Contract No. DACW51-01-D-0017-3
Delivery Order No. 0026

U.S. Army Corps of Engineers
New York District

PHASE I COMBINED EROSION CONTROL AND STORM DAMAGE PROTECTION FEASIBILITY STUDY, SOUTH SHORE OF STATEN ISLAND, RICHMOND COUNTY, NEW YORK

FINAL REPORT

July 2005

Panamerican Consultants, Inc.
Buffalo Branch Office
2390 Clinton Street
Buffalo, New York 14227-1735

Prepared for:

Northern Ecological Associates, Inc.
451 Presumpscot Street
Portland, Maine 04103

Under contract to:

U.S. Army Corps of Engineers
New York District
CENAN-PL-EA
26 Federal Plaza
New York, New York 10278-0090

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Management Summary

Project Name. Cultural Resources Survey for the South Shore of Staten Island Combined Erosion Control and Storm Damage Protection Feasibility Study, Borough of Staten Island, Richmond County, New York.

Project Description and Environmental Setting. Various protection measures will be constructed along six miles (9.7 kilometers) of the southern shoreline of Staten Island, New York Bay, from Fort Wadsworth to Crescent Beach. From Fort Wadsworth to Miller Field the measures comprise one of three options: 1) raising Father Capodanno Boulevard (Alternative FO3); (2) a combination of raising the Boulevard from Fort Wadsworth to Sea View Avenue coupled with elevating the Franklin Delano Roosevelt promenade section of the boardwalk above a seawall from Sea View Avenue to Miller Field (Alternative FO7), and 3) placement of buried and sheet pile seawalls immediately seaward of the boardwalk and landward of the promenade (Alternative FO2). A number of houses will need to be raised on the landside of the Boulevard under either of the first two alternatives.

A series of buried seawall (Alternatives FO2 and FO3) or buried seawall/raised promenade (Alternative FO7), complemented by sheet pile seawall, dune reinforcement, levees, and floodwall will be constructed from Miller Field the Oakwood Beach Sewage Treatment Plant. For the remaining Crescent Beach area the options entail a sloped stone sea wall with levees, or a vertical sheet pile seawall with levees. Inland water flow for the entire project length will be addressed through interrelated non-structural protection areas, ponds, pumps and storm sewer arrangements.

Purpose and Goals. A Phase I cultural resources investigation was conducted by Panamerican Consultants, Inc. under contract to Northern Ecological Associates, Inc., Fredonia, New York, and the U.S. Army Corps of Engineers, New York District. The goals involved locating prehistoric and historic remains and evaluating standing structures within the project area that might be affected by the protection measures. Assessments of identified resources' potential eligibility to the National Register of Historic Places, as well as appropriate recommendations for additional work were also expected.

Regulatory Basis. The U.S. Army Corps of engineers (USACE), as a federal agency, has management responsibilities concerning the protection and preservation of cultural resources on land it uses. Federal statutes require USACE to identity and evaluate significant cultural resources on these properties, and include: the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470 *et. seq.*) through 1992 (which includes Section 106 compliance); National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4371 *et. seq.*); Archaeological and Historic Preservation Act (AHPA) of 1974 (16 U.S.C. 469_469c); and the Advisory Council on Historic Preservation (ACHP) Guidelines for the Protection of Cultural and Historic Properties (36 CFR Part 800); as well as Army Regulation (AR) 200-4 "Cultural Resources Management.

Survey Results

Prehistoric Cultural Resources. An assessment of environmental conditions indicated that the probability of locating later prehistoric sites or materials within the entire project area would be low, and indeed the field survey failed to uncover any evidence for near-surface

prehistoric sites or materials. Deeply buried earlier prehistoric sites under the current beach, near-shore zone and filled-in historic marshes remain a possibility.

Historic Cultural Resources

Fort Wadsworth to Miller Field

Archival. Recorded historic resources very near or in this portion of the project area comprised the Walton-Stillwell House built in 1668; later 1800s Kettletas and W.H. Townsend properties with outbuildings along the South Beach shoreline, and a number of resort and amusement facilities from the late 1800s to mid-1900s set between the present Boulevard and boardwalk.

