HISTORICAL PERSPECTIVES INC.

# Phase IA Archaeological Documentary Study

## Randall's Island Living Shoreline Recreation Area
## Part of Block 1819, Lot 203
## Randall's Island, New York County, New York

## City of New York, Parks and Recreation Project M104-110M
## LPC # NYC DPR / Pre-CEQR-M

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**EXECUTIVE SUMMARY**

The City of New York, Parks and Recreation City (DPR) is proposing a project on Randall's Island, New York County, New York known as the Randall's Island Living Shore Recreation Area project (Figures 1 and 2). The project site, which measures 2.5 acres in size and approximately 1000 linear feet (LF), is located on the northwestern shore of Randall's Island, which itself is located at the confluence of three tidal straights: the Harlem River, East River and Bronx Kill. It is part of Block 1819, Lot 203. The northern tip of the project site is under the RFK (formerly Triborough) Bridge, which was constructed in 1936. Based upon an analysis of the site and its ecological context, a series of alternative concepts will be developed, leading to reconstruction of a portion of the shore which now is bordered by a collapsing stacked stone seawall. The purpose of the project is to build about 550 linear feet (LF) of intertidal multiple-purposed shoreline in an area where seawalls have collapsed. The goal is an accessible, appealing design of high habitat value that works well as sea level rises and provides passive recreational use including picnicking, shoreline access, boat access and native plantings. The intent of the pre-design research for the project is to help determine the most appropriate of a range of suitable and affordable methods for reconstructing degraded infrastructure along the shore of Randall's Island. The Area of Potential Effect (APE) is the area that could be affected by project development. The APE for the proposed project includes the entire project site.

The New York City's Landmarks Preservation Commission's (LPC) review of archaeological sensitivity models and historic maps of the area indicates that there is a potential for the recovery of remains from 19th century and Native American occupation on the project site (Sutphin 2011). DPR is following LPC's recommendation that an archaeological documentary study be performed for this site, and retained Historical Perspectives, Inc. (HPI) to clarify these initial findings and provide the threshold for the next level of review, if such review becomes necessary. This Phase IA Archaeological Documentary Study has been prepared to satisfy the requirements of the City Environmental Quality Review (CEQR), and to comply with the standards of the LPC (LPC 2002; CEQR 2010).

The Phase IA Archaeological Documentary Study revealed that the project site has experienced centuries of landform manipulation. Originally, the eastern side of the APE was marshland while the western side was under water (e.g. Figure 6). Tidal conditions and strong currents from the river would have affected the APE daily. The APE was landfilled in the mid to late 1870s, and a stone seawall was built at the same time. Soil borings within the APE note that the upper strata of all borings was fill, extending to ca. 13 feet below the existing ground surface. Groundwater was recorded within this fill layer in all borings. Beneath the fill were glacial soils, consisting of medium to fine sand with variable amounts of silt and gravel and occasional layers of black silt. These soils may have been exposed in places at low tide prior to landfilling, and likely were covered during high tide. Only one boring contained a trace amount of peat over the glacial soil. Boesch (1996) offers that peat deposits (which formed in marshy areas) acted as a preservation agent, and soils beneath peat layers should date to the period prior to development of the marshes. In areas where this peat deposit is absent, Boesch claims marine transgression would have destroyed former occupation surfaces. The lack of peat in all but one boring (and the presence of only a trace element in the boring where it was found) suggests that the effect of tides and river currents would have affected the APE soils well before its 19th and 20th century use.

The sequence of disturbance to the project site after the mid-1870s, when the seawall was built and the area landfilled, is significant. Maps and photographs show a series of docks and piers that were built from the APE jutting out into the river. Buildings that were constructed (and then demolished) on the APE included dock structures at the southern end, a very large power house and laundry building with an associated boiler house and smoke stack and a waiting room and store in the 1910s. The Triborough Bridge (now the RFK Bridge) was built in 1935-1936, and photographs document the extreme disturbance that this massive construction project entailed at the northern end of the APE. Last, the APE is criss-crossed with numerous subsurface utilities (see Figure 2).

Overwhelming evidence exists that Native Americans exploited the natural resources of all the areas adjacent to Randall's and Ward's Islands – northern Manhattan, the southern Bronx and northwestern Queens – for thousands of years before the arrival of Europeans. It is also clear that to these people, tidal marshlands offered a rich source of food and raw materials for prehistoric people. However, it is not evident that the marshlands along this stretch of the Harlem River would have afforded the best resources to Native Americans, being along a waterway with strong currents. The lack of more than just a trace of peat in one soil boring suggests that marine transgression along this stretch of shoreline was not insignificant. And since historic maps show that there was no firm land on the APE

prior to landfilling, it is likely that while precontact people were present on Randall's Island, the potential for any significant archaeological resources associated with that occupation within the project site itself is low.

Several categories of potential 19th-century archaeological resources may still be present within the APE.

Historic maps and accounts note that the southern end of the project site was used as a docking area for the early 19th century occupants of the island, as well as for the hospital complex from the 1840s through perhaps the early 20th century. At least two structures were noted at this docking area in 1867, a large store house and a dock house. It is unclear whether these buildings were located on top of the docks or on landfill, as this area was originally under water. Heavy use of this portion of the APE during the 20th century may have disturbed these early buildings, but it is possible that remnants may still be present, along with 19th-century docking elements.

The stone seawall that marks the western boundary of the APE was constructed in the mid to late 1870s by convict labor. Particularly along the northern stretch of the project site, the wall appears largely intact. However, the sections along the central and southern portions of the APE are in deteriorated condition, and according to photographs from 1941, were even more so then. Clearly there has been some repair and reconstruction of the seawall over time (the lighter colored capstones are the most visible later addition), and much of this historic feature has been compromised.

There have been numerous piers built along the project site waterfront in addition to the original dock at the southern end, described above. These piers would have extended beyond the APE boundaries into the river. Evidently, they have been removed from the APE, probably as navigation hazards. Any possible remains of 20th century piers would not appear to have archaeological significance.

The remainder of the building episodes on the project site (the power house and laundry, boiler house and smoke stack, as well as the waiting room and store) occurred during the 20th century. These buildings have been well documented in maps and photographs, and also would not appear to have archaeological significance. It is probable that the "old brick foundations" located during recent subsurface utility work just south of the RFK Bridge alignment were associated with the waiting room and store building area (as shown on Photographs 17-20) from the 1910s, and also would not have archaeological significance.

HPI has concluded that the Randall's Island APE does not possess precontact period archaeological sensitivity, and no further investigations for these resources are warranted. Despite widespread disturbance to the APE, it is possible that remnants from 19th century structures may survive beneath the fill at the southern tip of the APE. Figure 14 illustrates the approximate locations where 19th century historic maps show that these structures were located, as well as the original waterline. The general area of sensitivity begins at the southern tip of the APE and extends approximately 150 feet to the north. Although no two maps pinpoint the structures in exactly the same spot, the clustering of the mapped locations suggests that the general placement is accurate.

HPI recommends that if project plans allow it, subsurface impacts to this area should be avoided. If impacts cannot be avoided, then HPI recommends that this area of sensitivity be addressed through archaeological investigations. Depending on the nature of the planned project (which has yet to be determined), one of two types of archaeological investigations may be appropriate. Based on historic photographs and soil boring data, portions of this area are known to contain considerable debris and rock fill (one soil boring could not penetrate an obstruction in this area). If large amounts of soil and other overburden such as rocky fill are slated for removal in this area, it will be most practical (and cost effective) to undertake these excavations in tandem with project construction, which can provide the large-scale excavation and soil removal operations necessary, shore up the site if necessary to facilitate deeper excavation, and provide dewatering equipment if the water table interferes with archaeological resource recovery. Alternately, if project plans are smaller in scale and only target certain areas within the sensitive zone, either horizontally or vertically, a program of pre-construction archaeological testing may be a better solution. This pre-construction testing would consist of mechanical backhoe trenching at selected locations to remove the fill overburden and expose possible archaeological resources.

Prior to any excavation within the APE, regardless of the type, an archaeological Scope of Work and/or Monitoring Plan should be developed by the archaeological consultant in consultation with the LPC and DPR. All archaeological testing should be conducted according to OSHA regulations and applicable archaeological standards

(LPC 2002; CEQR 2010). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological team.

Last, the stone seawall at the edge of the APE, and which originally encircled the entire perimeter of Randall's Island, is historic in its own right. Although much of it is deteriorated within the APE, portions along the northern extent appear to be more intact. Prior to any planned impacts to the seawall, project personnel should consult with LPC to determine whether any recordation of this feature is warranted.

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## I. INTRODUCTION

The City of New York, Parks and Recreation City (DPR) is proposing a project on Randall's Island, New York County, New York known as the Randall's Island Living Shore Recreation Area project (Figures 1 and 2). The project site, which measures 2.5 acres in size and approximately 1000 linear feet (LF), is located on the northwestern shore of Randall's Island, which itself is located at the confluence of three tidal straights: the Harlem River, East River and Bronx Kill. It is part of Block 1819, Lot 203. The northern tip of the project site is under the RFK (formerly Triborough) Bridge, which was constructed in 1936. Based upon an analysis of the site and its ecological context, a series of alternative concepts will be developed, leading to reconstruction of a portion of the shore which now is bordered by a collapsing stacked stone seawall. The purpose of the project is to build about 550 linear feet (LF) of intertidal multiple-purposed shoreline in an area where seawalls have collapsed. The goal is an accessible, appealing design of high habitat value that works well as sea level rises and provides passive recreational use including picnicking, shoreline access, boat access and native plantings. The intent of the pre-design research for the project is to help determine the most appropriate of a range of suitable and affordable methods for reconstructing degraded infrastructure along the shore of Randall's Island. The Area of Potential Effect (APE) is the area that could be affected by project development. The APE for the proposed project includes the entire project site.

The New York City's Landmarks Preservation Commission's (LPC) review of archaeological sensitivity models and historic maps of the area indicates that there is a potential for the recovery of remains from 19$^{th}$ century and Native American occupation on the project site (Sutphin 2011). DPR is following LPC's recommendation that an archaeological documentary study be performed for this site, and retained Historical Perspectives, Inc. (HPI) to clarify these initial findings and provide the threshold for the next level of review, if such review becomes necessary. This Phase IA Archaeological Documentary Study has been prepared to satisfy the requirements of the City Environmental Quality Review (CEQR), and to comply with the standards of the LPC (LPC 2002; CEQR 2010). The HPI project team consisted of Julie Abell Horn, M.A., R.P.A., who conducted research and compiled the report; Christine Flaherty, M.A., who conducted the site visit and monitored soil borings; Richard Schaefer, Ph.D., who contributed data from earlier HPI studies of Randall's Island; and Cece Saunders, M.A., R.P.A. who assisted with the research, managed the project and provided editorial and interpretive assistance.

## II. METHODOLOGY

The present study entailed review of various resources.

- Primary and secondary sources concerning the general precontact period and history of Randall's Island and specific events associated with the project site and vicinity were reviewed at the New York Public Library, City Hall Library, the library of HPI, and using online resources.
- Historic maps and photographs were reviewed at the New York Public Library, the DPR Olmsted Center Archives, the MTA Bridges and Tunnels Special Archive, the library of HPI, and using various online websites. These maps and photographs provided an overview of the topography and a chronology of land usage for the project site. A selection of these maps has been reproduced for this report.
- Randall's Island has been owned by the City of New York since 1830. Due to this fact, additional deed research was not undertaken.
- Tax assessment records, city directories, and federal census records, which are standard resources consulted as part of a documentary study, also were not useful for this property because of its use since 1830 as part of city-owned charitable institutions and later parkland.
- Because the project site is vacant, Department of Building records do not exist for the APE.
- Information about previously recorded archaeological sites and surveys in the area was compiled from data available at the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP), the LPC, and the library of HPI. Of particular utility was an archaeological assessment undertaken by HPI for a portion of Randall's Island immediately south of the current project site, on which this report builds (HPI 2000).
- A geotechnical report for the project site was prepared in February 2012 and included data from soil borings conducted on the site in January 2012 (Fenley and Nicol Environmental Inc. 2012). Archaeologist Christine Flaherty from HPI was on site to monitor a selection of these borings. These soil borings, as well as data from additional borings associated with recent utility work under and adjacent to the RFK Bridge

alignment within the project site (Sound Environmental Associates LLC 2011), are included as Appendix A.

- Last, site visits were conducted by Christine Flaherty and Julie Abell Horn of HPI on January 23 and 24, 2012 to assess any obvious or unrecorded subsurface disturbance (Photographs 1-12; Figure 2).

## III. CURRENT CONDITIONS AND ENVIRONMENTAL SETTING

### A. Current Conditions

The project site, or APE, extends from the site of the present water taxi stand on the south, to just north of the overhead RFK bridge alignment on the north (Photographs 1 and 2). The western edge of the project site is the Harlem River waterline, and the eastern edge is an asphalt paved path (Photograph 3). The APE is relatively level, although as soil borings and historic maps and photographs (discussed below) show, this is an artificial landform created through landfilling during the 19th and 20th centuries. Portions of the APE are covered with grass, and trees which mostly date to the last 20 years, while other portions are covered with asphalt or gravel in varying conditions (Photographs 4 and 5). Debris and weeds are present in spots, particularly along the northern end of the APE (Photograph 6). Beneath the RFK Bridge are several storage trailers (Photograph 7). Large rocks or boulders have been imported onto the site and line the pathways, and a rock garden is located just southeast of the APE (Photographs 8 and 9). Modern topographic maps (see Figure 2) note a number of underground utilities traversing the project site.

The waterline is marked by a stone seawall, which varies in condition depending on location. The seawall along the northernmost portion of the APE is relatively intact, but portions moving south along the waterfront are in poor condition, with stones along the upper reaches missing or displaced (see Photographs 1 and 2). Additional stones are located inland of the seawall and serve as jumbled rubble fill (Photograph 10). A concrete jersey barrier is located in one particularly bad breach (Photograph 11). Photographs 23-27, taken in 1941, show that only one section of the seawall along the northern end was intact at that time, whereas the remaining section of the seawall within the APE was in significant disrepair. The seawall was reconstructed along this stretch of waterfront after 1941. Today, lighter colored dressed capstones (contrasting with the darker and cruder cut lower stones) attest to perhaps an additional episode of seawall reconstruction or repair (Photograph 12).

### B. Topography and Hydrology

According to historic maps made during the 19th century, the western extent of the APE was once under water of the Harlem River, while the eastern side was low-lying marshland. Maps made by Bridges (1811; Figure 3), Colton (1836, Figure 4), the U.S. Coast Survey (1837, Figure 5 and 1857, Figure 6), and Viele (1874, Figure 7) show that the APE did not contain fast land prior to this time. The 1857 map (Figure 6) is particularly detailed in this regard. During the mid to late 1870s, the original seawall bordering the APE was built and the marshland filled in, using labor supplied by prisoners at the Blackwell's Island Penitentiary (City Record 1878). An 1879 bird's eye view (Taylor 1879, Figure 8) and an 1886 U.S. Coast Survey map (Figure 9) both show the results of these efforts. Unfortunately, the low elevations of the APE do not allow precise documentation of how much landfill was added to the APE during the 1870s, as the entire site is illustrated as below the 20-foot contour line, but it should be assumed that at least several feet of soil were added during this time. The first detailed topographic map that indicates contours within the 0-20 foot range, made by the Parks Department in 1939 (see Figure 13) indicates elevations within the APE ranging from 0-10 feet at the northern end of the site, to 0-8 feet at the southern end of the site. The 1994 topographic map of the APE (see Figure 2) indicates that overall elevations have not changed markedly since that time.

### C. Geology

The prehistory and history of New York City was in part shaped by the topography, ecology, and economic conditions that prevailed at various times. Understanding the city's geologic history aids in understanding the land-use history. During the Pleistocene period, ice advanced in North America four times. In the last 50,000 years, the Wisconsonian period, ice was 1,000 feet thick over the region. Gravel and boulders deposited at the ice sheet's melting margin formed Long Island about 15,000 years ago (Kieran 1982:26).

The project area is within the embayed section of the Coastal Plain which extends along the Atlantic Coast and ranges from 100 to 200 miles wide. The Manhattan prong, which includes southwestern Connecticut, Westchester County and New York City, is a small eastern projection of the New England uplands, characterized by 360 million year old highly metamorphosed bedrock (Schuberth 1968:11).

**D. Soils**

According to the soil survey for New York City, the majority of the project site falls within soil mapping unit 250, or Unadilla-Riverhead-Pavement & buildings complex, 0 to 8 percent slopes. A small portion of the project site near the RFK Bridge may fall within mapping unit 7, Laguardia-Ebbets-Pavement & buildings, wet substratum complex, 0 to 8 percent slopes.

Unadilla-Riverhead-Pavement & buildings complex is described as:

> Nearly level to gently sloping areas of outwash plains that are partially developed for parks, hospitals, and cultural facilities; a mixture of silty and loamy outwash soils, with 15 to 49 percent of the surface covered by impervious pavement and buildings (USDA 2005:19).

Laguardia-Ebbets-Pavement & buildings, wet substratum complex is described as:

> Nearly level to gently sloping areas filled with a mixture of natural soil materials and construction debris over swamp, tidal marsh, or water; a mixture of anthropogenic soils which vary in coarse fragment content, with 15 to 49 percent of the surface covered by impervious pavement and buildings (USDA 2005:14).

The Unadilla, Riverhead, Laguardia and Ebbets soil series are further described in the table, below.

| **Name** | **Soil Horizon Depth** | **Color** | **Texture, Inclusions** | **Slope %** | **Drainage** | **Landform** |
|---|---|---|---|---|---|---|
| Unadlilla Series | Ap: 0-8 in<br>Bw1: 8-12 in<br>Bw2: 12-18 in<br>Bw3: 18-31 in<br>BC: 31-42 in<br>2C: 42-65 in | 10YR 4/3<br>10YR 6/4<br>10YR 5/6<br>10YR 6/4<br>10YR 5/4<br>10YR 4/2 | SiLo<br>SiLo<br>SiLo<br>SiLo<br>VFiSaLo<br>StrVGrlSa | 0-8 | Well | Lacustrine plains and outwash terraces |
| Riverhead Series | Ap: 0-12 in<br>Bw: 12-27 in<br>BC1: 27-32 in<br>2BC2: 32-35 in<br>2C1: 35-40 in<br>2C2: 40-65 in | 10YR4/3<br>7.5YR 5/6<br>10YR 5/4<br>10YR 5/4<br>7.5YR 4/4<br>10YR 7/4 | SaLo<br>SaLo<br>LoSa<br>GrlLoSa<br>Sa<br>CoMedSa | 0-8 | Well | Outwash plains |
| Laguardia Series | Ap: 0-8 in<br>Bw: 8-26 in<br>C: 26-79 in | 10YR4/3<br>10YR 4/3<br>10YR 4/3 | GrlSaLo<br>VGrlCoSaLo<br>VGrlCoSaLo | 0-8 | Well | Anthropogenic urban fill plains |
| Ebbets Series | Ap: 0-4 in<br>Bw: 4-8 in<br>C: 8-60 in | 10YR3/2<br>10YR 4/4<br>10YR 4/4 | Lo<br>GrlSaLo<br>GrlSaLo | 0-8 | Well | Anthropogenic urban fill plains |

Key: Soils: Si-Silt, Lo-Loam, Sa-Sand
Other: Str-Stratified, V-Very, Grl-Gravelly, Co-Coarse

It should be stressed, however, that historic maps note the APE originally was partially under water and partially covered by low lying marshland. Therefore, mapping by the USDA may not be precise enough to account for site-specific conditions.

