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Phase IA Documentary Study and Site History
Red Hook Water Pollution Control Plant System Upgrade
Brooklyn, Kings County, New York City, New York

NYPA 2006

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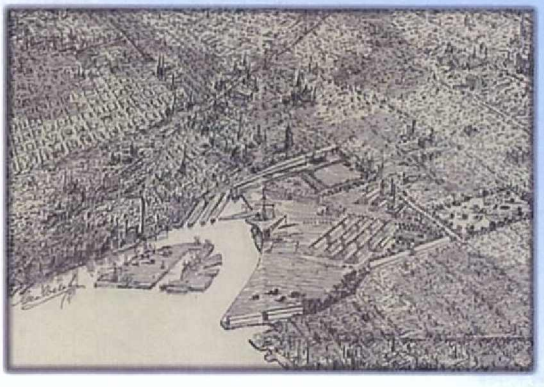

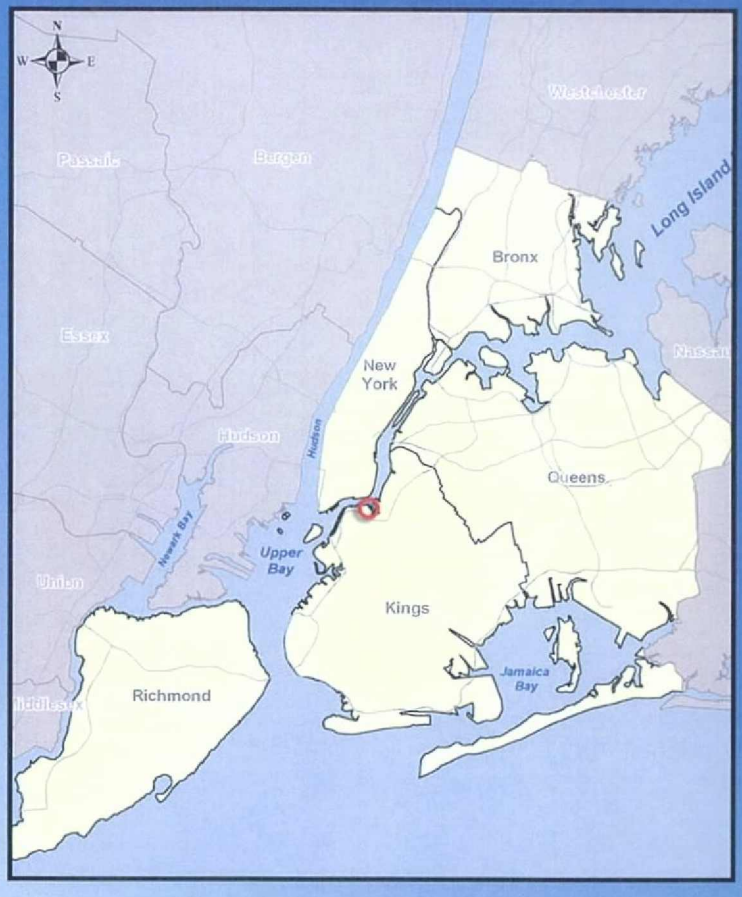

Submitted to:

The City of New York
Landmarks Preservation Commission
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September 2006

New York Power Authority

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INTRODUCTION

Pursuant to the New York State (State) Historic Preservation Act (NYSHPA), the New York Power Authority (Authority) is required to consider the potential impact of undertakings that may have adverse effects on historic properties listed in or eligible for inclusion on the State or National Registers of Historic Places. Additionally, in order to comply with the New York City Landmarks Law (Landmarks Law), the Authority's client, the New York City Department of Environmental Protection (NYCDEP), must consider the possible effects of its undertakings on properties and districts designated as New York City Historic Landmarks or Historic Districts.

In a letter dated May 15, 2006, the City of New York Landmarks Preservation Commission (LPC) requested that the Authority prepare a Phase IA Archaeological Documentary Study and Site History for the Red Hook Water Pollution Control Plant (WPCP or Plant) System Upgrade (the Project), located at 63 Flushing Avenue, Unit 101, in the Borough of Brooklyn, Kings County, New York City, New York (Map 1 and Map 2). The following report presents the results of this research. The Principal Investigator for this documentary study was Robert Quiggle, MA, the Authority's Cultural Resource Specialist (see Appendix B for the Principal Investigator's résumé and qualifications).

PROJECT INFORMATION

The Authority proposes to fund electric service upgrades at the Red Hook WPCP. The substation currently in operation at the site provides electricity and emergency power generation for the WPCP, a large wastewater treatment facility on the East River operated by the NYCDEP, the Lead Agency for the Project (Map 2). The substation is situated within the Brooklyn Navy Yard (Navy Yard or Yard) approximately 40 ft (12 m) east of the intersection of Little Street and Evans Street in the Borough of Brooklyn (Map 3). The Authority proposes to replace unreliable turbine generators at the facility with diesel engine-driven generators and to upgrade the distribution facilities at the substation (Figure 1). The proposed undertaking entails the construction of a new, one-story, 550 sq. ft. (0.01 acre) structure to house new batteries required for substation operation. The switchgear enclosures at the substation will also be consolidated and replaced in order to make room for the new equipment, and an additional 50 foot (15 m) lightning mast is to be installed (Figure 1). Additionally, a 63 foot (19 m) exhaust stack with an 18 inch (46 cm) diameter is to be installed at the northeast end of the substation in order to meet air quality regulation requirements. The surface components of the Project are designed to fit within the footprint of the current substation located at the western edge of the WPCP facility. Two access manholes and additional ductbanks will be installed in the roadway immediately east of the substation.

Ground disturbing-activities associated with the Project will be limited to the footprint of the current substation and adjacent sections of First Avenue roadway where ductbanks will be installed. In total, the Area of Potential Effect (APE) is approximately 0.81 acres (0.33 ha) (Map 3).

DOCUMENTARY RESEARCH

Introduction

The Project is located within the boundaries of the former New York Naval Shipyard (now known as the Brooklyn Navy Yard), a National Register of Historic Places (NRHP)-eligible property situated on Wallabout Bay along the East River in the Borough of Brooklyn. The Navy Yard has served variously as a shipyard, hospital, supply depot, and staging area from the beginning of the American Revolution until 1966 when the facility was closed. The Navy Yard was purchased by the City of New York in 1967, and currently operates as an industrial park (Map 4).

Background research in the Project area primarily consisted of an examination of soils, bedrock, and topography; a review of previous archaeological investigations within the vicinity of the Project; an analysis of soil borings taken in and adjacent to the substation; and a historical map review. Because of the

relationship between the Project area and the Navy Yard, documentary research for this project focused on the site history of the Project APE and the surrounding Navy Yard facilities. This section begins with a discussion of the physiographic context and proceeds through a brief discussion of historical development within the APE and the Navy Yard complex.

Physiographic Setting

The Project is situated within the Coastal Plain physiographic province, a lowland area that includes all of Long Island (New York City Soil Survey [NYCSS] 2005). Gneiss, schist, and marble form the bedrock underlying Brooklyn, and Cretaceous age coastal plain sediments overlie these crystalline basement rocks (NYCSS 2005:5). Glacial sediments deposited during the Pleistocene once formed the parent material for soil development in the Project area, but the deep deposits of anthropogenic fill that overlie glacial sediments now form the principle parent material.

Laguardia and Ebbets soils are the only two types of soils present within the Project area. Formed in nearly level to gently sloping areas (0–8 percent slopes) with over 40 inches (102 cm) or more of anthropogenic urban fill deposited over swamps or tidal marshes, these well-drained soils are characterized as loamy silts or loamy sands with inclusions of construction debris (NYCSS 2005). The NYCSS notes that 50 to 80 percent of the ground surface in areas with Laguardia or Ebbets soils is covered with "impervious pavement and buildings" (NYCSS 2005:16).

Precontact Context

Much of the land that is now the Brooklyn Navy Yard was once either submerged by Wallabout Bay or was part of an expanse of swamps, wetlands, and tidal flats (Geismar and Oberon 1993:11). The subsistence practices of Native American groups in the vicinity of Wallabout Bay centered on the exploitation of the fish, shellfish, and game that were naturally abundant in the tidal flats and marshes (Presa 1997; Ritchie 1965). While these wetland areas were utilized for resource procurement activities, more permanent settlements were located at higher natural elevations, such as along the western edge of the bay, overlooking the Project area (Presa 1997).

During the Late Woodland Period (A.D. 1000–1600), the Canarsie (also Canarsee) Indians occupied several settlements along the western edge of Wallabout Bay, including a historically-documented village in the present-day Vinegar Hill neighborhood of Brooklyn, directly east of the Project area (Grumet 1995; Presa 1997). The Canarsie, like other indigenous populations living along the New York Harbor, western Long Island, and the lower Hudson River, spoke a variant of the Munsee dialect of the Delaware language and lived in seasonal encampments that made use of locally available resources (Grumet 1995:218; Ritchie 1965).

Historic Context and Map Review

Early Historic Period

While the earliest known record of contact between Native Americans and Europeans in the Hudson River region dates from the early seventeenth century, the presence of European trade goods at Native American archaeological sites throughout the Middle-Atlantic prior to 1600 indicates that trade between European coastal fishermen and other intermediaries was ongoing prior to the arrival Dutch settlers in the early seventeenth century (Grumet 1995; Presa 1997). By the time the Dutch arrived, the Canarsie and other indigenous groups were already wracked by epidemic diseases brought from Europe and internecine hostilities fostered by competition for access to trade goods which would continue throughout the seventeenth century (Grumet 1995; Presa 1997). Facing increasing pressure from Dutch colonists and their Indian allies, the Canarsie eventually sold their lands, including a tract near Wallabout Bay, to Joris Jansen Rapalje in 1637 and moved westward (Presa 1997:3). By 1645, the location of the present-day Navy Yard (encompassing the Project) became part of the Dutch colonial Town of Breucklelen, which came under British control in 1674 (*Brooklyn Daily Eagle* [BDE] 1896; Presa 1997:3–4).

In 1710, Rem Remsen, a grandson of Rapalje, constructed a long tidal dam along the western edge of Wallabout Bay to power a gristmill located on the high ground known as Martyn's Hook (Geismar and Oberon 1993:17). The 1776 Ratzer map of Brooklyn (prepared from surveys completed in 1766 and 1767) shows the location of the mill dam and a structure identified as Remsen's Mill. The Project APE is located within the tidal regions of the mill pond (Map 5).

The American Revolution

On 22 August 1776, the British landed a large force on Long Island in an attempt to wrest control of the area from the Americans (Faden 1776). After two days of brutal fighting across Brooklyn, the Americans, outnumbered and lacking the heavy artillery of the British, retreated to General Putnam's camp located on the western edge of Wallabout Bay (Faden 1776). William Faden's 1776 map and description of the Battle of Long Island (Map 6) shows an area designated as "Gen. Putnam's Camp" in the present-day Vinegar Hill neighborhood of Brooklyn on the high ground immediately west of the APE (Faden 1776). During the night of 29 August 1776, the Americans, under the command of General Washington, retreated from Wallabout Bay to Manhattan Island in a successful attempt to spare the fledgling American Army from defeat at the hands of the British (Faden 1776).

The British held control of Wallabout Bay throughout the Revolution (Presa 1997). Immediately following the Battle of Long Island, the British began confining American prisoners of war in ships anchored in the vicinity of Remsen's Mill along the western edge of Wallabout Bay near the Project APE (BDE 1891; BDE 1888). An estimated 11,500 Americans died from disease and malnutrition aboard the prison ships during the course of the Revolution, and the corpses were unceremoniously lowered over the side of the ships and buried in shallow, unmarked graves in the tidal zone of Wallabout Bay (BDE 1894). Erosion caused by daily tidal fluctuations and wave action meant that the thousands of corpses had to be constantly re-interred by Americans living in the vicinity of the bay (Geismar and Oberon 1993; Waters 1992).

Even after the war, human remains continued to erode out of the tidal flats, and the disposition of what became known as the "Prison Ship Martyrs" was a subject of concern in the community (BDE 1888; Geismar and Oberon 1993). Many of the prisoners had been interred at the Remsen property, and the bones were subsequently disinterred and collected by John Jackson who purchased the land following the war (Presa 1997; West 1895). In 1803, Jackson eventually donated a portion of his land to the influential Tammany Hall for the construction of a tomb and memorial (West 1895). Construction of the tomb was halted, however, until 1808 when, after public appeal, the United States Congress finally released the funds necessary for the construction of a tomb near the present-day intersection of Front Street and Hudson Avenue along the western edge of the Navy Yard, approximately 400 feet (122 m) southwest of the Project (West 1895). The "Martyrs' Tomb" as it became known, eventually fell into disrepair and, after a temporary restoration by Benjamin Romaine in 1839, the monument continued to languish on the border of the Navy Yard. In 1908, the remains were removed to a more permanent site at Fort Greene Park where a large monument was constructed which still stands today (Fort Greene Park Conservancy 2006; Geismar and Oberon 1993; West 1895).

Emergence of the Navy Yard

After the American Revolution, a nascent shipbuilding industry developed adjacent to Wallabout Bay. John Jackson, an experienced shipbuilder who had purchased the Remsen estate which included the present-day Navy Yard and the APE, established his own small shipyard along the western edge of the Wallabout (Presa 1997). In 1801, the United States government purchased forty acres of land along the bay from Jackson, with the intention of developing a navy yard for ship construction and repair (Presa 1997). A rope-making industry (essential to ship construction throughout the 19th century) that had developed in the adjacent Vinegar Hill neighborhood and the protected location of the Jackson's existing shipyard made the Wallabout Bay site ideal for one of the Navy's earliest permanent shipyards (Presa 1997). The influx of

Irish immigrants into the area during the early 19th century provided a steady workforce, and the New York Naval Shipyard and surrounding Vinegar Hill neighborhood grew rapidly (Presa 1997).

Development of the Navy Yard generally progressed from west to east as the tidal marshlands bordering Wallabout Bay were gradually filled or drained. It is likely that the concentration of laborers in the Vinegar Hill area and the presence of the former mill dam along the western portion of the bay made this area most suitable for initial development by the Navy. As Atwood's 1818 map of the City of New York demonstrates, the early boundaries of the Navy Yard were roughly formed by the high ground of Vinegar Hill on the west, and the former mill dam on the east (Map 7). Given this course of development, the Project area is situated within the oldest section of the Navy Yard. The large amounts of fill underlying the Project (see below) further support this conclusion.

One of the earliest structures built at the Navy Yard was Quarters A (also known as the Matthew C. Perry House or the Commander's House). Built between 1805 and 1806, Quarters A served as the residence of the ranking officer in command of the New York Naval Shipyard, and was reportedly designed by Charles Bulfinch in association with John McComb, Jr. The house was located on the naturally elevated western edge of the Navy Yard above the filled or drained tidal flats, and it had a commanding view of the bay (Levy and Higgins 1973). Quarters A was initially a three story structure with a cellar and basement. The property included a carriage house, stables, and grounds enclosed by surrounding screening walls. Construction and repairs throughout the 19th and 20th centuries eventually added several components onto the original structure, including a conservatory built on the south side of the house in 1939 (Levy and Higgins 1973). Quarters A remains the oldest surviving property at the Navy Yard, and it is located adjacent to the APE. The house itself is situated approximately 120 ft (37 m) southwest of the Project on a small rise, approximately 40 ft (12 m) above the Navy Yard (Photo 1). At present, the Quarters A property is separated from the Project area by a wrought-iron fence and is owned by the United States Navy. Access to the property is currently restricted.

Expansion and Growth

The years following 1820 saw a dramatic growth at the Navy Yard. In the1830's, a Naval Hospital was constructed across the bay from the Yard in an area that would become known as the "Navy Yard Annex." The hospital complex would continue to grow throughout the 19th and 20th century and eventually included housing for officers, nurses, and enlisted men in addition to warehouse, recreation, and power generating facilities (New York Division of Military and Naval Affairs 1986; New York City Planning Commission 2005). The hospital was the first structure to be built as part of the annex, and it is shown in Burr's 1834 map of the City of New York (Map 8).

In 1833, Matthew Calbraith Perry was appointed the second officer of the New York Navy Yard. Son of a prominent Revolutionary War naval captain, and brother of Commodore Oliver Hazard Perry (who gained enormous fame during the War of 1812), Matthew C. Perry would become a significant figure in US Naval history in his own right (Naval Historical Center 2004). An innovator in naval matériel and an advocate of naval scholarship, Perry commanded the USS *Fulton*, the Navy's first steamship, as part of ongoing experiments in steam navigation (Naval Historical Center 2004). While at the Navy Yard, Perry also organized and developed the Naval Lyceum, precursor to the United States Naval Academy, and organized the first corps of naval engineers (Levy and Higgins 1973). In 1841, Perry became the Commandant of the Navy Yard and took up residence in Quarters A. He continued to serve in ongoing naval operations as commander of the African Squadron organized to suppress slave trade, and later as Commander of the Home Squadron, operating off the east coast of Mexico during the Mexican War (Naval Historical Center 2004). In 1852, toward the end of his impressive career, Perry was charged with opening US trade with Japan. Described as "a master of cajolery well dosed with threat," Perry sailed into Yedo harbor in 1853 with an impressive and well-armed fleet (Levy and Higgins 1973; Naval Historical Center 2004). His success in establishing a favorable treaty between the United States and Japan had a long-lasting impact on the economic and political growth of both countries. In 1858, shortly after returning from overseas, Perry died in New York at the age of 64.

In 1841, the Navy began construction of a massive dry dock at the Navy Yard. Dry Dock No. 1 was not only the Navy's first dry dock, but also the first in New York City (Snow 1990). Completed in 1851, Dry Dock No. 1 was constructed of Maine granite block laid over a cement and flagstone base, and it could accommodate a vessel 320 feet (97.5 m) long, with a 49.5-foot (15.08 m) beam and a 21-foot (6.4 m) draft (Burrows and Wallace 2000; Snow 1990). Dry Dock No. 1 is located approximately, 1,214 ft (304 m) southeast of the Project area, and is noted on the 1849 Colton map of the City of Brooklyn (presumably in an unfinished state) (Map 10). Additionally, the Colton map also shows a structure labeled as "Lyceum" (the Naval Lyceum established by Perry in 1837) east of the Project APE. In a later report prepared for the Brooklyn Navy Yard Cogeneration Project (see below) the Lyceum was identified approximately 113 feet (34 m) southeast of the APE's southern boundary.