Architectural. A mixture of residential and commercial concerns, the majority of which date to the mid to late-1900s, characterizes the west side of Father Capodanno Boulevard. A minor number of early to mid-1900s residences, which are typical of mid-1900s regional suburban dwellings, can be found at the north end; almost all have been modified. The Franklin Delano Roosevelt boardwalk was originally built between 1935 and 1938, but has subsequently been replaced. The few existing structures between the boulevard and boardwalk relate to post-1950 maintenance, comfort or concession buildings. The National Register-eligible Verrazano-Narrows Bridge can easily be seen from Miller Field northward.

Field Survey. No near-surface (within three feet or a meter) prehistoric sites or materials were located. No surface or subsurface historic structural remains or associated features were identified. Only a minor amount of historic 1800s and early 1900s materials were recovered. Three pond areas were visually inspected to locate any testable areas within the defined wetlands.

Miller Field to Oakwood Beach Sewage Treatment Plant

***Archival*.** The Miller Army Air Field Historic District (90NR01020) was placed on the National Register of Historic Places in 1980. A 44-foot concrete fire control tower (built 1943) lies shoreward of the field and was connected with the airfield's role in harbor defenses during World War II.

Other 1600s to 1900s properties whose remains might be extant include: Revolutionary War fortifications; the Britton Cottage; the Barnes House; the Lighthouse and Lighthouse Keepers House; the Lakes Mill and Millers House; St. Johns Hospital; residences and resort facilities, and the Cedar Grove Beach Club community.

Architectural. The Miller Army Air Field associated fire control tower and Cedar Grove Beach Club community bungalows were examined in relation to their potential eligibility to the National Register. Mid- to late-1900s structures include the Oakwood Beach Sewage Treatment Plant and residences near by but outside the project area.

Field Survey. No near-surface (within three feet or a meter) prehistoric sites or materials were located. Construction debris and historic materials point to additional structures that, along with the World War II fire control tower, might be associated with the Miller Army Air Field. Five structural foundations were located at New Dorp Beach that specifically or generally could be linked to the documented historic development in this beach area. Primarily

modern materials (mid-1900s to present) with a minor historic component were recovered from the present Cedar Grove Beach Club community bungalows.

Crescent Beach

Archival. Late 1800s to early 1900s historic resources depicted on maps comprised the Collins Hotel, the Crescent Beach Hotel and bungalows.

Architectural. No standing structures were within the pond or directly along the seawall alignment. Modern residential development surrounds or lies adjacent to the project area.

Field Survey. No near-surface (within three feet or a meter) prehistoric sites or materials were located. Prior construction activities precluded finding direct or indirect evidence for remains of the Crescent Beach and Collins Hotels. Materials from the shovel tests indicated the bungalow's general and one specific location.

Recommendations

Deeply Buried Prehistoric Resources. The environmental review indicated that deeply buried early prehistoric sites could lie under the current beach, near-shore zone and filled-in historic marshes. This becomes an issue throughout the entire project area when sheet pile seawalls will be chosen as a protection measure option since their ending depths may reach these prior landforms and possibly impact potential resources. Borings are recommended along:

- The sheet pile seawall alignments in all three segments of the project route, with the exception of the short portion at Miller Field (depending upon the ending depths and construction techniques)
- Testing along storm sewer outfall sections in the Crescent Beach study area (depending upon the ending depths and construction techniques)

No underwater survey of the near-shore or tidal zone at Crescent Beach is recommended.

Fort Wadsworth to Miller Field

- Phase I archaeological survey of higher ground that encircles three defined wetlands that will be used for inland water control and the two adjoining pump station areas.

Miller Field to Oakwood Beach Sewage Treatment Plant

- Phase II field and documentary investigation of New Dorp Beach and inland structural features to define nature, extent and specific associations with the documented historic development in this area.
- Phase II determination of Cedar Grove Beach Club Community's National Register of Historic Places eligibility status.

