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AVENUE V PUMPING STATION

PHASE 1A ARCHAEOLOGICAL ASSESSMENT

NYC DEP
WP-169

Coney ISLAND Creek

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I. INTRODUCTION

The New York City Department of Environmental Protection (NYCDEP) has proposed the upgrading of the Avenue V Pumping Station with state-of-the-art pumping equipment, and to reroute the existing force main in order to meet combined sewer overflow conveyance requirements established by the New York State Department of Environmental Conservation (NYSDEC).

The Avenue V Pumping Station is located on Block 7140, at the corner of Avenue V and West 11th Street in the Bensonhurst section of the Borough of Brooklyn, New York. The proposed route of the new 60-inch force main, which passes through the Bensonhurst, Bath Beach and Fort Hamilton sections of Brooklyn, is approximately 18,310 feet long. It follows Avenue V from the pumping station to the intersection of Stillwell, Benson and 27th Avenues. It continues southward along 27th Avenue, then west on Cropsey Avenue, and south along Bay 40th Street, crossing the Shore Parkway service road. It then continues in a generally westerly direction along the northern grassy shoulder of the Shore Parkway to Bay 20th Street. From Bay 20th Street, the route follows the line of the SE-133 Section 2 gravity sewer (designed but never constructed), past the entrance ramp for the Verrazano-Narrows Bridge, where it meets the existing SE-133 Section 1. (See Fig. 1)

For construction purposes, the force main route will be divided into two segments, Force Main 1 (FM1), the northerly part of the route beginning at Shore Parkway at Bay 20th Street and ending at the Verrazano-Narrows Bridge, and Force Main 2 (FM2), from the Shore Parkway at 20th Street to the Avenue V Pumping Station. When referring to maps while following the text of the report, the reader should note that the 1997 Sanborn maps begin with the southern end of the corridor, at the Pumping Station (Figure 2), and move northward to Fort Hamilton (Figure 14). The 1890 atlas figures (Figures 16-22) follow the same progression.

In the section of the force main route along Avenue V, 27th Avenue, Cropsey Avenue and Bay 40th Street (Figs. 2-6), construction would be below grade within the existing streetbeds. Along the Shore Parkway (Figs 6-14), the majority of the force main would be below grade on the grassy shoulder. The trench required would be designed to provide a minimum 4-foot cover, and given the 60-inch diameter of the force main, and varying surface elevations along the route, an average total depth of nine to eleven feet. Trench width would be approximately nine feet. Along the Shore Parkway at the Bay 8th Street entrance ramps (Fig. 14), the main would be installed using trenchless technology (pipe jacking/tunneling) to a depth ranging from 10 to 25 feet.

The purpose of this assessment report is to determine the presence, type, extent and significance of any cultural resources which may be present on the Avenue V

Pumping Station and Force Main site. It is based on archival research which documents the probability that the site hosted any prehistoric or historical resources, and their likely survival of post-depositional disturbances, which may have accompanied any subsequent development.

In order to address the above concerns, various sources of data were researched. Primary source material on the project sites was collected to determine the sites' original topography, and to compile a building history and disturbance record. Historical maps and descriptions of the study area were collected in the Local History and Map Divisions of the New York Public Library, the Fort Hamilton Harbor Defense Museum and the Office of Planning at Fort Hamilton. Two sets of soil boring logs for the proposed force main route were provided by Hazen and Sawyer, P.C., and can be found in Appendix B.

To place the Avenue V Pumping Station and Force Main sites within their prehistoric context, archaeological literature, available site reports and journal publications were researched for data specific to the project sites and their vicinity. These include the works of archaeologists Arthur C. Parker, Reginald P. Bolton and Ralph Solecki, as well as historians such as Grumet, Van Wyck and Thompson. William Ritchie's *The Archaeology of New York State* provided a valuable overview of Native American culture and lifeways during the prehistoric period. Inquiries on inventoried prehistoric and historical sites in the project area were sent to the New York State Museum and the Office of Parks, Recreation and Historic Preservation. Their responses are discussed within the report and can be found in Appendix A.

II. ENVIRONMENTAL SETTING

Long Island is the top of a Coastal Plain ridge formation that is covered with glacial drift, in reality an elevated sea bottom demonstrating low topographic relief and extensive marshy tracts. In the last million years, as glaciers advanced and receded three times, the surficial geology of the island, including the vicinity of the Ave V Pumping Station and Force Main site, was profoundly altered. "The glacier was an effective agent of erosion, altering the landscape wherever it passed. Tons of soil and stone were carried forward, carving and planing the land surface. At the margins of the ice sheet, massive accumulations of glacial debris were deposited, forming a series of low hills, or terminal moraines" (Eisenberg 1978:19). Circa 18,000 years ago, the last ice sheet reached its southern limit, creating the Harbor Hill moraine that traverses the length of Long Island. Before extensive alteration of the landscape during the 19th and 20th centuries, a gently-sloping plain extended south of the moraine to the sandy shore at the shallow edges of Gravesend Bay, and the Coney Island barrier beach.

Sections of the continental shelf, now buried beneath layers of modern fill deposited during construction of the Belt Parkway System, were exposed during the last ice age and served as Long Island's Atlantic shoreline from c.12,000 to 10,000 years before present (B.P.). The continental shelf was submerged as sea levels rose fairly rapidly until c.4,000 to 2,000 B.P., and continued to rise more slowly to the present.

The flooding of the gently sloping glacial outwash plains of Western Long Island led to the formation of the extensive salt marsh areas in the eastern section of the project site, in the area of Coney Island Creek and its tributaries, such as Hubbard Creek. (See Figs. 15 and 16) Such marshes are formed in areas with no strong currents and lying no more than one to two feet below low water. In such conditions, eel grass becomes established, trapping silt and building up a layer of dead grass and silt until the surface is slightly above high water (Pickman 1987:5).

West of 27th Avenue, the gently-sloping beaches of the pre-development shoreline of Gravesend Bay stretched in an unbroken line as far west as present Dyker Beach Park, which begins west of the line of Bay 8th Street. Here, at the time of the first European settlement, there was a creek draining through a salt marsh into Gravesend Bay. (See Fig. 15) Much of this section of the project area was land created from fill, some dating to the 19th century (generally Shore Parkway east of Bay 32nd Street) and much of the remainder to the west of Bay 32nd Street from the hydraulic filling associated with the construction of the Shore Parkway in the 1930s.

West of Dyker Beach Park, the Fort Hamilton Reservation sits on a naturally-elevated bluff, 30 to 40 feet above mean sea level, which juts out into the Narrows. (See Fig. 1) Low-lying areas south of Fort Hamilton, now

approximately 10 to 30 feet above mean sea level, were created through filling operations conducted by the U.S. Army in c.1900, and by the New York City Parks Department, for the Shore Parkway in the 1930s.

It is probable that when sea levels were below the current mean, between c.12,000 and 7,000 years ago, that the sections of the Force Main route which were formerly part of the Gravesend Bay floor, and have been deeply-buried by various modern fill episodes, were once exposed and available for exploitation by prehistoric man.

Because of the difficulties of discussing topography and the alterations to it through time, for such a large and varied area, the project site will be divided into smaller sections for the following more specific discussion of past and current environmental conditions.

Avenue V Pumping Station Site (Figure 2)

Prior to development, the Avenue V Pumping Station site (on Block 7140, the south side of Avenue V between 11th and 12th Streets) was a parcel of dry land adjacent to the northern edge of the salt marsh surrounding Hubbard Creek, which drained into Coney Island Creek. This marsh once came to within 200 feet of the station site, with the creek only about 300 feet to the south at West 10th Street. (See Fig. 15) The 1844 map depicts the location as part of a cultivated field (Hassler 1844-45), and both marsh and creek have definitely been filled by the end of the 19th century. The current U.S.G.S. topographic map records elevations there between the 10- and 15-foot contour lines, sloping gradually downward toward the west. (See Fig. 1)

Soil borings on the pump station site (MRPS-1, 2P, and 3a) record a fill overmantle of between 33' and 39' thick, with the water table approximately 8' below the current surface. This indicates that construction of the pump station entailed the removal of the predevelopment surface to a minimum depth of 25'. (Appendix B)

Avenue V from 10th Street to Stillwell, Benson and 27th Avenues (Figures 2 and 3)

This section of Avenue V was not constructed until sometime after 1897 (U.S.G.S. 1897). Prior to 19th- and 20th-century filling episodes, it was part of the dry land adjacent to the salt marsh drained by Hubbard Creek (Hassler 1844-45) The 1877 map shows the swamp abutting this section of the project site at Stillwell Avenue, with Hubbard Creek only 75' to the south. The distance between the swamp and Avenue V increased toward the east, to as much as

500' south of Avenue V at West 11th Street (Dripps 1877). The 1905 atlas shows the Creek itself abutting the south side of Avenue V at Stillwell Avenue (Sanborn 1905:50).

Avenue V slopes gradually downward toward the west. The earliest precise elevations found for Avenue V were from the 1905 real estate atlas, which records elevations declining from 11.5' at West 10th Street to 5' at Stillwell Avenue, generally the same as the current elevations. The current Sanborn gives an elevation of 11' at West 10th and 6' at the Stillwell intersection (See Fig. 2), and the current U.S.G.S. elevations lie between the 15- and 10-foot contour lines from West 10th Street to the east side of West 13th Street, and between the 10 and 5 foot contour lines between 27th Avenue and the east side of West 13th Street. (See Fig. 1)

Soil borings on Avenue V (MR-1, 2, 3P) show the presence of a fill overmantle ranging from 23.5' to 28.5' below the current streetbed, with the thickest fill layers nearest Stillwell. The water table was recorded at between 8.5' and 11' below the surface, indicating that a minimum of 11.5' of the original, predevelopment surface has been removed and replaced with fill. (Appendix B)

27th Avenue from Stillwell Avenue to Cropsey Avenue (Figures 3 and 4)

This portion of the project site was part of the marsh drained by Coney Island and Hubbard Creeks. Twenty-seventh Avenue runs roughly parallels to the old Beach Lane or Road to Gravesend Village which led down to Gravesend Bay. However, Twenty-seventh Avenue runs in a straight line from Stillwell to Cropsey, whereas Beach Lane is crooked, and sometimes meanders as much as 150' to the west of present 27th Avenue. (See Figs. 16 and 17) The reason for this is that Beach Lane ran along a narrow area of high ground which crossed the marsh, or possibly a causeway was constructed to it through the wetlands (Hassler 1844-45; Dripps 1877). A small finger of water called Harway Basin extended onto the present 27th Avenue location between present Mill and Harway Avenues (Dripps 1877) .

By 1852 the area of high ground seems larger or at least is more clearly delineated. It is possible that some fill activity had taken place, but it is unlikely that the entire 27th Avenue roadbed location had been filled (Conner 1852; Dripps 1868), and the 1873 map (Beers 1873) which shows this is to have occurred north of present Harway Avenue is contradicted by later maps. As late as 1905, sections of 27th Avenue were not open because of the continuing presence of the salt marsh and Hubbard Creek which crossed 27th at Stillwell Avenue (Sanborn 1905:XII 35,39).

The earliest precise elevations for 27th Avenue are from 1905, and are actually projected elevations for the uncompleted street – from north to south: 5½' above sea level near Avenue V/Stillwell Avenue, 4' at Bath Avenue (from soil borings now between 5.3' and 7.5'), 4½' in an area of dry land between Bath and present Harway Avenues, 3' at Harway and all intersections south (now from 6.6' to 8.9') (Sanborn 1905: XII 35,39; Appendix B). Elevations from the current U.S.G.S. map range from above the 5' contour to 10' above sea level, with the 10' contour line crossing 27th Avenue three times. (See Fig. 1) This data suggests that additional fill has been added since 27th Avenue was opened.

Soil borings on 27th Avenue north of Bath Avenue (MR-4, 5) show thick fill layers similar to those encountered along Avenue V, in this case between 33' and 35' of fill. The water table also extends up into the fill, to between 4.5' and 10' below the current surface, suggesting the removal or disturbance of more than 20' of the predevelopment surface prior to filling.

However, from the north side of Bath Avenue to present Cropsey Avenue(Borings MR-6P, 7, 8, 9N, 9P, 9S and 10) the fill layer is substantially smaller, between 7' and 21', varying in no discernible pattern. Beneath this fill layer is a layer of black organic clay with vegetation and peat, indicating the former predevelopment surface of the marsh. When the water level was observed it was approximately level with the organic layer or extended into the fill layer. This organic layer ranges from 1' to 7' thick in all borings but MR-10, at the corner of Cropsey Avenue. This boring is notable because the sand layer beneath the 8' fill overmantle was not inundated – the water table was not encountered until 10' below the current surface. However, the presence of only small pockets of organics identified as fill, in a location that historical maps depict as swampland, indicate that the naturally occurring organic surface was altered or removed during the historical period. (Appendix B)

Cropsey Avenue from 27th Avenue to Bay 40th Street (Figures 5 and 6)

Current Cropsey Avenue (which was formerly called Harway Avenue, and vice versa), runs roughly parallel and slightly south of the old Mill Road, which is still in existence from Bay 43rd to 46th Streets (crossing 27th Avenue) (Dripps 1877). Nineteenth-century maps show the present location of the project site section of Cropsey as a dry, wooded area (or at least not cleared for agriculture), adjacent to the beach along Gravesend Bay to the south (Hassler 1844-45; Conner 1852), although the 1873 indicates that the project site section of Cropsey Avenue is between two fingers of the saltmarsh, and area from 27th Avenue to the midway between Bay 43rd and 44th Streets is actually part of the marsh (Beers 1873). (See Fig. 17) This part of the roadbed was filled in and the road opened by 1905 (Sanborn 1905: XII 23, 33 and 35).

The earliest precise elevations along Cropsey Avenue come from the 1904 atlas, where the elevation at all intersections from 27th Avenue to Bay 40th Street is listed as 3' (Ibid.). The current Sanborn atlas records elevations between 8.85' (200' east of 27th Avenue), 6.06' at 26th Avenue (See Figs. 5 and 6), which agree with the surface elevations from the soil borings, which range from 6.5' to 7.7'. It is apparent that additional fill has been added since the beginning of the 20th century.

However, soil borings (MR-11, 12P, 13 and 14) record the smallest fill layer, 9' (MR-11) in the former swampland east of Bay 44th Street, and the amount of fill increases toward the west – 13.5' between Bay 43rd and 44th Streets (MR-12P), and to 18.5' at 26th Avenue (MR-13) and Bay 41st Street (MR-14). The depth to the water table, measured at 6' to 8.5' below the current ground surface, extends at least 2' into the fill layers. The presence of vegetation at approximately the current water table elevation in two of the borings (MR-11 and MR-13) and peat in one (MR-11) suggests that the marshy area was more extensive in this section of the project site than the historical maps reveal. (See Appendix B)

Bay 40th Street from Cropsey Avenue to Shore Parkway

(Figures 6 and 7)

The 1873 map depicts this entire area as marsh, with the marsh ending at the beach along Gravesend Bay, approximately 350' south of the southernmost edge of this part of the project site section (Beers 1873). Earlier maps show cultivated fields or simply empty space (Hassler 1844-45; Dripps 1868; Beers 1873). By 1890 this section of the marsh had been filled in (Fig. 6), and the 1905 and 1929 atlases record elevations of 3' to 4' along 40th Street from Cropsey to what is now the northern shoulder of the Shore Parkway (Sanborn 1905: XII 19-20; 1929: XII 19-20). Additional fill has been added since then – the boring logs give surface elevations of 7.6' and 7.7', and the current U.S.G.S. map records elevations above 5' and below 10' on Bay 40th Street, rising to 10' and above on the north shoulder of the Shore Parkway. (See Fig. 1)

A soil boring (MR-15P) from Bay 40th Street north of the Parkway, and another (MR-16) along the Shore Parkway service road (west of Bay 40th Street but east of 25th Avenue), both show 13.5' of fill, with the water table between 6.7' and 7.5' below the current surface, supporting the historical maps which show this section of the project site as marshland. (See Appendix B)

Shore Parkway from the line of Bay 40th Street to Bay 32nd Street
(Figures 7 and 8)

At the beginning of the historical period, this section of the project site lay along the shoreline of Gravesend Bay. The 1844-45 Coast Survey describes the area as sandy beach, and the remaining maps do not disagree, although the 1873 map tends to show the beach as a narrower strip, and also shows marsh running along the interior side of the beach for this entire section (Hassler 1844-45; Beers 1873). As the coastline curves northwestward, the project site is progressively nearer and nearer to the 19th-century shoreline. Four hundred feet distant from the shore at 40th Street, the project site meets the shoreline at approximately Bay 32nd Street. (See Fig. 18)

The current U.S.G.S. topographic map records elevations greater than 5' and up to 10' from Bay 40th Street to west of 25th Avenue, and from 10' to 15' from west of 25th Avenue to Bay 32nd Street. Elevations tend to increase toward the west, and toward the Shore Parkway traffic lanes, which is generally southwest. (See Fig. 1) Soil boring elevations agree, showing a gradual rise from 7.6' to 8.7', and a jump to 11.9' west of the 23rd Avenue line (MR-16, 17, 18P and 19). They also show 13.5' of fill as far as 23rd Street, with the water table extending into the fill layer, between 7' and 8.5' below the current surface. A deeply-buried (at -33.5') peat/organic layer was recorded only in MR-17. This suggests that either much of the pre-development soil surface was removed at some point, and that the pre-development layers are intact, but have been compressed by subsequent filling and construction, or that the area was originally inundated, and filled prior to 19th-century development.

At soil boring MR-21P, west of the 23rd Avenue line, the elevation jumps to 11.9', and the location shows only 12' of fill, but a deeper water level, 10.5'-11.4' below the surface. It is unclear why the amount of fill should decline at this location, since it is now more elevated than points east, and in the past was at the shore line, and therefore originally more depressed. (Appendix B)

Shore Parkway from Bay 32nd Street to Bay 20th Street
(Figures 8, 9, 10 and 11)

West of Bay 32nd Street, the project site runs through what was once Gravesend Bay, filled in during the 1930s for the construction of the Shore Parkway. Historical sources refer to the shallowness of the water near the shore and the gently-sloping beaches here, ideal for a beach resort or military landing, but dredging for pleasure and commercial boating may have taken place by the first decades of the 20th century. The 1844-45 Coast Survey records depth soundings in this vicinity (for the lowest Spring tides) of between 2' and 5' (Hassler 1844-45). Modern elevations, taken from soil boring logs, range from 12.8' to 14.4' from Bay 32nd Street to 21st Avenue, and 9.2' to 10.5'

between 21st Avenue and Bay 20th Street. Soil borings in this section of the project site (MR-23 through MR-31) are consistent with the scenario of a filled bay bottom, showing 26' to 37' of fill, and water encountered between 7.5' and 12.1' below the current surface. (See Appendix B)

Shore Parkway at Bay 20th Street to Bay 8th Street

(SE-133 Section 2 Route, Figures 11, 12, 13 and 14)

This section of the project site was also part of Gravesend Bay before fill and grading activity for the Shore Parkway during the 1930s brought it to its current elevations varying between 12.1' and 13.8' above sea level. Comparison of the current and the 1929 Sanborns show this section of the project site extending as much as approximately 441' at Bay 19th Street to 113' in the line of Bay 10th Street into Gravesend Bay (Sanborn 1929). (See Fig. 10 and 11) The 1844-45 Coast Survey records depth soundings in this vicinity (for the lowest Spring tides) of between 4' and 8" (Hassler 1844-45), but dredging for pleasure and commercial boating may have taken place by the first decades of the 20th century.

Soil Borings confirm this scenario, indicating between 15' and 30' of fill in all borings, and the water table extending into the fill layer, between 11.1' and 15.9' below the current surface. (See Appendix B)

Bay 8th Street to Verrazano-Narrows Bridge

(SE-133 Section 2 Route, adjacent to Dyker Beach Park and Fort Hamilton Figure 14)

Maps showing existing topographic conditions prior to the construction of the Shore Parkway indicate that this section of the project site was, prior to historical development, a part of Gravesend Bay, and adjacent to the Fort Hamilton Reservation, part of the bay, or at least on the beach adjacent to it, in an area inundated at high tide. A 1932 map (Fort Hamilton 1932) showing the "Proposed Shore Road Extension" records the extension route completely beyond the existing shoreline, except in the location of and to the northwest of Denyse['s] Wharf (in the line of Fort Hamilton Parkway). However, the lowest contour recorded is the 5'-line, and a 1911 map of the reservation (Schumm 1911) also records an narrow strip of rip-rap and beach below the 5' contour line. The tides (which according to the U.S.G.S. have a mean range of 4.7') would have inundated this area daily.

This interpretation is strongly supported by a c1936 painting in the collection of the Harbor Defense Museum at Fort Hamilton, "The Civil War Defenses of Fort Wadsworth [Staten Island]." Painted from the Gravesend Bay shore, from

somewhere east of the wharf in the line of present 7th Avenue, the view shows low bluffs along the shoreline, surrounded by a stretch of beach. The painting's caption indicates that the line of wooden pilings also shows "the point to which landfill would be added for Belt Parkway." (See Fig. 23)

Current elevations in this section of the project site range from 7.9' to as much as 30.0', above sea level, but are generally between 10' and 15'. The highest elevations correspond with the grading for the Bay 8th Street bridge over the Shore Parkway where elevations range from 16.7' to 30.0', and the lowest in the vicinity of Denyse's Wharf and the C-shaped "Old Fort Hamilton" (east of the Verrazano-Narrows Bridge), where elevations range from 7.9' to 9.2'. Soil borings (B22 through B41) record fill layers between 15' and 38' thick, with the observed water level extending into the fill layer. In some cases, e.g. B24 (near the old fort), where water was encountered at -1.8', the fill layer continues an additional 11.3' to -13.1', indicating an area that was completely inundated prior to filling activity. In scattered locations (e.g., B37, 31, 28), but not corresponding to any observable pattern, the water level extends 5 or fewer feet into the fill layer, indicating a location that was either continuously inundated, or exposed during low tide. [1] (Appendix B)

The elevated area around the still-existing Denyse's Wharf was created during the historical period, when a ferry was established there in 1742. Boring B23, adjacent to this location, records 22' of fill, with the observed water level extending 10.7' into the fill layer, indicating that the location was either once submerged in Gravesend Bay, or that the predevelopment surface has been dug out and replaced with modern fill. (See Appendix B)

[1] Only one boring, B38, adjacent to Dyker Beach Park and north and east of the Bay 8th Street westbound entrance ramp ("RAMP D"), showed 12' of fill and a below-fill surface (+4.7') elevated above the water table (-0.1'). However, like the other parts of this section of the project site, this location was also in Gravesend Bay, or on a part of the shore that was periodically inundated. Its location would have been just beyond the foot of the projected 14th Avenue (Fig. 1890). It is probable that the fill layer extended through the next recorded level in the boring (to -6.3'). A similar sample in adjacent boring B37 was labelled "POSSIBLE FILL." (See Appendix B)

III. PREHISTORIC ERA

The prehistoric era on the south shore of western Long Island is traditionally divided into time periods based on prehistoric man's adaptations to changing environmental conditions. These are generally known as the Paleo-Indian (c.12,000 to 9,500 B.P.), the Archaic (c.9,500 to 3,000 B.P.) and the Woodland (c.3,000 to 500 B.P.). In order to be able to assess the potential of the Avenue V Pumping Station and Force Main site for prehistoric exploitation, it is first necessary to review these time periods and their associated settlement patterns.

Paleo-Indian Period (c.12,000 B.P. - 9,500 B.P.)

Toward the end of the Wisconsin Glaciation, during the Late Pleistocene Epoch, the first 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 most 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).

In the Northeast, the glacially-lowered sea level exposed the broad coastal plain of which Long Island was a part, indicating that the project area would have been dry land during this period. "This large area apparently contained abundant big game resources and provided access along the entire length of the south shore to the area that is present day Long Island" (Saxon 1978:251).

The lanceolate points, two to five inches in length with a concave base 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 Long Island approximately 18,000 B.P. and a global warming trend c.14,000 B.P., 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 10,000 years ago, 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.9,500 B.P. - 3,000 B.P.)

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 ax. 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 on Long Island." 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 easily gathered all around Long Island (Ritchie 1980:142-143).

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).

The Transitional or Terminal Archaic (4,000 to 3,000 B.P.) is a pre-ceramic stage, highlighted by the production of ground and polished soapstone vessels. Characteristic of the Transitional Archaic were "fish-tailed" projectile points (Ritchie 1980:150, 166, 167, 171).

Woodland Period (c.3,000 B.P. - 500 B.P.)

Pottery use became widespread following the introduction of soapstone vessels in the Transitional Archaic, and although copper tools were utilized during that period, the earliest copper ornaments, tubular beads, made their appearance during the Woodland. Stone or clay smoking pipes were also an Early Woodland innovation (Ritchie 1980:179-180)

Settlement patterns were substantially altered with the introduction of agriculture, the systematic cultivation of maize, beans and squash possibly beginning as early as A.D. 1000. During this time large villages within palisaded enclosures were developed and occupied by semi-sedentary inhabitants. Groups moved seasonally, depending on exploitable food resources, between villages and camps of varying population concentrations. Preferred village/camp sites were in protected, elevated locations at the confluence of two water systems. "Nearly all the permanent sites are situated on tidal streams and bays on the second rise of ground above water" (Smith 1950:101). 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 1980:180,267).

Contact Period (c.500 B.P. to 300 B.P.)

Native American settlement patterns at the time of contact incorporated seasonal hunting and gathering. Semi-permanent villages or hamlets, containing oval and round mat-covered structures, were established near planting fields. Large subsurface pits were dug nearby to store dried meat, fish and corn, and were eventually filled with trash. Although fields were commonly burned at the end of the planting season to encourage floral and faunal repopulation, settlements centered on agricultural land were generally moved every ten to twenty years as soil fertility, firewood supplies and game resources were depleted (Salwen 1975:57).

Two Indian groups were recorded in the vicinity of the project area, the Nayack and the Canarsee. Both were Munsee-speaking members of the Delawaran or Lenape culture group. Prior to the sales of their lands, the Nayack had their planting fields and principal village, also called Nayack, possibly meaning "land at the point on the eastern side of the Narrows," at the present Fort Hamilton Reservation, probably near the water supply in what is now Dyker Beach Park (Grumet 1981:37; Bolton 1922:68). (See Fig. 15)

What may have been a second settlement is represented on the 1639 Manatus Map, which depicts a longhouse labelled "Wichquawanck" near the Gravesend Bay shore, located approximately at present 86th Street and 16th Avenue – adjacent to the New Utrecht village center, and about 3,000 feet northeast of the project site. The toponym, or place name is believed to mean, "as far as, ending at, the end or extreme point." Grumet's map erroneously combines Nayack and Wichquawanck, whereas the earlier map shows Wichquawanck to be much further east – where Grumet and Bolton both record a native settlement (Grumet 1981:37,59; Manatus 1639). (See Fig. 15)

The Canarsee are a bit more mysterious. Although traditionally all the native groups of Kings County, including the Nayack, were considered subgroups of the Canarsee Indians, historical documents give only three direct references to the Canarsee. Their chief settlement was in the present Canarsie section of Brooklyn, approximately 4.8 miles northeast of the project site. They first appear in the documentary record in 1647, when some of the settlers of Gravesend, at the eastern end of the project site, purchased land from the "Indians of Cannarse" (Grumet 1981:6).

Historical narratives written by European travellers and settlers provide eyewitness descriptions of Indian customs and lifeways during the 17th century. Jasper Danckaerts' journal of 1679 includes observations of the Nayack Indians who lived in the vicinity of Fort Hamilton, at that time the property of Jacques Cortelyou:

> we found the whole troop together, consisting of seven or eight families, and twenty or twenty-two persons, I should think. Their house was low and long, about sixty feet long and fourteen or fifteen feet wide. The bottom was earth, the sides and roof were made of reed and the bark of chestnut trees; the posts, or columns, were limbs of trees stuck in the ground, and all fastened together. The top, or ridge of the roof was open about half a foot wide, from one end to the other, in order to let the smoke escape . . . They build their fire in the middle of the floor, according to the number of families which live in it, so that from one end to the other each of them boils his own pot, and eats when he likes . . . By each fire are the cooking utensils, consisting of a pot, a bowl, or a calabash, and a spoon also made of calabash . . . Their other household articles consists of a calabash of

> water, out of which they drink, a small basket in which to carry and keep their maize and small beans, and a knife. The implements are, for tillage, a small sharp stone, and nothing more; for hunting, a gun and pouch for powder and lead; for fishing, a canoe without mast or sail, and without a nail in any part of it, though it is sometimes full forty feet in length, fish hooks and lines, and scoops to paddle with in place of oars. . . Their bread is maize, pounded in a block by a stone, but not fine. This is mixed with water, and made into a cake, which they bake under the hot ashes (James and Jameson 1913:55-56).

Contact with Europeans had far-reaching effects on Native American cultures. European products such as metal and glass began to replace traditional materials, while warfare and European-introduced diseases (against which the Indians had no protection), decimated the population in the present New York City area. This caused many groups to merge and remerge in complex ways in order to maintain viable communities. This activity is poorly represented in the documentary record. In 1670, Daniel Denton observed that the six towns on western Long Island had been reduced to two small villages (Thompson 1918:103). Danckaerts' 1679 journal notes the Nayack remnant, having sold off their lands, living on a small corner of its former holdings. They were "a poor, miserable people," using guns, keeping peach trees, having "dogs, fowls and hogs, which they learn by degrees from Europeans how to manage better" and some able to speak "good Dutch," like their European neighbors (James and Jameson 1913:55-57).

At the termination of the Governor Kieft War in 1645, the Nayack and Canarsee were joined by the Marechkawieck, refugees from northern Kings County. In 1652, the Nayack sold their land on Long Island and most of the group moved to Staten Island (Grumet 1981:38; Bolton 1920:273).

The Canarsee are last mentioned in 1684, when they sold the beach known as Mocuny or Mocung, (near the eastern edge of the project site, east of 27th Avenue), to the Town of Gravesend. Mocuny/Mocung and a possible synonym, Morpeesah, mean black, muddy or miry land, and probably indicated the swampy area around Coney Island and Hubbard Creeks, which extended onto the project site (Grumet 1981:35-36; Bolton 1920: 359). Following the sale, many of the Canarsee, who had merged with the Rockaway and Massapequa groups, are believed to have moved to Patchogue, in Suffolk County, along with the Massapequa. Like the Nayack mentioned in the Danckaerts journal, a number of Canarsee lingered on at the fringes of European settlements until well into the 19th century (Grumet 1981:6-7).

Nineteenth- and 20th-century research, survey and excavation have revealed a strong Native American presence in the Borough of Brooklyn. Archaeologist Arthur C. Parker noted that "without a doubt . . . it was occupied in nearly every part, and was once an important place of Indian travel and traffic" (Parker 1920:582). Parker identified two Indian sites in the vicinity of the project area, one at Fort Hamilton,

which he listed as "shell heaps or kitchen middens." The New York State Museum identifies this as their inventoried site #3611. Parker's other site, in the same vicinity (at the "Narrows") was a former lithic 'workshop' discovered in the early 19th century:

> Some years ago, on digging a few feet below the surface at the Narrows, more than a wagon load of Indian stone arrow heads were discovered lying together, under circumstances calculated to induce the belief that a large manufactory of those indispensable articles of Indian warfare once existed at this place; they were of all sizes, from one to six inches in length, some perfect, others only partly finished. There was also a number of blocks of the same kind of stone found in the same rough state as when brought from the quarry; they had the appearance of ordinary flint, and were nearly as hard; not only arrowheads, but axes, and other articles of domestic utility, were made from these stones (Bailey 1840:42; Parker 1920:582).

Archaeologist Reginald Pelham Bolton noted a major Indian trail traversing southwestern Brooklyn, ending at New York Bay above the Narrows. The trail was approximated by the later Kings Highway (a section of which still exists, about 4,000 feet north of the eastern end of the project site). Indian stations were established at various points along this important route, including the planting grounds at Indian Pond, a now-filled-in freshwater pond at Avenue P and West 11th Street (about 3,000 feet north northwest of the Avenue V Pumping Station), and the previously discussed Wichquawanck, a settlement consisting of a single longhouse near later New Utrecht village (present 86th Street and 16th Avenue, and about 3,000 feet northeast of the project site) (Manatus 1639; Bolton 1922:237). In addition, number of Indian trails branched from the main trail, and led to Gravesend Bay. One of these approximates present Fort Hamilton Parkway, and led to the abovementioned Nayack village on the site of the present military reservation, while the other corresponds to later Bennett Lane, roughly along the path of 16th Avenue, linking the bay with the Wichquawanck settlement. (See Fig. 15)

Bolton suggests that the toponym Massabarkem (misspelled, but meaning land by the great water), which appeared in an early Gravesend deed, also probably referred to a settlement in the vicinity of Gravesend village (Bolton 1922:237).

Prehistoric Potential

As outlined in the general Prehistoric Era discussion, our knowledge of prehistoric and contact period settlement patterns indicates that early Native Americans showed marked preference for sheltered, elevated sites close to wetland features and sources of fresh water. Such locations are likely to have been exploited by prehistoric Americans for their processing sites, camps and more permanent

settlements, as is evident from the siting of Nayack village, on the hills overlooking the Narrows at Fort Hamilton. Evidence of Indian exploitation of natural resources in, and occupation of the vicinity of the project site is well-documented through archaeological and historical research. The different sections of the project site are discussed in the following paragraphs:

Avenue V Pumping Station &
Force Main Route from Avenue V to the Shore Parkway at Bay 32nd Street
(Figures 2-8)

Although well-drained, elevated sites were preferred by the Indians for their activity and habitation sites, prehistoric archaeological potential is not confined to such areas. Often, low-lying and marshy areas adjacent to these dry, elevated habitation sites were utilized as shell middens, or garbage dumps. Such behavior has been documented archaeologically, as at Aqueduct in southwestern Queens, where soil borings have identified shell middens buried beneath layers of fill, but also atop layers of peat and organic silt (Pickman 1987:4).

According to the analysis of the data presented in the previous section (II. Environmental Setting), the Avenue V Pumping Station location, and the sections of the proposed force main project site from Avenue V to the Shore Parkway at Bay 32nd Street, were, in their pre-development state, a combination of well-drained, elevated lands that have a STRONG POTENTIAL, and adjacent marshy areas that have a MODERATE POTENTIAL for having hosted pre- and proto-historic settlements, camps, processing sites and middens. It is clear that Native Americans were familiar with the marsh, from their application of the names Mocuny/Mocung and Morpeesah, and the accessibility of this section of the project site by the nearby trail.

Due to the usually shallow nature of prehistoric archaeological deposits, three to four feet below the pre-development surface, they are usually extremely vulnerable to the ravages of historical period construction. However, the predevelopment land surface, as well as intact prehistoric cultural deposits may have been covered by thick layer of fill which could have protected the remains. These concerns will be addressed in the Conclusions section of this report.

Force Main Route from Bay 32nd Street to the Verrazano-Narrows Bridge
(Figures 8-14)

As has been described in the prehistoric overview, the environment of the project area has not been static since the final retreat of the glacial ice, c.18,000 B.P. One of the consequences of the post-glacial warming trend (c.14,000 B.P.) has been a continuous increase in sea level, estimated at from 75 to 80 feet. Although not occurring at a uniform rate, this sea level rise gradually inundated the continental

shelf, which was exposed during the Paleo-Indian period, and also the gently-sloping glacial outwash plain, creating the shallowly inundated areas which are conducive to the establishment of eel grass and therefore the creation of tidal marsh environments, adjacent to areas of not-yet-inundated dry land. With subsequent sea level rise, which slowed by about 4,000 to 2,000 B.P., and has slowed even more to the present, prehistoric and even historical archaeological sites in these areas may lie beneath the current water table, as well as historical fill and a number of feet of accumulated marsh mat. This has been substantiated at a number of locations in coastal New York and Connecticut where submerged prehistoric sites have been discovered during dredging activities, beneath, or in association with, the peat deposits produced by tidal marshes (Pickman 1987:6).

The shallows which existed along the shoreline of Gravesend Bay before the 1930s, upon which much of the project site is situated, would have been ideal for prehistoric exploitation prior to sea level rise. However, the archaeological survey of the area has been prevented due to the rise in sea level which had occurred by the beginning of the historical period, and the massive landfill operations that have occurred there since then. Given prehistoric man's preference for sites adjacent to watercourses, the shores of any drowned creeks or estuaries, such as at Dyker Beach Park, would be considered particularly attractive to exploitation.

Somewhat similar conditions were encountered by archaeologist Arnold Pickman in his archaeological assessment of a study parcel at Mill Basin (an area of former salt marsh approximately 4.5 miles east of the project site). He conclude that there was a strong potential for the presence of submerged sites (Pickman 1987:5,6). Pickman recommended a series of borings in potentially sensitive locations to determine thickness of peat and fill layers, and the elevation of the basal peat and organic silt deposits, i.e., the approximate elevation of the ground surface/sea level at the time of inundation. Pickman not only hoped to identify archaeological material, such as shell midden deposits, in the pre-inundation layers, but went further to suggest that data on pre-inundation sea level elevation could be used to extrapolate an inundation date, based on similar Carbon-14-dated boring samples (Pickman 1987:6).

As described in the *Environmental Setting* discussion (Section II.), historical and cartographic research indicates that this section of the project site was formerly along the shore of Gravesend Bay, both in the water and in locations regularly inundated by daily tides. However, widespread areas of marsh are not recorded in this area, except in the vicinity of Dyker Beach Park, west of current 8th Avenue. In light of the preceding discussion, due to changing sea level, and the documented presence in the project area vicinity of prehistoric and early historical period Native Americans, it is theoretically possible that the location was occupied at some time during the prehistoric era.

This section of the Force Main project site, from Bay 32nd Street through the Verrazano-Narrows Bridge is rated as having a LOW PREHISTORIC POTENTIAL. Given the subsequent rise in sea level, any potential buried prehistoric cultural remains would have been subject to impact from post-depositional tidal action. On the other hand, because any prehistoric cultural remains would be below the current water table, as well as deeply-buried beneath fill and layers of marsh mat (peat and accumulated organic silt), the sites would be well-protected from historical construction disturbance, but the most problematic to identify and recover archaeologically. Disturbance impact on this prehistoric potential, and the surviving potential archaeological sensitivity will be discussed in the conclusions section of this report.

IV. HISTORICAL PERIOD

Before its incorporation into Brooklyn at the end of the 19th century, the project site and its vicinity was originally divided between the towns of Gravesend on the east, and New Utrecht to the west and north. The town boundary between the two was approximately at present 23rd Avenue. The colonial period for each town will be discussed separately, and the discussions of both sections will be combined for the 19th- and 20th-century developments in the project area.

The Settlement of Gravesend

Driven from Massachusetts by incensed Puritans in 1642, Lady Deborah Moody and her followers, "infected with Anabaptism," fled to New Netherland and the somewhat more tolerant rule of the Dutch West India Company. Here they were joined by Nicholas Stillwell, a tobacco planter, and his comrades, who had already been driven from their settlement in eastern Manhattan by Indian attacks. The West India Company, desperate to secure settlers to occupy its lands and hold off the encroachments of expansionist New England, readily admitted the foreigners, and in June of 1643, Governor-General Willem Kieft gave Moody permission to settle at a site he named 's-Gravesande,[2] after the ancient residence of the Counts of Holland. The English settlers corrupted the name to Gravesend, probably thinking of the port of the same name on the Thames (Brodhead 1854:367; Stillwell 1892:5-6).[3]

Moody and her compatriots were not the first European settlers in the area. A month previously, in May 1643, Kieft had issued a patent for 100 morgen (200 acres) to the southwest and west of the original Gravesend settlement to Antonie Jansen van Salee. The patent was made retroactive to August 1639, when he first petitioned for the lands, but there is no record of his settling there. One section of the property was named "Old Bowery" and was partially in the neighboring town of New Utrecht, an area later known as Unionville. The other section was long known as "Twelve Morgen," situated in a swampy area on Hubbards Creek, immediately west of the 27th Avenue section of the project site (Conner 1852). The meadowlands between Salee's property and the Gravesend settlement became a bone of contention between the town and Salee's successors, since each claimed the meadows as part of his original grant. The dispute was not settled until the mid-19th century, when Gravesend finally relinquished any interest in the property (Stockwell 1883:158-160; Bergen 1884:256).

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[2] 's-Gravesande is written in an archaic Dutch possessive form, and means the count's sand or beach.

[3] Contrary to the "old wives' tale," there is no evidence that any of the settlers was from the English Gravesend, which is in Kent. Lady Moody was not. Her former estates were in Wiltshire.

Gravesend is unique in a number of ways. It was the only English town founded in present Kings County, with a town patent (1645) that is the only one in which a woman, Lady Moody, heads the list of patentees. The town patent was liberal, even for the Netherlands, guaranteeing freedom of worship "without magisterial or ministerial interference." Religion was left up to the individual, and therefore no provision for a church was made, neither for a burial ground, town hall nor school. The town plan, comparable to the sophisticated orthogonal layout of New Haven and later Philadelphia, was based on a central square of 16 acres, divided into four smaller squares, each surrounded by a street. The perimeters of the four squares were divided into ten equal lots, one for each of the forty original patentees. The lots surrounded common yards, where cattle were to be kept when brought in from pasture. This town core was surrounded by a palisade, from which triangular "planters' lots" radiated like the spokes of a wheel (Conner 1852). Among other things, this arrangement meant that all the farm lots were the same distance from the settlement, and each patentee could reach his own farm without trespassing (Stockwell 1884:160-162).

During the first year of settlement, Gravesend was almost destroyed by constant Indian attacks, during the colony-wide war that was a result of Governor Kieft's inept Indian policy. The village survived, and organized itself, choosing town court justices, a constable and town clerk. Laws were enacted against conducting business on Sundays, selling alcohol to Indians, and even selling more than a pint at a time to other colonists. In 1647 the town effected a further division of common lands among the patentees, allotting the meadowland between the settlement and Coney Island (probably including sections of the eastern end of the project site), which was used as a cow pasture, "so that every man might know his own" (Stockwell1884:163-165).

With the English conquest of New Netherland in 1664, the existing town patent was confirmed. Between 1668 and 1685 the English designated Gravesend a "shire" town, necessitating the construction of a court of sessions in the northwestern village square. During and after this period, when the court was returned to Flatbush, the sessions house was used as a meeting house for the Quakers, and later served as Gravesend's Dutch Reformed Church (Stillwell 1892:9-10; Brooklyn 1946:11).

Given the unstable political climate of the last quarter of the 17th century, the town attempted to strengthen its title to the surrounding area with real estate purchases from local Indians Crackewasco, Arrenopeah, Mamekto and Annenges (1684), including beach, meadow and valley land to the south and east of the town. Much of the meadow surrounding the Gravesend section of the project site remained swamp throughout the colonial period and into the 19th century, and must have been extremely muddy, since the list of officials appointed at the town's founding included men to extricate trapped cattle from the marshes. Although modern, urban eyes might consider them worthless, during

the 17th and 18th centuries, this meadowland was considered very valuable. The harvested salt grasses were an important source of much-needed feed for domestic animals. The creeks which drained into Gravesend Bay were important for fishing, transportation, and the locations of tidal grist mills.

A single road traversed the marsh and creeks which occupied the eastern end of the project area. The road was laid out in 1660, 20 feet wide (Stockwell 1884:170), and led southwesterly from Gravesend village down to the shore near the foot of current 27th Avenue. Known as the Beach Lane or the Gravesend Road, it ran within 150 feet to the northwest of the project site sections of 27th Avenue and Avenue V. East of present Stillwell Avenue, at Gravesend village center, it corresponded to current Lake Place. A smaller path appears on the 1781 map, and must be part of DeBruyn's Lane, which led from Kings Highway just east of New Utrecht village, to the bay at approximately present 20th Avenue. One of subsequent owners of Anthony van Sallee's property, Albert Coerton, dammed Brown's Creek (southeast of the project area?) and built a mill, and also laid out a road connecting it to DeBruyn's Lane, which came to be know as Old Mill Road. This road ran parallel and slightly north of the project site sections of Cropsey Avenue (Hazelton 1925:1,087). (See Figs. 15 and 17)

The village of Gravesend and its surroundings changed little during the 18th and 19th centuries. Because of Gravesend's commodious harbor, Gravesend Bay, the early settlers had hoped to develop the town into a major port, but despite its size, the shallowness of the bay was unsuitable for even the ships of that century. Therefore, the town grew slowly, maintaining its rural character, "conservative in its habits of life." During the American Revolution, British forces landed within a mile of the village in neighboring New Utrecht, and General Cornwallis passed through in 1776. Some soldiers were billeted in local houses, and after the war several Hessians remained behind and settled within the township. By 1810 the population was 520.

The Settlement of New Utrecht

The area that became the town of New Utrecht was first sighted by Europeans in 1524, when Giovanni da Verrazano sailed through the "Narrows," the channel which runs between the southwestern edge of Long Island and the eastern tip of Staten Island, connecting the Atlantic Ocean to New York Bay. It is presently spanned by the bridge that bears his name. Although landfalls may have been made by Dutch fur traders in the intervening period, the next recorded visit was not until 1609, when the *Halve Maen*, with Henry Hudson in command, entered New York Bay (Bergen 1884:255).

European settlement came only after decades of false starts. A New Amsterdam denizen, Antonie Jansen van Salee, applied to the Governor and Council of New

Netherland for lands west of present Gravesend, and received a patent from Governor Kieft in 1642 – apparently dated retroactively to 1639. This 200 acres at the eastern edge of New Utrecht and extreme western Gravesend, in what was later called Unionville, was part of a purchase Kieft had made from the Canarsee Chief Penhawits. Salee leased his property to Edmund Adley from 1646 to 1650, and a house was included in the agreement. In 1645, after the close of a series of Indian wars, Kieft again purchased all the lands around the Narrows as far as Coney Island (Bergen 1884:256; Bangs 1912:12).

The next potential settler was Cornelis van Werckhoven, a *schepen*[4] of the town of Utrecht, and a wealthy and influential stockholder in the Dutch West India Company. Werckhoven planned to establish two *patroonships* or manors in New Netherland, one of which was to be in the vicinity of the project area, near the Narrows. Accordingly, Werckhoven came to New Netherland in 1652, and purchased "the Nyack tract" from the Indians for six shirts, 2 pairs of shoes, six pairs of stockings, six adzes, six knives, two scissors and six combs. He built a house and a mill on the tract and surrounded them with a palisade. This location is unclear. It seems to be north of the project site, in present Dyker Beach Park, where an "old mill pond" is shown on an early 19th-century coastal survey (U.S. Engineering Department n.d.). Werckhoven returned to the Netherlands to organize colonists and supplies, and left the grant in charge of his children's tutor/guardian, Jacques Cortelyou. Unfortunately, Werckhoven died in 1655/56 before he could return (Bergen 1884:256-257).