Also in the 1840s, the Navy constructed a Cob Dock in Wallabout Bay that could accommodate additional ships. While no information regarding the construction of the dock is presently available, its name suggests that it was constructed by depositing fill material in the bay in order to create a permanent island. The date of construction of the Cob Dock is unclear, but the dock is not present in Kemble's detailed 1848 map of the City of New York but appears only a year later in the Colton 1849 map of the City of Brooklyn (Maps 9 and 10). While not entirely conclusive, this evidence suggests that the Cob Dock was constructed sometime in the late 1840s.

The 1863 Dripps Map of Brooklyn shows significant expansion of the Navy Yard. Several new buildings are present, and the remaining section of the mill pond has been either filled or drained. Additionally, the Cob Dock has been expanded and Dry Dock No. 1 is shown as operational (Map 11).

Late 19th Century Development

Throughout the mid-19th century, the growth of canals, railroads, and manufacturing fueled the economic growth of New York City and Brooklyn (Burrows and Wallace 2000). By the start of the Civil War, and throughout the conflict, the Brooklyn Navy Yard was becoming a nationally-significant naval seaport, critical to supplying Union troops (Burrows and Wallace 2000). This development was linked to the growth of New York City as an entrepôt and manufacturing center (Burrows and Wallace 2000).

Several important ships were outfitted or constructed at the Navy Yard during the Civil War, most notably the USS *Monitor*, the Navy's first "ironclad" vessel (Burrows and Wallace 2000). By the end of the war, approximately 5,000 individuals were employed at the Yard (*All Hands* 1966). Growth of the Navy Yard continued throughout the war, and the low-lying area between the Navy Yard proper and the Annex had been filled prior to the 1880s.

By the late 19th century, however, the Navy Yard was in need of serious repairs and upgrades (BDE 1889). In an 1889 article, the *Brooklyn Daily Eagle* reported on the plans submitted to Rear Admiral D.L. Braine of the Bureau of Yards and Docks, Navy Department, recommended by the Navy Yard's Board of Permanent Improvements (Map 12). The Board suggested a massive overhaul of the Yard's facilities, including demolition of unused or outdated buildings (including Quarters A which was deemed "much decayed and dilapidated"), construction of new docks and machine shops, and the expansion and consolidation of storehouses (BDE 1889). The map accompanying this article shows a structure either within or immediately adjacent to the Project APE, which the accompanying text describes as "provisions and clothing storehouse No. 33" (BDE 1889:13). No scale accompanied this map, however, and the distances appear distorted; it is likely that the storehouse described in the 1889 article is the unlabeled structure which appears in the 1863 Dripps map approximately 150 ft (45 m) northwest of the Project APE (Maps 11 and 12). In either case, a structure within the Project boundaries does not appear on earlier maps, and is not noted on later maps of the facility, although several additional buildings and expanded dock facilities are shown on the USGS 1898 *Brooklyn 15' Topographic Quadrangle, New York* (Map 13).

The Navy Yard in the 20th Century

The Navy Yard continued to be a center of shipbuilding and repair through the mid-20th century. As in the past, employment and construction at the facility followed a cyclical pattern throughout this period. As the United States emerged as a dominant naval power in the early 20th century, the Navy began construction of several large vessels at the Yard, including the USS *Arizona*, the USS *Florida*, and the USS *New York* (*All Hands* 1966:59).

Throughout World War I, the Navy Yard employed as many as 18,000 individuals in shipbuilding and reconditioning (*All Hands* 1966:59). At the end of the conflict, however, employment and construction fell off dramatically, and the Navy Yard was "shifted to a virtually standby status" until the 1930s (*All Hands*1966:59).

During World War II, the Navy Yard once again emerged as a center of heavy shipbuilding. The Yard employed a staggering 70,000 men and women in round-the-clock shifts during the conflict (*All Hands* 1966). According to the US Navy, three battleships and four aircraft carriers were constructed at the Navy Yard. Additionally, 250 ships were converted for wartime duty, and about 5,000 vessels received repairs at the Yard during the same period (*All Hands* 1966:59). While employment and construction were reduced following the war, the Yard remained a center of aircraft carrier construction and conversion to jet operations (*All Hands* 1966:61).

Employment rose again to approximately 22,000 during the Korean War, and vessel construction and conversion continued at the Navy Yard throughout the 1950s (*All Hands* 1966). However, the limitations of narrow streets, older buildings, and a generally smaller dockage eventually became apparent (Presa 1997). In 1964, the Navy ordered the Yard to prepare for permanent closure, and the New York Naval Shipyard was officially closed on January 25, 1966 (*All Hands* 1966:61). The City of New York purchased the abandoned Yard in 1967 (Presa 1997). Today, the facility is an industrial park, and is operated by the Brooklyn Navy Yard Development Corporation (Presa 1997).

NYCDEP Red Hook WPCP Development

Construction of the NYCDEP's Red Hook WPCP began in 1980 and was completed in 1987 (NYCDEP 2003). The facility is designed to treat sewage and dewater the heavy fraction before discharging the water fraction into harbor waterways in accordance with a State Pollution Discharge Elimination System (SPDES) permit (NYCDEP 2003). The WPCP is capable of handling 60 million gallons of wastewater per day (NYCDEP 2003). The WPCP facility includes primary and secondary settling tanks, disinfection facilities, and a main building housing offices, equipment, and controls (Figures 2 and 3). The Project APE includes the substation and the associated ductbanks which connect the substation to nearby WPCP facilities.

The original construction at the Project required placing a network of conduits and ductbanks throughout and adjacent to the substation at a depth of up to 8 feet (2.4 m) beneath the modern ground surface; installing generators, lightning masts, and switchgear on concrete foundations; and constructing a brick and wrought iron wall to separate the substation from other WPCP facilities (Figures 4 and 5). The substation and electrical equipment were built and installed by Schiavone Construction Company and Daidone Electric, both of New York City, and the project was completed in 1985.

Historic Structures

While no known New York City (NYC) Landmarks or historic properties listed on or eligible for inclusion on the NRHP exist within the Project boundary, several such structures, including a National Historic Landmark (NHL), are located either adjacent to or in the vicinity of the Project. Table 1 summarizes the NYC Landmarks and other historic properties near the Project or associated with the Navy Yard.

Table 1. NYC Landmarks and other historic properties in the vicinity of the Project APE or associated with the Navy Yard.

Name	Designation	Distance from Project APE	Description
Brooklyn Navy Yard	National Register-eligible	Boundaries not defined, APE does not include NR-eligible properties	Historic Navy Yard facilities
Quarters A	National Historic Landmark NYC Landmark	Immediately south of the APE	Commander's House occupied by Matthew C. Perry during mid-19th century
Vinegar Hill Historic District	NYC Landmark District	185 ft (56 m) west of the APE	Greek Revival houses
Dry Dock No. 1	NYC Landmark National Register-eligible	1,283 (391 m) ft southeast of the APE	First dry dock in New York, US Navy's first dry dock
Brooklyn Navy Yard Annex	National Register-eligible	4,000 ft southeast of the APE	Marine hospital and officer's quarters, constructed in 1831
Surgeon's House	NYC Landmark	4,262 ft southeast of the APE	Part of Navy Yard Annex
Old New York Naval Hospital	NYC Landmark	4,453 ft southeast of the APE	Part of Navy Yard Annex

New York State Museum (NYSM) and SHPO Site File Searches

Documentary research for this undertaking included examining the SHPO archaeological and structure files, the list of National Register Properties, and the NYSM site files. No precontact or historic period sites were recorded within 400 feet (122 m) of the Project APE, although Quarters A, a NHL, is located immediately south of the APE (see Table 1).

Previous Archaeological Investigations

WPCP Construction

In 1980, during initial construction of the WPCP facilities, crews demolishing the seawall located north of the Project's APE encountered two brass cannons. Ralph S. Solecki, PhD., of Columbia University, was asked by the NYCDEP to prepare a preliminary report on the cannons (Solecki 1980). Solecki's 1980 report notes that only one cannon was found in-situ, vertically placed in the seawall adjoining Wallabout Bay. The other cannon was apparently recovered from the debris associated with the ongoing demolition and therefore lacks any specific provenience or context (Solecki 1980). Solecki determined that the guns were eight inch Dahlgren cannons, dating to the Civil War, and that they were most likely placed in the seawall to be used as bollards for tying down ships moored in the bay (Solecki 1980). Because of the lack of specific detail regarding the exact location of the cannons, it is impossible to determine if they were located within the APE. Likewise, the location of the seawall is not detailed in the report, although it would most likely have been located adjacent to the East River or the bay, some distance either north or east of the APE. No further analyses of the cannons were conducted, and no additional archaeological investigations associated with the construction of the substation were carried out within the APE.

Brooklyn Navy Yard Cogeneration Project

In 1993, Joan H. Geismar, PhD. and Stephen J. Oberon undertook a Stage IA Cultural Resources Survey Documentary Study and Assessment of Potential in advance of the anticipated installation of overhead and underground conduits (Geismar and Oberon 1993) associated with the proposed Brooklyn Navy Yard Cogeneration Project (BNYCP). Because of the size and scope of the undertaking, the project limit for the western portion of the BNYCP study area was designated as the western edge of Navy Street and Hudson Avenue and the southern edge of Flushing Avenue along the southern boundary of the Navy Yard (Geismar and Oberon 1993: Figure 4) (Maps 3 and 4.). Based on documentary research, the report concluded that a potential for Native American artifacts, features, or deposits existed underneath Hudson Avenue in the elevated area outside the present-day Navy Yard boundary (Geismar and Oberon 1993:45). This area is located adjacent to the Project, but is situated on a natural rise approximately 40 feet (12 m) above the Navy Yard and the APE (Geismar and Oberon 1993). This elevated area once formed the high ground bordering the swamps and marshes of the Wallabout, and was better suited for occupation than the present APE.

In addition to Native American cultural resources, the report also determined that historic archaeological resources had the potential to exist within the BNYCP boundary at areas where Map Documented Structures (MDSs) existed within the Navy Yard (Geismar and Oberon 1993). The 1996 BNYCP report by Geismar and Oberon identified several mid-19th century MDSs in the Western section of the Navy Yard, including seven MDSs within a 400 foot (122 m) radius of the Project area (Map 14). Despite the early 19th century construction of the Martyrs' Tomb and the subsequent re-internment of the prisoners' remains, the report also noted that the Euroamerican remains could still potentially be present in natural soils along the margin of Wallabout Bay beneath the fill of the Navy Yard, particularly in the section designated as the Monument Lot (site of the former Martyrs' Tomb), approximately 400 ft (122 m) southeast of the Project.

Geismar and Oberon conducted archaeological field monitoring of the test borings for proposed monitoring wells and for the excavations for electrical conduit in the vicinity of the APE, and they reported on these Stage IB investigations in 1995 and 1996 (Geismar and Oberon 1995; Geismar and Oberon 1996). Examination of test boring samples focused on identifying natural soils beneath the historic fill with the potential to contain intact artifacts, deposits, or features; the excavation monitoring along the path of the conduit was intended to determine if MDSs would be impacted by the conduit (Geismar and Oberon 1995; Geismar and Oberon 1996). The underground conduit associated with the BNYCP runs under First Avenue, adjacent to the eastern boundary of the Project's APE before turning west and continuing along Plymouth Street, approximately 120 feet (36 m) north of the APE. A total of 16 test borings were taken, with test borings 4, 5 and 6 in the vicinity of the Project. Test borings 4 and 5 were taken along First Avenue, approximately 40 feet (12 m) northeast of the Project and 125 feet (39 m) north of the Project, respectively. Test boring 6 was taken approximately 200 feet (61 m) south of the Project (Geismar and Oberon 1996: Figure 5). Test borings were sampled to a depth of 2 feet (0.6 m) beneath the modern pavement using a split spoon, and soils recovered were comprised exclusively of fill relating to the 19th and 20th century construction of the Navy Yard (Geismar and Oberon 1995:6). The subsequent excavations for the conduit followed the path of the previous test borings, and extended approximately 5 feet (1.5 m) below the modern pavement (Map 14). These excavations were entirely restricted to fill and construction debris composed of bricks, building stone, steel beams and rods, glass, nails, wooden beams and moldings, cobbles, and sections of pavement (Geismar and Oberon 1996:12). Several in-situ clay sewer pipes were also encountered, but these were not considered significant cultural remains (Geismar and Oberon 1996:13). No intact natural soils or significant structural remains were encountered along the route of the conduit, and all cultural material appeared to have been deposited during filling or construction episodes and therefore lacked archaeological integrity.

Geismar and Oberon concluded that excavation within the fill area along the conduit would have no impact to historic properties or "potentially significant cultural resources pertaining to any period of human occupation or use of the area" (Geismar and Oberon 1996:22).

Additional Studies at the Project

NYCDEP Test Borings

In 2004, GZA GeoEnvironmental of New York City, New York (GZANY) prepared a geotechnical environmental and engineering report intended to evaluate the subsurface conditions at the Project and recommend designs for new equipment pads (GAZNY 2004:1) (Figure 6). As part of this evaluation, GZANY contracted with Aquifer Drilling and Testing, Inc., of New Hyde Park, New York to conduct three subsurface test borings within the Project boundaries (GZANY 2004). GZANY engineers analyzed and documented the samples that were recovered during these tests (GZANY 2004). All borings encountered a thin layer of gravel and topsoil associated with the substation construction in the first 6 inches (15 cm) of the profile. This surficial layer was underlain by man-made fill in all tests, extending to depths between 14 and 19 feet (4 and 6 m) below the modern ground surface (GZANY 2004:4). The remainder of the profile consisted of sand with occasional inclusions of gravel. Bedrock was not encountered during testing, and all borings were terminated 52 feet (16 m) beneath the modern ground surface in the sandy stratum (GZANY 2004:4) (see Appendix A for the 2004 test boring logs).

ASSESSMENT OF POTENTIAL

Introduction

Whether or not the proposed service upgrades at the WPCP will affect archeological or historic resources is dependent upon the extent of previous ground disturbance in the Project area, the scope of proposed improvements, and the presence of fill at the site. These issues are treated separately below.

Previous Ground Disturbance within the APE

The original construction of the WPCP facilities and the substation required substantial ground disturbance in order to lay foundations, ductbanks, conduits, plumbing, and fuel tanks (Figures 4 and 5). The approved as-built drawings for the WPCP substation demonstrate that several ductbanks were installed beneath the site at varying depths during construction (Figure 4). The present surface elevation at the WPCP substation is between 11.5 and 12 feet (3.5 and 3.6 m) above mean sea level (Borough of Brooklyn Highway Datum). As shown in the as-built drawings, the average bottom elevation of ductbanks presently at the site is approximately 7 feet (2.1) above mean sea level, indicating that, at minimum, the ground has previously been disturbed to a depth of 4.5 feet (1.4 m) throughout most of the APE. In some areas, the bottom elevations of current ductbanks demonstrate that previous excavations occurred to a depth of 7.5 feet (2.8 m) beneath the modern ground surface (Figures 4 and 5). In addition to the ductbanks installed at the site, concrete foundations were installed during construction to support generators and switchgear. The depth of these concrete foundations is not presently known (GZANY 2004).

In addition to the substation, construction at nearby WPCP facilities has undoubtedly disturbed much of the western section of the Navy Yard. The WPCP main building and primary settling tanks are located approximately 23 feet (7 m) and 42 feet (12 m) west of the substation, respectively. Construction of these structures in the 1980s most likely disturbed portions of the APE, although the depth and extent of subsurface disturbance was not documented during construction.

Scope of Proposed Improvements

Ground disturbing-activities associated with the Project will be limited to the footprint of the current substation and the adjacent sections of First Avenue roadway where ductbanks will be installed. As designed, the plans for the proposed improvements will not cause subsurface disturbance within the APE at a depth greater than 4 feet (1.2 m) below the modern ground surface.

Fill at the Substation Site

Based on the test boring analysis conducted by GZANY in 2004, at least 14 feet (4 m) of man-made fill exists beneath the modern ground surface at the substation (GZANY 2004). In their report on the 1995 excavations for the electrical conduit that passed along First Street adjacent to the APE, Geismar and Oberon noted that the excavations, which were approximately 5 feet (1.5 m) in depth, were entirely restricted to 19th-and 20th-century fill and construction debris (Geismar and Oberon 1996:12) (Map 14). Cultural material included in the fill lacked provenience and context, and did not include potentially significant resources (Geismar and Oberon 1993:22).

Assessment of Archaeological Potential

While long-term occupation of the tidal areas during the precontact period is unlikely, the historically documented trails and campsites ringing Wallabout Bay indicate that the wetland areas were used intensively by Native Americans (Burrows and Wallace 2000). Additionally, as discussed above, the western portion of the Navy Yard that includes the APE was one of the first sections of marshland along Wallabout Bay to be filled or drained. Accounts indicate that bodies were interred in the tidal flats surrounding the bay, and it is probable that individuals were buried at the former Remsen property that is now occupied by the WPCP (BDE 1894) (Map 5).

Intact Native American or early Euroamerican features, deposits, or in-situ artifacts may potentially be present within the upper strata of natural soils where these exist beneath the layers of fill. In addition, as Geismar and Oberon note in their 1996 report, unknown human remains from prisoners buried in the tidal area around Wallabout Bay during the American Revolution may still exist in the natural soils beneath the fill (Geismar and Oberon 1996:22). Despite the efforts of local inhabitants to relocate these remains, it is probable that they were not all removed.

Despite these concerns, the proposed improvements will not cause subsurface disturbance beyond a depth of 4 feet (1.2 m), and all excavations within the APE will be conducted by hand because of the proximity of conduits and ductbanks already in place at the site. Given the prior disturbance within the APE during original substation construction, the 14 feet (4 m) of fill underlying the APE documented during the GZANY study, and the limited nature of proposed substation improvements, the potential for this undertaking to impact archaeologically significant, in-situ historic or precontact resources is considered very low. Previous studies have demonstrated that any construction activities associated with the proposed system upgrade at the Project will not impact natural soils, and any 19th or 20th century cultural materials recovered from the fill will lack context, provenience, and archaeological significance. However, the potential to encounter late 19th-or early 20th-century cultural material deposited as fill is high.

