



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR. P.O. BOX 25201, RALEIGH, N.C. 27611-5201 DAVID McCOY  
GOVERNOR SECRETARY

October 11, 1999

STATE PROJECT: 6.439001T R-2562C  
FEDERAL PROJECT:  
COUNTY: Bladen  
DESCRIPTION: NC 87 from NC 131 to SR 1191  
SUBJECT: Geotechnical Report - Inventory

**Project Description**

The proposed NC 87 project generally consists of constructing a four lane divided facility with a 12.8 meter median. The project begins at NC 131 and proceeds 9.8± kilometers southeast to just south of SR 1191. The northwestern and southeastern termini of the project tie in with R-2562B and R-2562D, respectively. The investigation of subsurface conditions was confined to the corridor of proposed new construction.

The following lines were investigated for this project:

Line	Station
-L-	96+62 to 97+34
-L-Rev. (LT)	97+39 to 100+93
-L-Rev. (RT)	97+39 to 100+94
-L-Rev.	101+04 to 182+50
-L-Rev. (LT)	182+60 to 186+35
-L-Rev. (RT)	182+61 to 186+41
-L-Rev.	186+46 to 190+00
-Y2-	10+00 to 10+75
-Y3-	10+00 to 10+71
-Y4-	10+00 to 10+80
-Y5-	10+00 to 10+75

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Line	Station (±)
-L-Rev.	114+50 to 115+50
-L-Rev.	117+70 to 123+80
-L-Rev.	136+40 to 143+90
-L-Rev.	146+70 to 147+20
-L-Rev.	150+40 to 173+80
-L-Rev.	175+20 to 180+50
-L-Rev.	182+00 to 182+50
-L-Rev. (LT)	182+60 to 186+35
-L-Rev. (RT)	182+61 to 186+41
-L-Rev.	186+46 to 190+00
-Y3-	10+00 to 10+71
-Y5-	10+00 to 10+75
-Y6-	10+00 to 10+70
-Y7-	10+00 to 10+55

- 3) The following sections contain soft organic soils that have the potential for settlement and stability problems (see accompanying plan view for approximate organic soil limits):

Line	Station (±)
-L-Rev.	154+75 to 155+47
-L-Rev.	177+50 to 179+65

- 4) Several businesses along this project were identified as potentially hazardous waste sites by the GeoEnvironmental Section in their report dated May 23, 1994. Please refer to this report for locations of the contamination.

**Physiography and Geology**

The project corridor is located in Bladen County and generally southeast of Tar Heel. Topography is typical of the Coastal Plain and ranges from flat to moderately sloping. Reedy Meadow Swamp is the major drainage feature on this project with flood plain elevations of 41± meters. Additional small flood plains along the project are associated with Black Swamp and other unnamed tributaries to the Cape Fear River and range in elevation from 35 to 45 meters. Natural ground elevations along upland portions of the project generally range from 36 to 49 meters. Surface drainage is generally fair to good.

The geology of this region primarily consists of Quaternary to Recent age sediments. The 1985 Geologic Map of North Carolina indicates this project is underlain by the Black Creek Formation of Cretaceous age, although none of these soils were encountered within the scope of our investigation.

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Line	Station
-Y6-	10+00 to 10+70
-Y7-	10+00 to 10+55

**Areas of Special Geotechnical Interest**

- 1) The following sections contain silt-clay soils which typically have medium to high plasticity indices, 40% or more passing the 75µm sieve and/or high moisture contents:

Line	Station (±)
-L-Rev.	101+10 to 101+75
-L-Rev.	103+10 to 108+90
-L-Rev.	109+50 to 109+70
-L-Rev.	117+10 to 117+70
-L-Rev.	118+05 to 118+55
-L-Rev.	120+60 to 124+50
-L-Rev.	125+60 to 128+00
-L-Rev.	129+80 to 132+60
-L-Rev.	133+35 to 137+20
-L-Rev.	140+90 to 142+50
-L-Rev.	143+40 to 145+60
-L-Rev.	148+60 to 150+90
-L-Rev.	151+55 to 152+70
-L-Rev.	158+40 to 159+20
-L-Rev.	160+50 to 161+40
-L-Rev.	177+10 to 177+90
-L-Rev.	180+20 to 182+30
-Y3-	10+00 to 10+35
-Y4-	10+00 to 10+80

