# CATEGORICAL EXCLUSION FORM

Enhancement Projects

| | |
|---|---|
| Project Name | Old Durham Rd/Old Chapel Hill Rd Widening |
| TIP Project No. | EB-4707 |
| WBS Project No. | 38664.1.1 |
| Federal Project No. | STPDA-0505(29) |
| Project Sponsor | NCDOT Division 5 |

Project Contact
Name: Mike Kneis, P.E., NCDOT Division 5
Telephone: (919) 220-4600
Email: mkneis@ncdot.gov

A. Project Description:

The North Carolina Department of Transportation (NCDOT) proposes to widen SR 1838(Old Durham Road)/SR 2220 (Chapel Hill Road) (known locally as Old Durham/Chapel Hill Road) from US 15-501 (Durham/Chapel Hill Boulevard) in Orange County to SR 1116 (Garrett Road) in Durham County, a distance of 2.7 miles. An on-road striped bicycle lane (4 feet in curb and gutter sections, 5 feet in shoulder sections) and 5-foot sidewalk will be added to both sides of the roadway, except where an 8-foot multi-use path will be constructed in front of the Blue Cross/Blue Shield campus and a 10-foot multi-use path will be constructed in front of Sherwood Githens Middle School. The project includes the addition of a roundabout at the intersection of Pope Road and Old Durham/Chapel Hill Road; pedestrian signals at NC 15-501, Farrington Road, Garrett Road, and Sherwood Githens Middle School; and signal modifications at NC 15-501, Farrington Road, and Sherwood Githens Middle School. Figures showing the EB-4707 project are attached.

B. Purpose and Need:

The widening is necessary to accommodate pedestrian facilities along the corridor including bicycle lanes, sidewalks, and a multi-use path.

This project is scheduled for construction on the approved 2009-2015 NCDOT *Transportation Improvement Program* (TIP) in Fiscal Year (FY) 2009 and 2010, and is scheduled for construction on the draft 2011-2020 *Policy to Projects Plan* in FY 2011. The Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (MPO) *Old Durham/Chapel Hill Road Bicycle and Pedestrian Facilities Study* (February 2006) considered potential alternatives, impacts, and costs of adding pedestrian and bicycle facilities to this segment of Old Durham/Chapel Hill Road.

C. Proposed Improvements:

This project proposes to construct an on-road striped bicycle lane (4 feet in curb and gutter sections, 5 feet in shoulder sections) and 5-foot sidewalk on both sides of Old Durham/Chapel Hill Road for 2.7 miles. An 8-foot asphalt multi-use path will be constructed in front of the Blue Cross/Blue Shield campus and a 10-foot multi-use path will be constructed in front of Sherwood Githens Middle School rather than a sidewalk. The New Hope Creek Trail adjacent to Sherwood Githens Middle School connects with the Old Chapel Hill Road Park.

D. Special Project Information:

It is anticipated that Project EB-4707 will be funded with Surface Transportation Program (STP) enhancement (EB) and direct attributable (DA) funds. The estimated cost in the 2011-2010 Draft NCDOT *Policy to Projects Work Program* for this project is $6,900,000 ($2,900,000 for planning, design, and right-of-way acquisition; and $4,000,000 for construction).

Based on a field review (September 2009), research, and an impact assessment using preliminary designs (65 percent plans), the project will not have a substantial impact on any unique or important natural resource. Therefore, a Type II(B) Programmatic Categorical Exclusion is appropriate for Project EB-4707.

A concurrence meeting with the U.S. Army Corps of Engineers (USACE) and North Carolina Division of Water Quality (NCDWQ) was conducted on July 14, 2010. A USACE Nationwide Permit is anticipated.

The project crosses four streams within the Cape Fear River Basin (subbasin 03-06-05), which is under the jurisdiction of a NCDWQ Basinwide Management Plan. New Hope Creek is classified as a WS-IV water (Index #16-41-1-(11.5) and a Nutrient Sensitive Water (NSW) by NCDWQ, and crosses through a 24-inch reinforced concrete pipe (RCP). New Hope Creek Tributary crosses through two 10-foot by 7-foot reinforced concrete box culverts (RCBC). An unnamed tributary to a pond crosses through a 36-inch RCP, and an unnamed tributary near Garrett Road crosses through a 48-inch RCP.

The area along New Hope Creek has a floodway, 100-year floodplain, and a small amount of 500-year floodplain (see Figure 2). Based on the Natural Heritage Program's Biodiversity and Wildlife Habitat Assessment (January 2010), this floodplain area is a federally protected conservation area and has a high level of biodiversity and habitat (with a rating of 10 out of a possible 10). Adjacent areas gradually decrease in value, with most of the project corridor having a rating of -1 (impervious) to 1.

The construction limits would encroach onto the 30-foot and 50-foot buffer zones of a pond. However, the new alignment will shift away from the pond and some

of the existing pavement between the new road and the pond will be converted to grass.

One vacant building would be relocated by this project, on the southeast corner of Old Durham/Chapel Hill Road and Scarlette Drive. This building was originally a residence, and had most recently been used as a business. It has been vacant for several years.

A property adjacent to the road was determined to be eligible for the National Register of Historic Places by NCDOT. The Edwards-Sizemore Store, on the northeast corner of Old Chapel Hill Road and White Oak Drive, is now closed. The State Historic Preservation Officer (SHPO) agreed that this project would have no adverse effect on the property.

Public involvement activities were held as part of the *Old Durham/Chapel Hill Road Bicycle and Pedestrian Facilities Study* (February 2006). A two-day design charette/open house in April 2006 was attended by over 50 people, and a public open house in June 2005 was attended by 35 people. Fifty-two people completed and returned public surveys. An open house was held August 24, 2010 to present the most current designs to the public. Forty citizens signed in during the open house, and comments from 16 citizens were returned either during the workshop or in the comment period following the workshop. Five people thought that sidewalks were only needed on one side, and four liked the project as proposed. The remaining comments included concerns about removing trees, safety on the bridge, and accommodations for tractor-trailers through the roundabouts.