The APE is not designated as an archaeologically sensitive area by the OPRHP, and it seems clear that the amount of prior ground disturbance and fill have significantly disturbed or buried natural soils present within the APE. Given this background the archaeological sensitivity for both intact precontact and historic archaeologically significant cultural resources within the APE is low.

RECOMMENDATIONS

Because of previous ground disturbance and filling episodes within the APE, the potential for impacting intact archaeologically significant resources or natural soils is low. However, the review of historic maps presented above indicates that the APE includes one of the earliest areas of the Navy Yard to be filled and drained, and that a late 19th-century storehouse may have occupied the site. Additionally, the APE is adjacent to the Quarters A property, and household refuse or other domestic material may have been deposited in the present APE. Given this context, the fill is likely to contain historic materials dating to the 19th century and related to the development of the Navy Yard throughout that period. While cultural resources within fill layers lack all but the most general provenience and context, it is possible that significant 19th-century artifacts could still be present. Therefore, based on this analysis, the Authority's archaeologist recommends that construction activities within the APE be subject to Phase IB Field

Monitoring by a qualified archaeologist approved by the LPC. Because stratigraphy is not a concern in the previously disturbed top layer of fill where these excavations will be conducted, monitoring activities will include examining the contents, sides, and bottom of trenches during excavations; recording and collecting artifacts other than disarticulated building materials or construction debris present in the fill; collecting and analyzing soil samples to accurately determine the nature of the fill, and preparing a final report on monitoring activities for submission to the LPC. Conducted in this way, the archaeological monitoring would create a record of 19th-century cultural material significant to the development of the Navy Yard (if any such material is present), and would prevent an adverse impact to any unknown archaeological materials present in the fill layer. All monitoring work and subsequent reporting will be conducted by a trained archaeologist in accordance with the *Landmarks Preservation Commission Guidelines for Archaeological Work in New York City*.

If, as designed, the excavations proposed as part of the WPCP System Upgrade do not extend below a depth of 4 feet (1.2 m), archaeological field monitoring of construction activities is the only additional archaeological investigation recommended by the Principal Investigator. This strategy should be adequate to recover any significant cultural material and to mitigate any potential impact of the Project. Following completion of the monitoring, the Principal Investigator will prepare a report for submission to the LPC. All monitoring work and subsequent reporting will be conducted by a trained archaeologist in accordance with the *Landmarks Preservation Commission Guidelines for Archaeological Work in New York City* (LPC 2002) and the New York Archaeological Council's (NYAC's) *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* (NYAC 1994).

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FIGURES

Figure 1. Plan view of proposed substation improvements showing the extent of the Project APE.

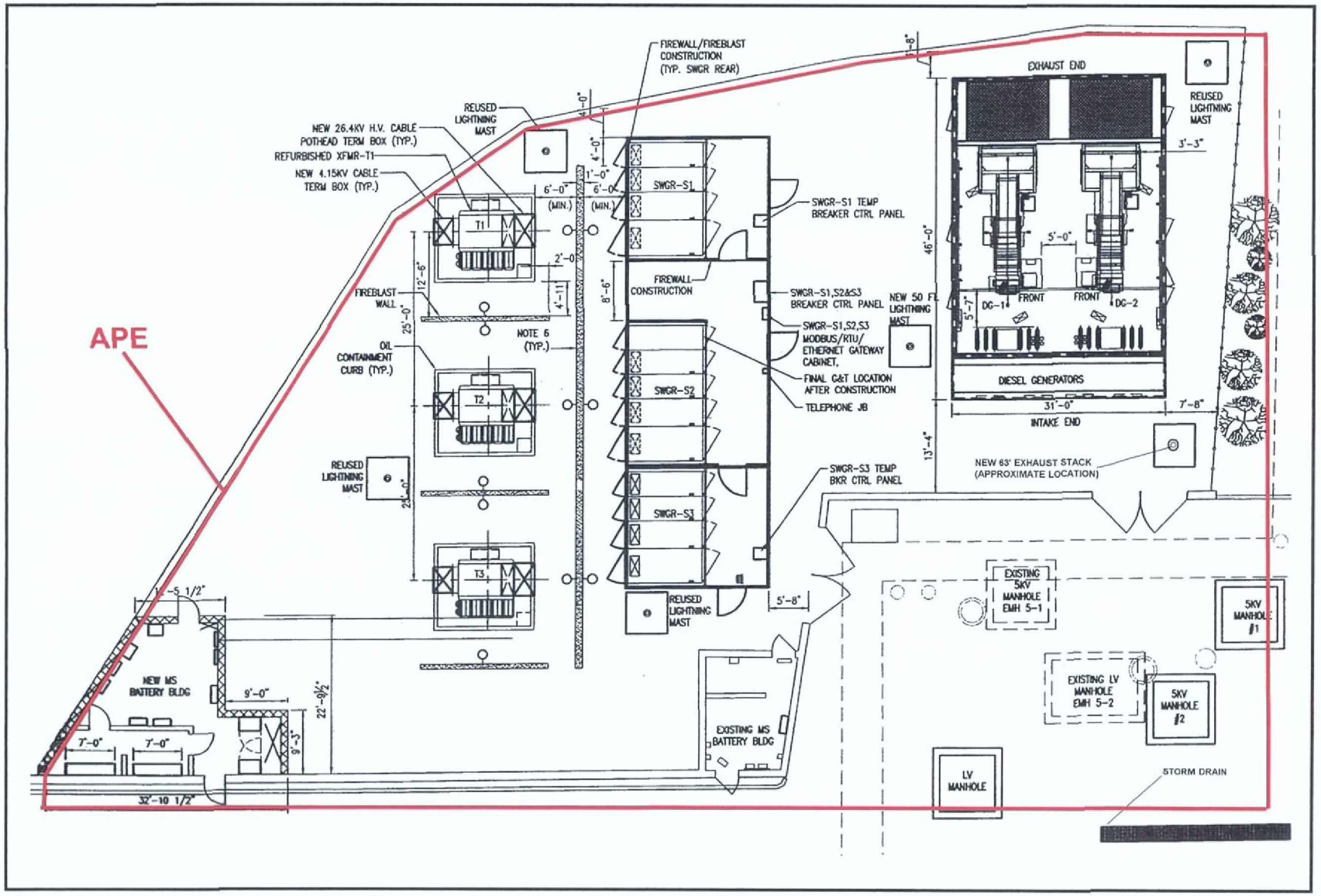


Figure 2. Plan view of Red Hook WPCP facilities showing current and proposed underground ductbanks and utilities.

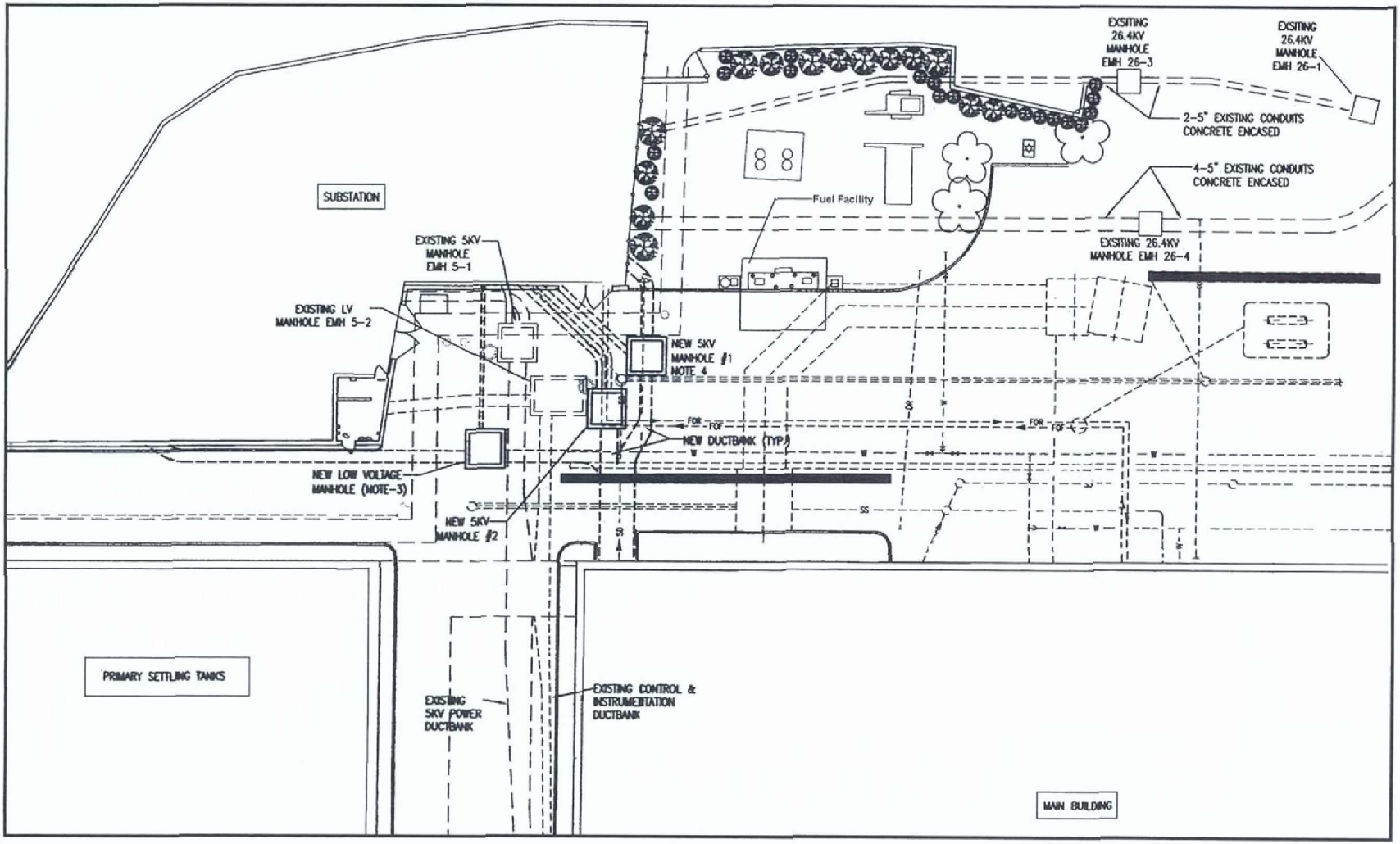


Figure 3. Plan view of existing buildings and structures at the Red Hook WPCP.

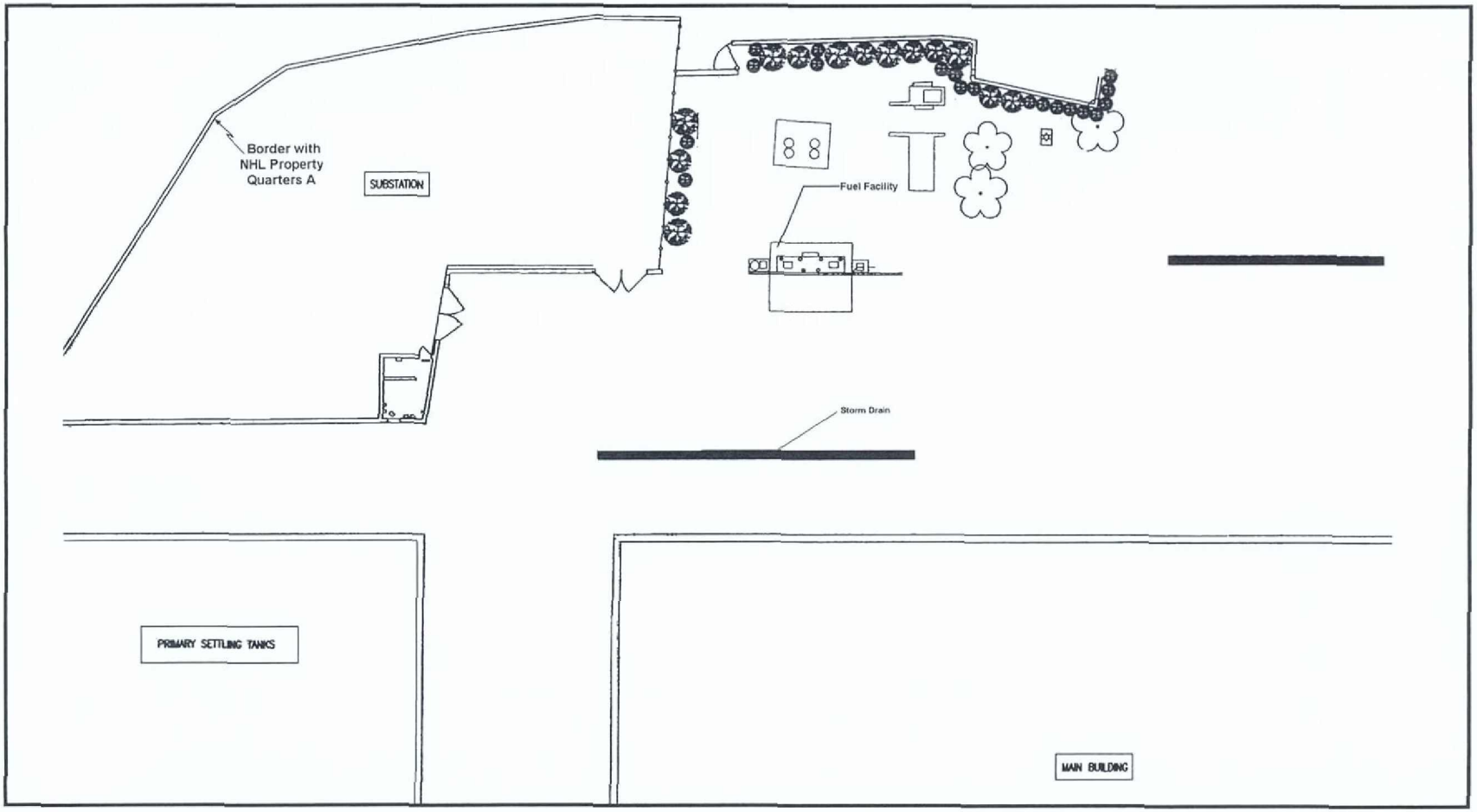


Figure 4. Approved, as-built drawings of the Project. The bottom elevations of the ductbanks installed during original substation construction have been highlighted. Note that the current ground surface is approximately 12 feet (4 m) above mean sea level.

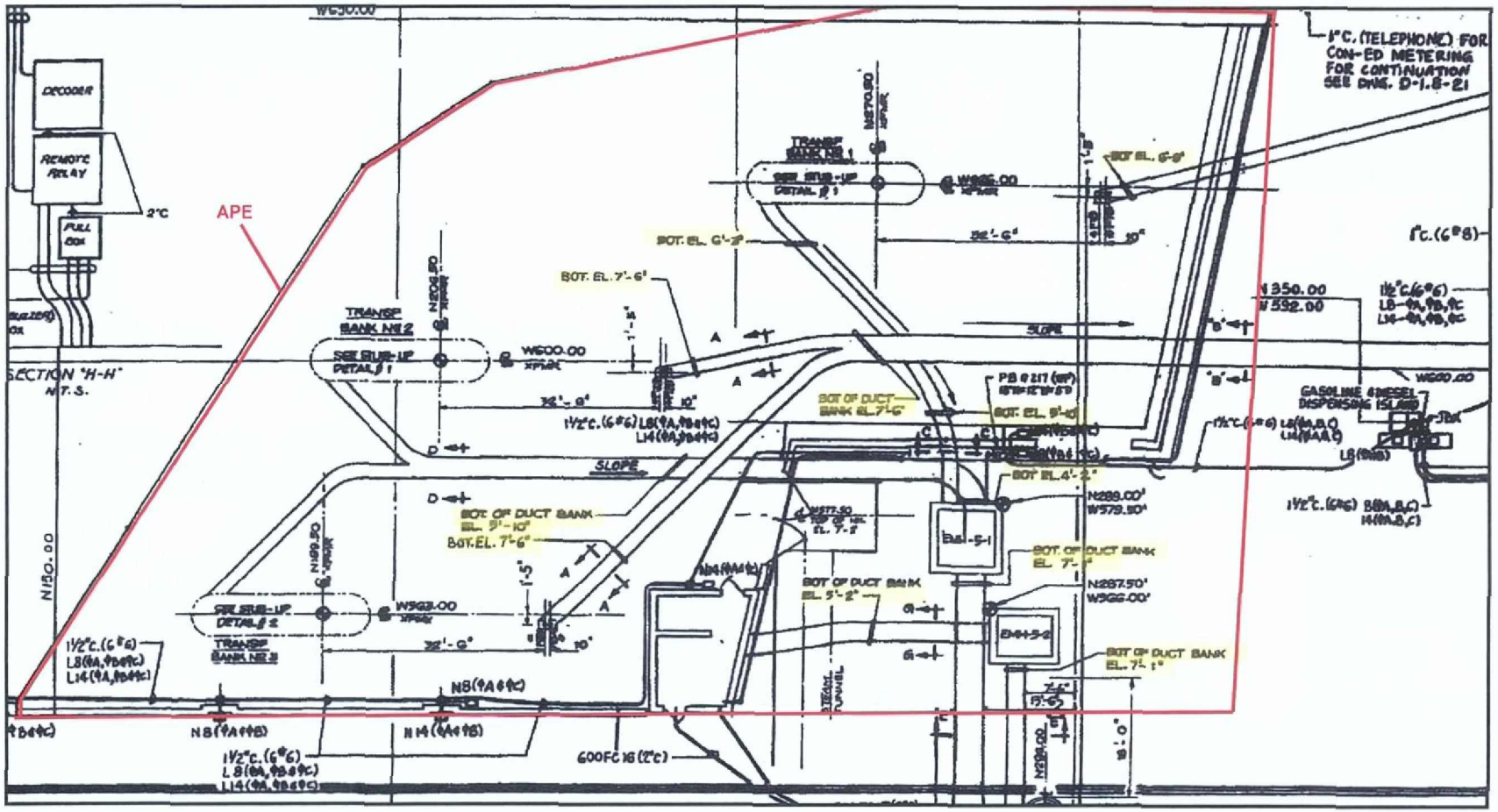


Figure 5. Approved, as-built drawings of the Project. The bottom elevations of conduits installed during original substation construction have been highlighted.