Crescent Beach

- Pond 1: Phase II close-interval shoving testing to locate features or materials associated with the late 1800s to early 1900s bungalows.
- Pond 2: Phase II close-interval shoving testing to locate features or materials associated with the late 1800s to early 1900s bungalows.

Location of Report Copies. Copies of this report are on file at USACE, New York District, New York; the New York State Historic Preservation Office, Peebles Island, Waterford; and the New York City Landmarks Preservation Commission, New York.

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1.0 Introduction

1.1 PROJECT DESCRIPTION

Panamerican Consultants, Inc. (Panamerican), under contract to Northern Ecological Associates, Fredonia, New York, conducted a Phase I cultural resource investigation of approximately 6 miles (9.7 kilometers) along the southern shoreline of Staten Island, New York Bay, from Fort Wadsworth to Crescent Beach (Figure 1.1). The New York District Office of the U.S. Army Corps of Engineers (USACE) proposes to stabilize this shoreline.

Various erosion control and storm damage protection measures are being considered. From Fort Wadsworth to Miller Field the measures comprise one of three options (Figure 1.2): a) raising almost the entire length of Father Capodanno Boulevard which parallels the shoreline and current boardwalk and promenade configuration (Alternative FO3); b) a combination of raising the Boulevard from Fort Wadsworth to Sea View Avenue coupled with elevating the promenade above a to-be-built seawall from Sea View Avenue to Miller Field (Alternative FO7), and c) placement of buried and sheet pile seawalls immediately seaward of the boardwalk and landward of the promenade (Alternative FO2). A number of houses will need to be elevated on the landside of the Boulevard under either of the first two alternatives.

A series of buried seawalls (Alternatives FO2 and FO3) or buried seawall/raised promenade (Alternative FO7), complemented by sheet pile seawall, dune reinforcement, levees, and floodwall will be constructed from Miller Field to the Oakwood Beach Sewage Treatment Plant (Figure 1.3). Only a minor variation in the route is anticipated. For the remaining Crescent Beach area the options entail a sloped stone sea wall with levees, or a vertical sheet pile seawall with levees (Figure 1.4). The alignment remains substantially the same under either alternative. Inland water flow for the entire project length will be addressed through interrelated non-structural protection areas, ponds, pumps and storm sewer arrangements (USACE 2003a:1-2).

Plans for the raising of Father Capodanno Boulevard call for placement of approximately five feet (1.5 meters) of structural grade fill upon the existing, but to-be-broken pavement and sidewalks, followed by a new paved surface, sidewalks and related utilities. Elevation of the promenade will involve a 17-foot (5.2-m) wide new paved walkway atop a pyramid-shaped buried seawall 12 feet (3.7 m) high with a 45-foot (13.7-m) base. Three feet (1 m) of the seawall will be below the present ground surface. Graded layers of stone will form the base with fill comprising the sloping sides (USACE 2003b: Figures E and F).

Sheet pile seawall construction in the Miller Field to treatment plant section will directly affect up to a 15-foot (4.6-m) width and at least 3 feet (1 m) below surface depth. Structural components include a double line of cantilevered steel sheeting, compacted fill in between the two steel sheets, and a railroad tie cap. The levees will also be pyramid-shaped comprising a 10-foot (3-m) wide level crest atop a 27-foot (8.2-m) height and a 75-foot (23-meter) base. Earthen fill will make up the levees with most of the structure above the surface; a 6- by 20-foot (2- by 6-m) area below the surface and directly underneath the levees' center will nevertheless be impacted. The floodwall will comprise a single steel sheet pile oriented vertically with 16 feet (5 m) above and 22 feet (6.7 m) below the surface. The two- foot (0.6-m) wide sheet will be reinforced with 6 inches (15 cm) of concrete on either side of the upper above-surface portion. One of the two existing levees or dunes in this section will have its