The following evaluation of threshold criteria must be completed for Type II actions:

| ECOLOGICAL | | YES | NO |
|---|---|---|---|
| (1) | Will the project have a substantial impact on any unique or important natural resource? | | X |
| (2) | Does the project involve habitat where federally listed endangered or threatened species may occur? | X | |
| (3) | Will the project affect anadromous fish? | | X |
| (4) | If the project involves wetlands, is the amount of permanent and/or temporary wetland taking less than one-tenth (1/10) of an acre and have all practicable measures to avoid and minimize wetland takings been evaluated? | N/A | N/A |
| (5) | Will the project require the use of U. S. Forest Service lands? | | X |
| (6) | Will the quality of adjacent water resources be adversely | | |

| | | | |
|---|---|---|---|
| | impacted by proposed construction activities? | | X |
| (7) | Does the project involve waters classified as Outstanding Water Resources (OWR) and/or High Quality Waters (HQW)? | | X |
| (8) | Will the project require fill in waters of the United States in any of the designated mountain trout counties? | | X |
| (9) | Does the project involve any known underground storage tanks (UST's) or hazardous materials sites? | X | |

| PERMITS AND COORDINATION | | YES | NO |
|---|---|---|---|
| (10) | If the project is located within a CAMA county, will the project significantly affect the coastal zone and/or any "Area of Environmental Concern" (AEC)? | N/A | N/A |
| (11) | Does the project involve Coastal Barrier Resources Act resources? | | X |
| (12) | Will a U. S. Coast Guard permit be required? | | X |
| (13) | Will the project result in the modification of any existing regulatory floodway? | | X |
| (14) | Will the project require any stream relocations or channel changes? | X | |

| SOCIAL, ECONOMIC, AND CULTURAL RESOURCES | | YES | NO |
|---|---|---|---|
| (15) | Will the project induce substantial impacts to planned growth or land use for the area? | | X |
| (16) | Will the project require the relocation of any family or business? | | X |
| (17) | Will the project have a disproportionately high and adverse human health and environmental effect on any minority or low-income population? | | X |
| (18) | If the project involves the acquisition of right of way, is the amount of right of way acquisition considered minor? | X | |
| (19) | Will the project involve any changes in access control? | | X |
| (20) | Will the project substantially alter the usefulness and/or land use of adjacent property? | | X |

| | | | |
|---|---|---|---|
| (21) | Will the project have an adverse effect on permanent local traffic patterns or community cohesiveness? | | X |
| (22) | Is the project included in an approved thoroughfare plan and/or Transportation Improvement Program (and is, therefore, in conformance with the Clean Air Act of 1990)? | X | |
| (23) | Is the project anticipated to cause an increase in traffic volumes? | | X |
| (24) | Will traffic be maintained during construction using existing roads, staged construction, or on-site detours? | X | |
| (25) | If the project is a bridge replacement project, will the bridge be replaced at its existing location (along the existing facility) and will all construction proposed in association with the bridge replacement project be contained on the existing facility? | N/A | N/A |
| (26) | Is there substantial controversy on social, economic, or environmental grounds concerning the project? | | X |
| (27) | Is the project consistent with all Federal, State, and local laws relating to the environmental aspects of the project? | X | |
| (28) | Will the project have an "effect" on structures/properties eligible for or listed on the National Register of Historic Places? | X | |
| (29) | Will the project affect any archaeological remains which are important to history or pre-history? | | X |
| (30) | Will the project require the use of Section 4(f) resources (public parks, recreation lands, wildlife and waterfowl refuges, historic sites, or historic bridges, as defined in Section 4(f) of the U. S. Department of Transportation Act of 1966)? | | X |
| (31) | Will the project result in any conversion of assisted public recreation sites or facilities to non-recreation uses, as defined by Section 6(f) of the Land and Water Conservation Act of 1965, as amended? | | X |
| (32) | Will the project involve construction in, across, or adjacent to a river designated as a component of or proposed for inclusion in the National System of Wild and Scenic Rivers? | | X |

F. Additional Documentation Required for Unfavorable Responses in Part E

**Question 2** – Federally protected species listed for Orange and Durham counties include the Bald Eagle, Red-cockaded Woodpecker, Michaux's sumac, and Smooth Coneflower. There is no habitat within the project corridor for the Bald Eagle Red-cockaded woodpecker, or Michaux's Sumac. Based on the habitat

description for the Smooth Coneflower, there is suitable habitat for this species along the roadsides and in the powerline transmission easement; however no coneflower was observed during the site reconnaissance in these areas, which took place in early October during the flowering season.

**Question 9** – Four possible underground storage tanks (UST) were identified within the proposed project corridor (see attached NCDOT GeoEnvironmental Report). No hazardous waste sites, landfills, or other geoenvironmental concerns were identified. Low monetary and scheduling impacts are anticipated resulting from potential USTs.

**Question 14** – The New Hope Creek Tributary currently crosses through a single 10-foot by 6-foot reinforced concrete box culvert (RCBC), at an approximate length of 36 feet and a 90 degree skew under the road. The existing culvert will be removed and replaced with a new realigned double 10-foot by 7-foot RCBC, at an approximate length of 100 feet and a skew of 127 degrees.

**Question 28** – One property adjacent to the road, the Edwards-Sizemore Store on the northeast corner of Old Chapel Hill Road and White Oak Drive, was determined to be eligible for the National Register of Historic Places by NCDOT. Following research, coordination with the property owner, and revisions to the design, the SHPO agreed to a finding of No Adverse Effect (see attached form). The effects determination found that the project will not impact the store structure or canopy, and none of the proposed changes impact the historic eligibility of the property.

Proposed changes include the addition of a sidewalk and curb and gutter within existing right of way in front of the property. The concrete pad in front of the store will be impacted, a portion of which is included in the National Register boundary. Two driveway cuts will be added in front of the store for access to parking, and the grassed shoulder on White Oak Drive along the western edge of the property can be used for parking.

G. Categorical Exclusion Approval

| | |
|---|---|
| Project Name | Old Durham Rd/Old Chapel Hill Rd Widening |
| TIP Project No. | EB-4707 |
| WBS Project No. | 38664.1.1 |
| Federal Project No. | STPDA-0505(29) |
| Project Sponsor | NCDOT Division 5 |