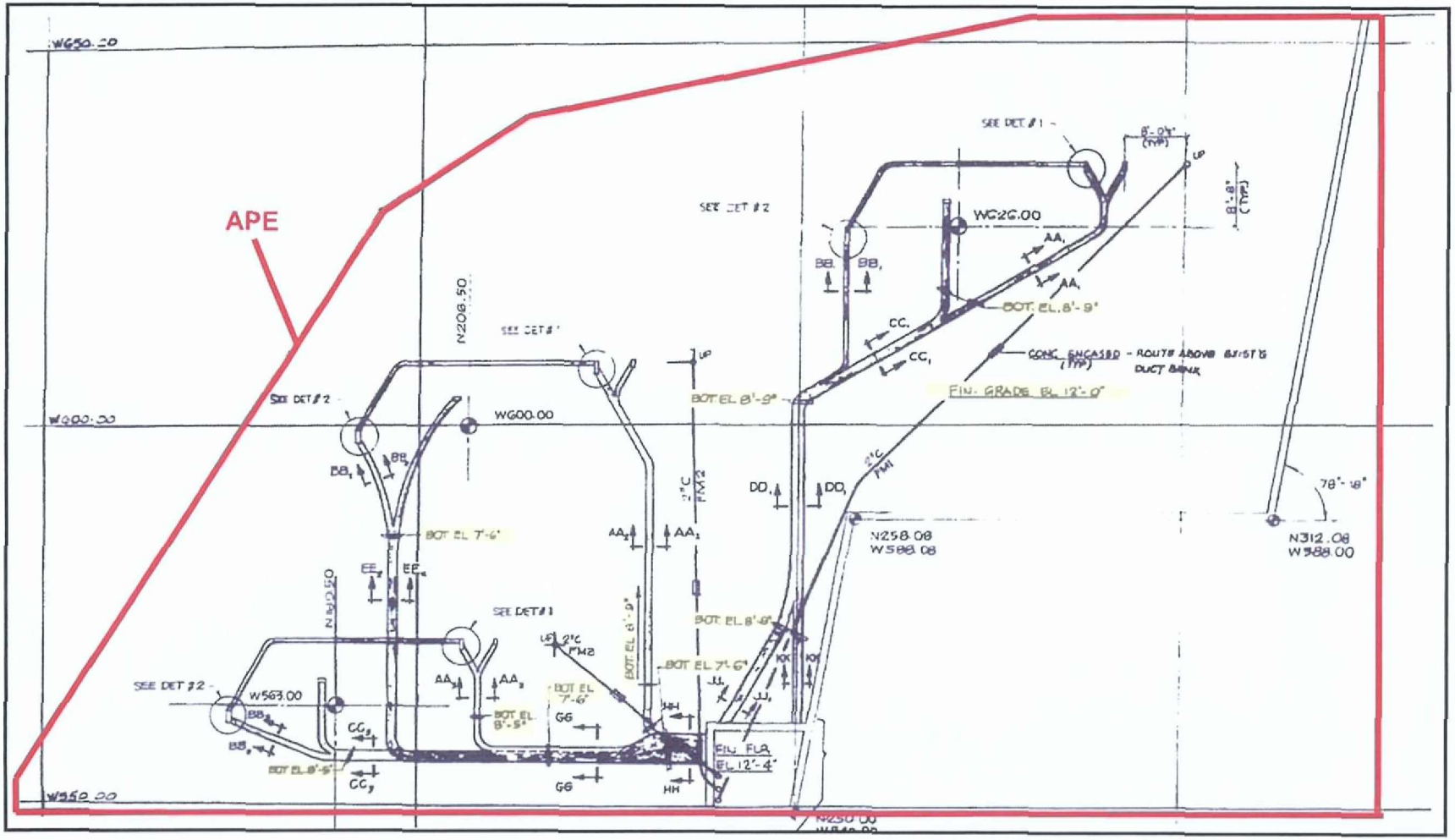
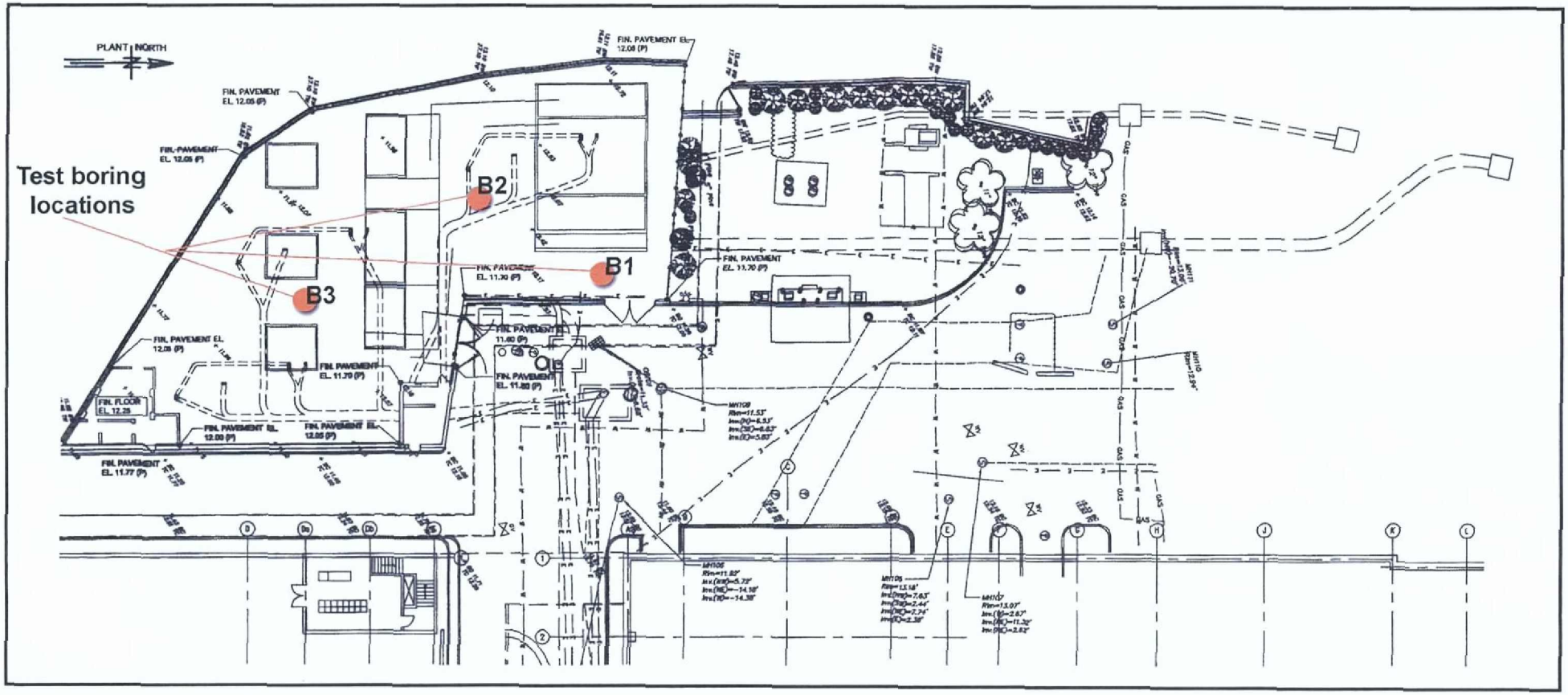
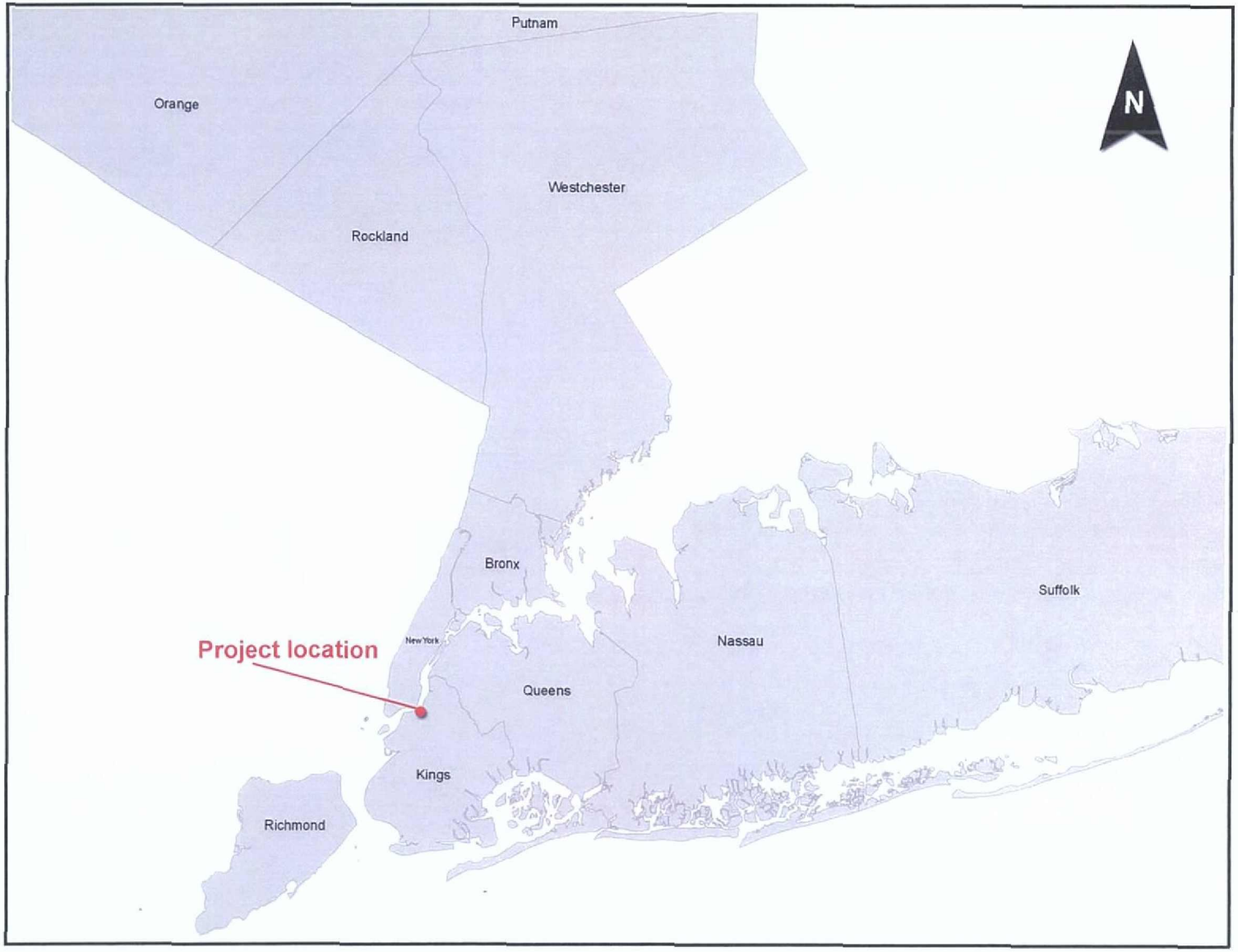


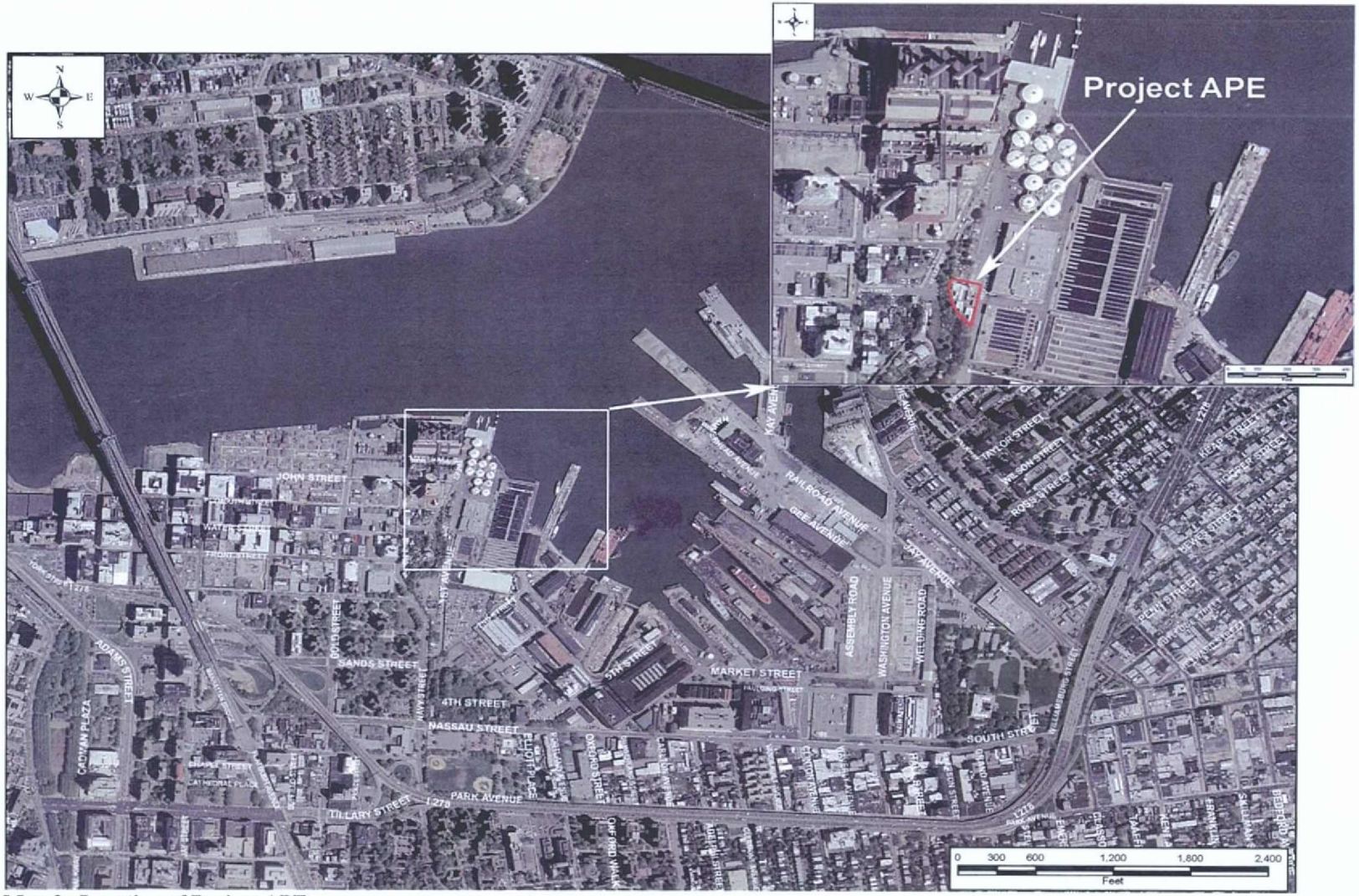
Figure 6. Plan view of the Project showing the location of test borings completed by GZANY in 2004.



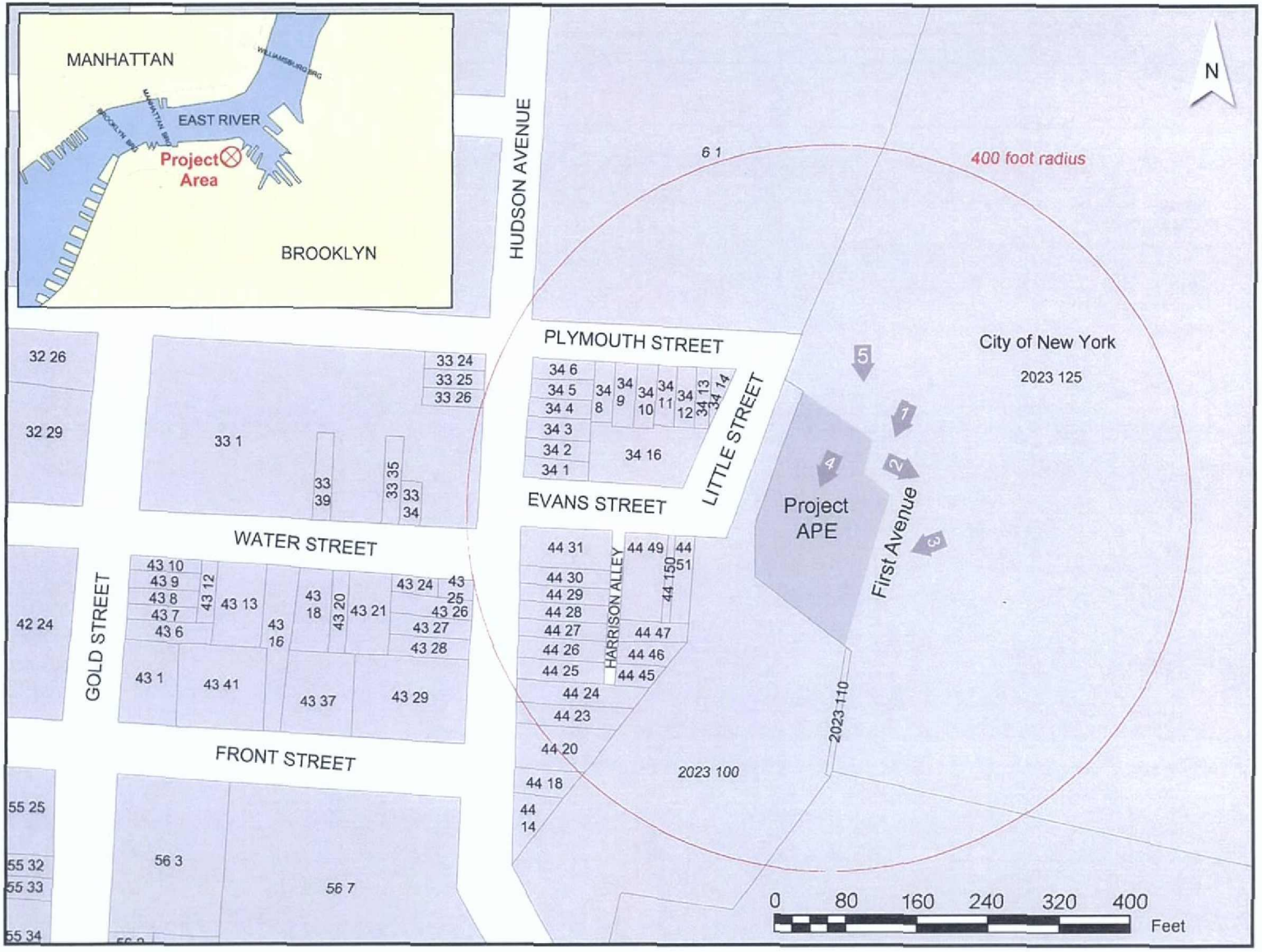
MAPS



Map 1. General view of Project location.

