



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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GOVERNOR SECRETARY

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STATE PROJECT: 8.1170901 R-2539C
FEDERAL PROJECT: STP-55(1)
COUNTY: Pamlico

DESCRIPTION: NC 55 from East of SR 1129 to NC 304 in Bayboro

SUBJECT: Geotechnical Report - Inventory

Project Description

The proposed project begins just east of SR 1129 and extends 8.1± kilometers east to NC 304 in Bayboro and generally consists of widening existing NC 55 from a two lane roadway to a five lane facility. Based on the current plans, the project will primarily consist of symmetrical widening of the existing roadway, with curb and gutter construction within the town limits of Grantsboro, Alliance, and Bayboro. The western terminus of the project ties in with R-2539B. The investigation of subsurface conditions was confined to the corridor or proposed new construction.

The following base lines were investigated for this project:

Line	Station (±)
-L-	155+43 to 236+91
-Y-	10+35 to 12+90
-Y2-	11+75 to 12+77
-Y3-	10+00 to 11+05
-Y4-	10+80 to 11+80
-Y5-	10+20 to 11+90
-Y7-	10+60 to 12+00

Physiography and Geology

The project corridor is located in Pamlico County along existing NC 55 within the Lower Coastal Plain. Topography along the project is flat to very gently sloping with poor surface drainage. Ground elevations along the project range from 0 meters along the bed of a tributary to South Prong Creek to 13 meters above sea level.

Drainage along the project is divided near the beginning of the project by a sand ridge. Drainage is confined to the Goose Creek drainage basin from the beginning of the project to Station 169+00, and to the South Prong Creek drainage basin from Station 169+00 to the end of the project. Small pocosin areas exist within both drainages along the project.

The geology of this region consists of soils of the Yorktown Formation, undivided Pleistocene sediments, and Recent alluvial and pocosin sediments. Alluvial and pocosin sediments are characterized by organic soils and discontinuous sand, silt and clay layers. Soils of the Yorktown Formation consist primarily of clay and sand. Pleistocene sediments consist primarily of sand with lesser amounts of silt and clay.

Ground Water

Ground water data was collected primarily from July 2002 through May 2003 during which period the area experienced drought to above normal precipitation conditions. Drought conditions ended in October 2002. During the period of normal precipitation, it was noted that high ground water conditions are present through a majority of the project. Water levels along the upland and/or pocosin areas range on average from 0.6 to 1.6 meters below natural ground and at or above the ground surface within the floodplain.

Soils

Soils encountered during this investigation are separated into five major categories based on origin. These categories include alluvial soils, Yorktown Formation, Pleistocene sediments, roadway embankment, and artificial fill.

Alluvial soils were encountered in the flood plain of South Prong Creek (-L- station 195+52± to 202+65±) and pocosin-like areas listed under the "Areas of Special Geotechnical Interest" section. The alluvial soils in these areas generally consist of 0.3 to 1.1 meters of very soft to soft organic silt and clay and muck. Soft sandy silt-clay (A-4, A-6) and silty clay (A-7-6) underlie the organic soils and range in thickness from 0.3± to 1.9± meters. Loose silty sand (A-2-4) is present in areas adjacent to tributaries of South Prong Creek. Typically, the organic sediments exhibit poor engineering properties. Organic content typically ranges from 9 to 20 percent and moisture content of tested samples ranges from 37 to 88 percent. Vane Shear Test

Line	Station (±)
-Y9-	10+05 to 11+00
-Y10-	10+00 to 10+85
-Y14-	10+20 to 11+00
-Y16-	10+00 to 10+75
-Y18-	10+00 to 11+02
-Y19-	10+00 to 11+00
-Y21-	10+00 to 10+76
-Y22-	10+48 to 11+00
-Y23-	10+40 to 11+40

Areas of Special Geotechnical Interest

- 1) The majority of the project was found to exhibit high water levels, seasonal high ground water, or the potential for ground water related construction problems.
- 2) The following sections are underlain by very soft to medium stiff flood plain and/or pocosin silt, clay and organic soils:

Line	Station (±)
-L-	165+90 to 166+24
-L-	195+80 to 201+62
-L-	202+13 to 202+69

- 3) The following sections contain cohesive soil with medium to high plasticity indices and greater than 50% passing 75µm sieve and shoulder material consisting of soft and/or slightly organic cohesive soils which exhibit poor engineering properties:

Line	Station (±)
-L-	155+43 to 165+33
-L-	175+70 to 179+20
-L-	206+75 to 210+32
-L-	211+40 to 213+65
-L-	215+80 to 216+10
-L-	220+75 to 223+42

data show shear strength values of the alluvial organic sediments ranging from 28 kPa to >65 kPa. The higher values for shear strength in the organic alluvial soils may be due to the presence of fibrous organic material and roots. The organic and cohesive sediments have the potential for subgrade failure due to the relatively poor engineering properties. Undercutting of the alluvial soils may be required to provide a suitable base for embankment along the new alignment.

Soils of the Yorktown Formation generally consist of very soft to stiff silty and sandy clay (A-6, A-7-6) and sandy silt (A-4) with lesser occurrence of loose to medium dense fine to coarse sand and silty sand (A-3, A-2-4). These units comprise the surficial soils of the upland areas at the beginning of the project (-L- station 155+43 to 166+15). Vane shear test data collected from the silt-clay sediments indicate that they have shear strength values that range from 32kPa to 65kPa. These soils exhibit poor engineering characteristics with medium to high plasticity indices (Plasticity Index values ranging from 15 to 32) and greater than 50 percent passing the 75µm sieve.

Soils of probable Pleistocene age occur along the majority of the project and generally consist of very loose to medium dense silty and clayey sand and fine to coarse sand (A-2-4, A-2-6, A-3) and to a lesser extent very soft to medium stiff sandy silt-clay and silty clay (A-4, A-6, A-7-6). These units comprise the surficial soils of the upland areas from station 166+30 to the end of the project. Typically, the Pleistocene sands have good to excellent engineering properties whereas the Pleistocene silts and clays exhibit fair to poor engineering characteristics. The silt and clay soils typically have medium plasticity indices, relatively high moisture contents and some have 50 percent or more passing the 75µm sieve.

Roadway embankment constructed for NC 55 exists along the entire project. The embankment consists primarily of loose to medium dense silty sand (A-2-4, A-2-6) and stiff to hard sandy silt-clay and silty clay (A-4, A-6, A-7-6). Thickness of the embankment material ranges from 0.3 to 2.3 meters. Overall, the embankment material has good to excellent engineering properties. However, there are some segments which contain poor material used during construction of the existing NC 55 shoulder. Poor shoulder material consists of cohesive and/or organic soils (A-4, A-6, A-7-6) that typically have poor engineering properties which include medium to high plasticity indices, 50 percent or more passing the 75µm sieve and a relatively soft/wet consistency. Areas containing poor shoulder material are listed in Section 3 of "Areas of Special Geotechnical Interest".

Artificial fill is present along the project as drive-way and lot backfill material. A significant quantity of fill material is located from -L- station 202+68 to 205+08 and consists primarily of loose silty sand and fine to coarse sand (A-2-4, A-3) with some sandy silt layers (A-4). Thickness of the artificial fill ranges from 0.6± to 1.7± meters. The artificial fill appears to have fair to good engineering qualities and is not expected to present a problem.

Respectfully submitted,
John R. McCray
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Project Geologist

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