Two sets of soil borings recently were completed within the project site boundaries (Appendix A). Soil borings in conjunction with proposed underground duct banking associated with the RFK Bridge were undertaken in 2011 just

south of and underneath the RFK Bridge (Sound Environmental Associates 2011). Although these borings were only excavated to 5 feet below grade, their results are nonetheless useful. Three of the eight soil borings (A1, D1, and D2) were located within the present APE, immediately south of and under the bridge. The two borings situated on the eastern side of the APE (A1 and D1) both encountered what appears to be fill (based on noted inclusions of concrete and brick) to a depth of 5 feet below grade. Boring D2, nearest the waterline, may also be fill, although no historic period inclusions were recorded. Additionally, engineers supervising the soil boring program advised DPR personnel of two "old brick foundations" uncovered during the course of utility work, located in proximity to borings D1 and D2 (Nikos 2012). As will be described below, the locations of these foundations correspond to the approximate mapped location of a building alternately referred to as a "community store" and a "waiting room and store" that stood near the Randall's Island ferry landing from the 1910s until ca. 1935.

As part of the present project, a geotechnical report was completed, which included a set of 8 soil borings (Fenley and Nicol Environmental, Inc. 2012). Seven of the borings were located within the APE, and the last was located east of the APE, on an overlooking terrace. Appendix A notes the locations of these soil borings and includes the soil boring logs.

According to the geotechnical report, there were three soil strata encountered. The uppermost stratum was introduced topsoil, ranging from 2-8 inches thick. Beneath the topsoil in all the borings within the APE (excluding Boring B-9, located east of the APE) was introduced fill, described as coarse to fine sand with various amounts of silt and gravel. Inclusions in the fill consisted of red brick, asphalt, concrete, and wood. The fill extended to a depth of approximately 13 feet below the ground surface, except in borings B-6 and B-8, where oversized debris prevented drilling to continue. Under the fill were natural glacial deposits described as medium to fine sand with variable amounts of silt and gravel and occasional layers of black silt. Boring B-7 encountered a trace amount of fibrous peat near the top of the glacial deposit. The glacial deposit extended to approximately 14 feet below the ground surface. Boring 6-A revealed weathered rock under the glacial soil; the remaining borings were terminated prior to reaching bedrock. Groundwater ranged from approximately 6-12 feet below ground surface, corresponding to elevations ranging from 4 feet below mean sea level and 2 feet above mean sea level, depending on location.

## IV. BACKGROUND RESEARCH/HISTORICAL OVERVIEW

### A. Precontact Summary

The precontact era in the coastal New York region can be divided into three time periods, based on human precontact adaptation to changing environmental conditions. These are generally known as the Paleo-Indian (c.12,000 to 10,000 years ago), the Archaic (c.10,000 to 2,700 years ago) and the Woodland (c.2,700 to 300 years ago). In order to be able to assess the project site's potential for precontact exploitation, it is first necessary to review these time periods and their associated settlement patterns.

*Paleo-Indian Period (c.12,000 y.a. - 10,000 y.a.)*

Toward the end of the Wisconsin Glaciation, during the Late Pleistocene Epoch, humans wandered across the exposed land bridge which connected Siberia and Alaska. These small groups of hunters were probably following the roaming herds of megafauna which were their chief prey. The distinctive weapon in their chipped stone tool kit was the fluted point, which has been found in association with mammoth, mastodon, bison and horse remains at various sites in the southwestern United States. Although none of these "kill sites" is located east of the Mississippi, the discovery of campsites such as that at Port Mobil, Staten Island, suggest a scattered, highly mobile population in bands of approximately 20 individuals, who ranged across a vast area necessary to support lifeways organized around the hunting of migratory game (Ritchie 1980:1-3, 13).

The fluted, lanceolate points, two to five inches in length with concave bases and channelled or fluted faces, presumably to facilitate hafting, exhibit a considerable range in shape and size. They were usually made from a high-grade silicious stone, often exotic to the region in which they are recovered, a function of their makers' seasonal migrations. Other artifacts in the Paleo-Indian tool kit include scrapers, knives, borers and gravers, tools which indicate extensive handiwork in wood, bone and leather (Ritchie 1980:3,6).

From the locations of recorded sites in the Northeast, Paleo-Indians exhibited a marked preference for well-elevated situations. However, 30% of sites were found on or near the margins of swampy ground. Environmental characteristics which appear to have been attractive to Paleo-Indians include the proximity of major waterways, large fertile valleys and the coastal plain, where the densest population of desired food animals was supported (Ritchie 1980:7). However since 10,000 years ago, the rise in sea level estimated to be from 75 to 80 feet, has submerged large numbers of these sites.

The retreat of ice from the project area vicinity approximately 18,000 years ago and a global warming trend circa 14,000 years before present, encouraged Paleo-Indian settlement in the Northeast. The post-glacial environment of spruce and pine underwent a gradual modification in favor of deciduous hardwoods such as oak and hickory, which have greater importance in terms of nutritional value to both animals and humans than do conifers. By 8,000 B.C., these deciduous species dominated forests along the eastern seaboard. In addition, the megafauna on which Paleo-Indian diet was based "were rapidly becoming extinct, and were being replaced by the temperate-climate fauna that are indigenous today" (Gwynne 1982:190-191).

*Archaic Period (c.10,000 y.a. - 2,700 y.a.)*

The warming trend at the end of the last glaciation completely transformed the northeastern coastal environment from tundra and conifer-dominated forests, to the present deciduous woodlands with generally modern distributions of fauna. Due to the dwindling contribution of meltwater from disappearing glaciers, the reduced flow of streams and rivers promoted the formation of swamps and mudflats. These wetlands created a congenial environment for migratory waterfowl, and a host of edible plant species and shellfish. The new mixed hardwood forests of oak, hickory, chestnut, beech and elm attracted such mast-eating fauna as white-tailed deer, wild turkey, moose and beaver.

Although the Archaic diet was still based on hunting and gathering, due to the greater variety of plants available and exploited, excavated Archaic sites yield a wide array of plant processing tools, including grinding stones, mortars and pestles. The diagnostic tool was the grooved axe. In the coastal areas of New York, have been found numerous, small "nearly always multi-component sites variously situated on tidal inlets, coves and bays, particularly at the heads of the latter, and on fresh-water ponds" (Ritchie 1980:143). By the Late Archaic, these areas provided shellfish, small game, fish, salt hay and tuberous grasses, making larger more permanent settlements possible. Semi-nomadic life is still indicated, but wandering occurred within well-defined territorial limits, with seasonal movements between camps near exploitable resources. A dietary shift to shellfish in coastal New York near the end of the Archaic suggests a scarcity of large game, and a change from the early Archaic inland adaptation of forest hunting. Coastal sites show a principal reliance upon shellfish, especially oysters, hard and soft shell clams and bay scallops, which were readily available in the waters of the East River and Long Island Sound. Characteristic of the Late Archaic were "fish-tailed" projectile points and soapstone bowls (Ritchie 1980:142,166, 167, 171). In contrast to conditions during the Paleo-Indian, Early and Middle Archaic, "by Late Archaic times sea level was so close to present levels that its subsequent small rise has failed to obliterate much of what remains on Long Island from that period" (Gwynne 1982:192). Hence the Late Archaic Wading River complex, four sites on the north shore of Suffolk County, was found at the edge of a salt marsh, on dry ground ranging only two to seven feet above mean high water (Wyatt 1982:71).

*Woodland Period (c.2,700 y.a. - 300 y.a.)*

From approximately 3,000 years ago until the arrival of the first Europeans, Native Americans of southern New York shared common attributes of the Woodland Stage: the advent of horticulture, extensive trade networks, large permanent or semi-permanent villages, pipe smoking, the bow and arrow and the production of clay vessels. The habitation sites of the Woodland Indians increased in size and permanence as they became ever more efficient in extracting food from their environment. The archaeological evidence from Woodland Period sites indicates a strong preference for large-scale habitation sites to be in close proximity to a major fresh water source, e.g., a river, a lake or an extensive wetland; and smaller scale sites for extractive operations, e.g., butchering stations, shell gathering loci and quarrying sites, to be situated at other resource locales. Late Woodland Stage sites of the East River Tradition in southern New York have been noted on the "second rise of ground above high water level on tidal inlets," and situated on "tidal streams or coves" and "well-drained sites" (Ritchie 1980:16). Carlyle S. Smith, who

studied and analyzed the distribution of precontact ceramics in coastal New York, stated that "village sites" are found on the margins of bays and tidal streams" (Smith 1950:130).

Woodland Period tool kits show some minor variations as well as some major additions from previous Archaic tool kits. Plant processing tools became increasingly common and their presence seems to indicate an intensive harvesting of wild plant foods that may have approached the efficiency of horticulture, which itself appeared during the second half of the Woodland Period. The advent of horticulture is tied in with the introduction of ceramic containers which allowed for more efficient cooking of certain types of food and may also have functioned as storage for surplus food resources. Despite the advent of agriculture, shellfish and small game remained an important component of the Woodland diet. Shellfish refuse heaps, termed "middens," reached immense proportions, covering from one to over three acres. Deer, turkey, raccoon, muskrat, ducks and other game were stalked with bow and arrows, replacing the spear and javelin, while dug-out boats, bone hooks, harpoons and nets with pebble sinkers were employed in fishing (Ritchie 1980:179-180,267).

Historical narratives written by European travelers and settlers provide us with our only first-hand descriptions of Native American daily life and customs during 17th century. Johannes de Laet, in his *New World, or Description of West India*, published in Holland in 1625, wrote that the Native Americans:

> are divided into many nations and languages, but differ little in manners. They dress in the skins of animals. Their food is maize, crushed fine and baked in cakes, with fish, birds and wild game. Their weapons are bows and arrows, their boats are made from the trunks of trees hollowed out by fire.
>
> Some lead a wandering life, others live in bark houses, their furniture mainly mats and wooden dishes, stone hatchets, and stone pipes for smoking tobacco (Bolton 1972:16).

Anthropologists and linguists agree that when Europeans arrived in the project area vicinity, the Native Americans were Munsee-speaking Upper Delaware Indians, a group known as the Wiechquaesgeck. At the time of European contact, c.1600, an estimated 900 Wiechquaesgeck occupied the Bronx, northern Manhattan Island and Westchester County. Henry Hudson's first meetings in 1609 with the Indians along the Hudson River shores of Westchester and the Bronx were not propitious. A mate rashly killed an Indian caught burgling one of the ship's cabins, and hostilities broke out which ended with the crew firing muskets on canoes crowded with hostile warriors, killing nine Indians (Brodhead 1853:33; Grumet 1981:25-26,60).

With the advent of Dutch settlement during the 17th century, the constant contact between peoples of two alien cultures, along with their competition for land and other natural resources was a source of frequent friction. Since the Wiechquaesgeck had few furs to trade with the Dutch, there was little motivation on either side for good relations. Several brutal wars with the Dutch and hostilities with other Indian groups during the 1640s and 1650s, coupled with the introduction of European diseases against which Native American populations had no natural protection, decimated Indian populations in the New York City area. Many groups were forced to migrate and merge in order to maintain viable communities. By the end of the 17th century, the Wiechquaesgeck had abandoned Manhattan. Some moved to New Jersey, where they joined the Raritan, while many others settled in northern Westchester County, among the Wappingers in Dutchess County and also in the vicinity of Stamford, Connecticut. They and other small groups were referred to as "River Indians" during the 18th century, when they provided the English with laborers and warriors, but these Indians were driven off or moved in with other groups outside the Lower Hudson Valley (Grumet 1981:60-62).

**B. Previously Recorded Archaeological Sites and Surveys**

Research by Robert S. Grumet and Reginald Bolton indicates that the Indian settlement nearest the project site was a habitation or campsite along the Manhattan shore of the Harlem River, between East 119$^{th}$ and 122$^{nd}$ Streets, about 500 feet west of the project site and directly across the river. First recognized in 1855, after "numerous shells, flakes and weapons" were found between East 120$^{th}$ and 121$^{st}$ Streets. Bolton felt that it was a "native site of some importance . . . a place of landing and trade, or perhaps a fishing-place," because it was the nearest point by canoe to the Bronx. Bolton records a major Indian trail cutting diagonally eastward through the present Manhattan streetgrid, linking the shore and campsite area with the main trail running through the center of Manhattan Island. The trail and the settlement were on a broad area of level land (later the location of the Dutch town of Nieuw Haarlem) known to

the Indians as ***Conykeekst***, probably meaning "little narrow tract." Bolton speculates that the name was probably applied to the settlement, which, due to the lack of sheltering high ground in the vicinity, was unlikely to have been occupied during the winter months (Bolton 1922:72-74,Map IV; Grumet 1981:9).

South of Conykeekst, archaeologist Arthur C. Parker's map of recorded precontact archaeological resources shows a village site (ACP-NYRK no#) at about East 110th Street and the East River, about 3,000 feet southwest of the project site (Parker 1920:627). The work of other researchers does not seem to support this, although Grumet does depict Native American planting fields in that area (Grumet 1981:68).

Archaeology also records a substantial Indian presence in the nearby Bronx, adjacent to Randall's Island across the narrow Bronx Kill. The Indian village ***Ranachqua*** is generally located on the northern banks of the Kill near Cypress Avenue south of East 132nd Street, approximately 2,500 feet northeast of the project site. "Food pits and Indian implements" have been found here (Bolton 1972:136-137). The name Ranachqua has been defined in various sources as "the end place," "stop" or "point," most likely due to its position on the shore at the end of an Indian trail. This trail ran generally northeast-southwest and in its southern sections approximates Cypress Avenue. Despite or perhaps due to the existence of the village, the name Ranachqua was often used to refer to the part of the southwestern Bronx that juts out between the Harlem and East Rivers. (Grumet 1981:43; Brodhead 1853:43).

The archaeological site file inventories from the New York State Museum (NYSM) and the NYSOPRHP, record a number of inventoried sites within one mile of the project site, most of which have already been discussed above.

**NYSM#4064** is a campsite identified by archaeologist Parker (ACP-NYRK no#), on the Manhattan shore of the Harlem River, in the vicinity of the approaches to the Triborough Bridge, about 500 feet west of the project site. This corresponds to the location of the Conykeekst campsite, described in more detail earlier.

**NYSM#5475; OPRHP #A005-01-0027, #A005-01-0031**: a village site, the same location as the village discussed above and identified by Reginald Bolton as Ranachqua. The NYSM and OPRHP locate the site(s) more generally than does Bolton, in a broad area south of 133rd Street, extending as far west as the Bruckner Expressway, about 2,500 feet northwest of the study site.

**NYSM#7248**: traces of occupation were recorded on this site, approximately 4,500 feet northwest of the project site on the Manhattan shore of the Harlem River, in the vicinity of Park Avenue.

**NYSM#4539 (ACP Quns no#)** These shell and kitchen *middens*, or refuse heaps, were along the East River shore, in what is now Ralph Demarco Park (north of Astoria Park), in the Ditmars area of northwestern Queens, about 1 mile southeast of the project site (Parker 1920: 672).

These sites all cluster along the shores of major waterways, the Harlem, Bronx and East Rivers, surrounding the project site to the north, west and south.

Despite the proximity to these sites, no inventoried precontact archaeological sites have been recorded on Randall's or Ward's Islands. It is more than likely that this lack of known sites is a function of the early institutional development of the island. As the location of what were actually informal prisons, the project site vicinity was probably not open to survey by amateur or professional archaeologists until the mid-20th century, after the period during which such archaeological site inventories were being assembled.

Randall's Island has had a number of archaeological studies conducted during the last dozen years, generally in advance of new DPR development, although the present APE has never been subjected to an archaeological study (Bergoffen 2001a, 2001b; HPI 2000, 2001a, 2001b; AKRF 2002; Geismar 2002; Geoarchaeology Research Associates 2008). Most of the investigations have consisted of documentary studies that have not included field testing. Those few that have involved subsurface investigations have not revealed significant archaeological resources (e.g. Geismar 2002).

## C. Historic Period Summary

The earliest recorded European to sail through the channel now separating Astoria, Queens and Wards and Randall's Islands, was Adriaen Block, the Dutch captain of the *Onrust,* who passed from the East River to Long Island Sound in 1614. From Block we have the first mention of the Hell Gate, the name by which the Dutch colonists referred to the entire East River. It eventually came to mean only the strait because of the dangerous shoals and unpredictable tidal currents and eddies (Brodhead 1853:56, 56n).

After the first European settlers arrived under the auspices of the Dutch West India Company, New Netherland Governor General Wouter van Twiller purchased both islands for his own private use. The sellers were identified as "two chiefs of Marechkawick," who appeared before him and the Council in 1637. At the time, Ward's Island, known as Tenkenas, had an area of about 200 acres, and Randall's Island, or Minnahanonck, about 120 acres. Twiller also purchased Governor's Island, becoming one of the largest landholders in the colony, and giving rise to criticism that he was enriching himself at the company's expense (Brodhead 1853:267; Stokes 1928:86; Grumet 1981:34). The 1639 Manatus Map shows Van Twiller's bouwerie or farm on Ward's Island, but Randall's Island, including the project site, appears to be vacant (Brodhead 1853:55-56; WPA 1939:420).

With the capture of New Netherland by the English in 1664, the new government confiscated and renamed the islands. On Governor Richard Nicolls' map of 1664-68, Ward's and Randall's Islands became Great Barn, and Little Barn Island respectively (Cohen and Augustyn 1997:44; Stokes 1922:4/26/1667). The next owner of the two islands was Thomas Delavall, Mayor of New York City. He declared his possession of the islands by January 1667, even though they were not officially confiscated until April, and he was not officially granted them until 1668. Among other "petitions" to the nearby Town of Harlem, Delavall, offered the islands to the inhabitants of the town, provided that they left the use of the meadows free to all. Despite the generous offer, no action appears to have been taken, and the islands remained in private ownership (Stokes 1922: 2/3/1668; 1/3/1667).

The colonial legislature joined both islands to New York County in 1683, and New York City in 1691 (Stokes 1922:11/1/1683; 10/1/1691). The ownership of the islands appears to have been split during the early 18$^{th}$ century. In 1735, Elias Pipon, a Harlem landowner held title to only Randall's or Little Barn Island (Stokes 1922:11/7/1735).

When Randall's Island was purchased by John Montresor in 1772, it had been called Belle and later Talbot's Island, suggesting some intermediate changes in ownership since Pipon. Continuing the custom, for many years it was referred to as Montresor's Island. Montresor was a British army engineer stationed in New York City by 1765, under the command of General Thomas Gage. As Gage's best engineer, he was responsible for surveying and drawing up a plan of the city, now known as the Montresor Plan. This was done in case military action against the inhabitants became necessary during the difficult period of civil unrest following the passage of the Stamp Act in 1765. Montresor also completed a survey of New York Harbor and its islands, as well as one of Bunker Hill, Philadelphia and New York Province. He was appointed chief engineer of British forces in December 1775 (Cohen and Augustyn 1997:71-72).

While the Continental Army was in control of New York City, George Washington established a smallpox quarantine on Randall's Island during the Spring of 1776. When the British drove the Continental Army out in September, Ward's Island became an army base, and a hospital was established on Randall's Island, in which Montresor's wife Frances served as matron. American forces were just to the north across the shallow, non-navigable Bronx Kill in the present Bronx, and were in contact with their counterparts on Randall's Island. An American attack on the island under General William Heath failed because the opposing soldiers had become so friendly with each other that many of the Americans refused to attack (Seitz and Miller 1996:164).