Werckhoven's death, and the fact that his children and/or other heirs never left the Netherlands, made Cortelyou the de facto owner of the land grant (Bangs 1912:17-22). Cortelyou, best known to posterity as the surveyor of the "Castello Plan" of New Amsterdam, a unique birds-eye view from c.1660, decided to go on with the proposed settlement, and in 1657 Director-General Stuyvesant and the Council granted 21 patents of 50 acres each – 19 people received patents and two were retained for the benefit of the poor. In addition to Cortelyou, among the landowners was Nicasius de Sille, council member and Stuyvesant's *fiscaal*, or attorney general. The settlement was named New Utrecht, probably in honor of the late Werckhoven's native town and province. By 1660, eleven houses and a blockhouse had been erected, surrounded by a palisades, and the first town charter was issued in 1661 (Bergen 1884:257-258). Cortelyou appears to have occupied Werckhoven's property, which included much of current Fort Hamilton and present Dyker Beach Park (north of the project site). His house was on the eastern slope of the Fort Hamilton bluff, with a nearby wharf (U.S. Engineering Department n.d.; Taylor and Skinner 1781).

New Utrecht's position on the narrows made it a front row spectator for each invasion of the colony – in 1664 when the English fleet anchored in Gravesend Bay

[4] Alderman or sheriff.

to take New Netherland from the Dutch, when the Dutch fleet recaptured the colony in 1673, and when the English repossessed it in 1674. In that year the English squadron seized a New Utrecht sloop transporting cattle to New Jersey, and proceeded to take the remaining cattle in the town, celebrating the return of the colony by feasting on the New Utrechter's beef. The English reconfirmed the town charter, and permitted the town to continue under its old name (Bergen 1884:260-261).

After these events, the town returned to its quiet agricultural existence, its farmers producing grain and tobacco, as well as raising cattle. The village was linked to neighboring settlements and markets with the construction of Kings Highway (which passed through the village in the path of current 84th Street) by the first decade of the 1700s. A ferry to Staten Island was established at the Narrows with a royal grant to Denyse Denyse in 1742. Prior to this, Denyse and his wife Teuntje had acquired the land around the foot of current Fort Hamilton Parkway, and maps show their house and stone wharf outside the project site, west of Fort Hamilton Parkway, adjacent to the Cortelyou lands (Bergen 1884:261-262). The stone wharf still stands there today (Taylor and Skinner 1781). (See Fig. 22)

A number of farmers owned slaves, and enslaved Africans numbered 67 in 1755, when the rest of the population was approximately 300. The slaveowners were 26 of New Utrecht's wealthiest people, including Denyse Denyse and Caspar Cropsey, whose family names still figure on various streets in and around the project area. Another source of income was the "important and valuable" shad fishery, which was active for a few weeks in the spring. In 1749, Justice [Simon?] Cortelyou, a descendant of Jacques Cortelyou, recorded a total of 9,000 shad caught in his seines at the Narrows, and other sources report 10,000 "at a single draught" (Bergen 1884:260-261; Bailey 1840:41-42).

Settlement along the shoreline (generally from 100 to 400 feet north of the project site sections along the Shore Parkway) was sparse. Two roads leading from Kings Highway to Gravesend Bay appear on the 1781 map: Bennett Lane, which led directly from New Utrecht village to the bay, roughly along the path of 16th Avenue; and Denyse's Lane, which, approximating Fort Hamilton Parkway, led from Kings Highway to the bay at Denyse's Ferry Landing, on the bluff of present Fort Hamilton. (Cohen and Augustyn 1997:107,108). A third path, DeBruyn or DeBruin's Lane, is partially drawn in as a dashed line, only extending halfway to the shore, generally parallel to 20th Avenue, but slightly to the west (Taylor and Skinner 1781).

Shore Road, mentioned as early as 1715, linked Bennett Lane to Denyse's Lane, and continued northward along the shoreline. Shore Road still exists northwest of the project area, beginning at 4th Avenue. Local historians record three houses on the Fort Hamilton bluff, those of Denyse, Simon Cortelyou and Abram Bennett. The earliest detailed map, from 1781, shows "Denices" and two unnamed houses in the vicinity, one east and one west of the fort site, Cortelyou's with the nearby dock on

the east, and Bennett's on the west (Runyon 1928:4; Hazelton 1925:1093,1094). All three were outside the project site, the Bennett and Denyse residences west of Fort Hamilton Parkway, and Cortelyou house north of the Shore Parkway. Also evident is what is labeled a redoubt, constructed by the British occupying forces west of the Shore Road, some time after 1776. The Cortelyou dock and the redoubt appear to have been on or adjacent to the project site (Taylor and Skinner 1781). By 1797, another house appears near the bay shore at the foot of Bennett Lane (roughly 16th Avenue) (Lott 1797).

As with the previous invasions, in August 1776 the British fleet approached New York City by the Narrows, and disgorged about 15,000 troops on the gently-sloping beaches of Gravesend Bay, who quickly marched up the roads from the shore, invested New Utrecht village and neighboring Gravesend. The American resistance to the fleet was led by a party under the command of General Henry Knox,[5] Washington's Chief of Artillery, which established a battery of two 12-pounders on the eastern slope of the Fort Hamilton bluff. The party managed to hit the frigate HMS *Asia*, killing five men, and fired on the advancing enemy troops before being forced to abandon the position. Col. Edward Hand and some riflemen were posted in the Simon Cortelyou house, holding off the landing before retreating northwards to the wooded hills (Runyon 1928:4-5; Hazelton 1925:1,087; Bergen 1884:262).

The Nineteenth and Twentieth Centuries

Fort Hamilton

With the departure of the occupying English and Hessian troops in 1783, the towns of New Utrecht and Gravesend once again returned to a quiet rural existence. However, the topography and geographic location of the towns ensured that the areas along Gravesend Bay to the Narrows would be the scene of future developments. The first was the recognition of the strategic importance of the bluff at Denyse's Ferry Landing, which commanded the Narrows, and with it the entrance to Upper New York Bay. Recommendations for its fortification date to at least 1703, but no action was taken until that of the American defenders in 1776. After its capture by the British in the same year, two small lunettes were constructed there for a Hessian garrison, including "the first battery capable of keeping ships out of the harbor," although only a small redoubt appears on the 1781 map (U.S. Army 1992:n.p.; Taylor and Skinner 1781).

Colonel Jonathan Williams, Chief Engineer, recommended the construction of a battery on Hendricks Reef, just offshore from the Fort Hamilton site, in 1807. The Federal Government acquired the reef from the State of New York in 1812, and

[5] Knox (1750-1806), a trusted companion of Washington, later commanded at West Point (1782-1784), was a founder of the Society of the Cincinnati (1783) and Secretary of War (1785-1794).

proceeded to build Fort Diamond, so named because of its shape. On the Fort Hamilton site, between 1807 and 1812 the State of New York built an earthwork which was named Fort Lewis. Construction was accelerated with the coming of the War of 1812 and fear of an attack on New York City. Civilians from New York City, armed with pick and shovel, greatly strengthened the works at the Narrows. With New York harbor blockaded, and occasional raids along the coast of Long Island, two new blockhouses were built along Gravesend Bay beach, one at the foot of DeBruyn's Lane, (now approximately the 20th Avenue roadbed), and the other at the foot of Bennetts Lane (Huffman 1976:51; U.S. Engineering Department n.d.).

In 1814, the city presented the Federal Government with the deed to the Fort Hamilton site for a fort for harbor defense (Runyon 1928:6-7; U.S. Army 1992:n.p.). Permanent harbor defenses were planned, and a new circular, masonry Fort Diamond was built with 96 guns, at a cost of $275,000. It was renamed Fort Lafayette in 1823 in honor of General Lafayette's visit in 1824. Construction of Fort Hamilton itself did not begin until plans were approved in 1824, and ground was broken the following year. The fort was finished and ready for occupation by 1831, having 70 guns, and facilities for a garrison of 100 men in peacetime and 1,400 in war (U.S. Army 1992:n.p.; Runyon 1928:7-9).

The defenses were strengthened several times during the 19th century, perhaps most notably by Robert E. Lee, who arrived there with his wife and children in 1841. Lee was a vestryman at nearby St. John's Episcopal Church, which was erected opposite the main gate (present Fort Hamilton Parkway and 99th Street, about 2,000 feet north of the project site). The church, which served as the garrison church for the fort, is known as the Church of the Generals, from the number of military leaders who worshipped there. Among them were Brevet Major Thomas "Stonewall" Jackson, who was baptized at St. John's in 1849, with two fellow officers as sponsors. The original building later burned down and was rebuilt in 1890 (Runyon 1928:10-13; Willensky and White 1988:705).

The Federal reservation also grew, adding 16.5 acres by purchase in 1826, another c.11 acres in 1852, 21 acres in 1862, and an additional 56.5 acres ceded by the state legislature in 1893. At its largest extent, it covered approximately 166 acres.

Recreational Development

The beneficial atmosphere of the Gravesend Bay shore had been recognized as early as the 18th century, when a group of New York City physicians, Drs. Bailey, Bard, Rogers, Tillary "et al.," erected Bath House in 1794 as a place of retreat for their invalid patients to enjoy "the invigorating influence of pure air and sea bathing." Bath House stood adjacent to the beach on the west side of De Bruyn (or DeBruin's) Lane, which was slightly west of present 20th Avenue, and ran northeasterly, directly to New Utrecht village. The oldest bathing establishment on Long Island, it burned

down in 1802. The "Messrs. Brown" rebuilt Bath House as a hotel, having the "power to accommodate with every regard to comfort more than 150 visitors" (Thompson 1918:161). In the latter decades of the 19th century, it was known as the Avon Beach Hotel (Hazleton 1925:1087). (See Fig. 19) As Brooklyn historian J. T. Bailey wrote in 1840:

> "Bath House" and village . . . has been a favorite place of resort for sea bathing for many years. There is a good hotel here, which is well conducted; it has a lawn in front, beautifully shaded by trees, where the luxury of the ocean breezes may be enjoyed to the fullest extent during the heat of summer. It is the nearest watering place to New York, and new accommodations have been recently erected within a short distance of the beach, which commands a charming prospect of the ocean (Bailey 1840:41).

Bath Beach grew slowly because it was somewhat isolated, but it benefited from its proximity to Coney Island which became a fashionable and increasingly-popular recreational destination in the 1840s. Transportation links were continually improved, and they often passed through or near Bath Beach. The Brooklyn, Greenwood and Bath Plank Company was formed in 1852, and constructed a direct road from the City of Brooklyn to Bath House. Also by 1852, the Bath and Coney Island Plank Road was completed, extending Bath Beach's main street, Franklin Avenue (now Cropsey Avenue) east of DeBruyn Lane toward Coney Island through the swamps at the eastern end of the project site (Conner 1852). Among the railroads that were constructed, the Brooklyn, Bath and Coney Island Railway was the first to be completed, to Bath in 1864, and extended to Coney Island in 1867. It ran southward along present 19th Avenue, and turned eastward near the Gravesend Bay shore, just south of the line of present 86th Street. East of approximately Bay 37th Street, the railroad occupied the route of the plank road, which crossed the project site on 27th Avenue, just south of present Harway Avenue (Dripps 1868; Beers 1873).

During this period, Bath Beach developed as an affluent resort community, and its boundaries were considered to be west of Bath House (approximately 20th Avenue) as far as Dyker Beach Park, and north to 86th Street. Cropsey Avenue was the main street, lined with fine homes and clubhouses (Hazleton 1925:1087-1088).

To the east of Bath Beach, were two small villages, Unionville and Guntherville. Unionville village straddled the line between the townships of New Utrecht and Gravesend, partly on the site of the old bowery of Anthony Jansen van Salee, the earliest landowner in the area. The village, which appears on historical maps as early as 1852, began at the Bath Beach border, now Bay Parkway, and ran eastward along the bay to about present 25th Avenue. By the 1880s, Unionville was a popular boating and fishing resort, and a favorite of summer boarders. It consisted of about 50 houses, a church, several stores and a lumber yard. At its western end,

by Bay Parkway was settlement of boatmakers' and fishermen's shacks. Amateur Gravesend historian Rev. A. P. Stockwell reported the still-existing (c1884) ruins of what must have been Coerton's tidal gristmill built in the 1710, but unfortunately did not record the location[6] (Hazleton 1925:1087,1088; Stockwell 1884:185).

Guntherville, which the 1873 map shows as lying in the elevated areas east of Unionville, between Gravesend village and Coney Island, apparently included the 27th Avenue section of the project site. It does not appear on local maps until after 1868 (Dripps 1868; Beers 1873) It was named for fur merchant (ran a shop on the Ladies' Mile), Mayor of New York (1864-1866) and Bath Beach landowner, Charles Godfrey Gunther, who acquired the Brooklyn, Bath and Coney Island Railway. It was sometimes called the Gunther Railway line (Photographic n.d.:105-A4). Gunther's own homelot was in Unionville, partly on the project site at Bay 41st Street and present Cropsey Avenue (Beers 1873:32).

The Guntherville community appears to be a string of dwellings along the railroad tracks and a parallel path, mainly to the east of the project site. The path and tracks cross Beach Lane below current Harway Avenue (Beach Lane runs within about 150 feet to the northwest of project site sections of 27th Avenue) North of the tracks, the African Zion Methodist Episcopal Church, referred to as the "Colored Church in Unionville" was built on the east side of Beach Lane (between present Harway and Bath Avenues) in 1869, its building and property extending into the project site on 27th Avenue (Stiles 1884:265).

Inevitably, real estate developers recognized the potential profits to be had from the development of residential communities along Gravesend Bay, to the east of Bath Beach. That area was made up of large properties owned by a handful of farming families, disinclined to part with the acreage which had sustained many of them for upwards of two centuries. However, after New York City real estate dealers James D. Lynch and his brother persuaded Robert Benson to sell his farm in c1886, the remaining holdouts went down like dominos. Within three years, Lynch owned the farms of Egbert Benson, Margaret Benson, Richard Benson, Samuel Smith, Erhardt Schmidt, Ella Wyckoff, Robert McGaw and Rebecca Van Sicklen. The last seller, Judge Robert Benson, reserved the family home and a large plot between 21st and Bay Parkway, extending from Cropsey Avenue down to the bay. After the death of Benson's widow, this land became Bensonhurst Park (Hazleton 1925:1088-1089). (See Figs. 1 and 19) The boundaries of this community, which Lynch named Bensonhurst-by-the-Sea, in honor of the Benson family, were DeBruyn's Lane (the Bath Beach community) on the west, varying between 25th Avenue to as far east as Stillwell Avenue near Kings Highway. The northern boundary was generally 86th Avenue, about 3,000 feet north of the project site (Shore Parkway), while the southern boundary was officially Bath Avenue (which runs through the project site at 27th Avenue), yet historical maps tend to show the Bensonhurst development

[6]Probably east of the project area.

extending down to the shoreline (eventually superseding Unionville), then south of Cropsey Avenue.

The layout was the "Result of Broad and comprehensive design," and there was to be "nothing crude or undigested about the place." Lynch hired well-known surveyor Samuel H. McElroy; B. S. and G. S. Olmstead (Olmstead & Olmstead of Boston), landscape architects; Col. George E. Waring Jr., sanitary engineer and the Parfitt Brothers, architects. He contracted 200 men with 90 wagons and carts, who "skinned the land and levelled it out like a lawn." The streets were built first, and by 1889, two miles had been completed, along with 20 miles of fences and sidewalks lined with young trees. The shore from 21st Street to 29th Avenue was leased as a public park and bathing beach "for a term of years." Arrangements for water were made with the Kings County Water Supply Company, and an "elaborate system of sewerage" was installed, which discharged the sewage of Bensonhurst and Bath Beach into Gravesend Bay through two outlets at 15th and 22nd Avenues. Lawns were planted and rolled. By the time this work was completed, 30 villas had already been built, and empty 20' by 100' parcels were being sold for $150 and upward (Bensonhurst 1889:6, 8, 24,28; Hazleton 1925:1089; McElroy 1889).

Building standards restricted stores to certain streets, while the residential streets were graded by the character of the dwelling – on some buyers agreed to build houses that cost no less than $10,000, while other streets had lower limits of $7,000 and $3,000. In parts of the village, no more than one house was permitted for every three lots (60' by 100') for 16 years. "Everyone could have what he could afford, and the symmetry of the neighborhood was preserved" (Hazleton 1925:1089; Bensonhurst 1889:8).

Public response was excellent. The first property owners included Mrs. Benjamin P. Kissam; Charles Sylvester, the son-in-law of William K. Vanderbilt; former Assemblyman Daniel Talmadge; and ex-postmaster general, Daniel M. Dickinson. Transportation facilities improved dramatically after 1889, as numerous ferry lines were established from Brooklyn and Manhattan, and the Bensonhurst railroad station, on the north side of Bath Avenue at Bay 28th Street, became a point of convergence for the many lines to Coney Island. Travel time from the Brooklyn Bridge to Bath Beach and Bensonhurst was as little as 30 minutes (Hazleton 1925:1089-90; Bensonhurst 1889:28).

The 1890 atlas shows a long line of villas, houses, hotels, boating piers and yacht clubs along the bay shore from 15th Avenue to beyond 27th Avenue. (See Fig. 16-21) However, on the same map the seeds of decline are also evident: the ample lots near the shore had been subdivided into small 20' or 25' by 100' building lots, and a broken line showing a new projected street to be built on filled land in the bay, with the ominous name (at least for a vacation resort) of Warehouse Avenue. By the time of the 1905 map, the more affluent patrons of the resorts had begun to move on to more exclusive areas, and numerous large hotels were operating along

the bay, such as the Lowry, Horton and Hollywood Hotels west of 17th Avenue, and the Avon Beach Hotel at Bay 22nd Street (Sanborn 1905). More popular amenities appeared, such as multiple public bathing pavilions and a camping ground between Bay 43rd and 38th Streets, and institutions such as the New York Children's Aid Society summer home between Bay 17th and 19th Streets. The fuel requirements of all these establishments brought businesses like F. Semken Coal and Wood, which constructed a massive pier with coal pockets, jutting into the bay at the end of Bay 32nd Street, cheek by jowl with the Hotel Idle Rest.

The declining popularity of Gravesend Bay as a resort destination may be attributed to a number of factors: pollution from the growing population; the advent of the automobile and the development of the modern highway system, allowing vacationers to travel to less-crowded destinations; and perhaps competition from a revived Coney Island, after World War I.

In order to address the water pollution problems of Greater New York, the Avenue V Pumping Station and its four sister stations in Brooklyn and Queens were created as part of a coordinated sewage treatment plan for the five boroughs. The original Avenue V Pumping Station buildings were constructed in stages between 1911 and 1916 on Block 7140, at the southeast corner of Avenue V and West 11th Street. Designed by Albert L. Martin, the brick structures were built in the Beaux Arts style with elaborate terra cotta detailing.

By 1939, the Bensonhurst area was described as an "undistinguished neighborhood," with Bath Beach a cluster of small houses and ramshackle mansions and hotels leading down to a deserted beach (WPA 1939:470). The final blow was the construction of the Bensonhurst/Bath Beach/Fort Hamilton section of the Shore Parkway in the late 1930s, by which the waterfront communities were literally cut off from the water. Parkway construction required massive amounts of fill to bring the area up to the required grade. This was especially so within the project site, west of Bay 32nd Street, where the Shore Parkway was constructed offshore. The hydraulic fill was "sand," "taken out from the bay by sandsucker pipes," and deposited on and along the shore. Piers from boating clubs and commercial concerns, which extended out into the bay, some of them onto the project site, were left standing as fill was deposited around them, and then removed once filling was completed (Photographic n.d.:125/A3-7, B1-4; 121/F7).

A further public works project, the building of the Verrazano-Narrows Bridge at the western terminus of the project site, was proposed as early as 1926, but ground was only broken in 1959, and the bridge completed in 1964 (Wright 1983:537). To accommodate the bridge, original Shore Parkway exit ramps which had been built between Fort Hamilton and 4th Avenue to the northwest, were buried beneath the bridge anchorage and an extensive connector complex necessary to integrate parkway and bridge traffic. Off-shore Fort Lafayette was demolished.

V. CONCLUSIONS

Prehistoric Potential

Two areas of differing prehistoric potential have been identified, first, a moderate to strong potential for having hosted pre- and proto-historic settlements, camps, processing sites and middens in the Avenue V Pumping Station location, and the sections of the proposed force main project site from Avenue V to the Shore Parkway at Bay 32nd Street. Second, the remaining areas of the project site, from the line of Bay 32nd Street to the Verazzano-Narrows Bridge were rated as an area of low prehistoric potential.

Moderate to Strong Prehistoric Potential:
Avenue V Pumping Station Site & Force Main Route from West 10th Street to the Shore Parkway at the Line of Bay 32nd Street

DISTURBANCE

The sections of the proposed force main project site from Avenue V to the Shore Parkway at Bay 32nd Street, were, in their pre-development state, a combination of well-drained, elevated lands, which our knowledge of prehistoric settlement patterns indicates were attractive to and exploited by prehistoric Americans, and therefore have a strong prehistoric potential, and also marsh areas adjacent to these elevated locations, which have a moderate potential for having been utilized as middens.

Avenue V Pumping Station Site (Block 7140)

The only recorded major construction disturbance in this section of the project site is the construction of the Avenue V Pumping Station and the numerous mains and utilities that proceed from the station structures to the surrounding streets. These mains include 36" and 24" sanitary sewers, a 90" storm sewer, 24" and 30" force mains, in addition to meter and valve vaults, and water lines. The depth of this disturbance is evident from the soil boring on adjacent Avenue V (MR-1) which records a massive fill layer 25' thick. Prior to 19th- and 20th-century development historical maps depict this section of the project site as a dry land, but at present the water table extends approximately 14' into the fill layer. This indicates deep excavation disturbance, which must be related to the construction of Avenue V Pumping Station.

Avenue V from West 10th Street to Stillwell, Benson and 27th Avenues
27th Avenue from Stillwell Avenue to Cropsey Avenue

The recorded major construction disturbance in this part of the project site is from the large number of utilities and mains which originate from the Avenue V Pumping Station, running beneath Avenue V to the intersection of 27th and Bath Avenues. These include 36" and 24" sanitary sewers, a 90" storm sewer, 24" and 30" force mains, as well as meter and valve vaults, and water lines. The depth of this disturbance is evident from the soil borings which record massive fill layers ranging from 23.5' to 35' thick. Although prior to 19th- and 20th-century development this section of the project site was depicted as a combination of dry land and marsh on historical maps, the present water table extends at least 12' and as much as 30' into the fill layer. Rather than a filled marsh, this suggests deep excavation disturbance, which must be related to the Avenue V Pumping Station.

In the remaining parts of this section of the project site (from 27th Avenue at Bath Avenue to Cropsey Avenue) soil borings record fill layers ranging from 7' up to 15' thick, and organic strata, with traces of peat and vegetation, encountered between 7' and 10' below the current surface, indicating the survival of the marshy, pre-development surface. At some locations (MR-9P, midway between Harway and Cropsey Avenues), this organic level has historical period glass and ceramics in it, suggesting that the marsh existed well into the historical period. Traces of shell, which do not signify a shell midden, are recorded in only one boring (MR-9S).

Conclusions

Given the deep disturbance recorded by the soil borings in project site from the Avenue V Pumping Station to the intersection of 27th and Bath Avenues, any potential prehistoric archaeological remains there would have been destroyed. Therefore, further study or testing for these potential remains is not recommended.

On 27th Avenue from Bath Avenue to Cropsey Avenue, there is no record of such subsurface disturbance and soil borings indicate that buried marsh surfaces have survived beneath the existing fill overmantle, between 7' and 10' below the current surface. As described earlier in the prehistoric overview section, the characteristics of a midden are thick layers of marsh deposits, beneath and usually interspersed with layers of discarded shells. Such characteristics would be clearly evident in the boring logs if they were present. Some traces of peat were encountered, and one soil boring log recorded traces of shell (MR-9S), but this was in the same stratum as brick. In three borings, the organic layer, including peat traces, was mixed with historical fill.

The subsurface data indicates that it is unlikely that area of 27th Avenue between Bath and Cropsey Avenues was exploited by prehistoric man, and is therefore not sensitive. No further study or testing for potential prehistoric cultural remains is recommended for this section of the project site.

Cropsey Avenue from 27th Avenue to Bay 40th street

Prior to 19th-century development, the project site section of Cropsey Avenue was marshland, as shown in historical maps (Beers 1873:32). Historical fill ranges from 9' thick between Bay 44th Street and 27th Avenue, where the predevelopment marsh surface is still preserved beneath the fill overmantle to a fill layer between 13.5' and 18.5' thick in the project site from Bay 44th to 40th Streets.

Conclusions

In the project site sections of Cropsey Avenue west of Bay 44th Street, it is unclear whether the pre-development surface, and any potential cultural remains from the prehistoric period have been adversely impacted by subsequent historical activities. There is no organic stratum present in the soil borings. However, because the project's proposed subsurface impact ranges only from 9' to 11' below the current surface, and fill in these areas is a minimum of 13.5' thick, trenching for the Avenue V Force Main will not impact any potential prehistoric resources in this section of the project site.

The project site section of Cropsey Avenue between 27th Avenue and Bay 44th Street, does not have the protective fill overmantle exhibited in the borings taken to the west. Here one boring shows only 9' of fill, and the surviving, inundated marsh surface beneath it. However, no shell fragments are recorded, nor any other evidence of prehistoric occupation. As described earlier in the prehistoric overview section, the characteristics of middens are thick layers of marsh deposits, beneath and usually interspersed with layers of discarded shells. Such characteristics would be clearly evident in the boring logs (MR-11). No peat or shells were encountered, and only a thin 1" layer of organic, silty clay with vegetation was recorded, and this was part of the historical fill stratum. It is possible that prior to historical filling activities and building construction, that some grading took place in this area, eliminating the predevelopment marsh surface.

The subsurface data indicates that it is unlikely that the area of Cropsey Avenue between 27th Avenue and Bay 44th Street was exploited by prehistoric man, and is therefore not sensitive. No further study or testing for potential prehistoric cultural remains is recommended for this section of the project site.

Bay 40th Street from Cropsey Avenue to the Shore Parkway
Shore Parkway from the Line of Bay 40th to Bay 32nd Streets

Prior to 19th-century development, the project site section of Bay 40th Street was marshland, and the northern shoulder of the Shore Parkway was located on the beach along Gravesend Bay, possibly abutting the marsh, which the 1873 Beers depicts as running along the northern side of the beachfront (Beers 1873:32). Historical fill ranges from 12' to 13.5' thick in these areas.

Conclusions

In this section of the project site, it is unclear whether the pre-development surface, and any potential cultural remains from the prehistoric period have been adversely impacted by subsequent historical activities. There is no organic stratum present in the soil borings, and no evidence of prehistoric exploitation. Because the project's proposed subsurface impact ranges only from 9' to 11' below the current surface, and fill in these areas is a minimum of 12' thick, trenching for the Avenue V Force Main will not impact any potential prehistoric resources or ground surfaces in this section of the project site. Therefore, no additional study or testing for potential prehistoric archaeological material is recommended.

Low Prehistoric Potential:
Shore Parkway from Bay 32nd Street to the Verrazano-Narrows Bridge

West of 32nd Street to the Verrazano-Narrows Bridge, the Shore Parkway, including its the areas in and adjacent to its northern shoulder, was constructed on hydraulic fill, removed from Gravesend Bay, and deposited in what was then part of the bay and the shallows along its shoreline. As described in the prehistoric overview, sea levels have been gradually rising since c4,000 to 2,000 B.P., and areas historically inundated may have been dry land during the prehistoric period. Because of their historical location in the water off the Gravesend Bay shore sections of the project site west of Bay 32nd Street have a low prehistoric potential.

In evaluating the potential of these parts of the project site for sensitivity, several criteria are examined. Firstly, is there a record of subsurface disturbance which may have destroyed potential prehistoric remains? Secondly, is there evidence of marsh deposits (peat and organic silt) many feet thick, that would indicate a gradually submerged former land surface? Finally, if the peat layer is present, are shell midden deposits beneath and in association with the peat?

DISTURBANCE

Although it is possible that because of the presence of numerous piers and docks along these sections of Gravesend Bay that dredging was performed so that boats and ships could approach the shore, no dredging has been recorded. Furthermore there is no record of subsurface disturbance at the time of the construction of the Shore Parkway.

In the project site sections west of the Bay 32nd Street, it is unclear whether the pre-development surface, and any potential cultural remains from the prehistoric period were ever present or have been adversely impacted by subsequent historical activities. Although an organic stratum is present in a number of the borings (B24, 25, 27, 28, 47, 49, 51, 53c) there is no evidence of the presence of shell middens beneath this organic layer. Since these organic strata are so deeply buried, and the project's proposed subsurface impact ranges only from 9' to 11' below the current surface where fill is a minimum of 15' and as much as 38' thick, trenching for the Avenue V Force Main will not impact any potential prehistoric resources in this section of the project site.

However, in one location, at the Bay 8th Street entrance ramps, the depth of subsurface impact for the project will be greater than 11', because the force main will be installed using trenchless technology (pipe jacking/tunneling) to a depth ranging from 10 to 25 feet. In this part of the project site, added fill which supports the Bay 8th Street overpass has increased surface elevations on the parkway shoulder to between 16.7' and 30' (Appendix B, Soil borings B38-41) from the 12' to 13' to the north and south (Soil borings B37 and 42), and therefore the force main will be more deeply buried.

The thickness of the fill overmantle adjacent to the Bay 8th Street entrance ramps ranges from 25' to 39' at the Bay 8th Street overpass, although to the north and south, observed fill layers tend to drop below 25', ranging from 12' and 15' (B38[7] and 37, north of the westbound entrance ramp, adjacent to Dyker Beach Park) to 23'. Although the soil boring logs indicate that the fill stratum is not thick enough in all of these locations to protect potential submerged prehistoric archaeological resources from disturbance deeper than 25' below the current surface, they also indicate that this part of the project site does not exhibit the stated criteria for identifying the presence of submerged sites. There is no evidence of thick marsh deposits of peat, which would have built up during gradual inundation, and there is no evidence of shells or shell middens here.

[7]Soil boring B38, shows only 12' of fill, which must be incorrect, since this boring location was once in Gravesend Bay, and presently the water table, at 16.8' below the surface, does not even reach the bottom of fill layer.

Therefore, this section of the project site is considered not sensitive for archaeological resources from the prehistoric period, and no further archaeological study or testing is recommended.

HISTORICAL POTENTIAL

Much of the Avenue V Force Main project site was inundated or partially inundated land along the shore of Gravesend Bay until the filling activities for the Shore Parkway were carried out in the 1930s. Although docks and piers were built in these areas extending from the shore into the project site, since the hydraulic fill for the parkway was placed prior to their demolition, only the dock supports would remain, and these are not considered archaeologically sensitive.

However, several parts of the project site were elevated above sea level prior to the construction of the Shore Parkway and the streetbeds of the project site. The entire project site east of Bay 32nd Street, although partially marsh or beach at the beginning of the historical period, was gradually filled in as residential and commercial development in the area proceeded.

Although often the dwelling or commercial structures were outside the project site, the proximity of the various structures to the project site indicates a high potential for the remains of outbuildings and shaft features (privies and wells), to be found there.

Privy and well shafts, which are often filled with contemporary refuse related to the dwellings and their occupants, schools and their pupils and employees, or businesses and their workers and managers, provide important stratified cultural deposits for the archaeologist. Such shafts, five or more feet deep, usually survive all but the deepest post-depositional disturbance and frequently provide the best remains recovered on sites, including animal bone, seeds, glass, metal, stone, ceramics, and sometimes leather, cloth, wood and even paper. By analyzing such artifacts, archaeologists can learn much about the diet, activities, customs and technology of the former occupants, and attempt to combine this data with what the documentary record tells us about their ethnicity, socioeconomic status, gender, environment, etc. Since the first recorded sewer lines were installed throughout the area in 1889, with the development of "Bensonhurst-by-the-Sea," and the earliest detailed real estate map available dates to 1890, 1890 was considered the year after which such shaft features were not a necessity for inhabitants and workers in the project area. (Robinson 1890; Bensonhurst 1889).

In addition, the presence of the African Zion Methodist Episcopal church was noted abutting the project site section of 27th Avenue. Before the consolidation of this part of Kings County with the cities of Brooklyn and New York at the end of the 19th

century, many churches tended to have their own cemeteries, and these were often not, or poorly recorded on historical maps and documents.

The locations, nature and survival of these potential historical resources will be examined in more detail in the following paragraphs, following the geographical divisions made for the Environmental Setting chapter (Section II). For the locations of these buildings and lots, refer to the 1890 Robinson map (Figures 16-18). Following the grouped descriptions of the potential resources, will be a discussion of subsurface disturbance subsequent to the deposition of the archaeological resources, and whether archaeologically sensitive areas will be adversely affected by the proposed Avenue V Pumping Station and Force Main project.

Avenue V from 10th Street to Stillwell, Benson and 27th Avenues
(Figures 2, 3 and 16)

East of Stillwell Avenue, on northern side of Avenue V, an attached pair of 2-story dwellings with basements on the Court D. Lake estate, was oriented toward the old Beach Road, making sections of present Avenue V part of the homelots backyard. This building appeared between 1873 and 1890, and was still standing in 1905 (Beers 1873:31; Sanborn 1905:XIII 50).

An unlabelled building stood approximately 60 feet north of Avenue V in West 13th Street. The building was oriented toward Beach Lane, making the adjacent areas of Avenue V part of the structures rear yard. It first appeared between 1873 and 1890, and was still present in 1905 (Beers 1873:31; Sanborn 1905:XIII 50).

A dwelling stood in the intersection of 27th Avenue and Stillwell Avenue, depicted as a 1½-story dwelling with a barn and two sheds in 1905 (Sanborn 1905:XIII 50). The structure first appeared between 1873 and 1890 (Beers 1873:31).

Disturbance

This section of the project site is overlaid by large amounts of fill, between 23.5' and 28.5' thick. Although prior to 19th- and 20th-century development this section of the project site was depicted as dry land on historical maps, the current water table extends at least 12' into the lower part of the fill layer. Therefore, rather than a filled marsh, this suggests deep excavation disturbance, much of which must be related to the Avenue V Pumping Station. A brief list of the water and sewage lines and other facilities that lie under Avenue V adjacent to the station include: 36" and 24" sanitary sewers, a 90" storm sewer, 24" and 30" force mains, as well as meter and valve vaults, and water lines.

Conclusions

Given the deep disturbance recorded by the soil borings in Avenue V from 10th Street to Stillwell, Benson and 27th Avenues any potential historical archaeological remains relating to the 19th-century dwellings built there would have been destroyed. Therefore, further study or testing for these potential cultural remains is not recommended.

27th Avenue from Stillwell Avenue to Cropsey Avenue
(Figures 3, 4, 16 and 17)

A group of three small buildings stood on the western side of 27th Avenue, south of Stillwell Avenue, built between 1873 and 1890 (Beers 1873:31). One stood on the western line of 27th Avenue, and the remaining two within 60 feet of 27th Avenue. They are probably the same three 2-story dwellings that appear in the approximate location in 1905 (Sanborn 1905:XII 39). Since they were oriented toward Beach Lane to the west, this section of the Avenue V project site part of the homelot's rear yard.

The J. Carter house stood on the west side of 27th Avenue, midway between Bath and Harway Avenues, with the rear of building within 20 feet of 27th Avenue. It was built between 1873 and 1890 (Beers 1873:31) Although this 2-story dwelling was west of the 27th Avenue section of the project site, the 1905 Sanborn map shows numerous barns, sheds and coops associated with the Carter house, extending behind the dwelling into the project site, and behind the neighboring church to the south (Sanborn 1905:XII 35; 1929:XII 41).

The African Zion Methodist Episcopal Church, was built in 1869, and the 1890 map shows the rear of sanctuary abutting the west side of 27th Avenue, between Bath and Harway Avenues. The rear of the church lot extended approximately 40' into the unbuilt 27th Avenue roadbed (Stiles 1884:265). Although the 1905 map tends to show the entire streetbed behind the church as part of the Carter property to the north (see previous paragraph), the 1929 map confirms the church's ownership of the western part of the streetbed. It also labels the building "Zion Baptist Church (COLORED)" (Sanborn 1905:XII 35; 1929:XII 41). The church was demolished between 1929 and 1950 (Sanborn 1950:XII 41)

A 1-story dwelling, built between 1873 and 1890, stood on the east side of the 27th Avenue in the roadbed, approximately 95 feet north of Cropsey Avenue. The house was still present in 1905 (Sanborn 1905:XII 35; Beers 1873:31). In 1890 it was labelled "Heirs of A. Voorhies," who owned additional empty lots to the east. Oriented toward the old Mill Road, north and parallel to present Cropsey, the rear yard of the dwelling included present intersection of Cropsey and 27th Avenues.

Disturbance

The northern portion of 27th Avenue as far as Bath Avenue, like the project site section of Avenue V discussed above, is overlain by large amounts of fill, which form a layer between 33' and 35' thick. Although prior to 19th- and 20th-century development this section of the project site was depicted as both dry land and marsh on historical maps, the current water table extends at least 20' into the lower part of the fill layer. Rather than a filled marsh, this suggests deep excavation disturbance, much of which must be related to the nearby Avenue V Pumping Station. A brief list of the water and sewage lines and other facilities that lie under Avenue V adjacent to the station include: 36" and 24" sanitary sewers, a 90" storm sewer, a 24" and 30" force mains, as well as meter and valve vaults, and water lines.

The southern portion of 27th Avenue, south of Bath Avenue to Cropsey Avenue, shows a much thinner fill layer, ranging from 7' to 15' thick, atop an organic layer indicating the location of the pre-fill, pre-development ground surface. Because much of this part of the project site was marsh or meadowland prior to late 19th-century development, and required the application of some fill before it was habitable. A comparison of early 20th-century elevations (4½' to 3') with current elevations (6.6' to 8.9') indicates that the areas of potential historical sensitivity are covered by approximately 2' to 7' feet of late 20th-century fill, and may have been protected from subsequent subsurface disturbance.

Conclusions

Given the deep disturbance recorded by the soil borings in 27th Avenue from Stillwell Avenue to Bath Avenue, any potential historical archaeological remains relating to the 19th-century dwellings built there would have been destroyed. Therefore, further study or testing for these potential cultural remains is not recommended.

However, south of Bath Avenue, buried cultural remains relating to the J. Carter property (dwelling constructed between 1873 and 1890), the African Zion Methodist Episcopal Church (built 1869, occupied until after 1929), and the Heirs of A. Voorhies property (dwelling built between 1873 and 1890), may have survived within the existing fill overmantle, and must be considered archaeologically sensitive. These potentially sensitive areas are indicated on Figures 4-8. Because projected subsurface disturbance for the required force main trench will average between 9' and 11,' these potential historical resources would be adversely affected by the project. Recommendations for the next stage of study and testing will be discussed at the end of this report.

Cropsey Avenue from 27th Avenue to Bay 40th Street
(Figures 5, 6 and 17)

Cropsey Avenue was opened between 1890 and 1905 running through earlier homelots and building sites. As originally laid out, Cropsey was 70' wide, and was widened to 120' between 1905 and 1929 (Sanborn 1905; 1929). This additional 50'-wide strip was taken from the building lots on the south side of the road.

The James Carter property, ran from Old Mill Road to Centre Place through present Cropsey Avenue. In 1890, a barn stood directly in center of Cropsey Avenue abutting east side of Bay 43rd Street line. An unidentified building straddles south line of Cropsey Avenue. Additional structures stood to the north and south of the project site. These buildings were constructed between 1873 and 1890 (Beers 1873:32).

The John Zimmermann property ran from Old Mill Road to Centre Place through the present Cropsey Avenue roadbed on the eastern half of the Bay 43rd Street intersection. In 1890 the dwelling stood along Mill Road, within 60' of the project site on the north, and what appears to be a barn was on Centre Place, 50' south of project site. These structures were put up between 1873 and 1890 (Beers 1873:32).

The Joseph Stryker property ran from Old Mill Road to Centre Place through present Cropsey Avenue, midway between Bay 43rd and 26th Avenue. The single building drawn there in 1890, abuts the north side of present Cropsey Avenue. Since the lot is oriented to Mill Road, the project site was the homelots immediate backyard. The dwelling was built between 1868 and 1873, when it is labelled "J. Stryker " (Beers 1873:32; Dripps 1868).

The Robert Euin property, ran from Old Mill Road to Centre Place through present Cropsey Avenue, about 20 feet east of 26th Avenue. One building abuts the north side of the present Cropsey Avenue roadbed, a barn stood in Cropsey Avenue along south side, and second barn abutted the south side of Cropsey. These buildings were constructed between 1873 and 1890 (Beers 1873:32).

The B. McGetrick property ran from Old Mill Road to Centre Place through present Cropsey Avenue, in the east side of present 26th Avenue. Buildings stood at both Mill Road and Centre Place, a 2-story, basemented dwelling along Centre Place (60 feet south of project site – Sanborn 1905:XII 20), and a third building abutted the north side of Cropsey Avenue. The earliest of these structures dates to between 1868 and 1873, when a dwelling labelled "B. McGretrick" appears on the map (Beers 1873:32).

The A. Saeger property fronted on Old Mill Road and extended southward through the present Cropsey Avenue roadbed, including the western half of the Cropsey and 26th Avenue intersection. What appears to be a dwelling abuts the north side of

Cropsey Avenue, straddling the western side of 26th Avenue. It was labelled A. Saeger on the 1873 map, and not present in 1868 (Beers 1873:32; Dripps 1868).

The James McBride property hosted a 2-story house, with a barn and outbuilding (Sanborn 1905:XII 20). The entire homelot stands within the project site, on the south side of present Cropsey Avenue, in, and extending westward from the 26th Avenue intersection. The structures were built between 1873 and 1890 (Beers 1873:32).

The C. G. Gunther property extended from Old Mill Road to Gravesend Bay, between what was then Stryker and Hubbard Streets, now roughly centered on Bay 41st Street, and extending east and west of the intersection of present 41st and Cropsey Avenue. Two buildings appear just north of the project site in 1873, where there was vacant land in 1868 (Beers 1873:32; Dripps 1868). Gunther was dead by 1890, and his heirs divided the property into small lots. In 1890, the two buildings from 1873, apparently dwellings, are shown as standing on smaller lots outside the project site, and are labelled, from west to east, Augustus Wolf and Cath. Wolf. As discussed in the Historical Period section, Charles Godfrey Gunther was a fur merchant and Mayor of New York (1864-1866). He also owned the Brooklyn, Bath and Coney Island Railroad.

The Public School No. 3 lot included the southern 50' of the present Cropsey Avenue roadbed, at the southwest corner of Cropsey and Bay 41st Street. The school building abutted the southern side of Cropsey. The school was established between 1868 and 1873, when it first appears on maps (Beers 1873:32).

Disturbance

Prior to 19th-century development, the project site section of Cropsey Avenue was marshland, as shown in historical maps (Beers 1873:32), and as evidenced in the borings which show deeply-buried organic layers submerged below the water table. Fill, which ranges from 9' to as much as 18.5' in thickness, appears to have been added in two stages, with late 19th-century activity raising surface elevations to 3', suitable for the construction of houses and outbuildings, and 20th-century fill operations increasing surface elevations to between 6' and 9'. A 1935 photograph notes that on Cropsey Avenue, west of the project site (Bay 37th Street), the streets had been recently raised, leaving the houses there between 8' and 10' below street level (Photographic n.d.:153/D1).

This elevation and boring data indicate that the areas of potential historical sensitivity described above are covered by approximately 3' to 6' feet of 20th-century fill, a may have been protected from subsequent subsurface disturbance.

Conclusions

Buried cultural remains relating to the James Carter property (dwelling constructed between 1873 and 1890), the John Zimmerman property (dwelling constructed between 1873 and 1890), the Joseph Stryker property (dwelling constructed between 1868 and 1873), the Robert Euin property (dwelling constructed between 1873 and 1890), the B. McGetrick property (dwelling constructed between 1868 and 1873), the A. Saeger property (dwelling constructed between 1868 and 1873), James McBride property (dwelling constructed between 1873 and 1890), the C. G. Gunther property (dwelling constructed between 1868 and 1873), and Public School No. 3 lot (school built between 1868 and 1873), may have survived within the existing fill overmantle, and their locations must be considered archaeologically sensitive. These potentially sensitive areas are indicated on Figures 4, 5 and 6. Because projected subsurface disturbance for the required force main trench will average between 9' and 11,' these potential historical resources would be adversely affected by the project. Recommendations for the next stage of study and testing will be discussed at the end of this report.

Shore Parkway from the line of Bay 40th Street to Bay 32nd Street
(Figures 6-8, 17 and 18)

The entire A. Voorhies property, with one dwelling, is within the project site. The homelot is approximately in the line of 25th Avenue. The name A. Voorhies appears next to the dwelling at this site in both 1890 and 1873 (Beers 1873:32), and an unlabelled building is there in both 1868 and 1852 (Dripps 1868; Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The large "Mrs. Remsen" property (1890) contained three 2-story dwellings which stood outside the project site, one approximately 35' south, in line of Bay 38th Street, the other two within 30 feet to the south between Bay 38th and 37th Streets. A number of smaller barns and other outbuildings were also within 30' of the project site (Sanborn 1905:XII 19). In 1873 the property was owned by R. Struthers, and what appears to be the easternmost of the three dwellings is present, called Scotia Villa (Beers 1873:32). One building present here in 1868 (Dripps 1868), and 1852 (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The John Bateman property, in 1890, was in the line of Bay 37th Street, with buildings on either side of project site – a 2-story, basemented mansion approximately 10' to the south, with the project site directly behind the house. (See Fig. 18) By 1905 the house had become the clubhouse of the New York Canoe Club

(Sanborn 1905:XII 18). This building appears as J. Bateman on the 1873 map, and was present there in 1868 (Dripps 1868), and was labelled Hart in 1852 (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The Mrs. William Bateman property, abutted the west side of the line of Bay 37th Street, in 1890. The project site cuts across and between the former site of the 3-story mansion and an outbuilding, still present in 1905 (Sanborn 1905:XII 18). In 1873 the house was owned by J. Rennie, and a building was present there in 1868 (Dripps 1868), and a dwelling with outbuilding is recorded in 1852 (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The John B. Denyse property, was midway between the lines of Bay 37th and 35th (Cropseys Lane) Streets. (See Fig. 18) The project site cuts across and between the site of a 2½-story dwelling and small outbuilding to the north. The same dwelling, labelled J. B. Denyse was depicted there in 1873 (Beers 1873:32), and the building was present there in 1868 (Dripps 1868), and a dwelling with outbuilding is recorded in the same location in 1852 (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The Stephen Morris property, in 1890 lay approximately 50 feet east of Bay 35th Street (Cropseys Lane). The project site cuts across and between the former site of the 1½-story dwelling (Sanborn 1905:XII 18), and the outbuildings to the north. S. Morris was also listed at the dwelling in 1873 (Beers 1873:32), and the buildings are present there in 1868 (Dripps 1868) and 1852 (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The James Cropsey Lumberyard, in 1890 occupied the east and west sides of Bay 35th Street (Cropseys Lane). The project site includes part of the yard and lumber shed, office and storage facilities for lime and cement (Sanborn 1905:XII 18). G. W. Cropsey was present with multiple structures there in 1873 (Beers 1873:24), and also in 1868 (Dripps 1868), and 1852 (Conner 1852). It is possible that some of the structures on this property, labelled "G. W. Cropsey" or "G.W.C." on 1873 are residences in the vicinity of the lumberyard. Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The H.W. Cropsey property, in 1890, lay between Bay 35th and 34th Streets, was adjacent to the G. W. Cropsey lumberyard, and was part of G. W. Cropsey property in 1873 (Beers 1873:24). The project site passes through the lot along

the south side of the 2½-story dwelling (Sanborn 1905:XII 18). The house was there in 1873, and a building appears in that location in 1868 (Dripps 1868) and also 1852, labelled Cropsey (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The Mrs. L. Hegeman property, in 1890, lay east of, and in the line of Bay 34th Street. The project site passes through the backyard and abuts the north side of the 2½- and 1-story mansion, named "Woodwilde" (Sanborn 1905:XII 18). It was owned by Robert Speir in 1873 (Beers 1873:24), and a building was present there in 1868 (Dripps 1868) and 1852 (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

The S. Fleet Speir property stretched from Bay 34th Street to just west of 23rd Avenue. The project site passes through the homelot and the southernmost of the two 2-story dwellings present in 1890. They both became clubhouses for the Brooklyn Yacht Club by 1905 (Sanborn 1905:XII 16). By 1873, the project site house was occupied by S. Fleet Speir, and second dwelling, on west side of 23rd Avenue, by H. Cropsey (Beers 1873:24). Only one building was drawn on the property in 1852 (Conner 1852). Although structures appear in the general vicinity on the 1844-45 Coast Survey, it is difficult to associate them with any particular property (Hassler 1844-45).