**Prepared By:**

Teresa Gresham, P.E.
*Name*

Teresa Gresham
*Signature*

January 21, 2010
*Date*

Project Engineer
*Title*

Kimley-Horn and Associates, Inc.
*Company/Agency*

31550
*License Number*

**For Official NCDOT Use Only**

**Reviewed By:**

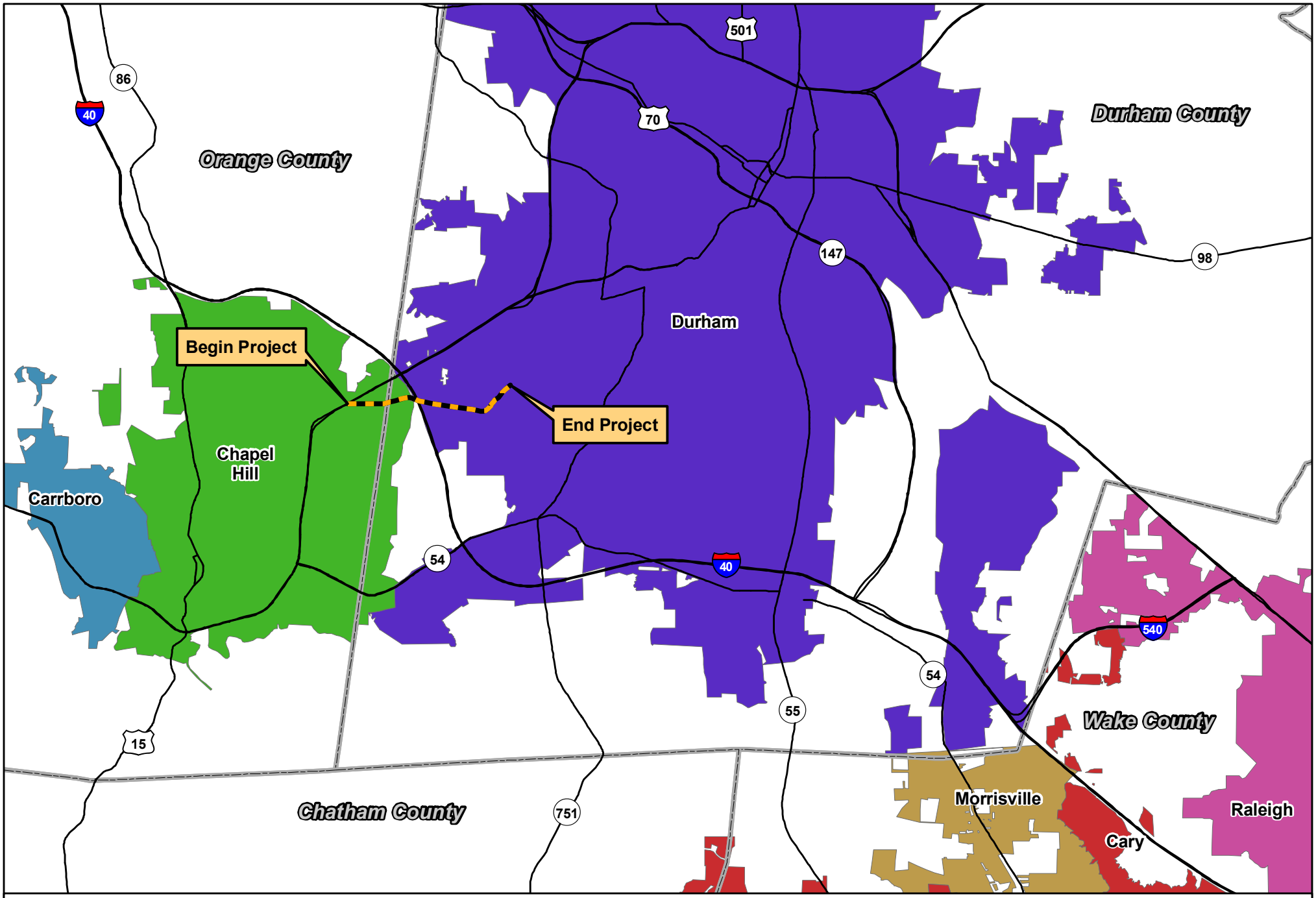
1/24/11
Date

Project Development & Environmental Analysis Branch
North Carolina Department of Transportation