- 2) The following intervals were found to exhibit a high water table, seasonal high ground water or the potential for ground water related construction problems:

Line	Station (±)
-L-	96+62 to 97+30
-L-Rev. (LT)	98+80 to 100+20
-L-Rev. (RT)	98+80 to 100+20
-L-Rev.	102+80 to 110+20
-L-Rev.	112+20 to 113+20

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**Ground Water**

Ground water data was collected primarily from May 1999 to June 1999 during dry to average rainfall conditions. During our investigation, the water table was generally between 1 and 3 meters below the natural ground surface along the upland areas. However, during the wet season or after heavy precipitation, water levels may rise 1± meter. In flood plain and adjacent areas, water is typically at or near the surface. During the wet season, the water in the flood plains will be at or above the surface.

**Soils**

Soils encountered during this investigation are separated into four major categories based on origin and published data. These categories are alluvial soils, Quaternary soils, rootmat and embankment soils.

Alluvial soils noted in the unnamed tributary to the Cape Fear River (-L-Rev. station 146+80±) consists of sand. Alluvial soils in Black Swamp (-L-Rev. station 154+75± to 155+47±) and Reedy Meadow Swamp (-L-Rev. station 177+50± to 179+65) generally consist of 0.5 to 1.5 meters of very loose moderately organic sand and muck, respectively. Vane Shear Tests performed in the organic soils range from 8 to 36 kPa. Typically, the organic sand and muck sediments exhibit poor engineering properties. The alluvial soils are generally underlain by very loose to medium dense fine to coarse sand (A-2-4).

The Quaternary soils along this project generally consist of 2.0 or more meters of very loose to medium dense fine to coarse sand (A-2-4, A-3) and clayey sand (A-2-6) with thin (< 1 meter) discontinuous silt (A-4) and clay (A-6, A-7-6) layers. The silt soils have a low plasticity index (8 to 9 PI) and relatively high moisture contents. The clay soils have a medium to high plasticity index (11 to 29) and moisture contents ranging from 15 to 26 percent. The silt-clay deposits generally have more than 40 percent passing the 75µm sieve. The silt-clay deposits have fair to poor engineering properties. The engineering properties of the granular soils range from good to excellent.

Rootmat is surficial organic debris derived from the decomposition of plant material. Rootmat along the project is primarily confined to wooded areas of the project and ranges in thickness from 0.05 to 0.1 meters.

Embankments are man-made fills built during construction of existing roadways. The fill material generally consists of very loose to loose fine to coarse sand (A-2-4). Thickness of the fill material ranges from 0.3 to 2.0 meters and has good to excellent engineering properties. This material was primarily encountered along existing NC 87 and associated -Y- lines.

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**Culvert at -L-Rev. Station 146+61.95**

Natural ground elevations typically range from 35.0 to 36.6 meters in the stream bed to 40.0± on the adjacent upland area. The flood plain of this stream is poorly developed. Auger borings made in the immediate vicinity of the proposed culvert show approximately 1.8 meters or more of loose to medium dense fine to coarse sand (A-2-4). During our investigation, water was measured at an elevation of 36± meters.

**Culvert at -L-Rev. Station 155+04.84**

Natural ground elevations typically range from 43.4 to 44.0 meters in the stream bed to 44.2 meters in the flood plain. Hand auger borings made in the immediate vicinity show that approximately 0.5 to 1.0 meter of moderately organic sand is underlain by loose to medium dense fine to coarse sand (A-2-4). During our investigation, water was measured at an elevation of 44.0± meters.

**Culvert at -L-Rev. Station 178+78.61**

Natural ground elevations typically range from 39.0 to 39.8 in the stream bed to 40.0± in the flood plain. Hand auger borings made in the immediate vicinity show that approximately 1.0 to 1.5 meters muck is underlain by loose to medium dense fine to coarse sand (A-2-4). During our investigation, water was measured at an elevation of 41.2± meters.

Respectfully submitted,

*Dean N. Argenbright*

Dean N. Argenbright, Project Geologist

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PROJECT REFERENCE NUMBER	SHEET NO.	TOTAL SHEETS
	3	47
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION