

A STAGE IA CULTURAL RESOURCES SURVEY
OF THREE SLUDGE FORCE MAIN ALTERNATIVE ROUTES
FOR THE FACILITY PLAN
CONEY ISLAND WATER POLLUTION CONTROL PROJECT,
BOROUGH OF BROOKLYN, NEW YORK

by

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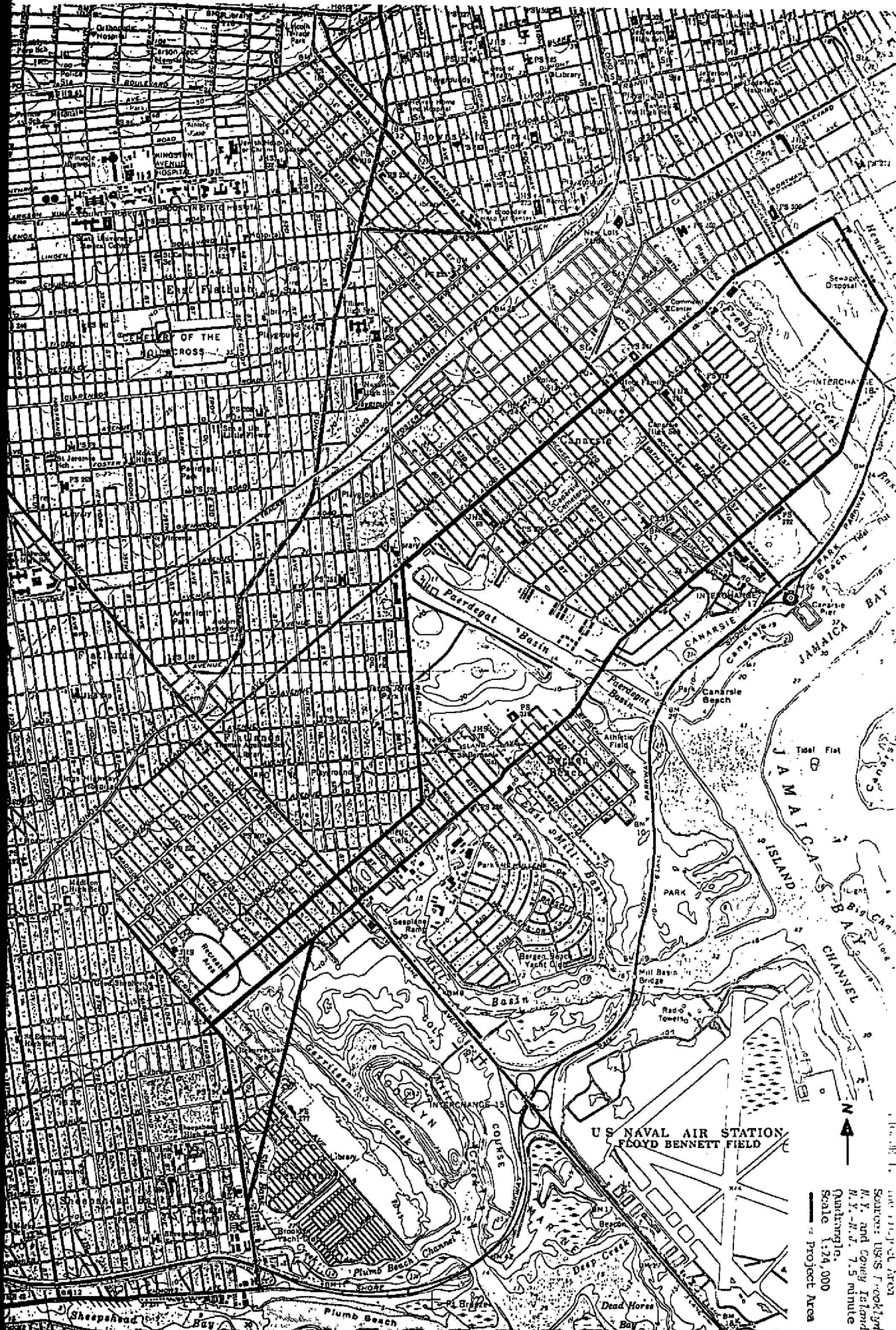
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I. INTRODUCTION

This report, prepared by Historic Conservation and Interpretation, Inc. (HCI) of Newton, New Jersey, for Pirnie/Baker, a joint venture of Malcolm Pirnie, Inc. of White Plains, New York and Michael Baker, Inc. of New York, New York, presents the results of a Stage IA Cultural Resources Survey of three sludge force main alternate routes for the Coney Island Water Pollution Control Project. The report is a continuation of the Stage IA work conducted on the proposed sewage treatment plant site located at the western end of the alignments being studied herein (Church, Williams, and Rutsch 1979). The proposed plan is to build a sludge pumping facility with a sludge storage facility through a 12-inch force main buried approximately 5 feet beneath grade. Three routes for the force main are considered here (see Figures 1 and 2).

The procedures followed and the conclusions and recommendations presented in this report are designed to comply with the requirements of the National Environmental Policy Act of 1969, the Historic Preservation Act of 1966, the Archeological Conservation Act of 1974, Executive Order 11593, and the procedures and regulations set forth by the New York State Division of Historic Preservation, the New York State Department of Environmental Conservation, and the United States Environmental Protection Agency, Region II.



U.S. NAVAL AIR STATION
FLOYD BENNETT FIELD

Scale 1:24,000
Project Area

Source: U.S.S. Frockling
N.Y. and Conroy Island
N.Y. - N.J. 7.5 minute
Quadrangle

BOROUGH OF BROOKLYN

ROUTE 3
32,000 FT.

ROUTES 1 AND 2





ROUTE 2
26,000 FT.

ROUTE 1
27,000 FT.

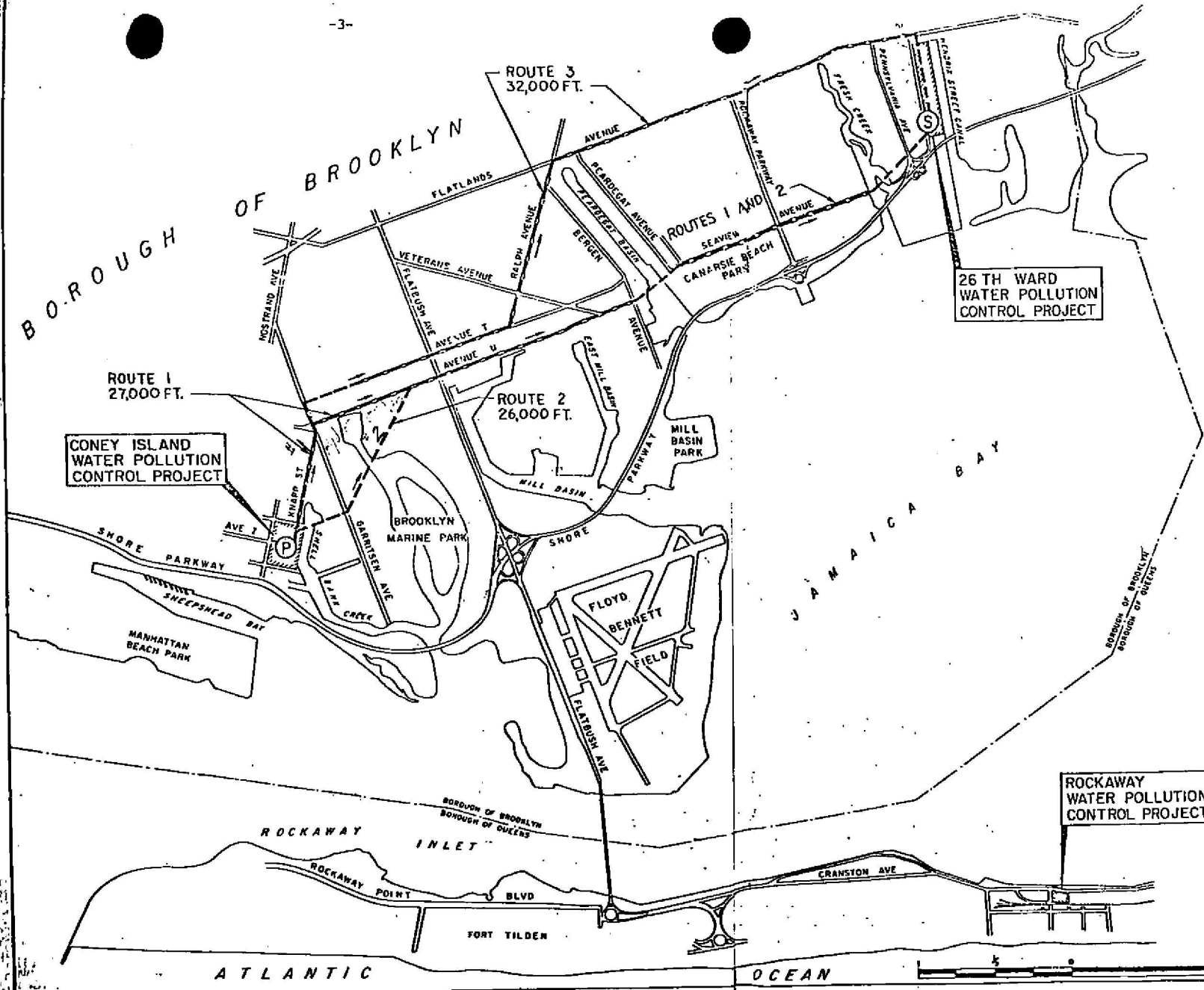
26 TH WARD
WATER POLLUTION
CONTROL PROJECT

CONEY ISLAND
WATER POLLUTION
CONTROL PROJECT

ROCKAWAY
WATER POLLUTION
CONTROL PROJECT

- LEGEND**
-  WASTEWATER TREATMENT PLANT
 -  NEW SLUDGE PUMPING STATION
 -  NEW SLUDGE STORAGE
 -  NEW SLUDGE FORCE MAIN

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CONEY ISLAND WPCP
**SLUDGE FORCE MAIN
ALTERNATIVE ROUTES**



A. Research Strategy

Research in primary and secondary sources was conducted in May 1980. In addition, previous findings from a Stage IA Cultural Resources Survey conducted for part of this facility plan were utilized (Church, Williams, and Rutsch 1979). Documentary research was carried out at the Brooklyn Public Library and the New York Public Library. Sources consulted include the National Register of Historic Places, the New York State Archeological Site Files, and the New York State Historic Buildings Survey. Information previously gathered at the American Museum of Natural History, the Long Island Historical Society, the Garvies Point Museum, and the Museum of the American Indian/Heye Foundation was also utilized.

A preliminary field examination of the project area was also conducted. This examination was designed to assess the present condition and land use of the project area and to walk over potential locales of archeological resources identified by the documentary and research phase of this study.

B. Summary of Recommendations

Each of the three alternate routes has a potential for impacting subsurface cultural remains. Alternate Route 1 will go through the Ryders Pond site and cross two watercourses where remains are likely. Inasmuch as the Ryders Pond Site is beneath existing streets, an archeological observer at the time of construction is recommended. Subsurface testing at the watercourse crossings is recommended.

Alternate Route 2 crosses Shell Bank Creek and Brooklyn Marine Park before becoming identical to Alternate 1. These areas are highly sensitive for aboriginal remains. Archaic material has been found in Marine Park, which was also the location of the Gerritsen homesite and gristmill. Careful testing is recommended here and at the watercourses crossed as Alternate 2 follows the route of Alternate 1.

Alternate Route 3 passes through the Ryders Pond site, and an archeological observer is recommended. This route then remains in streets away from watercourses until it reaches Hendrix Creek. The head of the basin at this creek has reportedly yielded shell heaps. Machine-assisted testing in open areas here is recommended.

The entire project area is heavily developed and covered with asphalt and fill. Although the extent and context of subsurface remains cannot be predicted under these circumstances, recent finds in Marine Park indicate that such remains are likely protected by a mantle of fill. No historic structures are involved.

II. PHYSICAL SETTING

A. Introduction

Physical setting is important to human occupation because each group perceives and uses the environment according to its culture. It is one important variable, along with culture, for interpreting settlement patterns, patterns of subsistence, and many aspects of social and economic development. Features such as landforms, soil, or vegetation may encourage or inhibit settlement by Native Americans or Euro-Americans according to their level of technology or mastery of the environment, their attitudes and perception of the environment, and their general socioeconomic level.

The physical setting is also dynamic and can be altered over relatively long periods of time as a result of natural change and over relatively short periods of time as a result of human activity. Salient environmental features to be considered here include landforms, vegetation, soils, and drainage, for all affected human occupation. Equally important is the level of previous disturbance or environmental change through human activity. Disturbance can destroy, obscure, or expose cultural resources within the affected area.

B. The Setting

The study area is situated on the southern coast of the western end of Long Island, in the inner part of the Atlantic Coastal Plain physiographic

province. The smooth, gentle, southeasterly sloping landscape found in this portion of Long Island is the product of a long history of marine sedimentation followed by the accumulation of vast amounts of moraine and outwash sediments related to Pleistocene glaciation. More recent shoreline erosional forces and shifting sea levels have completed the development of the terrain found presently in the study area (Fuller 1914: 1; Schuberth 1968: 213).

The ancestral terrain of Long Island was probably created during the Tertiary period, 1.5 to 65 million years ago. Some of the tougher sand and clay deposits of the Raritan and Magothy formations, laid down during the previous Cretaceous period, resisted the erosive force of the existing river drainage--which eventually became Long Island Sound--to emerge as a line of hills rising as much as 400 to 600 feet above sea level. This line of hills was the northeastern continuation of the cuesta that forms part of the present-day Coastal Plain of New Jersey. The northern slope, overlooking Long Island Sound, was relatively steep, whereas the southern slope was more gentle (Schuberth 1968: 164-80).

Most of the familiar land features of Long Island are the results of glacial action. Two terminal moraines are evident, both resulting from substages of the last glacier, the Wisconsin, which retreated from this area approximately 15,000 years ago. Evidence of the older moraine, the Ronkonkoma, starts at Montauk Point at the eastern end of Long Island and runs to Lake Success in western Nassau County, where it is crossed and obscured by the younger Harbor Hill moraine. This ridge runs from Orient

Point at the northeastern tip of the island to New York Harbor, where it is cut by the channel known as the Narrows, and thence into New Jersey. These morainal formations create the "backbone" and the two "flukes" of the whale to which the shape of Long Island has long been compared (Schuberth 1968: 184-87).

A vast outwash plain stretches from the morainal ridges southward to the Atlantic Ocean, a distance of up to 11 miles. This plain was formed as streams of meltwater carrying masses of gravel, sand, and silt flowed away from the glacier and deposited their debris as they lost velocity (Fuller 1914: 23; Schuberth 1968: 187). At the western end of Long Island, this outwash rests on the eroded surface of the gravels of the Manhasset formation (left behind by the Ronkonkoma advance of the Wisconsin glacial stage) and ranges from moderately coarse gravel and pebbles at the edge of the moraine to gently sloping fine sand at the south shore. The surface is generally covered by a foot or more of brownish sandy or pebbly loam and clayey sand (Fuller 1914: 166, 172-73; Schuberth 1968: 187).

Post-glacial changes in the landscape consist basically of the formation of the barrier beaches and the growth of vast areas of marsh. The extremely gentle seaward slope of the plains, only 10 to 20 feet to the mile, means that large waves break at a considerable distance from the shore. Wave action tosses sand shoreward and deposits it just landward of the breaker line, creating submerged bars which eventually grow into exposed beaches and islands. Coney Island is the westernmost of the string of barrier beaches which parallel the southern coast of Long Island (Fuller 1914: 178; Schuberth 1968: 200).

Behind the barrier beaches lagoons were created, cut off from the open sea. Eventually large portions of these lagoons were filled to the high tide level with sediments, either deposited by streams flowing into the lagoons or created by rotting vegetation that took root in the shallow waters; tidal or salt marshes replaced the open water of the lagoons (Fuller 1914: 183-85; Schubert 1968: 206). The addition of this marshland added perhaps as much as 100 square miles to the area of Long Island and created a new and useful natural resource, as immense quantities of salt hay were once harvested from the marshes (Fuller 1914: 176, 183).