**Approved By:**

2/4/11
Date

FS Division Administrator
Federal Highway Administration



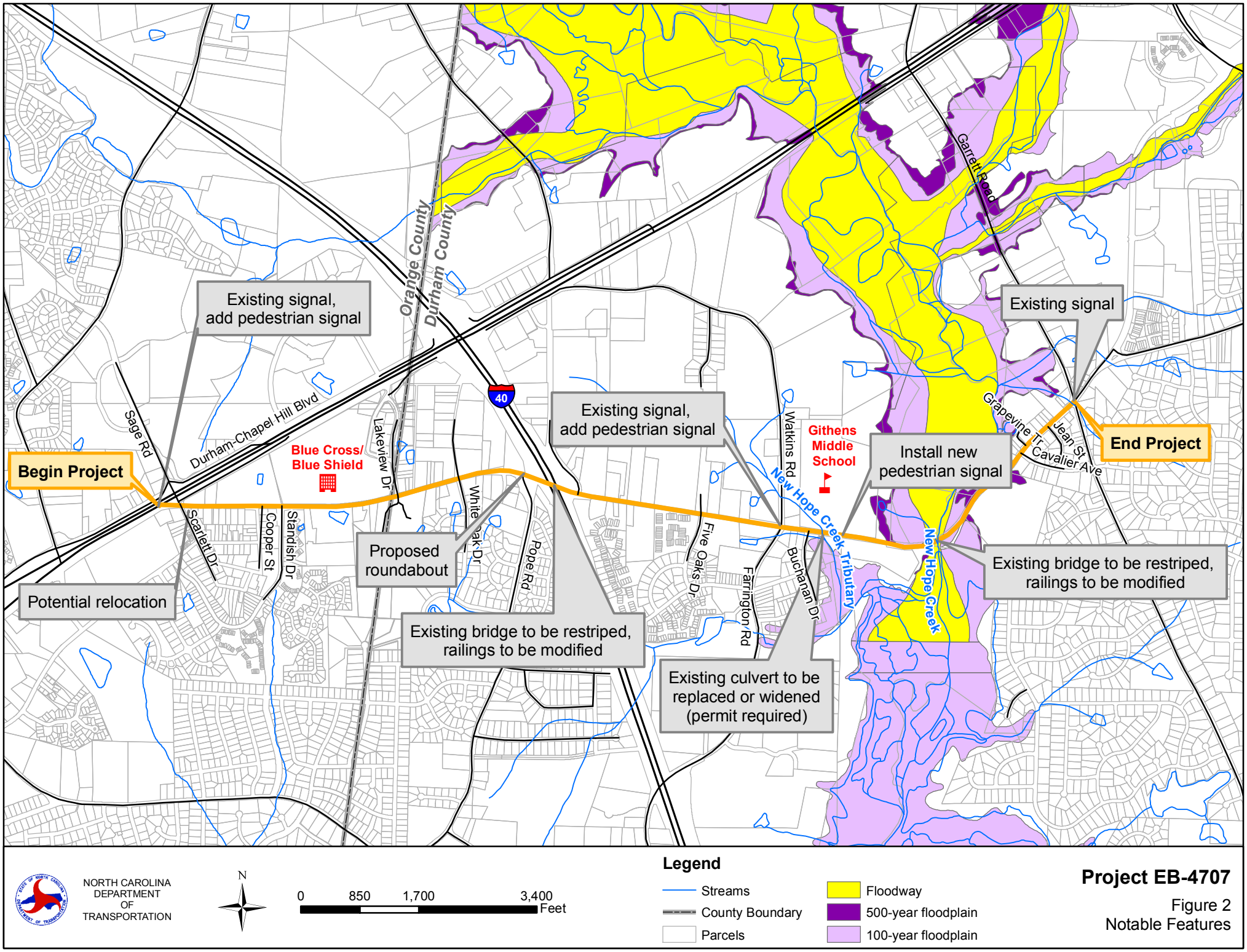

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 1 2 4 Miles

**Project EB-4707**

Figure 1
Vicinity Map


Existing signal, add pedestrian signal
Orange County
Durham County
Garrett Road
Existing signal
Existing signal, add pedestrian signal
Sage Rd
Durham-Chapel Hill Blvd
Lakeview Dr
40
Watkins Rd
Githens Middle School
Grapevine Ln
Jean St
Cavalier Ave
End Project
Blue Cross/ Blue Shield
Begin Project
Install new pedestrian signal
New Hope Creek Tributary
New Hope Creek
Scarlett Dr
Cooper St
Standish Dr
Proposed roundabout
White Oak Dr
Pope Rd
Five Oaks Dr
Farrington Rd
Buchanan Dr
Existing bridge to be restriped, railings to be modified
Potential relocation
Existing bridge to be restriped, railings to be modified
Existing culvert to be replaced or widened (permit required)
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
N
0
850
1,700
3,400
Feet
Legend
Streams
County Boundary
Parcels
Floodway
500-year floodplain
100-year floodplain
Project EB-4707
Figure 2
Notable Features

*Project Tracking No. (Internal Use)*

10-01-0023

# EFFECTS DETERMINATION FORM

## PROJECT INFORMATION

| | | | |
|---|---|---|---|
| *Project No:* | **EB-4707** | *County:* | Orange/Durham |
| *WBS No:* | 38664.1.1 | *Document:* | CE |
| *F.A. No:* | STPDA-0505(29) | *Funding:* | ☐ State ☒ Federal |

*Federal (USACE) Permit Required?* ☐ Yes ☒ No *Permit Type:*

*Project Description:* Widening Old Durham Road (SR 1838)/Chapel Hill Road (SR 2220) from US 15-501 in Orange County to SR 1116 (Garrett Road) in Durham County for a length of approximately 2.7 miles. The project includes the addition of a roundabout at the intersection with Pope Road, pedestrian signals, and signal modifications. The purpose and need of the project is to accommodate pedestrian facilities along the corridor including bicycle lanes, sidewalks, and a multi-use path.

*Brief description of review activities, results of review, and conclusions:* Initial screening of HPO maps and files indicated a surveyed property within the APE for this project. A site visit was conducted on 29 January 2010. An NCDOT architectural historian drove the entire project length and noted that the only property potentially eligible for National Register listing was the store located at 5520 Old Chapel Hill Road. In a meeting to discuss eligibility, Historic Architecture staff determined that the property was potentially eligible for National Register listing based on photographs of the store. Additional background research determined that the Edwards-Sizemore Store (DH 2561) is eligible for listing in the National Register of Historic Places as a good, intact example of a rural roadside store dating from the 1920s. The store has experienced little material change on the exterior and retains its historic interior finishes.

## EFFECTS DETERMINATION

*Property/Site:* **Edwards-Sizemore Store (DH 2561)**

*Status:* DOE

*Effects Finding:* ☐ No Effect ☒ No Adverse Effect ☐ Adverse Effect

*Explanation of Effects Determination:* The project will not impact the store structure or the canopy. Proposed changes in front of the property include the addition of a sidewalk and curb and gutter that will extend across the front of the property along Old Chapel Hill Road and end at the proposed cross walk on White Oak Drive. All construction activity will take place within the existing right-of-way. A portion of the concrete parking pad that is located in the right-of-way along Old Chapel Hill Road is included in the National Register Boundary. This will be impacted by the placement of the sidewalk in front of the property. There will be two driveway cuts provided in front of the store for access to parking. Additionally, the grassed shoulder on White Oak Drive along the western edge of the property can be utilized for parking. Considering that none of these changes impact the historic eligibility of the property, there are no adverse effects to the property.

*List Environmental Commitments (if any):* Not applicable.

**SUPPORT DOCUMENTATION**

See attached: Project location map, design plan sheet for the area in front of the Edwards-Sizemore Store, photographs of the property along White Oak Drive, and the Historic Architectural Resource Evaluation Report for the Edwards-Sizemore Store.

