and J.A. Lineback. 1991. Hydrogeologic data from selected sites in the Piedmont and Blue Ridge Provinces, Georgia. 86 ed. Dept. of Natural Resources, Atlanta Georgia.
- Cowardin, L.M., V. Carter, F.C. Golet and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Prepared for the U.S. Fish and Wildlife Service, United States Department of the Interior, Washington DC.
- Cressler, C.W., C.J. Thurmond, and W.G. Hester. 1983. Ground water in the greater Atlanta region. Georgia. Dept. of Nat. Res. Atlanta.
- Environmental Laboratory. 1987. United States Army Corps of Engineers. Wetlands Delineation Manual, Technical Report Y-87-1. United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
- Federal Highway Administration (FHWA). 1987. Guidance for Preparing and Processing Environmental and Section 4(f) Documents. US Department of Transportation. FHWA Technical Advisory No. T 6640.8A <http://wwwcf.fhwa.dot.gov/environment>
- Federal Highway Administration (FHWA). 1988. Visual Impact Assessment for Highway Projects. US Department of Transportation. Office of Environmental Policy. FHWA Publication No. FHWA-HI-88-054.
- Federal Highway Administration (FHWA). 1992. Secondary and Cumulative Impact Assessment in the Highway Project Development Process. US Department of Transportation. FHWA Project Development Branch. HEP-31.
- Federal Highway Administration (FHWA). 1998. Manual on Uniform Traffic Control Devices for Streets and Highways.
- Federal Highway Administration (FHWA). 2000. An Overview of Transportation and Environmental Justice. Publication No. FHWA-EP-00-013.
- Federal Highway Administration (FHWA). 2002. Roadside Use of Native Plants. FHWA Roadside Vegetation Program. Island Press, Washington, DC. <http://wwwcf.fhwa.dot.gov/environment/handbook.htm>
- Federal Highway Administration (FHWA). 2004. Critter Crossings: Linking Habitats and Reducing Roadkill. <http://www.fhwa.dot.gov/environment/wildlifecrossings/>
- Forman, R., Sperling, D., *et al.* 2003. Road Ecology: Science and Solutions. Island Press, Washington, DC.
- Gillis, William R. 1994. Lessons from Eastern Washington: State Route Mainstreets, Bypass Routes and Economic Development in Small Towns. Eastern Washington Intermodal Transportation Study (EWITS) Research Report Number 2. Ritzville, WA.



- LeGrand, H.E. 1988. Region 21, Piedmont and Blue Ridge. pp. 201-208. In: W. Back, J.S. Rosenshein and P.R. Seaber (eds.). Hydrogeology. Geological Society of America, Boulder, Colorado.
- LeGrand, Jr., H.E. and S.P. Hall. 1999. Natural Heritage Program List of Rare Animal Species of North Carolina. North Carolina Natural Heritage Program, Raleigh, NC.
- North Carolina Department of Commerce (NCDCC). July 2005. Economic Development Information System. Raleigh, NC. <http://cmedis.commerce.state.nc.us/>
- North Carolina Department of Environment and Natural Resources (NCDENR). 1993. North Carolina Erosion and Sediment Control Planning and Design Manual. Division of Land Resources, Land Quality Section. Raleigh, NC.
- North Carolina Department of Environment and Natural Resources (NCDENR). 1998. Yadkin-Pee Dee River Basinwide Water Quality Plan Division of Water Quality, Basinwide Planning Program., Raleigh, NC. <<http://h2o.enr.state.nc.us/basinwide/index.htm>>
- North Carolina Department of Environment and Natural Resources (NCDENR). 1995. Guidance for rating the values of wetlands in North Carolina. Raleigh, NC. 57 pp.
- North Carolina Department of Environment and Natural Resources (NCDENR). 1999. Internal Guidance Manual for Stream Classification Method. Version 2.0. Division of Water Quality. <<http://h2o.enr.state.nc.us/ncwetlands/strmman.pdf>>
- North Carolina Department of Environment and Natural Resources (NCDENR). 2005. List of Active National Pollutant Discharge Elimination System (NPDES) Permits. Division of Water Quality, NPDES Unit. Raleigh, NC.
- North Carolina Department of Environment and Natural Resources (NCDENR). 2006. Protected Species of Montgomery County, North Carolina. Division of Parks and Recreation, North Carolina Natural Heritage Program. Raleigh, NC. <http://www.ncsparks.net/nhp/county.html>
- North Carolina Department of Transportation (NCDOT). 1990. Troy Thoroughfare Plan. North Carolina Statewide Planning Branch. Raleigh, NC.
- North Carolina Department of Transportation (NCDOT). 1997. Best Management Practices for Protection of Surface Waters. Raleigh, NC.
- North Carolina Department of Transportation (NCDOT), 2002. Standard Specifications for Roads and Structures. North Carolina Department of Transportation Design Services. Raleigh, NC. [http://www.doh.dot.state.nc.us/preconstruct/highway/dsn\\_srvc/specifications/dual/](http://www.doh.dot.state.nc.us/preconstruct/highway/dsn_srvc/specifications/dual/)
- North Carolina Department of Transportation (NCDOT). 2002. Natural Resources Technical Report for the NC 24/27 Improvements. Prepared by Stantec Consulting Services Inc. Raleigh, NC.
- North Carolina Department of Transportation (NCDOT). 2003. Phase II Architectural Survey and Evaluations for Eligibility for the NC 24/27 Improvements. Division of Highways, Project Development & Environmental Analysis Branch. Prepared by Mattson, Alexander and Associates, Inc. Raleigh, NC.