Disturbance

Prior to 19th-century development, the project site section of the Shore Parkway shoulder from the line of Bay 40th to Bay 32nd Streets was part of the beach along Gravesend Bay, and as shown in historical maps, some meadowland may have intruded into the beach area (Beers 1873:32). The fill layer ranges from 12' to 13.5' thick, and the water table extends between 5' and 6.5' up into the fill layer, except west of the 23rd Avenue line, where this figure is approximately 1'. No organic layer was observed beneath the fill overmantle, but such would not be expected in an area of buried beach, and this configuration could indicate that certain areas of the beach were more depressed than others, and/or have suffered greater compaction through time, resulting in a pre-development surface which can be submerged by as much as 6.5'. Otherwise, there is no record of any major construction in this section of the project site that would account for the removal of soil.

Street elevations predating the construction of the Shore Parkway were recorded in 1905. They show a surface elevation of 4' for this section of the project site from Bay 40th through Bay 37th Streets. The elevations at the bay side were a constant 3' through Bay 32nd Street. It is possible that elevations west of Bay

37th Street were higher, since adjacent Cropsey Avenue to the north sloped upward from 3' at Bay 40th Street, to 9' at Bay 34th, 14' at 23rd Avenue, and 15' at Bay 32nd Street. Current elevations from the soil boring logs show a rise from 7.6' at Bay 40th Street to 11.9' west of 23rd Avenue.

Like other sections of the project site, fill appears to have been added in two stages, with late 19th-century activity raising surface elevations to 4' or more, suitable for the construction of houses and outbuildings, and 20th-century fill operations increasing surface elevations by adding between 3' and 9' of fill. As mentioned previously, a 1935 photograph notes that on Cropsey Avenue, north of this part of the project site (Bay 37th Street), the streets had been recently raised, leaving the houses there between 8' and 10' below street level (Photographic n.d.:153/D1).

This elevation and boring data indicate that the areas of potential historical sensitivity described above are covered by approximately 3' to 9' feet of 20th-century fill, and may have been protected from subsequent subsurface disturbance.

Buried cultural remains relating to the A. Voorhies property, the Mrs. Remsen property, the John Bateman property, the Mrs. William Bateman property, the John B. Denyse property, the Stephen Morris property, the James Cropsey Lumberyard lot, the H. W. Cropsey property, the Mrs. L. Hegeman property, the S. Fleet Speir property (all with a structure built on the lots prior to 1852), may have survived within the existing fill overmantle, and their locations must be considered archaeologically sensitive. These potentially sensitive areas are indicated on Figures 6, 7 and 8. Because projected subsurface disturbance for the required force main trench will average between 9' and 11,' these potential historical resources would be adversely affected by the project. Recommendations for the next stage of study and testing will be discussed at the end of this report.

HISTORICAL POTENTIAL – WHARVES ADJACENT TO FORT HAMILTON

Adjacent to present Fort Hamilton, two wharves extended from the shore into the project site, Denyses Wharf and a second wharf, which projected into the bay from the end of Battery Avenue, which once extended as far as the shore. (See Fig. 22) Maps, historical documents and one painting (Fig. 23) indicate that these were not wooden platforms "on stilts," but solid wharves, probably built on and of historical fill. Slips adjacent to wharves have been excavated in the past, and have strong potential for yielding historical artifacts, as at Old Slip in lower Manhattan. There deeply-buried 17th- and 18th-century fill strata were documented beneath an accumulated sand layer and later modern fill (Huey 1984:18-23).

Battery Avenue Wharf

This wharf appears to have been a late 19th- to early 20th century construction. As it is drawn on the 1890 map, the wharf was a projected construction, to be built in an inundated area that was part of Gravesend Bay. (See Fig. 22) It is drawn on the 1911 map of Fort Hamilton (Schumm 1911), yet by 1932, it was no longer present on early maps of the Shore Parkway route, and the location is drawn in the same way as other inundated locations adjacent to the military reservation (Fort Hamilton 1932). As a post-1890 construction, this wharf is not considered significant, and would have no historical archaeological potential.

Denyses Wharf

Like the Battery Avenue Wharf, Denyses Wharf called the Q.M. (Quatermaster's) Wharf in 1911(Schumm 1911), was built of earth and stone, but it pre-dates the establishment of the Fort Hamilton military reservation. As discussed in the overview of the historical period, Denyse Denyse established a ferry to Staten Island at this location in 1742. Denyse and his wife Teuntje had acquired the land around the foot of current Fort Hamilton Parkway, and constructed a stone wharf here (Bergen 1884:261-262; Taylor and Skinner 1781). The earliest ***detailed*** map depicting the wharf, from 1826, shows the outline of the project site section of the wharf to be the same as in 1911 (Fort Hamilton 1827; Schumm 1911). With the construction of the Belt Parkway, the shore was extended, and as with the other piers and wharves along the shore, Denyses Wharf was presumably left in place and surrounded by hydraulic fill pumped from the bay floor. The shorter version remaining today is a result of this expansion of the shoreline. (See Figs. 1, 14 and 22)

According to the 1911 and 1932 maps of the fort, the latter with the proposed Shore Parkway route plotted in, the project site crosses the wharf just beyond the outermost battery of the fort (Battery Griffin, to the northeast). On either side of the wharf, to the north and south, was a narrow ribbon of beach, subject to regular inundation by the tides, and rip-rap abutting the wharf itself (Schumm 1911). Between 1911 and 1932, the area north of the wharf seems to have expanded greatly, probably through tidal sand accumulations, but possibly through filling operations. The project site is shown to be between the 5' and 15' contour lines (Fort Hamilton 1932).

Because of the early date of Denyses Wharf, the potential for the presence of 18th- and early 19th-century fill within the wharf, as well as for the accumulation of artifacts in the areas north and south of the wharf, the project site section of Denyses Wharf location must be rated as having a strong historical archaeological potential, and its sensitivity will be considered further in the following discussion of disturbance.

Disturbance

Historical maps record a number of utility lines running along Denyses Wharf, crossing through the project site. In 1911, these included, "conduit fire control" which ran along the south side of the wharf, two 4" water mains for fire hydrants and an 18" sewer with manholes (Schumm 1911). A 1936 map records a power cable, an old sewer outlet (probably the 18" main from 1911), and a new sewer extension to be installed during parkway construction (Larkin 1936:Sheet 10). In 1960, the project site is crossed by a 30" V.C.P. main, which connected to the still-existing pumping station on the reservation. In preparation for Verrazano-Narrows Bridge construction, the hydrant adjacent on the northwest to the project site section of the wharf was to be removed. (See Fig. 24)

Pre-parkway topographic maps give wharf elevations in the project site between the 6' and 8' contour lines (Larkin 1936:Sheet 10), and soil boring B23, which is within the area of potential sensitivity, shows a present elevation of 8.5', [8] indicating the possible presence of a thin fill layer ranging between 0.5' and 2.5' feet thick over the pre-parkway surface of the wharf.

The impact of the recorded utilities described in the previous paragraph would have softened by the protection of the thin (0.5' to 2.5') fill overmantle. Yet even without the interposition of fill it is unlikely that the six recorded utility lines, none of which would have penetrated more than five feet below the surface, could have destroyed all the archaeological potential related to the project site sections of Denyses Wharf. This potentially sensitive area runs about 50 feet along the force main route and occupies its entire width. In depth it extends from the bottom of the modern fill overmantle, which is between 0.5' and 2.5' below the current surface, to below the water line, which is approximately 11' below the present surface. This is because the base of the wharf was originally built out into bay, and its lowest levels would be under water. B23 records 18' of fill in the potentially sensitive area, of which approximately 7' lies below the water level.

This potentially sensitive area is indicated on Figure 24. Because projected subsurface disturbance for the required force main trench will average between 9' and 11' below the present surface, possible surviving historical resources from the wharf would be adversely affected by project trenching. Recommendations for the next stage of study and testing will be discussed at the end of this report.

As noted earlier, the areas directly north and south of the wharf may also host historical deposits related to the wharf, i.e., artifacts discarded into the adjacent

[8]The 1932 contour map places the project site sections of the wharf between the 15' and 10' contours. This agrees with the current U.S.G.S. topographic map, which records elevations between 10 and 20' (Fig. 1), suggesting that a different elevation datum was used for the second pair of measurements.

waters. However, these would be more deeply-buried and submerged than the wharf itself. Soil boring B24, about 250 feet southwest of the wharf in an area of similar shore bottom records 22' of fill, of which approximately 11' of fill lies above the water table.

Since pre-20th-century deposits are likely to be buried several feet below the bay floor, potentially sensitive archaeological materials adjacent to the wharf itself will not be impacted by the project's projected depth of disturbance of 9' to 11' below the current surface. Therefore no further study or testing for historical remains adjacent to the sensitive area of the wharf is recommended.

Recommendations

Prehistoric

As discussed more fully on pages 31-35 of this report, two areas of varying prehistoric archaeological potential in the project site were identified. The section of Shore Parkway from Bay 32nd Street to the Verrazano-Narrows Bridge was classified as an area of low prehistoric potential, while the remainder of the force main route, from the Avenue V Pumping Station to the Shore Parkway at Bay 32nd Street was classified as having moderate to strong prehistoric potential. However, these areas of potential prehistoric sensitivity are either too disturbed by historical period construction and utility installation, or are too deeply-buried to be impacted by project trenching. Therefore, no further study or testing for buried prehistoric cultural remains is recommended.

Historical

Areas of potential historical archaeological sensitivity have been noted on Figures 4-8. These include homelots from the second half of the 19th century, a school lot established before 1873, and a churchyard in use since 1869. For these areas of potential sensitivity, additional research and testing is recommended, under a research design protocol according to CEQR standards, developed in conjunction with the Landmarks Preservation Commission, once the LPC has reviewed and accepted this Phase 1A report.

One component of this research design is a topic-intensive analysis concerning the occupation of the project site homelots, from c1852 to the advent of water and sewer service in c.1889. Similar research is needed for the lots used as industrial, school and church sites. The study of directories, census, real estate and tax records, as well as other historical data, would provide important basis for the interpretation and understanding of these lots, and also enable archaeologists to formulate questions associated with work- and life-ways, diet and consumer behavior. Particularly

important will be further research to determine whether the churchyard was utilized as a cemetery.

Another component of the protocol would be a discussion of research questions, and a methodology that details how significance would be determined.

The final component would be a proposed scope of work for field testing.

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1960 "Narrows Bridge -- Grading and Drainage Plan, Brooklyn Anchorage." Contract No. NB-5B, Drawing #80, July 1, 1960. Amman and Whitney, Consulting Engineers (Fort Hamilton DPW).

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n.d. "Brooklyn Coastline." C1824? Fort Hamilton Harbor Defense Museum.

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1897a "Brooklyn Quadrangle." H. M. Wilson, geographer-in-charge.

1897b "Staten Island Quadrangle." H. M. Wilson, geographer-in-charge.

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1939 *The WPA Guide to New York City*. 1982 reprint. Pantheon Books, New York .

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1983 *Blue Guide to New York*. W. W. Norton & Company, New York.

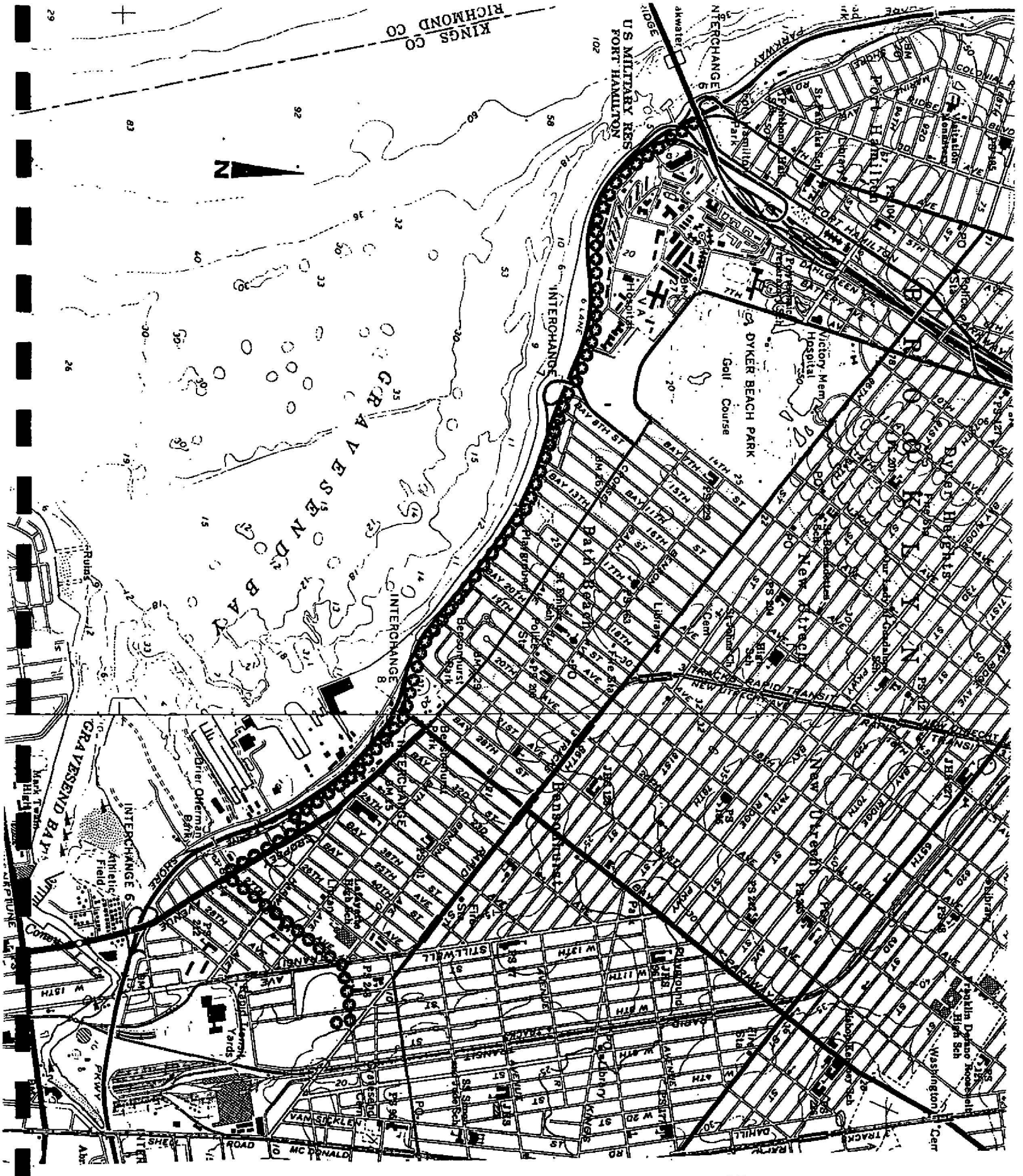


Figure 1. Project Site Location – Current U.S.G.S. Topographic Map
(Coney Island and The Narrows Quadrangles)
Scale: 1 inch = c.2,000 feet

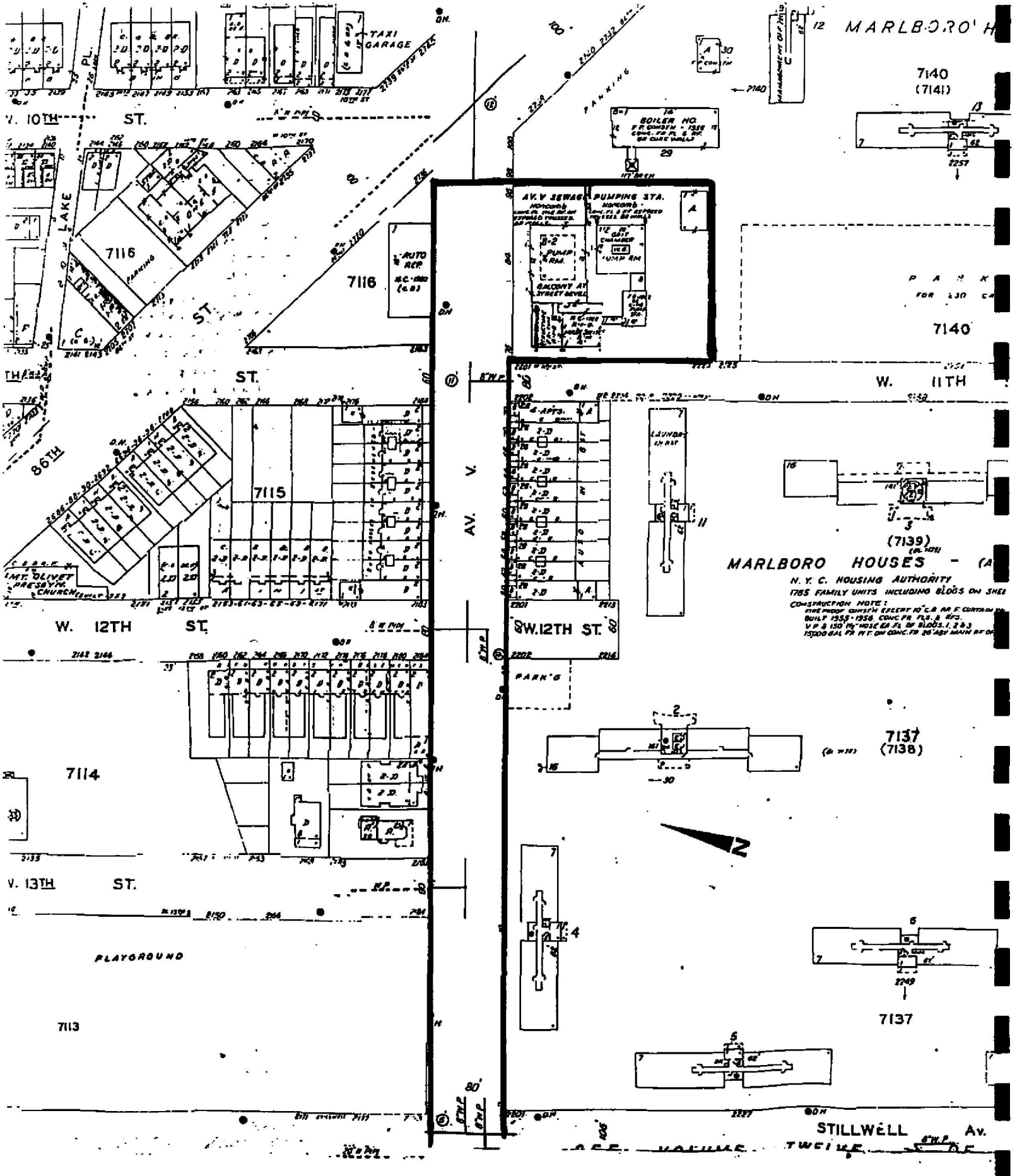


Figure 2. Sanborn Building and Property Atlas of Brooklyn, 1997
Avenue V from West 10th Street to Stillwell Avenue
Heavy outline indicates project site boundaries

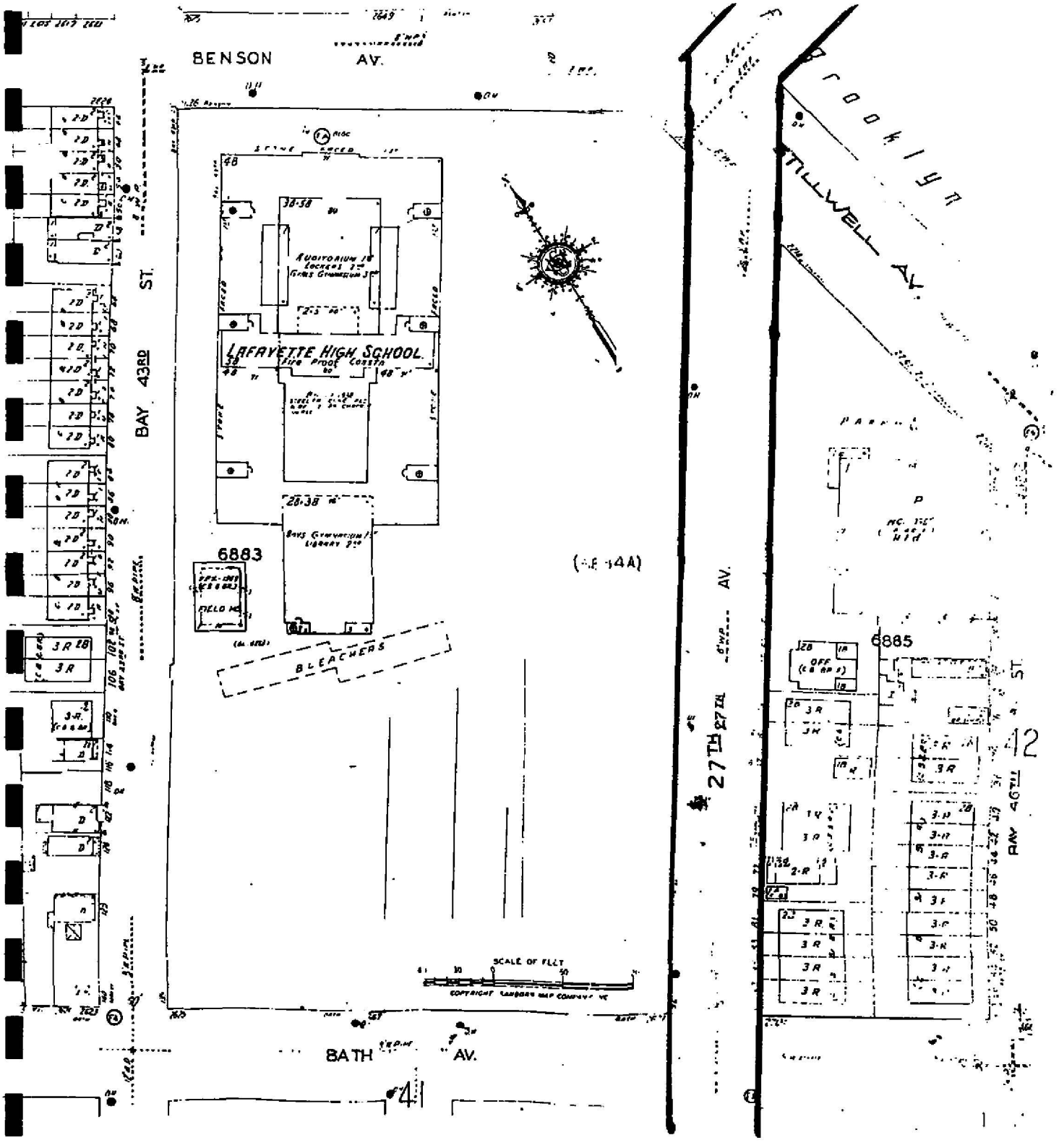


Figure 3. Sanborn Building and Property Atlas of Brooklyn, 1997
27th Avenue from Stillwell Avenue to Bath Avenue
Heavy outline indicates project site boundaries

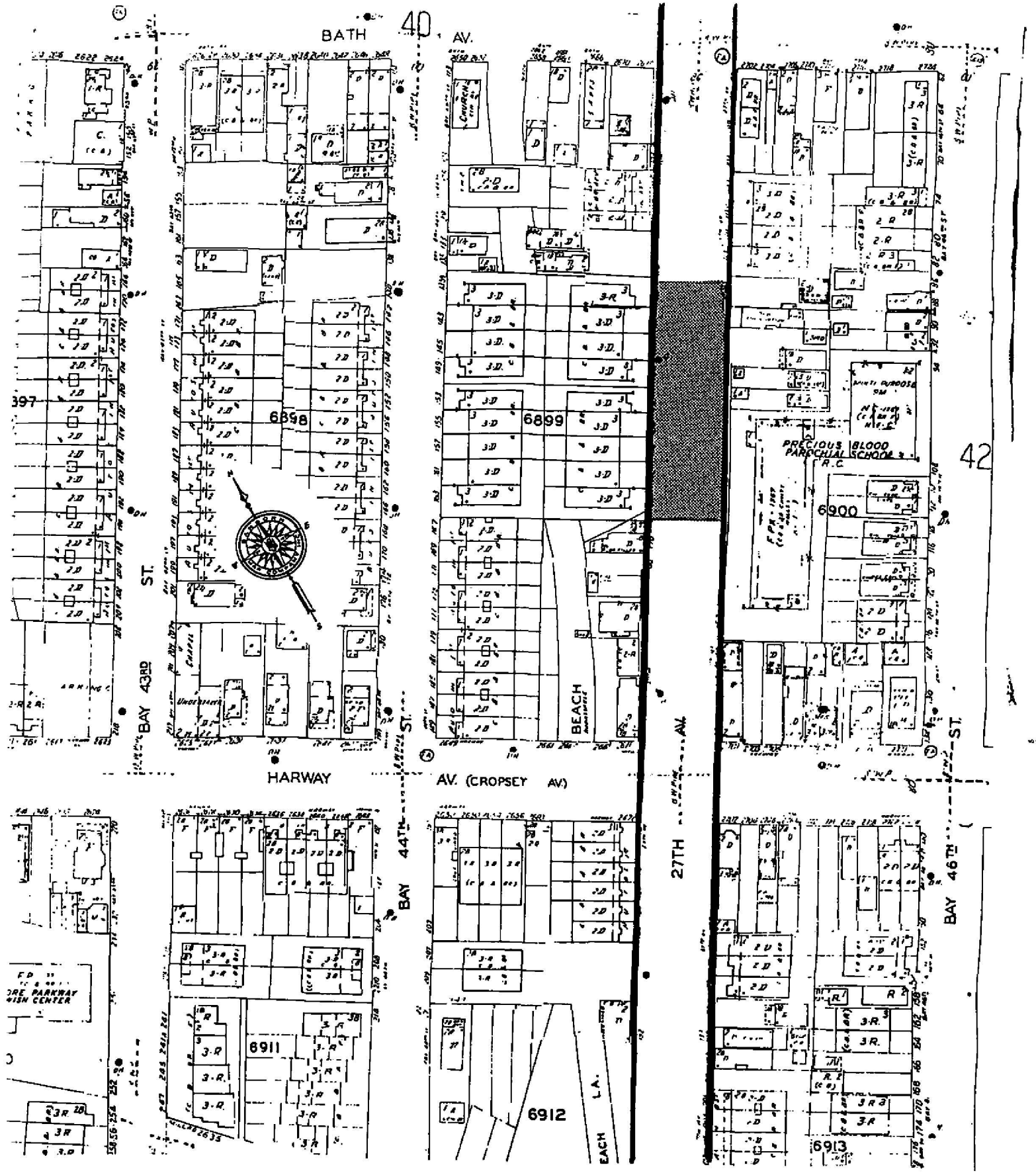


Figure 4. Sanborn Building and Property Atlas of Brooklyn, 1997
27th Avenue from Bath Avenue to South of Harway Avenue
Heavy outline indicates project site boundaries

– Areas of Potential Archaeological Sensitivity

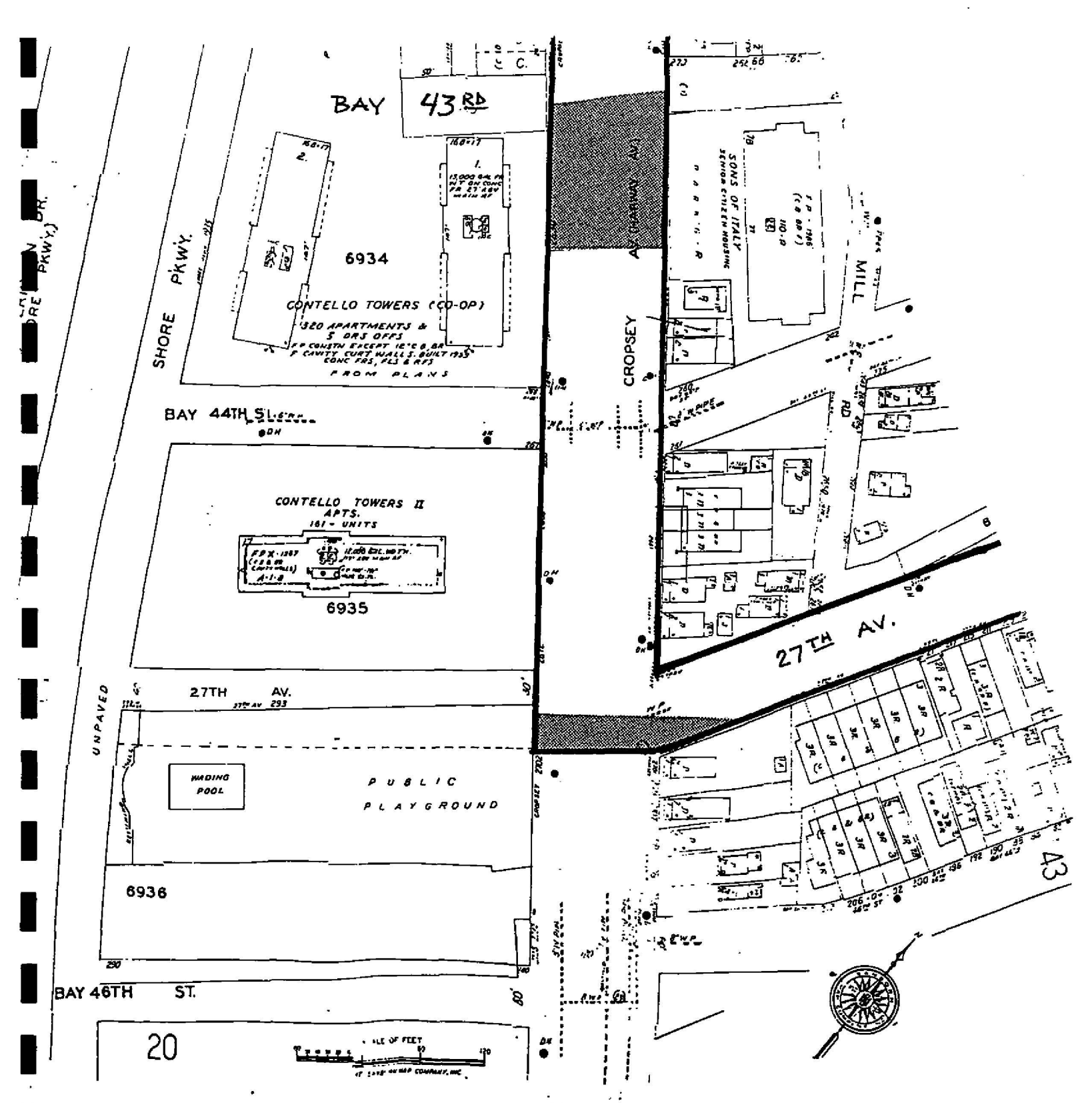


Figure 5. Sanborn Building and Property Atlas of Brooklyn, 1997
27th Avenue from South of Harway Avenue to Cropsey Avenue,
Cropsey Avenue to Bay 43rd Street
Heavy outline indicates project site boundaries

– Areas of Potential Archaeological Sensitivity

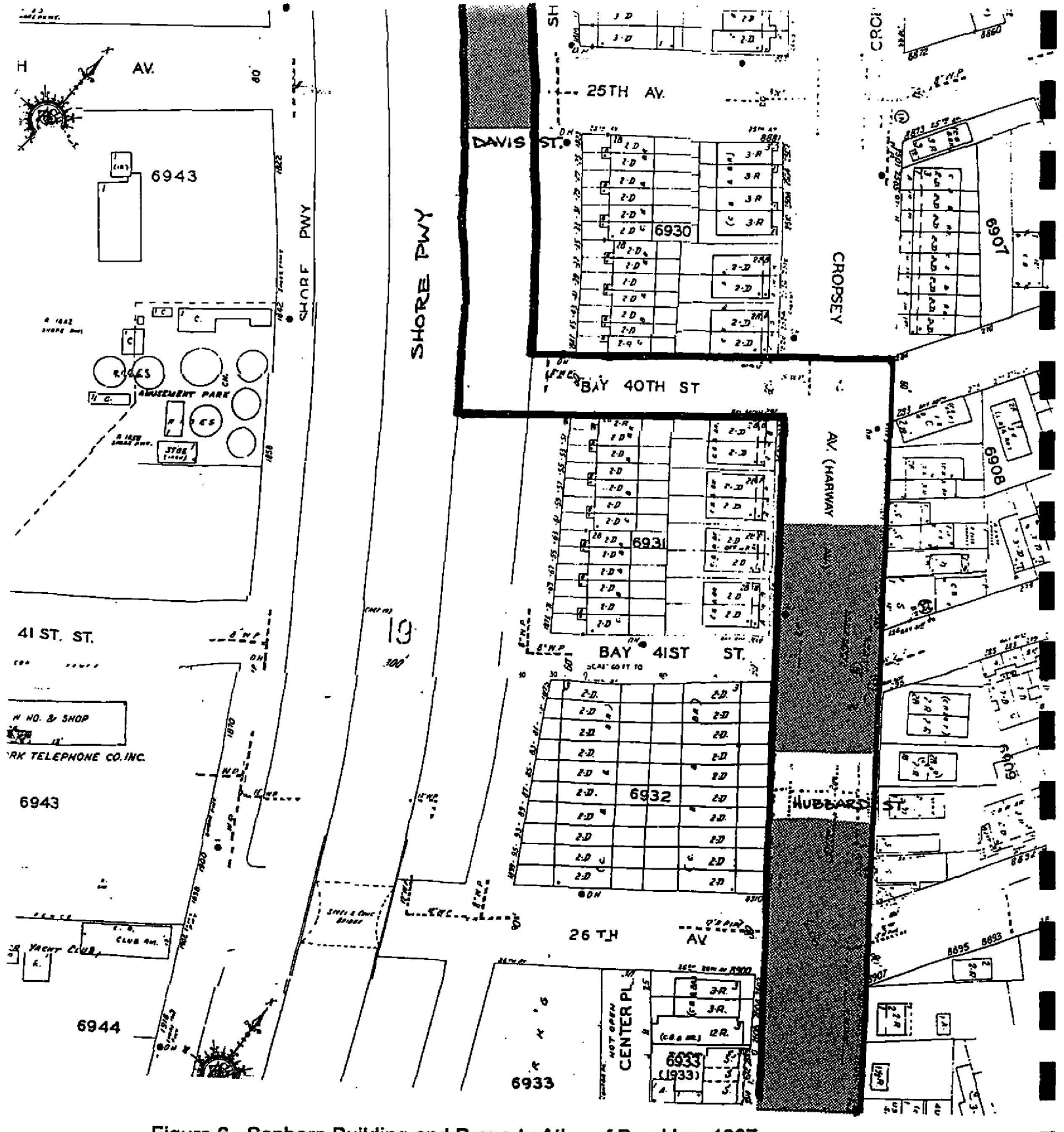


Figure 6. Sanborn Building and Property Atlas of Brooklyn, 1997
Cropsey Avenue from 26th Avenue to Bay 40th Street,
Bay 40th Street to the north shoulder of the Shore Parkway
Shore Parkway to the line of 25th Avenue
Heavy outline indicates project site boundaries

– Areas of Potential Archaeological Sensitivity

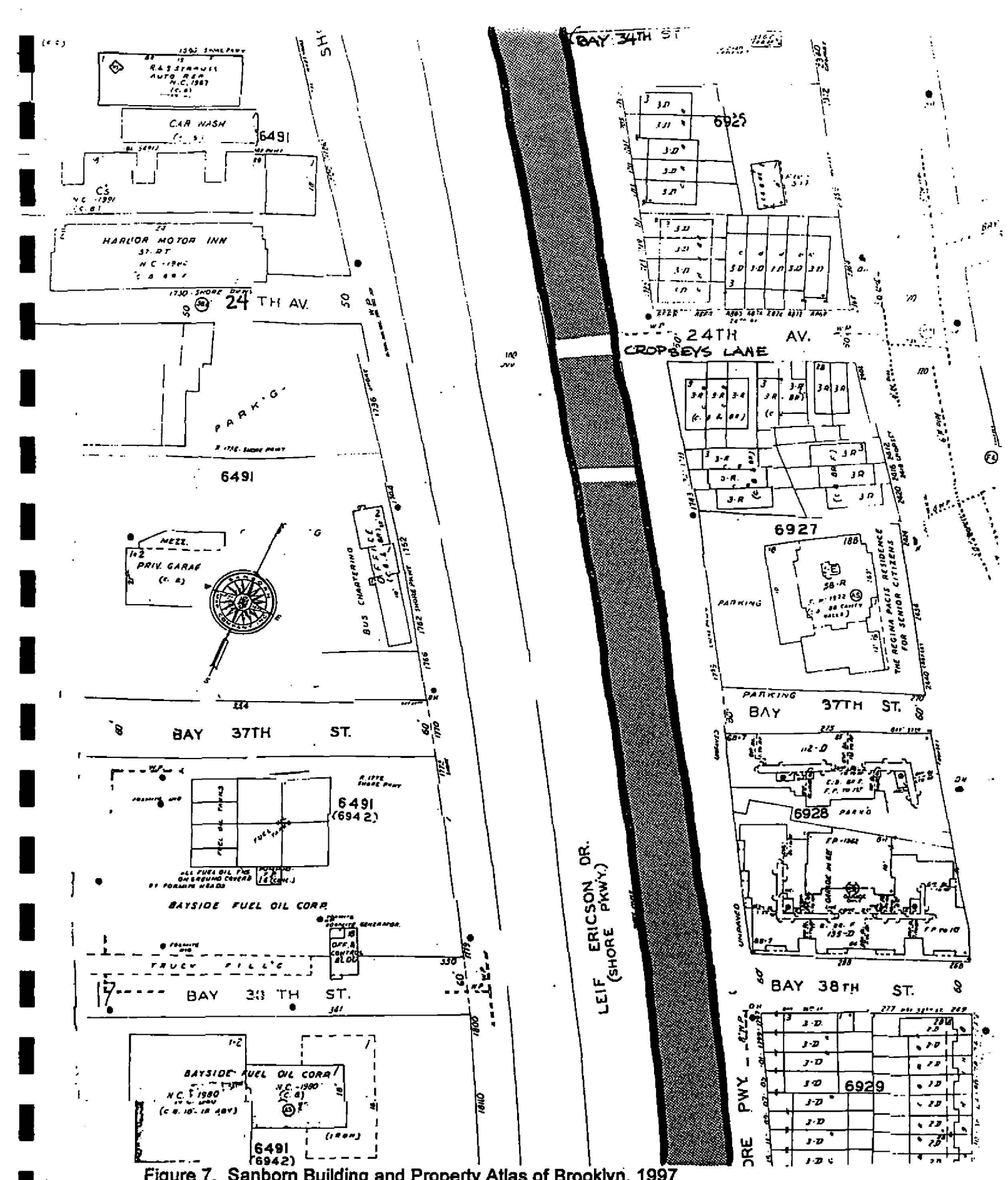


Figure 7. Sanborn Building and Property Atlas of Brooklyn, 1997
Shore Parkway from line of Bay 38th Street to Bay 34th Street
Heavy outline indicates project site boundaries

— Areas of Potential Archaeological Sensitivity

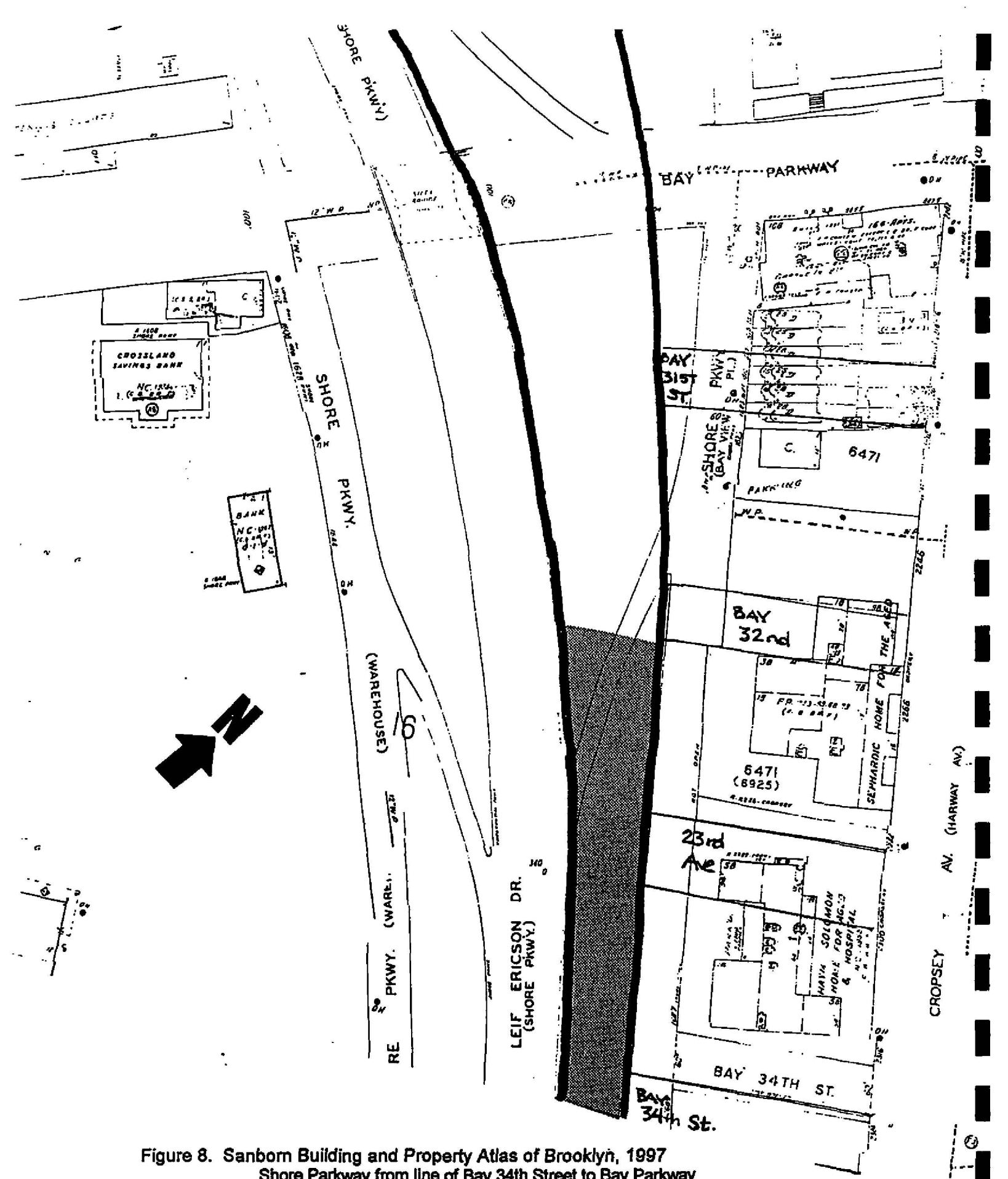


Figure 8. Sanborn Building and Property Atlas of Brooklyn, 1997
Shore Parkway from line of Bay 34th Street to Bay Parkway
Heavy outline indicates project site boundaries

– Areas of Potential Archaeological Sensitivity

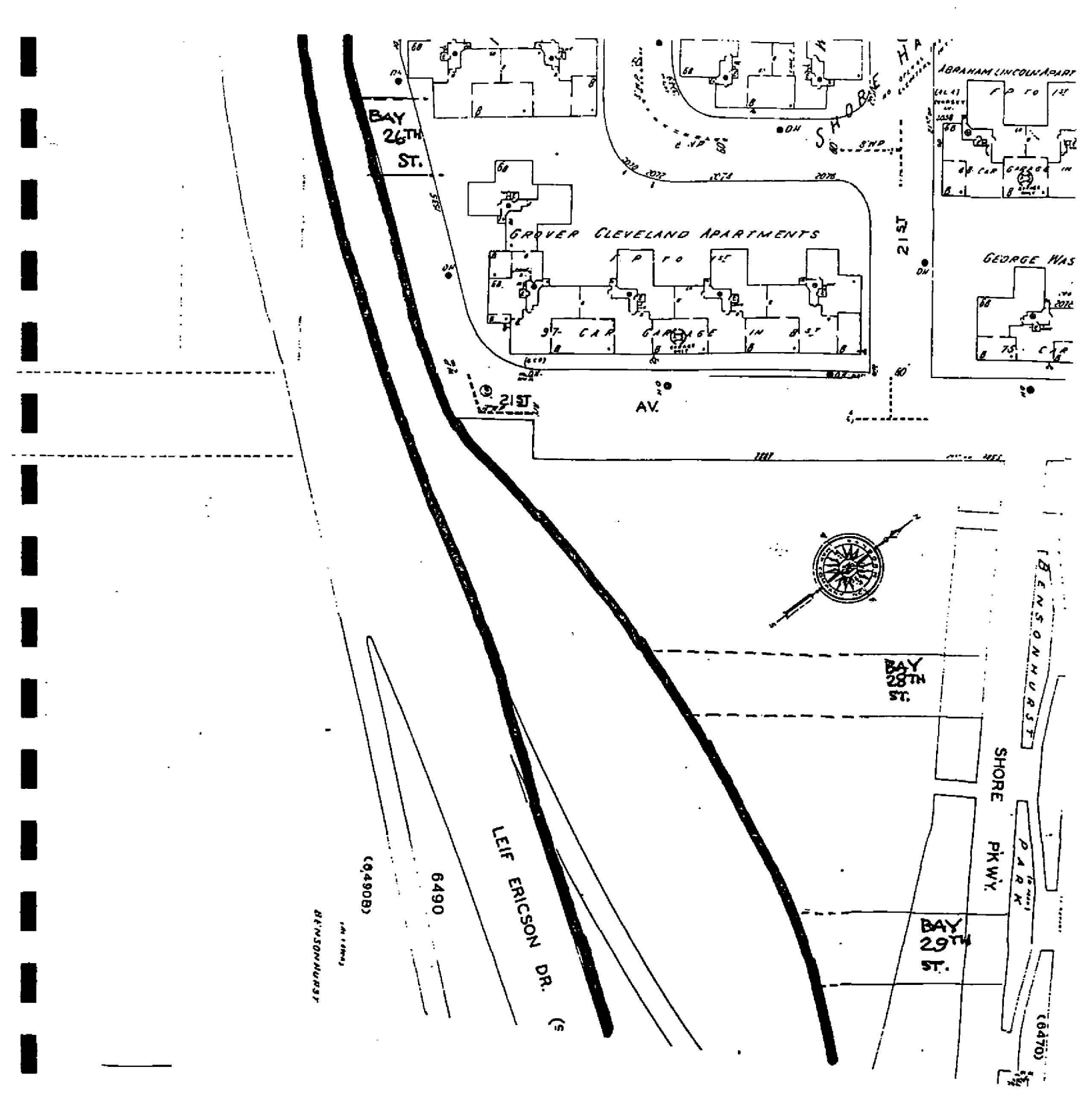


Figure 9. Sanborn Building and Property Atlas of Brooklyn, 1997

Shore Parkway from line of Bay Parkway to Bay 26th Street
Heavy outline indicates project site boundaries