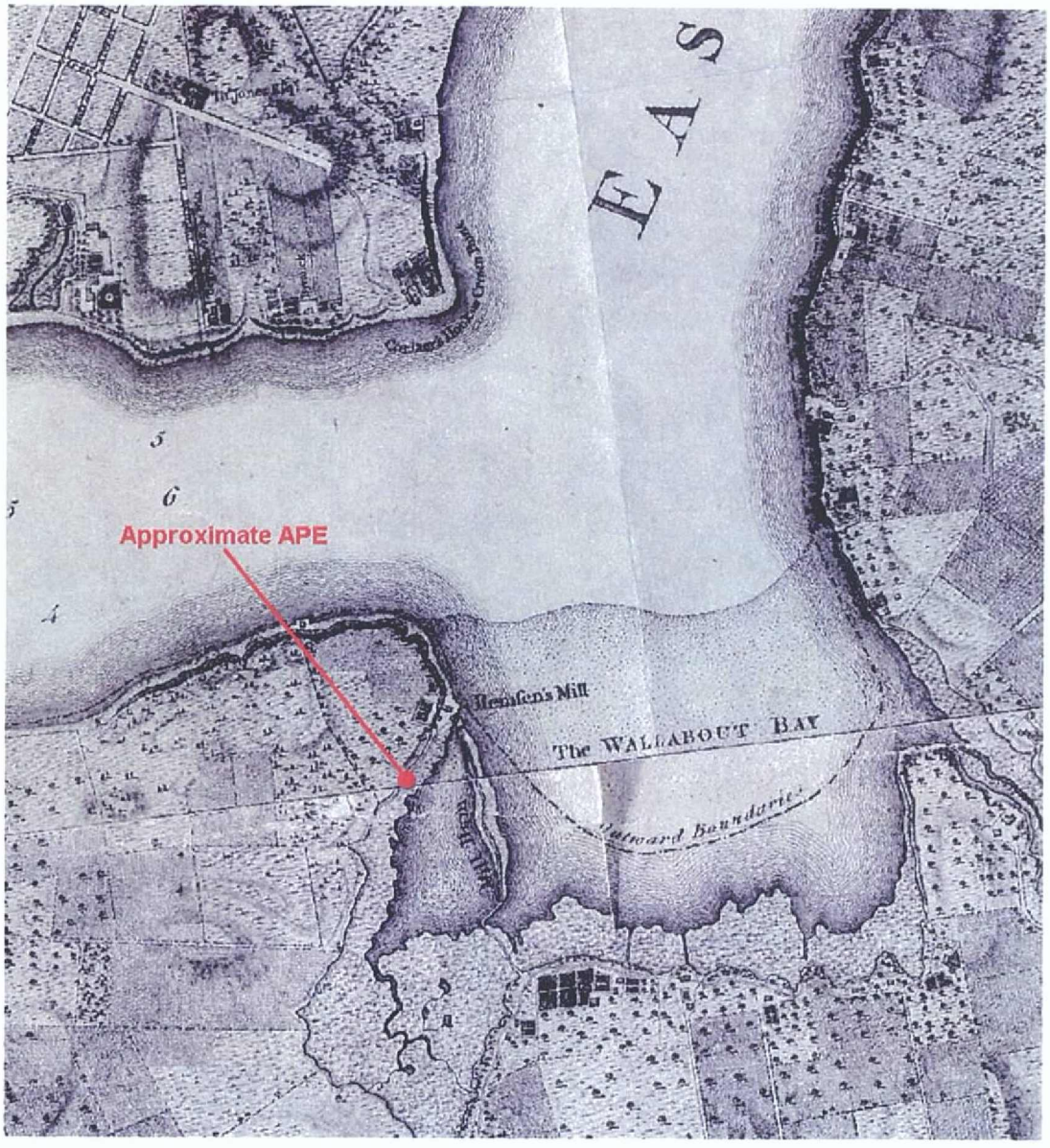


Map 2. Location of Project APE.

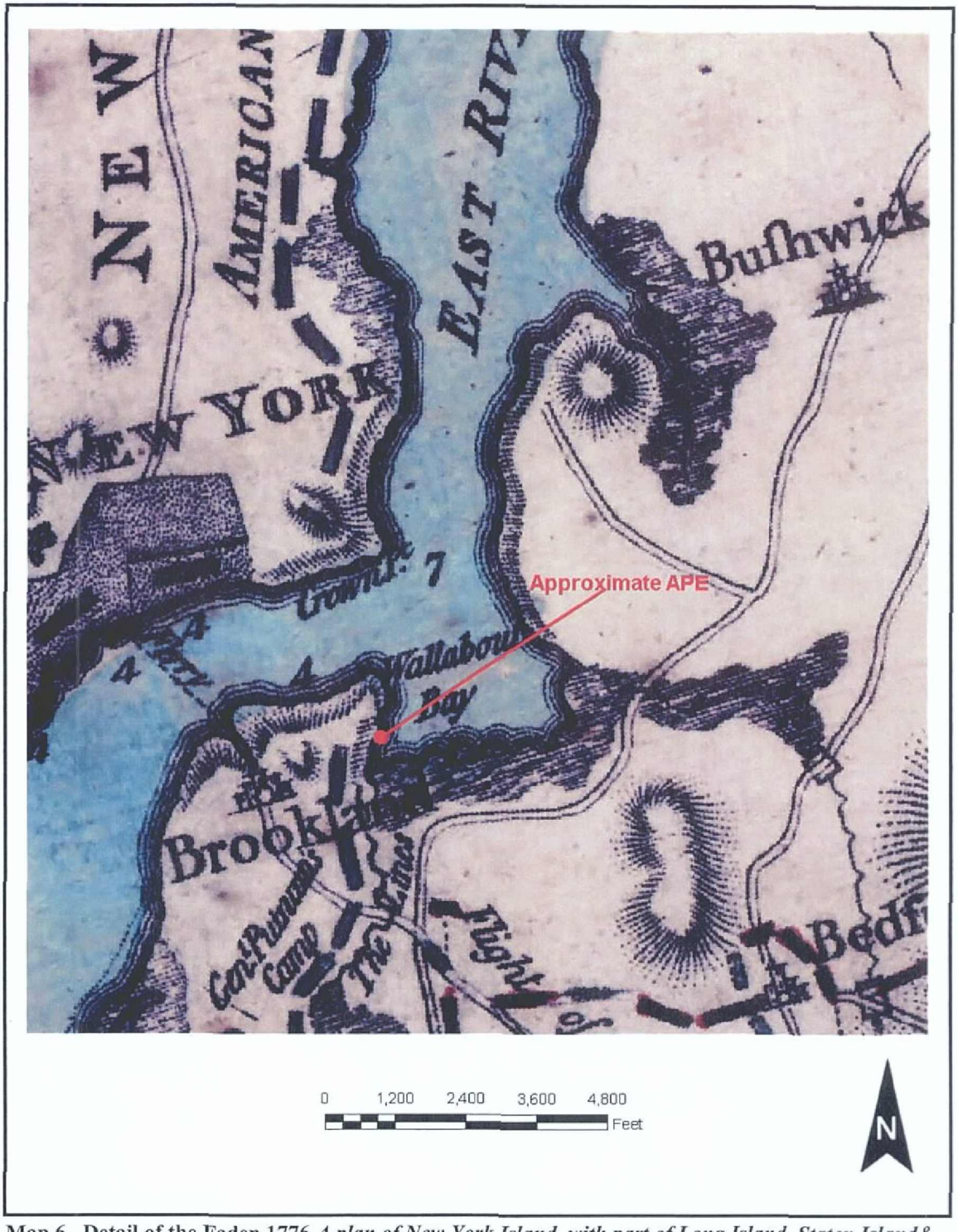


Map 3. Project APE, location and direction of photographs, 400 foot radius of Project, and block and lot information.

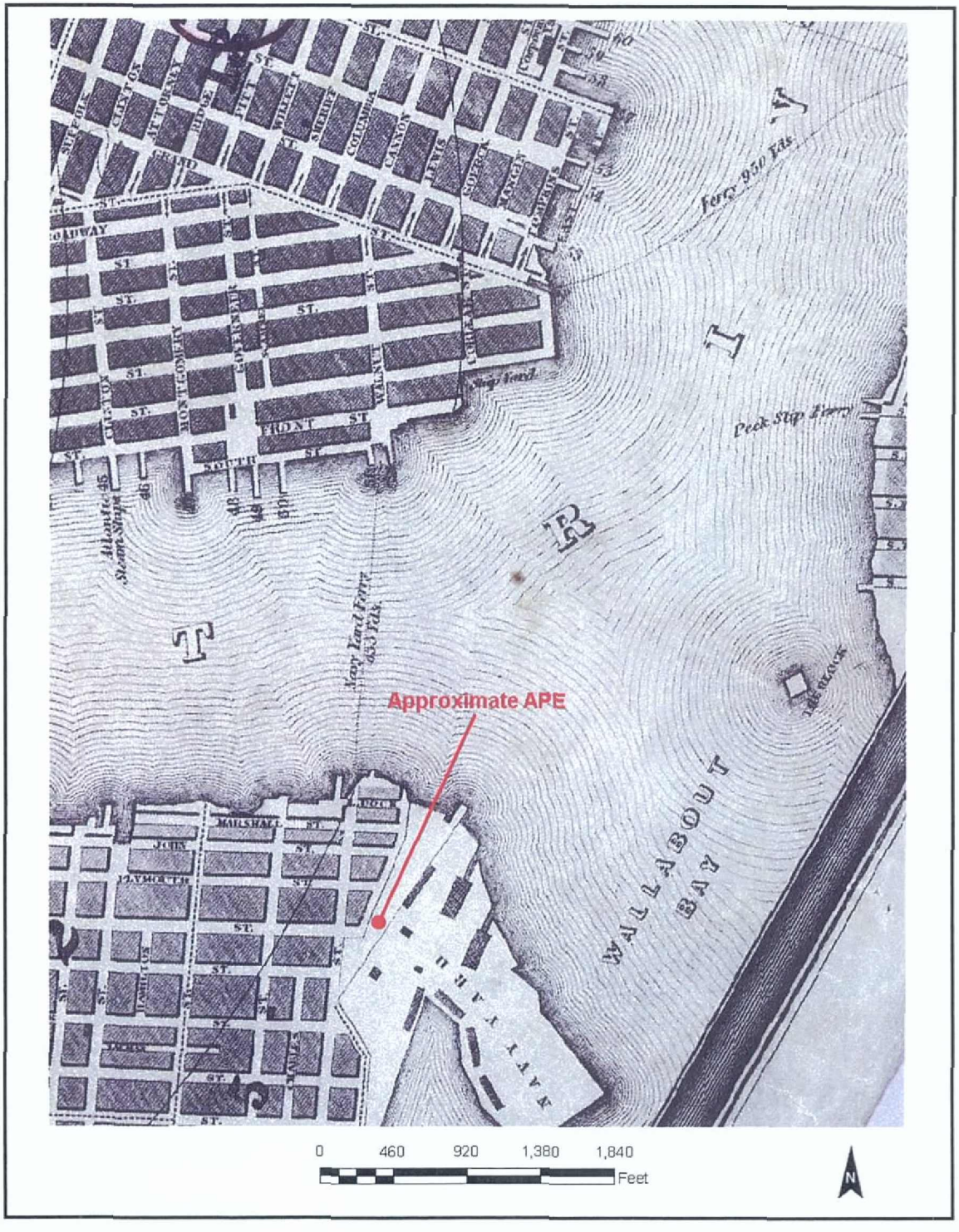
Map 4. Detail of the 1979 USGS *Brooklyn 7.5′ Topographic Quadrangle, New York* showing Project location.



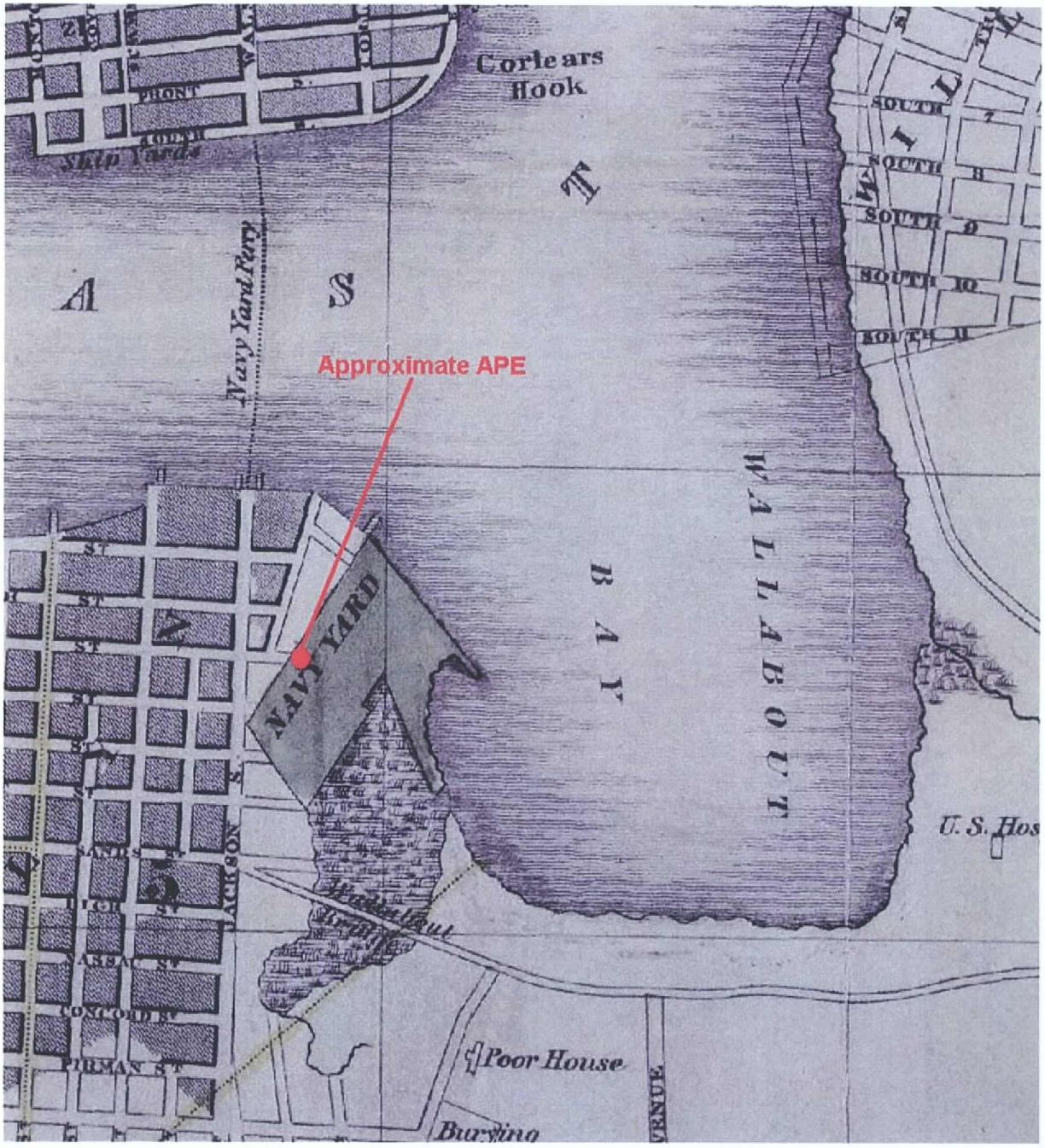
Map 5. Detail of the Ratzer 1776 *Plan of the city of New York in North America*, showing approximate Project APE. The Project is situated entirely within the tidal region of Wallabout Bay.