It is not clear whether the earlier owners had ever occupied Randall's Island, but Montresor definitely used it as his residence, moving his family there. On January 13, 1777, Montresor reported that, "this night my House and out-houses, Barns and offices on Montrésor's Island . . . was burnt by the Rebels (Stokes 1922:1/13/1777; Cohen and Augustyn 1997:72). General Heath denied this, asserting that the British, fooled into believing the Americans were about to mount a large-scale attack, panicked and burned down the buildings before retreating (Seitz and Miller 1996:164). A view of the Randall's Island, from October of the same year, seems to show no structures on the western side of the island (Stokes 1928:plate 86).

Following confiscation of the island after the war, Jonathan Randel or Randal acquired the island in 1784. Since Montresor's buildings were burned in the war, the group of three structures visible on the 1814 Commissioners Map (about 1,200 feet north of the project site), and labeled "J. Randel" must be new or the Montresor's structures rebuilt. The buildings also appear on maps in 1811 (Figure 3), 1821, 1827 and 1836 (Figure 4) (Cohen and Augustyn 1997:107,109,115,121). Colton's 1836 map is particularly detailed, showing the Randel residence with an avenue of trees leading down to the dock on the Harlem River shore (Colton 1836, Figure 4). The dock is located at the southern end of the APE. A U.S. Coast Survey map from 1837 shows similar conditions, albeit with a slightly different configuration of the main house parcel (Figure 5). The 1837 map also notes a structure along the waterfront within the APE, although it does not show the path from the main house. After he died in 1830, Randel's heirs sold the island, along with the separate 50-acre Sunken Meadow to the east, to the City of New York in 1835 for $60,000. Apparently, a misspelling in the deed altered Randel's name, and the island came to be called Randall's Island (WPA 1939:424)

As New York City's burgeoning population spread northward across Manhattan, Randall's Island was caught up in the general movement to place the poor, sick, orphaned and criminal on the city's various outlying islands. The Common Council moved c. 100,000 bodies from the Manhattan potter's field (50th Street and Fourth Avenue) to neighboring Ward's Island, and a new potter's field was opened on Randall's Island in 1843, and called the city cemetery. This burial ground was located well outside the APE, more than 1500 feet to the south. In 1845, on the northern portion of the island, an almshouse was opened, a children's hospital was completed in 1848, and later an "Idiot Asylum" opened (WPA 1939:424; Seitz and Miller 1996:164; Stokes 1926:1,779, 1,790). In 1851, the southwestern part of Randall's Island, 36½ acres, was appropriated for the Society for the Reformation of Juvenile Delinquents. The new House of Refuge for male delinquents was completed there in 1854, and housing for the Female Division in 1860 (Seitz and Miller 1996:165; Stokes 1926:1,836; NYSARA 1989:4).

Portions of the project site and the Randall's Island buildings are depicted on a series of U.S. Coast Survey maps dating to and 1848, 1851, 1854-5. But the clearest illustration of the facilities on Randall's Island and the conditions within the project site are provided on a U.S. Coast Survey map from 1857, which shows the entire island in great detail (Figure 6). The two institutional complexes are shown, albeit unlabeled: the House of Refuge complex on the south and the Children's Hospital complex on the north. The project site or APE was located on the northern end of the island, and would have been associated with the Children's Hospital complex use of the area. However, as noted earlier, in 1857 the project site still was shown as a combination of marshland and water under the river. Two structures are shown within the project site near the foot of the pathway leading from the hospital complex to the waterfront, where the ferry landing was situated in the mid 19th century. One relatively large structure is shown in this location on an 1879 bird's eye view including Randall's Island, and may be the same structure shown on earlier maps (Taylor 1879, Figure 8). An article by W.H. Davenport in *Harper's New Monthly Magazine* from 1867, entitled "The Nurseries on Randall's Island," describes the hospital complex and its occupants in great detail. Much of the information concerns the buildings within the central or inland part of the island and well removed from the APE, although the article does make some mention of the project site conditions. As noted above, the southern end of the APE was where the ferry landing was located. The article indicates the presence of "a wooden store-house of considerable size and a boat house stand near the landing" as well as a "neat and beautiful avenue" leading from the dock to the main nursery facility (Davenport 1867:8-9).

Perhaps the most significant change to the project site came in the mid and late 1870s, when the original seawall was constructed surrounding Randall's Island, including along the present western edge of the APE. The stones for the seawall were quarried locally and then set by gangs of prisoners from the penitentiary on Blackwell's Island (now Roosevelt Island). At the same time, the land behind the seawall was filled in to create firm ground (City Record 1878). The 1879 Taylor bird's eye view suggests that the seawall had been completed by this time, although it is likely that the view represented an idealized image of probably more incomplete conditions. However, an 1886 U.S. Coast Survey map (Figure 9) does clearly show that the project site was now firm ground, which suggests the seawall was in place by this period. The 1886 map also shows a structure at the extreme southern end of the APE, which may correspond to the building shown on the 1879 bird's eye view. Two additional piers or docks are shown along the project site expanse, one opposite 124th Street in Manhattan and a larger one opposite 125th Street. An 1885 real estate map, while not particularly useful in gauging conditions within the APE, does, for perhaps the first time, label the buildings within the Children's Hospital complex, noting (from east to west) a cluster of buildings labeled "Randels Island Hospital," the "Idiots Asylum," and an Infants Hospital. The House of Refuge complex is shown on the southern part of the island (Robinson and Pidgeon 1885).

During the 1890s, the Children's Hospital complex underwent a change in organization. A 1917 report by William Burgess Cornell, who was then the Medical Director of the facility, noted that in 1875, separate reports were generated by the Randall's Island Hospital, the Infants' Hospital, the Idiot Asylum, and the School for Feebleminded. In 1892, all but the Infants' Hospital were consolidated as one entity. In 1902 the Infants' Hospital was added to the organization, and it was renamed the Randall's Island Hospitals, Schools, and Asylum. The title changed next to the Children's Hospitals and Schools, and finally in 1916, was modified to the Children's Hospital and School (Cornell 1917).

The 1910s also was the period when the hospital complex began to be upgraded with a number of new buildings, some to expand the scope of the institution, but others to better serve the existing needs. With regard to the project site, several buildings were erected from the 1910s through the 1930s (a 1909 update to the 1886 U.S. Coast Survey map still shows the majority of the APE as vacant). The most significant of these structures was a new power house and laundry building, measuring approximately 300 feet in length and 100 feet in width, built in ca. 1913 (Drummond 1912:53). It was located in the approximate center of the project site, roughly in line with 123rd Street across the river. The building had a massive brick smoke stack located at its northwest corner, and a large boiler house at its northern end. Additionally, a "waiting room and store" was built at the northern end of the project site, or APE in the late 1910s, and was located just south of the RFK Bridge alignment. This building served a dual purpose of providing a waiting area for people taking the ferry across the river to and from Manhattan, as by this time a ferry landing had been built at this location, and as a small store.

These 20th century buildings, along with associated structures such as pier complexes and overhead trestle works associated with the power house, are well documented in both maps and photographs beginning in the 1920s and continuing through the 1930s. An aerial photograph from 1924 (Figure 10) is perhaps the best depiction of the building footprints, as maps from the 1930s did not always agree on exact placement of the structures (e.g. Department of Hospitals 1933, Figure 11; Parks Department 1935, Figure 12). The power house/laundry, boiler house, smoke stack, and waiting room/store buildings are all visible on this view, as is a structure at the southern tip of the APE, which likely is the same structure shown on the 19th century maps, and several piers jutting out beyond the APE boundaries into the river. Maps from 1933 (Figure 11) and 1935 (Figure 12) further depict these structures and their placement within the project site. And photographs, taken by Percy Sperr in 1934 and 1936 and by photographers representing the City of New York in advance of Triborough Bridge construction, even more fully convey the massiveness of these structures within the project site (Photographs 13-22). Interestingly, the difference between the depiction of the APE waterfront in photographs from 1934 and 1936 is remarkable. While the 1934 images (Photographs 13 and 14) show a relatively uncluttered shoreline between the power house and the southern end of the APE, with only a series of pilings for docking and a landing area, by 1936 two large pier complexes were visible adjoining the northern and southern ends of the power house (Photographs 21 and 22).

This change was not limited to the project site. Randall's Island went through a transformation during the mid-1930s, as the charitable institutions were closed and the island repurposed as a city park in conjunction with construction of the new Triborough Bridge, the brainchild of powerful City Parks Department head Robert Moses. Construction of the Triborough Bridge within the project site began in 1935, and progressed rapidly through that year, with the bridge opening in 1936. Moses also instituted a massive landfill program to the east and south of the APE, not only connecting Randall's and Ward's Islands, but also bringing the area of Randall's Island up to 194 acres (from its original 120) by 1939 (WPA 1939:424; Willensky and White 1988:475).

As part of the Triborough Bridge construction, all buildings within its path were demolished or moved. This included the waiting room and store building at the northern end of the APE. A series of photographs of the bridge under construction (Photographs 17-20) illustrate the degree to which this part of the APE was modified from its earlier condition. In addition to the demolition of this building (which likely occurred not long after Photograph 20 was taken), the former ferry pier was removed under the line of the Triborough Bridge, leaving only the seawall (which presumably was reconstructed after the bridge piers were built).

The power house and laundry building, with its associated boiler house and smoke stack, initially were slated for preservation and repurposing. A number of DPR maps from 1936 (on file at the DPR archives) label this structure as either a park service building or a proposed gymnasium. However, it seems evident that these plans were not realized. Both a detailed 1939 topographic map (Figure 13) and a series of photographs taken by the DPR of the

project site in 1941 (Photographs 23-27) documenting the condition of the seawall, show a completely vacant landscape, indicating that the power house and its associated structures had been razed by this time and the ground restored to grassland. So, too, had the piers shown in 1936 (one pier was still depicted in 1939) been removed, although Photographs 24-26 do show remnants of one pier complex along the central shoreline of the APE in the form of several remaining pilings atop a scoured landform, and Photograph 23 may show remnants of a wood foundation that could represent one of the former 19th century buildings along the waterfront at the southern end of the APE.

Since the 1940s, the APE has been further bolstered as parkland by planting additional grass and trees, backfilling behind the seawall and repairing and/or replacing some portions of the seawall, as evidenced by the lighter colored capstones atop the wall along stretches of the wall within the APE. Aerial views including the Randall's Island and the project site, online at historicaerials.com, show little change to the APE from the mid-1950s through 1980. By at least the turn of the 21st century, however, additional plantings had occurred on the APE, and aerial views show the present trees within the property. For a time the area under the Triborough Bridge (soon to be renamed the RFK Bridge) was used as an asphalt covered staging area, with vehicles and trailers clearly shown occupying the area. This portion of the APE at the northern end still shows evidence of this use, with degrading pavement, several trailers still in place, and debris littering the shoreline. The water taxi stand abutting the southern end of the APE is a relatively new addition to the park, erected between 2004-2006.

## V. CONCLUSIONS

### A. Disturbance Record

The project site has experienced centuries of landform manipulation. Originally, the eastern side of the APE was marshland while the western side was under water (e.g. Figure 6). Tidal conditions and strong currents from the river would have affected the APE daily. The APE was landfilled in the mid to late 1870s, and a stone seawall was built at the same time. Soil borings within the APE note that the upper strata of all borings was fill, extending to ca. 13 feet below the existing ground surface. Groundwater was recorded within this fill layer in all borings. Beneath the fill were glacial soils, consisting of medium to fine sand with variable amounts of silt and gravel and occasional layers of black silt. These soils may have been exposed in places at low tide prior to landfilling, and likely were covered during high tide. Only one boring contained a trace amount of peat over the glacial soil. Boesch (1996) offers that peat deposits (which formed in marshy areas) acted as a preservation agent, and soils beneath peat layers should date to the period prior to development of the marshes. In areas where this peat deposit is absent, Boesch claims marine transgression would have destroyed former occupation surfaces. The lack of peat in all but one boring (and the presence of only a trace element in the boring where it was found) suggests that the effect of tides and river currents would have affected the APE soils well before its 19th and 20th century use.

The sequence of disturbance to the project site after the mid-1870s, when the seawall was built and the area landfilled, is significant. Maps and photographs show a series of docks and piers that were built from the APE jutting out into the river. Buildings that were constructed (and then demolished) on the APE included dock structures at the southern end, a very large power house and laundry building with an associated boiler house and smoke stack and a waiting room and store in the 1910s. The Triborough Bridge (now the RFK Bridge) was built in 1935-1936, and photographs document the extreme disturbance that this massive construction project entailed at the northern end of the APE. Last, the APE is criss-crossed with numerous subsurface utilities (see Figure 2).

### B. Precontact Archaeological Sensitivity

Overwhelming evidence exists that Native Americans exploited the natural resources of all the areas adjacent to Randall's and Ward's Islands – northern Manhattan, the southern Bronx and northwestern Queens – for thousands of years before the arrival of Europeans. It is also clear that to these people, tidal marshlands offered a rich source of food and raw materials for prehistoric people. However, it is not evident that the marshlands along this stretch of the Harlem River would have afforded the best resources to Native Americans, being along a waterway with strong currents. The lack of more than just a trace of peat in one soil boring suggests that marine transgression along this stretch of shoreline was not insignificant. And since historic maps show that there was no firm land on the APE prior to landfilling, it is likely that while precontact people were present on Randall's Island, the potential for any significant archaeological resources associated with that occupation within the project site itself is low.

## B. Historic Period Archaeological Sensitivity

Several categories of potential 19th-century archaeological resources may still be present within the APE.

Historic maps and accounts note that the southern end of the project site was used as a docking area for the early 19th century occupants of the island, as well as for the hospital complex from the 1840s through perhaps the early 20th century. At least two structures were noted at this docking area in 1867, a large store house and a dock house. It is unclear whether these buildings were located on top of the docks or on landfill, as this area was originally under water. Heavy use of this portion of the APE during the 20th century may have disturbed these early buildings, but it is possible that remnants may still be present, along with 19th-century docking elements.

The stone seawall that marks the western boundary of the APE was constructed in the mid to late 1870s by convict labor. Particularly along the northern stretch of the project site, the wall appears largely intact. However, the sections along the central and southern portions of the APE are in deteriorated condition, and according to photographs from 1941, were even more so then. Clearly there has been some repair and reconstruction of the seawall over time (the lighter colored capstones are the most visible later addition), and much of this historic feature has been compromised.

There have been numerous piers built along the project site waterfront in addition to the original dock at the southern end, described above. These piers would have extended beyond the APE boundaries into the river. Evidently, they have been removed from the APE, probably as navigation hazards. Any possible remains of 20th century piers would not appear to have archaeological significance.

The remainder of the building episodes on the project site (the power house and laundry, boiler house and smoke stack, as well as the waiting room and store) occurred during the 20th century. These buildings have been well documented in maps and photographs, and also would not appear to have archaeological significance. It is probable that the "old brick foundations" located during recent subsurface utility work just south of the RFK Bridge alignment were associated with the waiting room and store building area (as shown on Photographs 17-20) from the 1910s, and also would not have archaeological significance.

# VI. RECOMMENDATIONS

HPI has concluded that the Randall's Island APE does not possess precontact period archaeological sensitivity, and no further investigations for these resources are warranted. Despite widespread disturbance to the APE, it is possible that remnants from 19th century structures may survive beneath the fill at the southern tip of the APE. Figure 14 illustrates the approximate locations where 19th century historic maps show that these structures were located, as well as the original waterline. The general area of sensitivity begins at the southern tip of the APE and extends approximately 150 feet to the north. Although no two maps pinpoint the structures in exactly the same spot, the clustering of the mapped locations suggests that the general placement is accurate.

HPI recommends that if project plans allow it, subsurface impacts to this area should be avoided. If impacts cannot be avoided, then HPI recommends that this area of sensitivity be addressed through archaeological investigations. Depending on the nature of the planned project (which has yet to be determined), one of two types of archaeological investigations may be appropriate. Based on historic photographs and soil boring data, portions of this area are known to contain considerable debris and rock fill (one soil boring could not penetrate an obstruction in this area). If large amounts of soil and other overburden such as rocky fill are slated for removal in this area, it will be most practical (and cost effective) to undertake these excavations in tandem with project construction, which can provide the large-scale excavation and soil removal operations necessary, shore up the site if necessary to facilitate deeper excavation, and provide dewatering equipment if the water table interferes with archaeological resource recovery. Alternately, if project plans are smaller in scale and only target certain areas within the sensitive zone, either horizontally or vertically, a program of pre-construction archaeological testing may be a better solution. This pre-construction testing would consist of mechanical backhoe trenching at selected locations to remove the fill overburden and expose possible archaeological resources.

Prior to any excavation within the APE, regardless of the type, an archaeological Scope of Work and/or Monitoring Plan should be developed by the archaeological consultant in consultation with the LPC and DPR. All archaeological testing should be conducted according to OSHA regulations and applicable archaeological standards (LPC 2002; CEQR 2010). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological team.

Last, the stone seawall at the edge of the APE, and which originally encircled the entire perimeter of Randall's Island, is historic in its own right. Although much of it is deteriorated within the APE, portions along the northern extent appear to be more intact. Prior to any planned impacts to the seawall, project personnel should consult with LPC to determine whether any recordation of this feature is warranted.

## VII. REFERENCES


AKRF
2002 *Randall's Island Amphitheater Site, Manhattan, New York. Phase II Subsurface Investigation Report*.

Bergoffen, Celia
2001a *Triborough Bridge and Tunnel Authority, Triborough Bridge Rehabilitation Project, Randall's and Ward's Islands, Manhattan, Phase IA Archaeological Assessment Report*.

2001b *Randall's Island Waterpark, Randall's Island, New York, Aquatic Development Group, Inc., Phase IA Archaeological Assessment Report*.

Boesch, Eugene J.
1996 *Archaeological Evaluation and Sensitivity Assessment of the Bronx, New York*. Prepared for the New York City Landmarks Preservation Commission.

Bolton, Reginald Pelham
1922 "Indian Paths in the Great Metropolis," in *Indian Notes and Monographs*, Misc. series #23. Museum of the American Indian Heye Foundation, New York.

1972 *Indian Life of Long Ago in the City of New York*, enlarged ed. Harmony Books, New York.

Bridges, William
1811 *Map of the City of New York and Island of Manhattan as Laid out by the Commissioners.* John Randel Jr., cartographer, adapted by William Bridges, New York.

Brodhead, John Romeyn
1853 *History of the State of New York.* Harper and Brothers, New York.

City Environmental Quality Review (CEQR)
2010 *City Environmental Quality Review Technical Manual*. City of New York, Mayor's Office of Environmental Coordination. May 2010.

City of New York, Department of Buildings
1898-present Indexed records available online at http://www.nyc.gov/html/dob/html/bis.html.

City of New York Parks & Recreation (DPR)
1994 *Topographic Survey of Randall's and Ward's Islands*.

City Record
1878 *City Record, New York*. November 19, 1878, p. 1727.

Cohen, Paul E. And Robert Augustyn
1997 *Manhattan in Maps 1527-1995*. Rizzoli, New York.

Colton, J. H.
1836 *Topographical Map of the City and County of New York and the Adjacent Country*. J. H. Colton & Co., New York.