Growth of the vast areas of coastal marsh is also correlated to the well-documented effects of post-glacial eustatic or world-wide rise in sea level. Since the volume of surface water on the earth has remained unchanged over millions of years, when enormous amounts of water were frozen into expanding glacial ice sheets, sea levels were lowered. With the recession of the glaciers, meltwaters fed back into the oceans and the sea levels rose. For coastal New York and New Jersey this rise in sea level has been estimated at between 3 and 4 feet per century until about 6,000 years ago when the rate slowed to 1 foot per century. About 2,600 years ago this rate slowed again to 0.45 feet per century (Salwen 1965: 32). The effect of this rise has been the drowning of large coastal areas, many of which may have supported prehistoric inhabitants.

Until the twentieth century, the region comprising the present study area was dominated by marshland and estuary meadows fringing Jamaica Bay. Available nineteenth-century maps of the region show only sparse settlement

with small communities developing on the better-drained localities such as Canarsie, Flatlands, and Gravesend (see Figures 3 and 4). Generally, the only structures located near the extensive marshlands were occasional homes and tidal mill complexes, the most notable of which was the Gerritsen mill on Gerritsen Creek behind the present Resurrection School (see Figure 1).

Figure 3 indicates that at the beginning of this century most of the study area was still undeveloped. However, since then urban development has covered this region, now a portion of the City of Brooklyn. Comparison of Figures 1 and 3 readily shows that large sections of marshland around Jamaica Bay have been filled in to support additional housing and commercial enterprises. Land reclaimed through filling is the dominant terrain of the study area. Soil borings placed in the vicinity of the Coney Island Water Pollution Control Project have exposed anywhere from a few feet to 20 feet of fill overlying organic silt and peat, below which is the ubiquitous stratum of loose to compact, brown or gray sand with traces of silt and gravel (Meuser *et al.* 1979).

The effect of this extensive reclamation has been the opening of large tracts of land previously unavailable to historic populations. However, many of the filled areas were potentially utilized by prehistoric people prior to being submerged with the rising post-glacial sea levels. Fill, therefore, may cover yet unidentified prehistoric archeological resources.



FIGURE 3. Portion of Brooklyn Quadrangle, 1901.
 USGS Brooklyn Quadrangle. 15 minute series.
 Scale 1:62,500'
 - - - - - = Project Area

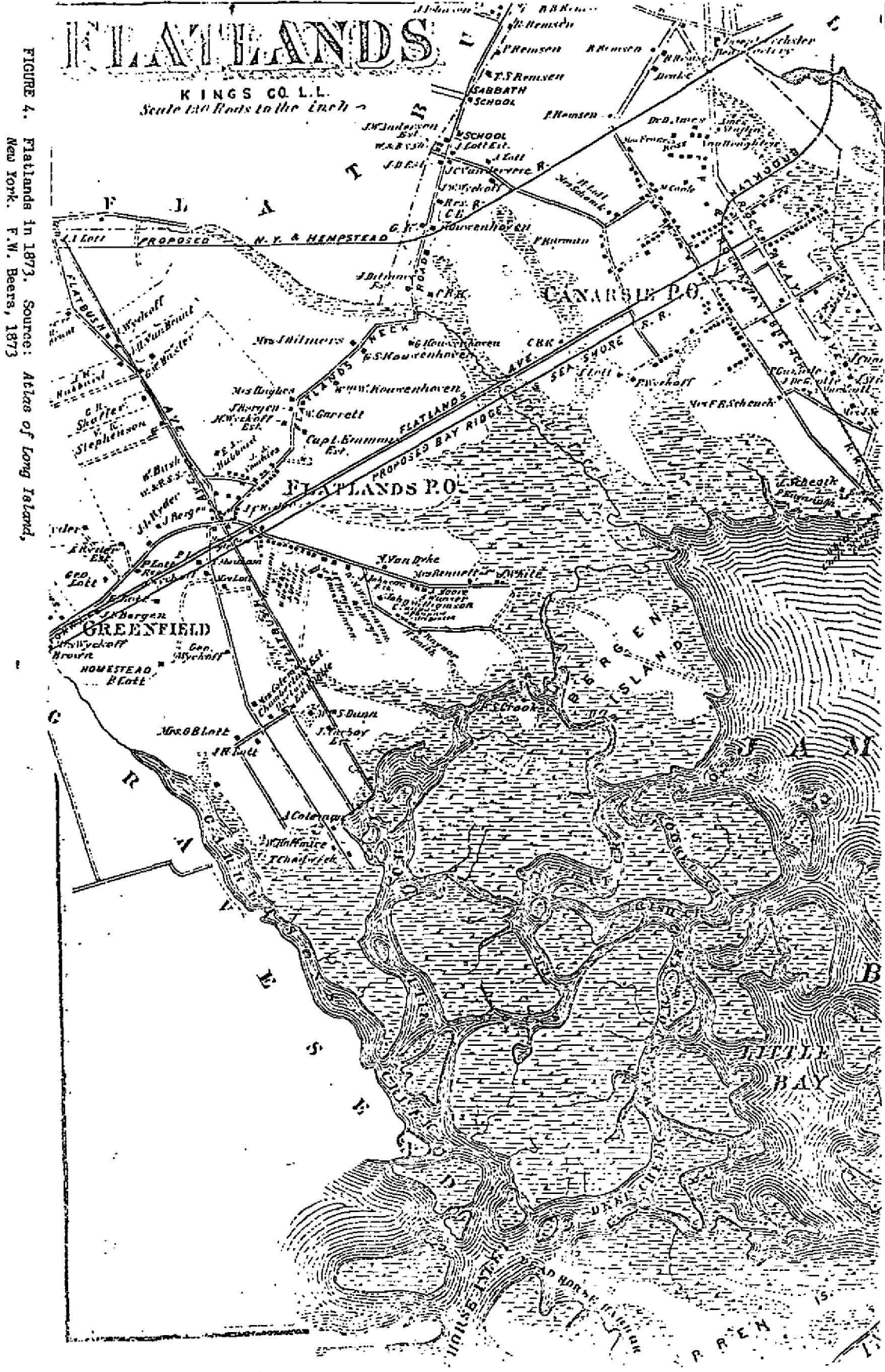


FIGURE 4. Flatlands in 1873. Source: Atlas of Long Island, New York. F. W. Beers, 1873.

