



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
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November 14, 2001

STATE PROJECT: 6.469002T R-0513BA
 FEDERAL PROJECT:
 COUNTY: Robeson
 DESCRIPTION: US 74 from 1.87 km East of SR 1166 (Cabinet Shop Road) to West of SR 1157 (Henry Berry Road)
 SUBJECT: Geotechnical Report - Inventory

The project consists of upgrading dual lane US 74 to a relocated four lane divided highway with a typical median width of 21 meters. The project lies parallel to and south of existing US 74. Length of the project is 6.8 km. Both termini of the project will tie into future US 74 roadway projects. The geotechnical investigation of subsurface conditions was confined to the corridor of proposed new construction.

The following survey lines were investigated for this project:

Line	Station
-L-	85+80 to 153+80
-Y1-	11+90 to 20+00
-SR1-	10+00 to 31+50
-SR2-	10+06 to 21+01
-SR3-	25+82 to 26+37
-SR4-	10+00 to 12+94
-LPB-	10+00 to 12+69
-RPB-	10+00 to 15+05
-LPC-	10+00 to 14+76
-RPC-	10+00 to 18+86

Areas of Special Geotechnical Interest

1) A high water table, seasonal high ground water or the potential for ground water related construction problems occur along the majority of the project.

Undisturbed Samples

Undisturbed (Shelby Tube) samples were taken at the following locations and submitted for testing:

Sample No.	Station	Depth (m)	Test
ST-1	23+20, -SR1-	1.50 - 2.10	Consolidation
ST-2	12+40, -RPB-	0.30 - 0.85	Consolidation
ST-3	10+20, -RPC-	0.61 - 1.21	Consolidation
ST-4	138+90, -L-	0.50 - 0.81	Consolidation
ST-5	13+70, -SR1-	2.70 - 3.15	Consolidation
ST-6	12+40, -LPC-	0.30 - 0.91	Triaxial CU
ST-9	138+91, -L-	0.30 - 0.91	Triaxial CU
ST-10B	113+40, -L-	1.52 - 1.96	Triaxial CU
ST-10C	113+40, -L-	2.29 - 2.69	Consolidation
ST-13	134+20, -L-	1.22 - 1.77	Triaxial CU
ST-14	134+20, -L-	1.52 - 1.96	Consolidation

ST-7 and ST-8 were unsuitable for testing, ST-12 was combined with ST-13 and run for triaxial testing.

California Bearing Ratio (CBR) Samples

Bulk samples were taken at the following locations and submitted for CBR testing:

Sample No.	Station	Depth (m)
CBR-1	-L- 122+80	1.00 - 400
CBR-2	-L- 151+20	1.00 - 400
CBR-3	-L- 92+80	1.00 - 400

Respectfully submitted,

P. Q. Lockamy
 Patrick Q. Lockamy, TEG-II

2) The following sections contain surficial cohesive soils which have the potential to cause subgrade problems during construction. Typically, the cohesive soils exhibit medium to high plasticity indices, relatively high moisture contents and 50 percent or more passing the 75µm sieve.

Line	Station
-L-	85+80 to 88+80
-L-	94+10 to 95+45
-L-	100+95 to 104+05
-L-	105+40 to 107+55
-L-	109+50 to 110+66
-L-	113+27 to 113+60
-L-	116+70 to 120+75
-L-	121+33 to 121+90
-L-	123+15 to 127+20
-L-	127+90 to 130+20
-L-	133+25 to 134+65
-L-	135+30 to 140+80
-L-	141+10 to 142+10
-L-	143+05 to 143+60
-L-	145+00 to 145+40
-L-	146+50 to 147+60
-RPB-	12+30 to 13+30
-RPB-	14+85 to 15+05
-RPC-	10+00 to 10+70
-RPC-	14+05 to 18+15
-LPB-	10+00 to 11+00
-LPB-	12+40 to 12+69
-LPC-	11+90 to 13+90
-SR1-	15+77 to 18+10
-SR1-	21+40 to 23+40
-SR1-	23+95 to 24+80
-SR1-	28+75 to 29+40
-SR2-	11+45 to 14+30
-SR2-	16+78 to 18+00
-SR2-	18+55 to 20+20
-SR3-	25+80 to 26+37
-SR4-	10+00 to 12+30

3) The following sections contain organic soils:

Line	Station
-L-	85+80 to 87+00
-L-	102+80 to 103+45
-L-	106+00 to 107+50
-L-	133+50 to 137+98
-L-	140+50 to 143+05

-L-	146+55 to 147+50
-RPB-	11+50 to 12+00
-SR1-	13+50 to 14+00
-SR1-	23+65 to 24+04
-SR2-	11+10 to 12+25

Approximate limits of surficial organic soils are shown on the accompanying plan view sheets.