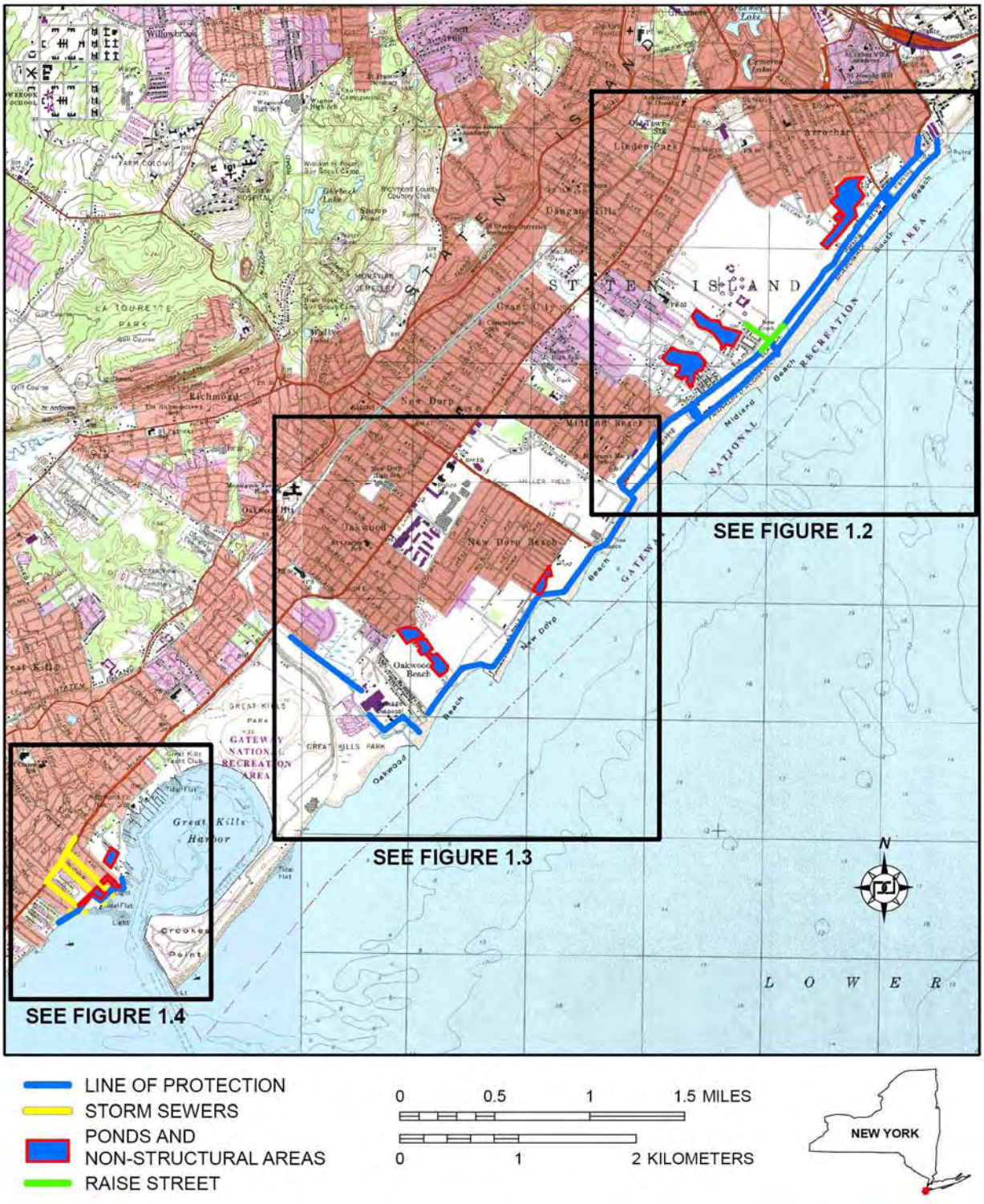


Figure 1.1. Location of the project area in the Borough of Staten Island, Richmond County, New York *(USGS 7.5' Quadrangles, Arthur Kill, NY, 1975 [1966], The Narrows, NY, 1975 [1966])*