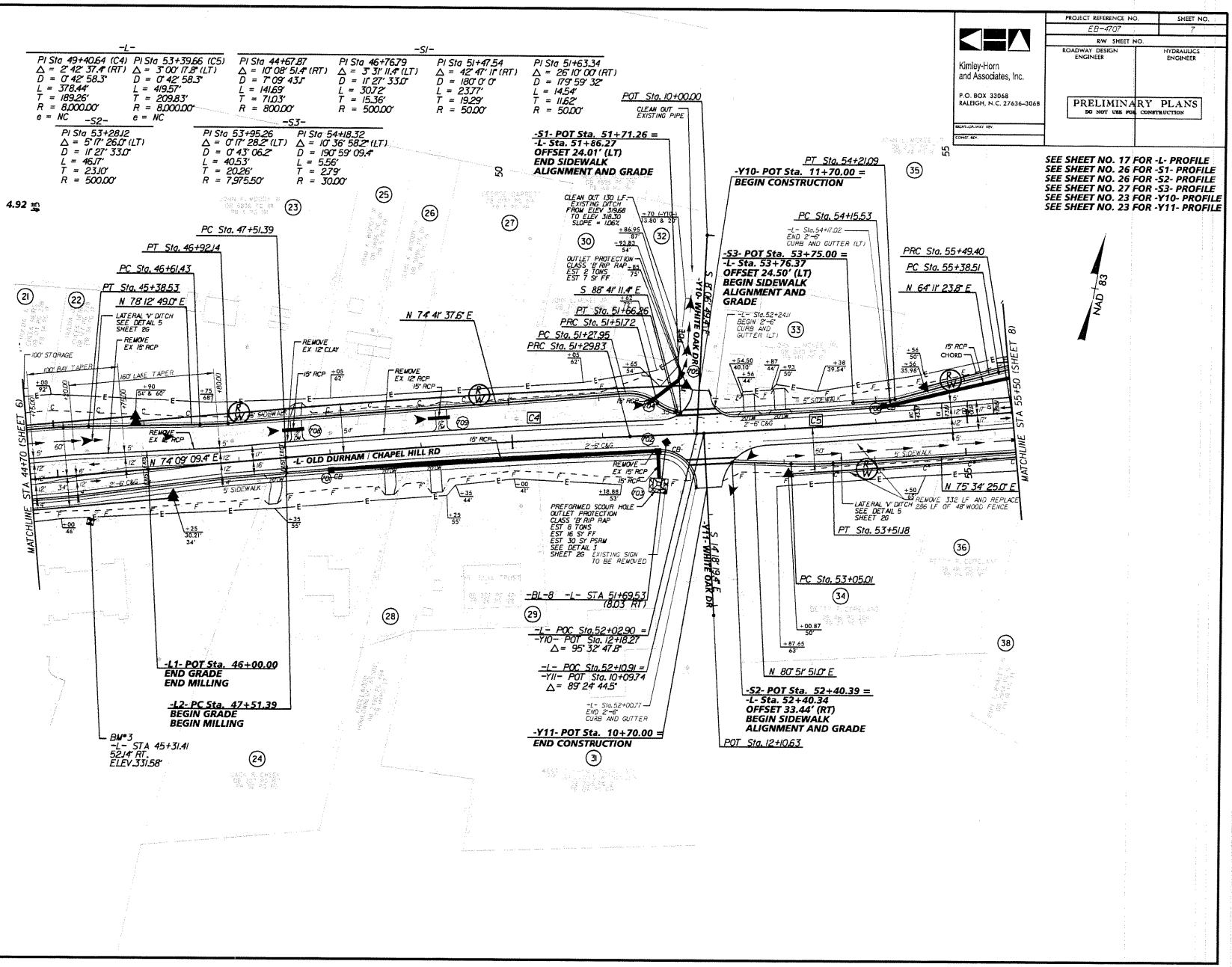
Mary Pope Furr — 12/10/2010

Cultural Resources Specialist, NCDOT — Date

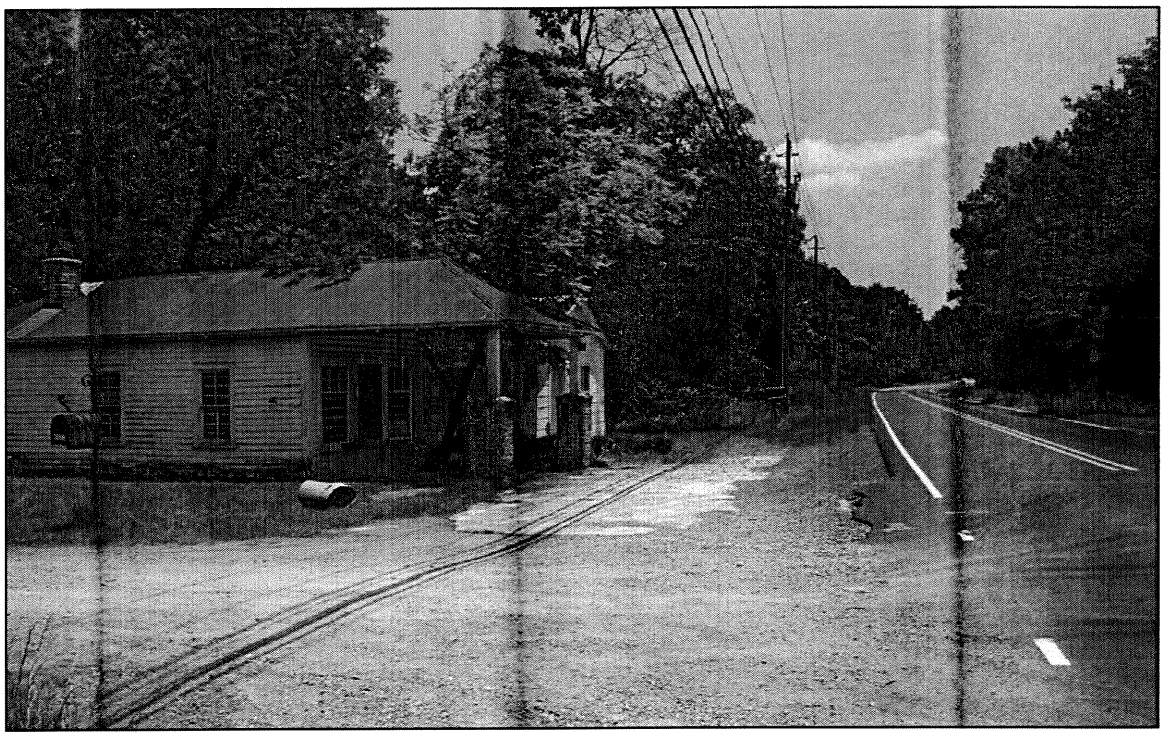
Renee Gledhill-Earley — 12-10-10

Representative, HPO/OSA — Date

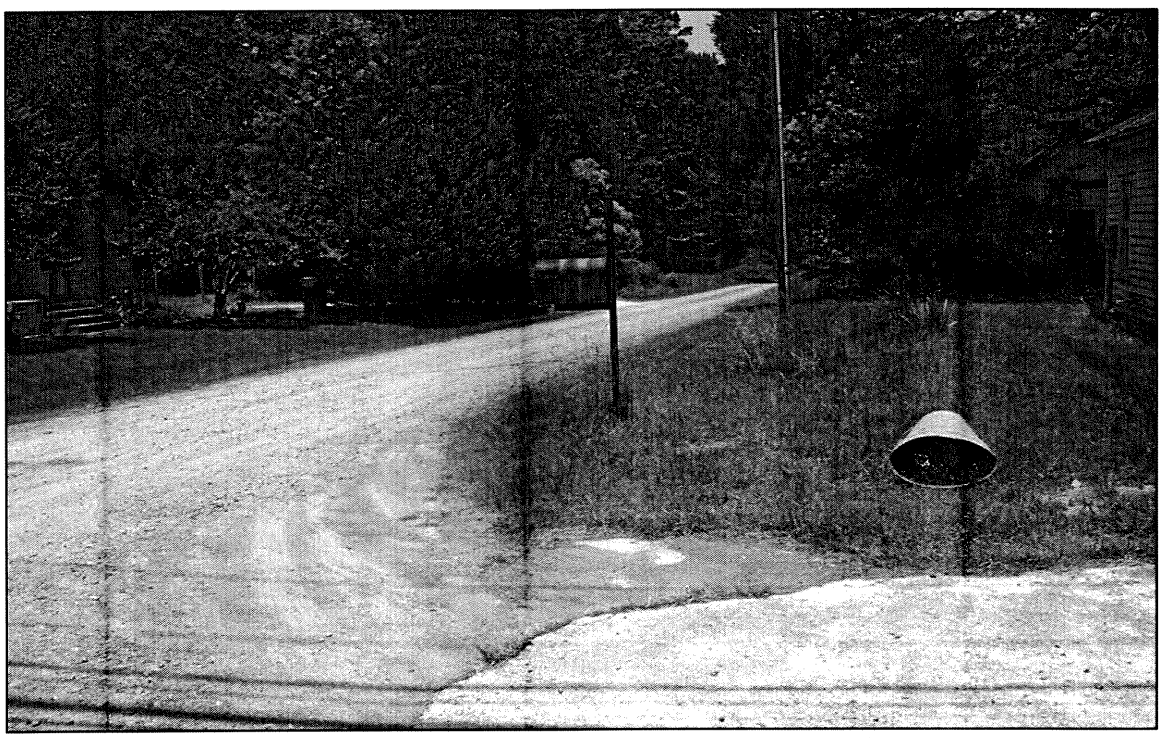
*HPO/OSA Comments:*



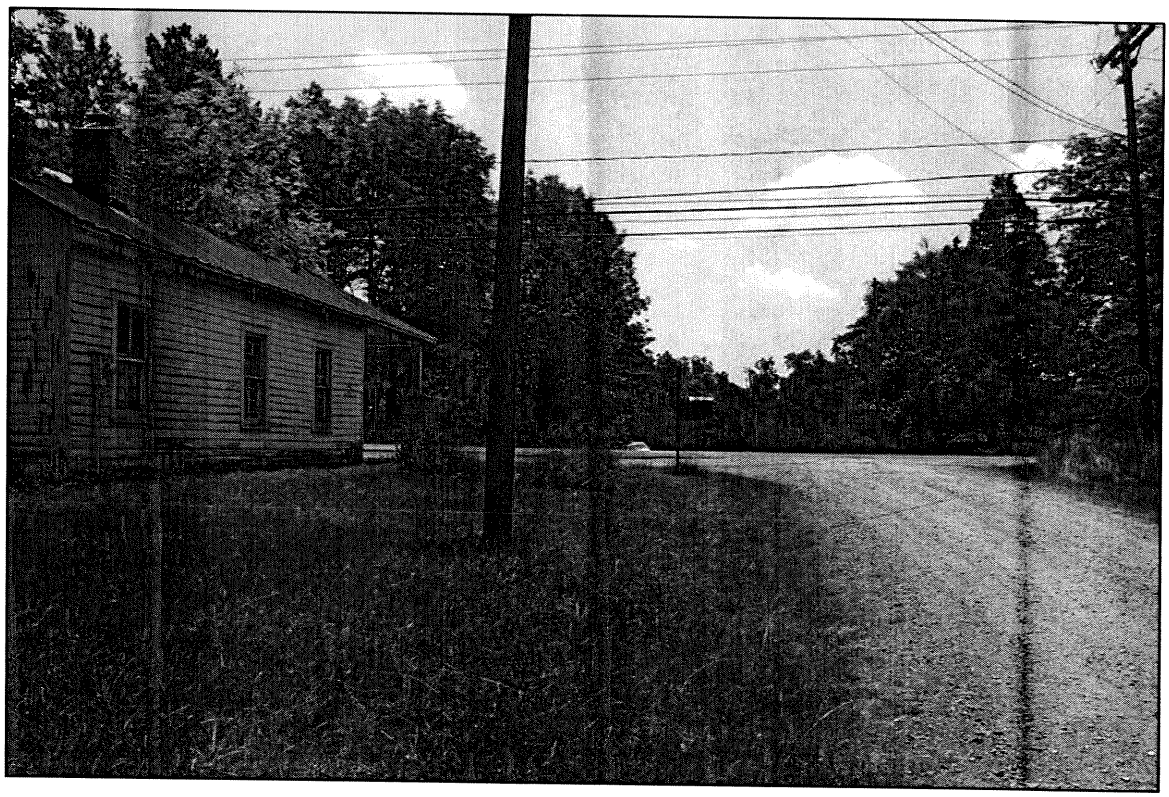

K:\RAL_Roadway\011056077 (Old Durham Roadway)\Proj\EB-4707_rdy_PS17.dgn
11/18/2010



Looking east along Old Chapel Hill Road. White Oak Drive in foreground.



Looking north on White Oak Drive from concrete pad in front of store.
Parking possible along side of road between mailbox and utility pole.



Looking south towards Old Chapel Hill Road. Future parking for the store would be on the grassed shoulder beside the store.

STATE OF NORTH CAROLINA
# DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

May 24, 2010

MEMORANDUM TO: Mike Kneis, Division 5, NCDOT

ATTENTION: Teresa Gresham, P.E., Kimley-Horn and Associates, Inc

FROM: Njoroge W. Wainaina, P.E.
State Geotechnical Engineer
Geotechnical Engineering Unit

TIP NO: EB-4707
WBS: 38664.1.1
COUNTY: Orange-Durham
DIVISION: Division 5
DESCRIPTION: Widening Old Durham Rd (SR 1838)/Chapel Hill Rd (SR 2220) from US 15-501 (Durham/Chapel Hill Blvd) to Garrett Rd (SR 1116)

SUBJECT: **Geotechnical Pre-Scoping Report**

The Geotechnical Engineering Unit has performed a limited assessment of the above referenced project to assist in developing the scope of work necessary to provide early identification of hazardous material and geotechnical issues that could impact the project's planning, design, or construction.

## HAZARDOUS MATERIALS EVALUATION

### Purpose

This section presents the results of a hazardous material evaluation conducted along the above referenced project. The main purpose of this investigation is to identify properties within the project study area that are or may be contaminated and therefore result in increased project costs and future liability if acquired by the Department. Hazardous material impacts may include, but

**MAILING ADDRESS:**
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-250-4088
FAX: 919-250-4237
*www.ncdot.gov/doh/preconstruct/highway/geotech*

**LOCATION:**
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

are not limited to, active and abandoned underground storage tank (UST) sites, hazardous waste sites, regulated landfills and unregulated dumpsites.

## Techniques/Methodologies

The Geographical Information System (GIS) was consulted to identify known sites of concern in relation to the project corridor. Geotechnical Engineering Unit personnel conducted a field reconnaissance along the project corridor on May 11, 2010. A search of appropriate environmental agencies' databases was performed to assist in evaluating sites identified during this study.