Cornell, William Burgess
1917 "The Reorganization of the New York City Children's Hospital and School." *Medical Record*. December 22, 1917.

Davenport, W.H.
1867 "The Nurseries of Randall's Island." *Harper's New Monthly Magazine*, Vol. 36, No. 211, December 1867.

Department of Hospitals
1933 *Randall's Island, Borough of Manhattan, New York City*.

Drummond, Michael J.
1912 "Department of Public Charities report." In *Message to the Board of Alderman: finances, departmental reviews. Jan. 27, 1913*. New York.

Fenley and Nicol Environmental Inc.
2012 *Report of Geotechnical Investigation, Proposed Randall's Island Northwest Shoreline Restoration, 34 Bronx Shore Road, New York, New York*. Prepared for City of New York Parks & Recreation.

Geismar, Joan
2002 *Randall's Island, New York, Amphitheater Site Test Pits Archaeological Re*port.

Geoarchaeology Research Associates
2008 *Phase IA Archaeological Investigation for the Proposed Randall's Island Field Development Project*.

Grumet, Robert S.
1981 *Native American Place Names in New York City*. Museum of the City of New York, New York.

Gwynne, Gretchen Anderson
1982 "Prehistoric Archaeology at Mount Sinai Harbor, Suffolk County, New York." In *The Second Coastal Archaeology Reader*, Volume V. James E. Truex, editor. SCAA, Stony Brook, New York.

Historical Perspectives, Inc. (HPI)
2000 *Randall's Island Cultural Resources Assessment, Randall's Island, New York, NY*.

2001a *Addendum: Archaeological Sensitivity Map. Randall's Island Cultural Resources Assessment, Randall's Island, New York, NY.*

2001b *Addendum: Archaeological Sensitivity Map. Randall's Island Cultural Resources Assessment, Randall's Island, New York, NY*.

Kieran, John
1982 *Natural History of New York City.* Fordham University Press, New York.

Landmarks Preservation Commission (LPC)
2002 *Landmarks Preservation Commission Guidelines for Archaeological Work in New York City*.

New York City Bureau of Engineering
1924 *Sectional aerial maps of the City of New York*. On file at the New York Public Library.

New York State Archives and Records Administration (NYSARA)
1989 *The Greatest Reform School in the World: A Guide to the Records of the New York House of Refuge* (Collection of the New York Public Library).

Nikos, Konstantine, LiRo Engineering
2012 Personal email communication with Julie Abell Horn, Historical Perspectives, Inc. February 7, 2012.

Parker, Arthur C.
1920 "The Archaeological History of New York," Part 2. *New York State Museum Bulletin*, Nos. 237 & 238, September/October.

Parks Department, New York City
1935 *Randall's Island Key Map*.

Ritchie, William A.
1980 *The Archaeology of New York State.* Revised Edition. Harbor Hill Books, NY.

Robinson, Elisha and R. H. Pidgeon
1885 *Atlas of the City of New York.*

Schuberth, Christopher J.
1968 *The Geology of New York City and Environs.* Natural History Press, Garden City, New York.

Seitz, Sharon, and Stuart Miller
1996 *The Other Islands of New York City.* Countryman Press, Woodstock, Vermont.

Smith, Carlyle Shreeve
1950 *The Archaeology of Coastal New York*, Anthropological Papers of the American Museum of Natural History, 43(2), New York.

Sound Environmental Associates LLC
2011 *Field Sampling Summary Report, Contract RK-65D In Situ Soil Sampling and Analysis Results*. Prepared for Thalle/Transit Construction, Yonkers, NY.

Stokes, I. N. Phelps
1922 *The Iconography of Manhattan Island*. Vol. 4. Robert Dodd, New York.

1926 *The Iconography of Manhattan Island*. Vol. 5. Robert Dodd, New York.

1928 *The Iconography of Manhattan Island*. Vol. 6. Robert Dodd, New York.

Sutphin, Amanda
2011 Archaeological Review Findings, Landmarks Preservation Commission. September 19, 2011.

Taylor, Will L.
1879 *The City of New York.* Galt and Hoy, New York.

United States Department of Agriculture (USDA)
2005 *New York City Reconnaissance Soil Survey*. United States Department of Agriculture, Natural Resources Conservation Service, Staten Island, NY.

United States Coast Survey (U.S.C.S.)
1837 *Hewlett's Cove, Wilkins Point, and Great Bay (western part).*

1848 *Map of Hell Gate and Vicinity*.

1851 *Hell Gate and Its Approaches*.

1854-5 *Manhattan- New York City and Manhattan Island.*

1857 *New York Harbor Including Wards I., Randall's I., North and South Brother and Riker's Island, East River*.

1886 *Blackwell's, Ward's, and Randall's Islands and Adjacent Shores of East and Harlem Rivers from 51st Street, New York to Lawrence's Pt.*

1909 *Blackwell's, Ward's, and Randall's Islands and Adjacent Shores of East and Harlem Rivers from 51st Street, New York to Lawrence's Pt.* Updated to 1909.

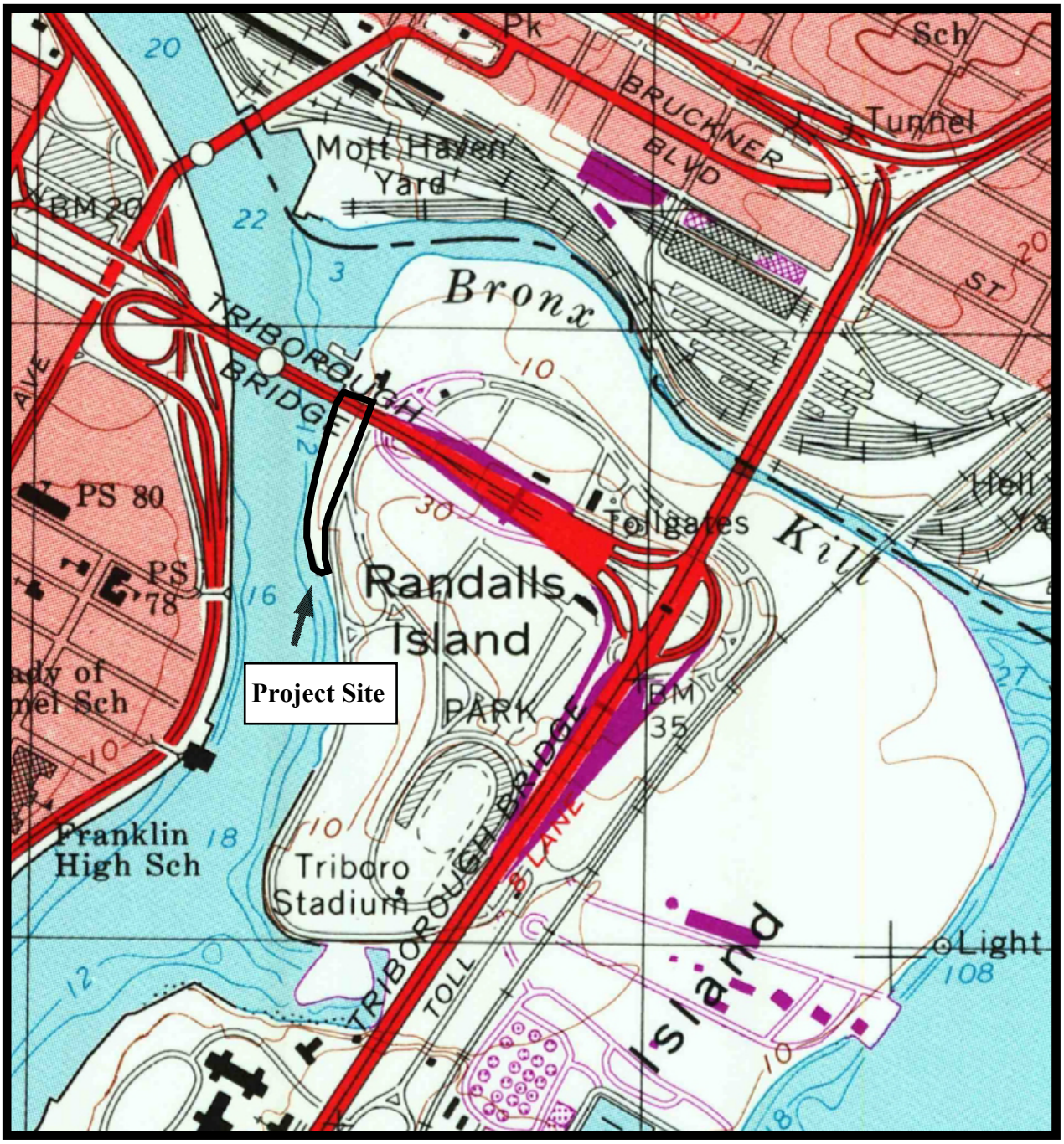
United States Geological Survey (U.S.G.S.)
1995 *Central Park, N.Y.-N.J.* 7.5 Minute Topographic Quadrangle.

Viele, Egbert L.
1874 *Topographical Atlas of the City of New York Including the Annexed Territory*. New York.

Willensky, Elliot and Norval White
1988 *AIA Guide to New York City.* Third edition. Harcourt Brace Jovanovich, New York.

Works Progress Administration (WPA)
1939 *The WPA Guide to New York City.* 1982 reprint. Pantheon Books, New York.

Wyatt, Ronald J.
1982 "The Archaic on Long Island." In *The Second Coastal Archaeology Reader*, Volume V. James Truex, editor. SCAA, Stony Brook, New York.




**Phase IA Archaeological Documentary Study**
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**Randall's Island, New York County, New York**

**Figure 1: Project site on *Central Park, N.Y-N.J.* topographic quadrangle (U.S.G.S. 1995).**

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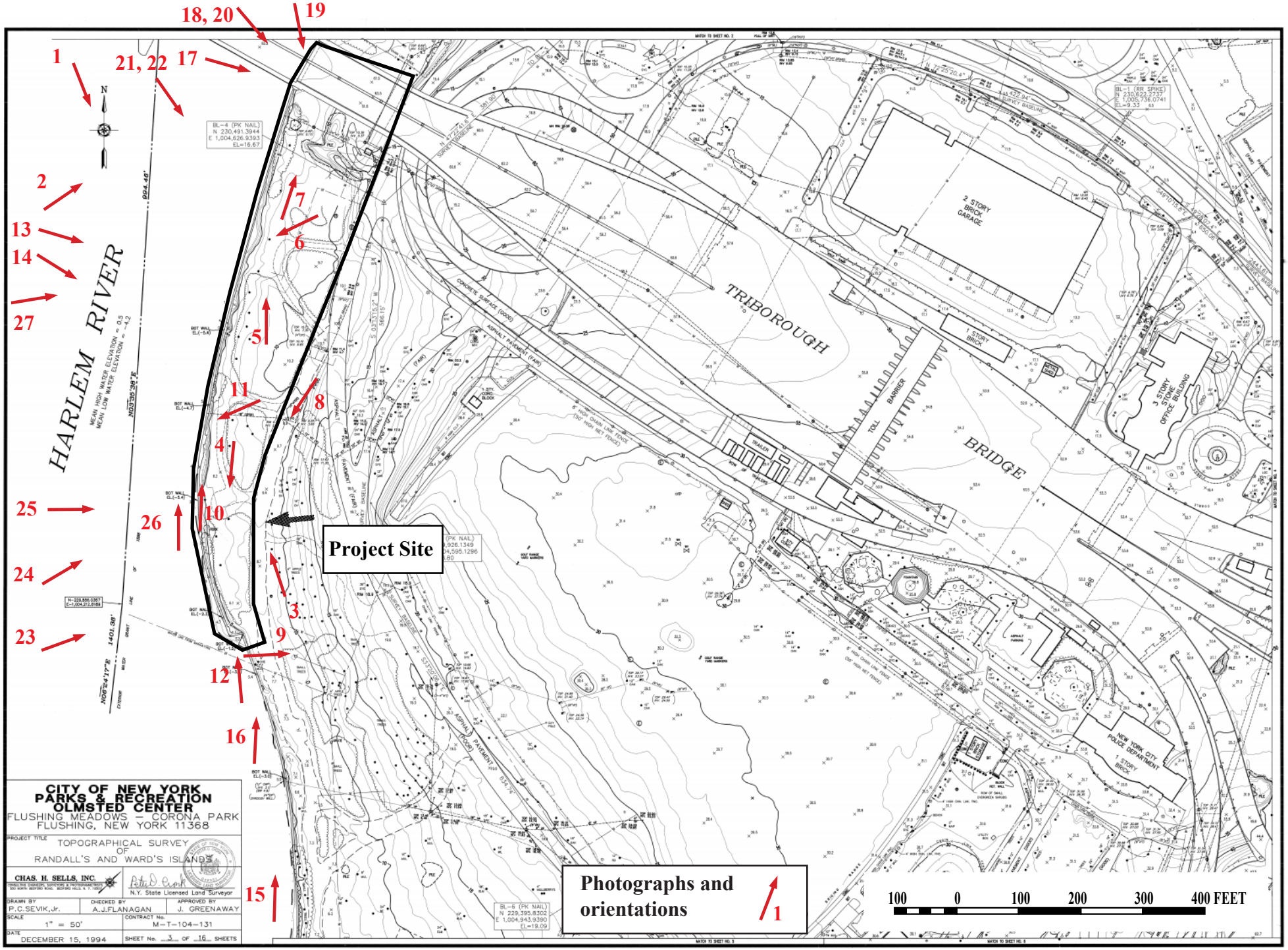


**Figure 2: Project site and photograph locations on *Topographical Survey of Randall's and Ward's Islands*, Sheet 3 (DPR 1994).**

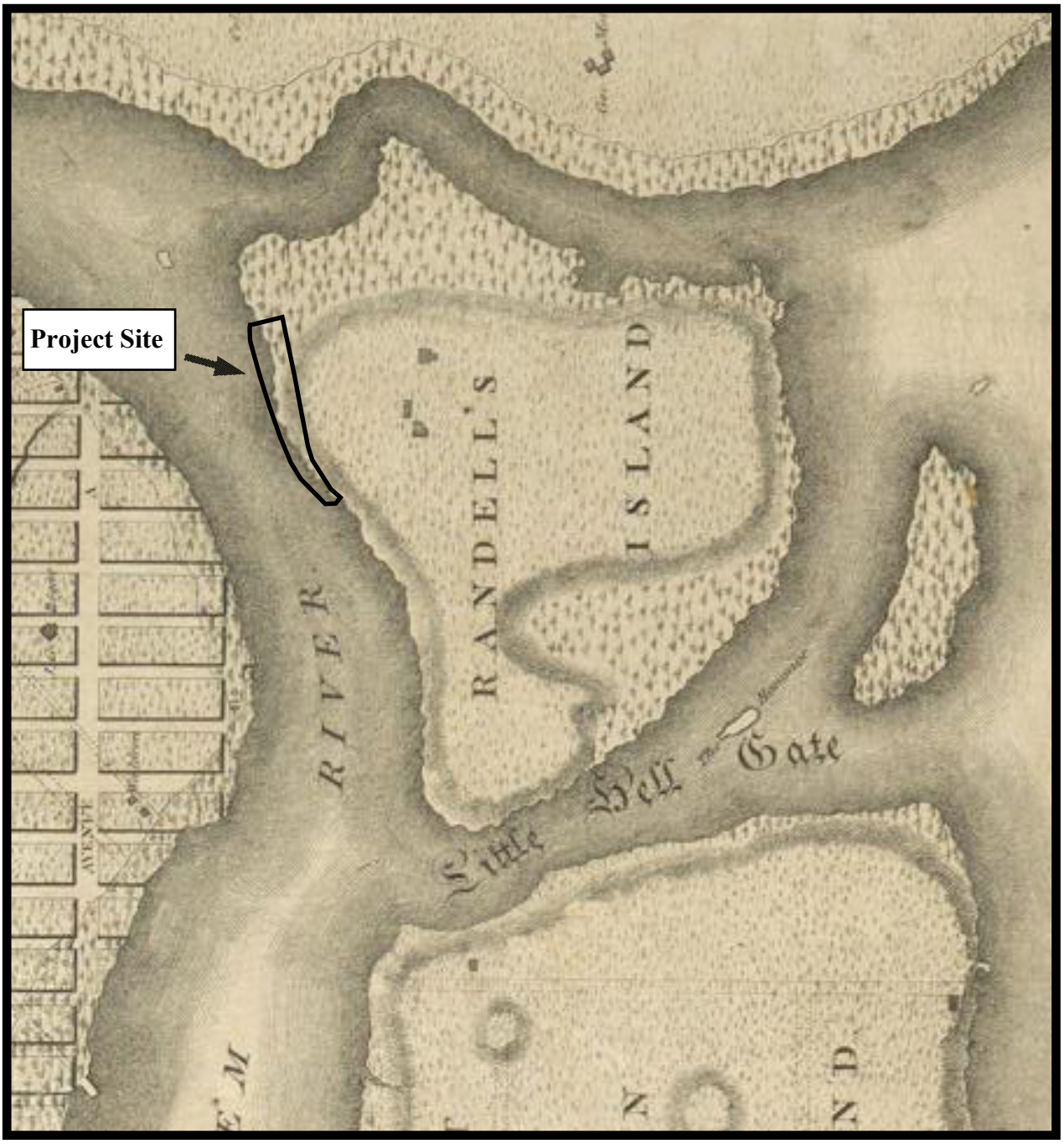


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**Figure 3: Project site on *Map of the City of New York and Island of Manhattan as Laid out by the Commissioners* (Bridges 1811).**

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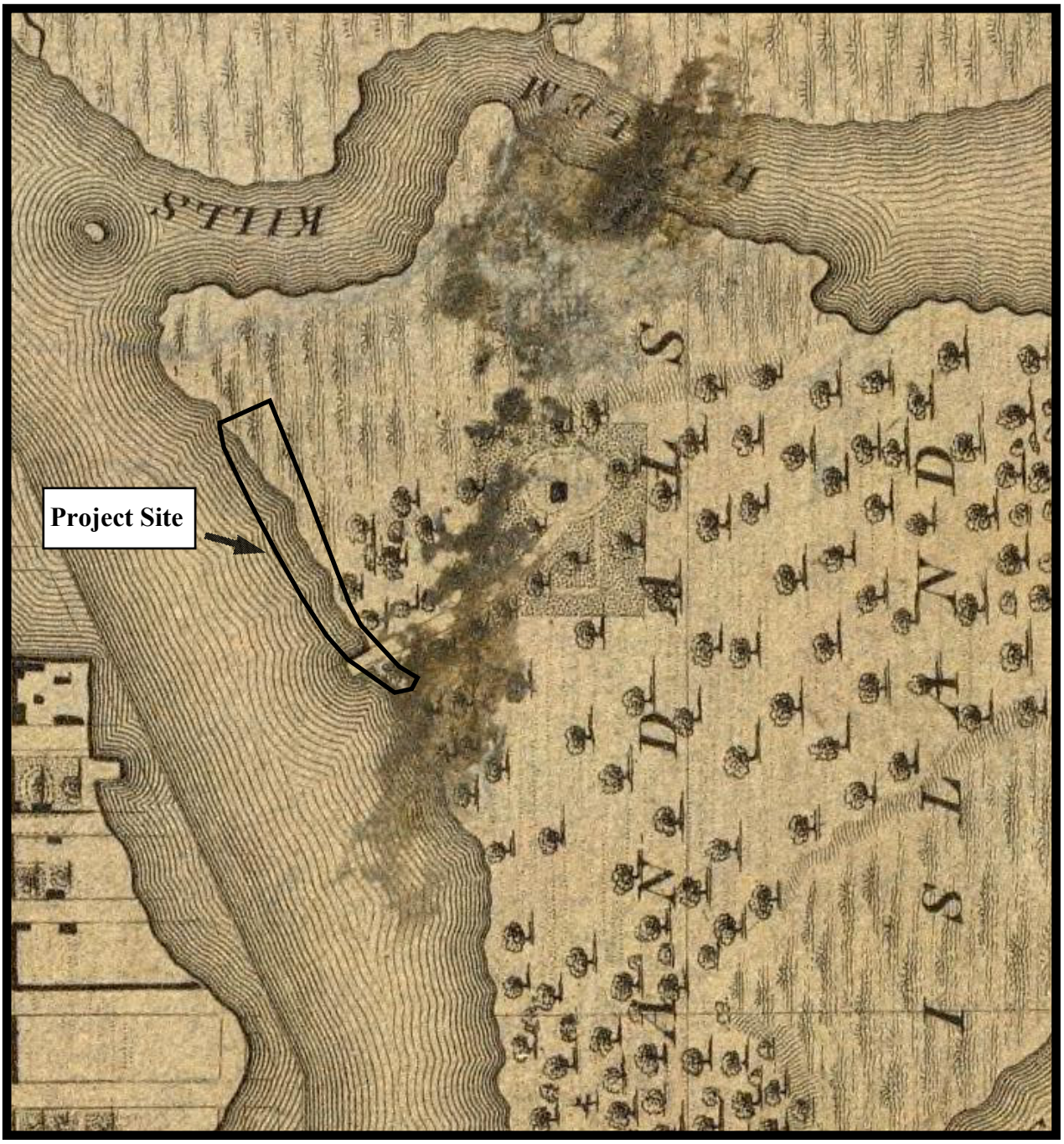


