Soil Properties

Roadway Embankment Soils: Two to seven meters of roadway embankment fill soil occurs on either side of the bridge carrying westbound US 70 Business over eastbound US 70A (see Plan Sheet Nos. 14, 15, and 16). These soils consist of medium stiff to very stiff, moist, sandy and silty clay (AASHTO classifications of A-7-5 and A-7-6). The fill soils overlie sandy and silty Coastal Plain soils. Roadway embankment fill soil is also present along portions of existing US 70A, and in small quantities on several of the SR roads within the project limits. These occurrences are noted on the plan sheets and profiles for completeness.

Alluvial Soils: Alluvial soils are present in the floodplain of Little Creek and in the channels of several other streams which cross the project corridor. Alluvial soils in the Little Creek floodplain are generally 2 to 5 meters in thickness, consisting of interbedded loose to medium dense, silty sand (A-2-4 and A-1-b), stiff, sandy silt (A-4), and medium dense, gravel. Other occurrences of alluvial soil are generally less than 1 meter in thickness and consist of very loose to loose, sand (A-2-4). Alluvial soil also occurs as pond sediment at -L2RT- Sta. 117+85 to 118+80 (see Section entitled "Pond" for further discussion).

Residual Soils: Residual soil occurs at the ground surface and underlies alluvial deposits in the vicinity of Little Creek (see Plan Sheet Nos. 4, 5, and 6). Three residual soil types are present in this area. These soil types are representative of the underlying bedrock from which they were derived. The most common residual soil is derived from the metamorphosed granite (meta-granite) bedrock and consists of loose to very dense, silty sand (A-2-4) and coarse sand (A-2-4). Residual soils derived from biotite schist are also present and are characterized by their silty nature and orange to greenish color. The most common soil in this group is soft to stiff, moist to wet, sandy silt (A-5). In addition to the silt, medium stiff to hard, moist to wet, sandy clay and sandy silty clay (A-7-5 and A-7-6) are also present. The third type of residual soil occurs just east of Little Creek. This soil is derived from the underlying metamorphosed gabbro (meta-gabbro) bedrock and consists of stiff to hard, dry to wet, silty clay and sandy silty clay (A-7-5). Soils derived from the meta-gabbro exhibit moderate to high plasticity indices. Meta-gabbro rock boulders are common at the surface where these soils occur.

In addition, residual soils were encountered beneath Coastal Plain soils in several areas on the eastern-most portion of the project. From -L2- Sta. 132+40 to 134+50, residual, stiff to very stiff, sandy silty clay (A-7-5) underlies Coastal Plain and alluvial soils (see Profile Sheet Nos. 38 and 59). Residual soil was encountered in several deep borings in the vicinity of the proposed interchange. Residual soils in this area consist of medium dense to very dense, silty sand (A-2-4), very stiff, micaceous sandy silt (A-5), and very stiff to hard, sandy silty clay (A-7-5) (see Profile Sheet Nos. 38, 49, 59, 60, and 68).

Coastal Plain Soils: These soils are derived from the Tertiary-age sedimentary deposits which occur at the ground surface from -L2- Sta. 112+70 eastward to the end of the project. The Coastal Plain soils range in thickness from 6 meters to as much as 16 meters. These soils are multicolored, with hues of tan, orange, and gray being most common. Clay soil is the most common Coastal Plain soil in the project area. These clay soils are generally medium stiff to very stiff, and consist of clay, silty clay, silty sandy clay, and sandy silty clay (A-7-5, A-7-6, and A-6). Loose to medium dense, clayey sand (A-2-6) is also common. Minor amounts of medium stiff to very stiff, sandy silt (A-4), loose, silty sand (A-2-4), and gravel are also present. Areas containing highly plastic (plasticity indices of greater than 25) soils are listed above, in the section "Areas of Special Geotechnical Interest".

Rock Properties

Soft and hard weathered rock was primarily encountered within, and adjacent to, the Little Creek floodplain. The weathered rock is derived from the underlying meta-granite, mica schist, and meta-gabbro bedrock (see Profile Sheet Nos. 28, 29, and 31). Soft weathered rock was also encountered beneath the Coastal Plain deposits in several deep borings in the proposed interchange area (see Profile Sheet Nos. 40, 56, 60, 62, and 68). Weathered rock in this area is derived from mica schist and granite bedrock.

Hard rock occurs primarily in the Little Creek area of the project (see Plan Sheet Nos. 4 and 5). The hard rock includes meta-granite, mica schist, and meta-gabbro bedrock of the Raleigh Belt. The rock was encountered in the structure investigation borings at the -L2LT- and -L2RT- bridges (see Profile Sheet Nos. 28, 29, and 31). Detailed core descriptions and rock properties are presented in the Structure Investigation reports (completed October 2004) for the two bridges over Little Creek. Hard rock (meta-granite) outcrops at the ground surface in the steep hillside left of -L2LT- Sta. 109+00 (see Plan Sheet No. 4). The meta-granite outcrops are interspersed with areas of residual soil.

East of Little Creek, an area of shallow meta-gabbro rock was encountered. This rock body appears linear in nature and trends approximately due north across the -L2RT-, -L2-, and -L2LT- alignments (as portrayed on Profile Sheet Nos. 28 and 31). This rock consists of green-gray, meta-gabbro with clay-filled joints and seams. The meta-gabbro is moderately weathered to fresh and slightly fractured to sound. This rock body was encountered slightly above the proposed ditch grade at -L2- Sta. 110+80/10LT. The meta-gabbro inferred rock line is shown on Cross-section Sheet Nos. 72 - 74, and 89).

Culverts

-L2- Sta. 134+01.5: This proposed culvert consists of a 70-meter long double box culvert on Coopers Branch, supplemented by an adjacent wildlife-crossing culvert at -L2- Sta. 134+31 (see Plan Sheet No. 11). Approximately 2 to 3 meters of fill will overlie the primary culvert; with 1 to 2 meters of fill overlying the wildlife culvert (see Profile Sheet Nos. 38 and 59, and also Cross-section Sheet Nos. 104 and 105). Both culverts are underlain by similar soils, consisting of 1.5 to 2 meters of loose to medium dense, saturated, silty coarse alluvial sand (A-2-4). The alluvial sand is underlain by stiff to very stiff, moist, silty sandy residual clay (A-7-5 and A-7-6).

-L2- Sta. 154+38.6: This existing culvert is to be extended 9.5 meters in the downstream direction. Approximately one to two meters of fill will overlie the culvert extension (see Plan Sheet Nos. 16 and 17, and Profile Sheet No. 41). The culvert is underlain by alluvial soils consisting of loose, wet, silty sand (A-2-4) with woody debris. A bed of alluvial gravel occurs at the base of the sand.

-RAMP C- Sta. 7+93: This proposed culvert consists of a 38-meter long box culvert providing a drainage outlet for several drainage systems which flow into the -Ramp C-/-Loop C- gore area (see Plan Sheet No. 16). The culvert empties into an existing drainage ditch. Approximately 2 to 3 meters of fill will overlie the culvert (see Profile Sheet No. 67, and Cross-section Sheet No. 124). The proposed culvert will be founded on dense to very dense, Coastal Plain sand (A-2-4) at its upstream end. The downstream portion will lie on stiff to very stiff, Coastal Plain sandy clay (A-6).