## Findings

### UST Facilities

Based on our study, four (4) sites presently, or formerly containing petroleum USTs were identified within the project limits.

### Hazardous Waste Sites

No Hazardous Waste Sites were identified within the project limits.

### Landfills

No apparent landfills were identified within the project limits.

### Other GeoEnvironmental Concerns

No other geoenvironmental concerns were identified within the project limits.

## Anticipated Impacts

Four (4) possible UST facilities were identified within the proposed project corridor. We anticipate low monetary and scheduling impacts resulting from these sites. (See the following table and appendices for details)

The Geotechnical Engineering Unit will provide soil and groundwater assessments on each of the above properties after identification of the selected alternative and before right of way acquisition. Please note that discovery of additional sites not recorded by regulatory agencies and not reasonably discernable during the project reconnaissance may occur. The Geotechnical Engineering Unit should be notified immediately after discovery of such sites so their potential impact(s) may be assessed.

If there are questions regarding the geoenvironmental issues, please contact Terry W. Fox, LG, at 919-250-4088.

## Known and Potential Hazardous Material Sites

1) **Property Name**

Former Chapel Hill Nursery
Scarlett Drive
Chapel Hill, NC 27514

**Facility ID #: N/A**

**Property Owner:**

Muthigi Gorvardham
4213 Peachway Drive
Durham, NC 27705

**UST Owner: N/A**

This closed business formerly operated as Chapel Hill Nursery. It is located in the southeastern quadrant of Scarlett Drive and Old Durham Road. The structure is approximately 50 feet south of the Old Durham Road centerline. No information could be found in the UST registry for this facility. Furthermore, no evidence of any UST system was observed in the field. However, the design of the building suggests it may have been a gas station at one time. **This site is anticipated to present low geoenvironmental impacts to the project.**

2) **Property Name**

R&H Mini Mart
117 Old Durham Road
Chapel Hill, NC 27514

**Facility ID #: N/A**

**Incident #:** 15985

**Property Owner:**

Edward B. Heard Heirs
104 Old Durham Road
Chapel Hill, NC 27514

**UST Owner: N/A**

This facility currently operates as a convenience store. It is located on the south side of Old Durham Road and approximately 200 feet east of Scarlett Drive. Although no information was found in the UST Registry, evidence of an old pump island was noted during the filed reconnaissance. The former pump island is located approximately 55 feet south of the Old Durham Road median. GWI # 15985 has been assigned to this facility. **This site is anticipated to present low geoenvironmental impacts to the project.**

3) **Property Name**

Performance Automall
1806 Fordham Blvd
Chapel Hill, NC 27515

**Facility ID #:** 0-020696

**Incident #:** 8462 & 16492

**Property Owner:**

Hendrick Automotive Group
PO Box 2287
Chapel Hill, NC 27515

**UST Owner:**

Hendrick Automotive Group
6000 Monroe Road
Charlotte, NC 28212

This facility currently operates as an Automotive Dealership. The property is located between US 15/501 and Old Durham Road. The paint shop and several BMW service bays with waste oil storage are located on the back side of the property. The oil storage is located 80 feet north of the Old Durham Road median. The UST registry shows that four tanks were removed between 1991 and 2002. GWI #'s 8462 and 16492 have been assigned to this facility. **This site is anticipated to present low geoenvironmental impacts to the project.**

| | | |
|---|---|---|
| 4) | **Property Name**<br>Former Gas Station<br>5520 Old Chapel Hill Road<br>Durham, NC 27707<br>**Facility ID #: N/A** | **Property Owner:**<br>John L. Jr. & Ann McKee<br>11 White Oak Drive<br>Durham, NC 27707<br>**UST Owner: N/A** |

This facility is currently being used for private storage. It is located in the northeastern quadrant of N. White Oak Drive and Old Chapel Hill Road. Although no information was found in the UST registry for this facility, evidence of an old pump island was noted during the field reconnaissance. The building canopy is approximately 30 feet north of the Old Chapel Hill Road centerline. **This site is anticipated to present low geoenvironmental impacts to the project.**

## GEOTECHNICAL IMPACT EVALUATION

### Techniques/Methodologies

The Eastern Regional Office has completed a limited investigation of the proposed addition of multi-modal infrastructure for approximately 2.7 miles from US 15-501 to SR1116 (Garrett Road) along SR 1838 (Old Durham Road)/SR 2220 (Chapel Hill Road) through Orange and Durham County. In addition to multi-modal infrastructure (bike and walking paths), a roundabout is planned for the intersection of SR 1838 with Pope Road. A culvert just east of Buchanan Drive will also be replaced to accommodate the additional roadway width. Bridges over I-40 and New Hope Creek will be restriped and their railing modified to accommodate two 4-foot wide, multi-modal lanes. This investigation consisted of field reconnaissance in May of 2010 and review of roadway subsurface investigations along US 15-501 and SR 1733, performed in 2003 and 2006 respectively (U-4012, U-3306). General structural and roadway design practices were considered for this review including groundwater depth and depth to competent material.

### Findings

Currently, SR 1838/SR 2220 is a 2 to 3-lane, secondary road with a no-access bridge over I-40, and a roundabout east of I-40 at Mt. Moriah Road. There is one major stream crossing over New Hope Creek (bridge). Multiple small to medium drainage crossings are facilitated by culverts and corrugated drainage pipes.

The project is located in the westernmost boundary of the Durham Triassic Basin within the Piedmont Physiological Province. Rocks of the Triassic Basin consist of sedimentary, interbedded siltstone, mudstone, sandstone and conglomerate. These materials are highly susceptible to weathering. Occasional diabase dikes are also prevalent within the region. Rocks of the Triassic Basin are typically shallow to moderately deep, and form residual soils that consist of loose to dense, sands as well as soft to hard, silts and highly plastic, potentially expansive clays.

Topography along the project is gently rolling. The major drainage features are small streams with associated ponds and drainage ditches, with the exception of the larger drainage basin for New Hope Creek. Subsurface drainage for the area of the investigation ranges from poor to well-drained. Based on TIP project research, observations in the field, and general topography of the project site, regional groundwater depth is typically 5 to 15 feet below existing grades, with shallower groundwater associated with New Hope Creek and its tributaries.

Surface water was observed in a pond adjacent to SR 1838 near Bluefield Drive, and in the New Hope Creek and its tributary floodplains near Buchanan Drive. No standing water was present in the ditches along the alignment during the May 7$^{th}$ reconnaissance.

Soils in the area consist of roadway embankment, alluvial, and saprolitic, residual material transitioning to Triassic, weathered rock. Both granular and cohesive soils are present and exhibit poor to good engineering properties.