III. PREHISTORIC OCCUPATION

A. Introduction and Sensitivity

Numerous archeological source materials exist for eastern and northern portions of Long Island and for the neighboring region of Staten Island. For western Long Island, and specifically for the study area, fewer archeological studies have been conducted. Source materials, including historic accounts of archeological finds such as "shell heaps" and the more recent studies on the Ryders Pond site near Gerritsen Avenue and Avenue U (Lopez and Wisniewski 1971), help indicate that the study area was a region known and utilized by Native Americans. A search of the New York State Archeological Site Files revealed that one prehistoric site is definitely within the study area and others are within close proximity of it. The Ryders Pond site, a habitation and possible village site located generally near the mouth of Gerritsen Creek and the intersection of Gerritsen Avenue and Avenue U is within the study area. A preliminary surface reconnaissance of the area conducted for this study indicated that urban development has probably heavily impacted this site. However, the partially filled-in banks of Gerritsen Creek and the filled-in mouth of the creek, which is now a recreation area just east of Gerritsen Avenue, have a high potential of yielding prehistoric archeological materials (see Figure 1). In fact, recent work in Marine Park unearthed significant Archaic materials (*The New York Times* July 1979: B3). Two sites are reported on Fresh Creek Basin,

a camp site near Avenue M and 108th Street and a village site across the basin from the camp site. In addition, shell heaps are reported at the head of Hendrix Creek, in close proximity to the sludge storage facility proposed on Figure 2. Two unidentified sites are also listed in the New York State Files as flanking the northern shore of Sheepshead Bay between 23rd and 28th streets.

Historic references to prehistoric sites in this region suggest a strong utilization of the shore of Jamaica Bay by Native Americans. The Canarsie Indians, who inhabited the Ryders Pond site, had a principal village near the present Canarsie section of Brooklyn (Bolton 1920: 313; Jaffe 1979: 46). The proposed project does transect this section of Brooklyn along Seaview Avenue. Immediately south of the study area is Bergen Beach, now also known as Mill Basin. Although the landscape of this region has been heavily altered through filling and housing development, Bergen Beach was probably an important wampum manufacturing site for the prehistoric inhabitants (Van Wyck 1924). Other references to archeological sites generally are vague identifications of "shell heaps" or "shell banks" mostly on the banks of Gerritsen Creek, earlier known as Strome Kill, and around Bergen Island.

Habitation and utilization of the environment by Native Americans are clear in and about the study area. Unfortunately, the potential of the region for yielding prehistoric archeological resources is less obvious owing both to the effects of rising post-glacial sea levels, which have undoubtedly

submerged archeological sites, and the extensive disturbance of the original landscape by more recent populations through filling in of wetlands and intensive urban growth. Buildings and asphalt now cover a high percentage of the land here. However, land that is still open has a high potential for containing prehistoric archeological materials.

In the following sections a model of the aboriginal occupation of the region will be presented. This model is based on archeological investigations conducted in nearby areas.

B. Paleoindian Stage

Potential Paleoindian occupation within the project area must be inferred from data drawn from other areas in the region. Paleoindians probably exploited the earliest post-glacial environments by remaining in small, family bands of hunters and gatherers. Because these people represented a highly mobile, small population, and because they may have preferred well-elevated locations which were the locations to be first and most extensively developed by historic populations, there is little archeological record of them. Ritchie (1965: xvii) reports that a Paleoindian component was discovered at the Port Mobil site, Staten Island, New York, a location within ten miles of the project area. Other Paleoindian sites are also reported within inland portions of New Jersey and New York (Ritchie and Funk 1973).

Whether Paleoindians occupied or exploited the project area or the region of western Long Island is problematic. No Paleoindian sites or materials have been identified within Long Island.

C. The Archaic Stage

As the post-glacial environment of the Northeast evolved toward more modern conditions, the subsistence and settlement patterns of people occupying this region changed. Newly developed natural resources and an increased knowledge of the environment by its human inhabitants influenced "an early level of culture based on hunting, fishing, and gathering of wild vegetable foods" (Ritchie 1965: 31). Ritchie adds that "Cultures of the Archaic stage in the Northeast area give evidence of mobility, small-band organization, and simple social structuring" (1965: 32). Material evidence of people practicing this more balanced economy of hunting, fishing, and gathering is generally associated with dates as early as 6,500 B.P. Within coastal New York, this material evidence has been gathered at several sites on Staten Island and along the northern and eastern shores of Long Island (Ritchie and Funk 1973: 4).

Materials identified at localities in Long Island and Staten Island suggest their use as campsites by small bands of people seasonally exploiting the abundant shellfish resources as well as practicing some hunting and gathering (Smith 1950: 106). Unfortunately, with the eustatic rise in sea levels that has affected coastal areas since glacial times, many areas potentially sensitive to finds of Archaic materials may be drowned (Salwen 1965).

D. The Transitional Stage

Sites representing human activity during the Transitional Stage have also been identified along the northern and eastern portions of Long Island.

