ENGINEERING APPENDIX

GEOTECHNICAL

NASSAU COUNTY BACK BAYS
COASTAL STORM RISK MANAGEMENT
FEASIBILITY STUDY

PHILADELPHIA, PENNSYLVANIA

APPENDIX E

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NCBB
Nassau County Back Bays Study

U.S. Army Corps of Engineers
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1 INTRODUCTION

The objective of the feasibility study is to investigate and recommend implementable solutions to address the affected areas caused by Hurricane Sandy within the boundaries of the Nassau County Back Bays (NCBB). Several alternative plans were considered and identified within the study. Such alternatives consist of both structural and non-structural design alternatives. The Tentative Selected Plan (TSP) includes non-structural components within the NCBB region. Due to the lack of geotechnical data available in the feasibility phase to perform geotechnical analyses, this report will focus on the geological conditions in the highly vulnerable areas (HVAs) within Nassau County Back Bay. The project area is shown is Figure 1.1.1.

Figure 1.1.1. NCBB Project Study Area.

2 REGIONAL GEOLOGY

The study area is categorized by the four HVAs: Village of Freeport, Village of East Rockaway, Village of Island Park and Vicinity and the city of Long Beach. Based on the Geologic Map of New York, dated 1995, these areas lie within the Atlantic Coastal Plain Physiographic Province. The study area is characterized by the Msozoic-era, upper cretaceous age to include the Monmouth group, matawan group and magothy formation. These formations consist of silty clay, glauconitic sandy clay, sand and gravel. The Atlantic Coastal lowlands lies upon a thick mantal of glacier-derived sediments that are draped over cuestas of cretaceous sedimentary rocks.

2.1 Surficial Deposits

2.1.1 Village of Freeport

Based on the soil survey of Ocean County (USDA-NRCS, 2019) shown in Figure 2.1.1, the soils within the village of Freeport generally consists of Udipsamments, wet substratum (Ue), Urban land (Ug), Urban land-Riverhead complex (UrA), Urban land-Sudbury complex (Us), Urban land-Udipsamments (Uw), and Water (w).

The Udipsamments, wet substratum (Ue) and the Urban land-Udipsamments (Uw) soils consist of coarse sand on the top 72 inches. The soil properties include 0 to 3 percent slope, not frequently flooded and the depth to water table is more than 80 inches. The Urban land soil consist of 90 percent Urban land and 10 percent minor components. The minor components include riverhead, Udorthents, Hempstead, Enfield, and Udipsamments.

The general characteristics of the Urban land-Riverhead complex include slightly decomposed plant material (0 to 1 in.), sandy loam (1 to 25 in.), loamy sand (25 to 36 in.) and stratified gravelly sand (36 to 60 in.). The soils develop along moraines, outwash plains with 0 to 3 percent slope are derived from loamy glaciofluvial deposits overlying stratified sand and gravel.

The Urban land-Sudbury complex (Us) include sandy loam (0 to 18 in.), gravelly loamy sand (18 to 28 in.), and stratified very gravelly sand (28 to 60 in.). The soils develop along outwash plains, with 0 to 3 percent slope are derived from sandy and gravelly glaciofluvial deposits derived mainly from crystalline rock.

Figure 2.1.1. Village of Freeport Soils Map

2.1.2 Village of East Rockaway

Based on the soil survey of Ocean County (USDA-NRCS, 2019) shown in Figure 3.1.2, the soils within the village of East Rockaway consists of Ipswich mucky peat (Ip), Sudbury sandy loam (Su), Udipsamments (UdA, Ue), Urban land (Ug), Udorthents (Uf), Urban land (Ug), Urban land-Riverhead complex (UrA), Urban land-Sudbury complex (Us), Urban land-Udipsamments complex (Uu), Urban land-Udipsamments (Uw), and Water (w).

Ipswich mucky peat soils include mucky peat (0 to 42 inches) and peat (42 to 59 inches). The soils develop from tidal marshes, with 0 to 2 percent slope are derived from partially- decomposed herbaceous organic material. The Sudbury sandy loam (Su) include sandy loam (0 to 18 in.), gravelly loamy sand (18 to 28 in.), and stratified very gravelly sand (28 to 60 in.). The soils develop along outwash plains, with 0 to 3 percent slope are derived from sandy and gravelly glaciofluvial deposits derived mainly from crystalline rock. The additional soils encountered in East Rockaway are described in section 2.1.1.

Figure 3.1.2. Village of East Rockaway Soils Map

2.1.3 Village of Island Park

Based on the soil survey of Ocean County (USDA-NRCS, 2019) shown in Figure 4.1.3, the soils within the village of Island Park consists of Ipswich mucky peat (Ip), Pawcatuck mucky peat (Pa), Udipsamments, wet substratum (Ue), Urban land (Ug), Urban land-Udipsamments (Uw), and Water (w). The soil properties are described in sections 2.1.1. and 2.1.2

Figure 4.1.3. Village of Island Park Soils Map

2.1.4 Long Beach

Based on the soil survey of Nassau County (USDA-NRCS, 2015) shown in Figure **2.1.1**, the soils within the City of Long Beach generally consists of Sand beaches (Bc), Hooksan-Dune land complex (HDR), Udipsamments (UdA), Urban land (ug), Urban land-Udipsamments complex (Uu), Urban land-Udipsamments (Uw) and Water (w).

The Sand Beaches develop along back-barrier beaches, and shores with 0 to 8 percent slope are derived from beach sands. The beach sand soil is moderately high to very highly drained, very frequently flooded, and moderate to strong saline content. Additional soils are described in sections 2.1.1. and 2.1.2

Figure 5.1.4. Long Beach Soil Map

3 SUBSURFACE CONDITIONS

No site-specific geotechnical investigation and laboratory testing program were performed in the vicinity of the study area within the NCBB. Several attempts were made to obtain subsurface information for the NCBB HVAs. Sources included the NYSDOT, NJDOT and previous reports from projects written by USACE. However, the information received from these sources were considered irrelevant due to the proximity of the HVAs. Due to the lack of subsurface investigation, site specific designs are not to be performed in the TSP phase. The PDT assumes the geotechnical conditions in NCBB were similar to the NJBB for the purpose of the TSP phase. Therefore, the design conditions used in NJBB were applied to NCBB. Refer to Civil **Appendix C** for the selected deep foundation designs.

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