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**Figure 4: Project site on *Topographical Map of the City and Country of New York, and the Adjacent Country* (Colton 1836).**

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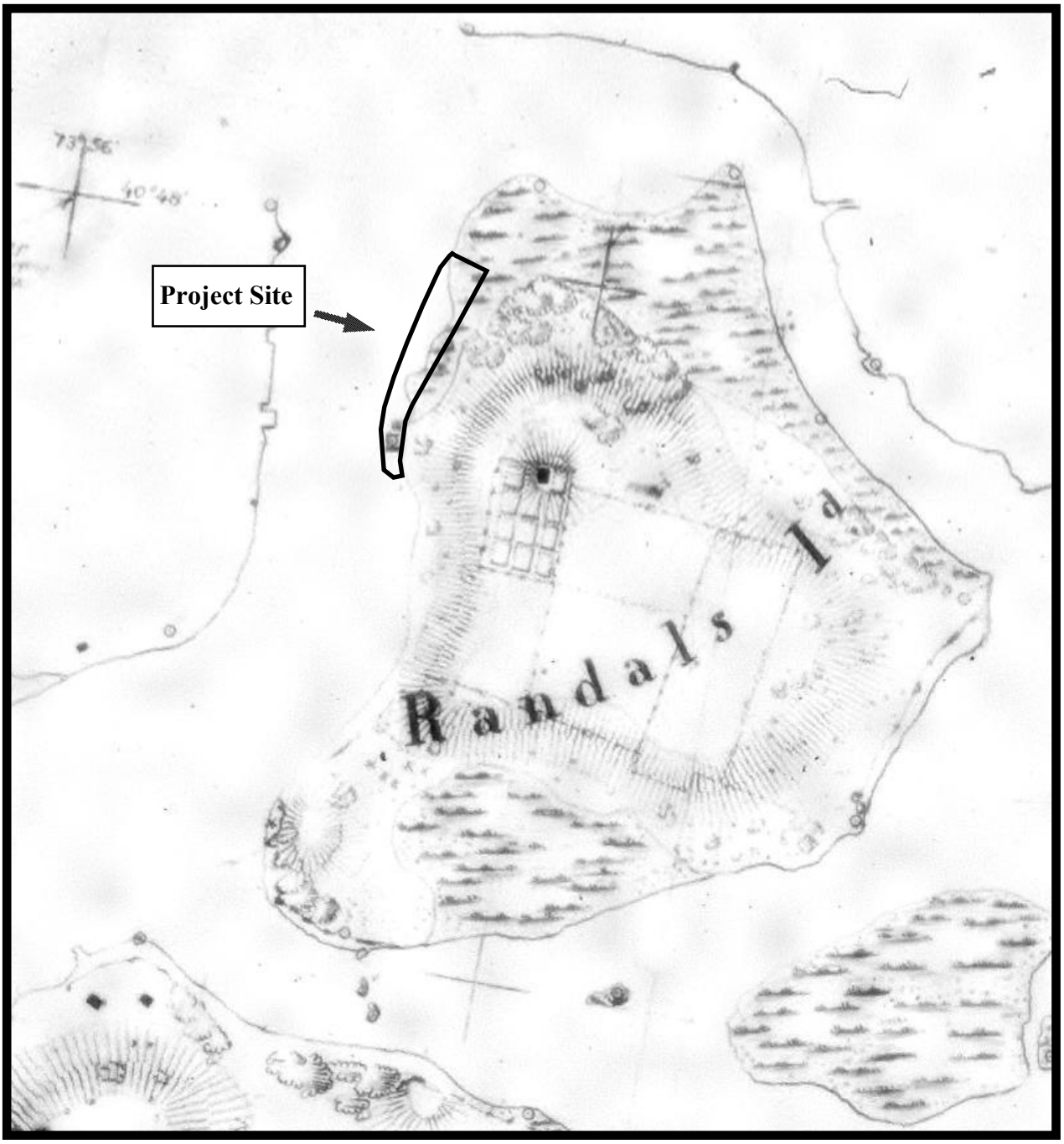


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**Figure 5: Project site on *Hewlett's Cove, Wilkins Point, and Great Bay (western part)* (U.S.C.S. 1837).**

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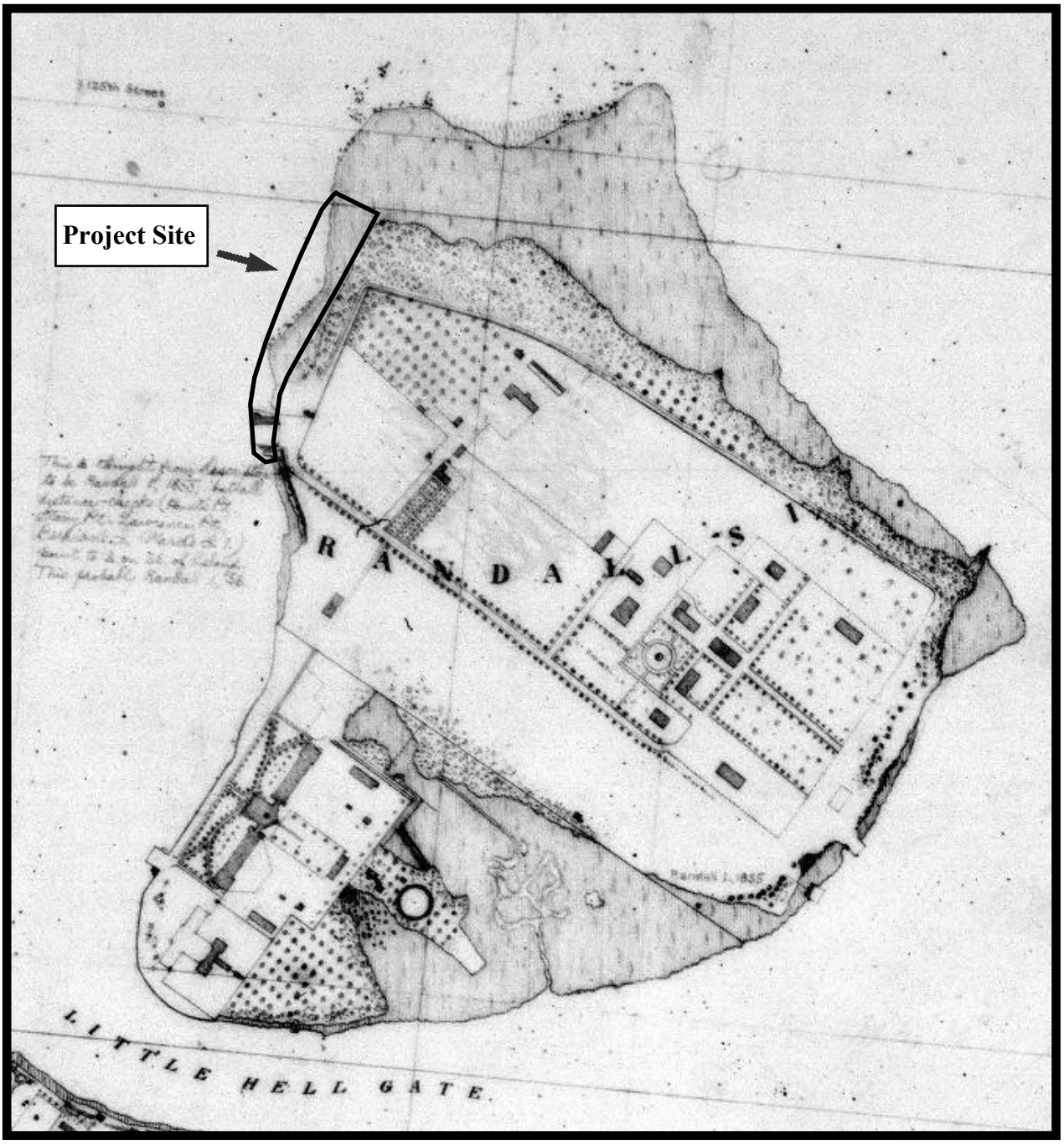


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**Figure 6: Project site on *New York Harbor, Including Ward's I., Randall's I., North and South Brother and Riker's Island, East River* (U.S.C.S. 1857).**

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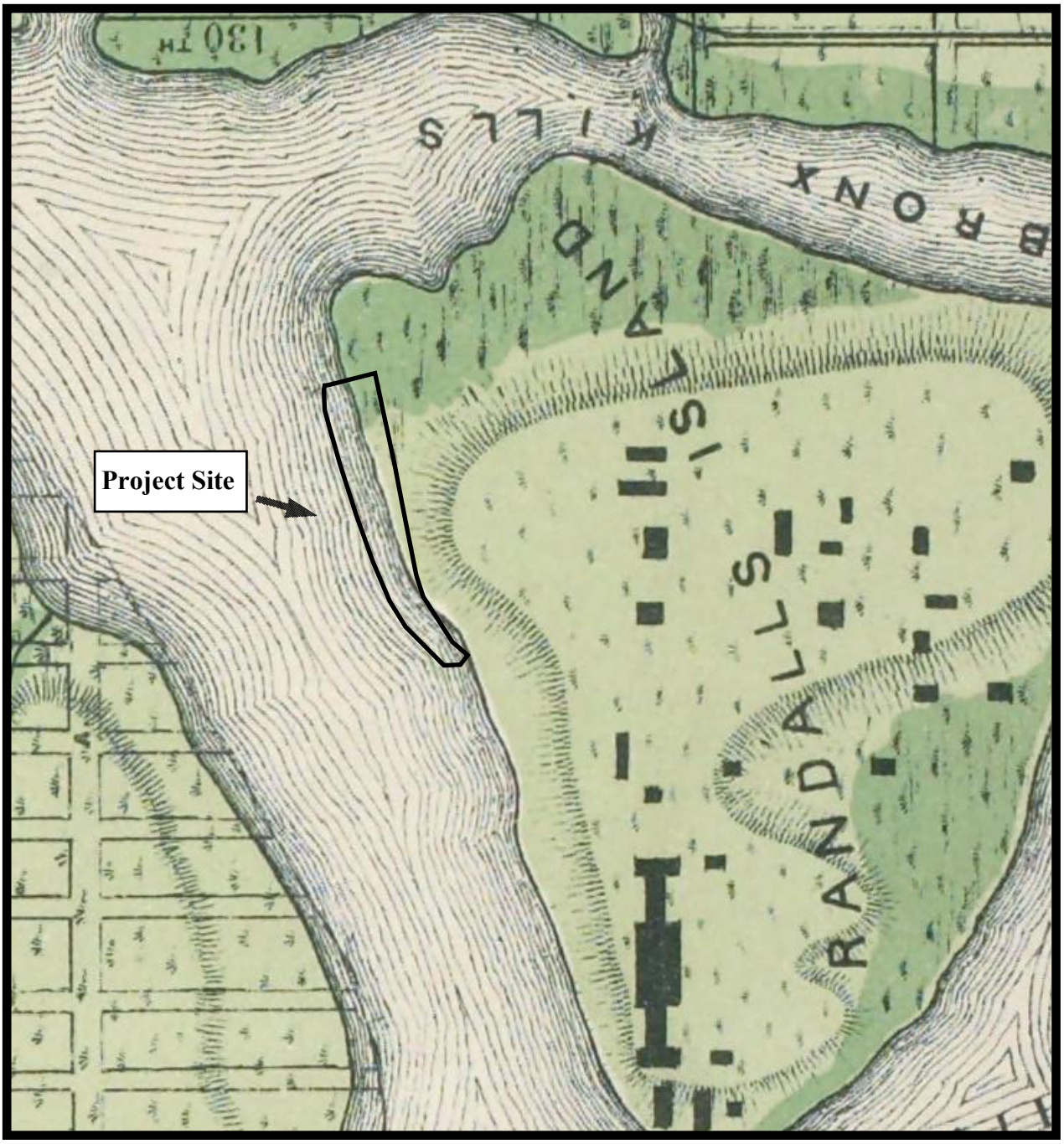


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**Figure 7: Project site on *Topographical Atlas of the City of New York including the Annexed Territory* (Viele 1874).**

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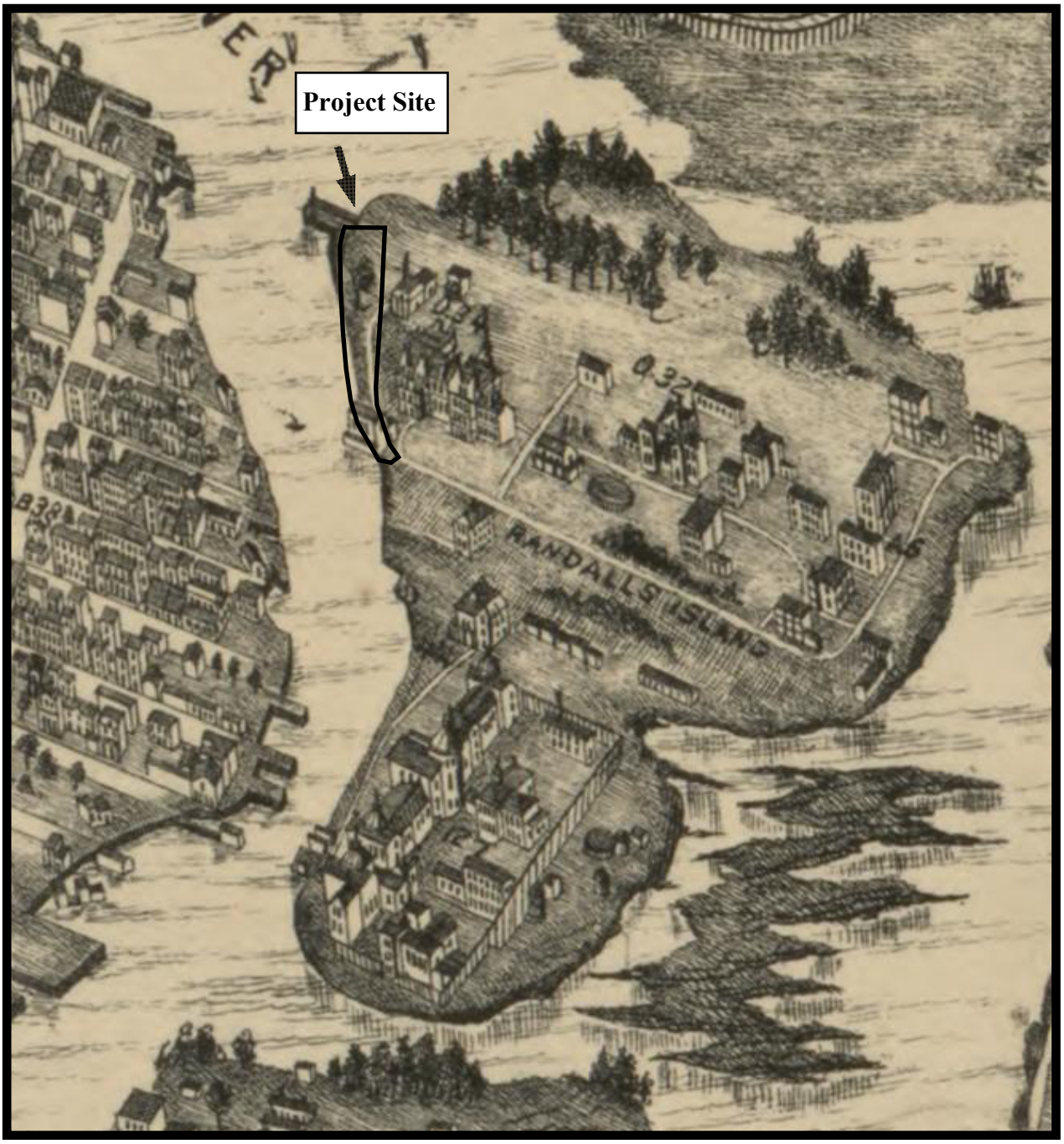


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**Figure 8: Project site on *The City of New York* (Taylor 1879).**

