

2.2 Geology

The project site is located within the Carolina Coastal Plain Physiographic Province. Sediments of the Carolina Coastal Plain were deposited during depositional cycles caused by fluctuating sea-levels. Younger sediments lie at the surface near the coast. Older sediments, which underlie these younger sediments, lie at or near the surface further inland. The 1985 Geologic Map of North Carolina, compiled by the N.C. Geologic Survey, indicates the geology at the site consists of surficial deposits of sand, clay, gravel and peat, deposited in marine, fluvial, eolian and lacustrine environments. Older sediments of the Yorktown Formation underlie the surficial deposits. The Yorktown Formation consists of shelly clays with sand lenses. The Yorktown Formation is marine in origin. Our investigation at the sites identified artificial and roadway embankment fill, underlain by alluvial and/or coastal plain sediments, underlain by the Yorktown Formation. The Yorktown Formation was not encountered within the depths explored at the Knotts Island Ferry site.

Alluvial sediments consist of muck; fine sandy, silty clay (A-7-6) with trace amounts of organic material; and silty, fine to coarse sand (A-3/A-2-4) with trace amounts of organic material. We interpret these soils to be Quaternary-aged (<2 million years ago) sediments. The alluvial sediments are underlain by coastal plain sediments consisting of silty, fine to coarse sand (A-2-4/A-3/A-1-b) with lenses and layers of silt and clay (A-4, A-7-6) and containing trace to little amounts of shell fragments. These coastal plain sediments are somewhat characteristic of the Yorktown Formation sediments. However, without additional evidence to identify these soils as part of the Yorktown Formation, we interpreted them as a transitional, stratigraphic unit between the overlying alluvium and the underlying Yorktown Formation, and grouped them as Coastal Plain Undivided (CPU).

3.0 FOUNDATION MATERIALS

Boring logs describing subsurface conditions at each of the boring locations are included in the Appendix. Generalized profiles, Sheets 8 and 39 in the Appendix, depict subsurface conditions along the proposed bridge locations. Generalized cross-sections, Sheets 9 to 11 and 40 to 41 in the Appendix, depict subsurface conditions along proposed End Bent and Bent locations. Generalized profile, sheet 12 in the Appendix, depicts subsurface conditions 10 feet behind the existing bulkhead at the Currituck Ferry site.

3.1 Subsurface Conditions

Currituck Ferry Basin

Subsurface materials encountered at the Currituck Ferry Basin during our investigation are divided into four major geologic strata including Artificial Fill, Alluvium, Coastal Plain Undivided and the Yorktown Formation. These four strata are divided into 4 major material units that generally occupy the following relative vertical positions downward from the surface:

Artificial Fill

- Sand

Alluvium

- Sand

Coastal Plain Undivided

- Sand

Yorktown Formation

- Clay and Silt

3.1.1 Artificial Fill: Sand

Artificial Fill: Sand occurs as the surface unit at the EB-1 and BH-1 to BH-4 boring locations. The unit is 5.0 to 6.0 feet thick and is characterized as loose to medium dense, dry to wet, silty, clayey, fine to coarse sand (A-2-4/A-1-b) with roots. The elevation of the base of the Artificial Fill: Sand material unit ranges from -0.1 to -1.4 feet MSL.

3.1.2 Alluvium: Sand

The Alluvium: Sand material unit consists of very loose to medium dense, wet to saturated, micaceous, silty, fine to coarse sand (A-3/A-2-4) with trace organic debris and shell fragments. The Alluvium: Sand unit is 5.0 to 7.5 feet thick. The elevation of the base of the unit ranges from -5.7 to -12.4 feet MSL.

3.1.3 Coastal Plain Undivided: Sand

The Coastal Plain Undivided: Sand material unit consists of very loose to very dense, wet to saturated, micaceous, silty, fine to coarse sand (A-2-4/A-3/A-1-b) with trace gravel and organic debris and trace to little shell fragments. The Coastal Plain Undivided: Sand unit is 20 to 26 feet thick. A thickly to very thickly interbedded, soft to very stiff, wet to saturated, micaceous, fine sandy, silt and clay (A-4/A-7-6) layer occurs within this unit and was encountered in all borings except B-3. The elevation of the base of the Coastal Plain Undivided: Sand unit ranges from -30.8 to -32.7 feet MSL.

3.1.4 Yorktown Formation: Clay and Silt

The Yorktown Formation: Clay and Silt material unit consists of soft to hard, moist to wet, fine sandy clay and fine sandy silt (A-7-6/A-5/A-4) with trace shell fragments. A very thickly interbedded, loose to very dense, wet, clayey, silty, fine to coarse sand (A-2-4) layer occurs within this unit, but was only encountered in borings B-1 and B-2. All borings were terminated in the Yorktown Formation: Clay and Silt unit.

Knotts Island Ferry Basin

Subsurface materials encountered at the Knotts Island Ferry Basin during our investigation are divided into three major geologic strata including Roadway Embankment Fill, Alluvium, and Coastal Plain Undivided. These three strata are divided into 5 major material units that generally occupy the following relative vertical positions downward from the surface: