2.0 PHYSIOGRAPHY AND GEOLOGY

2.1 Site Description

The project site is situated in the fluvial valley of White Oak Creek, a tributary to the Neuse River. The creek in the vicinity of the site is generally confined to an approximately 6-meter wide and 1-meter deep channel that meanders across the approximately 120-meter wide floodplain. The interior bents of the proposed structures will lie within the creek's floodplain whereas the end bents will be constructed just outside of the upland floodplain margins.

The topography within the floodplain is generally flat with relatively well-defined drainage channels that empty into the main trunk stream. Ground surface elevations at borings within the floodplain range from 58.05 to 60.59 meters mean sea level (MSL). The floodplain is vegetated with low brush and grass. The ground surface rises away from the floodplain boundaries in the vicinity of the end bents. Ground surface elevations at End Bent 1 borings range from 61.48 to 67.79 meters MSL. Ground surface elevations at End Bent 2 borings range from 60.07 to 63.77 meters MSL.

White Oak Creek is subject to periodic flood events. During non-flood conditions, the surface soils within the floodplain are generally wet to saturated as groundwater elevations across the floodplain are typically within 0.5 meter of the ground surface. During periods of flooding, we anticipate that the floodwater will surpass the capacity of the main channel and use secondary drainage channels before spilling across the floodplain.

The Austin Pond Dam, located approximately 1 kilometer downstream of the site, retains Austin Pond. Austin Pond recently covered the floodplain at the project site before the dam was damaged during a recent storm event. Plans to rebuild Austin Pond Dam are unknown.

Site photographs included in this report show site conditions during our field investigation in 2001. A topographic site map is included as Drawing No. 2 in the Appendix.

2.2 Geology

The project site is situated within the Raleigh Belt, a division of the Piedmont Physiographic Province. The 1985 Geologic Map of North Carolina compiled by the N.C. Geologic Survey indicates that site is located on the contact between foliated to massive granite, and biotite gneiss and schist. The map shows a northwest-trending diabase dike in the vicinity of the site. Burt, et. al (1978) mapped a diabase dike in the vicinity of the site trending approximately 330°. Diabase dikes in the region generally trend northwestward and the dikes are rarely over 2 meters thick.

We encountered surface alluvial deposits (up to 4.45 meters thick) consisting of very loose to dense sand and gravel, and very soft to very stiff clay and silt. We interpret these surface soils to be Quaternary-aged (<2 million years ago) sediments deposited by the White Oak Creek fluvial system.

We encountered residual soil and rock (weathered to hard granite and gneiss) unconformably underlying alluvial materials, consistent with the 1985 Geologic Map of North Carolina. We encountered diabase in the EB1-A LL and EB1-A RL borings. We interpret the diabase as part of the northwest-trending dike shown on the North Carolina geologic map and in Burt, et. al (1978). We attempted to offset along end bent 1 to determine the lateral limits of the dike. However, we abandoned our attempt due to boulders in the shallow (<1 meter) subsurface. We assume the dike to be 2 meters wide and near vertical with a trend of 330°.

Weathering of the parent rock generally originates at its upper surface and proceeds vertically downward, first along discontinuities. Water migrates along interconnecting discontinuities to penetrate deep within the rock profile. Early stages of weathering produce seams of decomposition products (soft and hard weathered rock and residual soil) along these discontinuities. Advanced weathering results in the reduction of the entire rock profile into decomposition products. In general residual soil overlies zones of weathered and hard rock. Non-uniform weathering has created a variably weathered rock profile and an erratic hard rock surface.

We observed discontinuities within the rock core obtained at the site ranging from horizontal to near vertical. Some joints exhibited weathering products and/or mineralization deposits along their surfaces.

3.0 FOUNDATION MATERIALS

Boring and coring logs describing subsurface conditions at each of the boring locations are included in the Appendix. Generalized cross-sections, Drawing Nos. 4 through 14, and 19 through 28 in the Appendix, depict subsurface conditions along each bent. Generalized profiles, Drawing Nos. 15 through 18, and 29 through 32 in the Appendix, depict subsurface conditions along each proposed structure, 21.5 meters left and right of the centerline (-L-).

3.1 Subsurface Conditions

LAW encountered two major geologic strata in our borings including Alluvium and Residual Soil and Rock. We divide these two strata into seven major material units. Generally they occupy the following relative vertical positions downward from the surface.

- Alluvium
  - Muck
  - Very soft to very stiff silt and clay
  - Very loose to dense, silty sand and gravel
- Residual
  - Medium stiff to hard silt and clay
  - Loose to very dense, silty sand and gravel
  - Soft and Hard Weathered Rock: Granite, Gneiss and Diabase
  - Hard Rock: Granite, Gneiss and Diabase

We discuss these material units below.