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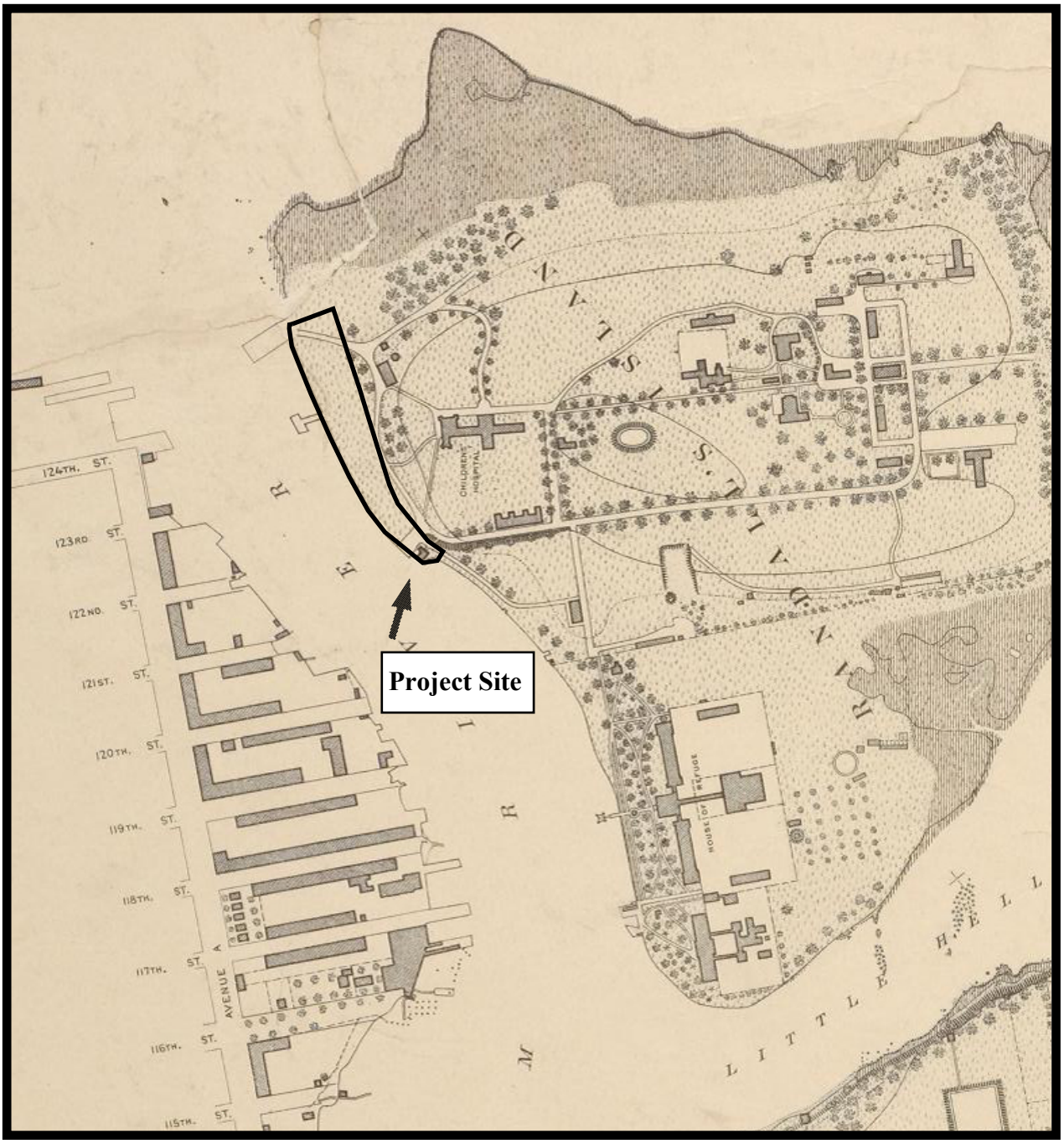


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**Figure 9: Project site on *Blackwell's, Ward's, and Randall's Islands...* (U.S.C.S. 1886).**

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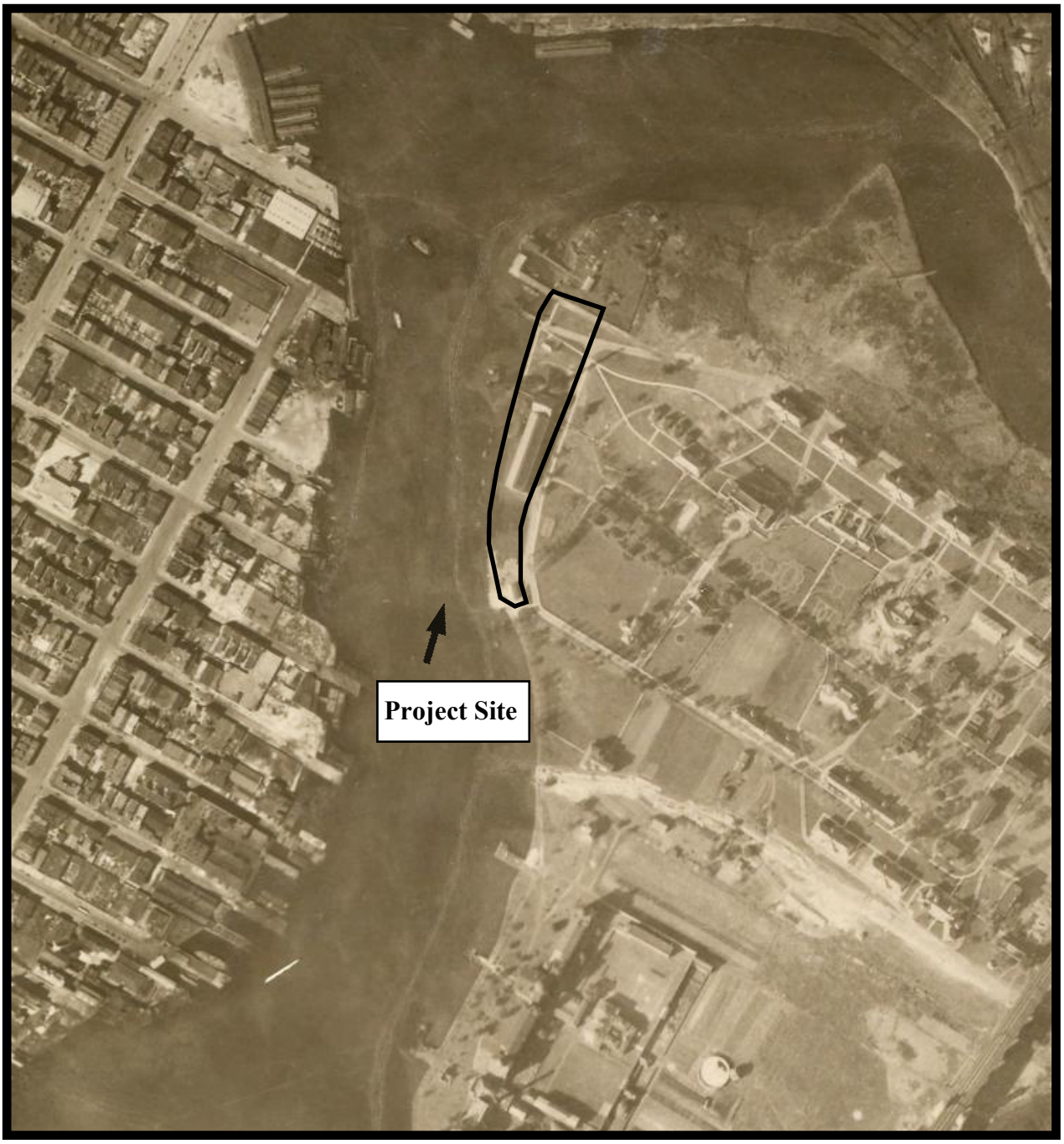


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**Figure 10: Project site on *Sectional Aerial Maps of the City of New York* (N.Y. Bureau of Engineering 1924).**

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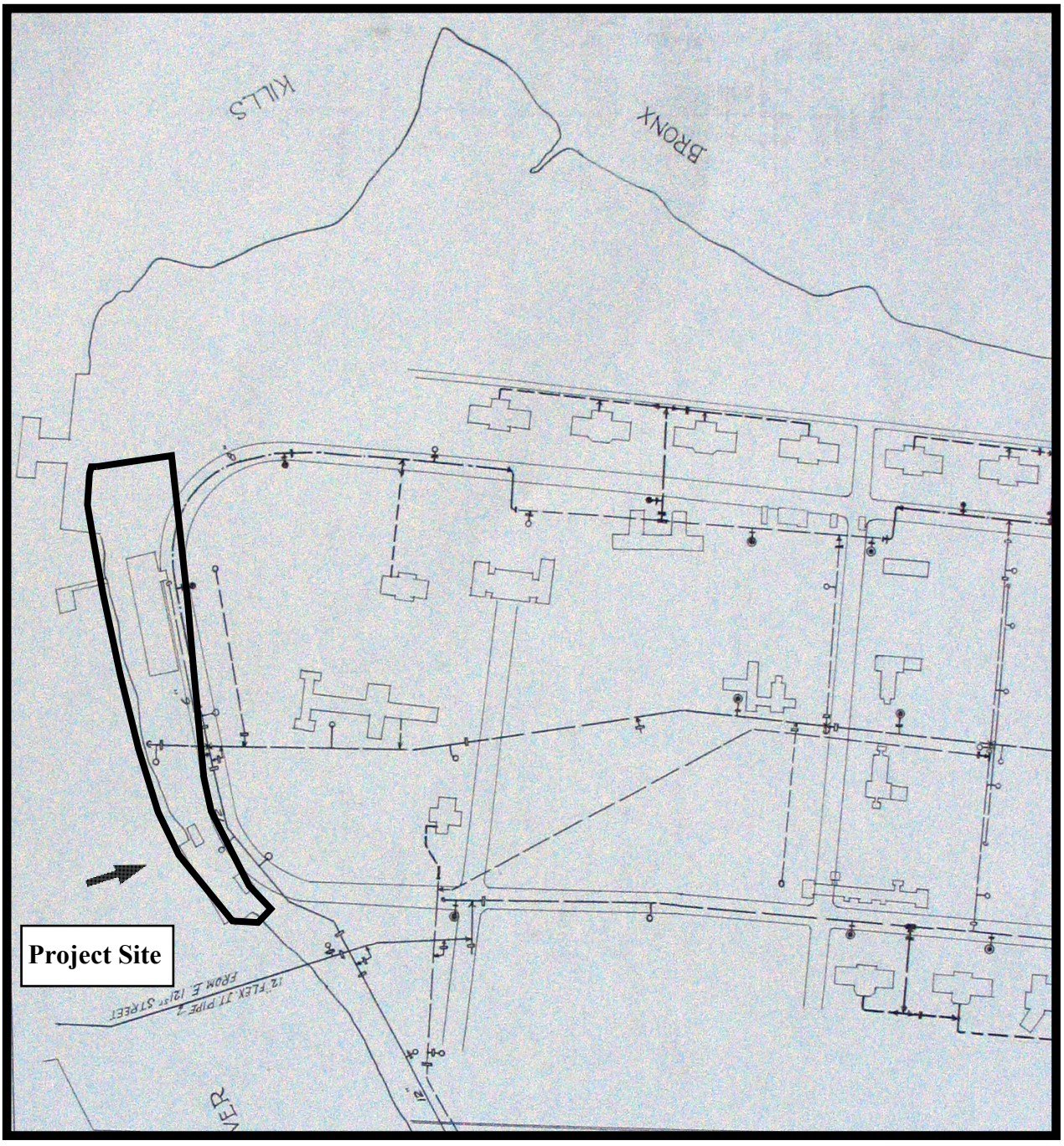


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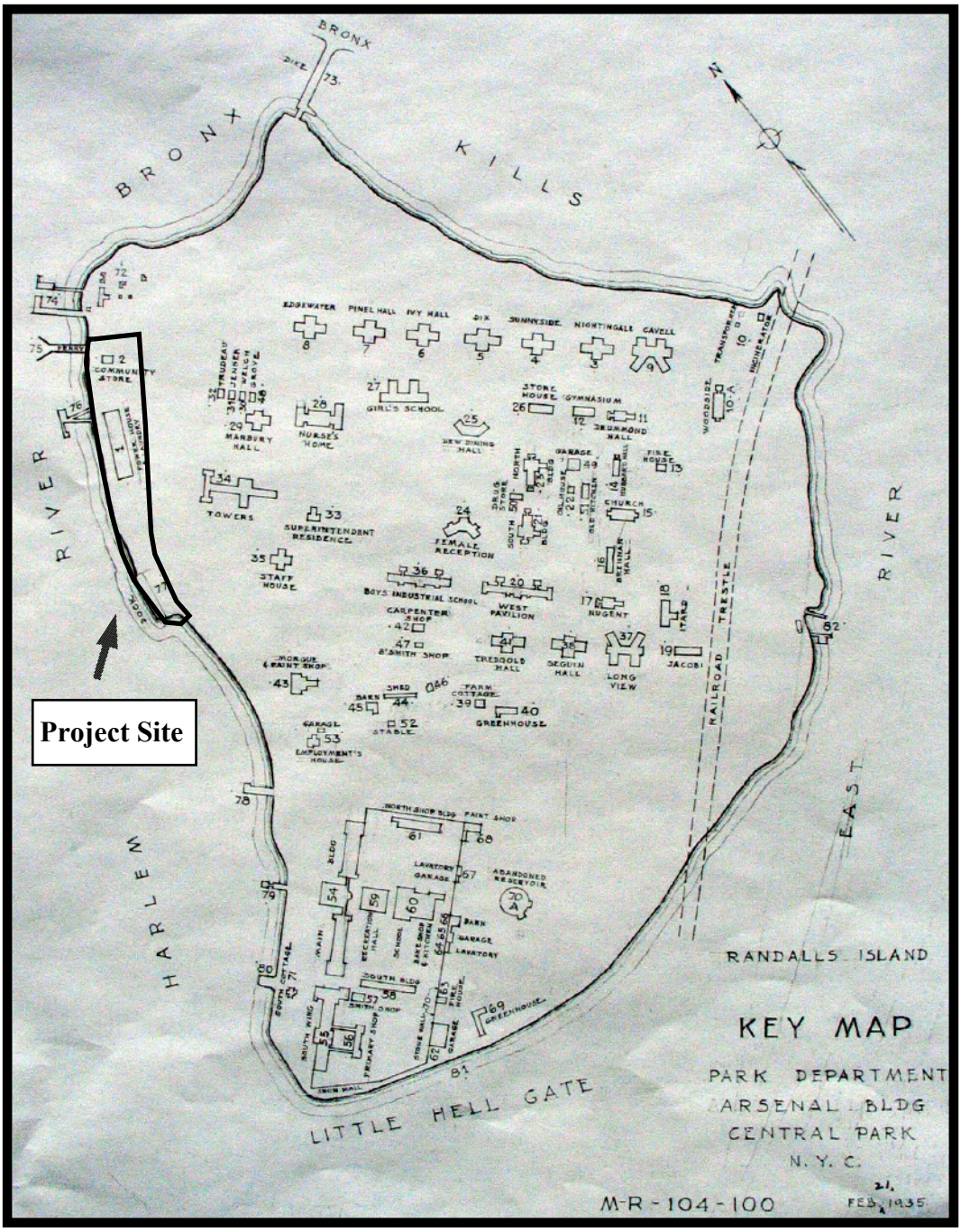
**Figure 11: Project site on *Randall's Island, Borough of Manhattan, New York City* (Department of Hospitals 1933).**

200 0 200 400 600 800 FEET

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**Randall's Island Living Shoreline Recreation Area**
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**Figure 12: Project site on *Randall's Island Key Map* (Park Department 1935).**

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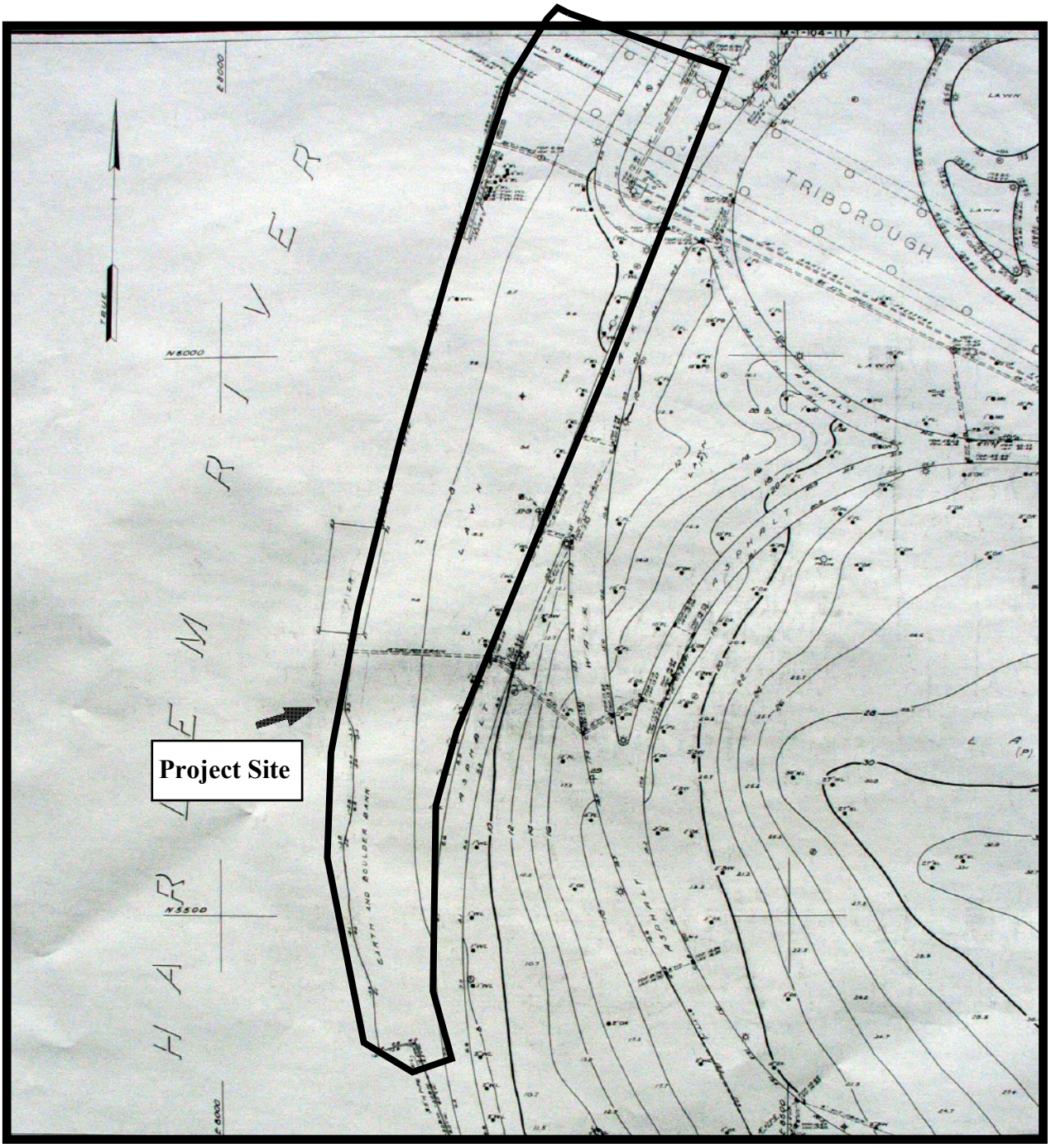


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**Randall's Island, New York County, New York**

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**Figure 13: Project site on *Topographical Map*, *Portion of Randall's Island, Boro of Manhattan* (Park Department 1939).**

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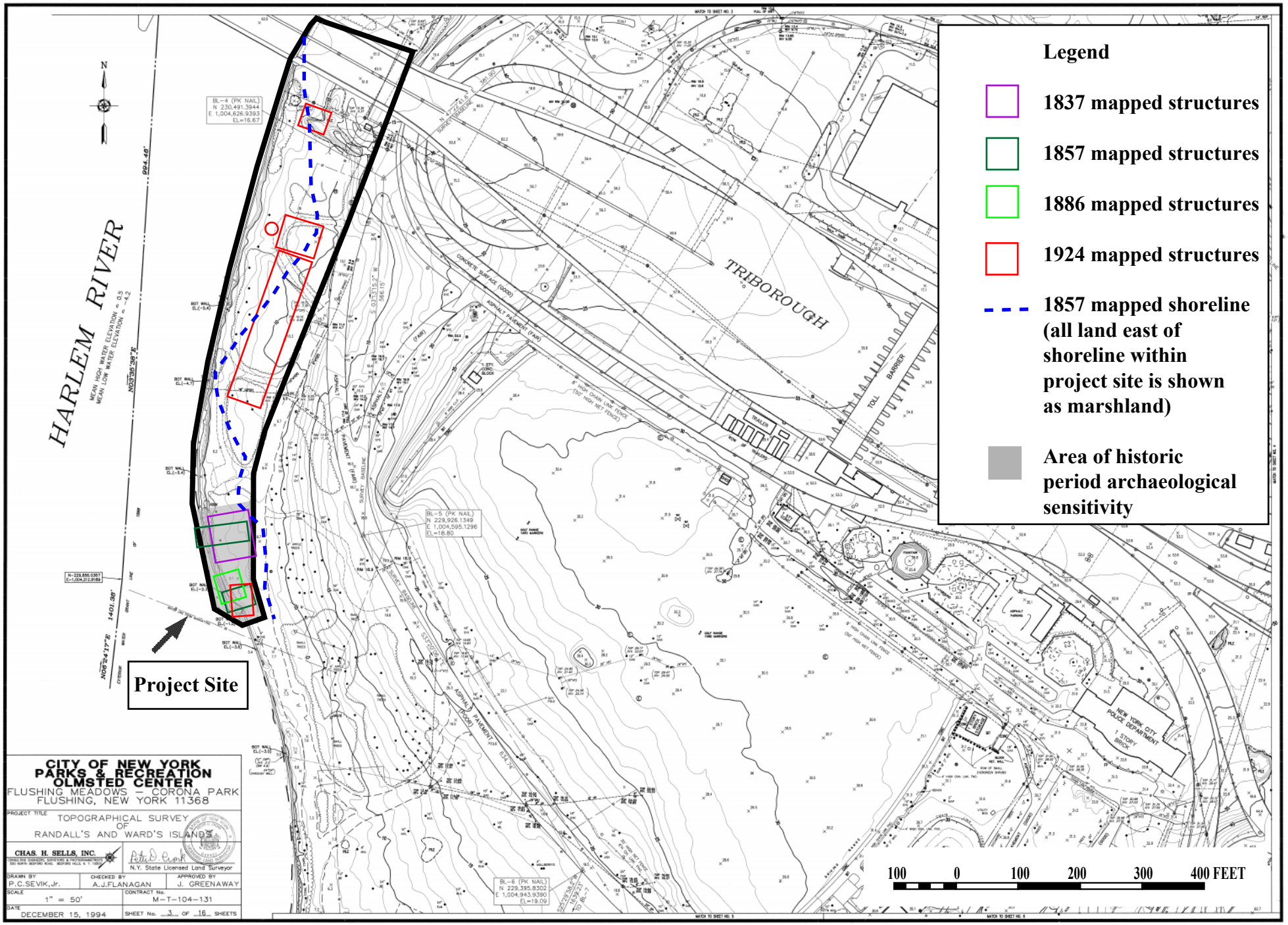



**Figure 14: Project site, former structure footprints, and area of archaeological sensitivity on *Topographical Survey of Randall's and Ward's Islands*, Sheet 3 (DPR 1994).**

Photograph 1: Southern end of project site as seen from the RFK Bridge. View looking southeast. Courtesy DPR.