Generally, the beginning of this stage (c. 3,300 B.P.) is identified by the presence of stone pots in artifact assemblages similar to those found at Archaic sites (Ritchie and Funk 1973: 71). Transitional aborigines probably practiced an economy similar to that found for the Archaic, i.e., a balance between shellfish and plant gathering and hunting generally carried on by small, seasonally mobile populations.

Based on finds in northern and eastern Long Island, Ritchie (1975) has defined much of the Transitional in coastal New York as the Orient Phase of cultural development. Associated with the Orient Phase are lithic projectile points of "semi-lozenge" or "heart-shaped" form along with evidence of mortuary ceremonialism (Ritchie and Funk 1973: 71). Again, campsites similar to those from the Archaic are potentially within the region of the project area, either near the present shore or below water, as are burial sites within better-drained areas.

E. The Woodland Stage

The introduction of the Woodland Stage is marked by the appearance of new traits in the archeological record. Beginning with the Early Woodland (c. 3,000 B.P.) is a pronounced presence of ceramic pottery at archeological sites, as well as other traits such as tubular smoking pipes of clay or stone, birdstones, and boatstones (Ritchie and Funk 1973: 96). Burial ceremonialism, evidence of which first appeared in Transitional sites, became more complex and refined through the Middle Woodland.

Apparently, the subsistence and settlement patterns of the Early and Middle Woodland people remained similar to those of their ancestors. Trash pits and shell middens found throughout coastal New York indicate that Woodland people were subsisting on a variety of food resources but certainly relied heavily on the shellfish resources of the coastal bays and estuaries (Smith 1950: 106; Ritchie 1965: 268).

Later Woodland people continued the use of ceramic pottery, now more elaborate and decorated. However, sites dating near the period of contact with Euro-Americans appear to lack the ceremonialism associated with burials of earlier Transitional and Woodland cultures (Ritchie 1965: 267). Ritchie (1965) has defined two cultural phases of the Late Woodland for coastal New York including western Long Island. The Bowmans Brook and later Clasons Point phases, distinguished by the ceramic and lithic artifacts found at various trash pits, habitation sites, and burials on Staten Island, Long Island, and the lower Hudson Valley, represent cultures of a more sedentary, village population still exploiting the abundant shellfish resources, as well as game found within the surrounding deciduous forests (Smith 1950: 116-17, 120-21; Ritchie 1965: 267-71). Throughout the northeast, similar villages were also beginning agricultural practices with maize, beans, squash, and other varieties.

The extent of agricultural practice in coastal New York may have been quite minor. Ceci (1977) argues that maize cultivation by the Algonquian Indians of Long Island was never more than marginal owing to the generally infertile quality of soils in coastal New York. Village life developed

for these Late Woodland people around the production of wampum, the shell currency of the Indians. During the seventeenth century the Canarsie Indians (western Long Island tribe of the Algonquins) became involved in trade with the newly arriving Dutch and later English. Wampum, manufactured by the local Indians, became an important currency in the fur trade and in the acquisition of settlement lands for the Europeans.

However Late Woodland village life developed, either through the early requirements of agriculture or through the later production of wampum for trade, two villages of the Canarsie Indians existed in the region. The principal village of the Canarsie was near the present Canarsie section of Brooklyn (Bolton 1920: 313). The second village was the Ryders Pond site, also known as Gerritsen Basin (Bolton 1920: 312; Lopez and Wisniewski 1971). As previously mentioned, this village site is within the study area. Reports of shell banks possibly representing refuse of this village are known for Gerritsen Creek, formerly Strome Kill (Bolton 1920: 274; Van Wyck 1924: 649; Wood 1824).

Bergen Beach, immediately south of the study area, is also recognized as possibly one of the more important wampum manufacturing sites on the coast (Van Wyck 1924). Undoubtedly, control of this coastal region by the European traders and settlers was important owing to the regional wampum production and the proximity of the important inland waterway, the Hudson River. Seventeenth-century control of western Long Island by Europeans produced a definite decline in the Canarsie culture and eventually crowded the Canarsie out of the coastal region (Smith 1950: 103; Ceci 1977: 264-65).

F. Prehistoric Sensitivity

Several sites are reported in and adjacent to the project area. Each tidal basin crossing, where fill rather than construction of new buildings is the dominant landscape feature, either contains reported sites or should be considered as likely to contain sites. In addition, Paleoindian sites and early Archaic sites may lie deeper in those areas submerged by rising sea levels.

IV. HISTORICAL DEVELOPMENT

A. Introduction

In the almost 380 years since initial settlement in the project area, the land and the cultural landscape have undergone sweeping transformations. Initially a flat coastal area with tidal streams, extensive salt marshes, and several small islands, the entire region has become a commercial, residential zone characterized by busy urban streets, vast filled flats over the former marshes and islands, and channelized watercourses. This significant transformation, and the land use patterns associated with the change bear directly on the likely locations of historic period cultural resources.

B. Initial Settlement

The history of territorial claims in the New York Harbor region is a complex one, just as it is along the entire Atlantic coast of the United States. Cabot, Verrazano, and Hudson all made voyages, wrote accounts, and had their journeys used as a later basis for land claims. Of these explorers, Henry Hudson was initially most prominent since his voyage in 1609 led to the initial settlement of the New York City area.

Hudson's voyage for the Dutch East India Company led to settlement in Manhattan established for the purpose of trade. At the time, Holland was one of the most liberal, tranquil nations in Europe, and there existed

little pressure for trans-oceanic colonization from dissident groups with the country. Consequently, the Dutch were not pressured internally to open land for settlement, and the government was interested primarily in securing trade routes and rights.