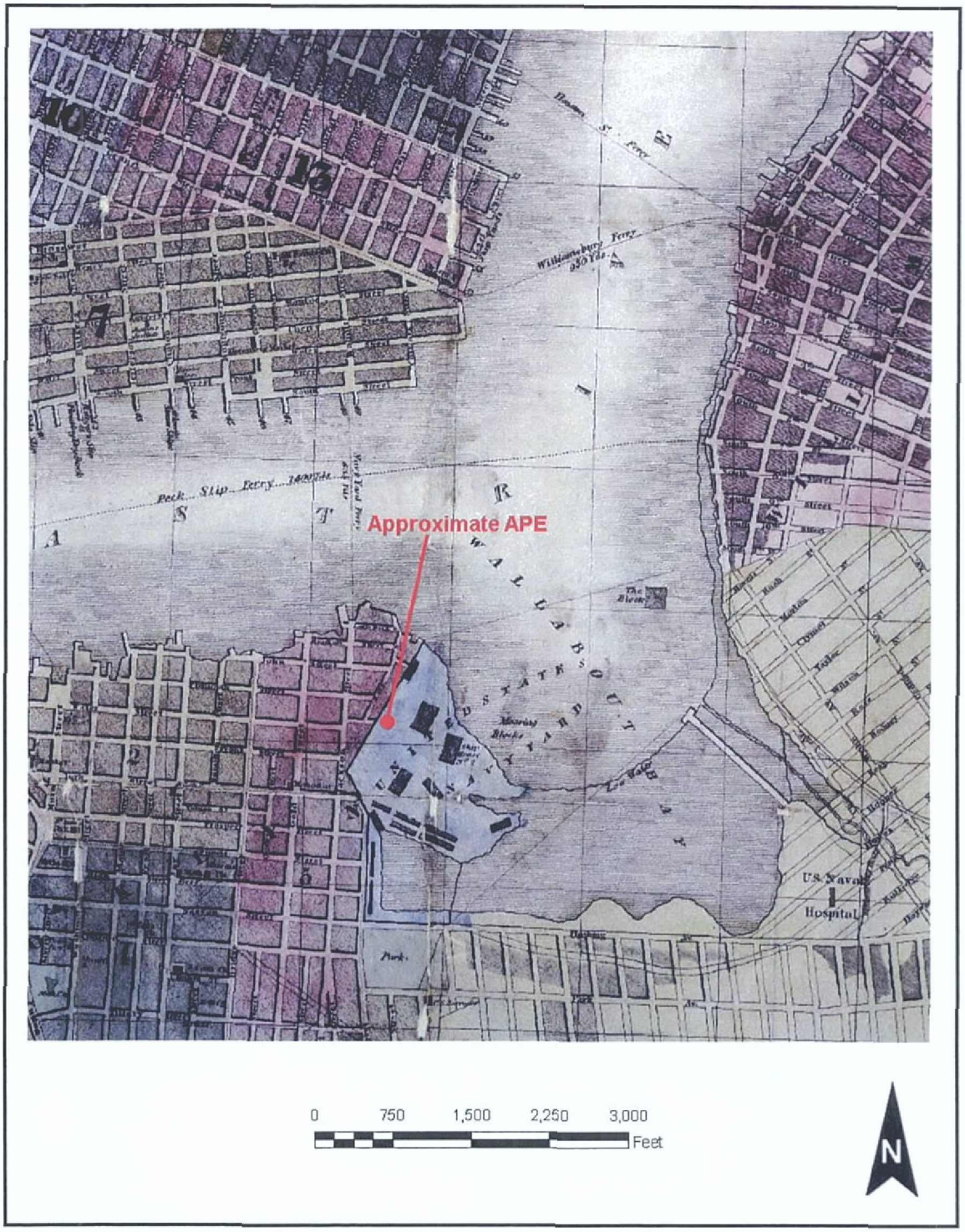
Map 6. Detail of the Faden 1776 *A plan of New York Island, with part of Long Island, Staten Island& east New Jersey*, showing approximate Project APE. Note the area west of the Project labeled "Gen. Putnam's Camp."



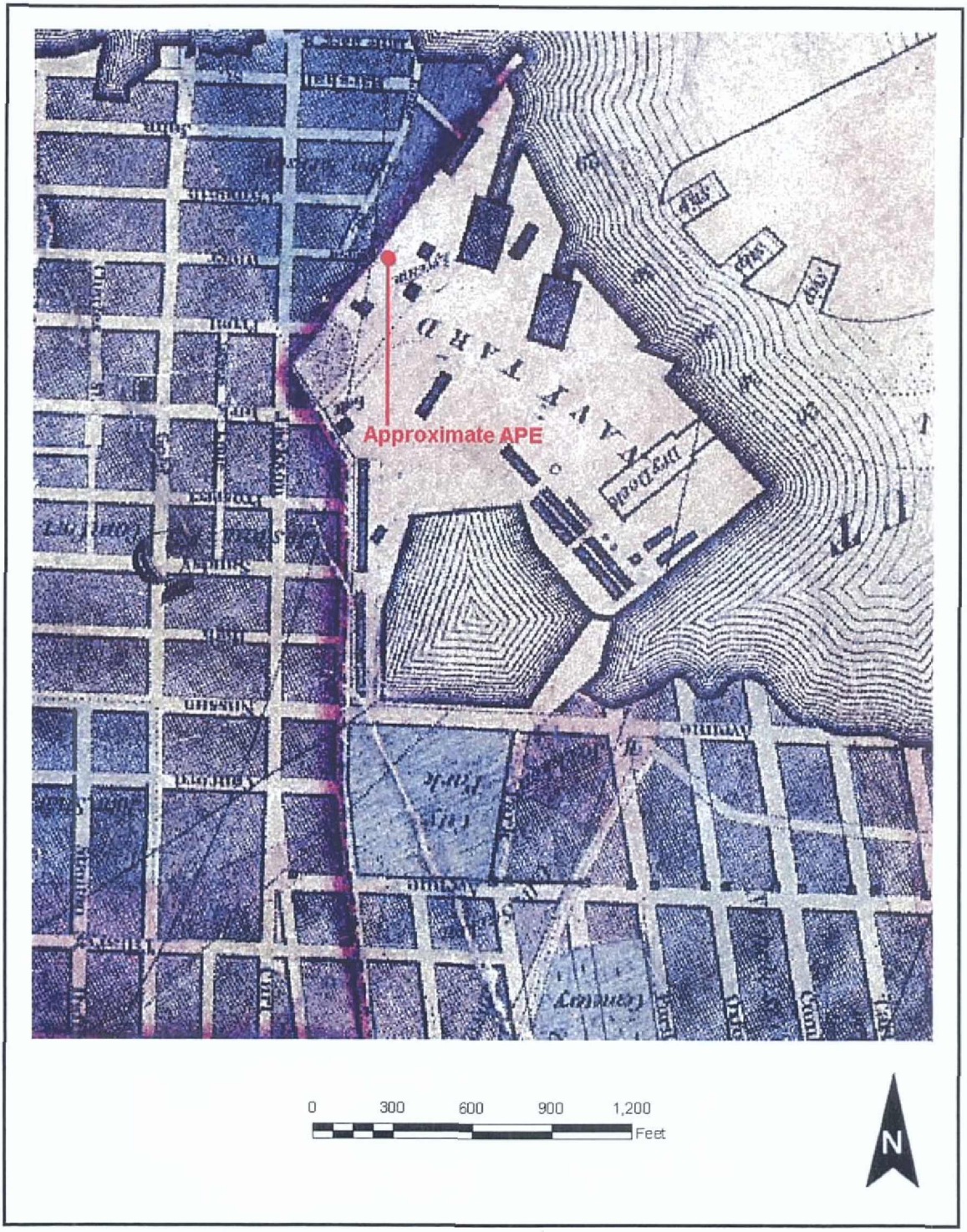
Map 7. Detail of the Atwood 1848 *Map of the City of New York*, showing the approximate Project APE.



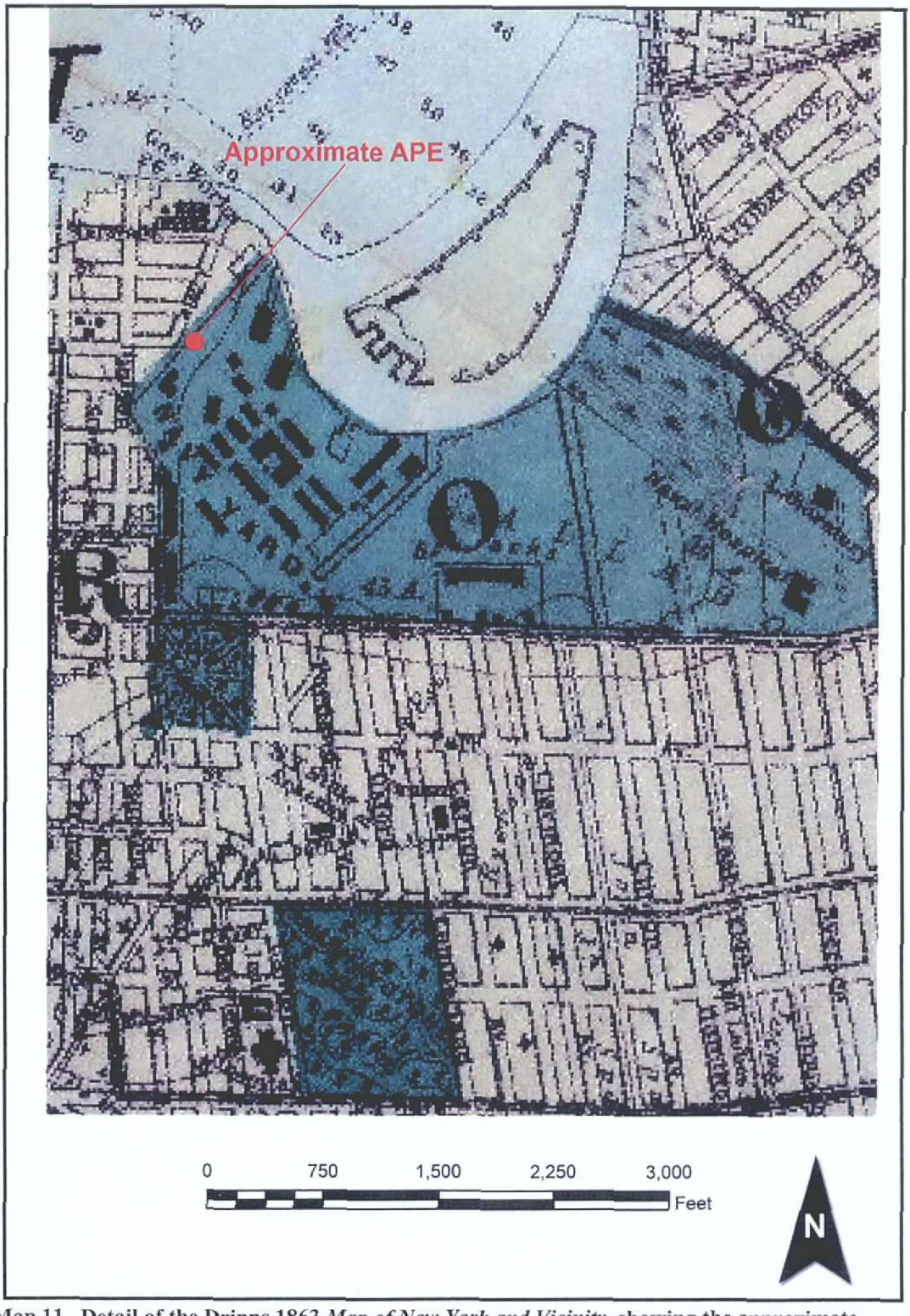
Map 8. Detail of the Burr 1834 Burr *Map of the City of New-York*, showing the approximate Project APE.



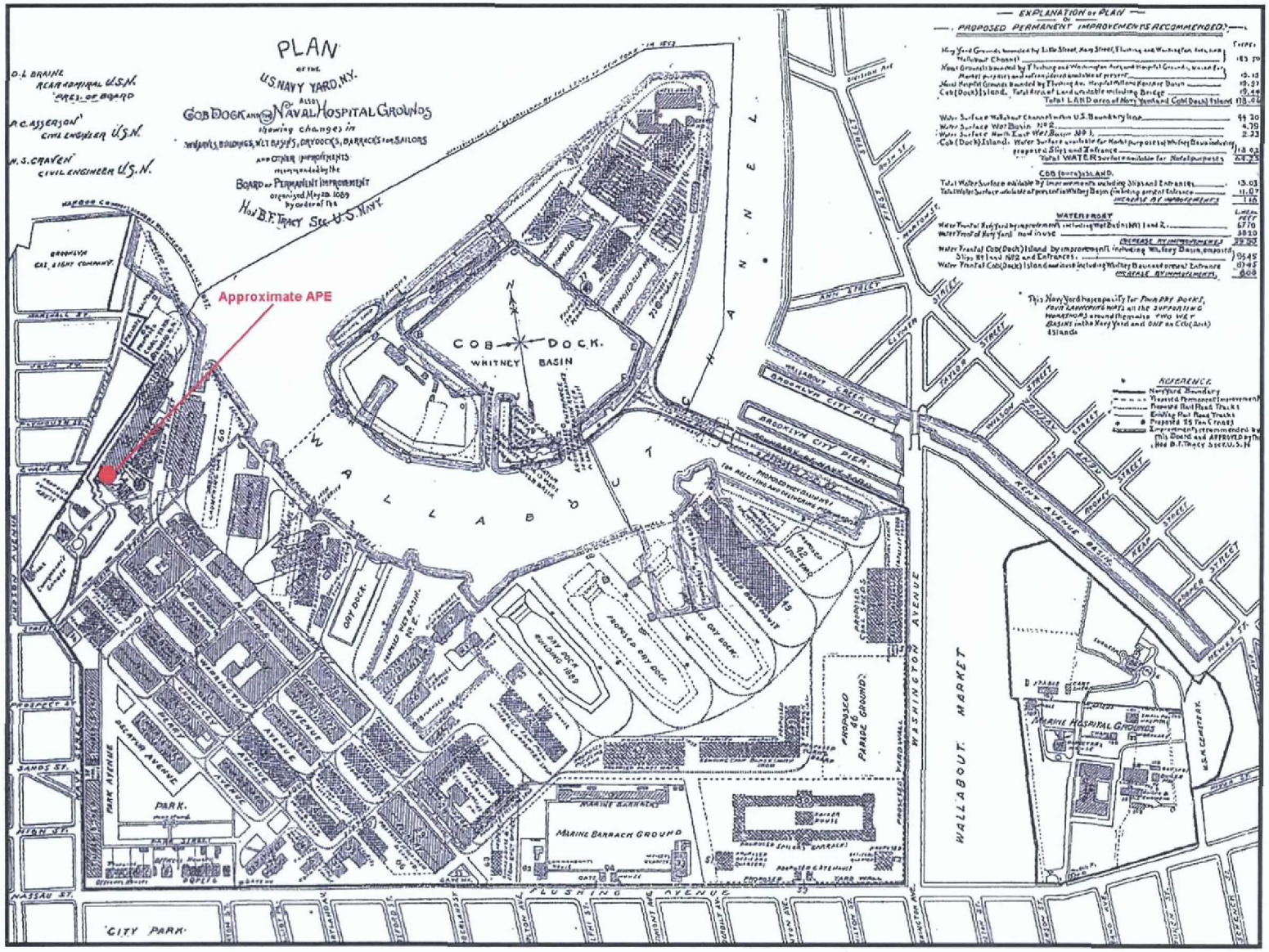
Map 9. Detail of the Kemble 1848 *City of New-York* map, showing the approximate Project APE.



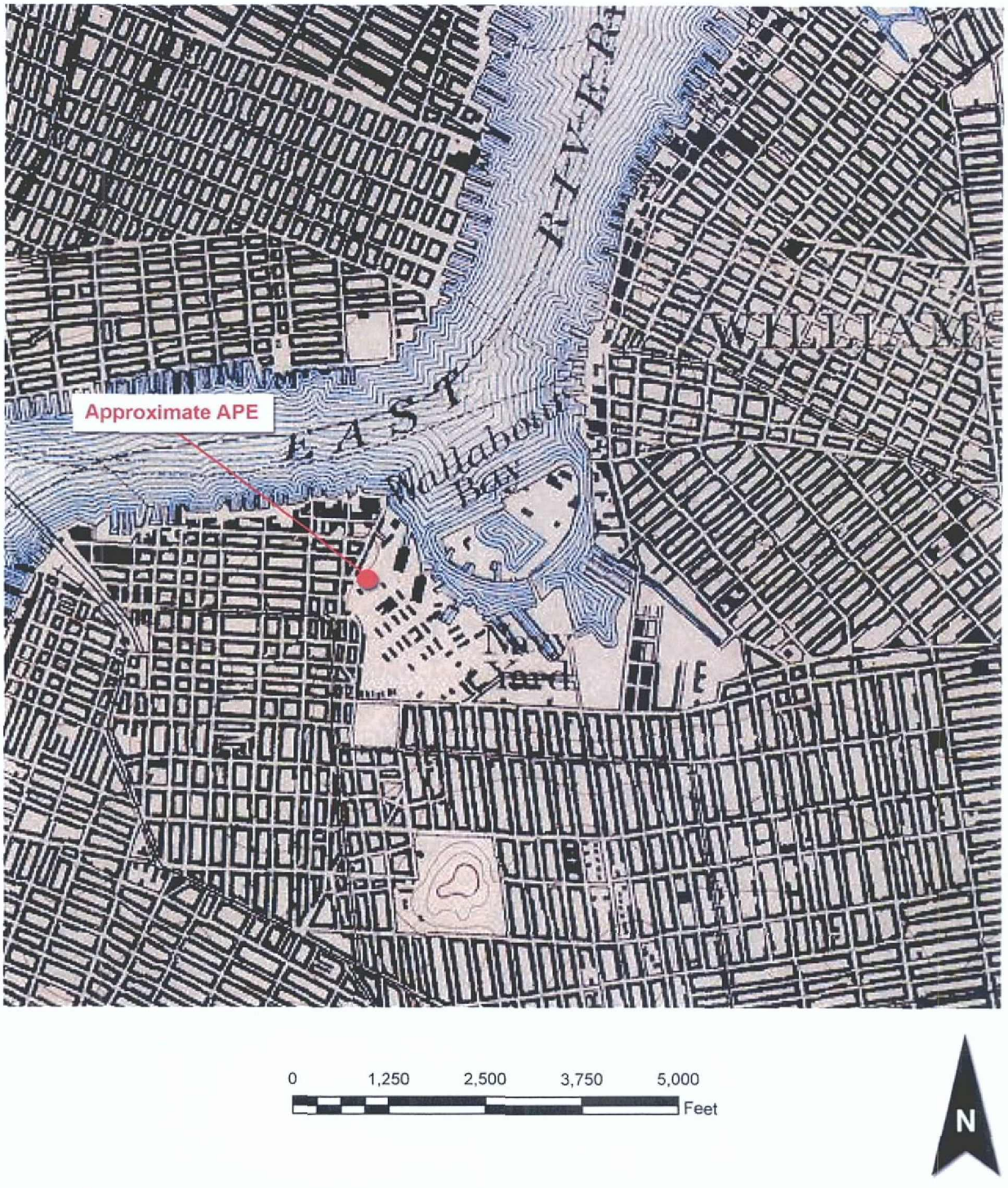
Map 10. Detail of the Colton 1849 *Map of the City of Brooklyn*, showing the approximate Project APE. Note the structure east of the Project labeled "Lyceum."



