

Surface Drainage and Geomorphology

The major streams of the project area drain from the east-northeast to the west-southwest. The wet weather tributaries to these streams drain either to the north-northwest or south-southeast, depending on whether one is on the north or south side of the ridges defined by the major streams. The northwest trending alignment crosses two of the wet weather tributaries obliquely, filling them with roadway.

Geology

The Project Area is in the Charlotte Litho-Tectonic belt. The Geologic Map of the Charlotte Quadrangle shows the Project Area underlain by one rock type: Mgd metamorphosed quartz diorite. The 1985 Geologic Map of North Carolina identifies the same lithology as: Czg metamorphosed granitic rock. Our experience agrees with this identification; we found weathered granitic rock to underlie the project.

Soils Properties

The soil that underlies the topographic uplands of the project area is either residual soil derived from weathered granite or the same material eroded and transported a short distance in the small streambeds, before deposition as alluvial soil. In either case, P.I. values, (Plasticity Index), range from non-plastic to a P.I. of 20. These soils are expected to be highly permeable when in-place. A local contractor reported that they compact easily. Almost all of the alluvial samples from the named streams returned A-2-4 or A-4 classifications.

Residual Soil

Clay Soil

Gray brown, sandy A-6 and A-7 soil was absent from the project between -L- 26+40 and -L- 55+40. In the upper half of the project clay soil is usually at the top of the residual section with barely a high enough P.I. to push it out of an A-4 classification. Even when the clay constituent reached 40%, the P.I. was often below 20.

Silt Soil

Tan sandy A-4 silt was commonly found as the uppermost residual soil horizon above A-2-4 residual sand or within alluvial intervals.

Sandy Soil

The "typical" residual soil of the project is a tan silty sand that yields an A-2-4 classification when analyzed, that occurs directly above weathered rock.

Alluvial Soil

As mentioned above, alluvial soil sampled on the project was almost always either A-2-4 or A-4 with a low plasticity.

Fill Soil of -Y-12

A section of fill soil with boulders was identified on the north side of -Y12-, (Lexington Avenue), across from Ledford Middle School.

Rock Properties

There are no outcrops of rock within the project corridor, nor was any core drilling of rock undertaken. Rock was identified on the basis of auger refusal in numerous borings.

The residual soil returned in the sampler was consistent with the rock description from the Geologic Map of North Carolina for the Czg unit: medium to coarse grained equigranular, massive granite. The regional north east topographic trend in the area may be a manifestation of the foliation.

Groundwater Properties

After several deep borings were found to be dry, but with slump in the hole, prevention of hole caving prior to groundwater measurement was undertaken. Upon completion of drive borings, small PVC pipe was installed to the bottom of the boring. The lower section of this "casing" was perforated to allow influx of water. Most borings continued to come up dry. When groundwater elevations were plotted, groundwater follows the rock-line in the higher elevations and is shallow only near the major streams. The porous sandy soil apparently allows free flow to the lower elevations.

Geotechnical Descriptive Analysis of the Project

For organizational purposes, the project was divided into 4 segments. The -L- line crosses two ridges so each ridge was used to define a segment. A planned bridge is between these two segments so the preliminary bridge holes are presented as a third segment. The culvert at -L- 46+85 is presented as a separate segment.

1. Station -L-23+20 to Station -L-62+70, Including Y, Y1, Y9, Y10 and Y10A and LTLN 1 and RTLN1

This segment is the -L- line for a new alignment that straightens out and widens N.C. 109, Northwest of Thomasville N.C.

Physical Description

The project begins at 23+20, but the Hunts Fork Creek Culvert and approaches were investigated previously under R-2568A. The Y lines Y1, and Y9, provide connection between current NC 109 and the new alignment. The -L- line rises from the beginning at Hunts Fork Creek, elevation 224.5m, to the ridge top at 31+80 and elevation 254m. The road then drops to a culvert crossing at 46+80 and 223m elevation. From the culvert, the alignment rises to 246m at 51+80 then drops to the end of the segment at Rich Fork Creek, at 61+70 and elevation 214m, where the present NC 109 rejoins the new alignment as Y10 and Y10A. An underground gas transmission line crosses the project at -L-49+60.

Soil

A-7 residual soil: The only occurrence within this segment was within the residual section at an upper elevation at -L-36+70. Tan micaceous silt was logged above weathered rock. The P.I. was 12, but the liquid limit pushed it into the A-7 category.

A-6 residual soil occurred near the beginning and the end of this segment near the two largest streams of the project. It was logged as a tan micaceous clayey sand. Testing found the P.I. to be 12, which pushed it out of the A-2 or A-4.

A-2-4 residual soil was found in nearly every borehole in the segment. It was logged as tan silty sand, often as a transition into weathered rock.

A-1 residual soil provided the transition to weathered rock if A-2-4 did not.

A-4 alluvial soil is found in the larger streams, is usually micaceous and almost always soft.

A-2-4 alluvial soil often loose to very loose was found almost as commonly as A-4 as