The first serious attempts at colonization east of New Amsterdam (Manhattan) did not occur until the late 1630s, well over a decade after title to New Amsterdam had been secured from the Indians. Although such matters are often romanticized and disputed, it is claimed by some writers that the first "white" or European settlement on Long Island occurred in Flatlands, the early town name for the study area and its vicinity (Van Wyck 1924: 78). Regardless of the truth of this claim, there is general agreement that the first grants of land by the Indians in Kings County (Brooklyn) were made in 1636 (Stiles 1884: 43; Van Wyck 1924: 79; *Historic Brooklyn* 1946: 3). Other grants soon followed.

In 1639 and 1643 land within what was to become Gravesend was granted to Anthonie Jansen van Salee (Flint 1967: 109), and in 1644 Coney Island was granted to Guysbert Op Dyck, who apparently failed to occupy his patent (Stiles 1884: 159, 189). In 1645 a patent was issued to Lady Deborah Moody and others incorporating the town of Gravesend and giving the settlers the right to graze their livestock on Coney Island (Thompson 1849, III: 110; Flint 1967: 114-15). She had apparently been granted a preliminary patent of some sort two years earlier (Flint 1967: 109; Stiles 1884: 157).

Lady Moody had settled in Salem, Massachusetts in 1640, but religious differences with her neighbors there soon led her to seek a home elsewhere

(Flint 1967: 105-108). She settled at Gravesend with a group totaling 40 English families, who were granted land by the Dutch on the condition that they take an oath of allegiance to the Dutch government (Stiles 1884: 43). [The towns of Newtown, Flushing, Jamaica, and Hempstead within the present Queens County were likewise settled by the English within Dutch territory (Thompson 1849, I: 151).]

The English were interested in the Dutch colony of New Amsterdam, and, in fact, claimed the area as a result of the early explorations of John Cabot. The influx of settlers to Long Island from New England, with increasing demands for freedom from Dutch restrictions on trade and settlement, eventually led the English to seize control of the colony. This move was a political one, based on the English desire for hegemony over North America rather than one motivated for concern for English colonists in a Dutch territory.

Had the Dutch been more open in their settlement policies, perhaps the pressure brought to bear, and the support provided by the English colonists, would not have been so great. New Amsterdam reflected the political-social climate of the home nation: it was open and tolerant of all races and creeds--the very qualities that first attracted so many English dissidents from New England. However, the Dutch forbade scattered settlements and occasionally enforced the rule, preferring to concentrate people in a few key settlements as protection against Indian attacks so that their limited forces could concentrate on controlling trade.

Under these conditions of little reason to leave Holland and restrictions on settlement in the New World, it is not surprising that early Dutch settlement was relatively sparse. Although the first vernacular name for the area was New Amersfoort, the name "Flatlands" was more descriptive of the natural setting and became adopted as the official town name under later English control (Stiles 1884: 64). Stiles (1884: 65) describes this flat area as one which was open, having been cultivated by the Indians, and thus convenient for Dutch settlers who had had little experience in clearing land. It also had the advantage of salt marshes, which could be reclaimed for salt hay for cattle, an experience very familiar to the Dutch.

Initial settlement forms were bouweries and plantations, Dutch farmsteads dispersed about the area rather than tightly drawn together in villages as was the English custom brought from New England. It is likely that early tidal gristmills also were established to grind grain into an edible form. Also likely is some fishing activity, for the settlers learned early of the abundance of shellfish from the shell mounds of the Indians. Despite this relatively hospitable environment, Peter Stuyvesant is reported as finding the Flatlands quite empty of settlers upon his arrival in 1647 (Stiles 1884: 64). In 1656, permission was asked to erect the village of Canarsie and a small settlement began in what is now the eastern end of the project area.

C. The Agricultural Period

The entire study area remained rural in character through the eighteenth and nineteenth centuries. Farmsteads along main roads, tidal mills, and coastal activity, the hallmarks of initial settlement, persisted through the colonial period well into the national period. For example, settlement was sparse enough, even after the English had taken control in 1664, that large landholdings were not subdivided into lots until 1719 (Van Wyck 1924: 73). Even the English army during the American Revolution, in passing nearby for the Battle of Brooklyn, scarcely paid attention to the area.

By 1836, Thomas Gordon in his gazetteer refers mostly to salt hay production, an enterprise which can occupy considerable land but not land suitable for the building of permanent structures. He describes the village of Flatlands as having one church, two stores, one tavern, and fourteen dwellings (Gordon 1836: 497). This settlement is extremely small by comparison to nearby villages such as Flatbush or Gravesend. Federal and state census figures for the entire town of Flatlands during the period 1820-1835 show a population in the 500 to 700 range. After this period, little historical information concerning this rural area is available, which probably indicates a stable rural setting based on ways of life established during the initial settlement phase.

The first significant change probably occurred with the later development of resort activities just to the west, centered on the Coney Island

area. While Spafford (1824) and Gordon (1836) refer to resort developments to the west at their respective early dates, they make no mention of any such activities in the project area. Thus it is likely that development did not begin until after 1874, when the large-scale development of Coney Island began, coincident with the construction of several railroads. On the only available map of Flatlands, published in 1873, limited development and proposed railways are evident (Figure 4).

Figure 4 does reveal an interesting pattern of flats and islands. It appears that the edges of these areas were settled and exploited, but filling in did not begin until the twentieth century. Other similar areas in the New York City vicinity were being filled at this time in response to commercial interests. That this area was not filled attests to its relatively remote location and strongly agricultural base.