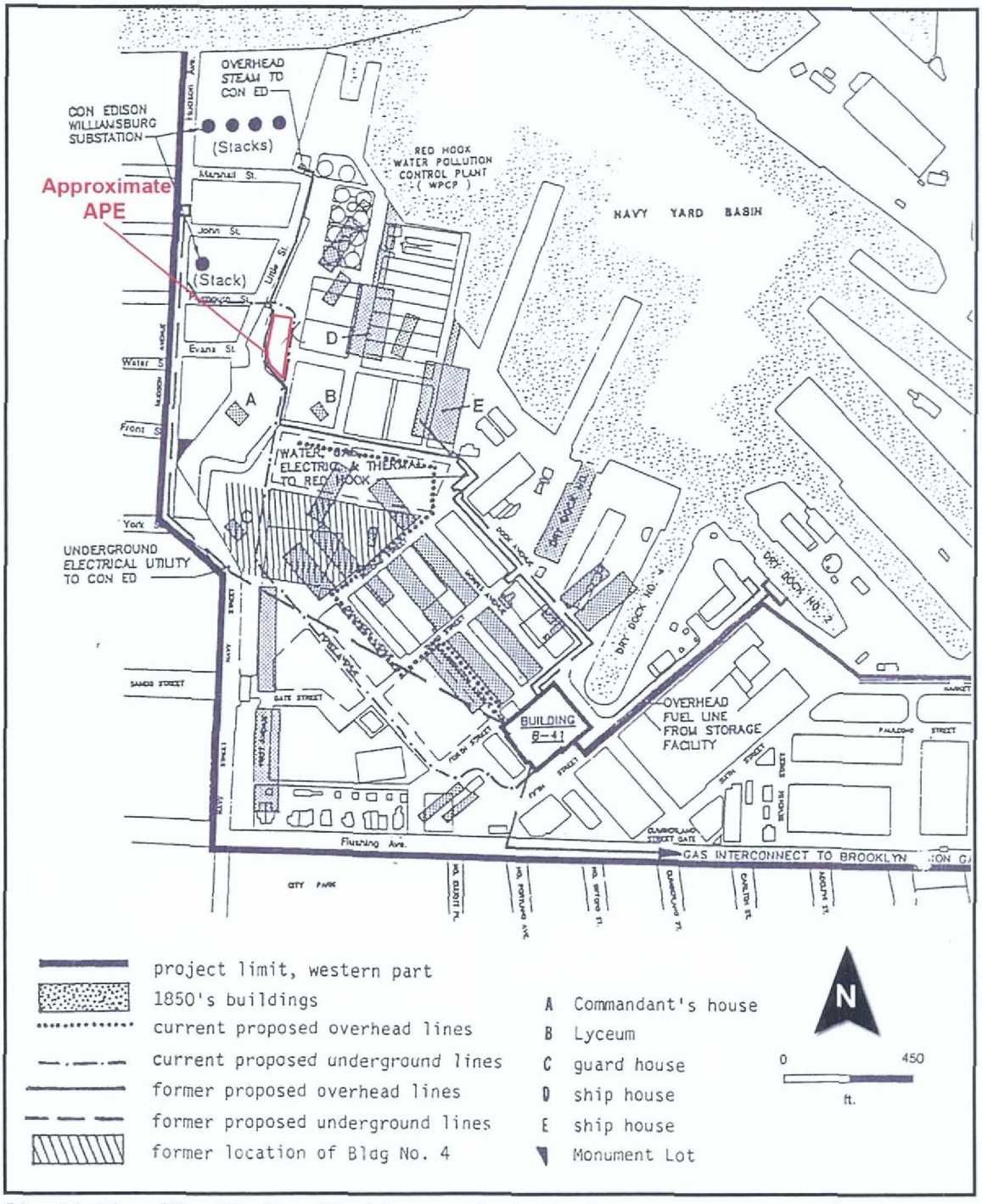
Map 11. Detail of the Dripps 1863 *Map of New York and Vicinity*, showing the approximate Project APE.



Map 12. Map of the "US Navy Yard, N.Y." published on page 13 of the November 17, 1889 issue of the *Brooklyn Daily Eagle*, showing the approximate Project APE. Note that no scale accompanies the map in the original publication.



Map 13. Detail of the USGS 1898 *Brooklyn 15′ Topographic Quadrangle, New York*, showing the approximate Project APE.



Map 14. Map of Brooklyn Navy Yard Cogeneration Project improvements monitored by Geismar and Oberon in 1996 showing the APE for the current WPCP system upgrade. Note the 1850s buildings in the vicinity of the Project APE and the proximity of the underground lines to the APE. The 1996 archaeological monitoring of these excavations revealed only fill deposits along the route of the underground lines (from Geismar and Oberon 1996:Figure 4).

PHOTOGRAPHS

Photo 1. General view of the Project APE, facing southwest. Note Quarters A in the background.

Photo 2. View of the Red Hook WPCP facilities adjacent to the Project APE, facing southeast from the substation. The WPCP main building is on the left in the photograph, and the primary settling tanks are visible on the right of the photograph.

Photo 3. General view of the Project, facing west. Note the existing paved roadway (First Avenue) adjacent to the Project.

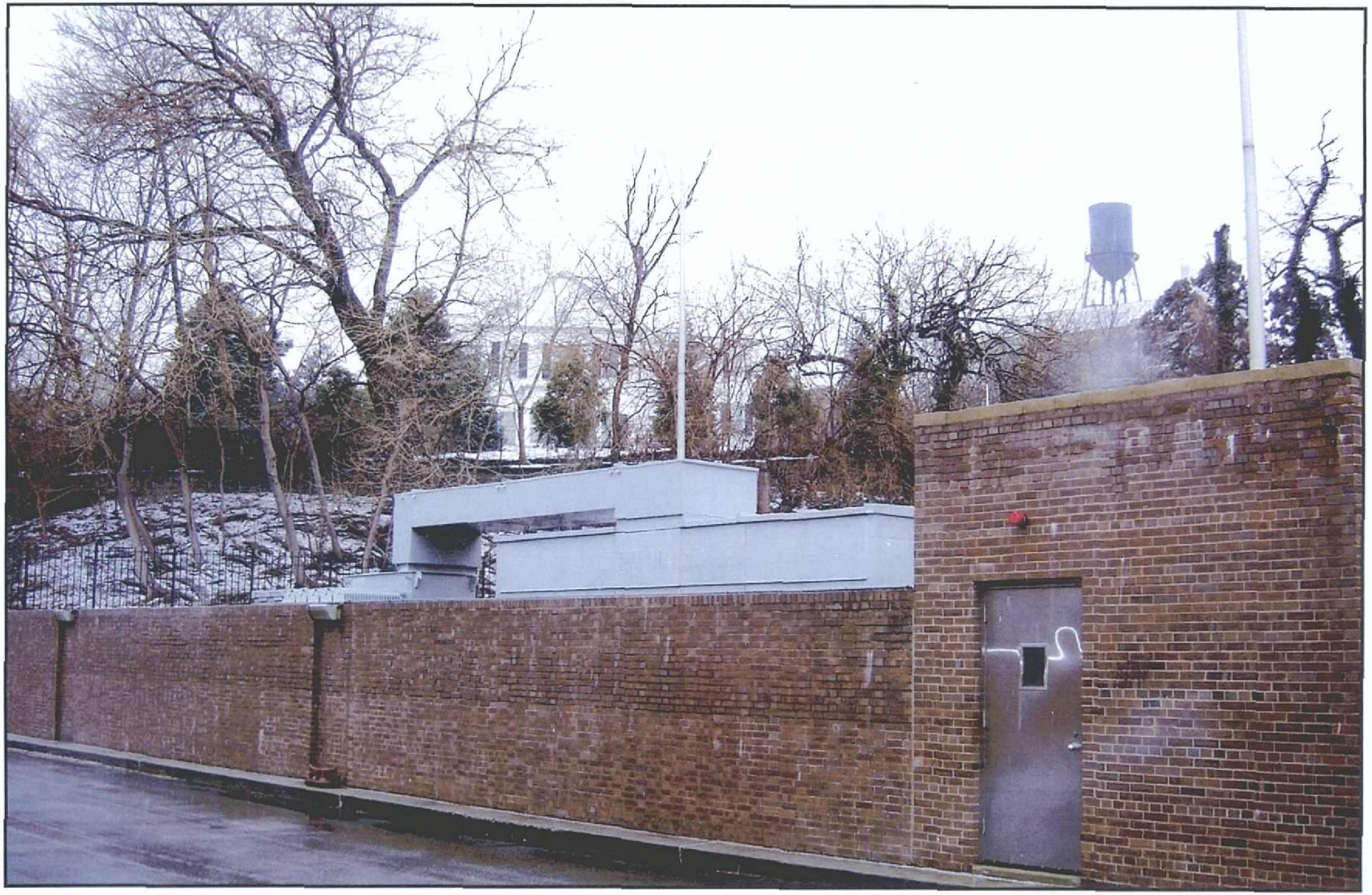


Photo 4. Interior view of substation, facing southeast. Note the existing concrete walkways and foundations. Note the existing concrete walkways and foundations. The switches and generating equipment visible in the photograph are connected via underground ductbanks and conduits running beneath the concrete paths.

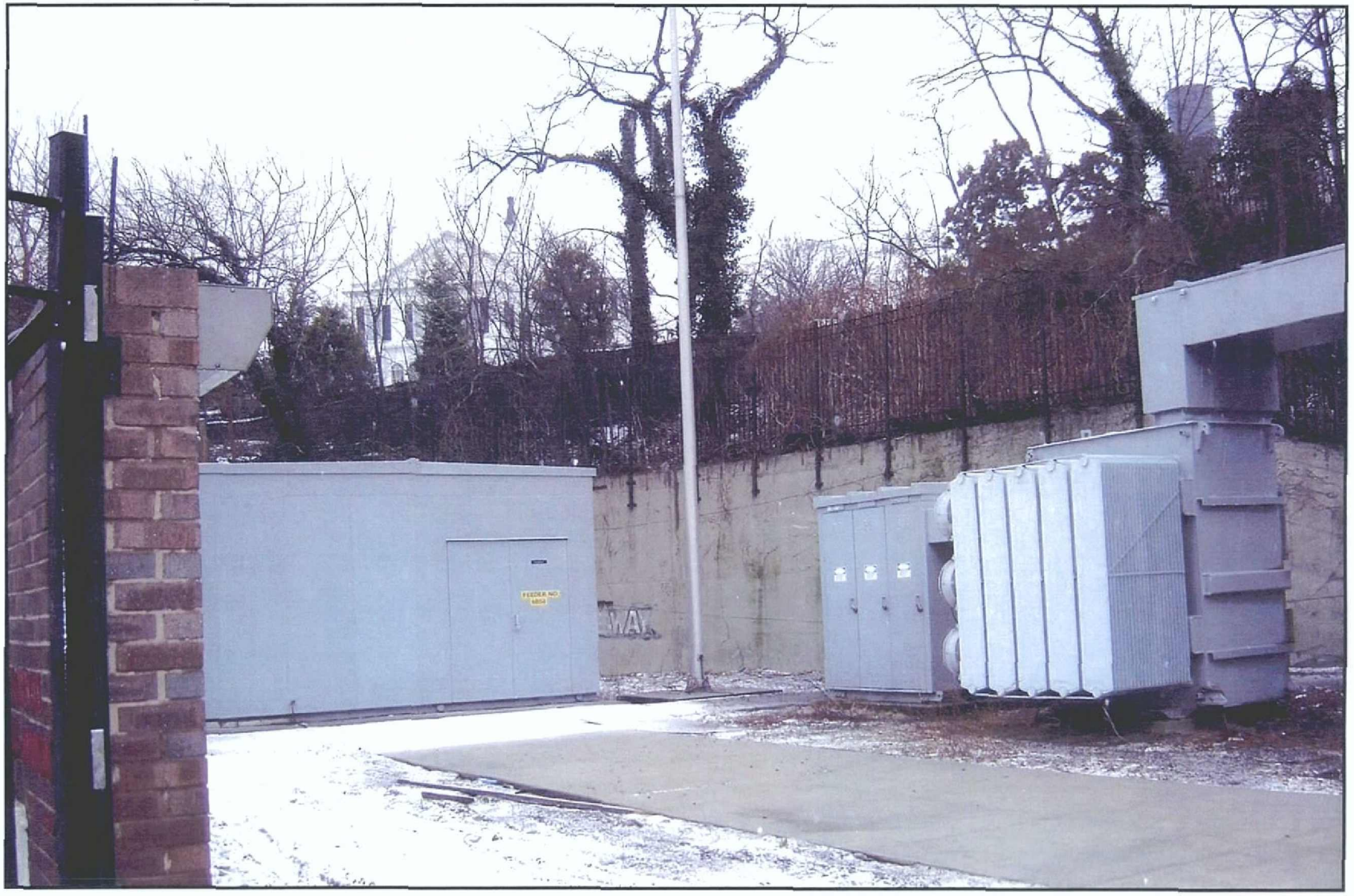


Photo 5. View of the Project, facing south. Note the fuel facility in the foreground and Quarters A in the background.

APPENDIX A: GZANY 2004 TEST BORING LOGS

BORING LOG

GZA GEOENVIRONMENTAL OF NEW YORK
440 NINTH AVENUE 16TH FLOOR
NEW YORK, NEW YORK 10001
GEOTECHNICAL CONSULTANTS

Client: DMJM Harris
Red Hook Water Pollution Control Plant
Generator Foundations

BORING NO. B-1
SHEET 1 of 2
GZA PROJECT NO. 41.0161338.00
PROJECT LOCATION Brooklyn, New York

BORING CO.	ADT	DRILLING RIG: CME-55	
FOREMAN	Dominick Pepe	TYPE OF DRILLING	
GZA ENG.	D. Bastos	HSA / MR / MRC / CO	

BORING COORDINATES	See Boring Location Plan
GROUND SURFACE EL.(FT)	Approx. 11.5 ft
FINAL BORING DEPTH (FT)	52
DATUM: Borough of Brooklyn Highway Datum	
DATE START/END	09/23 - 09/23/2004

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN.

TYPE OF HAMMER: AUTOMATIC DONUT

CASING SIZE: 4"

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME
09/24/04	8:00 AM	12.2 ft		17 hours
09/27/04	8:00 AM	11.4 ft		53 hours

DEPTH (ft)	SAMPLE NO	SAMPLE DEPTH (Feet)	PEN / REC (inch / inch)	PID	BLOWS per 6" / RQD (%)	SAMPLE DESCRIPTION: BURMISTER / USCS / NYC BUILDING CODE		PROFILE
0	S1	0 - 2		1.3		0.5' of topsoil and gravel.		TOPSOIL 0.5'
	S2	2 - 4		1.3		0.5' - 5': Hand-augered: Brown, fine to coarse SAND, little fine Gravel, trace Silt. (11-65)	SP	
5	S3	5 - 7	24/11	2.0	56-42-54-44*	S3: Very dense, gray, fine to coarse SAND, some Gravel, trace Silt. (11-65)	SP	
	S4	7 - 9	24/11	1.7	17-47-85-33	S4: Very dense, gray, fine to coarse SAND, some Gravel, trace Silt. (11-65)	SP	
10	S5	9 - 11	24/8	11.0	12-9-10-8	S5: Medium dense, gray, fine to coarse SAND, some Gravel, trace Silt, brick fragments, strong odor as of oil or diesel. (11-65)	SP	FILL
	S6	11 - 13	24/3	230	8-8-13-12	S6: Medium dense, gray, fine to coarse SAND, some Gravel, little Silt, brick fragments, strong odor as of oil or diesel. (11-65)	SP	
15	S7	15 - 17	24/2	44.0	16-11-8-12	S7: Medium dense, gray, fine to coarse SAND, some fine Gravel, trace Silt, brick fragments, strong odor as of oil or diesel. (6-65)	SP	
20	S8	20 - 22	24/8	4.0	11-9-11-14	S8: Medium dense, brown, fine to coarse SAND, some fine Gravel, trace Silt. (6-65)	SP	19' SAND
25	S9	25 - 27	24/4	4.0	11-8-9-8	S9: Medium dense, brown, fine to coarse SAND, trace Silt. (7-65)	SP	
30	S10	30 - 32	24/0	-	13-13-11-10	S10: No recovery.		

GRANULAR SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM DENSE
30-50	DENSE
>50	VERY DENSE

COHESIVE SOILS BLOWS/FT	DENSITY
<2	VERY SOFT
2-4	SOFT
4-8	M. STIFF
8-15	STIFF
15-30	V. STIFF
>30	HARD

REMARKS: * These blow counts are artificially high. Driller used less energy afraid of hiting utilities.
PID = Photo Ionization Detector

HSA-Hollow Stem Auger
MR-Mud Rotary
MRC-Mud Rotary with continuous casing
CO-Coring

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GZA

BORING LOG

GZA GEOENVIRONMENTAL OF NEW YORK
440 NINTH AVENUE 18TH FLOOR
NEW YORK, NEW YORK 10001
GEOTECHNICAL CONSULTANTS

Client: DMJM Harris
Red Hook Water Pollution Control Plant
Generator Foundations

BORING NO. B-1
SHEET 2 of 2
GZA PROJECT NO. 41.0161338.00
PROJECT LOCATION Brooklyn, New York

BORING CO. ADT — DRILLING RIG: CME-55
FOREMAN — TYPE OF DRILLING
GZA ENG. D. Bastos — HSA / MR / MRC / CO

BORING COORDINATES — See Boring Location Plan
GROUND SURFACE EL.(FT) Approx. 11.6 ft — DATUM: Borough of Brooklyn Highway Datum
FINAL BORING DEPTH (FT) 52 — DATE START/END 09/23 - 09/23/2004

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN
TYPE OF HAMMER: AUTOMATIC DONUT
CASING SIZE: 4"

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME
09/24/04	8:00 AM	12.2 ft		17 hours
09/27/04	8:00 AM	11.4 ft		53 hours

DEPTH feet	SAMPLE NO	SAMPLE DEPTH (Feet)	PEN / REC (inch / inch)	PID	BLOWS per 6" ROD (%)	SAMPLE DESCRIPTION BURMISTER / USCS / NYC BUILDING CODE		PROFILE
30								
35	S11	35 - 37	24/3	3.7	15-10-14-14	S11: Medium dense, brown, fine to coarse SAND, trace Silt (7-65)	SP	
40	S12	40 - 42	24/2	7.2	13-13-11-10	S12: Medium dense, brown, fine to coarse SAND, trace Silt, trace Gravel. (7-65)	SP	SAND
45	S13	45 - 47	24/0	-	22-19-19-14	S13: No recovery.		
50	S14	50 - 52	24/10	-	11-10-11-12	S14: Medium dense, brownish gray, fine to coarse SAND, trace Silt (7-65)	SP	
55						End of Boring at 52 ft.		52'
60								

GRANULAR SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM DENSE
30-50	DENSE
>50	VERY DENSE

COHESIVE SOILS BLOWS/FT	DENSITY
<2	VERY SOFT
2-4	SOFT
4-8	M. STIFF
8-16	STIFF
16-30	V. STIFF
>30	HARD

REMARKS: Observation well installed at 16 ft. (See Observation Well Installation Log).