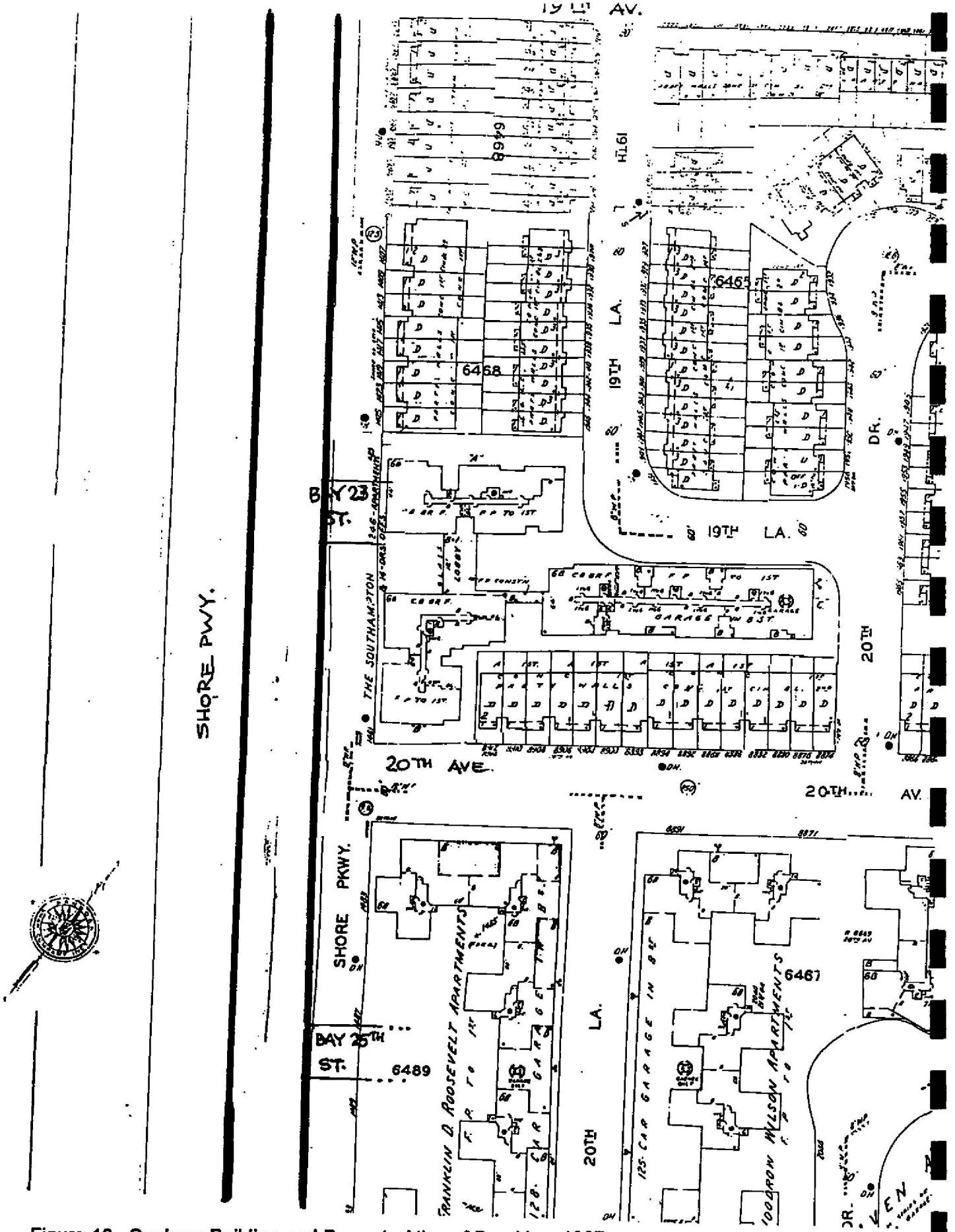


Figure 10. Sanborn Building and Property Atlas of Brooklyn, 1997
Shore Parkway from line of Bay 25th Street to 19th Avenue
Heavy outline indicates project site boundaries

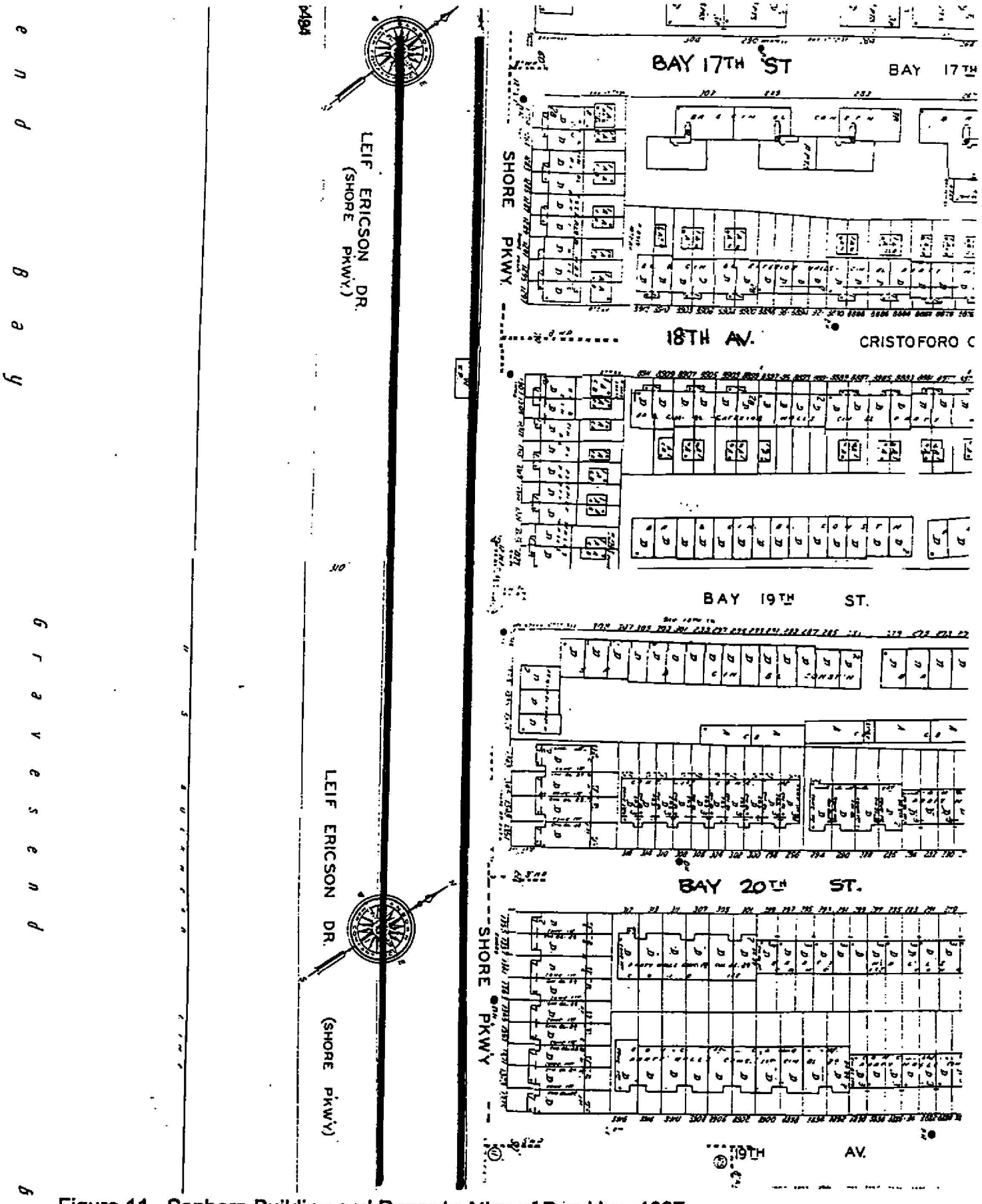


Figure 11. Sanborn Building and Property Atlas of Brooklyn, 1997
Shore Parkway from line of 19th Avenue to Bay 17th Street
Heavy outline indicates project site boundaries

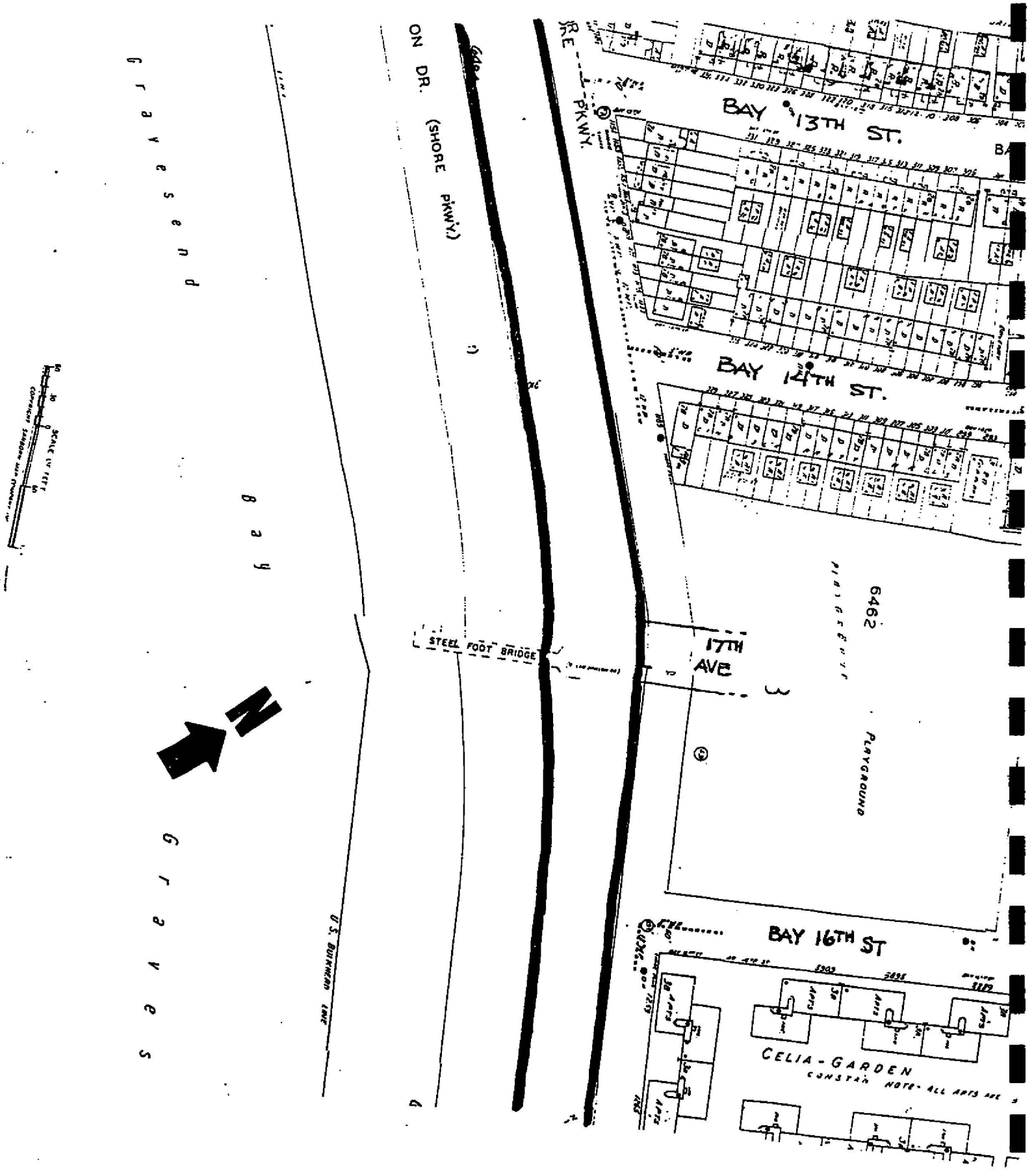


Figure 12. Sanborn Building and Property Atlas of Brooklyn, 1997
Shore Parkway from line of Bay 17th Street to Bay 13th Street
Heavy outline indicates project site boundaries

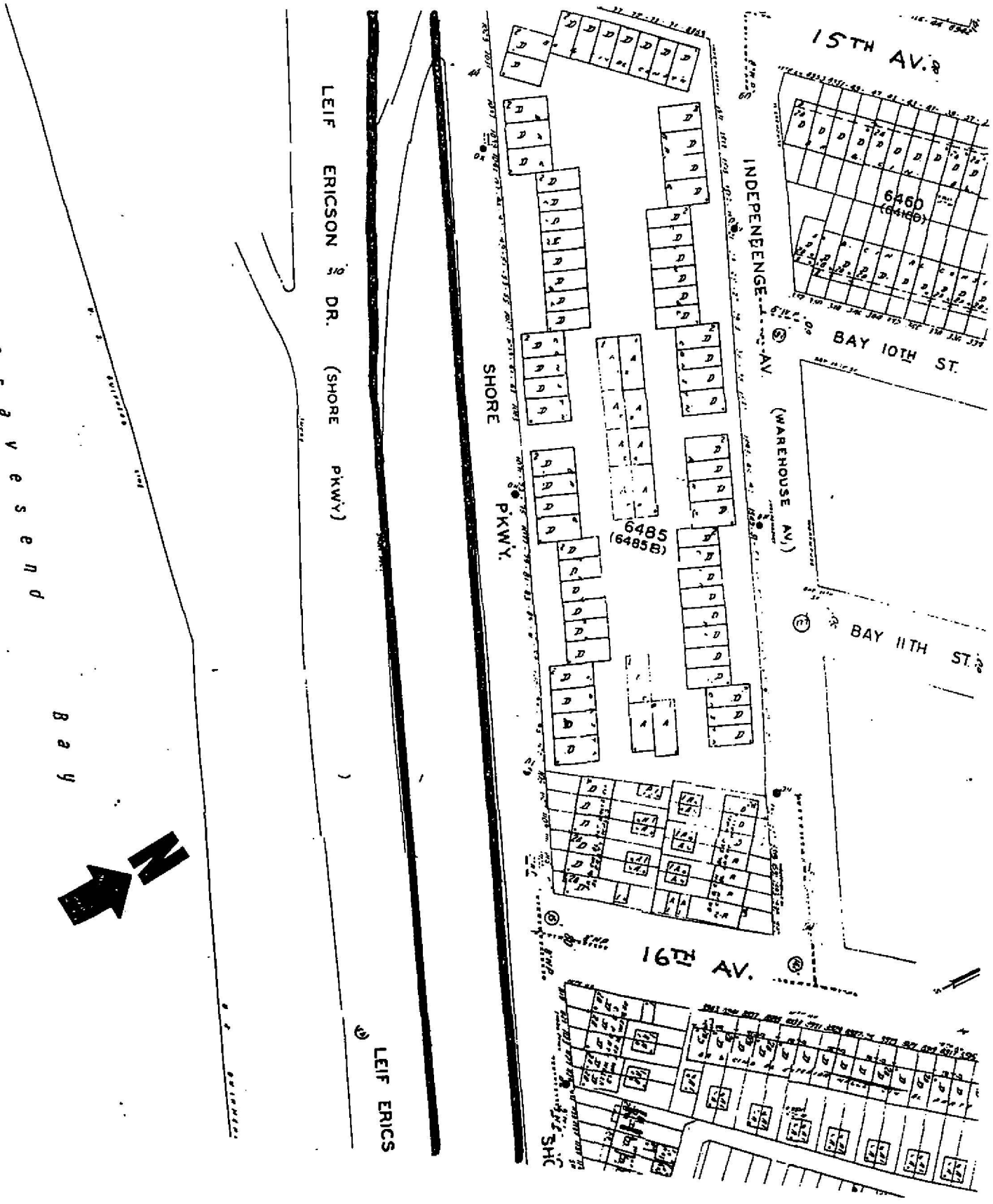


Figure 13. Sanborn Building and Property Atlas of Brooklyn, 1997
Shore Parkway from line of 16th Avenue to 15th Avenue
Heavy outline indicates project site boundaries

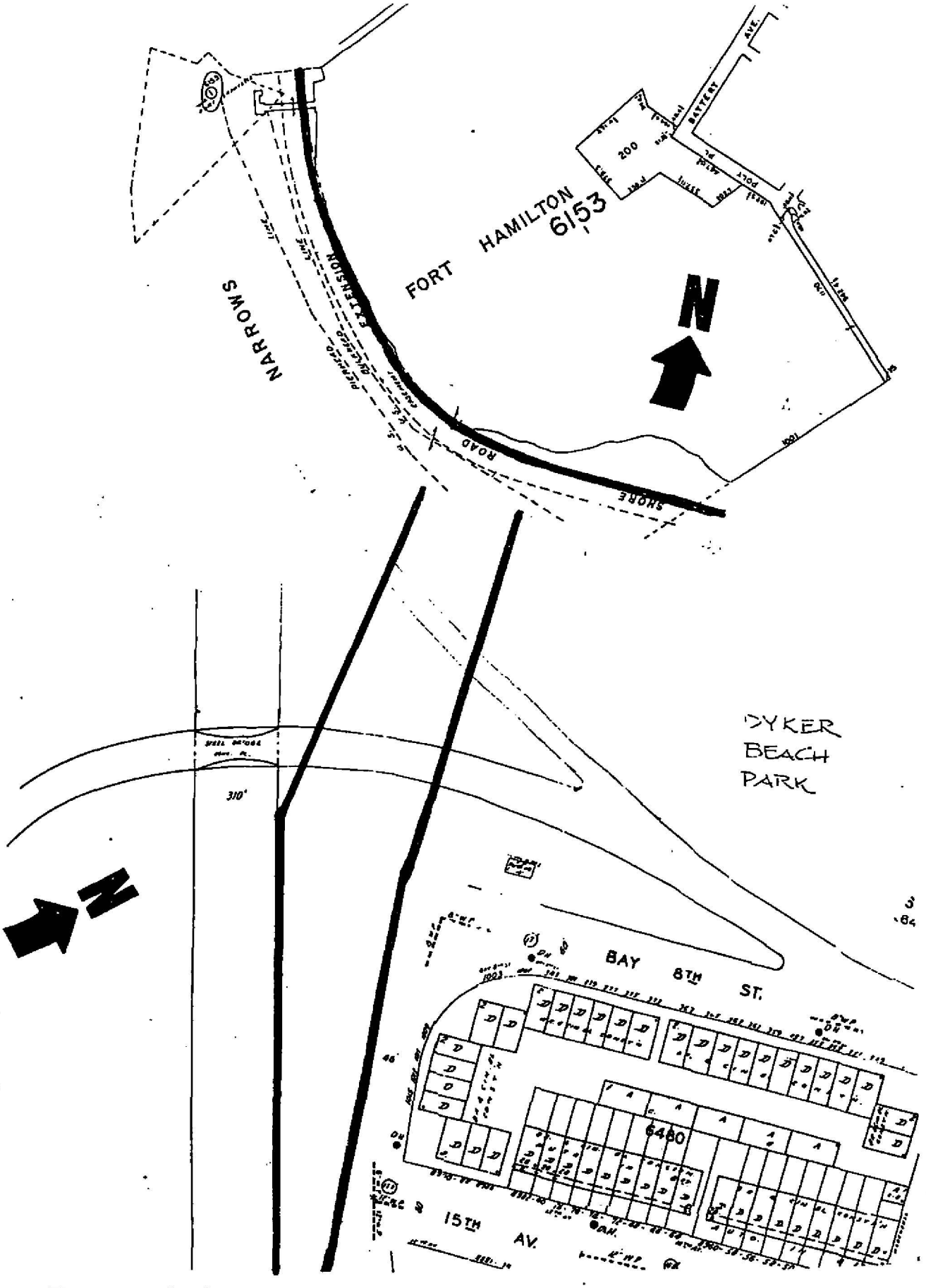


Figure 14. Sanborn Building and Property Atlas of Brooklyn, 1997
Shore Parkway from line of 15th Avenue to Dyker Beach Park (bottom)
Shore Parkway – Fort Hamilton to Verrazano-Narrows Bridge (top)
Heavy outline indicates project site boundaries

Figure 15. Bolton, Indian Paths in the Great Metropolis (1922:Map VIII C)

ooooo Approximate location of project site

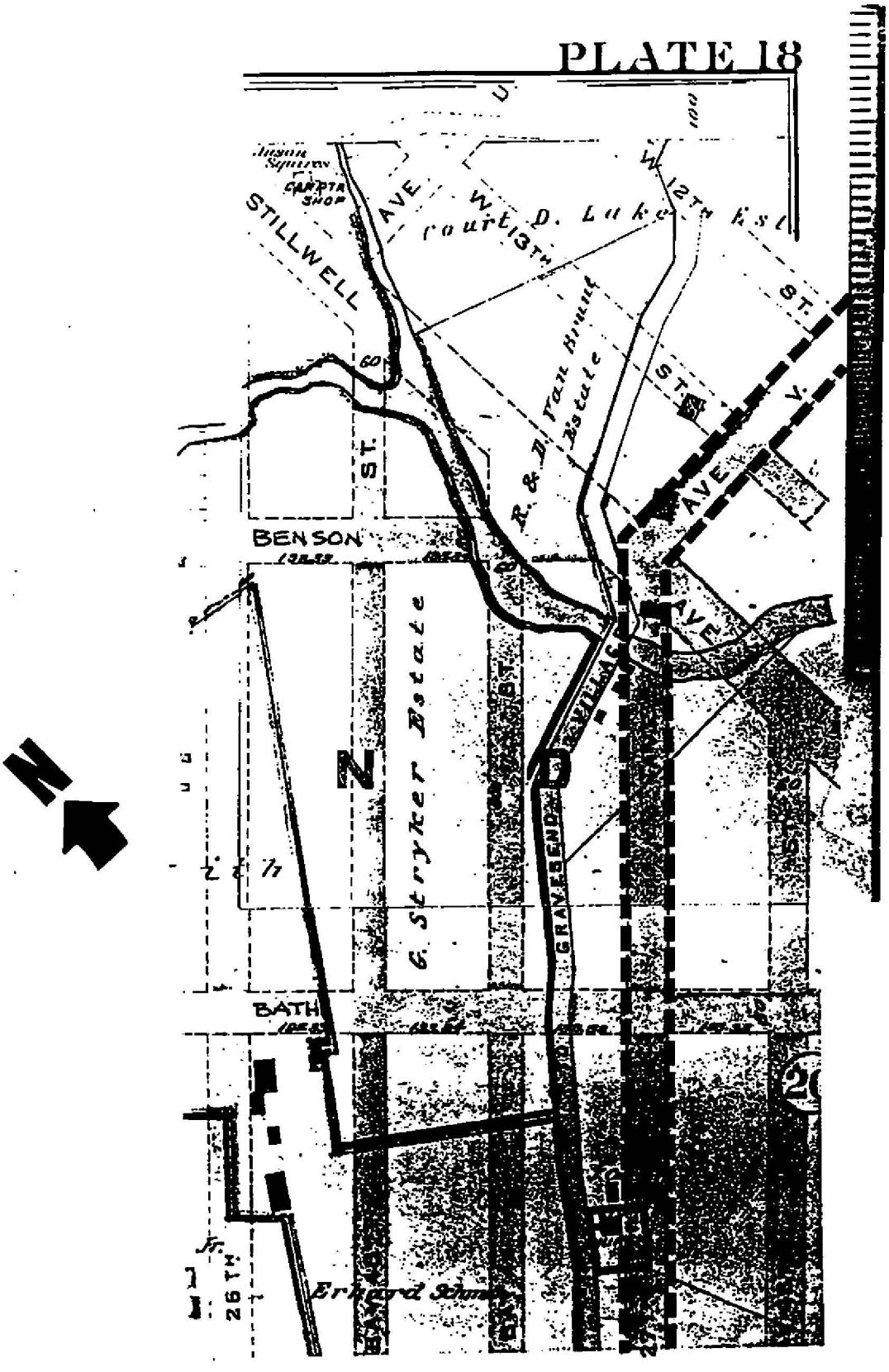


Figure 16. Robinson, Atlas of Kings County, 1890 (Plate 18)
Avenue V to 27th Avenue south of Bath Avenue

Project site boundaries

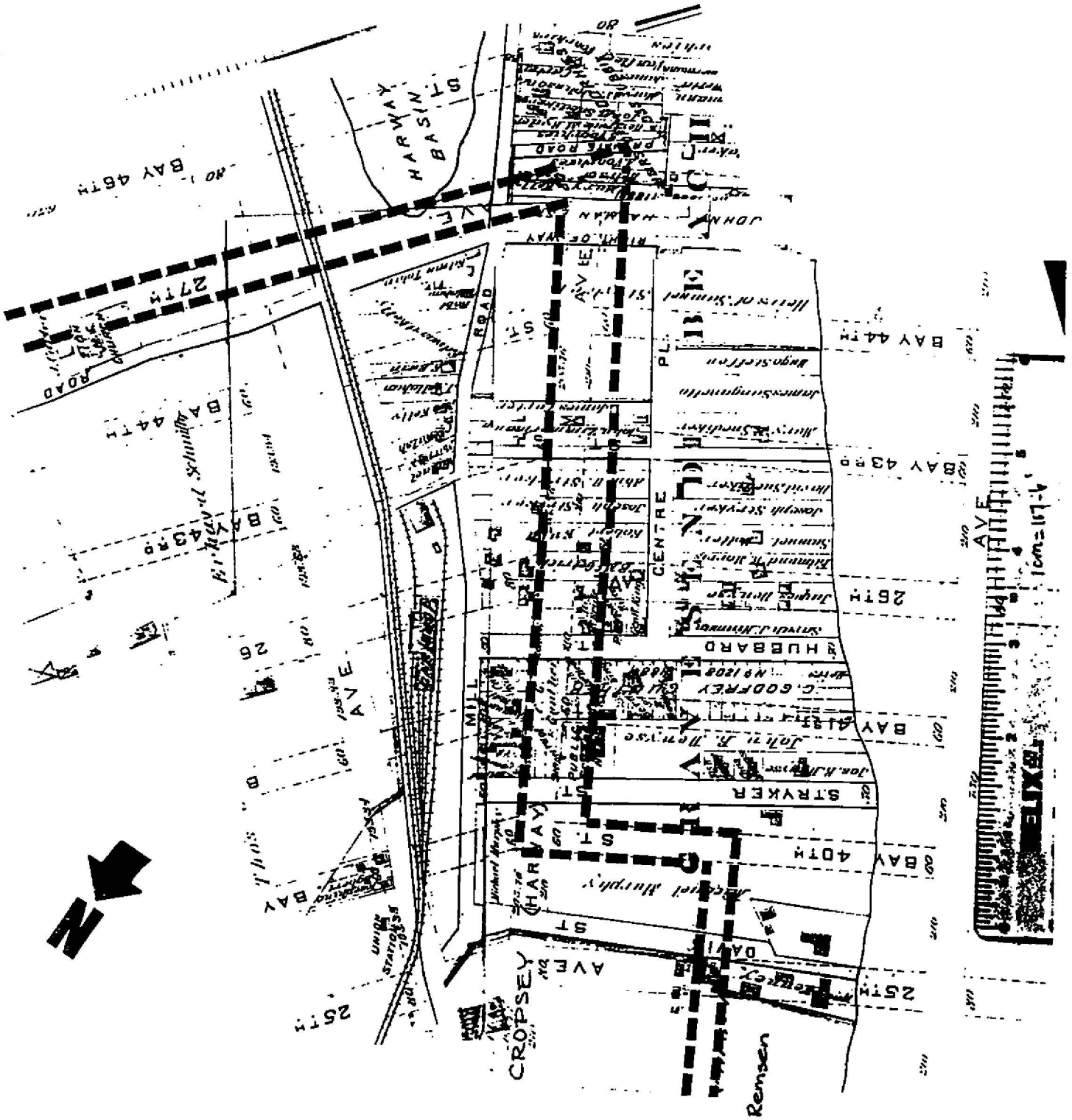


Figure 17. Robinson, Atlas of Kings County, 1890 (Plate 18)
27th Avenue to 25th Avenue

Project site boundaries

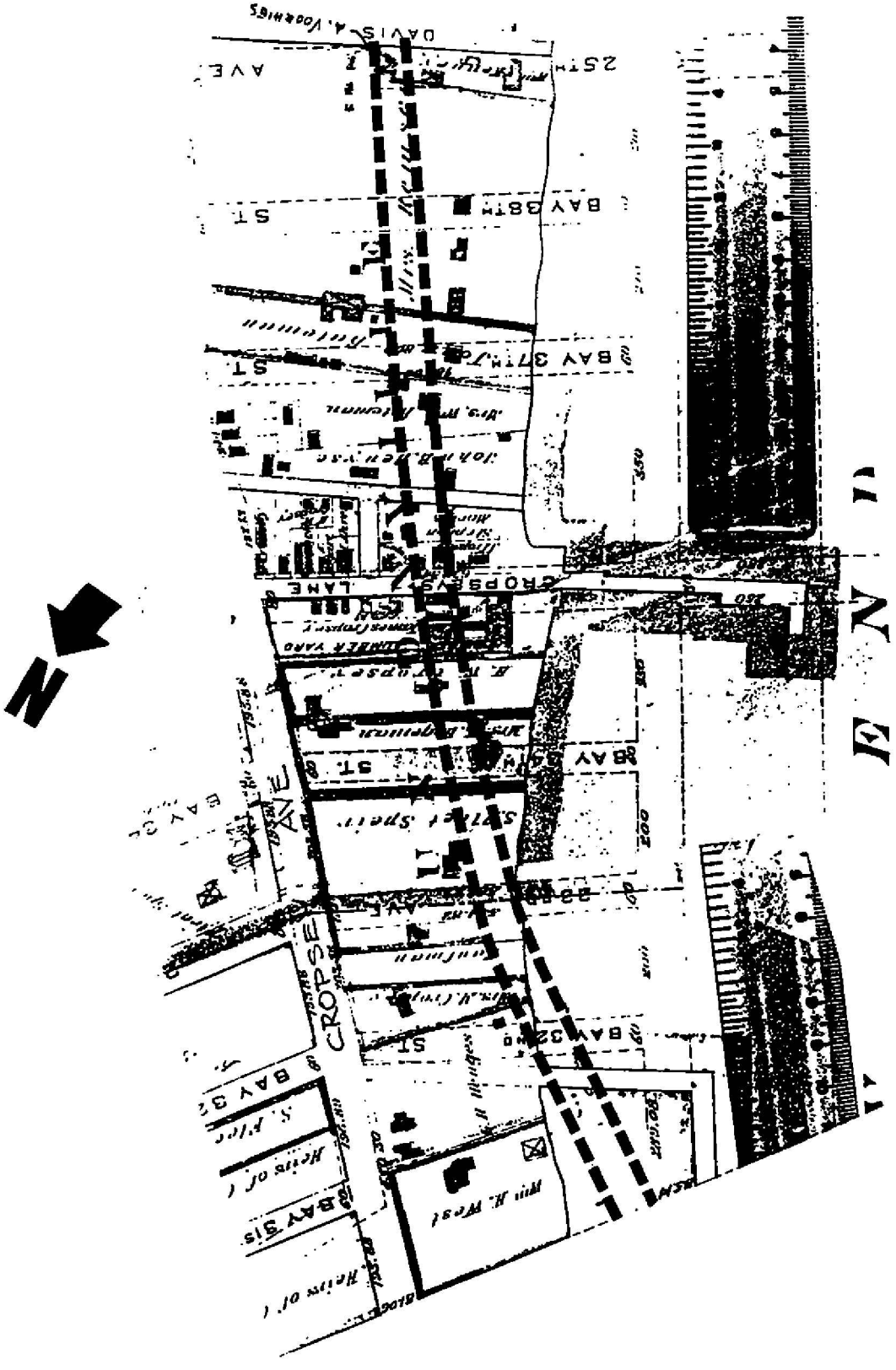


Figure 18. Robinson, Atlas of Kings County, 1890 (Plate 18)
25th Avenue to 23th Avenue

▬ ▬ Project site boundaries

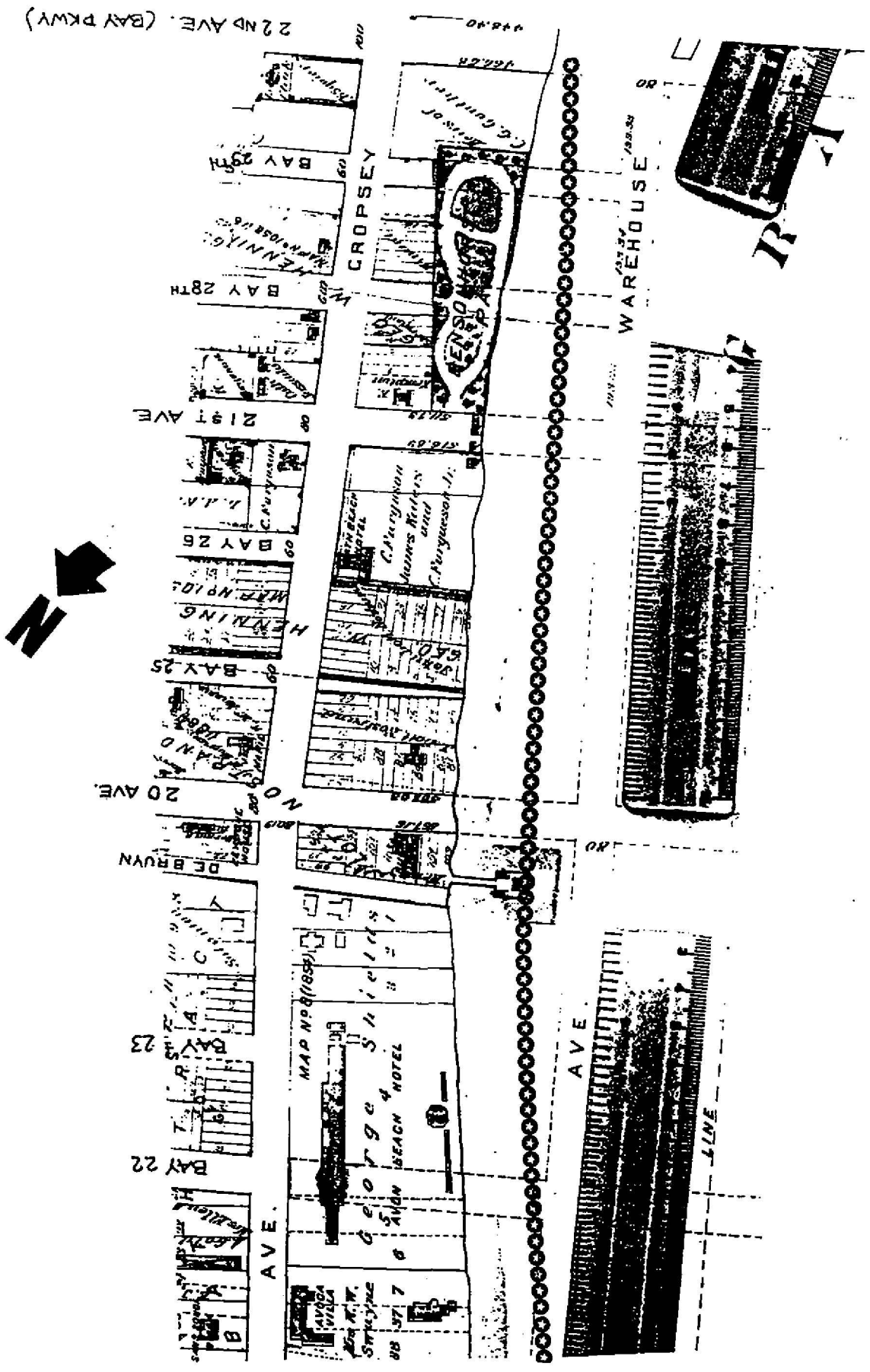


Figure 19. Robinson, Atlas of Kings County, 1890 (Plates 17 and 18)
23th Avenue to 19th Avenue

●●●● Project site location

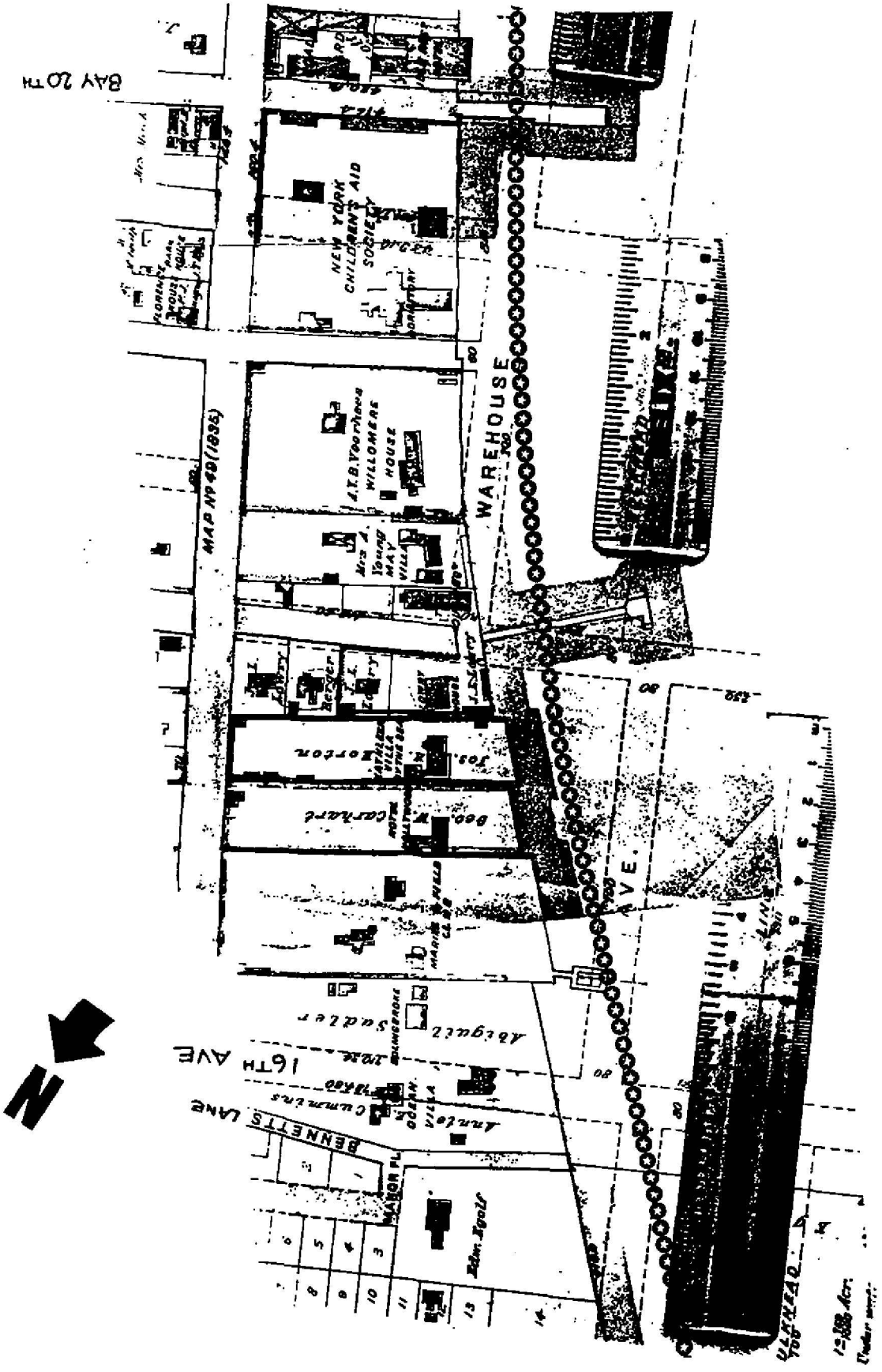


Figure 20. Robinson, Atlas of Kings County, 1890 (Plate 17)
Bay 20th Street to Bay 11th Street

○○○○ Project site location

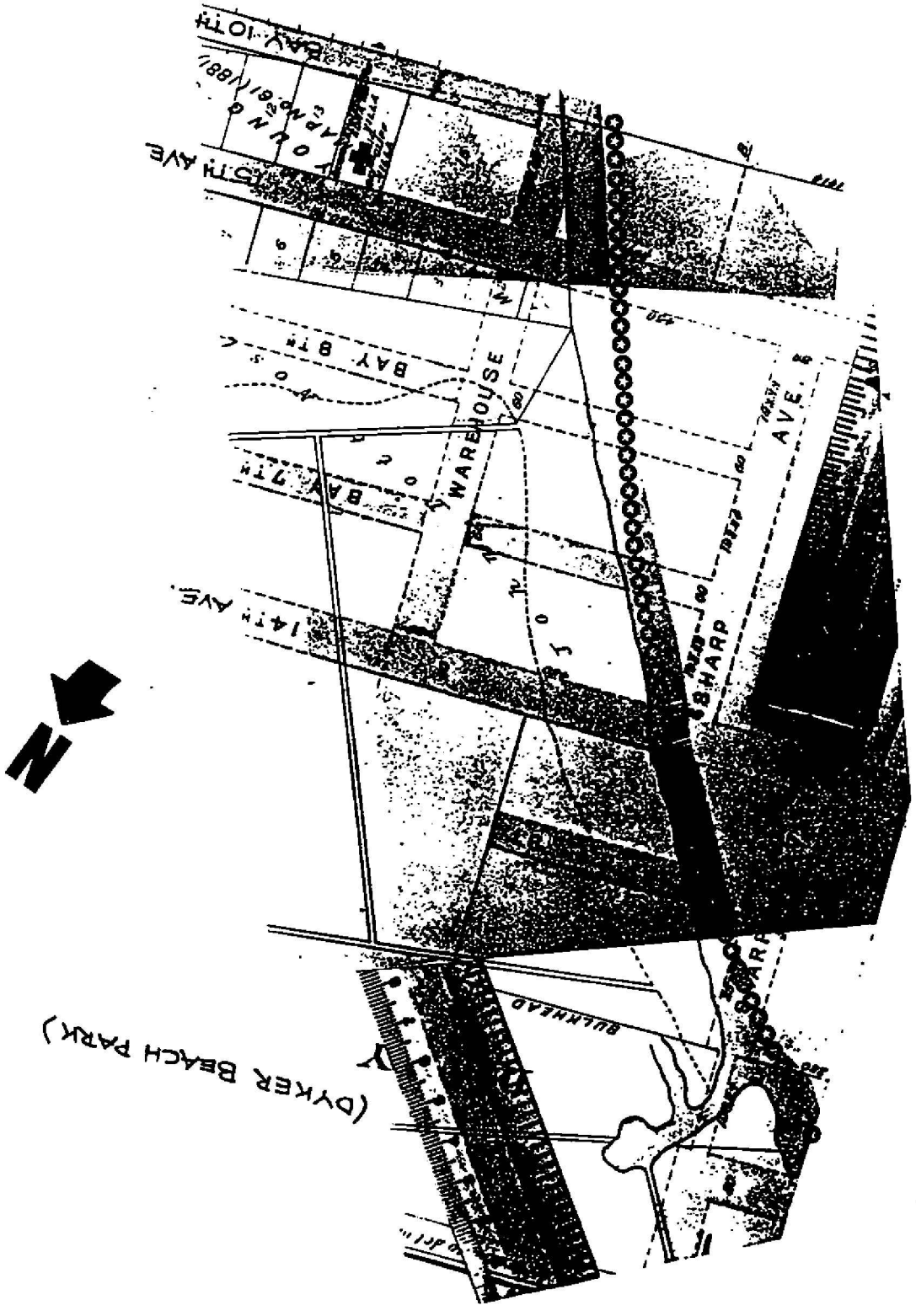


Figure 21. Robinson, Atlas of Kings County, 1890 (Plate 17)
Bay 10th Street to Dyker Beach Park

Project site location

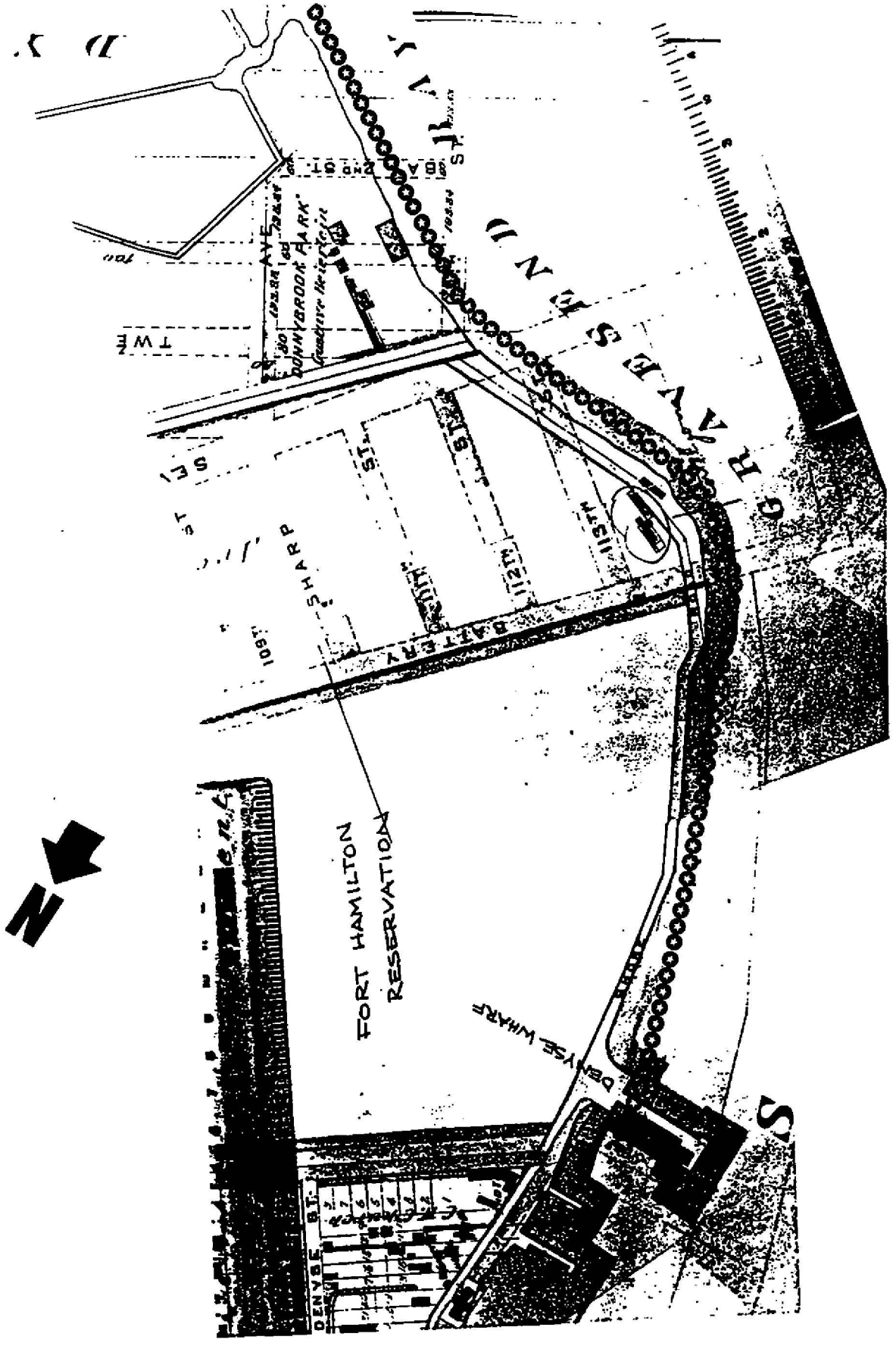


Figure 22. Robinson, Atlas of Kings County, 1890 (Plate 9)
Dyker Beach Park to Fort Hamilton

Project site location

Figure 23. "The Civil War Defenses of Fort Wadsworth [Staten Island] as They Appeared About 1936."