4) The following sections typically are located in high embankment areas and contain beds of relatively soft clay and/or organic soils which have the potential to cause embankment stability and/or long term settlement problems:

Line	Station
-L-	113+20± to 113+70±
-L-	133+20± to 139+10
-L-	140+70± to 143+10±
-LPC-	10+00 to 13+80±
-SR2-	11+20± to 12+20±

Physiography and Geology

The project is located within the Coastal Plain Physiographic Province. Geology basically consists of mixed fluvial, marine and eolian sediments of Pliocene to Recent age overlying deltaic sediments of Upper Cretaceous age Black Creek Formation. The project corridor traverses nearly level to flat topography with elevations typically ranging from 45 to 49 meters above sea level.

The project is primarily located on alluvial terrace soils of Back Swamp, uplands of the Duplin Formation, and Carolina Bays. Back Swamp, a tributary of the Lumber River, has been channelized and runs parallel to the south side of the canal for most of the project limits. Several feeder canals and large ditches along the project drain into the Back Swamp Main Canal. Drainage conditions are generally fair to poor along the project corridor due to the nearly level topography and the lack of sufficient natural outfall.

Ground Water Properties

Ground water data was collected primarily from winter of 2000/2001 through the summer of 2001 during average rainfall conditions. Typically, ground water levels were measured at depths of 0.5 to 1.5 meters along the majority of the project.

Soils

Soils occurring on the project are derived from marine, eolian and fluvial sediments deposited in the geologic past.

The predominant soil type along the project consists of fine to coarse sand (A-1-b, A-3, A-2-4, A-2-6). Sand occurs as surficial deposits, low ridges or rims of Carolina Bays and as thick beds underlying the surficial soils. Engineering properties of the granular soils are good to excellent but are highly susceptible to erosion.

Cohesive soils typically consisting of clayey and sandy silt (A-4) and silty to fine sandy clay (A-6, A-7) occur as 1 to 3 meters thick beds and as discontinuous beds of variable thickness within the surficial veneer. Engineering properties of the silt and clay soils range from fair to poor. The cohesive soils typically have a high percentage passing the 75µm sieve. Vane Shear tests performed in surficial cohesive soils indicates typical shear strengths ranging from 38 to 280 KPa. Moisture contents of the silt-clay deposits generally range from 15 to 64 percent. The sandy silt and sandy clay soils with a maximum Plasticity Index of 15 and 50 percent or less passing the 75 µm sieve generally exhibit fair to poor engineering properties and may be suitable for use in subgrade if moisture contents are low. However, the majority of the surficial cohesive soils consist of soft to medium stiff sandy and silty clay (A-6, A-7-6) with poor engineering properties as shown by plasticity indices of 16 to 50, above optimum moisture contents and an excess of 50 percent passing the 75 µm sieve. The surficial clays have the potential to cause subgrade failure. A potential for long term settlement and/or stability problems exist in areas where the cohesive soils are under proposed high embankments. (See Areas of Special Geotechnical Interest part 4.)

Soils the Black Creek Formation are typically below elevation 39 meters. The Black Creek soils are predominantly stiff to very stiff silt clays (A-6, A-7-5, A-7-6) interbedded with granular material (A-1-b, A-2-4). Moisture contents range from 15 to 28. Engineering properties of the Black Creek soils are generally fair. These formational soils will not cause any geotechnical problems due to depth of these sediments and their relatively stiff consistency.

Organic soils occurring along the project typically consist of slightly to moderately organic sand (A-2-4), silts (A-4, A-5) and clays (A-6, A-7). Typically, organic soils occur as thin dipping beds. A Carolina Bay containing surficial organic soil is crossed by -L- and -SR3- along the initial 120 meters of the project. Engineering properties of the organic soils are generally poor. Tested organic contents range from 3 to 14.3 percent. Moisture content of the tested organic soil ranges from 20 to 82 percent. Vane Shear Tests performed in organic deposits indicate typical shear strengths of 13 to 60 KPa. The organic soils are generally highly compressible and exhibit low shear strengths. A potential for subgrade failure or embankment stability/long term settlement problems exists in areas containing organic soils. Refer to areas of Special Geotechnical Interest part 3 for locations of organic soils.

Culverts

Survey and Hydraulic Design Reports of proposed culverts along the project have not been received at this time.