Photograph 2: Northern end of project site as seen from the Harlem river. View looking northeast. Courtesy DPR.

Photograph 3: Project site showing asphalt path on east and waterfront on west. View looking northwest.

Photograph 4: Project site showing typical grass and tree covered area. View looking southwest.

Photograph 5: Project site showing typical asphalt and gravel covered area in background. View looking northwest.

Photograph 6: Project site showing typical debris and weeds covered area. View looking southwest.

Photograph 7: Project site showing storage trailers under the RFK Bridge in background. View looking northwest.

Photograph 8: Project site showing large rocks and boulders lining pathways. View looking southwest.

Photograph 9: Project site showing Rock Garden abutting property. View looking west.


Photograph 10: Project site showing typical rubble fill behind deteriorating seawall. View looking north.

Photograph 11: Project site showing concrete jersey barrier along breach of seawall. View looking southwest.

Photograph 12: Project site showing example of lighter colored capstones atop seawall. View looking northwest.

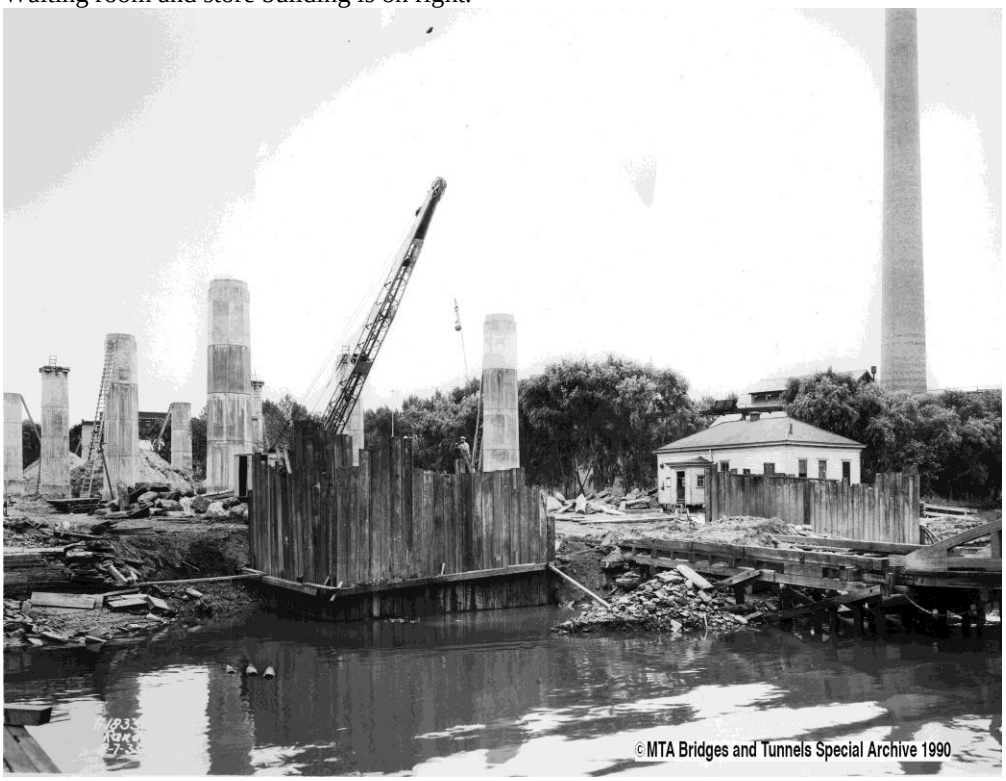
Photograph 13: Project site in background showing power house building on left and pilings on right. View looking southwest from foot of East 122nd Street on the Manhattan shoreline. 9-19-34. (Sperr 1934).

Photograph 14: Project site in background showing pilings. View looking southwest from foot of East 122nd Street on the Manhattan shoreline. 9-19-34. (Sperr 1934).

Photograph 15: "Randall's Is./Sea wall north of old dock, off northern end of "House of Refuge." View N. from point on northern side of old dock." Image 1111, contract 31-A, courtesy MTA Bridges and Tunnels Special Archive. 1-14-35. Project site is in left background, beyond pier.

Photograph 16: "Randall's Is./Road on westerly edge of island, between "House of Refuge" and old Hospital dock. View N." Image 1113, contract 31-A, courtesy MTA Bridges and Tunnels Special Archive. 1-14-35. Pilings for pier in left foreground is location of modern water taxi pier.

Photograph 17: "Randall's Is, general view of operations for pier footings. View east from top of Randall's Is. ferrybridge hoist." Image 1576, contract 31-A, courtesy MTA Bridges and Tunnels Special Archive. 6-13-35. Waiting room and store building is on right.



Photograph 18: "Camera on Police dock, Randall's Is. Looking S.E. at pier 16W to 9W." Image 1833, contract 31-A, courtesy MTA Bridges and Tunnels Special Archive. 8-7-35. Waiting room and store building is on right, with smoke stack for power house in background.

Photograph 19: "Randall's Is./Demolition item No. 21, (waiting room & store). View south from point 50 ft. north of N/W corner." Image 1872, contract 51, courtesy MTA Bridges and Tunnels Special Archive. 8-29-35. Smoke stack for power house is in background.

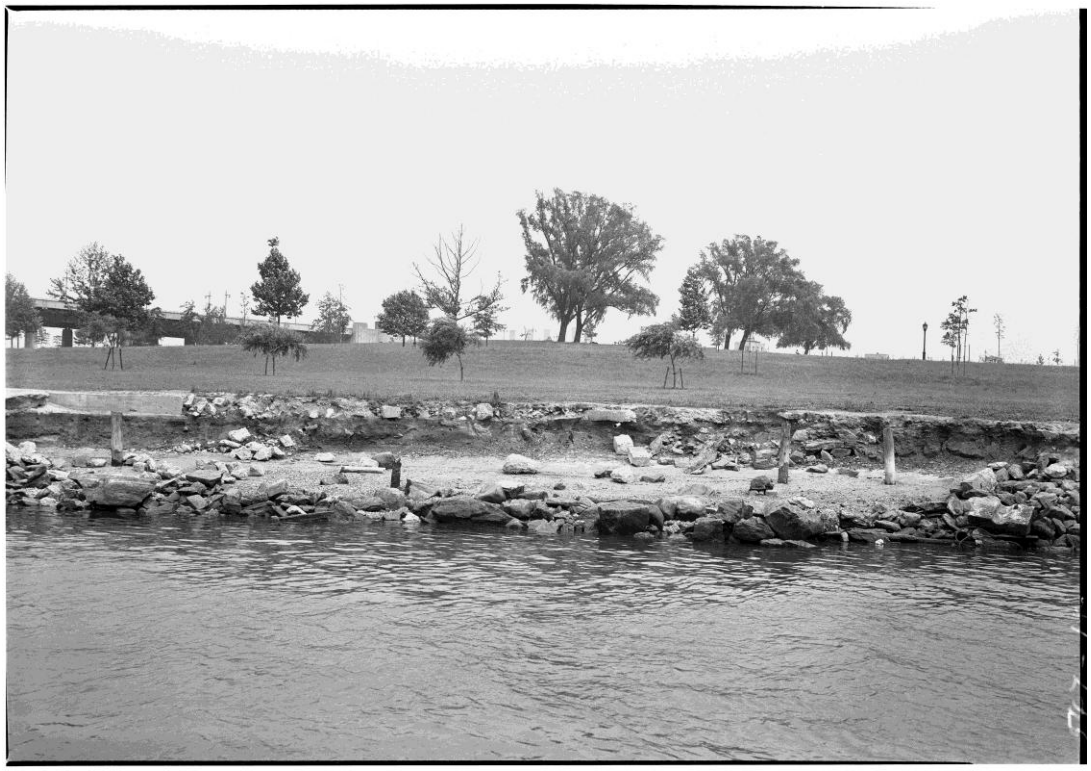
Photograph 20: "Randall's Is./Roadway steel in place from pier 16 eastward. View east from point on "Police Dock Landing." Image 2060, contract 31-A, courtesy MTA Bridges and Tunnels Special Archive. 11-13-35. Waiting room and store building and smoke stack for power house are visible on right.

Photograph 21: Project site showing power house with smoke stack and pier complexes (original image enlarged to show detail). View looking southeast from Triborough [RFK] Bridge. 8-3-36. (Sperr 1936).

Photograph 22: Project site showing detail of power house smoke stack and trestles from pier complex (original image enlarged to show detail). View looking southeast from Triborough [RFK] Bridge. 8-3-36. (Sperr 1936).

Photograph 23: Southern end of project site showing seawall. View looking northeast. 6-3-41. Courtesy DPR.

Photograph 24: Southern and central portion of project site showing seawall. View looking northeast. 6-3-41. Courtesy DPR.



Photograph 25: Central portion of project site showing seawall. View looking east. 6-3-41. Courtesy DPR.

Photograph 26: Central portion of project site showing seawall. View looking north. 6-3-41. Courtesy DPR.

Photograph 27: Northern end of project site showing seawall. View looking northeast. 6-3-41. Courtesy DPR.

APPENDIX A: SOIL BORINGS

2011 SOIL BORING PROGRAM
(Courtesy Sound Environmental Associates LLC)

NOTES:

1. SEE UTILITY NOTES ON DWG. E-100.
2. SEE DWG. E-600 SERIES FOR DUCT BANK AND MANHOLE DETAILS.
3. NOT USED.
4. CONTRACTOR TO VERIFY EXACT DUCT BANK ROUTING IN THE FIELD.
5. CONTRACTOR SHALL MAKE ALLOWANCE FOR HAND EXCAVATION IN THE VICINITY OF EXISTING UTILITIES.
6. EXTEND COMMUNICATIONS CONDUITS AND STUB UP TO 5'-0" AT ADJACENT COLUMNS AT PIER 16 CAP CONDUITS.
7. SEE DWG. E-301 - E-303 FOR MORE INFORMATION OF EXISTING DUCT BANK SYSTEM.

2 ADD #2

LEGEND:

1. NOT USED
2. SEE DETAIL 1 ON DWG. E-603.
3. SEE DETAIL 2 ON DWG. E-603.

Existing MH-9

~~EXISTING MANHOLE MH•9~~

MH-9C

Stub Out to column.

MH-9A

Existing Lighting Handhole above new Duct Bank C

MH 10C

MH 10A

MH 11C

MH 11A

A1 A2 A3 A4 A5 B1 D1 D2

FOR EXISTING WATER MAIN SEE CONTRACT TB-09A

MANHOLE MH•10

MANHOLE MH•11

COMM. MANHOLE MH•9C NOTE 6

EXISTING DUCT BANK TO BE ABANDONED (TYP.)

FDR 21

EXISTING FOOTING (TYP.)

BRIDGE VIADUCT OUTLINE (TYP.)

TRENCH EXCAVATION FOR NEW UTILITY (TYP.)

PROVIDE SILT FENCE ON EACH SIDE OF TRENCH EXCAVATION (TYP.)

EXISTING SITE LIGHTING (TYP.)

EXISTING ELECTRICAL HANDHOLE (TYP.)

G/R RAMP

R/O RAMP

RQ RAMP (ABOVE)

TRIBOROUGH BRIDGE VIADUCT (ABOVE)

MATCH LINE DWG. E-202

New Duct Bank

Existing Duct Bank

Soil Borings

20' 10' 0' 20' 40'
1" = 20'

| REV. | DESCRIPTION | DATE | APP'D. |
|---|---|---|---|
| 2 | CONFORMED DRAWINGS | 3/25/11 | M.A.M. |
| 1 | GENERAL MODIFICATIONS | 11/10 | |

"IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER/ARCHITECT AS APPLICABLE. THE ALTERING ENGINEER/ARCHITECT SHALL AFFIX HIS/HER SEAL AND THE NOTATION 'ALTERED BY' FOLLOWED BY HIS/HER SIGNATURE AND DATE OF ALTERATION."

DRAWN BY J. CAYETANO
DESIGNED BY S. WEGIEL
CHECKED BY M. McDONALD
SCALE: 1"=20'

STATE OF NEW YORK MICHAEL A. McDONALD 075764 LICENSED PROFESSIONAL ENGINEER

PARSONS

KEY PLAN

Triborough Bridge and Tunnel Authority

ROBERT F. KENNEDY BRIDGE
EXISTING UTILITY RELOCATION

DRAWING TITLE
UNDERGROUND DUCT BANK ROUTING - ELECTRICAL
SHEET 1 OF 7

PROJECT NO. RK-65D

CONTRACT NO. RK-65D
DRAWING NO. E-201
SHEET 10 OF 86
DATE DECEMBER 2009
REVISION NO. 2

c:\dw_working_xm\ptg#p0030103#dms44933#T201E009.dgn
4/7/2011
$$refn1$$
$$refn2$$
$$refn3$$
$$prf$$
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9:43:06 AM
p0030103
REV.5

## SOIL DESCRIPTION/CHARACTERISTICS

| Cell/Sample | Depth | VOC PPM | Description |
|---|---|---|---|
| Bore A-1 | 0-5 | 0 | RCA, bits of wood, medium brown sandy soil |
| Bore A-2 | 0-5 | 0 | RCA, grey, brown clay |
| Bore A-3 | 0-5 | 0 | Grey sand, light brown clay, bricks, RCA-Smelled of kerosene |
| Bore A-4 | 0-5 | 0 | Moist light brown clay, sandy soil with pebbles |
| Bore A-5 | 0-5 | 0 | Caramel brown sandy soil, grey sand with pebbles |
| | | | |
| Bore B-1 | 0-5 | 0 | Medium brown, grey sandy soil with RCA |
| Bore B-2 | 0-5 | 0 | Light brown sandy soil with grey patches w/small pebbles |
| Bore B-3 | 0-5 | 0 | Light brown moist soil with small pebbles |
| Bore B-4 | 0-5 | 0 | Light brown sandy soil with grey patches w/small pebbles |
| Bore B-5 | 0-5 | 0 | Light brown sandy soil with grey patches w/small pebbles |
| | | | |
| Bore C-1 | 0-5 | 0 | Light brown sandy soil with pebbles |
| Bore C-2 | 0-5 | 0 | Light brown and black sandy soil with pebbles |
| Bore C-3 | 0-5 | 0 | Black and dark brown sandy soil with pebbles |
| Bore C-4 | 0-5 | 0 | Black sandy soil, gray clay, light brown sand with pebbles |
| Bore C-5 | 0-5 | 0 | Black sandy soil, gray/brown clay. 1 ft of water at the bottom of the hole. |
| | | | |
| Bore D-1 | 0-5 | 0 | Dark brown sandy soil with bits of brick and pebbles |
| Bore D-2 | 0-5 | 0 | Dark grey/black sandy soil with pebbles |
| | | | |

NOTES:

1. SEE UTILITY NOTES ON DWG. E-100.
2. SEE DWG. E-600 SERIES FOR DUCT BANK AND MANHOLE DETAILS.
3. NOT USED.
4. CONTRACTOR TO VERIFY EXACT DUCT BANK ROUTING IN THE FIELD.
5. CONTRACTOR SHALL MAKE ALLOWANCE FOR HAND EXCAVATION IN THE VICINITY OF EXISTING UTILITIES.
6. EXTEND COMMUNICATIONS CONDUITS AND STUB UP TO 5'-0" AT ADJACENT COLUMNS AT PIER 16 CAP CONDUITS.
7. SEE DWG. E-301 - E-303 FOR MORE INFORMATION OF EXISTING DUCT BANK SYSTEM.

2 ADD #2

LEGEND:

1. NOT USED
2. SEE DETAIL 1 ON DWG. E-603.
3. SEE DETAIL 2 ON DWG. E-603.

2 ADD #2

Existing MH-9

EXISTING MANHOLE MH-9

FOR EXISTING WATER MAIN SEE CONTRACT TB-09A

MANHOLE MH-10

EXISTING DUCT BANK TO BE ABANDONED (TYP.)

FDR 21

COMM. MANHOLE MH-9C NOTE 6

MH-9C

Stub Out to column.

SLEEVE

MH-9A

AREAS WHERE RED BRICK FOUNDATION WAS FOUND

BRIDGE VIADUCT OUTLINE (TYP.)

EXISTING FOOTING (TYP.)

MANHOLE MH-11

MATCH LINE DWG. E-202

Existing Lighting Handhole above new Duct Bank C

TRENCH EXCAVATION FOR NEW UTILITY (TYP.)

PROVIDE SILT FENCE ON EACH SIDE OF TRENCH EXCAVATION (TYP.)

EXISTING SITE LIGHTING (TYP.)

MH 10C

MH 10A

EXISTING ELECTRICAL HANDHOLE (TYP.)