View from Fort Hamilton. Water barrier gives point to which landfill would be added for the Belt Parkway. Wharf is at the foot of Battery Avenue

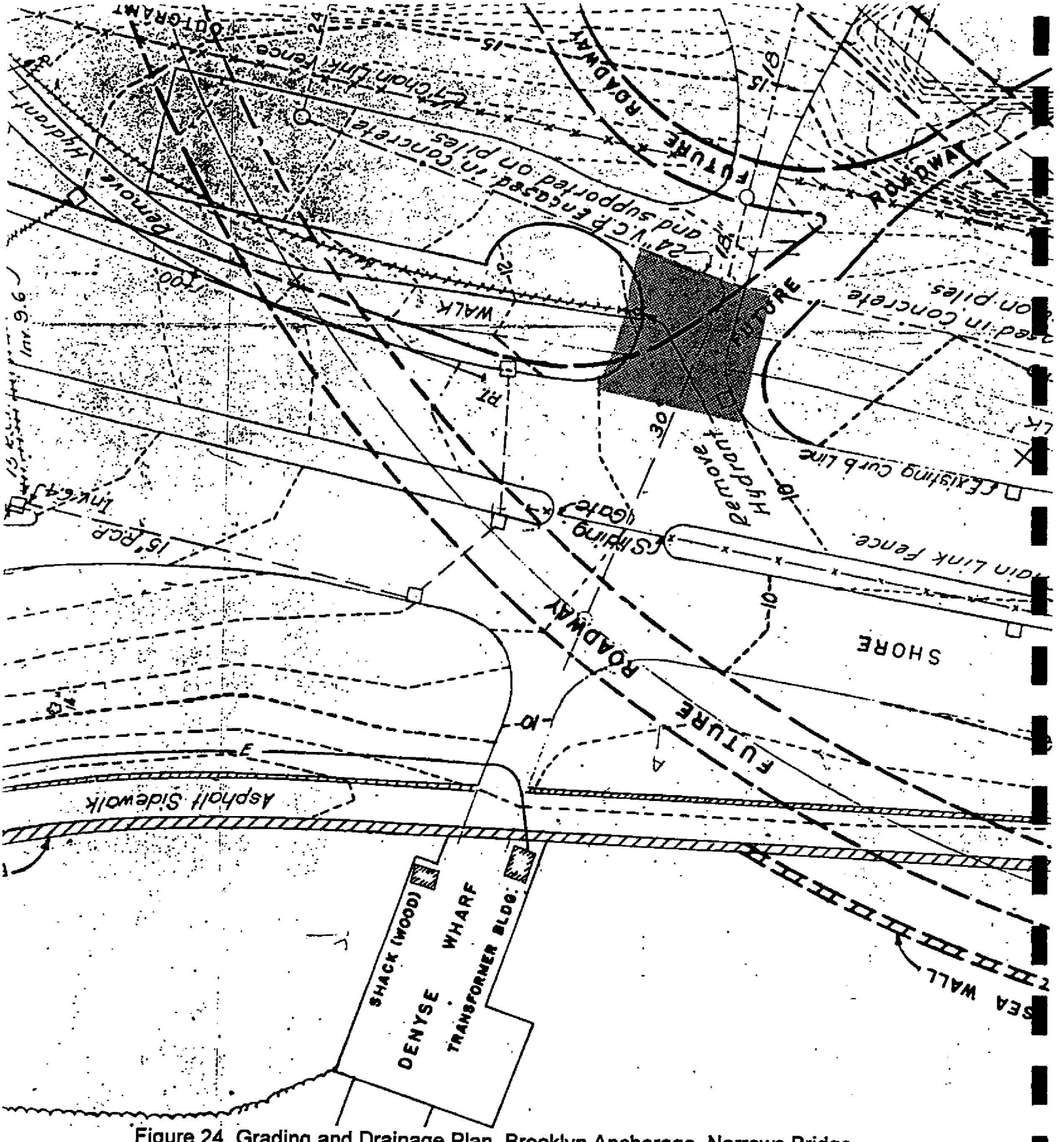
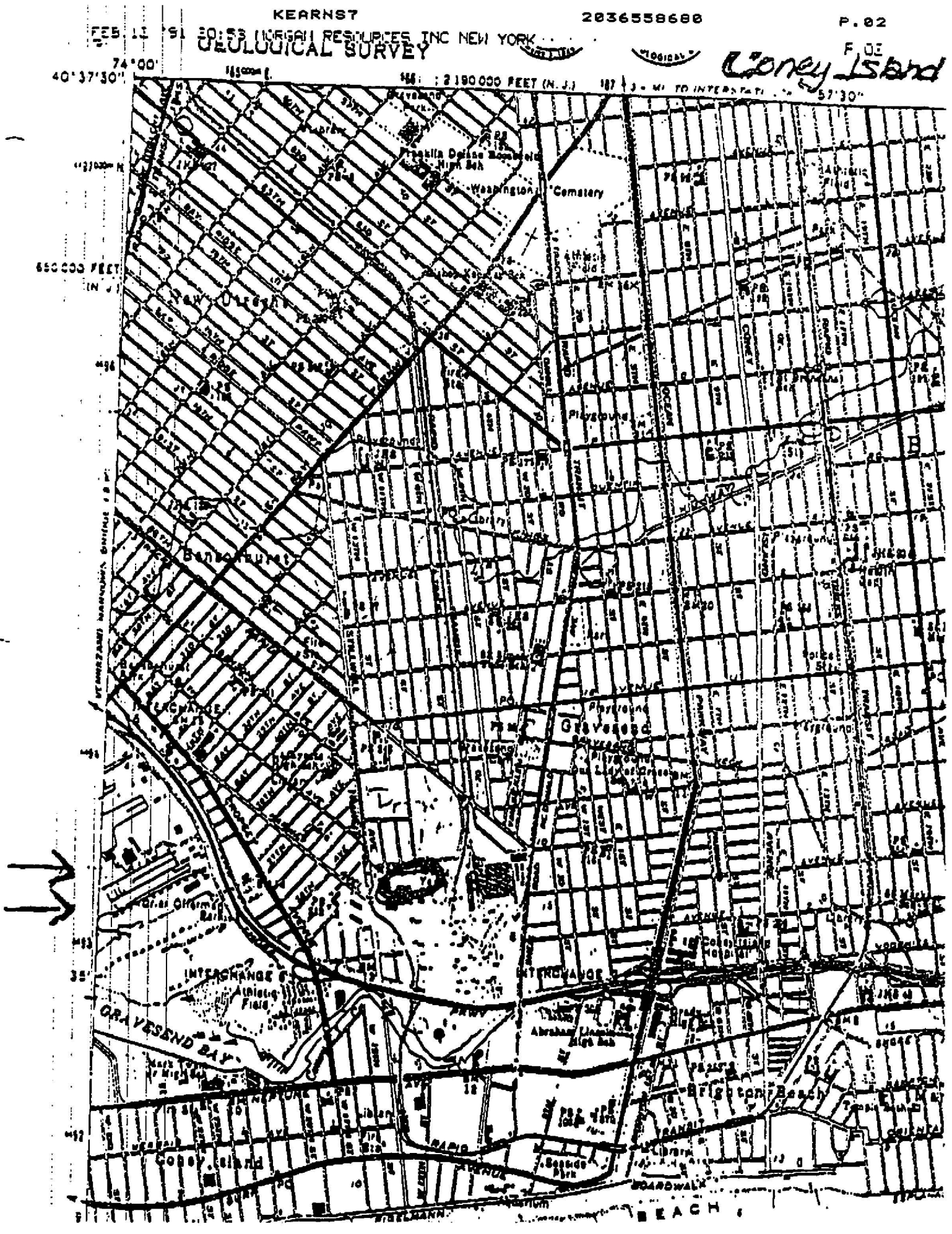


Figure 24. Grading and Drainage Plan, Brooklyn Anchorage, Narrows Bridge
1960
Contract No.NB-5B, Drawing 80, Triboro Bridge and Tunnel Authority,
Amman & Whitney Consulting Engineers, July 1 (Scale 1" = 40')

— Area of Potential Archaeological Sensitivity for Denyses Wharf

APPENDIX A


GEOLOGICAL SURVEY
Coney Island
74°00'
40°37'30"
650 000 FEET
2 190 000 FEET (N. J.)
57'30"
Washington Cemetery
Playground
Bath Beach
Gravesend
INTERCHANGE
Athletic Field
GRAVESEND BAY
Abraham Lincoln High Sch
Brighton Beach
Coney Island
RAPID TRANSIT
BOARDWAY
BEACH

for Historical Perspectives on Coeymans land 7.5' 2/25/91 BW

NEW YORK STATE MUSEUM PREHISTORIC ARCHAEOLOGICAL SITE FILES

EVALUATION OF ARCHAEOLOGICAL SENSITIVITY FOR PREHISTORIC (INDIAN) SITES

Examination of the data suggests that the location indicated has the following sensitivity rating:

[ ] HIGHER THAN AVERAGE PROBABILITY OF PRODUCING PREHISTORIC ARCHAEOLOGICAL DATA.

[ ] AVERAGE PROBABILITY OF PRODUCING PREHISTORIC ARCHAEOLOGICAL DATA.

[ ] LOWER THAN AVERAGE PROBABILITY OF PRODUCING PREHISTORIC ARCHAEOLOGICAL DATA.

[✓] MIXED PROBABILITY OF PRODUCING PREHISTORIC ARCHEOLOGICAL DATA.

The reasons for this finding are given below:

[ ] A RECORDED SITE IS INDICATED IN OR IMMEDIATELY ADJACENT TO THE LOCATION AND WE HAVE REASON TO BELIEVE IT COULD BE IMPACTED BY CONSTRUCTION.

[ ] A RECORDED SITE IS INDICATED SOME DISTANCE AWAY BUT DUE TO THE MARGIN OF ERROR IN THE LOCATION DATA IT IS POSSIBLE THE SITE ACTUALLY EXISTS IN OR IMMEDIATELY ADJACENT TO THE LOCATION.

[ ] THE TERRAIN IN THE LOCATION IS SIMILAR TO TERRAIN IN THE GENERAL VICINITY WHERE RECORDED ARCHAEOLOGICAL SITES ARE INDICATED.

[ ] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION SUGGEST A HIGH PROBABILITY OF PREHISTORIC OCCUPATION OR USE.

[ ] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION SUGGEST A MEDIUM PROBABILITY OF PREHISTORIC OCCUPATION OR USE.

[ ] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION ARE SUCH AS SUGGEST A LOW PROBABILITY OF PREHISTORIC OCCUPATION OR USE.

[ ] EVIDENCE OF PRIOR DESTRUCTIVE IMPACTS FROM CULTURAL OR NATURAL SOURCES SUGGESTS A LOSS OF ORIGINAL CULTURAL DEPOSITS IN THIS LOCATION.

[✓] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION ARE MIXED, A HIGHER THAN AVERAGE PROBABILITY OF PREHISTORIC OCCUPATION OR USE IS SUGGESTED FOR AREAS IN THE VICINITY OF STREAMS, SWAMPS AND WATERWAYS AS WELL AS FOR ROCK FACES WHICH AFFORD SHELTER. DISTINCTIVE HILLS OR LOW RIDGES HAVE AN AVERAGE PROBABILITY OF USE AS A BURYING GROUND. LOW PROBABILITY IS SUGGESTED FOR AREAS OF EROSIONAL STEEP SLOPE.

[✓] PROBABILITY RATING IS BASED ON THE ASSUMED PRESENCE OF INTACT ORIGINAL DEPOSITS, POSSIBILITY UNDER FILL, IN THE AREA. IF NEAR WATER OR IF DEEPLY BURIED, MATERIALS MAY OCCUR SUBMERGED BELOW THE WATER TABLE.

[ ] INFORMATION ON SITES NOT RECORDED IN THE N.Y.S. MUSEUM FILES MAY BE AVAILABLE IN A REGIONAL INVENTORY MAINTAINED AT THE FOLLOWING LOCATION(S). PLEASE CONTACT:

COMMENTS:

PROJECT: 15 721 K

NEW YORK STATE MUSEUM: OFFICE OF THE STATE ARCHEOLOGIST
PREHISTORIC SITE FILE: FILE USE REQUEST FORM
PROJECT SCREENING FILE

NAME Cec Kuklis

ADDRESS PO Box 331 Kinderhook, NY 12106

AC PHONE # 758-1107

AGENCY/COMPANY/INSTITUTION REPRESENTED Hartgen Archeological Assoc. Inc

The screening file gives site locations within generalized .5 mile circles.

PURPOSE OF REQUEST: (Identify the proposed project and contractor, indicate the nature of the work, depth and extent of ground disturbance)

15 721 K

EVENTUAL DISTRIBUTION OF DATA: (Specify range of data use and distribution, publication, reproduction, etc.).

Client, municipality & private agencies

REQUESTED APPOINTMENT:

1st Choice _____ _____ 2nd Choice _____ _____
date time (or any) date time (or any)

(Appointments are on the hour between 9 a.m. and 12 noon on Wednesday of each week. Mail this request at least two weeks in advance of the appointment date. You will be notified by mail of your appointment date and time).

U.S.G.S. 7.5' MAPS REQUESTED: (indicate 15' maps)

Coxsackie

FOR THE FOLLOWING attach the project map, site data list and self-addressed envelope to this request. Responses will be mailed or provided on the following day.

The following site(s) may be within or adjacent to the project area. If so, please provide the location of:
SITE #. 7.5' MAP

none

X Please provide a sensitivity rating for the attached project area.

I understand that the information provided is to be used solely for the preparation of an environmental impact statement as required by State or Federal law.

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM

For Office Use Only--Site Identifier A085-01-0007

Project Identifier

Your Name Terry H. Klein
Address 100 Halsted Street
East Orange, New Jersey
Zip 07019
Phone (201) 678-1960

Date October 24, 1985

Organization (if any) Louis Berger & Associates, Inc.

1. Site Identifier(s) Fountain-Mouquin House
2. County Richmond One of following: City New York City
Township
Incorporated Village
Unincorporated Village or Hamlet

3. Present Owner U.S. Army
Address Fort Wadsworth
Staten Island, New York
Zip

4. Site Description (check all appropriate categories):
Structure/site
Superstructure: complete__ partial__ collapsed__ not evident X
Foundation: above__ below X (ground level) not evident__
__Structural subdivisions apparent __Only surface traces visible
X Buried traces detected
List construction materials (be as specific as possible):
Sandstone and schist foundation stones

Grounds
__Under cultivation __Sustaining erosion __Woodland __Upland
X Never cultivated __Previously cultivated __Floodplain __Pasturelan
Soil Drainage: excellent X good __ fair __ poor __
Slope: flat__ gentle X moderate__ steep__
Distance to nearest water from structure (approx.)
Elevation: 40 feet

5. Site Investigation (append additional sheets, if necessary):
Surface--date(s) None
__Site Map (Submit with form*)
__Collection
Subsurface--date(s) Mid 1984 and September/October 1985
Testing: shovel X coring__ other unit size 5x5 foot
no. of units 5 (Submit plan of units with form*)

Excavation: unit size no. of units
(Submit plan of units with form*)
* Submission should be 8½"x11", if feasible

Investigator Jay R. Cohen
Manuscript or published report(s) (reference fully):

Present repository of materials Louis Berger & Associates, Inc.

a. Historic map references (attach sheets, if necessary):
1) Name Hassler Map of NY Bay and Environs Date 1845 Source _____
Present location of original, if known S.I. Institute of Arts & Sci
2) Name Colton Map of S.I. Date 1884 Source _____
Present location of original, if known SIIAS

b. Representation in existing photography
1) Photo date c.1900 Where located SIIAS
2) Photo date _____ Where located _____

c. Primary and secondary source documentation (reference fully)
Richmond County Deeds, on file at County Clerk's Office
Black, F.R. A History of Fort Wadsworth, Prepared for National Park Service. February, 1982
U.S. Census, 1790; Population Schedules 1800, 1810, 1820, 1830, 1840, 1850. All for Richmond County, Staten Island, N.Y.

d. Persons with memory of site:
1) Name _____ Address _____
2) Name _____ Address _____

8. List of material remains other than those used in construction (b as specific as possible in identifying object and material):
Window glass; wire nails; bottle glass, ironstone, pearlware, whiteware, creamware, porcelain, stoneware, redware ceramics (all ranging in date from 18th to 20th century), metal, bone, chert flakes, argillite biface

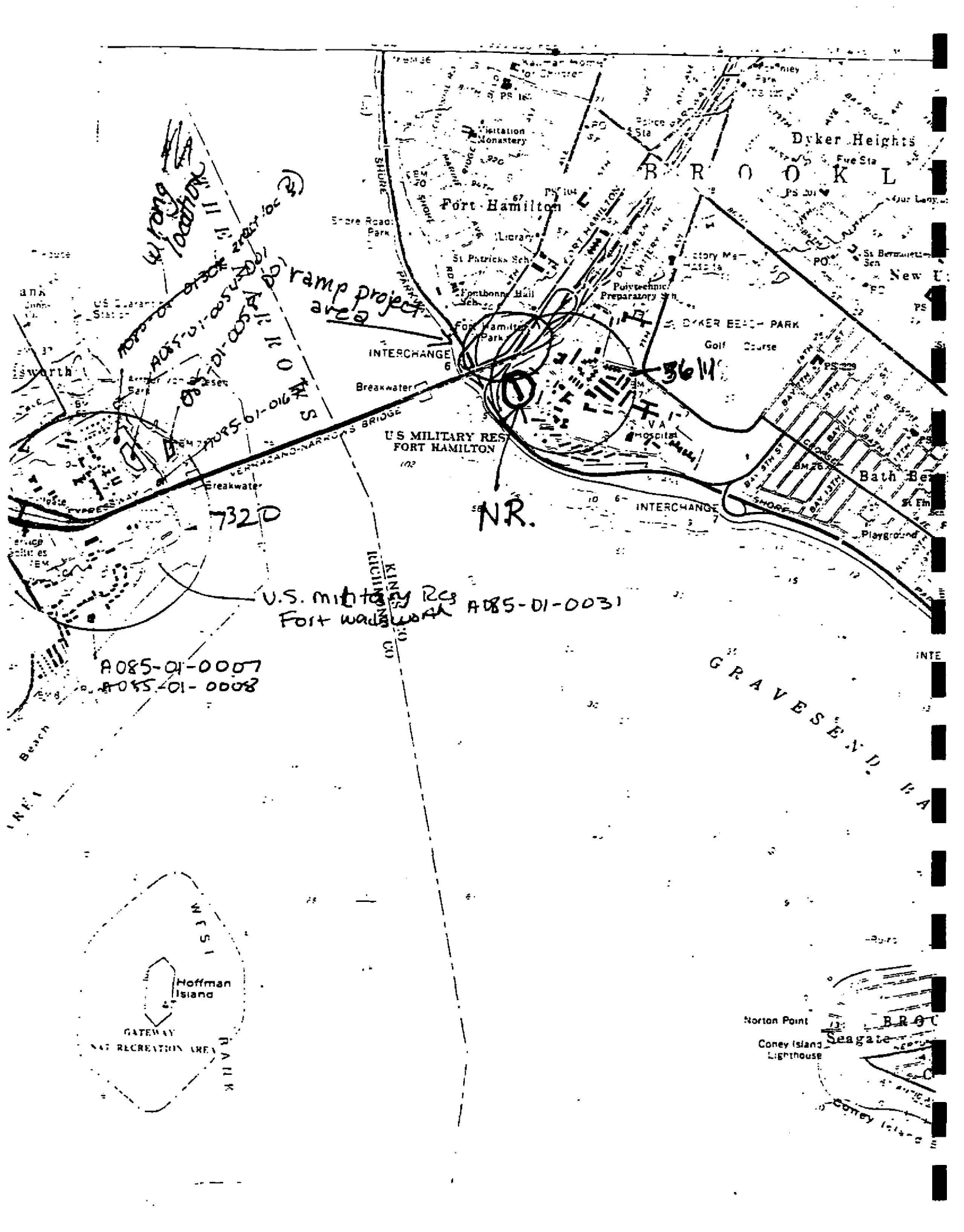
If prehistoric materials are evident, check here and fill out prehistoric site form. X

9. Map References: Map or maps showing exact location and extent of site must accompany this form and must be identif by source and date. Keep this submission to 8½"x if feasible.

USGS 7½ Minute Series Quad. Name The Narrows

For Office Use Only--UTM Coordinates _____

10. Photography (optional for environmental impact survey):
Please submit a 5"x7" black and white print(s) showing the current state of the site. Provide a label for the print(s) on a separate sheet.


Fort Hamilton
BROOKL
Dyker Heights
Visitation Monastery
St Patricks Sch
Fortbonne Hall Sch
Polytechnic Preparatory Sch
DYKER BEACH PARK
Golf Course
Fort Hamilton Park
Shore Road Park
INTERCHANGE 6
Breakwater
VERRAZANO-NARROWS BRIDGE
US MILITARY RES
FORT HAMILTON
VA Hospital
INTERCHANGE
Bath Be
Playground
NR.
732D
A085-01-0031
U.S. military Res
Fort Wadsworth
A085-01-0007
A085-01-0008
KINGS
RICHMOND CO
GRAVESEND
Hoffman Island
GATEWAY
NAT RECREATION AREA
Norton Point
Coney Island Lighthouse
Seagate
BROC
Coney Island

THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12230

NEW YORK STATE MUSEUM
HISTORICAL AND ANTHROPOLOGICAL SURVEYS

NEW YORK STATE MUSEUM
Prehistoric Site File
RM 3122
Cultural Education Center
Albany, N.Y. 12230

DATE: 6/15/92

To:
CECE KIRKORIAN
HISTORICAL PERSPECTIVES
P.O. BOX 331
RIVERSIDE, CT 06878

Proposed Project: VERRAZANO/FT. HAMILTON RAMP PROJECT
7.5' U.S.G.S. Quad: THE NARROWS

In response to your request our staff has conducted a search of our data files* for locations and descriptions of prehistoric archaeological sites within the area indicated above. The results of the search are given below.

If specific information requested has not been provided by this letter, it is likely that we are not able to provide it at this time, either because of staff limitations or policy regarding disclosure of archaeological site data.

Questions regarding this reply can be directed to the site file manager, at (518) 474-5813 or the above address. Please refer to the N.Y.S.M. site identification numbers when requesting additional information.

Please resubmit this request if action is taken more than one year after your initial information request.

*[NOTE: Our files normally do not contain historic archeological sites or architectural properties. For information on these types of sites as well as prehistoric sites not listed in the N.Y.S.M. files contact The State Historic Preservation Office; Office of Parks, Recreation & Historic Preservation; Agency Building #1; Empire State Plaza; Albany,NY,12238 at (518) 474-0479.

RESULTS OF THE FILE SEARCH:

Recorded sites ARE located in or within one mile of the project area. If so, see attached list.

Code "ACP" = sites reported by Arthur C. Parker in The Archeology Of New York, 1922, as transcribed from his unpublished maps.

SEARCH CONDUCTED BY: BW (initials) Anthropological Survey, NYS Museum

cc: N.Y.S. OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION: HISTORIC PRESERVATION FIELD SERVICES BUREAU

6/15/92 To: CECE KIRKORIAN, HISTORICAL PERSPECTIVES

Project: VERRAZANO/FT. HAMILTON RAMP PROJECT Topo. Maps: THE NARROWS
BW (initials) Anthropological Survey, NYSM

New York State Museum Prehistoric Archaeological Site Files
EVALUATION OF ARCHAEOLOGICAL SENSITIVITY FOR PREHISTORIC (NATIVE AMERICAN) SITES
Examination of the data suggests that the location indicated has the following sensitivity rating:

HIGH PROBABILITY OF PRODUCING PREHISTORIC ARCHAEOLOGICAL DATA.

The reasons for this finding are given below:

[✓] A RECORDED SITE IS INDICATED IN OR IMMEDIATELY ADJACENT TO THE LOCATION AND WE HAVE REASON TO BELIEVE IT COULD BE IMPACTED BY CONSTRUCTION.

[✓] A RECORDED SITE IS INDICATED SOME DISTANCE AWAY BUT DUE TO THE MARGIN OF ERROR IN THE LOCATION DATA IT IS POSSIBLE THE SITE ACTUALLY EXISTS IN OR IMMEDIATELY ADJACENT TO THE LOCATION.

[✓] THE TERRAIN IN THE LOCATION IS SIMILAR TO TERRAIN IN THE GENERAL VICINITY WHERE RECORDED ARCHAEOLOGICAL SITES ARE INDICATED.

[✓] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION SUGGEST A HIGH PROBABILITY OF PREHISTORIC OCCUPATION OR USE.

[ ] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION SUGGEST A MEDIUM PROBABILITY OF PREHISTORIC OCCUPATION OR USE.

[ ] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION SUGGEST A LOW PROBABILITY OF PREHISTORIC OCCUPATION OR USE.

[ ] EVIDENCE OF CULTURAL OR NATURAL DESTRUCTIVE IMPACTS SUGGESTS A LOSS OF ORIGINAL CULTURAL DEPOSITS IN THIS LOCATION.

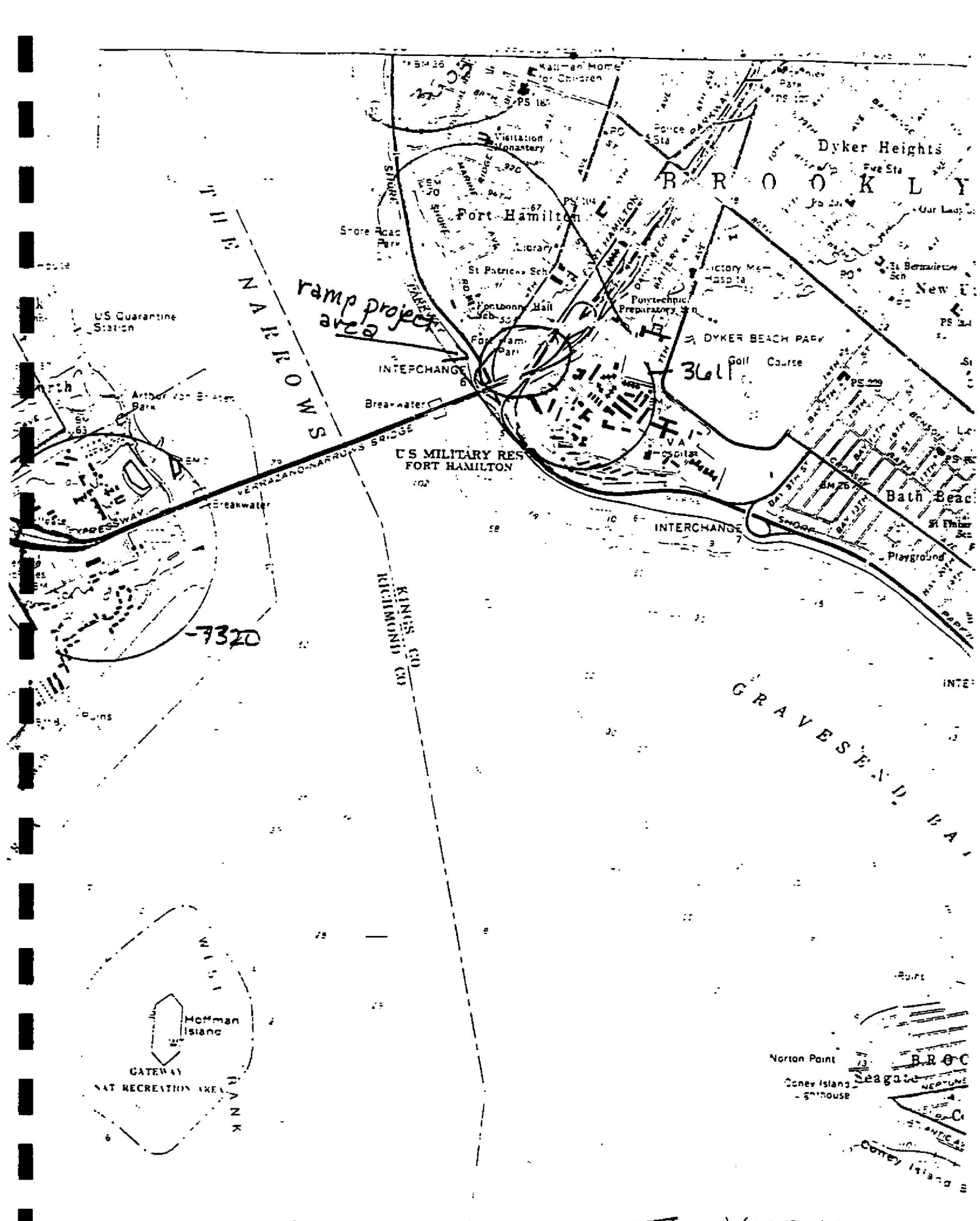
[ ] THE PHYSIOGRAPHIC CHARACTERISTICS OF THE LOCATION ARE MIXED, A HIGHER THAN AVERAGE PROBABILITY OF PREHISTORIC OCCUPATION OR USE IS SUGGESTED FOR AREAS IN THE VICINITY OF EITHER PRESENT OR PREEXISTING BODIES OF WATER, WATERWAYS, OR SWAMPS. A HIGHER THAN AVERAGE PROBABILITY IS SUGGESTED FOR ROCK FACES WHICH AFFORD SHELTER OR FOR AREAS SHELTERED BY BLUFFS OR HILLS. AREAS IN THE VICINITY OF CHERT DEPOSITS HAVE A HIGHER THAN AVERAGE PROBABILITY OF USE. DISTINCTIVE HILLS OR LOW RIDGES HAVE AN AVERAGE PROBABILITY OF USE AS A BURYING GROUND. LOW PROBABILITY IS SUGGESTED FOR AREAS OF EROSIONAL STEEP SLOPE.

[ ] PROBABILITY RATING IS BASED ON THE ASSUMED PRESENCE OF INTACT ORIGINAL DEPOSITS, POSSIBILITY UNDER FILL, IN THE AREA. IF NEAR WATER OR IF DEEPLY BURIED, MATERIALS MAY OCCUR SUBMERGED BELOW THE WATER TABLE.

[ ] INFORMATION ON OTHER SITES MAY BE AVAILABLE IN A REGIONAL INVENTORY MAINTAINED AT THE FOLLOWING LOCATION(S).

COMMENTS:

cc: N.Y.S. OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION; HISTORIC PRESERVATION FIELD SERVICES BUREAU


THE NARROWS
ramp project area
US Quarantine Station
Fort Hamilton
Dyker Heights
BROOKLY
Fort Hamilton Library
St Patrick's Sch
Fortbonne Hall
Polytechnic Preparatory Sch
DYKER BEACH PARK
Golf Course
INTERCHANGE
Breakwater
US MILITARY RES
FORT HAMILTON
VA Hospital
VERRAZANO-NARROWS BRIDGE
Bath Beac
Playground
INTERCHANGE
KINGS CO
RICHMOND CO
GRAVESEND BA
Hoffman Island
GATEWAY
NAT RECREATION AREA
Norton Point
Coney Island Lighthouse
Seagate
Coney Island

The Narrows

NEW YORK STATE PREHISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM

For Office Use Only--Site Identifier A085-01-0008

Project Identifier _____ Date October 24, 1985

Your Name Terry H. Klein Phone (201) 678-1960
Address 100 Halsted Street
East Orange, New Jersey
Zip 07019

Organization (if any) Louis Berger & Associates, Inc.

1. Site Identifier(s) Fountain-Mouquin House
2. County Richmond One of following: City New York City
   Township _____
   Incorporated Village _____
   Unincorporated Village or Hamlet _____
3. Present Owner U.S. Army
   Address Fort Wadsworth
   Staten Island, New York
   Zip

4. Site Description (check all appropriate categories):

Site

__Stray find	__Cave/Rockshelter	__Workshop
__Pictograph	__Quarry	__Mound
__Burial	__Shell midden	__Village
__Surface evidence	__Camp	__Material in plow zone
X Material below plow zone	X Buried evidence	__Intact occupation floor
__Single component	__Evidence of features	__Stratified
	__Multicomponent	

Location

__Under cultivation	X Never cultivated	__Previously cultivated
__Pastureland	__Woodland	__Floodplain
__Upland		__Sustaining erosion

Soil Drainage: excellent X good__ fair__ poor __
Slope: flat __ gentle X moderate __ steep __
Distance to nearest water from site (approx.) 300 feet
Elevation: 40 feet

5. Site Investigation (append additional sheets, if necessary):

Surface__date(s) None
__Site Map (Submit with form*)
__Collection

Subsurface--date(s) MId 1984 and September/October 1985
Testing: shovel X coring__ other _____ unit size 5x5 foot
no. of units 5 (Submit plan of units with form*)

Excavation: unit size _____ no. of units _____
(Submit plan of units with form*)

* Submission should be 8½"x11", if feasible

Investigator Jay R. Cohen

Manuscript or published report(s) (reference fully):

Department of the Navy

1984 Draft Envrionmental Impact Statement. Surface Action Group Homeporting. Ms. on file, Northern Division, Naval Facilities Engineering Command, Naval Base, Philadelphia.

*

Present repository of materials Louis Berger & Associates, Inc.

6. Component(s) (cultural affiliation/dates):

Possibly Woodland

7 List of material remains (be as specific as possible in identifying object and material):

Argillite, chert, slate debitage, possible chert core, argillite bifaces, slate bead, shell tempered ceramics

If historic materials are evident, check here and fill out historic site form. X

8. Map References: Map or maps showing exact location and extent of site must accompany this form and must be identified by source and date. Keep this submission to 8½"x11" if possible.

USGS 7½ Minute Series Quad. Name The Narrows

For Office Use Only UTM Coordinates _____

9. Photography (optional for environmental impact survey):
Please submit a 5"x7" black and white print(s) showing the current state of the site. Provide a label for the print(s) on a separate sheet.

*

n.d. Supplemental Environmental Impact Statement, Surface Action Group Homeporting. Ms. on file, Northern Division, Naval Facilities Engineering Command, Naval Base, Philadelphia.

Historical Theme:
= Military

ARCHEOLOGICAL SITE INVENTORY FORM

DIVISION FOR HISTORIC PRESERVATION
NEW YORK STATE PARKS AND RECREATION
ALBANY, NEW YORK
518 474-0479

FOR OFFICE USE ONLY

UNIQUE SITE NO. A085-01-0031
QUAD. The Narrows
SERIES USGS 7½'
NEG. NO. _____

REPORTED BY: L M Reinenkamf

YOUR ADDRESS: NYS Div. for Historic Preservation TELEPHONE: 474-0479

ORGANIZATION (if any): _____

DATE: 3/15/74

* *

1. SITE NAME: Fort Wadsworth - U.S. Army Reservation

2. COUNTY: Richmond TOWN/CITY: _____ VILLAGE: _____

3. LOCATION: east Staten Island, borders on the Narrows, where Verrazano Narrows Bridge crosses from Staten Island to Brooklyn

4. PRESENT OWNER: U.S. Army

5. OWNER'S ADDRESS: _____

6. DESCRIPTION, CONDITION, EVIDENCE OF SITE:

- ☒ STANDING RUINS
- ☐ CELLAR HOLE WITH WALLS
- ☐ SURFACE TRACES VISIBLE
- ☐ WALLS WITHOUT CELLAR HOLE
- ☐ UNDER CULTIVATION
- ☐ EROSION
- ☐ UNDERWATER
- ☐ NO VISIBLE EVIDENCE
- ☐ OTHER Also: intact fortifications, housing, etc. Some abandoned, many presently in use. Much of reservation is of archeological interest.

7. COLLECTION OF MATERIAL FROM SITE:

- ☐ SURFACE HUNTING BY WHOM _____ DATE _____
- ☐ TESTING BY WHOM _____ DATE _____
- ☒ EXCAVATION BY WHOM local high school DATE 1973
  At Battery Weed
- ☐ NONE

PRESENT REPOSITORY OF MATERIALS: Ft. Wadsworth Museum

8. PREHISTORIC CULTURAL AFFILIATION OR DATE: _____

Cultural affiliation: Delaware Indian, Colonial period Dutch, English, American military use

9. HISTORICAL DOCUMENTATION OF SITE:
Excellent possibilities that there are archeological materials on the Reservation relating to a whole series of occupations, including at least the following: a) Canarsie (Delaware) Indians - the Indians who inhabited Brooklyn are known to have also utilized parts of Staten Island, and this point, the shortest distance from the Brooklyn shore, is thought by many to be the site of one of their settlements.

10. POSSIBILITY OF SITE DESTRUCTION OR DISTURBANCE:
Has been disturbed recently in some places by new construction - including the Verrazano Narrows Bridge

11. REMARKS:
Some years ago, two Staten Island diggers, Al Arc son & Donald Saenz, dug some pits that yielded both Indian & early Colonial materials at the edge of the bluff just southwest of the reservation boundari

12. MAP LOCATION

7 ½ MINUTE SERIES QUAD. NAME: _____

15 MINUTE SERIES QUAD. NAME: _____

U.S.G.S. COORDINATES: _____

D.O.T. COORDINATES: (if known) _____

ATTACH SKETCH, TRACING OR COPY OF MAP

SOURCE OF MAP:

13. PHOTOGRAPHS (optional)

9. b) very early Dutch settlement - the maps show that the early Dutch town was slightly southwest of the point of the Narrows, and it may easily have extended far enough to the northeast to have been partially included within the southern part of the Ft. Wadsworth property.
c) various episodes of military use - Dutch.

ARCHEOLOGICAL SITE INVENTORY FORM

DIVISION FOR HISTORIC PRESERVATION
NEW YORK STATE PARKS AND RECREATION
ALBANY, NEW YORK
518 474-0479

FOR OFFICE USE ONLY

UNIQUE SITE NO. 085-01-0054-001 *
QUAD. The Narrows
SERIES U.S.G.S. 7½'
NEG. NO.

* See also structures inventory

REPORTED BY: John Milner Associates

YOUR ADDRESS: West Chester, Pennsylvania TELEPHONE:

ORGANIZATION (if any): NPS Contract CX-2000-7-0010

DATE: 2/10/78

* *

1. SITE NAME: Fort Tompkins

2. COUNTY: Richmond TOWN/CITY: VILLAGE:

3. LOCATION: Within Fort Wadsworth Reservation

4. PRESENT OWNER: NPS.

5. OWNER'S ADDRESS:

6. DESCRIPTION, CONDITION, EVIDENCE OF SITE: See Attached Form

☐ STANDING RUINS ☐ CELLAR HOLE WITH WALLS

☐ SURFACE TRACES VISIBLE ☐ WALLS WITHOUT CELLAR HOLE

☐ UNDER CULTIVATION ☐ EROSION ☐ UNDERWATER

☐ NO VISIBLE EVIDENCE ☐ OTHER

7. COLLECTION OF MATERIAL FROM SITE:

☐ SURFACE HUNTING BY WHOM DATE

☐ TESTING BY WHOM DATE

☐ EXCAVATION BY WHOM DATE

☐ NONE

PRESENT REPOSITORY OF MATERIALS:

10. POSSIBLE [illegible]

11. REMARKS:

12. MAP LOCATION

7 ½ MINUTE SERIES QUAD. NAME: _____

15 MINUTE SERIES QUAD. NAME: _____

U.S.G.S. COORDINATES: _____

D.O.T. COORDINATES: (if known) _____

ATTACH SKETCH, TRACING OR COPY OF MAP

See aerial mosaic in above cited report, p. 72.

SOURCE OF MAP:

13. PHOTOGRAPHS (optional)

(ATTACH)

NATIONAL HERITAGE

Historic Site Survey Record

View:
Camera Facing:

UTM Grid 44 95,080m.N.
5 79,690m.E.

1. NAME
Historic Fort Tompkins
Common Fort Wadsworth, Staten Island

2. LOCATION
Street & No. The Narrows, N.Y.-N.J.
8" over from right hand margin
18-1/2" up from right hand margin

U.S.Department of the Interior, Geological Survey 1966

Zoning:_____ Map Reference Key #_____

3. CLASSIFICATION

CATEGORY (Check One)	OWNERSHIP		STATUS	ACCESSIBLE TO PUBLIC
___District ___Building ___Site x Structure ___Object	x Public ___Private ___Both	Public Acquisition: ___In Process ___Being Considered	___Occupied x Unoccupied ___Work in Progress ___Pres. ___Altera.	Yes: x Restricted ___Unrestricted ___No

PRESENT USE (Check One or More if Applicable)

___Agriculture	x Government	___Museum	___Religious	___Scientific	
___Commercial	___Industrial	x Park	___Rental Residence	___Transportation	
___Educational	x Military	___Private Residence (Owner Occupied)	___Single Family ___Double ___Multiple	___Other	

ORIGINAL USE: Gun Battery

4a. OWNERSHIP (Present)
Name:
National Park Service
Street and Number:
City or Town:

4b. OWNERSHIP (Original, if known):

4c. BUILDER/ARCHITECT (If known):

5. DESCRIPTION

Features (exterior)	Materials
Facade	Granite
Foundations	Granite
Trim	
Roof Type: x flat ___gable ___shed ___"French" ___gambrel ___hip ___other	
Chimney(s)	
Porch(es)	
Addition(s) none known	

Dimensions & Plan Trapezoidal, @ 300 x 100ft (Sketch):
5 sides

PLANVIEW

Structural System:
___wood frame, interlocking joints ___wood frame, light member
___masonry load bearing walls ___log ___metal ___other

5. DESCRIPTION (cont.)

Number of Stories 2

Other notable features: _____

Condition: EXTERIOR ___Excellent X Good ___Fair ___Deteriorated ___Ruins
INTERIOR ___Excellent x Good ___Fair ___Deteriorated ___Ruins

Integrity: a. ___Original Site b. ___Moved If so, when and from where _____

c. Major alterations and dates (if known): _____

Site:
Frontage: Acreage:
Depth:
Related Outbuildings and Property: None
___barn ___carriage house ___garage(s) ___shop ___shed ___gardens ___orchards
___fencing (type)_____ ___walling (type)_____ ___other_____
Threats and/or intrusions to Building:
x none known ___zoning ___roads ___development ___deterioration ___other_____

6. INTERRELATIONSHIP OF BUILDING AND SURROUNDINGS

Relationship to Street: x Pivotal ___Positive ___Neutral ___Negative
Relationship to Village: ___Pivotal ___Positive ___Neutral ___Negative

7. SIGNIFICANCE

Date of Initial Construction:
___c.1840 ___c.1850 ___c.1860 ___c.1870 ___c.1880 ___c.1890 ___c.1900
___c.1910 ___after 1910 Specific Date (if known) Prior to 1812

Style: ___Frontier ___Italianate ___Neo-Classic Revival ___Art Deco
___Classic Revival ___Romanesque Revival ___English Eclectic ___Ranch Style
___Gothic Revival ___Queen Anne ___Federal Revival ___Split-Level
___Tuscan Villa ___Eastlake ___Bungaloid x Utilitarian
___Second Empire ___Georgian Revival ___Western Stick Style ___Other

National Register Status:
Presently on National Register or nominated for:
x national significance ___state significance ___local significance ___none

COMMENTS: (expand on next page)

Fort Tompkins, situated on a high bluff overlooking the Narrows, measures about 500 by 250 feet. It consists of five sides, each two stories high, surrounding central courtyard. Listed in National Register of Historic Places.

Recorder: DGR Date of Inventory _____

Photographer: _____ Date of Exposure _____

ARCHEOLOGICAL SITE INVENTORY FORM

DIVISION FOR HISTORIC PRESERVATION
NEW YORK STATE PARKS AND RECREATION
ALBANY, NEW YORK
518 474-0479

FOR OFFICE USE ONLY
UNIQUE SITE NO. 085-01-0058-D01*
QUAD. The Narrows
SERIES U.S.G.S. 7½'
NEG. NO. ______

* See also structures inventory

REPORTED BY: John Milner Associates

YOUR ADDRESS: West Chester, Pennsylvania TELEPHONE: ______

ORGANIZATION (if any): NPS Contract CX-2000-7-0010

DATE: 2/10/78

* *

1. SITE NAME: Battery Weed
2. COUNTY: Richmond TOWN/CITY: ______ VILLAGE: ______
3. LOCATION: Fort Wadsworth Reservation
4. PRESENT OWNER: N.P.S.
5. OWNER'S ADDRESS: ______
6. DESCRIPTION, CONDITION, EVIDENCE OF SITE: See Attached Form

☐ STANDING RUINS ☐ CELLAR HOLE WITH WALLS
☐ SURFACE TRACES VISIBLE ☐ WALLS WITHOUT CELLAR HOLE
☐ UNDER CULTIVATION ☐ EROSION ☐ UNDERWATER
☐ NO VISIBLE EVIDENCE ☐ OTHER ______

7. COLLECTION OF MATERIAL FROM SITE:

☐ SURFACE HUNTING BY WHOM ______ DATE ______
☐ TESTING BY WHOM ______ DATE ______
☐ EXCAVATION BY WHOM ______ DATE ______
☐ NONE

PRESENT REPOSITORY OF MATERIALS: ______

8. PREHISTORIC CULTURAL AFFILIATION OR DATE: ______

9. HISTORICAL DOCUMENTATION OF SITE:

John Milner Associates
1978 "A Cultural Resources Inventory of the Gateway National Recreation Area, New York & New Jersey." [A report prepared for the N.P.S. (Copy on file at the NYSOHP)]

10. POSSIBILITY OF SITE DESTRUCTION OR DISTURBANCE:

11. REMARKS:

12. MAP LOCATION

7 ½ MINUTE SERIES QUAD. NAME: _____

15 MINUTE SERIES QUAD. NAME: _____

U.S.G.S. COORDINATES: _____

D.O.T. COORDINATES: (if known) _____

ATTACH SKETCH, TRACING OR COPY OF MAP

See aerial mosaic in above cited report, p. 72

SOURCE OF MAP:

13. PHOTOGRAPHS (optional)

(ATTACH)

NATIONAL HERITAGE

Historic Site Survey Record

View: UTM Grid ^{44}95,140m.N.
Camera Facing: ^{5}79,900m.E.