HSA-Hollow Stem Auger
MR-Mud Rotary
MRC-Mud Rotary with continuous casing
CO-Coring

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GZA

BORING LOG

GZA GEOENVIRONMENTAL OF NEW YORK 440 NINTH AVENUE 18TH FLOOR NEW YORK, NEW YORK 10001 GEOTECHNICAL CONSULTANTS	Client: DMJM Harris Red Hook Water Pollution Control Plant Generator Foundations	BORING NO.: B-2 SHEET: 1 of 2 GZA PROJECT NO.: 41.0181338.00 PROJECT LOCATION: Brooklyn, New York	

BORING CO.	ADT	DRILLING RIG: CME-55	
FOREMAN	Dominick Pepe	TYPE OF DRILLING	
GZA ENG.	D. Bastos	HSA / MR / MRC / CO	
BORING COORDINATES		See Boring Location Plan	
GROUND SURFACE EL.(FT)	Approx. 12 ft	DATUM: Borough of Brooklyn Highway Datum	
FINAL BORING DEPTH (FT)	52	DATE START/END	09/24 - 09/24/2004

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

TYPE OF HAMMER: AUTOMATIC DONUT

CASING SIZE: 4"

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME

DEPTH (ft)	SAMPLE NO	SAMPLE DEPTH (Feet)	PEN / REC (inch / inch)	PID	BLOWS per 6" / RQD (%)	SAMPLE DESCRIPTION BURMISTER / USCS / NYC BUILDING CODE		PROFILE
0	S1	0 - 2		1.3		0.5' of topsoil and gravel.		TOPSOIL 0.5'
	S2	2 - 4		1.0		0.5' - 5': Hand-augered: Brown, fine to coarse SAND, trace Silt. (11-65)	SP	
5	S3	6 - 7		1.0		5' - 9': Hand-augered: Dark brown, fine to coarse SAND, little fine Gravel, trace Silt. (11-65)	SP	FILL
	S4	7 - 9	24/8	1.0	24-25-22-17	S4: Medium dense, dark brown, fine to coarse SAND, little Gravel, trace Silt. (Environmental sample) (11-65)	SP	
10	S5	9 - 11	24/5	1.0	10-5-9-6	S5: Medium dense, dark brown, fine to coarse SAND, some fine Gravel, trace Silt. (Environmental sample) (6-65)	SP	9'
	S6	11 - 13	24/6	1.7	8-8-9-7	S6: Medium dense, dark brown, fine to coarse SAND, some fine Gravel, little Silt. (6-65)	SP	
15	S7	15 - 17	24/6	3.7	17-17-15-18	S7: Dense, dark brown, fine to coarse SAND, some fine Gravel, trace Silt. (6-65)	SP	
20	S8	20 - 22	24/5	4.4	12-12-15-12	S8: Medium dense, dark brown, fine to coarse SAND, some fine Gravel, trace Silt. (6-65)	SP	SAND
25	S9	25 - 27	24/1	12.0	11-8-10-9	S9: Medium dense, brown, fine to coarse SAND and fine GRAVEL, trace Silt. (6-65)	GP	
30	S10	30 - 32	24/10	1.0	8-8-11-9	S10: Medium dense, dark brown, fine to coarse SAND, trace Gravel, trace Silt. (6-65)	SP	

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE	<2	VERY SOFT
4-10	LOOSE	2-4	SOFT
10-30	MEDIUM DENSE	4-8	M. STIFF.
30-50	DENSE	8-15	STIFF.
>50	VERY DENSE	15-30	V. STIFF.
		>30	HARD

REMARKS: PID = Photo Ionization Detector

HSA-Hollow Stem Auger
MR-Mud Rotary
MRC-Mud Rotary with continuous casing
CO-Coring

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING LOG

GZA GEOENVIRONMENTAL OF NEW YORK 440 NINTH AVENUE 18TH FLOOR NEW YORK, NEW YORK 10001 GEOTECHNICAL CONSULTANTS	Client: DMJM Harris Red Hook Water Pollution Control Plant Generator Foundations	BORING NO. B-2 SHEET 2 of 2 GZA PROJECT NO. 41.01613.16.00 PROJECT LOCATION Brooklyn, New York	

BORING CO.	ADT	DRILLING RIG: CME-55	
FOREMAN	Dominick Pepe	TYPE OF DRILLING	
GZA ENG.	D. Bastos	HSA / MR / MRC / CO	
BORING COORDINATES		See Boring Location Plan	
GROUND SURFACE EL.(FT)	Approx. 12 ft	DATUM: Borough of Brooklyn Highway Datum	
FINAL BORING DEPTH (FT)	52	DATE START/END	09/24 - 09/24/2004

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

TYPE OF HAMMER: AUTOMATIC DONUT

CASING SIZE: 4"

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME

DEPTH feet	SAMPLE NO.	SAMPLE DEPTH (Feet)	SAMPLE PEN / REC (inch / inch)	SAMPLE PID	SAMPLE BLOWS per 6" ROD (%)	SAMPLE DESCRIPTION BURMISTER / USCS / NYC BUILDING CODE		PROFILE
30								
35	S11	35 - 37	24/8	5.0	9-10-12-10	S11: Medium dense, brown, fine to coarse SAND, little Gravel trace Silt. (6-65)	SP	SAND
40	S12	40 - 42	24/8	0.6	10-12-16-14	S12: Medium dense, brown, fine to coarse SAND, little Gravel trace Silt. (6-65)	SP	
45	S13	45 - 47	24/8	6.0	9-11-14-13	S13: Medium dense, brown, fine to coarse SAND, little Gravel trace Silt. (6-65)	SP	
50	S14	50 - 52	24/3	3.0	7-9-11-15	S15: Medium dense, brown, fine to coarse SAND, some Gravel trace Silt. (6-65)	SP	
						End of Boring at 52 ft.		52'
55								
60								

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE	<2	VERY SOFT
4-10	LOOSE	2-4	SOFT
10-30	MEDIUM DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	VERY DENSE	15-30	V. STIFF
		>30	HARD

REMARKS:

HSA-Hollow Stem Auger
MR-Mud Rotary
MRC-Mud Rotary with continuous casing
CO-Coring

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GZA

BORING LOG

GZA GEOENVIRONMENTAL OF NEW YORK 440 NINTH AVENUE 18TH FLOOR NEW YORK, NEW YORK 10001 GEOTECHNICAL CONSULTANTS	Client: OMJM Harris Red Hook Water Pollution Control Plant Generator Foundations	BORING NO.: B-3 SHEET: 1 of 2 GZA PROJECT NO.: 41.0181338.00 PROJECT LOCATION: Brooklyn, New York	

BORING CO.	ADT	DRILLING RIG: CME-55	
FOREMAN	Dominick Pepe	TYPE OF DRILLING	
GZA ENG.	D. Bastos	HSA / MR / MRC / CO	
BORING COORDINATES		See Boring Location Plan	
GROUND SURFACE EL.(FT)	Approx. 12 ft	DATUM: Borough of Brooklyn Highway Datum	
FINAL BORING DEPTH (FT)	52	DATE START/END	09/24 - 09/27/2004

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

TYPE OF HAMMER: AUTOMATIC DONUT

CASING SIZE: 4"

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME

DEPTH feet	SAMPLE NO.	SAMPLE DEPTH (Feet)	SAMPLE PEN./ REC. (inch/inch)	PID	BLOWS per 6" RQD (%)	SAMPLE DESCRIPTION: BURMISTER / USCS / NYC BUILDING CODE		PROFILE
0	S1	0 - 2		1.0		0.5' of topsoil and gravel.		TOPSOIL 0.5'
	S2	2 - 4		1.0		0.5' - 6': Hand augered: Light brown, fine to coarse SAND, little fine Gravel, trace Silt. (11-65)	SP	
5	S3	4 - 6		0.0				
	S4	6 - 8	18/8	0.0	12-48-100/6"	S4:Very dense, brown, fine to coarse SAND, little Gravel, trace Silt; brick, concrete and asphalt fragments (piece of concrete at the end of spoon). (11-65)	SP	FILL
	S5	8 - 10	24/4	1.0	10-22-43-12			
10	S6	10 - 12	24/7	1.0	9-9-12-10	S5: Very dense, greyish brown, fine to coarse SAND, some Gravel, trace Silt; concrete fragments at the end of spoon. (Environmental sample) (11-65)	SP	
						S6: Medium dense, greyish brown, fine to coarse SAND, some fine Gravel, trace Silt; fragments of debris. (Environmental sample) (11-65)	SP	
15	S7	15 - 17	24/8	0.0	7-9-10-10	S7: Medium dense, dark brown, fine to coarse SAND, some fine Gravel, trace Silt. (6-65)	SP	
20	S8	20 - 22	24/1	1.0	10-16-11-11	S8: Medium dense, dark brown, fine to coarse SAND, some fine Gravel, trace Silt. (6-65)	SP	18' Gravelly SAND
25	S9	25 - 27	24/3	1.3	9-17-16-14	S9: Dense dark brown, fine to coarse SAND, some Gravel, trace Silt. (6-65)	SP	
30	S10	30 - 32	24/8		10-11-14-13	S10: Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt. (6-65)	SP	

GRANULAR SOILS BLOWS/FT. DENSITY		COHESIVE SOILS BLOWS/FT DENSITY	
0-4	VERY LOOSE	<2	VERY SOFT
4-10	LOOSE	2-4	SOFT
10-30	MEDIUM DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	VERY DENSE	15-30	V. STIFF
		>30	HARD

REMARKS: PID = Photo Ionization Detector

HSA-Hollow Stem Auger
MR-Mud Rotary
MRC-Mud Rotary with continuous casing
CO-Coring

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING LOG

GZA GEOENVIRONMENTAL OF NEW YORK 440 NINTH AVENUE 16TH FLOOR NEW YORK, NEW YORK 10001 GEOTECHNICAL CONSULTANTS	Client: DMJM Harris Red Hook Water Pollution Control Plant Generator Foundations	BORING NO.: B-3 SHEET: 2 of 2 GZA PROJECT NO.: 41.0151838.00 PROJECT LOCATION: Brooklyn, New York	

BORING CO.	ADT	DRILLING RIG: CME-55	BORING COORDINATES: See Boring Location Plan
FOREMAN	Dominick Pepe	TYPE OF DRILLING	GROUND SURFACE EL.(FT): Approx. 12 ft — DATUM: Borough of Brooklyn Highway Datum
GZA ENG.	D. Bastos	HSA / MR / MRC / CO	FINAL BORING DEPTH (FT): 52 — DATE START/END: 09/24 - 09/27/2004

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

TYPE OF HAMMER: AUTOMATIC DONUT

CASING SIZE: 4"

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME

DEPTH feet	SAMPLE NO	SAMPLE DEPTH (Feet)	PEN / REC (inch / inch)	PID	BLOWS per 6" / RQD (%)	SAMPLE DESCRIPTION BURMISTER / USCS / NYC BUILDING CODE		PROFILE
30								
35								
	S11	35 - 37	24/3	3.7	8-9-11-13	S11: Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt (7-65)	SP	SAND
40								
	S12	40 - 42	24/2	7.2	4-12-18-13	S12: Medium dense, brown, fine to coarse SAND, trace Silt (7-65)	SP	
45								
	S13	45 - 47	24/0	-	12-15-18-18	S13: Dense, brown, fine to coarse SAND, some Gravel, trace Silt (6-65)	SP	
50								
	S14	50 - 52	24/10	-	13-18-23-20	S14: Dense, brown, fine to coarse SAND, little Gravel, trace Silt (6-65)	SP	
						End of Boring at 52 ft.		52'
55								
60								

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE	<2	VERY SOFT
4-10	LOOSE	2-4	SOFT
10-30	MEDIUM DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	VERY DENSE	15-30	V. STIFF
		>30	HARD

REMARKS:

HSA-Hollow Stem Auger
MR-Mud Rotary
MRC-Mud Rotary with continuous casing
CO-Coring

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

APPENDIX B: PRINCIPAL INVESTIGATOR'S RÉSUMÉ

ROBERT J. QUIGGLE, MA

Robert.Quiggle@nypa.gov

Cultural Resource Specialist • New York Power Authority • 123 Main Street
White Plains, New York 10601• Office: 914.681.6404
Cell: 914.703.0116 • Fax: 914.287.3294

OVERVIEW

I currently serve as the Cultural Resource Specialist for the New York Power Authority (NYPA). In this capacity, my duties include developing scopes of work for cultural resource studies; reviewing NYPA undertakings to determine if additional studies or consultation with the State Historic Preservation Office (SHPO), or the City of New York Landmarks Preservation Commission (LPC) are necessary; developing Programmatic Agreements with state agencies; reviewing consultants' proposals and budgets; and monitoring ongoing cultural resources work. Additional responsibilities include meeting with stakeholders and Indian Nations; maintaining a close dialogue with the SHPO and New York State Museum; preparing background documentation on historic properties within the area of potential effects for NYPA undertakings; and assisting NYPA's Agency Preservation Officer in ensuring compliance with National Historic Preservation Act, the State Historic Preservation Act, and other applicable laws regulations.

While my primary research interests are in Contact Period fiber perishables in the northeast, I have participated in archaeological fieldwork across the United States involving both prehistoric and historic sites. As a practicing archaeologist, I have conducted research on artifact collections and archaeological sites in New York and Pennsylvania. Additionally, in my capacity with NYPA, I have evaluated the potential impact of undertakings on historic properties at NYPA facilities throughout New York and prepared internal reports for NYPA review and supporting documentation for SHPO review.

ADDITIONAL QUALIFICATIONS

Exceeds the Professional Qualifications Standards for Archaeology (36CFR61)

Eligible for membership in the Register of Professional Archaeologists

EDUCATION

Binghamton University, Binghamton, NY
Doctoral Student: September 2006–January 2006
Anthropology (Archaeology)
GPA: 3.96

Binghamton University, Binghamton, NY
Master of Arts: August 2005
Anthropology (Archaeology)
GPA: 3.96

Mercyhurst College, Erie, PA
Bachelor of Science: May 2003
Anthropology (Archaeology)
GPA: 3.35

PREVIOUS EXPERIENCE AND EMPLOYMENT

Binghamton University
Teaching Assistant, Spring 2004–Spring 2005

Independent Archaeological Research Consultant
Summer 2005

Public Archaeology Facility, Binghamton, NY
Senior Research Aide, Summer 2005

Fish and Wildlife Service, Shemya Island, AK

Archaeologist Field Technician, Summer 2005

Public Archaeology Facility, Binghamton, NY
Archaeological Field Technician, Fall 2003–Summer 2004

Binghamton University, Anthropology Dept., Binghamton, NY
Research Assistant, Spring 2004

Mercyhurst Archaeological Institute, Erie, PA
Assistant Instructor and Crew Chief
Summer Field School, 2003

Mercyhurst Archaeological Institute, Erie, PA
Archaeological Field Technician
Cultural Resource Management, 2000–2003

Skelly and Loy Engineers and Consultants, Monroeville, PA
Archaeological Field Technician, Summer 2002

Mercyhurst Archaeological Institute, Irvine, PA
Prehistoric Field School, Summer 2001

AWARDS AND HONORS

Recipient, 2004 Graduate Student Award for Service/Outreach, Binghamton University

Mercyhurst College Dean's List, 2001–2003

RESEARCH

Will, R.T., R.J. Cole-Will, K.L. Wheeler, W.M. Marlett, and R.J. Quiggle
2006 *Phase IB Cultural Resources Investigation, Niagara Power Project, FERC No. 2216*. Submitted to the New York Power Authority. Copies Available from the New York Power Authority, White Plains, New York.

Quiggle, R.J.
2005 *Report on the Cornish Site and Hayes I Locality: Artifact Analysis and Interpretation*. Contract report submitted to Franklin and Marshall College. Copies available from Franklin and Marshall College, Lancaster, Pennsylvania.

Quiggle, R.J.
2005 Cordage and Basketry Impressions on Ceramics from the Strickler Site (36La03), Lancaster County, Pennsylvania. Unpublished MA thesis, Department of Anthropology, State University of New York, Binghamton.

Quiggle, R.J.
2003 Geoarchaeological Investigations at Walnut Creek Terrace, Millcreek Township, Erie County, PA. Unpublished senior thesis, Mercyhurst Archaeological Institute, Mercyhurst College, Erie.

PUBLIC INTERPRETATION

Community Archaeology Program, Binghamton University, Binghamton, NY
2003-Present

- Educate students and adults in the community on archaeological resources
- Help to build a more detailed understanding of methodology, problems, and concerns in archaeology and historic preservation

Archaeology for Kids Program, Binghamton University, Binghamton, NY
Summer 2004

- Introduce elementary school students to archaeology in the in their region and around the world, while fostering an appreciation for past cultures
- Stress the significance of archaeological and historical resources and the importance of preserving them for the future

PROFESSIONAL MEMBERSHIPS

Society for American Archaeology (SAA)

ROBERT J. QUIGGLE, MA
Robert.Quiggle@nypa.gov

PROFESSIONAL REFERENCES

The following have indicated their willingness to speak to my skills and qualifications:

Albert A. Dekin, Jr., Ph.D.
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J. M. Adovasio, Ph.D., D.Sc.
Dean, the Zurn School of
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Additional references available upon request.