Even as Coney Island and the Sheepshead Bay area became a fashionable resort from 1880 to World War I, there was limited development in surrounding areas. Agriculture continued to be the dominant land use until World War II. Again, limited documentary evidence makes it difficult to detail the exact sequence of development here; however, visual inspection of the project area reveals that post-World War II housing is dominant over the 1920s row housing present in some districts.

D. The Post-War Boom

It was not until after World War II that development began on such a scale that the past has almost been obliterated. A substantial portion

of area housing, as noted, dates from this period (*Plan for New York City* n.d.). In 1946, when a local newspaper published vignette histories of the towns within Brooklyn, numerous Dutch and other colonial houses were still standing in the town of Flatlands (*Historic Brooklyn* 1946). Much of the filling in of the waterfront was occurring at that time as well. Projects such as Marine Park, through which the proposed Alignment 2 passes (refer to Figure 2), were underway at that time (*Historic Brooklyn* 1946).

At present, the spread of development has obliterated and covered most traces of the past. Long commercial streets, high-rise apartments, row housing, and shopping areas dominate the scene. A layer of fill covers all the tidal flats, obscuring any historic period remains that might exist.

E. Historic Period Sensitivity

Owing to the rapid growth of the past decades, the likelihood of historic period remains is problematical. No properties eligible for the National Register of Historic Places are listed in the project area. On the New York State Historic Buildings Survey, only four properties are listed in the general area. Three of these are well south of the project area, between Seaview Avenue and Jamaica Bay. The fourth, the Gerritsen Homestead and Mill Site, is in the vicinity of Gerritsen Creek and may be near Alignment 2 in Marine Park. This property was an early tidal gristmill, elements of which may be beneath the fill of Marine Park. If this route is selected, careful archeological testing along the alignment will be necessary as the

wet conditions would have preserved any elements of the site. Any other historic period remains in any of the alternate alignments cannot be predicted owing to heavy fill and wholesale alteration of the landscape.

V. RECOMMENDATIONS AND CONCLUSIONS

A reconnaissance survey of the alternate routes was conducted in conjunction with the documentary research. Modern construction and fill make it impossible to assess the potential for any area to yield archeological remains *in situ*. However, several areas deserve careful subsurface testing before construction of any alternate route begins. The following archeological testing (Stage IB) program is recommended.

A. Alternate Route 1

This route begins at the Coney Island Water Pollution Control Project on Knapp Street and proceeds north on Knapp Street to Avenue U (see Figure 2). At the intersection of Knapp Street, Gerritsen Avenue, and Avenue U is the Ryders Pond prehistoric village site. There is substantial development at this intersection and there are utilities in the street. Thus, the site is of unknown condition. Because this is an extremely busy intersection, and because modern developments may have damaged part of the site, it is recommended that an archeological observer be present when construction occurs here. The alternative is to test before the construction. This course of action would be extremely expensive in terms of traffic rerouting, street breaking, and later repairs, and is probably not warranted under these circumstances.

If this route is selected and this recommendation accepted, provision must be made with the contractor to be prepared to suspend work for from

1 to 2 days if aboriginal materials are encountered so that careful recovery and recording are possible.

From this point, the force main proceeds east on Avenue U. Inasmuch as this street is heavily developed and utilities exist in the street, some deeper than the proposed force main, no testing is recommended. The likelihood of discovering *in situ* remains is low and not worth the expense of breaking the street.

The force main next crosses Paerdegat Basin, proceeds eastward on Seaview Avenue, crosses Fresh Creek, and terminates at the Sludge Storage facility. Both watercourse crossings--which are open, filled, land--are considered highly sensitive for prehistoric remains, particularly around Fresh Creek, where two sites are reported north of the proposed alignment. It is recommended that careful subsurface testing occur at these locations. Owing to a deep mantle of fill, a backhoe will be necessary for excavation.

B. Alternate Route 2

This route begins at the Coney Island Water Pollution Control and goes eastward and northward across Shell Bank Creek, Gerritsen Avenue, and Brooklyn Marine Park before joining and becoming identical to Alternate Route 1. This alternate is the most sensitive of the three proposed, because Shell Bank Creek and Marine Park have a high probability of yielding archeological remains. Marine Park, in particular, was the site of the Gerritsen Gristmill as well as the location of recent Archaic finds. Careful testing, machine assisted through fill, is recommended here.

The alternate then follows the same route as Alternate Route 1, along Avenue U and Seaview Avenue. Machine-assisted testing will be necessary at Paerdegat Basin and Fresh Creek, as recommended previously for Alternate 1.

C. Alternate Route 3

This route proceeds northward from the Coney Island Water Pollution Control Project on Knapp Street and passes through the Ryders Pond site. As with Alternate Route 1, an archeological observer is recommended at the time of construction.

This alternate then proceeds eastward on Avenue T, northward on Ralph Avenue, and eastward on Flatbush Avenue. All these streets are heavily developed, with buried utilities, and are not likely to yield archeological remains. No testing is recommended.

Finally, this alternate proceeds southward off Flatlands Avenue adjacent to the Hendrix Street Canal or Hendrix Creek (refer to Figures 1 and 2). Shell heaps have been reported here, and machine-assisted archeological testing is recommended in available open land.

Finally, it is recommended that careful coordination between project engineers and archeologists occurs when the preferred alternate is selected and an archeological testing program is agreed upon. The preparations required, including backhoe rental and gathering of existing utilities data, will take some time as will the actual execution of the testing through the

heavy fill. In addition, careful coordination for an archeological observer at the Ryders Pond site, if either Alternates 1 or 3 is selected, is necessary to avoid confusion and delay in successful completion of the proposed project.

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