1. NAME
Historic Battery Weed
Common Fort Wadsworth, Staten Island

2. LOCATION
Street & No. U.S. Department of the Interior, Geological Survey
The Narrows, N.Y. - N.J. 1966
18-3/4" up from right hand margin
8-1/4" over from right hand margin
Zoning:_____ Map Reference Key #_____

3. CLASSIFICATION

CATEGORY (Check One)	OWNERSHIP	STATUS	ACCESSIBLE TO PUBLIC
___District ___Building ___Site X Structure ___Object	X Public ___Private ___Both Public Acquisition: ___In Process ___Being Considered	___Occupied X Unoccupied Work in Progress ___Pres. ___Altera.	Yes: X Restricted ___Unrestricted ___No

PRESENT USE (Check One or More if Applicable)

___Agriculture ___Commercial ___Educational
X Government ___Industrial X Military
___Museum X Park ___Private Residence (Owner Occupied)
___Religious ___Rental Residence ___Single Family ___Double ___Multiple
___Scientific ___Transportation ___Other

ORIGINAL USE: Gun Battery

4a. OWNERSHIP (Present)
Name: National Park Service
Street and Number:
City or Town:

4b. OWNERSHIP (Original, if known):

4c. BUILDER/ARCHITECT (If known):

5. DESCRIPTION
Features (exterior) — Materials

Facade — Granite
Foundations
Trim
Roof Type: ___flat ___gable ___shed ___"French" ___gambrel ___hip ___other
Chimney(s)
Porch(es)
Addition(s)

Dimensions & Plan 4 sided, @ 200 x 100 ft. (Sketch):

Structural System:
___wood frame, interlocking joints ___wood frame, light member
___masonry load bearing walls ___log ___metal ___other

5. DESCRIPTION (cont.)

Number of Stories 3

Other notable features: _____

Condition: EXTERIOR ___Excellent ___Good X Fair ___Deteriorated ___Ruins
INTERIOR ___Excellent ___Good X Fair ___Deteriorated ___Ruins

Integrity: a. X Original Site b. ___Moved If so, when and from where _____

c. Major alterations and dates (if known): _____

Site:

Frontage: Acreage:

Depth:

Related Outbuildings and Property: None known

___barn ___carriage house ___garage(s) ___shop ___shed ___gardens ___orchards

___fencing (type)_____ ___walling (type)_____ ___other_____

Threats and/or Intrusions to Building:

X none known ___zoning ___roads ___development ___deterioration ___other_____

6. INTERRELATIONSHIP OF BUILDING AND SURROUNDINGS

Relationship to Street: X Pivotal ___Positive ___Neutral ___Negative

Relationship to Village: ___Pivotal ___Positive ___Neutral ___Negative

7. SIGNIFICANCE

Date of Initial Construction:

___c.1840 ___c.1850 ___c.1860 ___c.1870 ___c.1880 ___c.1890 ___c.1900
___c.1910 ___after 1910 · Specific Date (if known) Prior to 1808

Style:

___Frontier	___Italianate	___Neo-Classic Revival	___Art Deco
___Classic Revival	___Romanesque Revival	___English Eclectic	___Ranch Style
___Gothic Revival	___Queen Anne	___Federal Revival	___Split-Level
___Tuscan Villa	___Eastlake	___Bungaloid	X Utilitarian
___Second Empire	___Georgian Revival	___Western Stick Style	___Other

National Register Status:

Presently on National Register or nominated for:

X national significance ___state significance ___local significance ___none

COMMENTS: (expand on next page)

Battery Weed, formerly Fort Richmond, has been placed in National Register of Historic Places.

Recorder: DGR Date of Inventory 7/77

Photographer: _____ Date of Exposure _____

ARCHEOLOGICAL SITE INVENTORY FORM

DIVISION FOR HISTORIC PRESERVATION
NEW YORK STATE PARKS AND RECREATION
ALBANY, NEW YORK
518 474-0479

FOR OFFICE USE ONLY

UNIQUE SITE NO. A085-01-0167
QUAD. The Narrows
SERIES U.S.G.S. 7½'
NEG. NO. _____

REPORTED BY: John Milner Associates

YOUR ADDRESS: West Chester, Pennsylvania TELEPHONE: _____

ORGANIZATION (if any): NPS contract CX-2000-7-0010

DATE: 2/10/78

* *

1. SITE NAME: ACP: Rich-21

2. COUNTY: Richmond TOWN/CITY: _____ VILLAGE: _____

3. LOCATION: Fort Wadsworth

4. PRESENT OWNER: NPS

5. OWNER'S ADDRESS: _____

6. DESCRIPTION, CONDITION, EVIDENCE OF SITE: See Attached Form

☐ STANDING RUINS ☐ CELLAR HOLE WITH WALLS

☐ SURFACE TRACES VISIBLE ☐ WALLS WITHOUT CELLAR HOLE

☐ UNDER CULTIVATION ☐ EROSION ☐ UNDERWATER

☐ NO VISIBLE EVIDENCE ☐ OTHER _____

7. COLLECTION OF MATERIAL FROM SITE:

☐ SURFACE HUNTING BY WHOM _____ DATE _____

☐ TESTING BY WHOM _____ DATE _____

☐ EXCAVATION BY WHOM _____ DATE _____

☐ NONE

PRESENT REPOSITORY OF MATERIALS: _____

8. PREHISTORIC CULTURAL AFFILIATION OR DATE: _____

9. HISTORICAL DOCUMENTATION OF SITE:

John Milner Assoc.
1978 "A Cultural Resources Inventory of the Gateway National Recreation Area, New York & New Jersey." Report prepared for the N.P.S. (Copy on file at NYSDHP)

10. POSSIBILITY OF SITE DESTRUCTION OR DISTURBANCE:

11. REMARKS:

12. MAP LOCATION

7 ½ MINUTE SERIES QUAD. NAME: _____

15 MINUTE SERIES QUAD. NAME: _____

U.S.G.S. COORDINATES: _____

D.O.T. COORDINATES: (if known) _____

ATTACH SKETCH, TRACING OR COPY OF MAP

See above cited report, p. 55, Fig. 5.1

SOURCE OF MAP:

13. PHOTOGRAPHS (optional)

(ATTACH)

NATIONAL HERITAGE

Prehistoric Site Survey Record

1. DESIGNATION
Number ACP: Rich - 21
Name

2. LOCATION
Relation to Surroundings Fort Wadsworth
Staten Island

Map Reference U.S. Department of Interior, Geological Survey
County The Narrows, N.Y.-N.J. 1966
Township _____ Range _____
_____ 1/4 of _____ 1/4 of Sec. _____
18 1/2" up from lower right printed margin
7 3/4" over from lower right printed margin

Photo Numbers:

Camera Facing:

UTM Grid 44 94,870m.N.
5 80,140m.E.

Note: Due to the extreme nature 20th cent. disturbance in this area, this location should not be taken to be precise.

3. CLASSIFICATION

FUNCTION
- X encampment
- ___ village
- ___ hunting
- ___ mortuary
- ___ petroglyph
- ___ other

PHYSIOGRAPHY
- X Open
- ___ Rockshelter
- ___ Cave
- ___ Other

PRESENT USE (check one or more as applicable)
- ___ Agricultural
- ___ Commercial
- X Government
- ___ Industrial
- ___ Military
- X Park
- ___ Other

OWNERSHIP
- X Public
- ___ Private
- ___ Both

Public Acquisition
- ___ In Process
- ___ Being Considered

4a. OWNERSHIP (present)
Name: National Park Service
Street & Number:
City or Town:

4b. OWNERSHIP (original, if known)
Name:
Street & Number:
City or Town:

5. DESCRIPTION
Dimensions:
Vegetation: developed
Elevation: @ 100 feet above sea level
Nearest Water: Approximately ten feet
Surface Soil: brown organic humus

5. DESCRIPTION (cont.)

Erosion/Deposition: probably erosion

Present Disturbance: modern development

Impending Disturbances: none known

Structures:

Burials:

Other Features:

Artifacts Observed or Recovered:

6. SIGNIFICANCE

Tradition and Phase (if known): probably Lenape

Probable Dates of Occupation (if known): late prehistoric - early historic

National Register Status
Presently on National Register or nominated for:

___ national significance
___ local significance
___ state significance
_X_ none

Comments: Parker (1922) indicates that there is a Lenape site in the vicinity of Fort Wadsworth.

The site has been incorporated into the site recording system of the New York State Museum and Science Service.

Reference cited: Parker, Arthur C.
1922 The Archeological History of New York.
Albany: New York State Museum Bulletin
Nos. 235-238.

Recorder: Anthropological Survey of New York State and Science Service
Photographer:

Date of Inventory:

Date of Exposure:

APPENDIX B

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-1
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 11.4
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA CONC.	DEPTH	CASING BLOWS	REMARKS
10:30	1D	0.5	3	Brown clayey fine to coarse sand, trace		0.5		Hole advanced
03-12-98		2.0	2-4	gravel (Fill) (SC)				with 3" I.D. hollow
Thursday	2D	2.0	4-5	Brown coarse to fine sand, some clay, trace				stem augers.
Cold		4.0	3-5	gravel, silty clay pockets (Fill) (SC)				
20°F	3D	4.0	4-5	Brown coarse to fine sand, some silt, trace		5		
		6.0	6-8	gravel, clay pockets (Fill) (SM)				
	4D	6.0	5-4	Brown coarse to fine sand, trace gravel, silt				
		8.0	4-4	(Fill) (SP-SM)				
	5D	8.0	3-4	Brown fine to medium sand, trace silt,				
		10.0	3-4	coarse sand (Fill) (SP-SM)	F	10		
	6D	10.0	5-5	Top: Brown fine to medium sand, some				
		12.0	3-4	gravel, trace silt, coarse sand (Fill) (SP-SM)				6D Bot: Petroleum
				Bot: Gray coarse to fine sand, trace gravel,				odor. Wet sample.
				silt (Fill) (SP-SM)				
						15		
	7D	15.0	3-3	Brown fine to coarse sand, trace gravel,				
		17.0	3-4	silt, green clay pockets (Fill) (SP)				
						20		
	8D	20.0	2-5	Do 7D (Fill) (SP)				
		22.0	6-6					
						23.5		
						25		
	9D	25.0	4-7	Brown fine to medium sand, trace silt				
		27.0	8-9	(SP-SM)				
						30		
	10D	30.0	3-5	Brown coarse to fine sand, trace silt, gravel				
		32.0	6-9	(SP-SM)	S			
						35		
	11D	35.0	2-5	Brown fine to medium sand, trace coarse				
		37.0	4-5	sand, silt (SP-SM)				
						40		
	12D	40.0	4-7	Do 11D (SP-SM)				
13:30		42.0	10-13			42		End of Boring at
								42'.
						45		
						50		

BORING NO. MR-1

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-1
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 11.4
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM	TO	
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-12-98	11:15	12	10	11	WATER LEVEL BASED ON WET MATERIAL IN BOTTOM
					1' OF SPLIT SPOON SAMPLE 6D. (DEPTH
					OF SPOON: 10'-12'). WATER LEVEL REMAINED
					CONSTANT THROUGH THE REMAINDER OF DRILLING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	42	NO. OF 3" SHELBY TUBE SAMPLES		
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES		
CORE DRILLING IN ROCK	LIN. FT.		OTHER:		

BORING CONTRACTOR *INDEPENDENT DRILLING*
DRILLER DAVID CARTER HELPERS TONY EDWARDS
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS FROM BOREHOLE.
RESIDENT ENGINEER GERARD DROHAN DATE 3-12-98

BORING NO. MR-1

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-2
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 8.8
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	3/2"-3	Brown clayey fine to medium sand, trace		0.3		Hole advanced with
03-13-98		2.0	8-7	gravel, coarse sand (Fill) (SC)	CONC.			3" I.D. hollow stem
Fnday	2D	2.0	3-4	Do 1D (Fill) (SC)				augers.
Cold		4.0	3-7					
	3D	4.0	2-3	Top:Soft gry silty clay, sm f-m sand(Fill)(CL)		5		Slight organic
		6.0	10-8	Bot:Brn c-f sa, sm si, tr gvl, cl pkts(Fill)(SM)				odor.
	4D	6.0	2-3	Gray coarse to fine sand, some silt, trace				
		8.0	6-6	gravel (Fill) (SM)				
	5D	8.0	2-3	Gray coarse to fine sand, trace silt, gravel				
		10.0	3-3	(Fill) (SP-SM)		10		
	6D	10.0	3-3	Brown fine to medium sand, trace gravel,				
		12.0	2-3	silt, coarse sand (Fill) (SP-SM)				
					F			
						15		
	7D	15.0	3-2	Do 6D (Fill) (SP-SM)				
		17.0	1-3					
						20		
	8D	20.0	7-7	Do 6D (SP-SM)				
		22.0	7-8					
						25		
	9D	25.0	5-6	Brown coarse to fine sand, trace silt (Fill)				
		27.0	6-8	(SP-SM)				
						28.5		
						30		
	10D	30.0	5-9	Brown fine to medium sand, trace coarse	S			
11:30		32.0	11-11	sand, silt (SP-SM)		32		End of Boring at
								32'.
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-2
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 8.8
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.		DEPTH, FT. FROM	TO
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-13-98	10:00	10	8	8.5	WATER LEVEL BASED ON WET MATERIAL IN SPLIT
					SPOON. WATER LEVEL REMAINED CONSTANT
					THROUGH DRILLING OF BOREHOLE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER TONY EDWARDS HELPERS MARIO DURAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS FROM BOREHOLE.
RESIDENT ENGINEER GERARD DROHAN. DATE 3-13-98

BORING NO. MR-2

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-3P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 6.8
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.		DEPTH, FT. FROM	TO
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					SEE ATTACHED.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SHEET 2 OF BORING LOG

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT.	30	TOP ELEV. 8±
INTAKE ELEMENT:	TYPE	PVC	OD, IN.	2-3/8	LENGTH, FT.	5	TIP ELEV. -27±
FILTER:	MATERIAL	CUTTINGS	OD, IN.	7	LENGTH, FT.	42	BOT. ELEV. -34±

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	42	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS NGOZI CHRISTIAN DURU
REMARKS CUTTINGS FROM BOREHOLE BACKFILLED AROUND 2" DIA. PVC INSTALLED IN BOREHOLE.
RESIDENT ENGINEER GERARD DROHAN. DATE 3-13-98

BORING NO. MR-3P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-4
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 6.4
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:00	1D	0.3	1/2"-1	Brown clayey fine to medium sand, trace		0.3		Hole advanced with
03-13-98		2.0	3-2	coarse sand, gravel (Fill) (SC)	CONC.			3" I.D. hollow
Friday	2D	2.0	1-1	*Gray coarse to fine sand, some clay, trace*				*stem augers.*
Cold		4.0	2-1	cinders, gravel (Fill) (SC)				
	3D	4.0	2-2	Do 2D (Fill) (SC)		5		
		6.0	2-2					
	4D	6.0	1-1	Brown coarse to fine sandy gravel, some				
		8.0	1-1	cinders, trace wood, *silt (Fill) (GP-GM)*				
	5D	8.0	1-1	Gray fine to coarse sand, some silt, trace				5D&6D: Slight
		10.0	2-3	gravel (Fill) (SM)		10		organic odor.
	6D	10.0	1-1	Gray fine to medium sand, some silt, trace				
		12.0	1-2	coarse sand (Fill) (SM)				
						15		
	7D	15.0	3-5	Brown coarse to fine sand, some gravel,	F			
14:00		17.0	5-4	trace silt (Fill) (SP-SM)				
09:30								
03-16-98								
Monday						20		
Mild	8D	20.0	3-6	Brown coarse to fine sand, some gravel,				
		22.0	7-8	trace silt, clay pockets (Fill) (SP-SM)				
						25		
	9D	25.0	1-2	Brown fine to coarse sand, trace gravel, silt				
		27.0	4-6	(Fill) (SP-SM)				
						30		
	10D	30.0	2-4	Do 9D (Fill) (SP-SM)				
		32.0	7-11					
						33.5		
						35		
	11D	35.0	4-7	Brown fine to medium sand, trace coarse				
		37.0	10-15	sand, *silt (SP-SM)*	S			
						40		
	12D	40.0	3-6	Do 11D (SP-SM)				
11:30		42.0	8-11			42		*End of Boring at*
								42'.
						45		
						50		

BORING NO. MR-4

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-3P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 6.8
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.0	4-5	Black brown coarse to fine sand, sm gravel,				Hole advanced with
03-13-98		2.0	3-4	silt, tr brick, glass, metal (Fill) (SM)				3" I.D. hollow stem
Friday	2D	2.0	4-3	Brown medium to fine sand, tr coarse sand,				augers.
Cold		4.0	2-2	clay pockets, gravel, silt (Fill) (SP-SM)				
	3D	4.0	1-1	Do 2D, trace wood (Fill) (SP-SM)		5		
		6.0	2-2					
	4D	6.0	2-3	Brown coarse to fine sand, trace silt,				
		8.0	2-3	gravel, clay pockets (Fill) (SP-SM)				
	5D	8.0	4-4	Brown coarse to fine sand, trace silt, gravel				
		10.0	4-5	(Fill) (SP-SM)		10		
	6D	10.0	3-3	Brown fine to coarse sand, trace silt, gravel	F			
		12.0	3-3	(Fill) (SP-SM)				
						15		
	7D	15.0	3-4	Brown coarse to fine sand, trace gravel, silt				
		17.0	4-3	(Fill) (SP-SM)				
						20		
	8D	20.0	1-2	Brown fine to coarse sand, trace gravel, silt				
		22.0	2-3	(Fill) (SP-SM)				
						25		
	9D	25.0	4-7	Do 8D (Fill) (SP-SM)				
		27.0	8-9					
						28.5		
						30		
	10D	30.0	4-5	Brown fine to medium sand, trace coarse				
		32.0	7-10	sand, gravel, silt (SP-SM)				
					S	35		
	11D	35.0	2-5	Do 10D (SP-SM)				
		37.0	9-9					
						40		
	12D	40.0	6-10	Brown fine to medium sand, trace silt				Two attempts.
13:00		42.0	12-13	(SP-SM)		42		End of Boring at
								42'.
						45		
						50		

BORING NO. MR-3P

SHEET 2 OF 3
FILE NO. 8769
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Avenue Y — PIEZOMETER NO. MR3P
LOCATION Brooklyn, N.Y.
PIEZOMETER LOCATION In Boring MR 3 — DATE OF INSTALLATION 3/13/98
☐ SEE SKETCH ON BACK — RES. ENG. G. Brohan

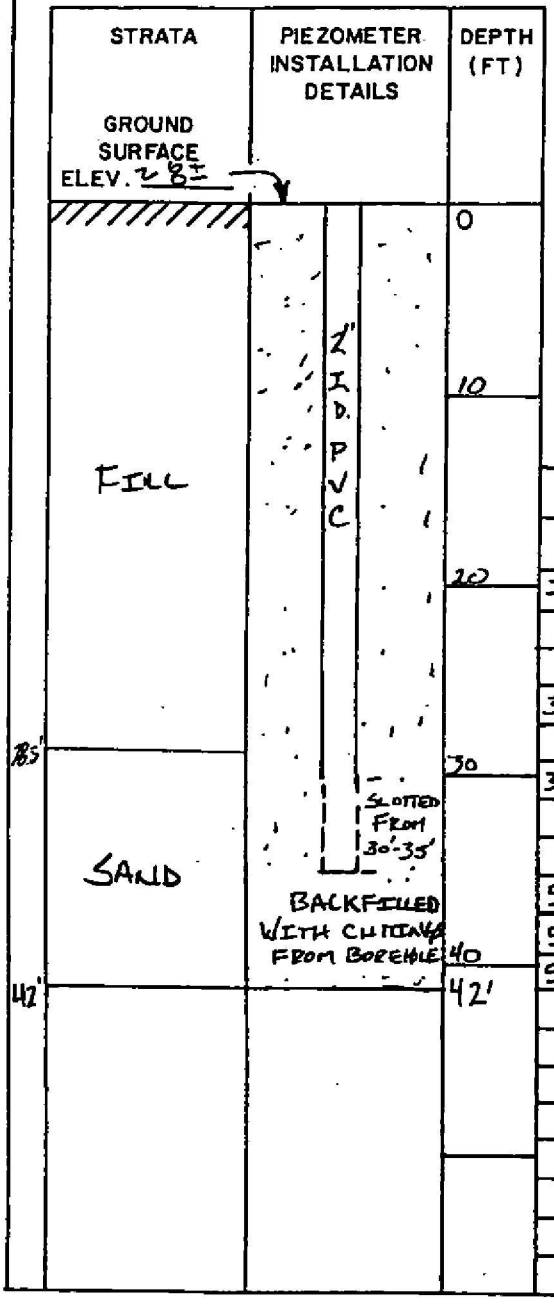
PIEZOMETER TYPE 2" I.D. PVC

INTAKE POINT

depth to bottom, ft = 35
depth to top, ft = 30
length, ft = 5 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = Approx. 8±
diameter, in = 2, ft = 0.17 = 2r



READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
3/13/98	1402	5.7	2.3	
	1402	5.3	2.7	
	1402	5.7	2.3	AFTER 10 SECS.
3/16/98	0730	5.9	2.1	
	0730	5.9	2.1	AFTER 10 SECS.
3/17/98	0815	5.9	2.1	
	0815	5.9	2.1	AFTER 10 SECS
5/5/98	NR	5.8	2.2	
5/7/98	AM	5.8	2.2	
5/12	AM	5.4	2.6	

NR = NOT RECORDED

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. ≈8±

PIEZOMETER NO. MR3P

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING NO. MR-4
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 6.4
DATUM BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC
OTHER

CASING USED ☐ YES ☒ NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS J

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-13-98	12:30	6	4	4.5	MEASURED DURING DRILLING OPERATION.
3-16-98	7:30	17	15	7.6	HOLE LEFT OPEN OVER THE WEEKEND.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 42
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER/TONY EDWARDS HELPERS TONY EDWARDS/MARIO DURAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS FROM BOREHOLE.
RESIDENT ENGINEER GERARD DROHAN DATE 3-16-98

BORING NO. MR-4

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-5
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.5
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:30	1D	0.0	1-7	Medium brown silty clay, trace fine sand,				Hole advanced with
03-13-98		2.0	2-3	gravel, wood (Fill) (CL)				3" I.D. hollow stem
Friday	2D	2.0	3-3	Brown fine to medium sand, some silt, trace				augers.
Cold		4.0	10-18	gravel (Fill) (SM)				
	3D	4.0	6-11	Do 3D (Fill) (SM)		5		
		6.0	16-21					
	4D	6.0	17-14	Dark gray c-f sand, sm silt, tr cinders, clay				
		8.0	11-9	pockets, glass (Fill) (SM)				
	5D	8.0	1-2	Brown silty fine to medium sand, trace				
		10.0	1-1	gravel (Fill) (SM)		10		
	6D	10.0	1-1	Brown fine to medium sand, some clay,				
14:30		12.0	2-2	trace wood (Fill) (SC)				
12:30								
03-16-98								
Monday						15		
Mild	NR	15.0	2-3	No recovery	F			NR: Pieces of shells
		17.0	4-6					found inside spoon.
	7D	17.0	12-8	Top 3": Dark gray organic silty f-m sand,				Organic odor from
		19.0	8-9	trace gravel, wood, metal (Fill) (SM)				spoon.
				Bot: Lt gray si f-c sand, sm gvl (Fill) (SM)		20		
	8D	20.0	7-10	Dark gray organic silty fine to coarse sand,				
		22.0	10-9	trace gravel, vegetation, wood, metal, clay				
				pockets (Fill) (SM)				
						25		
	9D	25.0	6-7	Light red fine to coarse sand, trace gravel,				Organic odor.
		27.0	8-6	silt, clay pockets, vegetation, metal (Fill)				
				(SP-SM)				
						30		
	NR	30.0	4-2	No recovery				
		32.0	1-2					
	10D	32.0	1-2	Brown fine to medium sand, trace coarse				
		34.0	2-3	sand, silt (SP-SM)				
						34.5		
	11D	35.0	5-5	Light brown fine to medium sand, trace silt				
		37.0	9-11	(SP-SM)	S			
						40		
	12D	40.0	6-9	Light brown fine to medium sand, trace				
14:30		42.0	12-15	coarse sand, gravel, silt (SP-SM)		42		End of Boring at
								42'.
						45		
						50		

BORING NO. MR-5

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-5
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 7.5
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC
OTHER

CASING USED ☐ YES ☒ NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS J

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-13-98	14:00	12	10	10	MEASURED DURING DRILLING OPERATION.
3-16-98	7:30	12	10	7.8	HOLE LEFT OPEN OVER THE WEEKEND.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 42
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS NGOZI CHRISTIAN DURU/TONY EDWARDS
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS FROM BOREHOLE.
RESIDENT ENGINEER GERARD DROHAN DATE 3-16-98

BORING NO. MR-5

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-6P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 5.3
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	2-2	Gray coarse to fine sand, some cinders, silt,				Hole advanced with
03-17-98		2.0	1-2	trace brick (Fill) (SM)				3" I.D. hollow stem
Tuesday	2D	2.0	2-2	Brown silty coarse to fine sand, trace brick,				augers.
Mild		3.8	4-50/3"	cinders, concrete, gravel (Fill) (SM)				Groundwater
	3D	4.0	6-50/3"	Gray coarse to fine sand, some silt,	F	5		measured in piezo-
		4.8		concerte, trace cinders (Fill) (SM)				meters.
	4D	5.0	26-5	Brown silty fine to coarse sand, trace				
		7.0	2-2	vegetation & concrete (Fill) (SM)				
	5D	7.0	1-1	Brown gravel, some coarse to fine sand,				5D: piece of gravel
		9.0	1-1	trace silt (Fill) (GP-GM)		10		in nose.
	6D	10.0	1-1	Soft gray organic clayey silt, some fine				WC=21
		12.0	1-1	sand, trace vegetation (OL)	O			Soft black organic
	7U	12.0	PUSH=24"	Top:Soft blk org si clay,tr veg, f sand(OH)				silty clay, trace
		14.0	REC=24"	Bot: Gry f-c sand, trace silt (SP-SM)		13.5		fine sand, vegetation
	8D	14.0	4-6	*Gray coarse to fine sand, some gravel,*		15		& peat recovered
		16.0	6-8	trace silt (SP-SM)				when cleaning from
								10' to 12'.
								7U: WC=27
								7U: pp<0.25
						20		
	9D	20.0	3-5	Brown fine to coarse sand, trace gravel, silt				
		22.0	6-7	(SP-SM)				
						25		
	10D	25.0	3-4	Do 9D (SP-SM)				
		27.0	5-6					
					S			
						30		
	11D	30.0	3-3	Brown fine to medium sand, trace coarse				
		32.0	5-6	sand, silt (SP-SM)				
						35		
	12D	35.0	2-5	Do 11D (SP-SM)				
		37.0	7-9					
								pp=Pocket
						40		Penetrometer
	13D	40.0	2-2	Brown coarse to fine sand, trace gravel, silt				reading in tsf.
		42.0	5-8	(SP-SM)				
								WC=Water Content
								in percent of dry
						45		weight.
	14D	45.0	8-13	Brown fine sand, trace silt, medium sand				
14:00		47.0	16-16	(SP-SM)		47		End of Boring at
								47'.
						50		

BORING NO. MR-6P

SHEET 2 OF —
FILE NO. 8769
SUBCODE ____

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Avenue V — PIEZOMETER NO. MR6P
LOCATION Brooklyn, N.Y.
PIEZOMETER LOCATION ____ — DATE OF INSTALLATION 3-17-98
☐ SEE SKETCH ON BACK — RES. ENG. G. Dizhan

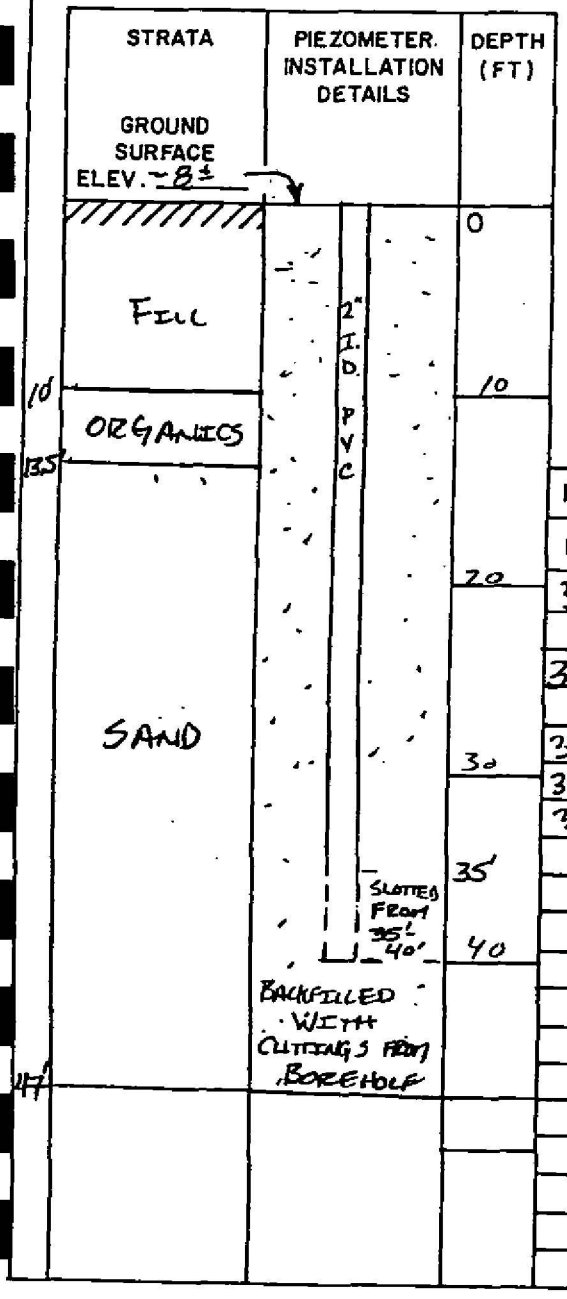
PIEZOMETER TYPE 2" ID PVC

INTAKE POINT

depth to bottom, ft = 35
depth to top, ft = 30
length, ft = 5 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = ~8±
diameter, in = 2, ft = 0.17 = 2r



READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
3-17-98	1400	5.3		
	1400	5.3		AFTER 10 SECONDS
3-18	0930	5.3		
	0930	5.3		AFTER 10 SECONDS
3/5	AM	6.1		
3/7	AM	6.2		
3/12	AM	4.7		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. 28±

PIEZOMETER NO. MR6P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-6P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 5.3
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	3" O.D. SHELBY TUBE
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	J

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-17-98	14:00	47	0	5.3	AT COMPLETION OF BORING
3-18-98	9:30	47		5.3	OVERNIGHT WATER LEVEL

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SEE SKETCH ON SHEET 2 OF LOG

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT. 35	TOP ELEV.	8±
INTAKE ELEMENT:	TYPE	PVC	OD, IN.	2-3/8	LENGTH, FT. 5	TIP ELEV.	-32±
FILTER:	MATERIAL	CUTTINGS	OD, IN.	7	LENGTH, FT. 47	BOT. ELEV.	-39±

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	47	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	1
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVE CARTER HELPERS TONY EDWARDS
REMARKS CUTTINGS FROM BOREHOLE BACKFILLED AROUND 2" I.D. PVC INSTALLED IN BOREHOLE.
RESIDENT ENGINEER G. DROHAN DATE 3-17-98

BORING NO. MR-6P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-7
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.1
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	2-3	Brown silty fine to coarse sand, some clay, trace cinders (Fill) (SM)	CONC.	0.3		Hole abandoned after crew broke water line while advancing augers to 8'.
03-23-98		2.0	1-2	Brown fine sandy silt, trace gravel (Fill) (ML)	F	5		Hole advanced with 3" I.D. hollow stem augers.
Monday	2D	2.0	1-1			7		
Sunny		4.0	1-2		O	8		4D: Top: WC=58
	3D	4.0	2-3	Brown black fine to coarse sand, some silt, trace gravel (Fill) (SM)		10		4D Bot: WC=33
		6.0	1-7					End of Boring at 8'.
	4D	6.0	1-1	Top: Soft black organic silty clay & peat, trace vegetation, fine to medium sand (OH&Pt)		15		WC=Water Content in percent of dry weight.
14:00		8.0	1-2	Bot: Soft gray organic sitly clay, some fine sand (OL)		20		
						25		
						30		
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-7
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 7.1
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC X
OTHER

CASING USED ☐ YES ☒ NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 8
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER TONY WILLIAMS HELPERS MARIO DUNCAN
REMARKS BOREHOLE ABANDONED AFTER HITTING WATER LINE.
RESIDENT ENGINEER G. DROHAN DATE 3-23-98

BORING NO. MR-7

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-8
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 6.6
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:30	1D	0.3	2/2"-2	Brown clayey fine sand, some black f-c ,		0.3		Hole advanced with
03-18-98		2.0	2-1	cinders, tr metal, misc. fill(Fill)(SC)	CONC.			3" I.D. hollow stem
Wednesday	2D	2.0	1-1	Gray coarse to fine sand, some silt, trace	F			augers.
Raining		4.0	1-1	brick, wood, cinders (Fill) (SM)		4		
	3D	4.0	1-1	Top: Soft blk org si clay, sm f sand(Fill)(OH)		5		
		6.0	1-7	Bot: Gray clayey f-m sand (Fill) (SC)				
	4D	6.0	4-3	Brown coarse to fine sand, some clay, trace	O			3D Top: WC=49
		8.0	4-3	gravel (Fill) (SC)				
	5D	8.0	4-5	Top:Dk gray org cl si, tr f sa,glass(Fill)(OL)		9		5D Top: WC=44
		10.0	5-8	Bot:Brn f-m sand, tr c sand, gvl, silt (SP-SM)		10		
	6D	10.0	3-5	Brown fine to coarse sand, trace gravel, silt				
		12.0	7-9	(SP-SM)				
						15		
	7D	15.0	7-6	Brown coarse to fine sand, some gravel,				
		17.0	5-5	trace silt (SP-SM)				
						20		
	8D	20.0	7-7	Brown fine to medium sand, trace coarse				
13:00		22.0	9-9	sand, silt (SP-SM)	S			
09:30								
03-19-98								
Thursday						25		
Raining	9D	25.0	4-4	Do 8D (SP-SM)				
		27.0	6-8					
						30		
	10D	30.0	8-8	Do 8D (SP-SM)				
		32.0	9-12					
						35		
	11D	35.0	12-14	Do 8D (SP-SM)				
		37.0	17-16					
						40		
	12D	40.0	9-9	Do 8D (SP-SM)				
11:00		42.0	13-14			42		End of Boring at
								42'.
						45		WC=Water Content
								in percent of dry
								weight.
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-8
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 6.6
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	☐ YES - ☒ NO		
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS J

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-18-98	11:00	12	10	8.5	MEASURED DURING DRILLING OPERATION.
3-19-98	10:30	22	20	8.5	HOLE LEFT OPEN OVERNIGHT.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	42	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER/TONY EDWARDS HELPERS TONY EDWARDS/NGOZI CHRISTIAN DURU
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS FROM BOREHOLE.
RESIDENT ENGINEER GERARD DROHAN DATE 3-19-98

BORING NO. MR-8

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

BORING NO. MR-7A
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.1
RES. ENGR. GERARD DROHAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00 03-25-98 Wednesday Sunny, Mild					F	5		Borehole started at 7' to clear obstructions. See Boring MR-7 for soil description from 0' to 7'. Hole advanced with 3" I.D. hollow stem augers. Groundwater level observed during drilling. 2D: Organic odor.
	1D	7.0	1-1	Soft dark brown organic silty clay (OH)		7		
		9.0	1-1		O			
	2D	10.0	2-3	Gray fine to coarse sand, some silt, trace gravel (SM)		10		
		12.0	3-3					
	3D	15.0	9-8	Gray fine to coarse sand, some gravel, trace silt (SP-SM)		15		
		17.0	9-11					
	4D	20.0	4-5	Brown fine to medium sand, trace coarse sand, gravel, silt (SP-SM)	S	20		
		22.0	7-6					
	5D	25.0	7-8	Do 4D (SP-SM)		25		
		27.0	8-9					
	6D	30.0	7-8	Brown fine to medium sand, trace coarse sand, silt, gravel (SP)		30		
13:00		32.0	9-10			32		End of Boring at 32'.
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-7A
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 7.1
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	☐ YES	☒ NO	
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
				7	WATER LEVEL OBSERVED DURING DRILLING.

PIEZOMETER INSTALLED ☐ YES ☒ NO ℄ SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-25-98

BORING NO. MR-7A

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-9P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 6.9
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:30	1D	0.3	1/2"-1	Brown silty fine to coarse sand, trace		0.3		Hole advanced with
03-20-98		2.0	2-1	cinders (Fill) (SM)	CONC.			3" I.D. hollow stem
Friday	2D	2.0	2-2	Top: Brn silt, tr f sand, veg (Fill) (ML)				augers.
Overcast		4.0	2-1	Bot: Dk gry org si cl, tr f sa, veg(Fill)(OH)				Groundwater level
	3D	4.0	3-5	Top: Brn silt, tr f sand (Fill) (ML)	F	5		measured in
		6.0	5-5	Bot: Dk gry f-c sand, sm org silt(Fill) (SM)				piezometer.
	4D	6.0	5-5	Dark gray fine to coarse sand, some silt,				
		8.0	3-3	trace cinder, glass (Fill) (SM)		8		
	5D	8.0	2-1	Blk organic clayey silt, sm fine to medium				
		10.0	1-1	sand, tr veg, glass & peat (Fill) (OL&Pt)		10		
	6D	10.0	1-WH	Top: Do 5D (Fill) (OL&Pt)	O			
		12.0	3-1	Bot:Soft gry org si cl, tr veg, f sa(Fill)(OH)				
	7U	12.0	PUSH=24"	Top: Blk f-c sand, sm org silt (Fill) (SM)				
		14.0	REC=15"	Bot: Brown peat & dark gray cinders, some				WC=129
	8U	14.0	PUSH=24"	silt, trace metal, ash, glass (Fill) (Pt&SM)		14		
		16.0	REC=21"	Top: Black fine to coarse sand, some		15		WC=106
				organic silt, cinders, trace peat, glass,				
				ceramics (Fill) (SM)				
				Bot 6": Gray fine sand, trace silt (SP-SM)	F			
						20		
	9D	20.0	3-4	Top: Gray fine sand, trace silt (SP)		21		
		22.0	7-8	Mid 6": Brown peat (Pt)		21.5		9D Mid: WC=319
				Bot: Brown fine to medium sand, trace	O			Organic layer of
				coarse sand, silt (SP-SM)				pocket at 21' depth.
						25		
	10D	25.0	4-7	Brown medium to fine sand, trace coarse	S			
		27.0	9-10	sand, silt (SP-SM)				
						30		
	11D	30.0	3-5	Brown fine to medium sand, trace coarse				
		32.0	9-8	sand, silt (SP-SM)				
						35		
	12D	35.0	8-12	Do 11D (SP-SM)				
		37.0	15-16					
						40		
	13D	40.0	5-8	Do 11D (SP-SM)				
14:00		42.0	8-11			42		End of Boring at
								42'.
						45		WC=Water Content
								in percent of dry
								weight.
						50		

SHEET 2 OF 3
FILE NO. B769
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT AVENUE V
LOCATION BROOKLYN, N.Y.
PIEZOMETER LOCATION
☐ SEE SKETCH ON BACK

PIEZOMETER NO. MR 9P
DATE OF INSTALLATION 3/20/98
RES. ENG. G. DROHAN

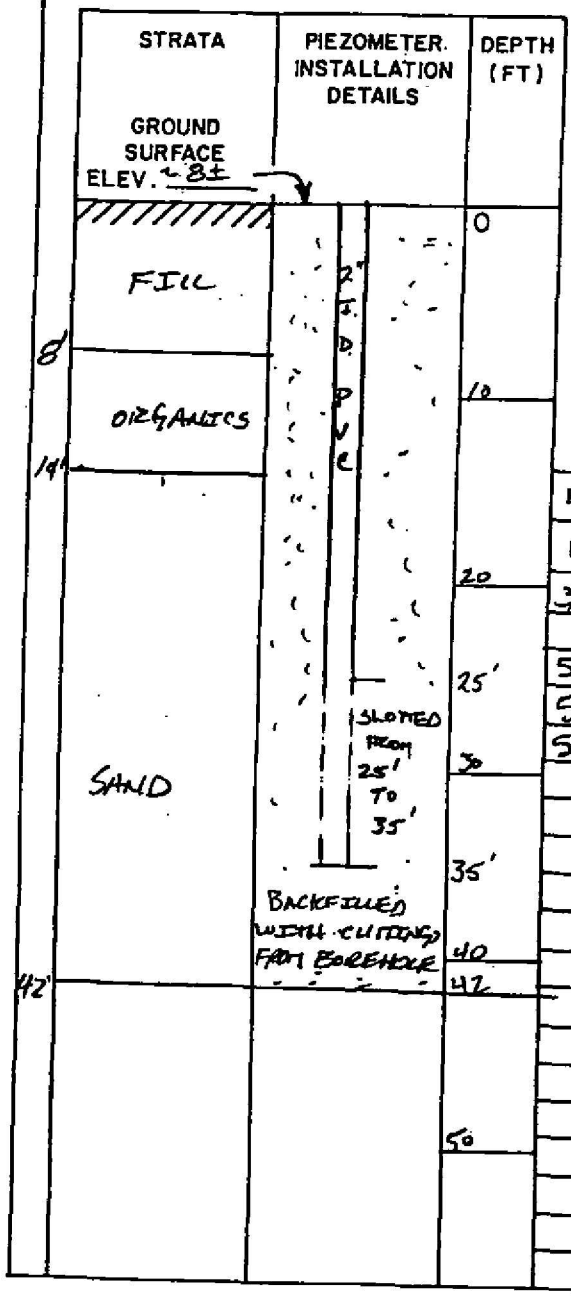
PIEZOMETER TYPE 2" I.D. PVC

INTAKE POINT

depth to bottom, ft = 35
depth to top, ft = 25
length, ft = 10 = L
diameter, in = 2, ft = 0.17 = 2r

STANDPIPE/RISER

elevation of rim, ft = ~8±
diameter, in = 2, ft = 0.17 = 2r



READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
3/20/98	1400	6.7	~1.3	
	1400	6.7	~1.3	AFTER 15 SECS.
5/5	AM	6.9		
5/7	AM	6.9		
5/12	AM	6.2		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. ~8±

PIEZOMETER NO. MR 9P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-9P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 6.9
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS J

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					SEE ATTACHED.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SHEET 2 OF THIS LOG

STANDPIPE:	TYPE PVC	ID, IN. 2	LENGTH, FT. 25	TOP ELEV. 8±
INTAKE ELEMENT:	TYPE PVC	OD, IN. 2-3/8	LENGTH, FT. 10	TIP ELEV. -27±
FILTER:	MATERIAL CUTTNGS	OD, IN. 7	LENGTH, FT. 42	BOT. ELEV. -34±

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 42	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	2
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVE CARTER HELPERS MARIO DURAN
REMARKS CUTTINGS FROM BOREHOLE BACKFILLED AROUND 2" I.D. P.V.C. INSTALLED IN BOREHOLE.
RESIDENT ENGINEER G. DROHAN DATE 3-20-98

BORING NO. MR-9P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

BORING NO. MR-9N
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.0
RES. ENGR. GERARD DROHAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
	1D	0.5	6	Top: Brn f-m sand, t r coarse sand & gvl				"6" Concrete sidewalk.
		2.0	4-8	Mid: Light brown sand, trace gravel				
	2D	2.0	6-3	Bot: Gray f-c sand, some ash & brick				45' North of MR-9P.
		4.0	2-4	Top: Do 1D, Bot				
	3D	4.0	1-2	Bot: Red brn f-m sand, some ash		5		
		6.0	2-2	Top: Do 1D, Bot				
	4D	6.0	1-2	Bot: Gray silty sand, some ash	F			Note: This boring was performed at the request of the client to obtain soil for environmental testing. All soil was delivered to the analytical laboratory. Descriptions shown based on visual classification in field only. End of Boring at 12'.
		8.0	2-2	Do 3D, Bot				
	5D	8.0	1-WH					
		10.0	1-WH	Brown gray silty sand, some ash, peat		10		
	6D	10.0	1-1					
		12.0	3-6	Top 1': Do 5D		12		
				Bot: Gray silty fine sand, trace vegetation				
						15		
						20		
						25		
						30		
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-9S
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.0
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
	1D	0.0	2-3	Top: Dark brown fine sand, some ash				6" Topsoil. 33' South of MR-9P.
		2.0	6-4	Bot: Light tan fine sand, trace ash				
	2D	2.0	1-2	Top: Light tan fine sand, trace ash				Note: This boring was performed at the request of the client to obtain soil for environmental testing. All soil was delivered to the analytical laboratory. Descriptions shown based on visual classification in field only. End of Boring at 12'.
		4.0	2-3	Bot: Red brown fine sand, trace brick				
	3D	4.0	2-7	Dark gray silty sand, trace coarse sand & gravel	F	5		
		6.0	1-3					
	4D	6.0	2-2	Top: Do 3D				
		8.0	6-4	Bot: Red brown silty sand				
	5D	8.0	3-1	Top: Gray silty fine sand				
		10.0	WH-WH	Bot: Black to gray silty sand		10		
	6D	10.0	1-WH	Top: Black to gray silt, some ash, concrete, trace brick & peat				
		12.0	1-WH	Bot: Gray silty clay, trace wood & shell		12		
						15		
						20		
						25		
						30		
						35		
						40		
						45		
						50'		

BORING NO. MR-9S

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-10
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 8.9
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:30	1D	0.0	3-7	Brown silty fine to medium sand, some				Hole advanced with
03-18-98		2.0	8-7	black cinders, trace brick (Fill) (SM)				3" I.D. hollow stem
Wednesday	2D	2.0	2-3	Do 1D (Fill) (SM)				augers.
Raining		4.0	4-9		F			
	3D	4.0	14-13	Brown silty fine to coarse sand, trace		5		
		6.0	6-6	gravel, cinders (Fill) (SM)				
	4D	6.0	14-20	Dark gray silty fine to medium sand, trace				
		8.0	16-22	gravel, organic silt pockets (Fill) (SM)		8		
	5D	8.0	5-9	Light gray fine sand, trace silt (SP)				
		10.0	10-7			10		
	6D	10.0	4-4	Do 5D (SP)				
		12.0	6-6					
						15		
	7D	15.0	3-4	Gray fine to medium sand, trace silt (SP)				
		17.0	6-9		S			
						20		
	8D	20.0	5-17	Light gray fine sand, trace silt (SP)				
13:30		22.0	24-28					
11:30								
03-19-98								
Thursday						25		
Raining	9D	25.0	8-19	Do 8D (SP)				
		27.0	19-16					
						30		
	10D	30.0	6-8	Brown fine to medium sand, trace silt				
13:30		32.0	12-12	(SP-SM)		32		End of Boring at
								32'.
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-10
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 8.9
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	☐ YES ☒ NO		
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS J