RQ RAMP (ABOVE)

ROAD

MH 11C

MH 11A

- New Duct Bank
- Existing Duct Bank
- Existing 8" Hydrant Water Main (New Duct Bank Under)

20' 10' 0' 20' 40'
1" = 20'

| REV. | DESCRIPTION | DATE | APP'D. |
|---|---|---|---|
| 2 | CONFORMED DRAWINGS | 3/25/11 | M.A.M. |
| 1 | GENERAL MODIFICATIONS | 11/10 | |

"IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER/ARCHITECT AS APPLICABLE. THE ALTERING ENGINEER/ARCHITECT SHALL AFFIX HIS/HER SEAL AND THE NOTATION 'ALTERED BY' FOLLOWED BY HIS/HER SIGNATURE AND DATE OF ALTERATION."

DRAWN BY J. CAYETANO
DESIGNED BY S. WEGIEL
CHECKED BY M. McDONALD
SCALE: 1"=20'

STATE OF NEW YORK — MICHAEL A. McDONALD — No. 075284 — LICENSED PROFESSIONAL ENGINEER

PARSONS

KEY PLAN

Triborough Bridge and Tunnel Authority

ROBERT F. KENNEDY BRIDGE
EXISTING UTILITY RELOCATION

DRAWING TITLE
UNDERGROUND DUCT BANK ROUTING - ELECTRICAL
SHEET 1 OF 7

PROJECT NO. RK-65D

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SHEET 10 OF 86
DATE DECEMBER 2009
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C:\#pw_working_xmhpt$\#p0030103\#dms44933\#T201E009.dgn
4/7/2011
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$$ref02$$
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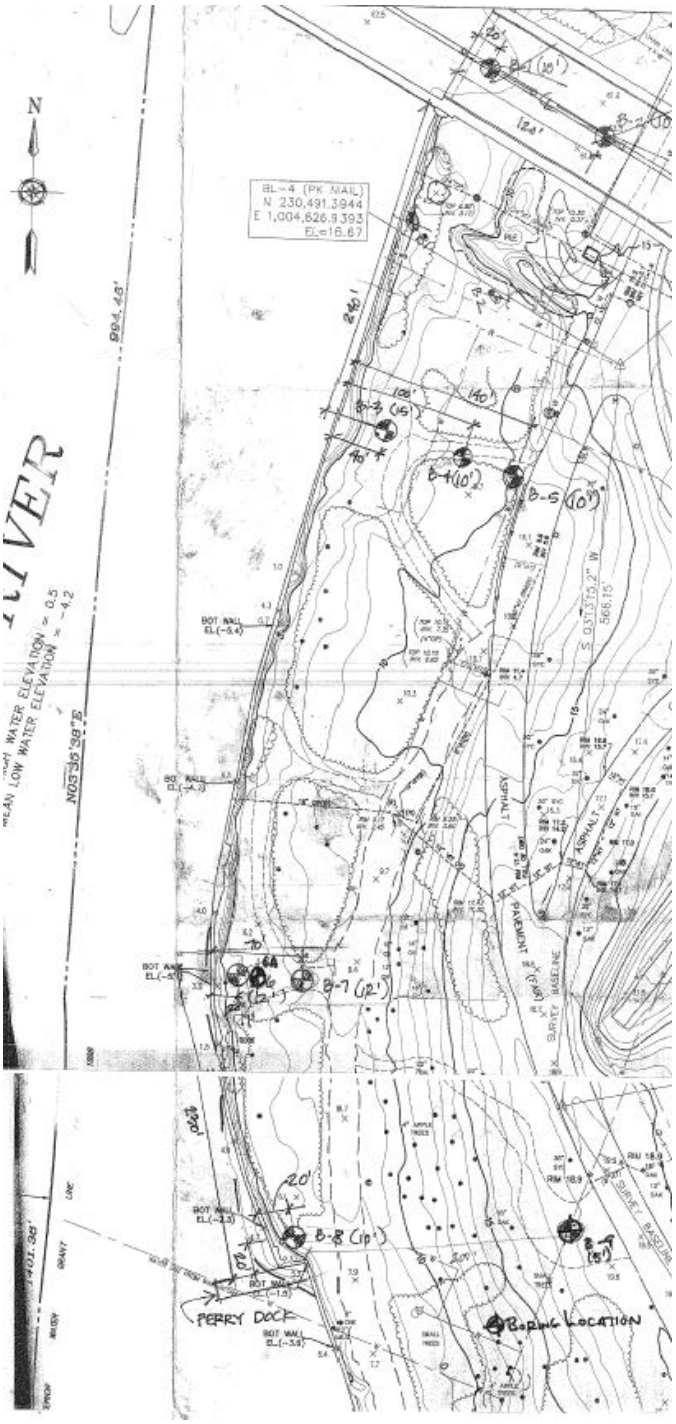
p0030103
REV.5

2012 SOIL BORING PROGRAM
(Courtesy Fenley and Nicol Environmental Inc.)




| | | | | | |
|---|---|---|---|---|---|
| **TITLE:** Boring Location Sketch | | | | | |
| **CLIENT:** Fenley & Nicol Environmental, Inc. | | | | | |
| **PROJECT:**<br>Proposed Randall's Island Shoreline Restoration<br>34 Bronx Shore Road<br>Borough of Manhattan, New York County, New York | **BY:**<br>PHH | **PROJ #:**<br>0652-11-12EC | **DATE:**<br>2/10/2012 | **SCALE:**<br>NTS | **FIG:**<br>1 |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-1**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 8.0 mse | **Date Started:** | 1/24/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 12 feet | **Date Completed:** | 1/24/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | 6.0 | 2.0 | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | 6.0 | 2.0 | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
| 0 - 2 | S1 | SS | 12 | -- | 10 17<br>10 12 | 27 | | Fill | Dark gray coarse to fine sand, little silt, little medium to fine gravel, moist (FILL) (NYC Class 7) | |
| 2 - 4 | S2 | SS | 18 | -- | 10 14<br>7 7 | 21 | | | As above (FILL) (NYC Class 7) | |
| 4 - 6 | S3 | SS | 18 | -- | 8 4<br>14 17 | 25 | 5 | | As above, some wood (FILL) (NYC Class 7) | |
| 6 - 8 | S4 | SS | 12 | -- | 14 11<br>3 3 | 14 | | | As above, wet (FILL) (NYC Class 7) | |
| 8 - 10 | S5 | SS | 10 | -- | 5 5<br>6 4 | 11 | 10 | | As above, very dark gray, wet (FILL) (NYC Class 7) | |
| 10 -12 | S6 | SS | 20 | -- | 4 3<br>4 4 | 7 | | | As above, (FILL) (NYC Class 7) | |
| | | | | | | | | Glacial | Black silt, some fine sand, wet, very soft (ML) (NYC (Class 6) | Qp=0 tsf |
| | | | | | | | | | Boring B-1 was terminated at 12 feet | |
| | | | | | | | 15 | | | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-2**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 9 mse | **Date Started:** | 1/24/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 12 feet | **Date Completed:** | 1/24/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | NE | NE | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | NE | NE | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
| 0 - 2 | S1 | SS | 20 | -- | 15 18<br>34 12 | 55 | | Fill | Grayish brown coarse to fine sand, little silt, little medium to fine gravel, moist (FILL) (NYC Class 7) | |
| 2 - 4 | S2 | SS | 12 | -- | 18 14<br>14 12 | 28 | | | As above, some brick (FILL) (NYC Class 7) | Grinding 2' to 3' |
| 4 - 6 | S3 | SS | 16 | -- | 10 12<br>15 11 | 27 | 5 | | As above (FILL) (NYC Class 7) | |
| 6 - 8 | S4 | SS | 18 | -- | 47 52<br>37 19 | 89 | | | Dark gray, coarse to fine sand, some medium to fine gravel, little silt, little brick, moist (FILL) (NYC Class 7) | |
| 8 - 10 | S5 | SS | 18 | -- | 11 14<br>14 18 | 28 | | | As above (FILL) (NYC Class 7) | |
| | | | | | | | 10 | | | |
| 10 -12 | S6 | SS | 18 | -- | 12 12<br>16 14 | 28 | | Glacial | Yellowish brown coarse to fine sand, some silt, little fine gravel, moist, medium dense (SM) (NYC Class 3b) | |
| | | | | | | | | | As above (SM) (NYC Class 3b) | |
| | | | | | | | | | Boring B-2 was terminated at 12 feet | |
| | | | | | | | 15 | | | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-3**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 7.5 mse | **Date Started:** | 1/23/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 12 feet | **Date Completed:** | 1/23/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | 8.0 | -0.5 | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | 8.0 | -0.5 | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
| 0 - 2 | S1 | SS | 16 | -- | 28 18<br>14 12 | 32 | | Fill | Gray coarse to fine sand, some coarse to fine gravel, some debris (brick, concrete), moist (FILL) (NYC Class 7) | |
| 2 - 4 | S2 | SS | 12 | -- | 13 15<br>23 31 | 38 | | | As above (FILL) (NYC Class 7) | |
| 4 - 4.7 | S3 | SS | 3 | -- | 30 50/2" | 50/2" | 5 | | As above (FILL) (NYC Class 7) | |
| | | | | | | | | | | |
| 6 - 8 | S4 | SS | 6 | -- | 14 6<br>9 10 | 15 | | | As above (FILL) (NYC Class 7) | |
| 8 - 10 | S5 | SS | 6 | -- | 4 6<br>3 4 | 9 | 10 | | Gray and light brown medium to fine sand, wet (FILL) (NYC Class 7) | |
| 10 -12 | S6 | SS | 22 | -- | 3 2<br>4 4 | 6 | | Glacial | Dark grayish black medium to fine sand, some silt, wet, loose (SM) (NYC Class 6) | |
| | | | | | | | 15 | | Boring B-3 was terminated at 12 feet | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-4**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 9.5 mse | **Date Started:** | 1/23/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 10 feet | **Date Completed:** | 1/23/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | NE | NE | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | NE | NE | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | | | | |
| 0 - 2 | S1 | SS | 6 | -- | 33 50/2" | 50/2" | | Fill | Gray coarse to fine sand, some brick, concrete, moist (FILL) (NYC Class 7) | |
| 2 - 2.2 | S2 | SS | 4 | -- | 100/3" | 100/7" | | | | |
| | | | | | | | | | Concrete debris (FILL) (NYC Class 7) | |
| 4 - 6 | S3 | SS | 6 | -- | 14 12<br>10 8 | 22 | 5 | | Gray medium to fine sand, some coarse to fine gravel, moist (FILL) (NYC Class 7) | |
| 6 - 8 | S4 | SS | 12 | -- | 9 8<br>7 4 | 15 | | Glacial | Light brown medium to fine sand, some medium to fine gravel, little silt, moist, medium, dense (SM) (NYC Class 3b) | |
| 8 - 10 | S5 | SS | 4 | -- | 12 10<br>6 3 | 16 | 10 | | As above (SM) (NYC Class 3b) | |
| | | | | | | | | | Boring B-4 was terminated at 10 feet | |
| | | | | | | | 15 | | | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-5**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 10 mse | **Date Started:** | 1/23/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 10 feet | **Date Completed:** | 1/23/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | NE | NE | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | NE | NE | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

Sample Information

| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | | N | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 - 2 | S1 | SS | 16 | -- | 31<br>18 | 23<br>19 | 41 | | Fill | Gray medium to fine sand, some silt, some coarse to fine gravel, some debris (concrete, brick), moist (FILL) (NYC Class 7) | |
| 2 - 4 | S2 | SS | 12 | -- | 21<br>18 | 20<br>19 | 38 | | | As above (FILL) (NYC Class 7) | |
| 4 - 6 | S3 | SS | NR | -- | 3<br>1 | 1<br>1 | 2 | 5 | | No recovery | |
| 6 - 8 | S4 | SS | 4 | -- | 2<br>3 | 2<br>1 | 5 | | | Gray medium to fine sand and silt, some brick, moist (FILL) (NYC Class 7) | |
| 8 - 10 | S5 | SS | 12 | -- | 9<br>5 | 5<br>9 | 14 | 10 | Glacial | Gray medium to fine sand, some silt, moist, medium dense (SM) (NYC Class 3b) | |
| | | | | | | | | | | Boring B-5 was terminated at 10 feet | |
| | | | | | | | | 15 | | | |
| | | | | | | | | 20 | | | |
| | | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-6**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 6 mse | **Date Started:** | 1/23/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 7.5 feet | **Date Completed:** | 1/23/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | NE | NE | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | NE | NE | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
| 0 - 2 | S1 | SS | 20 | -- | 6 29 / 40 32 | 69 | | Fill | Gray coarse to fine sand, little silt, little debris (brick, concrete), moist (FILL) (NYC Class 7) | |
| 2 - 4 | S2 | SS | 12 | -- | 8 10 / 12 15 | 22 | | | Light brown medium to fine sand and brick, moist (FILL) (NYC Class 7) | |
| 4 - 6 | S3 | SS | 16 | -- | 28 10 / 11 12 | 21 | 5 | | As above (FILL) (NYC Class 7) | |
| 6 - 6.3 | S4 | SS | 6 | -- | 50/3" | 14 | | | As above (FILL) (NYC Class 7) | |
| | | | | | | | 10 | | Boring B-6 was terminated at 7.5 feet due to auger refusal | Refusal on apparent oversized debris |
| | | | | | | | 15 | | | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-6A**



| | | | |
|---|---|---|---|
| **Project:** | Randall's Island Northwest Shoreline Restoration | **Proj. No.:** | 0652-12-012EC |
| **Location:** | Below the RFK Triboro Bridge Manhattan Span | **Client:** | Fenley & Nicol Environmental Inc. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 6.5 mse | **Date Started:** | 1/23/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** / **El. (mse)** |
| **Termination Depth:** | 12 feet | **Date Completed:** | 1/23/2012 | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | NE | NE | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | NE | NE | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A |

| Sample Information | | | | | | | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | | | | |
| | | | | | | | 5 | Fill | Gray coarse to fine sand and brick (FILL) (NYC Class 7) | Drilled through fill to 8' |
| 8 - 10 | S1 | SS | 0 | -- | 50/3" | 50/3" | 10 | Weathered Rock | No recovery | Grinding 8' to 12' |
| 10 -12 | S2 | SS | 1 | -- | 50/2" | 50/2" | | | Dark gray coarse to medium gravel size weathered rock fragments, moist, (GC) (NYC Class 1d) | |
| | | | | | | | 15 | | Boring B-6A was terminated at 12 feet | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-7**

Page 1 of

| | | | |
|---|---|---|---|
| **Project:** | Randall's Island Northwest Shoreline Restoration | **Proj. No.:** | 0652-12-012EC |
| **Location:** | Below the RFK Triboro Bridge Manhattan Span | **Client:** | Fenley & Nicol Environmental Inc. |
| **Surface Elevation:** | 8 mse | **Date Started:** | 1/24/2012 |
| **Termination Depth:** | 14 feet | **Date Completed:** | 1/24/2012 |
| | | **Logged by:** | S. Everest |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT |

| Ground Water Data | Depth (ft) | El. (mse) | Additional Ground Water Data | Depth (ft) | El. (mse) |
|---|---|---|---|---|---|
| **While Drilling:** | 12.0 | -4.0 | | | |
| **At Completion:** | 12.0 | -4.0 | | | |
| | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | | | | |
| | | | | | | | | Fill | Gray coarse to fine sand and coarse to fine gravel, concrete, moist (FILL) ( NYC Class 7) | |
| 1 - 3 | S1 | SS | 18 | -- | 10, 19, 32, 15 | 51 | | | Grading to dark gray at 2.5 feet (FILL) (NYC Class 7) | |
| 3 - 5 | S2 | SS | 4 | -- | 24, 50/1", | 50/1" | 5 | | As above (FILL) (NYC Class 7) | |
| 5 - 7 | S3 | SS | 18 | -- | 32, 25, 18, 26 | 43 | | | As above (FILL) (NYC Class 7) | |
| 7 - 9 | S4 | SS | 1 | -- | 8, 4, 11, 13 | 22 | | | Dark greenish gray medium to fine sand, some silt, little medium to fine gravel, moist (FILL) (Class 7) | Grinding 7' to 12' |
| 9 - 11 | S5 | SS | 1 | -- | 14, 16, 16, 14 | 32 | 10 | | As above (FILL) | |
| | | | | | | | | | | |
| 12 - 14 | S6 | SS | 20 | -- | 5, 4, 3, 3 | 7 | | | As above (FILL) (NYC Class 7) | |
| | | | | | | | | Glacial | Brownish gray medium to fine sand, some silt, little fibrous peat, wet, loose (SM) (NYC Class 6) | |
| | | | | | | | 15 | | Boring B-7 was terminated at 14 feet | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-8**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 7 mse | **Date Started:** | 1/24/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 1 foot | **Date Completed:** | 1/24/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | NE | NE | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | NE | NE | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | | | | |
| 0 - 2 | S1 | SS | 12 | -- | 2 2<br>50/0" | 52/6" | | Topsoil | 2" topsoil | |
| | | | | | | | | | Boring B-8 was terminated at one foot due to refusal | Refusal on apparent cobble/boulder |
| | | | | | | | 5 | | | |
| | | | | | | | 10 | | | |
| | | | | | | | 15 | | | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |

DYNAMIC EARTH

# BORING LOG

**Boring No.: B-9**



**Project:** Randall's Island Northwest Shoreline Restoration **Proj. No.:** 0652-12-012EC

**Location:** Below the RFK Triboro Bridge Manhattan Span **Client:** Fenley & Nicol Environmental Inc.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | 18.5 mse | **Date Started:** | 1/24/2012 | **Ground Water Data** | **Depth (ft)** | **El. (mse)** | **Additional Ground Water Data** | **Depth (ft)** | **El. (mse)** |
| **Termination Depth:** | 10 feet | **Date Completed:** | 1/24/2012 | | | | | | |
| | | **Logged by:** | S. Everest | **While Drilling:** | NE | NE | | | |
| **Drill/Test Method:** | HSA/SPT | **Contractor:** | Fenley & Nicol | **At Completion:** | NE | NE | | | |
| **Hammer Type:** | Safety/Cathead | **Rig Type:** | Cantera 450CT | | | | **ESHGW** | N/A | |

| Sample Information | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (Feet) | Number | Type | Rec (in) | RQD % | Blows per 6" or drill time (min/ft) | N | Depth (ft) | Strata | DESCRIPTION OF MATERIALS (Classification) | Remarks |
| 0 - 2 | S1 | SS | 18 | -- | 2 5 / 9 10 | 14 | | Topsoil | 8" topsoil | |
| | | | | | | | | Glacial | Dark yellowish brown medium to fine sand, some silt, moist, medium dense (SM) (NYC Class 3b) | |
| 2 - 4 | S2 | SS | 18 | -- | 7 8 / 6 5 | 14 | | | As above (SM) (NYC Class 3b) | |
| 4 - 6 | S3 | SS | 12 | -- | 6 5 / 5 5 | 10 | 5 | | As above, little fine gravel (SM) (NYC Class 3b) | |
| 6 - 8 | S4 | SS | 4 | -- | 5 6 / 6 4 | 12 | | | As above (SM) (NYC Class 3b) | |
| 8 - 10 | S5 | SS | 20 | -- | 4 6 / 6 5 | 12 | 10 | | As above (SM) (NYC Class 3b) | |
| | | | | | | | | | Boring B-9 was terminated at 10 feet | |
| | | | | | | | 15 | | | |
| | | | | | | | 20 | | | |
| | | | | | | | 25 | | | |