

Marine Geotechnical Exploration and Subsurface Characterization

The marine exploration study area extends approximately 300 feet northwest (downstream) of the northern edge of the existing tunnel. Marine survey and geotechnical site exploration begun in February 2008 and was completed in May 2008, landside geotechnical site exploration began in July 2008 and are nearing completion.

Current landside geotechnical investigations and site characterization efforts are underway in the vicinity of the Norfolk and Portsmouth portal areas. As the data becomes available, individual factual data reports as well as interpretive reports will be provided for each of these areas. The results of the studies for each of the project areas will be provided in an overview report summarizing the conditions across the entire alignment, late summer 2008.

Marine survey operations completed to date consist of the following activities:

- Bathymetric survey to define water depths and develop a bathymetry chart of the project corridor,
- Side scan sonar survey of the project area to identify obstructions extending above the river bottom,
- Magnetometer survey of the project area to identify ferrous objects on or immediately below the river bottom, and
- Seismic reflection surveys to image subsurface obstructions and image conditions below the river bottom.

The geotechnical exploration program consisted of marine drilling aboard a jack-up platform, and 2) seabed testing, including CPT soundings, T-Bar soundings, and vane shear tests aboard a spud barge. The specific activities performed during the operations included the following activities:

- Marine drilling at ten (10) locations to identify subsurface stratigraphy and collect samples for geotechnical and environmental testing,
- CPT soundings at forty (40) locations to supplement the borings, provide a continuous profile of the subsurface soils and characterize stratigraphic variations,
- T-Bar soundings (including cyclic testing) at four (4) locations adjacent to CPT soundings to provide further characterization of the upper materials, and
- Vane shear testing at four (4) locations in the vicinity of the four T-Bar locations to evaluate the undrained shear strength of the upper materials.
- Environmental samples were collected concurrently with the geotechnical samples to assist in evaluating the subsurface chemistry of the existing soils.

The project vicinity has been divided into three areas corresponding to the various phases of data collection: 1) Norfolk area, 2) Elizabeth River area, and 3) Portsmouth area. The locations of the recent marine borings, CPT soundings, T-Bar soundings, and

vane shear tests, including bathymetry and site development of the Elizabeth River, Portsmouth and Norfolk, geophysical data examples, 1894 morphology and summary of historic fills are shown on various charts noted below.

 [Site Development Elizabeth River](#)

 [Preliminary Subsurface Cross Sections](#)

 [Geophysical Data Examples](#)

 [Portsmouth Site Development](#)

 [1894 Morphology and Summary of Historic Fills \(Portsmouth Area\)](#)

 [Norfolk Site Development](#)

 [1894 Morphology \(Norfolk\)](#)

 [Summary of Historic Fills \(Norfolk\)](#)