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-18-98	11:00	12	10	10	MEASURED DURING DRILLING OPERATION.
3-19-98	10:30	22	20	10	HOLE LEFT OPEN OVERNIGHT.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER/TONY EDWARDS HELPERS TONY EDWARDS/MARIO DURAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS FROM BOREHOLE.
RESIDENT ENGINEER GERARD DROHAN DATE 3-19-98

BORING NO. MR-10

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

BORING NO. MR-11
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.7
RES. ENGR. GERARD DROHAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	6/2"-10	Brown silty fine to medium sand, trace		0.3		Hole advanced with
03-23-98		2.0	6-8	coarse sand, gravel (Fill) (SM)	CONC.			3" I.D. hollow stem
Monday	2D	2.0	6-6	Brown fine to medium sand, some silt,				auger. Groundwater
Sunny		4.0	4-10	gravel, tr coarse sand, concrete (Fill) (SM)				level observed
	3D	4.0	30-23	Brown coarse to fine sand, some silt, trace	F	5		during drilling.
		6.0	9-8	brick, ceramics, clay pockets (Fill) (SM)				
	4D	6.0	3-4	Brown fine to medium sand, trace silt (Fill)				1" Layer of soft
		8.0	3-3	(SP-SM)				black organic silty
	5D	8.0	3-3	Top: Bm si f-c sand, tr gvl, veg (Fill) (SM)		9		clay.
		10.0	5-5	Bot: Bm gray f-m sand, tr si, c sa(SP-SM)		10		5D: Petroleum odor.
	6D	10.0	3-4	Gray fine to medium sand, trace silt, coarse				
		12.0	4-5	sand (SP-SM)				
						15		
	7D	15.0	7-10	Gray fine to medium sand, trace silt				
		17.0	13-13	(SP-SM)				
					S			
						20		
	8D	20.0	11-16	Gray fine sand, trace silt (SP)				
		22.0	26-24					
						25		
	9D	25.0	5-5	Top: Gray fine to coarse sand, trace gravel,				
		27.0	8-9	silt (SP-SM)				
				Bot 4": Brown fine to medium sand, trace				
				silt (SP-SM)				
						30		
	10D	30.0	6-10	Brown fine to medium sand, trace silt				
11:00		32.0	13-14	(SP-SM)		32		End of Boring at
								32'.
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-11
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 7.7
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC X
OTHER

CASING USED [ ] YES [X] NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-23-98	-	-	-	7	WATER LEVEL OBSERVED DURING DRILLING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON SHEET #2

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 32
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-23-98

BORING NO. MR-11

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-12P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 6.7
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:00	1D	0.5	2	Brown fine to coarse sand, trace gravel,		0.5		Hole advanced with
03-23-98		2.0	3-3	concrete, silt (Fill) (SP-SM)	CONC.			3" I.D. hollow stem
Monday	2D	2.0	3-4	Brown fine to medium sand trace silt (Fill)				augers.
Sunny		4.0	4-3	(SP-SM)				
	3D	4.0	5-5	Brown fine to medium sand, some gravel,		5		
		6.0	5-5	trace silt (Fill) (SP-SM)				
	4D	6.0	5-5	Gray fine to medium sand, trace silt (Fill)	F			
		8.0	7-8	(SP-SM)				
	5D	8.0	4-6	Do 4D (Fill) (SP-SM)				
14:30		10.0	6-5			10		
11:30	6D	10.0	1-2	Brown fine to medium sand, trace silt (Fill)				
03-25-98		12.0	2-2	(SP)				
Wednesday								
Mild						13.5		
						15		
	7D	15.0	2-7	Red gray coarse to fine sand, some gravel,				
		17.0	9-11	silt, trace silt (SP)				
						20		
	8D	20.0	10-13	Gray fine sand, trace silt, gravel (SP-SM)	S			
		22.0	10-11					
						25		
	9D	25.0	4-6	Brown fine to medium sand, trace silt				
		27.0	6-8	(SP-SM)				
						30		
	10D	30.0	6-8	Brown fine to medium sand, trace coarse				
14:00		32.0	9-8	sand, silt (SP-SM)		32		End of Boring at
								32'.
						35		
						40		
						45		
						50		

BORING NO. MR-12P

SHEET 2 OF 3
FILE NO. 8769
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Avenue V — PIEZOMETER NO. MR12P
LOCATION Brooklyn, N.Y.
PIEZOMETER LOCATION In Boring MR12P — DATE OF INSTALLATION 3-25-98
☐ SEE SKETCH ON BACK — RES. ENG. G. Drohan

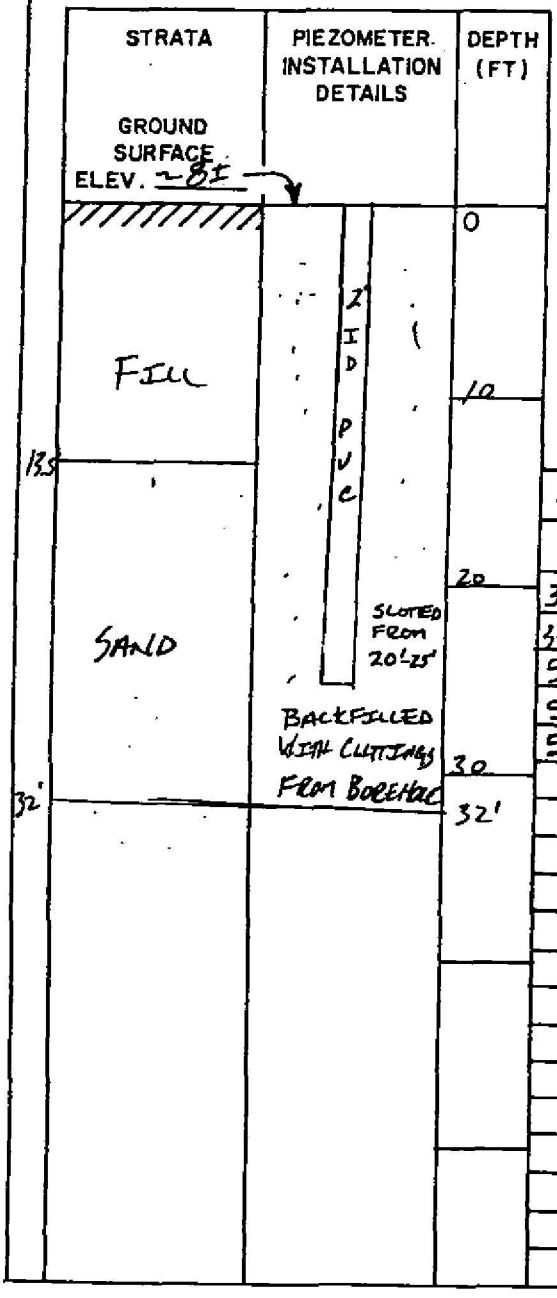
PIEZOMETER TYPE 2 ID PVC

INTAKE POINT

depth to bottom, ft = 25
depth to top, ft = 20
length, ft = 5 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = Approx 8±
diameter, in = 2, ft = 0.17 = 2r



READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
3-26-98	1000	6.6	1.4	
3-26-98	1000	6.6	1.4	AFTER 10 SEES
5/5	AM	6.7		
5/7	AM	6.7		
5/12	AM	6.0		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. ~8±

PIEZOMETER NO. MR 12P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-11
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.7
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	6/2"-10	Brown silty fine to medium sand, trace		0.3		Hole advanced with
03-23-98		2.0	6-8	coarse sand, gravel (Fill) (SM)	CONC.			3" I.D. hollow stem
Monday	2D	2.0	6-6	Brown fine to medium sand, some silt,				auger. Groundwater
Sunny		4.0	4-10	gravel, tr coarse sand, concrete (Fill) (SM)				level observed
	3D	4.0	30-23	Brown coarse to fine sand, some silt, trace	F	5		during drilling.
		6.0	9-8	brick, ceramics, clay pockets (Fill) (SM)				
	4D	6.0	3-4	Brown fine to medium sand, trace silt (Fill)				1" Layer of soft
		8.0	3-3	(SP-SM)				black organic silty
	5D	8.0	3-3	Top: Brn si f-c sand, tr gvl, veg (Fill) (SM)		9		clay.
		10.0	5-5	Bot: Brn gray f-m sand, tr si, c sa(SP-SM)		10		5D: Petroleum odor.
	6D	10.0	3-4	Gray fine to medium sand, trace silt, coarse				
		12.0	4-5	sand (SP-SM)				
						15		
	7D	15.0	7-10	Gray fine to medium sand, trace silt				
		17.0	13-13	(SP-SM)				
					S			
						20		
	8D	20.0	11-16	Gray fine sand, trace silt (SP)				
		22.0	26-24					
						25		
	9D	25.0	5-5	Top: Gray fine to coarse sand, trace gravel,				
		27.0	8-9	silt (SP-SM)				
				Bot 4": Brown fine to medium sand, trace				
				silt (SP-SM)				
						30		
	10D	30.0	6-10	Brown fine to medium sand, trace silt				
11:00		32.0	13-14	(SP-SM)		32		End of Boring at
								32'.
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-12P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 6.7
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					SEE ATTACHED.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT.	20	TOP ELEV.	8±
INTAKE ELEMENT:	TYPE	PVC	OD, IN.	2-3/8	LENGTH, FT.	5	TIP ELEV.	-17±
FILTER:	MATERIAL	CUTTINGS	OD, IN.	7	LENGTH, FT.	32	BOT. ELEV.	-24±

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-25-98

BORING NO. MR-12P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-13
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 6.5
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.5	4	Brown fine to medium sand, some silt, trace		0.5		Hole advanced with
03-24-98		2.0	4-6	coarse sand, brick (Fill) (SM)	CONC.			3" I.D. hollow stem
Thursday	2D	2.0	13-5	Do 1D (Fill) (SM)				augers.
Sunny		4.0	6-6					Groundwater level
	3D	4.0	11-3	Brown fine to medium sand, some gravel,		5		observed during
		6.0	2-4	trace silt (Fill) (SP-SM)				drilling.
	4D	6.0	2-1	Gray fine to medium sand, some silt, trace				
		8.0	3-4	vegetation (Fill) (SM)				4D: 1" of Brown
	5D	8.0	3-3	Brown coarse to fine sand, trace gravel,	F			peat. Petroleum odor
		10.0	3-4	brick, silt (Fill) (SP-SM)		10		
	6D	10.0	2-3	Do 5D (Fill) (SP-SM)				
		12.0	4-5					
						15		
	7D	15.0	11-13	Gray red coarse to fine sand, trace gravel,				
		17.0	17-20	silt (Fill) (SP-SM)				
						18.5		
						20		
	8D	20.0	11-21	Gray fine sand, trace silt (SP-SM)				
		22.0	25-25					
					S			
						25		
	9D	25.0	9-8	Brown medium to fine sand, trace coarse				
		27.0	10-10	sand, gravel, silt (SP-SM)				
						30		
	10D	30.0	7-9	Brown fine to medium sand, trace coarse				
11:00		32.0	8-12	sand, silt (SP-SM)		32		End of Boring at
								32'.
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-13
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 6.5
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	☐ YES	☒ NO	
TRUCK	X	MECHANICAL		DIA., IN.		DEPTH, FT. FROM	TO
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-24-98	-	-	-	8.5	WATER LEVEL OBSERVED DURING DRILLING

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-24-98

BORING NO. MR-13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-14
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 6.8
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:30	1D	0.5	2	Brown black fine to coarse sand, some silt, gravel (Fill) (SM)	A	0.5		Hole advanced with 3" I.D. hollow stem augers. Groundwater level observed during drilling. Obstruction from 6.9' to 7.5'.
03-24-98		2.0	2-14		CONC.			
Thursday	2D	2.0	4-3	Gravel & concrete (Fill)				
Sunny		4.0	2-2					
	3D	4.0	3-2	Brown fine to medium sand, some silt, trace		5		
		6.0	1-1	gravel, wood (Fill) (SM)				
	4D	6.0	13-50/5"	Brown coarse to fine sand, some gravel, silt				
		6.9		(Fill) (SM)				
	5D	8.0	5-3	Brown fine to coarse sand, trace silt, gravel	F			
		10.0	4-5	(Fill) (SP-SM)		10		
	6D	10.0	4-6	Do 5D (Fill) (SP-SM)				
		12.0	6-7					
						15		
	7D	15.0	9-11	Do 5D (Fill) (SP-SM)				
		17.0	16-19					
						18.5		
						20		
	8D	20.0	17-25	Gray fine sand, trace silt (SP)				
		22.0	25-22					
					S	25		
	9D	25.0	7-8	Brown fine to medium sand, trace coarse				
		27.0	8-9	sand, silt (SP-SM)				
						30		
	10D	30.0	5-5	Do 9D (SP-SM)				
13:30		32.0	7-10			32		End of Boring at 32'.
						35		
						40		
						45		
						50		

BORING NO. MR-14

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-14
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 6.8
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC x
OTHER

CASING USED [ ] YES [X] NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-24-98	-	-	-	6	WATER LEVEL OBSERVED DURING DRILLING

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 32
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-24-98

BORING NO. MR-14

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-15P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 7.7
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	3/2"-2	Brown fine to medium sand, trace silt, black		0.3		Hole advanced with
03-25-98		2.0	2-3	cinders (Fill) (SP-SM)	CONC.			3" I.D. hollow stem
Vednesday	2D	2.0	2-2	Brown silty fine to medium sand, trace				augers.
Sunny		4.0	4-6	gravel (Fill) (SM)				
	3D	4.0	3-3	Brown fine to medium sand, trace silt,		5		
		6.0	4-5	gravel (Fill) (SP-SM)	F			
	4D	6.0	2-3	Do 3D (Fill) (SP-SM)				
		8.0	4-3					
	5D	8.0	5-6	Do 3D (Fill) (SP-SM)				
		10.0	6-8			10		
	6D	10.0	3-5	Do 3D, trace coarse sand (Fill) (SP-SM)				
		12.0	6-7					
						13.5		
						15		
	7D	15.0	10-13	Brown fine to medium sand, trace coarse				
		17.0	16-16	sand, gravel, silt (SP-SM)				
						20		
	8D	20.0	10-13	Gray medium to fine sand, trace silt, coarse	S			
		22.0	10-11	sand, gravel (SP-SM)				
						25		
	9D	25.0	4-6	Brown medium to fine sand, trace silt,				
		27.0	6-8	coarse sand, gravel (SP)				
						30		
	10D	30.0	6-8	Do 9D (SP)				
11:00		32.0	9-8			32		End of Boring at 32'.
						35		
						40		
						45		
						50		

BORING NO. MR-15P

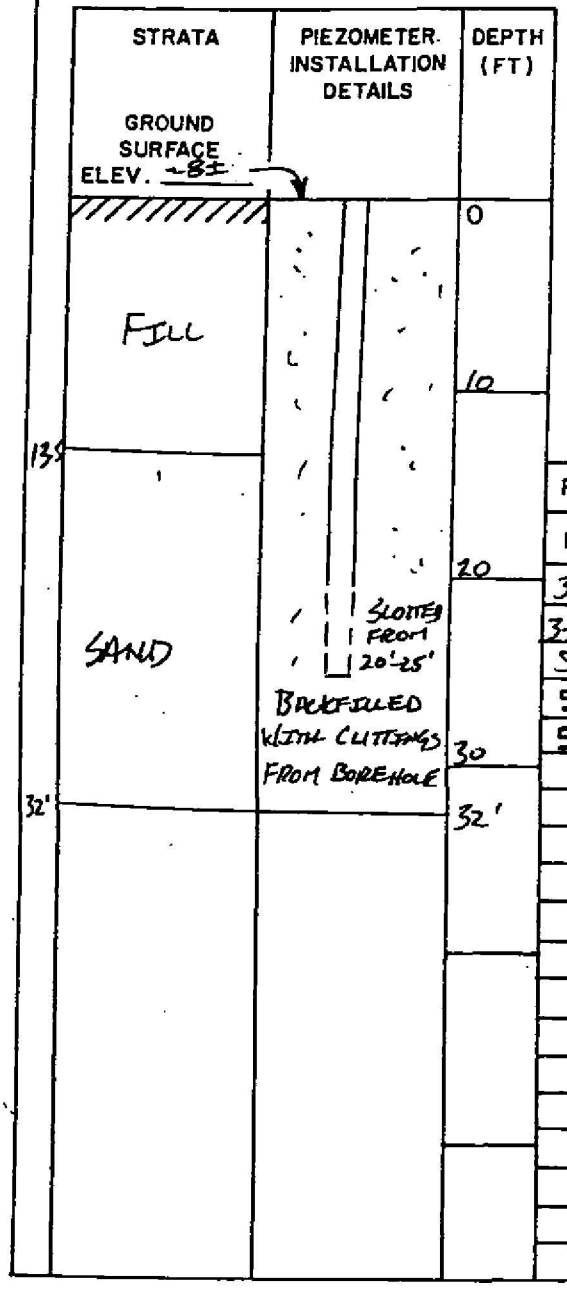
SHEET 1 OF 1
FILE NO. 8769
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Avenue V — PIEZOMETER NO. MR 15P
LOCATION Brooklyn, N.Y.
PIEZOMETER LOCATION In Boring MR 15P — DATE OF INSTALLATION 3-25-98
☐ SEE SKETCH ON BACK — RES. ENG. G. Drohan

PIEZOMETER TYPE 2 ID PVC



INTAKE POINT

depth to bottom, ft = 25
depth to top, ft = 20
length, ft = 5 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = Approx. 8±
diameter, in = 2, ft = 0.17 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
3-26-98	1015	7.5	0.5	
3-26-98	1015	7.5	0.5	AFTER 10 SECS.
5/5	AM	7.5		
5/7	AM	7.6		
5/12	AM	6.7		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. ~8±

PIEZOMETER NO. MR 15P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-15P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 7.7
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					SEE ATTACHED.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SHEET #2

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT. 20	TOP ELEV.	8±
INTAKE ELEMENT:	TYPE	PVC	OD, IN.	2-3/8	LENGTH, FT. 5	TIP ELEV.	-17±
FILTER:	MATERIAL	CUTTINGS	OD, IN.	7	LENGTH, FT. 32	BOT. ELEV.	-17±

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-25-98

BORING NO. MR-15P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-16
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 7.6
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	12/2"-6	Brown fine to medium sand, some silt, trace		0.3		Hole advanced with
03-26-98		2.0	5-5	gravel (Fill) (SM)	CONC.			3" I.D. hollow stem
Thursday	2D	2.0	4-4	Brown fine sand, trace silt (Fill) (SP-SM)				augers.
Sunny		4.0	4-6					Groundwater level
	3D	4.0	4-5	Do 2D (Fill) (SP-SM)		5		observed during
		6.0	5-7					drilling.
	4D	6.0	4-3	Brown fine to medium snad, trace silt (Fill)	F	7		
		8.0	3-4	(SP)				
	5D	8.0	4-3	Do 4D (Fill) (SP)				
		10.0	4-5			10		
	6D	10.0	2-3	Do 4D (Fill) (SP)				
		12.0	6-7					
						13.5		
						15		
	7D	15.0	15-19	Brown coarse to fine sand, some gravel,				
		17.0	20-21	trace silt (SP-SM)				
						20		
	8D	20.0	5-8	Gray fine to medium sand, trace silt				
		22.0	8-6	(SP-SM)				
						25		
	9D	25.0	1-2	Dark gray coarse to fine sand, trace gravel,	S			
		27.0	4-5	silt (SP)				
						30		
	10D	30.0	4-4	Do 9D (SP)				
		32.0	7-8					
						35		
	11D	35.0	3-3	Do 9D (SP)				
		37.0	4-6					
						40		
	12D	40.0	4-5	Dark gray fine to medium sand, trace				
		42.0	6-8	coarse sand, gravel, silt (SP-SM)				
						45		
	13D	45.0	3-5	Dark gray fine to medium sand, trace				
13:30		47.0	6-9	coarse sand, gravel, silt (SP-SM)		47		End of Boring at
								47'.
						50		

BORING NO. MR-16

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-16
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 7.6
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	☐ YES	☒ NO	
TRUCK	X	MECHANICAL		DIA., IN.		DEPTH, FT. FROM	TO
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-26-98	-	-	-	7	WATER LEVEL OBSERVED DURING DRILLING.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 47	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-26-98

BORING NO. MR-16

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-17
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 7.9
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.3	6/2"-7	Brown fine sand, trace silt (SP)		0.3		Hole advanced with
03-27-98		2.0	6-7		CONC.			3" I.D. hollow stem
Friday	2D	2.0	4-4	Do 1D (Fill) (SP)				augers.
Sunny		4.0	5-5					Groundwater level
	3D	4.0	5-4	Do 1D (Fill) (SP)		5		observed during
		6.0	4-6					drilling.
	4D	6.0	4-4	Brown fine to medium sand, trace silt (Fill)	F	7		
		8.0	3-4	(SP)				
	5D	8.0	6-6	Do 4D (Fill) (SP)				
		10.0	6-6			10		
	6D	10.0	3-4	Do 4D (Fill) (SP)				
		12.0	6-8					
						13.5		
	7D	15.0	9-15	Gray fine to medium sand, trace silt, coarse		15		
		17.0	12-11	sand, gravel (SP-SM)				
						20		
	8D	20.0	4-5	Gray fine to medium sand, trace silt, coarse				
		22.0	6-7	sand, gravel (SP-SM)	S			
						25		
	9D	25.0	3-3	Gray coarse to fine sand, trace silt, gravel				
		27.0	5-10	(SP-SM)				
						30		
	10D	30.0	2-7	Gray fine to medium sand, trace silt				2" Layer of brown
		32.0	7-6	(SP-SM)				silt.
						33.5		
	11D	35.0	4-5	Brown peat trace vegetation (Pt)		35		11D: WC=180
		37.0	8-9		O			2" Layer of gray
	12U	37.0	PUSH=27"	Top: Medium brown organic clayey silt,				fine sand.
		39.3	REC=27"	some fine sand, trace peat (OL)				12U:pp=3.0, WC=44
				Bot:Gray f-m sand, tr silt, c sand (SP-SM)		39		
	13D	40.0	1-1	Gray fine to coarse sand, trace silt, gravel		40		
		42.0	2-3	(SP-SM)				
					S	45		
	14D	45.0	4-7	Gray fine to medium sand, trace silt				
		47.0	9-12	(SP-SM)				
						50		
	15D	50.0	7-9	Gray fine to medium sand, trace silt				
		52.0	11-10	(SP-SM)				

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-17
SHEET 2 OF 3
FILE NO. 8769
SURFACE ELEV. 7.9
RES. ENGR. GERARD DROHAN

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 03-27-98 Friday Sunny								
						55		
	16D	55.0	6-11	Brown fine to medium sand, trace coarse sand, silt (SP-SM)				
		57.0	13-13					
					S	60		
	17D	60.0	6-9	Brown fine to medium sand, trace silt (SP-SM)				
		62.0	15-15					
						65		
	18D	65.0	8-10	Brown fine sand, trace silt, medium to coarse sand (SP-SM)				
		67.0	11-12					
						70		
	19D	70.0	4-10	Brown fine to medium sand, trace coarse sand, gravel, silt (SP-SM)				
14:00		72.0	17-19			72		End of Boring at 72'.
						75		pp=Pocket Penetrometer reading in tsf.
								WC=Water Content in percent of dry weight.
						80		
						85		
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK
BORING LOCATION: SEE PLAN

BORING NO. MR-17
SHEET 3 OF 3
FILE NO. 8769
SURFACE ELEV. 7.9
DATUM BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC X
OTHER

CASING USED ☐ YES ☒ NO
DIA., IN.: DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
3-27-98	-	-	-	7	WATER LEVEL OBSERVED DURING DRILLING.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 72
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 3-27-98

BORING NO. MR-17

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

BORING NO. MR-18P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 8.7
RES. ENGR. GERARD DROHAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:30	1D	0.5	3	Brown fine sand, trace silt (Fill) (SP)		0.5		Hole advanced
04-01-98		2.0	5-5		CONC.			with 3" I.D. hollow
Wednesday	2D	2.0	4-4	Do 1D (Fill) (SP)				stem augers.
Overcast		4.0	5-6					
	3D	4.0	5-7	Brown fine to medium sand, trace silt (Fill)		5		
		6.0	9-9	(SP)				
	4D	6.0	5-4	Do 3D (Fill) (SP)	F			
		8.0	5-7					
	5D	8.0	4-4	Do 3D (Fill) (SP)				
		10.0	4-5			10		
	6D	10.0	4-3	Do 3D (Fill) (SP)				
		12.0	5-7					
						13.5		
	7D	15.0	6-10	Brown fine to coarse sand, some gravel,		15		
		17.0	10-10	trace silt (SP-SM)				
						20		
	8D	20.0	8-9	Gray fine to medium sand, trace coarse				
		22.0	9-11	sand, gravel, silt (SP-SM)				
						25		
	9D	25.0	6-7	Do 8D (SP-SM)				
		27.0	6-8					
						30		
	10D	30.0	7-7	Do 8D (SP-SM)				
		32.0	9-10					
					S			
	11D	35.0	9-9	Brown fine to medium sand, trace coarse		35		
		37.0	11-11	sand, silt (SP-SM)				
						40		
	12D	40.0	5-6	Brown fine to coarse sand, trace gravel, silt				
13:30		42.0	6-9	(SP-SM)				
09:00								
04-02-98						45		
Thursday								
Sunny	13D	45.0	4-7	Brown fine to medium sand, trace silt				
		47.0	11-16	(SP-SM)				
						50		
	14D	50.0	7-10	Brown fine to medium sand, trace coarse				
:00		52.0	16-17	sand, gravel, silt (SP-SM)		52		End of Boring at 52'.

BORING NO. MR-18P

SHEET 1 OF 2
FILE NO. 8769
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Avenue V — PIEZOMETER NO. MR18P
LOCATION Brooklyn, N.Y.
PIEZOMETER LOCATION In Boring MR18P — DATE OF INSTALLATION 4-2-98
☐ SEE SKETCH ON BACK — RES. ENG. G. Drohan

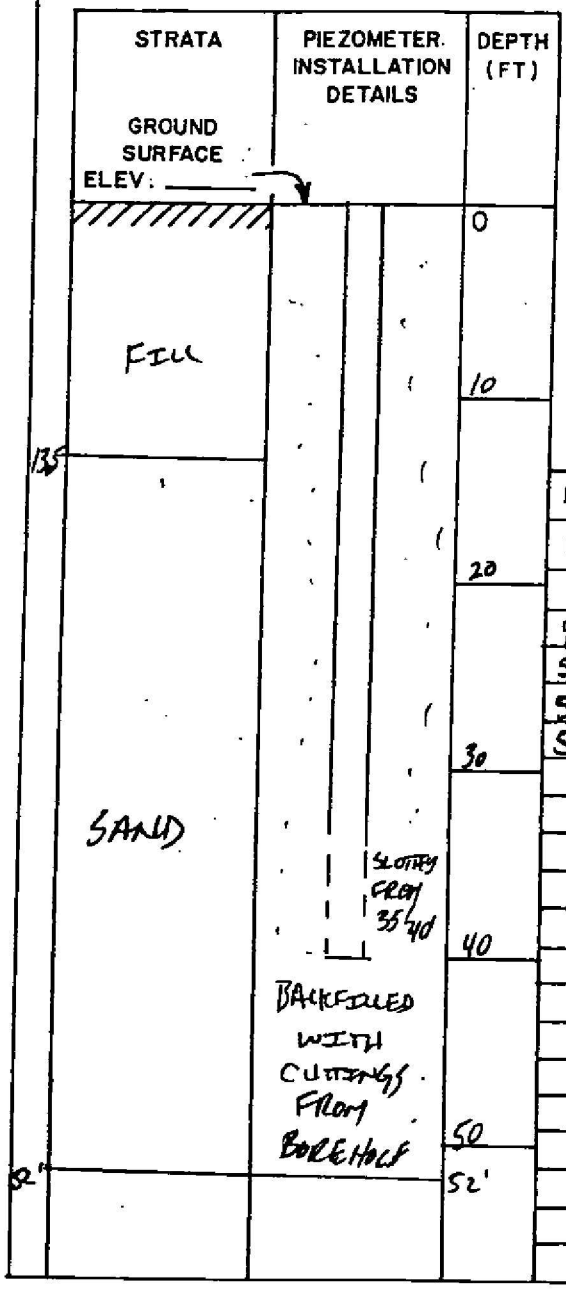
PIEZOMETER TYPE 2" I.D. PVC

INTAKE POINT

depth to bottom, ft = 40
depth to top, ft = 35
length, ft = 5 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = Approx. 8±
diameter, in = 2, ft = 0.17 = 2r



READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
4-3-98	0930	7.8	0.2	
4-7-98	0930	7.8	0.2	AFTER 10 SECS.
5/5	AM	8.3		
5/7	AM	8.3		
5/12	AM	7.4		

Sand Bentonite Gravel Grout

GROUND SURFACE ELEV. ~8±

PIEZOMETER NO. MR18P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-18P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 8.7
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC
OTHER

CASING USED [ ] YES [X] NO
DIA., IN. ____ DEPTH, FT. FROM ____ TO ____
DIA., IN. ____ DEPTH, FT. FROM ____ TO ____
DIA., IN. ____ DEPTH, FT. FROM ____ TO ____

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. ____ AVERAGE FALL, IN. ____
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					SEE ATTACHED.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SHEET 2

STANDPIPE: TYPE PVC ID, IN. 2 LENGTH, FT. 35 TOP ELEV. 8±
INTAKE ELEMENT: TYPE PVC OD, IN. 2-3/8 LENGTH, FT. 5 TIP ELEV. -32±
FILTER: MATERIAL CUTTINGS OD, IN. 7 LENGTH, FT. 52 BOT. ELEV. -44±

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 52
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 4-2-98

BORING NO. MR-18P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

BORING NO. MR-19
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 8.7
RES. ENGR. GERARD DROHAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:30	1D	0.0	2-3	Brown fine sand, trace medium sand, silt				Hole advanced with
04-02-98		2.0	5-5	(Fill) (SP)				3" I.D. hollow stem
Thursday	2D	2.0	4-5	Do 1D (Fill) (SP)				augers. Groundwater
Sunny		4.0	7-7					level observed
	3D	4.0	5-5	Do 1D (Fill) (SP)		5		during drilling
		6.0	5-6		F			operations.
	4D	6.0	4-3	Do 1D (Fill) (SP)				
		8.0	3-4					
	5D	8.0	3-2	Do 1D (Fill) (SP)		8.5		
		10.0	3-3			10		
	6D	10.0	2-3	Do 1D (Fill) (SP)				
		12.0	4-4					
						13.5		
						15		
	7D	15.0	6-8	Brown coarse to fine sand, some gravel,				
		17.0	11-14	trace silt (SP-SM)				
						20		
	8D	20.0	6-9	Brown fine to medium sand, trace coarse				
		22.0	15-17	sand, gravel, silt (SP-SM)				
						25		
	9D	25.0	5-6	Brown fine to medium sand, trace coarse				
		27.0	9-11	sand, silt (SP-SM)				
					S	30		
	10D	30.0	7-9	Brown fine to medium sand, trace silt,				
13:30		32.0	11-10	coarse sand (SP-SM)				
09:00								
04-03-98								
Friday						35		
Sunny	11D	35.0	8-13	Do 10D (SP-SM)				
		37.0	18-19					
						40		
	12D	40.0	7-18	Brown fine to medium sand, trace gravel,				
		42.0	16-21	silt (SP-SM)				
						45		
	13D	45.0	6-10	Brown fine sand, trace silt (SP-SM)				
		47.0	13-18					
						50		
	14D	50.0	8-11	Brown fine to medium sand, trace silt				End of Boring at
12:00		52.0	10-11	(SP-SM)		52		52'.

BORING NO. MR-19

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-19
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 8.7
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	X	MECHANICAL		DIA., IN.		DEPTH, FT. FROM	TO
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D. HOLLOW STEM

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
4-3-98	-	-	-	8.5	WATER LEVEL OBSERVED DURING DRILLING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	52	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS MARIO DUNCAN
REMARKS BOREHOLE BACKFILLED WITH CUTTINGS.
RESIDENT ENGINEER G. DROHAN DATE 4-3-98

BORING NO. MR-19

SHEET NO. 1 OF 1

FILE 8769

MADE BY CJM DATE 6/17/98

CHECK BY ____ DATE ____

MUESER RUTLEDGE CONSULTING ENGINEERS

CLASSIFICATION OF DRY SAMPLES

PROJECT Avenue V

BORING NUMBER	SAMPLE NUMBER	DEPTH FROM	DEPTH TO	BLOWS/6"	W.C. %	DESCRIPTION AND REMARKS
MR-20	1D	0.0	2.0	3-3 5-6		Brown f-m sand, trace silt, brick, shells (FILL) (SP-SM)
	2D	2.0	4.0	3-3 2-3		Do 1D (FILL) (SP-SM)
	3D	4.0	6.0	3-3 4-5		Do 1D (FILL) (SP-SM)
	4D	6.0	8.0	4-3 4-6		Brown f-m sand, trace silt (FILL) (SP-SM)
	5D	8.0	10.0	5-5 6-8		Do 4D (FILL) (SP-SM)
	6D	10.0	11.5	3-3 3		Do 4D (FILL) (SP-SM)
	7D	15.0	16.5	9-14 10		Brown gravelly f-c sand, trace silt (SP-SM)
	8D	20.0	21.5	11-14 16		Do 7D (SP-SM)
	9D	25.0	26.5	2-6 5		Brown f-m sand, trace silt, gravel (SP-SM)
	10D	30.0	31.5	3-5 7		Brown f-c sand, some gravel, trace silt (SP-SM)

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-21P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 11.9
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:15	1D	0.0	2-4	Top 5": Topsoil				
04-30-98		2.0	7-8	Bot: 18': Brn f sand, tr silt, brick (Fill) (SP)				
Thursday	2D	2.0	6-7	Brown fine sand, trace coarse sand, gravel,				
Cloudy		4.0	5-4	silt (Fill) (SP)				
60°F	3D	4.0	2-3	Dark brown fine sand, trace brick, gravel,		5		
		6.0	2-WH	silt (Fill) (SP-SM)	F			
	4D	6.0	1-2	Dark brown fine sand, trace wood, silt (Fill)				
		8.0	1-1	(SP)				
	5D	8.0	1-2	Light brown medium to fine sand, trace				
		10.0	3-7	gravel, silt, coarse sand (Fill) (SP)		10		
	6D	10.0	4-4	Do 5D (Fill) (SP)				Water at 11'.
		12.0	5-7			12		
						15		
	7D	15.0	12-7	Brown coarse to fine sandy gravel, trace silt				
		17.0	8-8	(GP)				
						20		
	8D	20.0	13-19	Brown coarse to fine sand, some gravel,				
		22.0	24-30	trace silt (SP)				
					S			
						25		
	9D	25.0	11-10	Top 3": Brown fine to coarse sand, trace				
		27.0	9-12	silt (SP)				
				Bot: Red brown fine to medium sand, trace				
				silt (SP-SM)				
						30		
	10D	30.0	5-5	Brown fine to medium sand, trace gravel,				
		32.0	8-11	coarse sand, silt (SP-SM)				
						35		
	11D	35.0	3-3	Brown fine to medium sand, trace coarse				
15:00		37.0	5-9	sand, gravel, silt (SP-SM)		37		End of Boring at 37'.
						40		
						45		
						50		

BORING NO. MR-21P

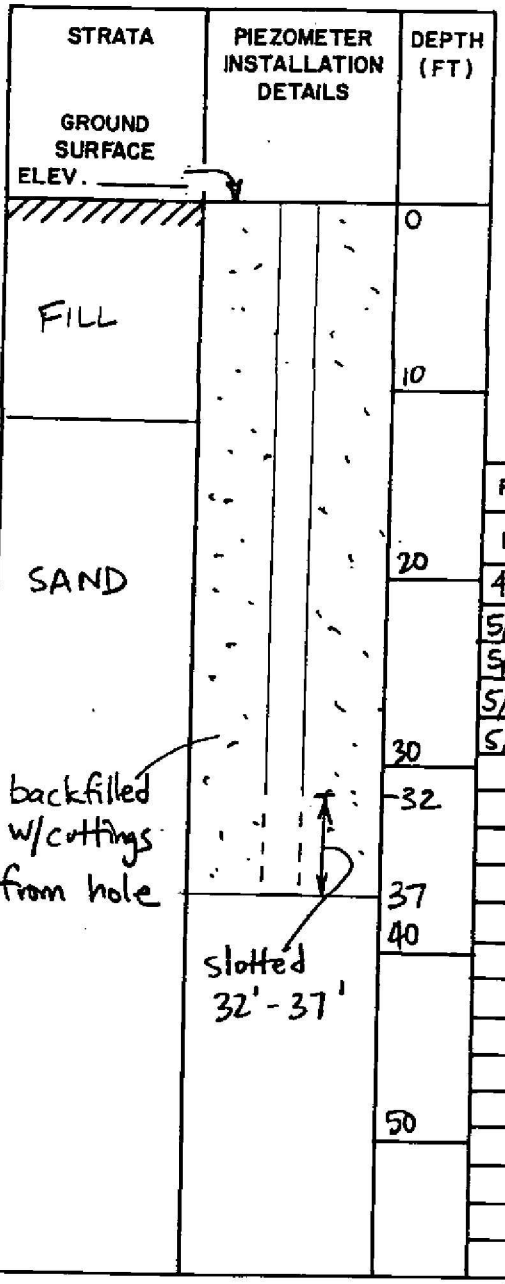
MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT AVENUE V
LOCATION BROOKLYN, NY
PIEZOMETER LOCATION
☐ SEE SKETCH ON BACK

PIEZOMETER NO. MR 21P
DATE OF INSTALLATION 4/30/98
RES. ENG. C. CASCIO

PIEZOMETER TYPE 2" I.D. PVC



INTAKE POINT

depth to bottom, ft = 37
depth to top, ft = 32
length, ft = 5 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft =
diameter, in = 2, ft = 0.17 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
4/30/98	1425	11.4		
5/6/98	1129	11.4		
5/8/98	NR	11.4		
5/11/98	AM	10.9		
5/12/98	AM	10.5		

NR = NOT RECORDED

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV.

PIEZOMETER NO. MR-21P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-21P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 11.9
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	CME	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 5" DIA.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
4-30-98	13:30	15		11	AUGER BEING USED.
4-30-98	14:25	37		11.4	PVC WITH SCREEN PLACED TO 37'.
5-4-98	11:07	37		11.4	WATER METER USED.
5-6-98	11:29	37		11.4	PIEZOMETER READING.
5-11-98		37		10.9	PIEZOMETER READING.
5-12-98		37		10.5	PIEZOMETER READING.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT. 32	TOP ELEV.	
INTAKE ELEMENT:	TYPE	PVC	OD, IN.	2-1/4	LENGTH, FT. 5	TIP ELEV.	37
FILTER:	MATERIAL	CUTTINGS	OD, IN.	2-3/8	LENGTH, FT. 37	BOT. ELEV.	

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 37	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS DAILB. BISSON
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 4-30-98

BORING NO. MR-21P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-23
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 12.8
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:26	1D	0.0	1-2	Top1': Topsoil				
05-03-98		2.0	3-5	Bot: Light bronw fine to medium sand,				
Sunday	2D	2.0	3-4	trace root, silt, brick (Fill) (SP)				
Cloudy		4.0	5-5	Light brown f-m sand, trace silt (Fill) (SP)				
60°F	3D	4.0	3-4	Do 2D (Fill) (SP)		5		
		6.0	4-4					
	4D	6.0	3-2	Do 2D (Fill) (SP)				
		8.0	3-3					
	5D	8.0	2-2	Do 2D (Fill) (SP)				
		10.0	2-3			10		
	6D	10.0	7-9	Brown fine to medium sand & brick &	F			
		12.0	9-10	gravel, trace silt, clay pockets (Fill)				
				(SP-SM)&(GP-GM)				
						15		
	7D	15.0	5-8	Brown fine to coarse sand, some gravel,				
		17.0	9-13	trace silt (Fill) (SP-SM)				
						20		
	8D	20.0	3-7	Brown fine to medium sand, some gravel,				
		22.0	11-13	trace coarse sand, silt (Fill) (SP-SM)				
						25		
	9D	25.0	9-14	Brown fine to medium sand, trace coarse				
		27.0	18-20	sand, silt (SP-SM)	S			
						30		
	10D	30.0	16-22	Brown fine to coarse sand, trace gravel, silt				
14:49		32.0	24-19	(SP-SM)		32		End of Boring at 32'.
						35		
						40		
						45		
						50		

BORING NO. MR-23

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-23
SHEET 2 **OF** 2

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

FILE NO. 8769
SURFACE ELEV. 12.8
DATUM BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	CME	MECHANICAL		DIA., IN.		DEPTH, FT. FROM	TO
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 5" DIA.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVE CARTER HELPERS DHILB BISSON
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 5-3-98

BORING NO. MR-23

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-25P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 14.4
RES. ENGR. C. CASCIO

OJECT: AVENUE V
OCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:28	1D	0.0	2-2	Brown fine sand, trace silt (Fill) (SP-SM)				Note: Samples
07-98		2.0	3-3					were lost and not
ursday	2D	2.0	3-3	Top: Do 1D (Fill) (SP-SM)				delivered to our
Cloudy,		4.0	2-2	Bot:Brn to gry f-m sa, tr si,veg(Fill)(SP-SM)				office for
Misty	3D	4.0	2-2	Brown fine to medium sand, trace coarse		5		reclassification.
60°F		6.0	1-2	sand, silt, mica, root (Fill) (SP-SM)				Descriptions shown
	4D	6.0	1-1	Do 3D (Fill) (SP-SM)				are based on visual
		8.0	1-2					classification in
	5D	8.0	3-4	Do 3D (Fill) (SP-SM)				field only.
		10.0	5-5			10		
	6D	10.0	4-4	Gray brown fine to medium sand, trace silt,				
		12.0	5-7	shell (Fill) (SP-SM)				Water at 12'.
					F			
						15		
	7D	15.0	2-3	Gray fine to medium sand, trace coarse				
		17.0	3-5	sand, silt, shell, mica (Fill) (SP-SM)				
						20		
	8D	20.0	4-8	Top 3": Light brn fine sand, tr silt (SP-SM)				
		22.0	6-6	Bot: Gray fine to medium sand, trace				
				coarse sand, gravel, silt (Fill) (SP-SM)				
						25		
	9D	25.0	5-7	Gray brown fine to medium sand, trace				
		27.0	17-40	coarse sand, silt, wood (Fill) (SP-SM)		27		
					S			
						30		
	10D	30.0	8-13	Brown fine to medium sand, trace shell, silt,				
14:59		32.0	15-17	mica, dark gray silty clay lense (SP-SM)		32		End of Boring at
								32'.
						35		
						40		
						45		
						50		

BORING NO. MR-25P

SHEET 2 OF 3
FILE NO. _____
SUBCODE _____

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT AVENUE V
LOCATION BROOKLYN, NY
PIEZOMETER LOCATION _____
☐ SEE SKETCH ON BACK

PIEZOMETER NO. MR25P
DATE OF INSTALLATION 5/4/98
RES. ENG. C. CASCIO

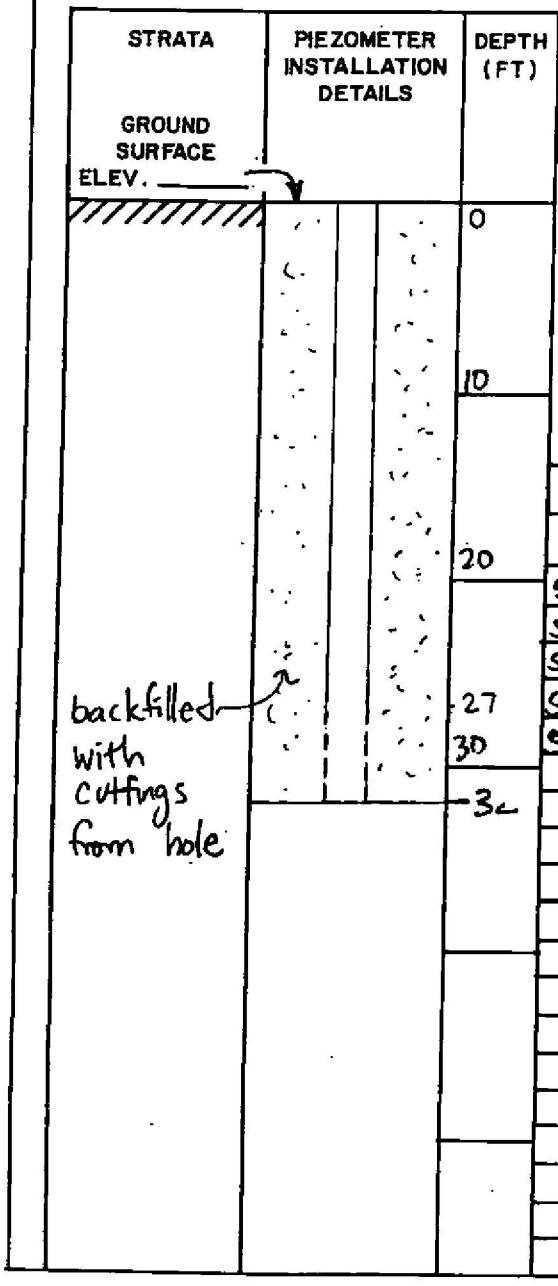
PIEZOMETER TYPE 2" I.D. PVC

INTAKE POINT

depth to bottom, ft = 32
depth to top, ft = 27
length, ft = 5 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = _____
diameter, in = 2, ft = 0.17 = 2r



READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
5/5/98	1010	12		
5/6/98	1145	12		
5/7/98		12.1		
5/11		11.6		
5/12		11.2		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. _____

PIEZOMETER NO. MR25P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-25P
SHEET 2 **OF** 3
FILE NO. 8769
SURFACE ELEV. 14.4
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	CME	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 5" O.D.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-4-98	14:40	32		12	DURING DRILLING.
5-5-98	10:10	32		12	PIEZOMETER READING.
5-6-98	11:45	32		12	PIEZOMETER READING.
5-7-98		32		12.1	PIEZOMETER READING.
5-11-98		32		11.6	PIEZOMETER READING.
5-12-98		32		11.2	PIEZOMETER READING.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT. 27	TOP ELEV.	
INTAKE ELEMENT:	TYPE	SLOTTED PVC	OD, IN.	2-3/8	LENGTH, FT. 5	TIP ELEV.	32
FILTER:	MATERIAL	NONE	OD, IN.	7	LENGTH, FT. 32	BOT. ELEV.	