Roadway embankment soils consist of cohesive and non-cohesive material and have plasticity indices ranging from non-plastic up to approximately 25. These soils may are generally medium stiff to stiff in strength.

Alluvial deposits are relatively thin, except in association with New Hope Creek and its tributaries. Alluvial deposits in these areas consist of surficial soft clays and silts with little to moderate organics overlying silty and coarse sands up to 15 feet below the current floodplain elevation. One to two feet of very soft muck may be associated with the pond near Bluefield Drive.

The majority of soils encountered along the project area are residual in origin. These soils consist of saprolitic sands (A-2-4, and A-2-6), silts and clays (A-4, A-5, A-6, A-7), and vary in engineering properties. High plastic, unsuitable residual clays were encountered within roadway cuts on nearby roadway projects. These soils may be unsuitable for subgrade or borrow (Plastic Indices ranging from 25 to 45).

Weathered and non-crystalline rock (Triassic mudstone and sandstone) elevations are variable throughout the project, typically ranging in elevation from 250 feet to 350 feet (mean sea level).

**Anticipated Impacts/Recommendations**

It is anticipated that the proposed grade along the widening portion of the project corridor will likely match the existing grade of SR 1838/SR 2220. Where additional fill and cuts are necessary, side slopes of 2:1(H:V) or flatter are recommended to establish vegetation and assist in erosion control. Some undercutting may be necessary within soft, cohesive, and potentially organic, alluvial soils, as well as any highly plastic roadway embankment or residual, cohesive soils. Most unclassified excavation is anticipated to be suitable for embankment construction.

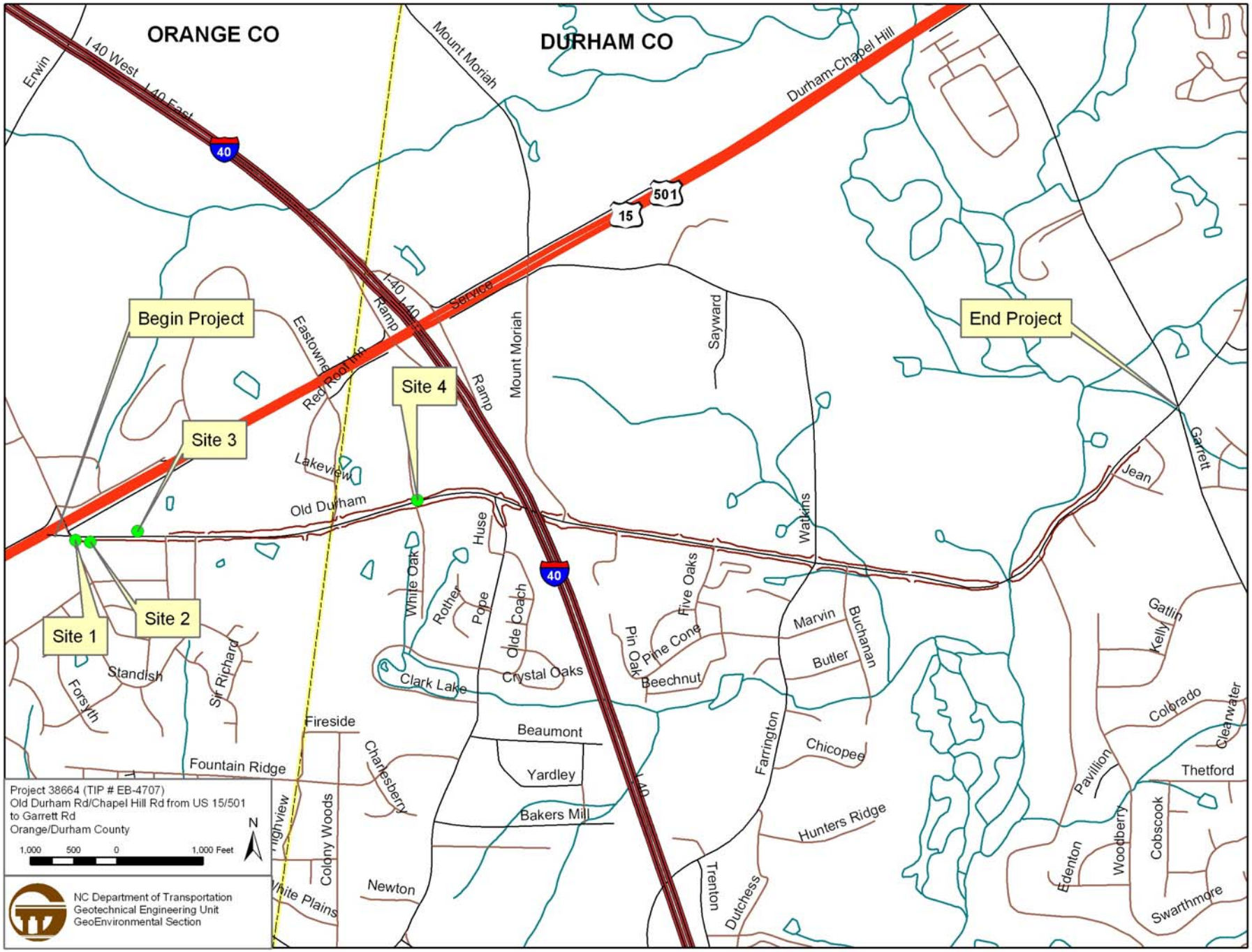
If widening of the bridges on this project is necessary, based on subsurface conditions at this and nearby sites, the probable foundation type for the above mentioned structures is pile construction at the end bents. Drilled piers or spread footings are the most probable foundation options for interior bent locations due to the typically shallow rock in the area.

Special ditches or subsurface drainage may be necessary to assist in drainage in the event of additional cuts or realignment and extension of existing culverts. Culvert extensions may require undercutting of any soft, alluvial soils to avoid differential settlement.

If there are questions regarding geotechnical issues, please contact James R. Batts, PE or Christina Bruinsma, LG at (919) 662-3576.

cc:
Art McMillan, PE, State Highway Design Engineer
Jay Bennett, PE, State Roadway Design Engineer
Tom Koch, PE, Assistant State Bridge Design Engineer
D.R. Henderson, PE, State Hydraulics Engineer
Charles W. Brown, PE, PLS, State Location & Surveys Engineer

**Appendix A**
**Location of USTs, Landfills, & Other Potentially Contaminated Sites**




**Site #1**: Former Chapel Hill Nursery. View to the east.


**Site # 2**: R & H Mini Mart. View to the southeast

**Site # 3:** Performance BMW waste oil storage. View to the northeast.

**Site # 4:** Former Gas Station. View to the northeast.