- North Carolina Department of Transportation (NCDOT). 2006a. Comprehensive Transportation Plan for the Town of Troy. North Carolina Transportation Planning Branch. Raleigh, NC.
- North Carolina Department of Transportation (NCDOT). 2006b. Congestion Management Report for the NC 24/27 Improvements. Prepared by Stantec Consulting Services Inc. Raleigh, NC.
- North Carolina Department of Transportation (NCDOT). 2006c. Indirect and Cumulative Impacts Assessment for the NC 24/27 Improvements
- North Carolina Department of Transportation (NCDOT). 2006d. Air Quality Impact Analysis for the NC 24/27 Improvements. Prepared by Stantec Consulting Services Inc. Raleigh, NC.
- North Carolina Department of Transportation (NCDOT). 2006e. Noise Impact Analysis for the NC 24/27 Improvements. Prepared by Stantec Consulting Services Inc. Raleigh, NC.
- North Carolina Department of Transportation/North Carolina Department of Environment and Natural Resources (NCDOT/NCDENR). 2001. Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina. Prepared by the Louis Berger Group, Inc. Cary, NC.
- North Carolina Department of Transportation/North Carolina Department of Environment and Natural Resources (NCDOT/NCDENR). 2004. Final Guidance: Prescreening Projects for Applying Indirect/Cumulative Impact Assessment. Prepared by the Louis Berger Group, Inc. Cary, NC.
- North Carolina Division of Water Quality (DWQ). 2005. Best Usage Classifications for North Carolina Waterbodies – Updated April 14, 2003. Basinwide Information Management System (BIMS). Raleigh, NC. <http://h2o.enr.state.nc.us/bims/Reports/reportsWB.html>
- North Carolina Employment Security Commission (NCESC). Accessed July 2005. State and Area Research Analysis System (WebSARAS). Labor Market Information Division. <http://eslmi12.esc.state.nc.us/websaras/index.asp>
- North Carolina State Data Center (NCSDC). Accessed July 2005. LINC Database. Data Services Unit, Office of State Budget and Management. Raleigh, NC, <http://www.linc.state.nc.us>.
- North Carolina Wildlife Resource Commission (NCWRC). 2002. Guidance Memorandum to Address and Mitigate Secondary Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality. Division of Inland Fisheries, Raleigh, NC.
- Radford, A.E., H.E. Ahles and G.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, North Carolina.
- Radtke, D.B., C.W. Cressler, H.A. Perlman, H.W. Blanchard, Jr., K.W. McFadden, and R. Brooks. 1986. Occurrence and availability of ground water in the Athens region, northeastern Georgia. U.S. Geological Survey. Doraville, Georgia.
- Rose, S. 1992. Tritium in ground water of the Georgia Piedmont: Implications for recharge and flow paths. Hydrological Processes. 6:67-78.



- Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.
- Town of Troy. 2005. Land use planning and future zoning within project study area. Personal communication with Johnny Wear, Troy Town Planner.
- United States Bureau of the Census (USBOC). 2000. Census 2000 Gateway. Accessed July 2005. <http://www.census.gov/main/www/cen2000.html>
- United States Department of Agriculture (USDA). Draft Soil Survey Sheets of Montgomery County, North Carolina. Natural Resources Conservation Service.
- United States Department of Agriculture (USDA). 1930. Soil Survey of Montgomery County, North Carolina. Soil Conservation Service.
- United States Department of Agriculture (USDA). 1989. Hydric Soils of North Carolina. Natural Resources Conservation Service. [http://soils.usda.gov/soil\\_use/hydric/main.htm](http://soils.usda.gov/soil_use/hydric/main.htm)
- United States Department of Agriculture (USDA). 1998. Important Farmlands of North Carolina. <http://www.nc.nrcs.usda.gov/programs/soilsurvey/primefarmland.html>
- United States Environmental Protection Agency (USEPA). September 1995. User's Guide to CAL3QHC, Version 2.0: A modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections.
- United States Environmental Protection Agency (USEPA). August 2003. User's Guide to MOBILE6.1 and MOBILE6.2, Mobile Source Emission Factor Model.
- United States Fish and Wildlife Service (USFWS). 2006. Protected Species of Montgomery County, North Carolina. <http://nc-es.fws.gov/es/cntylist/montgomery.html>
- University of Kentucky (UK). 2001. The Impact of a New Bypass Route on the Local Economy and Quality of Life. Kentucky Transportation Center, College of Engineering. Research Report KTC-01-10/SPR219-00-2I. Lexington, KY.
- University of Texas (UT). 2000. Economic Effects of Highway Relief Routes on Small and Medium Size Communities: Literature Review and Identification of Issues. Prepared by the Center for Transportation Research for the Texas Department of Transportation. Research Report Number 0-1843-1. Austin, TX.
- Winner, M.D., Jr., and W.L. Lyke. 1989. Aquifers in Cretaceous Rocks of the Central Coastal Plain of North Carolina. United States Geological Survey, Water- Resources Investigations Report 87-4178. United States Geological Survey.
- Wisconsin Department of Transportation (WisDOT). 1998. The Economic Impacts of Highway Bypasses on Communities. January 1998. Daniel Yeh. Madison, WI.