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 32	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER LINDEL EDWARDS HELPERS DHILB BISSON
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 5-4-98

BORING NO. MR-25P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-26
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 13.9
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:29	1D	0.0	2-3	Top 1": Topsoil				
05-05-98		2.0	3-3	Bot: Brn gray f sand, tr silt (Fill) (SP-SM)				
Friday	2D	2.0	4-5	Light brown fine to medium sand, trace silt				
Cloudy,		4.0	5-6	(Fill) (SP-SM)				
Misty	3D	4.0	3-3	Do 2D (Fill) (SP-SM)		5		
60°F		6.0	2-3					
	4D	6.0	4-4	Do 2D (Fill) (SP-SM)				
		8.0	4-5					
	5D	8.0	3-4	Do 2D (Fill) (SP-SM)				
		10.0	3-3		F	10		Water noted at 10'.
	6D	10.0	4-5	Brown fine to medium sand, trace gravel,				
	" "	12.0	5-7	shells, silt (Fill) (SP-SM)				
						15		
	7D	15.0	6-4	Brown fine to medium sand, trace coarse				
		17.0	4-6	sand, shell, silt (Fill) (SP-SM)				
						20		
	8D	20.0	3-2	Gray fine to medium sand, trace coarse				
		22.0	2-2	sand, shells, silt (Fill) (SP-SM)				
						24		
						25		
	9D	25.0	PUSH=24"	Soft dark gray organic silty clay, some	O			WC=70
		27.0		layers of fine sand, some silt (OH&SM)				
						28		
						30		
	10D	30.0	2-6	Dark brown fine to medium sand, trace silt,				
14:45		32.0	14-15	mica (Fill) (SP-SM)	F			
11:10								
05-06-98								
Wednesday						35		
Cloudy,	11D	35.0	2-6	Do 10D, trace shell, wood (Fill) (SP-SM)				
Rain		37.0	8-11			37		
60°F								
						40		
	12D	40.0	4-5	Brown fine to medium sand, trace coarse				
		42.0	6-6	sand, gravel, shell (SP-SM)	S			
						45		
	13D	45.0	6-6	Do 12D (SP-SM)				
11:45		47.0	7-9			47		End of Boring at 47'.
								WC=Water Content
						50		in percent of dry weight.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-26
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 13.9
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK: CME
SKID:
BARGE:
OTHER:

TYPE OF FEED DURING CORING
MECHANICAL:
HYDRAULIC: X
OTHER:

CASING USED [ ] YES [X] NO
DIA., IN. / DEPTH, FT. FROM / TO
DIA., IN. / DEPTH, FT. FROM / TO
DIA., IN. / DEPTH, FT. FROM / TO

TYPE AND SIZE OF:
D-SAMPLER: 2" O.D. SPLIT SPOON
U-SAMPLER:
S-SAMPLER:
CORE BARREL:
CORE BIT:
DRILL RODS: AWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.:
TYPE OF DRILLING MUD:

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN.: 5" O.D.

CASING HAMMER, LBS. / AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. / AVERAGE FALL, IN.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-4-98	13:35	32		10	DURING DRILLING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE / ID, IN. / LENGTH, FT. / TOP ELEV.
INTAKE ELEMENT: TYPE / OD, IN. / LENGTH, FT. / TIP ELEV.
FILTER: MATERIAL / OD, IN. / LENGTH, FT. / BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 47
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR: INDEPENDENT DRILLING
DRILLER: DAVE CARTER HELPERS: JAMES MATTHEW & D. BISSON
REMARKS:
RESIDENT ENGINEER: C. CASCIO DATE: 5-6-98

BORING NO. MR-26

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-27P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 9.2
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:56	1D	0.0	3-4	Top 1'-6": Topsoil				
05-05-98		2.0	8-8	Bot: Lt brn fine sand, tr silt (Fill) (SP-SM)				
Tuesday	2D	2.0	8-8	Brown fine to medium sand, trace gravel,				
Cloudy.		4.0	7-6	silt (Fill) (SP-SM)				
Rain	3D	4.0	4-4	Brown fine to medium sand, trace silt (Fill)		5		
60°F		6.0	4-5	(SP-SM)				
	4D	6.0	1-4	Do 3D (Fill) (SP-SM)				
		8.0	4-4					
	5D	8.0	4-4	Do 3D (Fill) (SP-SM)				
		10.0	4-4			10		
	6D	10.0	4-3	Do 3D, trace cinders, shells (Fill) (SP-SM)				Water at 10.5'.
		12.0	2-3					
					F			
						15		
	7D	15.0	7-4	Dark gray gravel, some fine to coarse sand,				
14:35		17.0	4-7	trace silt (Fill) (GP-GM)				Auger chattering
10:12								from 17' to 19'.
05-06-98								
Wednesday						20		
Cloudy	8D	20.0	2-8	Black to gray fine to coarse sandy gravel,				
60°F		22.0	3-9	trace concrete, organic silt (Fill) (GP-GM)				Auger chattering
								from 22' to 25'.
								Wash water black to
						25		gray recovery=3"
	9D	25.0	6-8	Do 8D (Fill) (GP-GM)				from 25' to 27'.
		27.0	11-14					
						30		
	10D	30.0	4-4	Brown fine to medium sand, trace coarse				
		32.0	5-8	sand, silt (Fill) (SP-SM)		32		
						35		
	11D	35.0	7-6	Brown fine to medium sand, trace coarse				
		37.0	10-12	sand, silt, mica (SP-SM)	S			
						40		
	12D	40.0	7-8	Do 11D, trace gravel (SP-SM)				
12:38		42.0	11-11			42		End of Boring at
								42'.
						45		
						50		

BORING NO. MR-27P

SHEET 1 OF 2
FILE NO. B769
SUBCODE

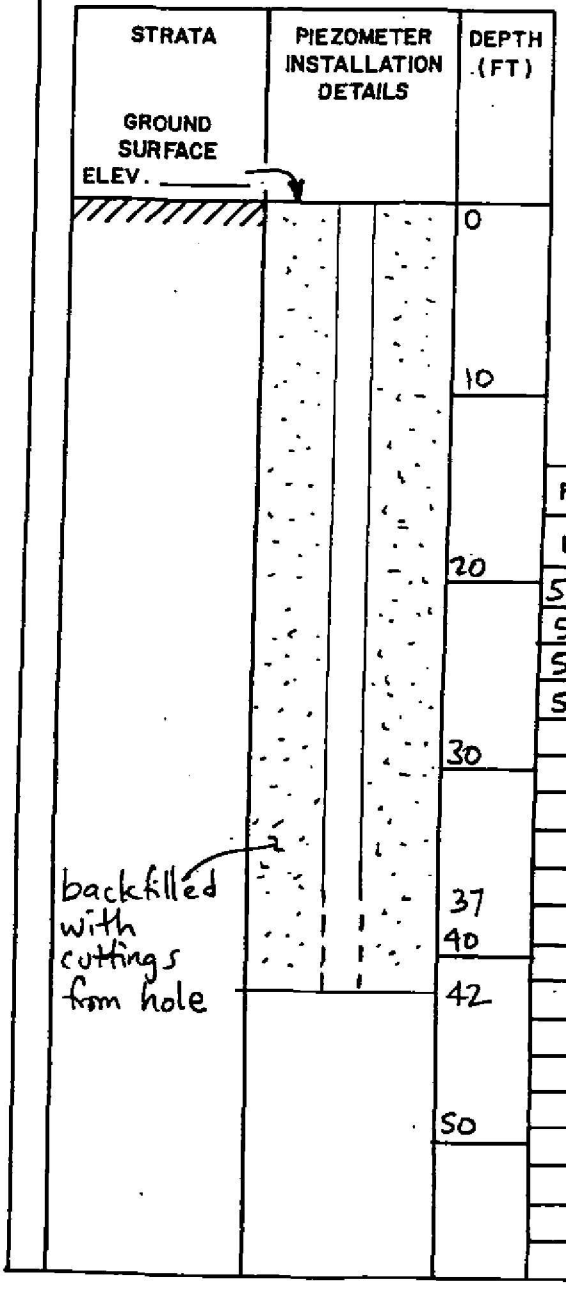
MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT AVENUE V
LOCATION BROOKLYN, NY
PIEZOMETER LOCATION
☐ SEE SKETCH ON BACK

PIEZOMETER NO. MR 27P
DATE OF INSTALLATION 5/6/98
RES. ENG. C. CASCIO

PIEZOMETER TYPE 2" I.D. PVC



INTAKE POINT

depth to bottom, ft = ____
depth to top, ft = ____
length, ft = ____ = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = ____
diameter, in = 2, ft = 0.17 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
5/6/98	1215	10.5		
5/7	AM	9.6		
5/11	AM	7.8		
5/12	AM	7.5		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. ____

PIEZOMETER NO. MR27P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-27P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 9.2
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK CME
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC X
OTHER

CASING USED ☐ YES ☒ NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 5" O.D.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-5-98	13:10	12		10	DURING DRILLING.
5-6-98	12:15	42		10.5	PIEZOMETER INSTALLED.
5-7-98		42		9.6	PIEZOMETER READING.
5-11-98		42		7.8	PIEZOMETER READING.
5-12-98		42		7.5	PIEZOMETER READING.

PIEZOMETER INSTALLED ☒ YES ☐ NO SKETCH SHOWN ON

STANDPIPE: TYPE PVC ID, IN. 2 LENGTH, FT. 37 TOP ELEV.
INTAKE ELEMENT: TYPE PVC OD, IN. 2-3/8 LENGTH, FT. 5 TIP ELEV.
FILTER: MATERIAL CUTTINGS OD, IN. 7 LENGTH, FT. 42 BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 42
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVID CARTER HELPERS D. BISSON
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 5-6-98

BORING NO. MR-27P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

BORING NO. MR-28
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 10.1
RES. ENGR. C. CASCIO

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:10	1D	0.0	3-6	Topsoil 1'-0"				
05-06-98		2.0	7-7					
Wednesday	2D	2.0	5-4	Light brown fine sand, trace silt (Fill)				
Cloudy		4.0	5-4	(SP-SM)				
60°F	3D	4.0	3-4	Brown fine to medium sand, trace silt (Fill)		5		
		6.0	3-2	(SP-SM)				
	4D	6.0	4-4	Do 3D (Fill) (SP-SM)				
		8.0	5-7					
	5D	8.0	3-3	Do 3D (Fill) (SP-SM)				
		10.0	4-5					Water at 9.6'.
	6D	10.0	3-3	Do 3D (Fill) (SP-SM)	F	10		
		12.0	4-5					
						15		
	7D	15.0	1-1	Gray fine to medium sand, trace shells, silt,				
		17.0	1-1	mica (Fill) (SP-SM)				
				Top: Dark brown fine to medium sand, trace		20		8D: REC=100%
	8D	20.0	WH-WH	gravel (Fill) (SP-SM)				Pushed tube from
		22.0	WH-1	Bot 1": Wood & organic silty sand (OL)		21.9		22' to 24'.
	1U	22.0	PUSH=24"	Soft gray organic silty clay, trace silty fine	O			8D Bot: Odor.
		24.0		sand pockets (OH)		24		1U: WC=65
						25		
	9D	25.0	2-1	Gray fine to medium sand, trace silt, shells,				
14:45		27.0	4-9	organic silty clay pockets (Fill) (SP-SM)				
12:40					F			
05-07-98								
Thursday						30		
Cloudy	10D	30.0	4-6	Brown fine to medium sand, trace coarse				Slight organic odor.
65°F		32.0	8-9	sand, gravel, silt (Fill) (SP-SM)		32		
						35		
	11D	35.0	2-6	Brown fine to medium sand, trace silt, mica				
		37.0	8-8	(SP-SM)	S			
						40		
	12D	40.0	3-4	Brown fine to medium sand, trace coarse				
13:29		42.0	5-7	sand, silt (SP-SM)		42		End of Boring at
								42'.
						45		
						50		

BORING NO. MR-28

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-28
SHEET 2 **OF** 2

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

FILE NO. 8769
SURFACE ELEV. 10.1
DATUM BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	☐ YES	☒ NO		
TRUCK	CME	MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:

D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER 3" SHELBY TUBE
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN. 5" O.D.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-7-98	11:10	27	-	9.6	WATER LEVEL OBSERVED DURING DRILLING.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	42	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	1
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVE CARTER HELPERS D. BISSON
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 5-7-98

BORING NO. MR-28

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-30P
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 10.3
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
14:10	1D	0.0	2-4	Top: 8 " Topsoil				
05-07-98		2.0	5-7	Bot: LT tan fine sand, tr silt (Fill) (SP-SM)				
Thursday	2D	2.0	7-7	Top 5": Do 1D, Bot (SP-SM)				
Cloudy		4.0	7-7	Bot:Red brn f-m sand,tr c sa, si(Fill)(SP-SM)				
Light	3D	4.0	7-6	Do 2D, Bot (Fill) (SP-SM)		5		
Rain		6.0	7-7					
	4D	6.0	5-4	Light brown fine to medium sand, trace silt,				
		8.0	4-5	coarse sand (Fill) (SP-SM)				
	5D	8.0	3-3	Do 4D (Fill) (SP-SM)				
		10.0	4-4			10		
	6D	10.0	5-3	Do 4D, trace shells (Fill) (SP-SM)				
		12.0	5-5					
					F			
						15		
	7D	15.0	4-3	Dark brown fine to medium sand, trace				
		17.0	2-3	shell, mica (Fill) (SP-SM)				
						20		
	8D	20.0	1-2	Brown fine to medium sand, trace silt, shell				
14:45		22.0	1-1	& coarse sand (Fill) (SP-SM)				
10:21								
05-08-98								
Friday						25		
Cloudy	9D	25.0	1-1	Top 1'-0": Brn fine to medium sand, trace		26		
60°F		27.0	2-4	shell, gravel, coarse sand, silt (Fill) (SP-SM)	O			
				Bot: *Gray organic fine sandy silt, trace*		28		
				organic silty clay pockets (OL)				
						30		
	10D	30.0	3-6	Brown fine to medium sand, trace silt,				
		32.0	11-16	gravel (Fill) (SP-SM)				
					F			
						35		
	11D	35.0	2-2	Brown fine to medium sand, trace coarse				
		37.0	4-5	sand, gravel, cinder, silt, gray silt lenses		37		
				(Fill) (SP-SM)				
					S	40		
	12D	40.0	5-6	Red brown fine sand, trace silt, mica				
11:29		42.0	8-8	(SP-SM)		42		End of Boring at 42'.
						45		
						50		

BORING NO. MR-30P

SHEET 1 OF 2
FILE NO. B769
SUBCODE

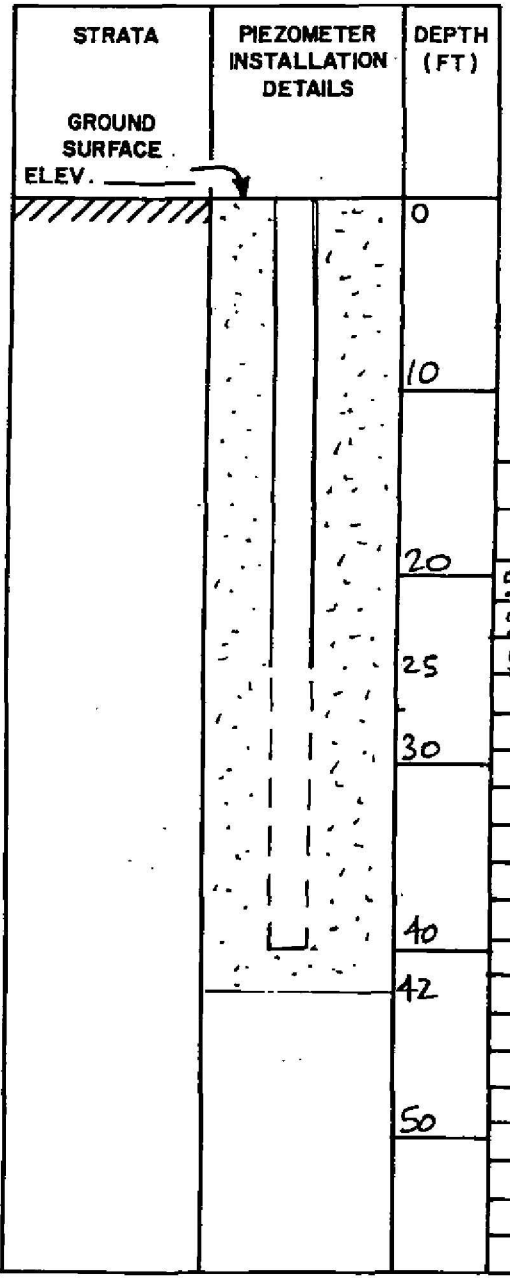
MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT AVENUE V
LOCATION BROOKLYN, NY
PIEZOMETER LOCATION
☐ SEE SKETCH ON BACK

PIEZOMETER NO. MR 30P
DATE OF INSTALLATION 5/8/98
RES. ENG. C. CASCIO

PIEZOMETER TYPE 2" I.D. PVC



INTAKE POINT

depth to bottom, ft = 40
depth to top, ft = 25
length, ft = 15 = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft =
diameter, in = 2, ft = 0.17 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
5/8/98	1420	10		
5/11	AM	9.3		
5/12	AM	8.5		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV.

PIEZOMETER NO. MR 30P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-29B
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 10.5
RES. ENGR. C. CASCIO

OJECT: AVENUE V
CATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:35	1D	0.0	1-6	Light tan fine sand, trace silt, rock				
05-15-98		2.0	11-15	fragments (Fill) (SP-SM)				
riday	2D	2.0	10-10	Top: Do 1D, Bot (Fill) (SP-SM)				
unny		4.0	6-5	Bot 6": Brn f-m sand, tr silt (Fill) (SP-SM)				
70°F	3D	4.0	13-5	Do 2D, Bot (Fill) (SP-SM)		5		
		6.0	5-5					
	4D	6.0	5-5	Do 2D, Bot trace shells, coarse sand, gravel				
		8.0	5-7	(Fill) (SP-SM)				
	5D	8.0	3-3	Do 2D, Bot (Fill) (SP-SM)				
		10.0	4-5			10		
	6D	10.0	3-3	Do 2D, Bot (Fill) (SP-SM)	F			
		12.0	4-5					
						15		
	7D	15.0	3-2	Top: Brown fine to medium sand, trace silt,				
		17.0	3-4	shell, brick (Fill) (SP-SM)				
				Bot 3": Dark brown fine to medium sand,				
				trace silt (Fill) (SP-SM)				
						20		2nd Attempt at 20'.
	NR	20.0	1-WH	No recovery				No recovery.
		22.0	1-WH			22		
	8D	22.0	1-2	Black cinders & soft gray organic silty clay,	O			
15:20		24.0	1-8	sm blk silty f-c sand seams (SM&OH)		24		
09:18	9D	24.0	PUSH=29"	Gray black silty fine sand (Fill) (SM)		25		Attempted to push
-18-98		26.0	REC=2"					tube from 24' to
onday	10D	26.0	1-2	Black coarse to fine sand, some silt, cinders				26'.
0°F		28.0	1-2	(Fill) (SM)	F			
						30		
	11D	30.0	5-4	Top 1': Do 10D (Fill) (SM)		31		
		32.0	7-4	Bot: Brown fine to medium sand, trace				
				mica, silt (SP-SM)				
						35		
	12D	35.0	6-13	Brown fine to medium sand, trace silt, mica	S			
		37.0	13-15	(SP-SM)				
						40		
	13D	40.0	7-11	Do 12D (SP-SM)				
13:30		42.0	14-16			42		End of Boring at
								42'.
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-29B
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 10.5
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK CME
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC X
OTHER

CASING USED [ ] YES [X] NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 5" DIA.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-15-98	14:30	15		11	DURING DRILLING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 42	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER JAMES MATTHEW HELPERS D. BISSON & L. EDWARDS
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 5-15-98

BORING NO. MR-29B

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-30P
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 10.3
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK: CME
SKID:
BARGE:
OTHER:

TYPE OF FEED DURING CORING
MECHANICAL:
HYDRAULIC: X
OTHER:

CASING USED ☐ YES ☒ NO
DIA., IN.: DEPTH, FT. FROM: TO:
DIA., IN.: DEPTH, FT. FROM: TO:
DIA., IN.: DEPTH, FT. FROM: TO:

TYPE AND SIZE OF:
D-SAMPLER: 2" O.D. SPLIT SPOON
U-SAMPLER:
S-SAMPLER:
CORE BARREL:
CORE BIT:
DRILL RODS: AWJ

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.:
TYPE OF DRILLING MUD:

AUGER USED ☒ YES ☐ NO
TYPE AND DIAMETER, IN.: 5" O.D.

CASING HAMMER, LBS.: AVERAGE FALL, IN.:
SAMPLER HAMMER, LBS.: 140 AVERAGE FALL, IN.: 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-8-98	14:02	40		10	PIEZOMETER INSTALLED.
5-11-98		40		9.3	PIEZOMETER READING.
5-12-98		40		8.5	PIEZOMETER READING.

PIEZOMETER INSTALLED ☒ YES ☐ NO SKETCH SHOWN ON

STANDPIPE: TYPE PVC ID, IN. 2 LENGTH, FT. 25 TOP ELEV.
INTAKE ELEMENT: TYPE PVC OD, IN. 2-3/8 LENGTH, FT. 15 TIP ELEV.
FILTER: MATERIAL CUTTINGS OD, IN. 7 LENGTH, FT. 42 BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 42
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER DAVE CARTER HELPERS D. BISSON
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 5-8-98

BORING NO. MR-30P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-31
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 10.3
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:15	1D	0.0	3-4	Top: 5 " Topsoil				
05-08-98		2.0	4-8	Bot:Lt brn fine sand, trace silt(Fill) (SP-SM)				
Friday	2D	2.0	4-7	Top 11": Do 1D, Bot (Fill)(SP-SM)				
Cloudy,		4.0	8-6	Bot 6":Brn f-m sand, trace silt(Fill)(SP-SM)				
Light Rain	3D	4.0	6-5	Brown fine to medium sand, trace silt,		5		
		6.0	5-5	coarse sand, gravel (Fill) (SP-SM)				
	4D	6.0	3-4	Brown fine to medium sand, trace coarse				
		8.0	4-5	sand, silt (Fill) (SP-SM)				
	5D	8.0	5-5	Do 4D (Fill) (SP-SM)				
		10.0	5-6			10		Water at 10'.
	6D	10.0	1-1	Do 4D (Fill) (SP-SM)				
		12.0	1-2		F			
						15		
	7D	15.0	4-1	Brown fine to medium sand, trace gravel				
		17.0	3-3	(Fill)(SP-SM)				
						20		
	8D	20.0	1-1	Gray fine sand, trace silt, shell, mica (Fill)				
14:39		22.0	2-1	(SP-SM)				
11:28						23		
05-11-98								
Monday					O	25		
	9D	25.0	2-4	Top: Dark gray black organic fine sandy silt,		26		
		27.0	6-8	trace organic silty clay pockets, shell (OL)				
				Bot: Dark brown fine sand, trace silt, mica				
				(SP-SM)				
						30		
	10D	30.0	5-9	Brown fine to coarse sand, trace gravel, silt				
		32.0	13-18	(SP-SM)				
					S			
						35		
	11D	35.0	5-7	Do 10D (SP-SM)				
		37.0	11-11					
						40		
	12D	40.0	3-6	Brown fine to medium sand, trace silt,				
12:11		42.0	8-10	coarse sand, mica (SP-SM)		42		End of Boring at 42'.
						45		
						50		

BORING NO. MR-31

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MR-31
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 10.3
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK: CME
SKID:
BARGE:
OTHER:

TYPE OF FEED DURING CORING
MECHANICAL:
HYDRAULIC: X
OTHER:

CASING USED [ ] YES [X] NO
DIA., IN. / DEPTH, FT. FROM / TO
DIA., IN. / DEPTH, FT. FROM / TO
DIA., IN. / DEPTH, FT. FROM / TO

TYPE AND SIZE OF:
D-SAMPLER: 2" O.D. SPLIT SPOON
U-SAMPLER:
S-SAMPLER:
CORE BARREL:
CORE BIT:
DRILL RODS: AWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN.:
TYPE OF DRILLING MUD:

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN.: 5" O.D.

CASING HAMMER, LBS. / AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. / AVERAGE FALL, IN.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-11-98	14:02	12		10	DURING DRILLING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE / ID, IN. / LENGTH, FT. / TOP ELEV.
INTAKE ELEMENT: TYPE / OD, IN. / LENGTH, FT. / TIP ELEV.
FILTER: MATERIAL / OD, IN. / LENGTH, FT. / BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 42
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR: INDEPENDENT DRILLING
DRILLER: DAVE CARTER HELPERS: D. BISSON
REMARKS:
RESIDENT ENGINEER: C. CASCIO DATE: 5-11-98

BORING NO. MR-31

SHEET NO.____ OF ____

FILE 8769

MADE BY CJM DATE 6/19/92

CHECK BY____ DATE ____

MUESER RUTLEDGE CONSULTING ENGINEERS

CLASSIFICATION OF DRY SAMPLES

PROJECT Avenue V

BORING NUMBER	SAMPLE NUMBER	DEPTH FROM	DEPTH TO	BLOWS/6"	W.C. %	DESCRIPTION AND REMARKS
MR-32	1D	0.0	2.0	2-3		TOP: Brown silty f sand, tr roots (FILL) (SM)
				4-8		(TOPSOIL)
						BOT: Lt. brown f sand, tr silt (FILL) (SP-SM)
	2D	2.0	4.0	6-7		Lt. brown f sand, tr silt (FILL) (SP-SM)
				7-8		
	3D	4.0	6.0	6-6		Brown f sand, tr silt, silt pockets
				6-6		(FILL) (SP-SM)
	4D	6.0	8.0	3-4		Brown f-m sand, tr silt (FILL) (SP)
				3-3		
	5D	8.0	10.0	6-15		Brown f-c sandy gravel, tr silt
				9-9		(FILL) (GP-GM)
	6D	10.0	12.0	6-3		Brown f-c sandy gravel, sm silt
				9-5		(FILL) (GM)
	7D	15.0	17.0	8-6		Dk. gray f-m sand, sm gravel, tr c sand,
				7-11		silt (FILL) (SP-SM)

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MR-32C
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 10.1
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:40	1D	0.0	2-3	Dark brown silty fine sand, trace brick,				
05-14-98		2.0	4-11	coarse sand (Fill) (SM)				
Thursday	2D	2.0	10-14	Brn f-c sa, sm gvl, cndrs, tr si(Fill)(SP-SM)				
Sunny		4.0	11-10	Top 6": Dark brown fine to coarse sand, sm				
60°F	3D	4.0	15-10	gravel, tr silt, rock fgmnts (Fill) (SP-SM)		5		
		6.0	9-9	Bot: Brn f sand, tr silt (Fill) (SP-SM)				
	4D	6.0	9-9	Brown fine sand, trace silt (Fill) (SP-SM)				
		8.0	8-10		F			
	5D	8.0	2-2	Brown fine to medium sand, trace silt,				
		10.0	1-2	gravel (Fill) (SP-SM)		10		Water at 10'.
	6D	10.0	1-2	Brown fine to medium sand, trace coarse				
		12.0	1-2	sand, silt (Fill) (SP-SM)				
						15		
	7D	15.0	1-WH	Top: Brown fine to medium sand, trace silt		16		
		17.0	1-WH	(Fill) (SP-SM)	O			
				Bot: Soft gray organic silty clay (OH)		18		7D Bot: WC=49
					F	20		
	8D	20.0	1-1	Top: Dark brown fine to medium sand,		21		
		22.0	1-1	some silt, trace shell (Fill) (SM)				
				Bot: Gray organic sitly clay (OH)	O	23		8D Bot: WC=34
						25		
	9D	25.0	4-8	Gray black fine to coarse sand, trace silt,	F			
14:50		27.0	8-9	gravel, shells (Fill) (SP-SM)				
10:09								
05-15-98						29		2 Attempts made to
Friday						30		advance hole to 30'.
Sunny	10D	30.0	3-7	Brown fine to coarse sand, trace silt				
70°F		32.0	10-13	(SP-SM)				
						35		
	11D	35.0	7-9	Brown fine to coarse sand, trace silt	S			REC=4"
		37.0	10-14	(SP-SM)				
						40		
	12D	40.0	5-8	Brown fine to medium sand, trace coarse				3rd Attempt made
11:59		42.0	11-18	sand, silt (SP-SM)		42		to recover sample.
								End of Boring at
						45		42'.
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MRPS-1
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 10.5
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
07:20	1D	1.3	3	Black ash, some concrete, silt (Fill) (SM)	*			*9" Cobblestone,
06-02-98		1.8				1.3		7" Concrete.
Tuesday	2D	2.0	3-3	Top: Blk ash, sm silt, tr gravel (Fill) (SM)				Drill through surface
Sunny		4.0	2-3	Bot: 3" Brn f-m sand, tr silt (Fill) (SP-SM)				obstructions.
70°F	3D	4.0	4-4	Brown fine to coarse sand, trace gravel,		5		
		6.0	4-4	silt, ash (Fill) (SP-SM)				
	4D	6.0	3-4	Brown fine to medium sand, trace coarse				
		8.0	4-4	sand, silt (Fill) (SP-SM)				Water at 8'.
	5D	8.0	8-1	Brown f-c sand, tr silt, gravel, black fine to				
		10.0	2-1	coarse sand & ash seams (Fill) (SP-SM)		10		
	6D	10.0	2-3	Top 8" Black sandy ash (Fill)				
		12.0	3-2	Bot: Gray fine to coarse sand, trace silt	F			
				(Fill) (SP-SM)				
						15		
	7D	15.0	1-2	Gray brown fine to coarse sand, trace silt,				
		17.0	1-1	gravel (Fill) (SP-SM)				
						20		
	8D	20.0	1-2	Gray fine to coarse sand, trace silt, gravel				
		22.0	2-3	(Fill) (SP-SM)				
						25		
	9D	25.0	2-2	Top: Do 8D (Fill) (SP-SM)				
		27.0	1-1	Bot 3": Brown fine to medium sand, trace				
				silt (Fill) (SP-SM)				
						30		
	10D	30.0	4-7	Brown fine to medium sand, trace silt, red				
		32.0	9-12	silt lenses (Fill) (SP-SM)				
						33		
						35		
	11D	35.0	11-14	Red brown fine sand, trace silt, medium				
		37.0	14-15	sand, mica (SP-SM)				
						40		
	12D	40.0	8-10	Do 11D (SP-SM)				
		42.0	11-14		S			
						45		
	13D	45.0	7-6	Red brown fine to medium sand, trace silt,				
		47.0	6-7	mica (SP-SM)				
						50		
	14D	50.0	5-6	Do 13D (SP-SM)				
		52.0	10-9					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION: BROOKLYN, NEW YORK

BORING NO. MRPS-1
SHEET 2 OF 3
FILE NO. 8769
SURFACE ELEV. 10.5
RES. ENGR. C. CASCIO

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	CASING DEPTH	CASING BLOWS	REMARKS
Cont'd								
06-02-98								
Tuesday								
Sunny								
70°F						55		
	15D	55.0	14-21	Red brown fine sand, trace silt, mica				
14:59		57.0	17-14	(SP-SM)				
07:45								
06-03-98								
Wednesday						60		
Sunny,	16D	60.0	3-3	Red brown fine to medium sand, trace				
Windy,		62.0	4-7	coarse sand, silt, mica (SP-SM)				
70°F								
						65		
	17D	65.0	4-5	Do 16D (SP-SM)				
		67.0	10-9					
						70		
	18D	70.0	4-5	Top 1': Do 16D (SP-SM)				
		72.0	10-16	Bot: Red fine sand, trace silt, mica (SP-SM)				
					S	75		
	19D	75.0	6-6	Do 16D (SP-SM)				
		77.0	16-21					
						80		
	20D	80.0	4-7	Do 16D (SP-SM)				
		82.0	17-21					
						85		
	21D	85.0	5-14	Red brown fine to medium sand, trace silt,				
		87.0	19-23	red silt seams, mica (SP-SM)				
						90		
	22D	90.0	8-13	Red brown fine to medium sand, trace silt,				
		92.0	22-32	mica (SP-SM)				
						95		
	23D	95.0	20-27	Do 22D (SP-SM)				
		97.0	27-33					
						100		
	24D	100.0	17-24	Do 22D (SP-SM)				End of Boring at
		102.0	29-32					102'.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MRPS-1
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 10.5
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	CME	MECHANICAL		DIA., IN.		DEPTH, FT. FROM	TO
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2-7/8
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 5" O.D.

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
6-2-98	8:30	10	10	8	DURING DRILLING OF BORING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON SHEET #2

STANDPIPE: TYPE _____ ID, IN. _____ LENGTH, FT. _____ TOP ELEV. _____
INTAKE ELEMENT: TYPE _____ OD, IN. _____ LENGTH, FT. _____ TIP ELEV. _____
FILTER: MATERIAL _____ OD, IN. _____ LENGTH, FT. _____ BOT. ELEV. _____

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 102	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER JAMES MATTHEWS HELPERS RON BRIAN
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 6-3-98

BORING NO. MRPS-1

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MRPS-2P
SHEET 1 OF 4
FILE NO. 8769
SURFACE ELEV. 8.8
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:30	1D	1.0	1-1	Brown fine to coarse sand, trace silt, gravel	*	0.7		"8" Asphalt pave-
05-22-98		2.0		(Fill) (SP-SM)				ment.
Friday	2D	2.0	1-1	Brown fine to coarse sand, some gravel,				Obstructions at 3'
Sunny		4.0	1-1	trace silt, silt lens (SP-SM)				to 4'.
80°F	3D	4.0	1-WH	Brown fine to coarse sand, some gravel,		5		Possible cobble or
		6.0	WH-WH	trace silt (Fill) (SP-SM)				concrete.
	4D	6.0	1-WH	*Top: Brn f-c sand, tr gvl, silt(Fill) (SP-SM)*				
		8.0	1-2	Bot:Brn f-c sa, sm cndrs, tr silt(Fill)(SP-SM)				
	5D	8.0	2-4	Do 4D (Fill) (SP-SM)				
		10.0	6-6			10		
	6D	10.0	6-7	Gray fine to medium sand, trace silt, coarse				Drilled with
		12.0	7-9	sand, brick, glass (Fill) (SP-SM)				bentonite slurry
								below 10' depth.
						15		
	7D	15.0	WH-3	Gray fine to medium sand, trace coarse				REC=2"
		17.0	3-3	sand, silt, gravel (Fill) (SP-SM)	F			
						20		
	8D	20.0	1-1	Do 6D, trace wood, brick, concrete (Fill)				REC=2"
		22.0	2-2	(SP-SM)				
						25		
	9D	25.0	1-1	Gray brown fine to medium sand, trace silt,				REC=18"
		27.0	2-3	coarse sand, wood (Fill) (SP-SM)				
						30		
	NR	30.0	2-1	No recovery				
		32.0	WH-1					
	10D	32.0	5-5	Brown medium to fine sand, trace silt,				
		34.0	5-6	coarse sand, wood, gravel (Fill) (SP-SM)				
						35		
	NR	35.0	8-6	No recovery				
14:55		37.0	10-9					
09:24	11D	37.0	7-5	Brown fine to medium sand, trace silt, wood				REC=6"
05-26-98		39.0	8-11	*fragments (Fill) (SP-SM)*		39		
Tuesday						40		
Partly	12D	40.0	3-5	Red brown fine sand, some silt, trace				
Cloudy		42.0	10-14	medium to coarse sand, mica (SM)				
					S			
						45		
	13D	45.0	4-7	Do 12D (SM)				REC=6"
		47.2	9-17/8"					
						50		
	14D	50.0	1-4	Red brown fine to medium sand, trace silt,				
		52.0	7-7	*mica (SP-SM)*				

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MRPS-2P
SHEET 2 OF 4
FILE NO. 8769
SURFACE ELEV. 8.8
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	CASING DEPTH	CASING BLOWS	REMARKS
Cont'd								
05-26-98								
Tuesday								
Partly								
Cloudy						55		
	15D	55.0	7-9	Red brown fine to medium sand, trace silt,				
		57.0	12-9	mica (SP-SM)				
						60		
	16D	60.0	10-12	Do 15D (SP-SM)				
		62.0	9-14					
						65		
	17D	65.0	7-10	Do 15D (SP-SM)				
		67.0	10-12					
						70		
	18D	70.0	14-17	Do 15D (SP-SM)				
14:59		72.0	20-22					
					S			
05-27-98								
Wednesday						75		
Sunny	19D	75.0	4-4	Do 15D (SP-SM)				
80°F		77.0	8-9					
						80		
	20D	80.0	3-4	Brown fine to medium sand, trace silt,				
		82.0	10-13	coarse sand, mica (SP-SM)				
						85		
	21D	85.0	8-13	Do 20D (SP-SM)				
		87.0	16-22					
						90		
	22D	90.0	4-6	Do 20D (SP-SM)				
15:00		92.0	9-15					
07:32								
05-28-98								
Thursday						95		
Sunny	23D	95.0	15-24	Top: Do 20D (SP-SM)				
80°F		97.0	37-35	Bot: Red brown fine sand, some silt (SM)				
						100		
	24D	100.0	7-8	Red brown fine to coarse sand, trace silt				End of Boring at
09:55		102.0	12-19	(SP-SM)		102		102'.

BORING NO. MRPS-2P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MRPS-2P
SHEET 3 **OF** 4
FILE NO. 8769
SURFACE ELEV. 8.8
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	CME	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2-7/8
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3" I.D., 5" O.D.

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-28-98	10:10		45	8	MEASURED FROM TOP OF HOLE AFTER BACKFILLING.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON _____

STANDPIPE:	TYPE		ID, IN. 2	LENGTH, FT. 29	TOP ELEV.		
INTAKE ELEMENT:	TYPE		OD, IN. 2-3/8	LENGTH, FT. 5	TIP ELEV.		
FILTER:	MATERIAL NONE		OD, IN.	LENGTH, FT.	BOT. ELEV.		

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT. 102	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER JAMES MATTHEWS HELPERS RON BRIAN
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 5-28-98

BORING NO. MRPS-2P

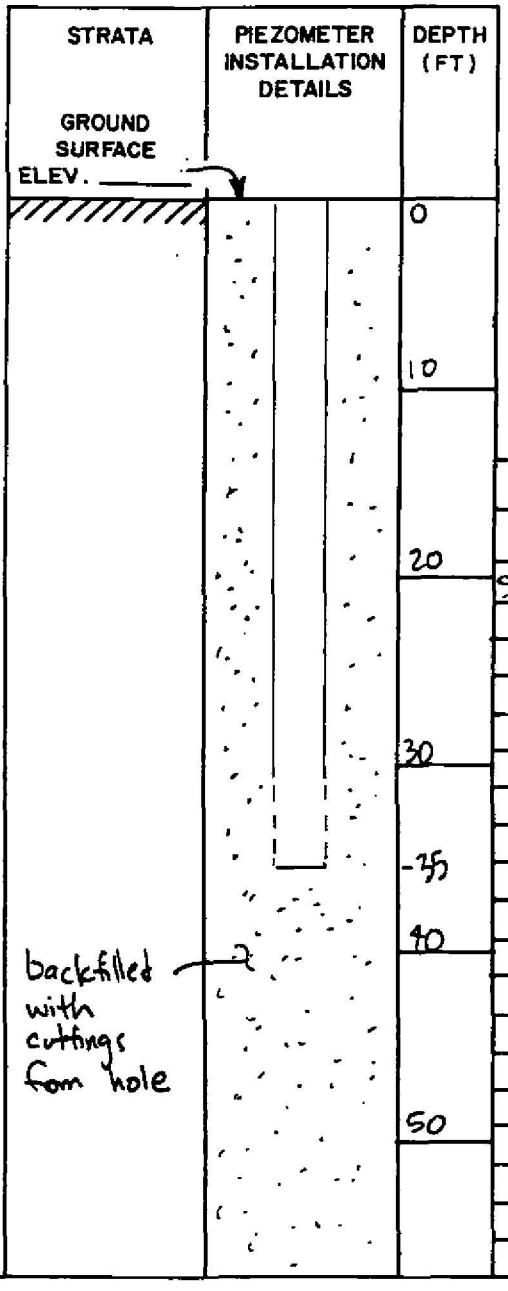
SHEET 4 OF 4
FILE NO. 8769
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT AVENUE V — PIEZOMETER NO. MRPS-2P
LOCATION BROOKLYN, NY
PIEZOMETER LOCATION SEE PLAN — DATE OF INSTALLATION 5/28/98
☐ SEE SKETCH ON BACK — RES. ENG. C. CASCIO

PIEZOMETER TYPE 2" PVC



INTAKE POINT

depth to bottom, ft = ____
depth to top, ft = ____
length, ft = ____ = L
diameter, in = 2, ft = 0.17 = 2R

STANDPIPE/RISER

elevation of rim, ft = ____
diameter, in = 2, ft = 0.17 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
9/1/98	7:47	8.52		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. ____

PIEZOMETER NO. ____

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. MRPS-3
SHEET 1 OF 2
FILE NO. 8769
SURFACE ELEV. 10.5
RES. ENGR. C. CASCIO

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
	1D	0.0	1-6	Top 3": Dark brown black ash (Fill)				3" Concrete at ground surface.
		2.0	6-6	Bot:Brn f-m sa,tr c sa, si,bk&gvl(Fill)(SP-SM)				
	2D	2.0	6-5	Brown fine to medium sand, trace gravel,				
		4.0	5-6	coarse sand, silt (Fill) (SP-SM)	F			
	3D	4.0	12-6	Brown fine to medium sand, trace coarse		5		
		6.0	5-7	sand, gravel, silt (Fill) (SP-SM)				
	4D	6.0	6-6	Brown fine to medium sand, trace coarse				
		7.5	6-25/0"	sand, gravel, silt (Fill) (SP-SM)		7.5		Obstruction at 7.5'; Offset hole. Possible concrete pipe or utility location. End of Boring at 7.5'.
						10		
						15		
						20		
						25		
						30		
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. MRPS-3
SHEET 2 **OF** 2
FILE NO. 8769
SURFACE ELEV. 10.5
DATUM BROOKLYN HIGHWAY

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK	CME	MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2-7/8
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 5" O.D.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [ ] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING	LIN. FT.	7.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER JAMES MATTHEWS HELPERS RON BRIAN
REMARKS
RESIDENT ENGINEER C. CASCIO DATE

BORING NO. MRPS-3

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

BORING NO. MRPS-3A
SHEET 1 OF 3
FILE NO. 8769
SURFACE ELEV. 10.5
RES. ENGR. C. CASCIO

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
07:05	1D	0.5	4	Brown fine to medium sand, trace silt,				5" Concrete at
05-29-98		2.0	5-5	coarse sand, gravel, ash (Fill) (SP-SM)				ground surface.
Friday	2D	2.0	5-5	Brown fine to medium sand, trace coarse				
Sunny		4.0	6-6	sand, gravel, silt (Fill) (SP-SM)				
80°F	3D	4.0	6-6	Do 2D (Fill) (SP-SM)		5		
		6.0	7-7					
	4D	6.0	8-5	Top:Brn f-m sand, tr gvl, c sa, si(Fill)(SP-SM)				
		8.0	4-3	Bot: Brown silty fine sand (Fill) (SM)				
	5D	8.0	4-1	Brown fine to coarse sand, trace silt, gravel				
		10.0	1-1	(Fill) (SP-SM)		10		
	6D	10.0	1-1	Do 5D (Fill) (SP-SM)				
		12.0	1-2					
					F	15		
	7D	15.0	2-3	Dark gray brown fine to coarse sand, trace				
		17.0	5-5	silt, concrete, gravel (Fill) (SP-SM)				
						20		
	8D	20.0	2-3	Do 7D (Fill) (SP-SM)				REC=3"
		22.0	4-6					
						25		
	9D	25.0	5-5	Brown fine to medium sand, trace coarse				REC=18"
		27.0	6-7	sand, silt, mica (SP-SM)				
						30		
	10D	30.0	6-7	Brown fine to medium sand, trace silt, mica				REC=18"
		32.0	8-10	(SP)				
						35		
	11D	35.0	8-11	Top: Do 10D (SP)		36		
		37.0	15-16	Bot: Red silty fine sand (SM)				
						40		
	12D	40.0	8-10	Red brown fine to medium sand, trace silt,				
		42.0	16-18	mica (SP-SM)	S			
						45		
	13D	45.0	4-4	Red brown fine sand, trace silt, medium to				
		47.0	5-9	coarse sand (SP)				
						50		
	14D	50.0	7-8	Do 13D (SP)				
		52.0	10-11					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: AVENUE V
LOCATION : BROOKLYN, NEW YORK

BORING NO. MRPS-3A
SHEET 2 OF 3
FILE NO. 8769
SURFACE ELEV. 10.5
RES. ENGR. C. CASCIO

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
05-29-98								
Friday								
Sunny								
80°F						55		
	15D	55.0	7-7	Do 13D (SP)				
		57.0	9-10					
						60		
	16D	60.0	5-10	Do 13D (SP)				
		62.0	12-13		S			
						65		
	17D	65.0	6-12	Red brown fine to medium sand, trace silt,				
		67.0	13-15	coarse sand, mica (SP-SM)				
						70		
	18D	70.0	7-9	Red brown fine sand, trace silt, mica				
		72.0	15-17	(SP-SM)				
						75		
	19D	75.0	9-9	Brown fine to medium sand, trace coarse				1st Attempt, no
12:48		77.0	14-17	sand, silt, mica (SP-SM)		77		recovery.
								2nd Attempt.
								REC=16"
						80		End of Boring at
								77'.
						85		
						90		
						95		
						100		

BORING NO. MRPS-3A

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT AVENUE V
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING NO. MRPS-3A
SHEET 3 **OF** 3
FILE NO. 8769
SURFACE ELEV. 10.5
DATUM BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK: CME
SKID:
BARGE:
OTHER:

TYPE OF FEED DURING CORING
MECHANICAL:
HYDRAULIC: X
OTHER:

CASING USED [ ] YES [X] NO
DIA., IN.: DEPTH, FT. FROM: TO:
DIA., IN.: DEPTH, FT. FROM: TO:
DIA., IN.: DEPTH, FT. FROM: TO:

TYPE AND SIZE OF:
D-SAMPLER: 2" O.D. SPLIT SPOON
U-SAMPLER:
S-SAMPLER:
CORE BARREL:
CORE BIT:
DRILL RODS: AWJ

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN.: 2-7/8
TYPE OF DRILLING MUD: QUIK - GEL

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN.: 5" O.D.

CASING HAMMER, LBS.: AVERAGE FALL, IN.:
SAMPLER HAMMER, LBS.: 140 AVERAGE FALL, IN.: 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
5-29-98	9:10	17	20	8	VISUAL WITH DROP LINE BY WATER METER (DDC).
6-1-98	8:35	34	55	7.9	VISUAL WITH DROP LINE BY WATER METER (DDC).
6-2-98	9:16	34	0	7.9	VISUAL WITH DROP LINE BY WATER METER (DDC).
6-3-98	14:10	34	0	7.9	VISUAL WITH DROP LINE BY WATER METER (DDC).

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON

STANDPIPE: TYPE PVC ID, IN. 2'-8" LENGTH, FT. 29 TOP ELEV.
INTAKE ELEMENT: TYPE SLOTTED PVC OD, IN. 2'-4" LENGTH, FT. 5 TIP ELEV.
FILTER: MATERIAL NONE OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.0" DIA. DRY SAMPLE BORING LIN. FT. 77
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR INDEPENDENT DRILLING
DRILLER JAMES MATTHEWS HELPERS RON BRIAN
REMARKS
RESIDENT ENGINEER C. CASCIO DATE 6-1-98

BORING NO. MRPS-3A