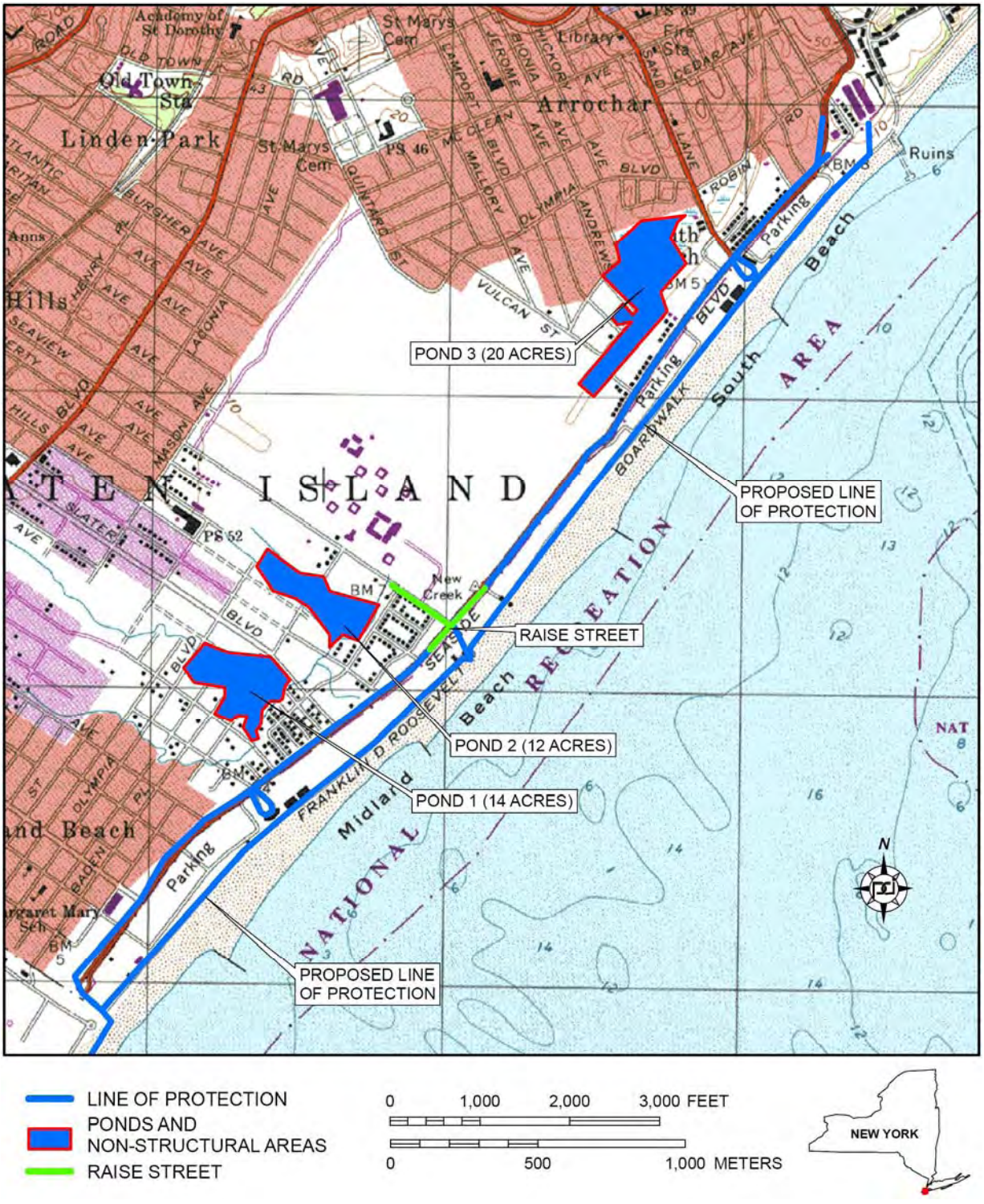


Figure 1.2. Location of the northern portion of the project area in the Borough of Staten Island, Richmond County, New York *(USGS 7.5' Quadrangle, The Narrows, NY, 1975 [1966]).*

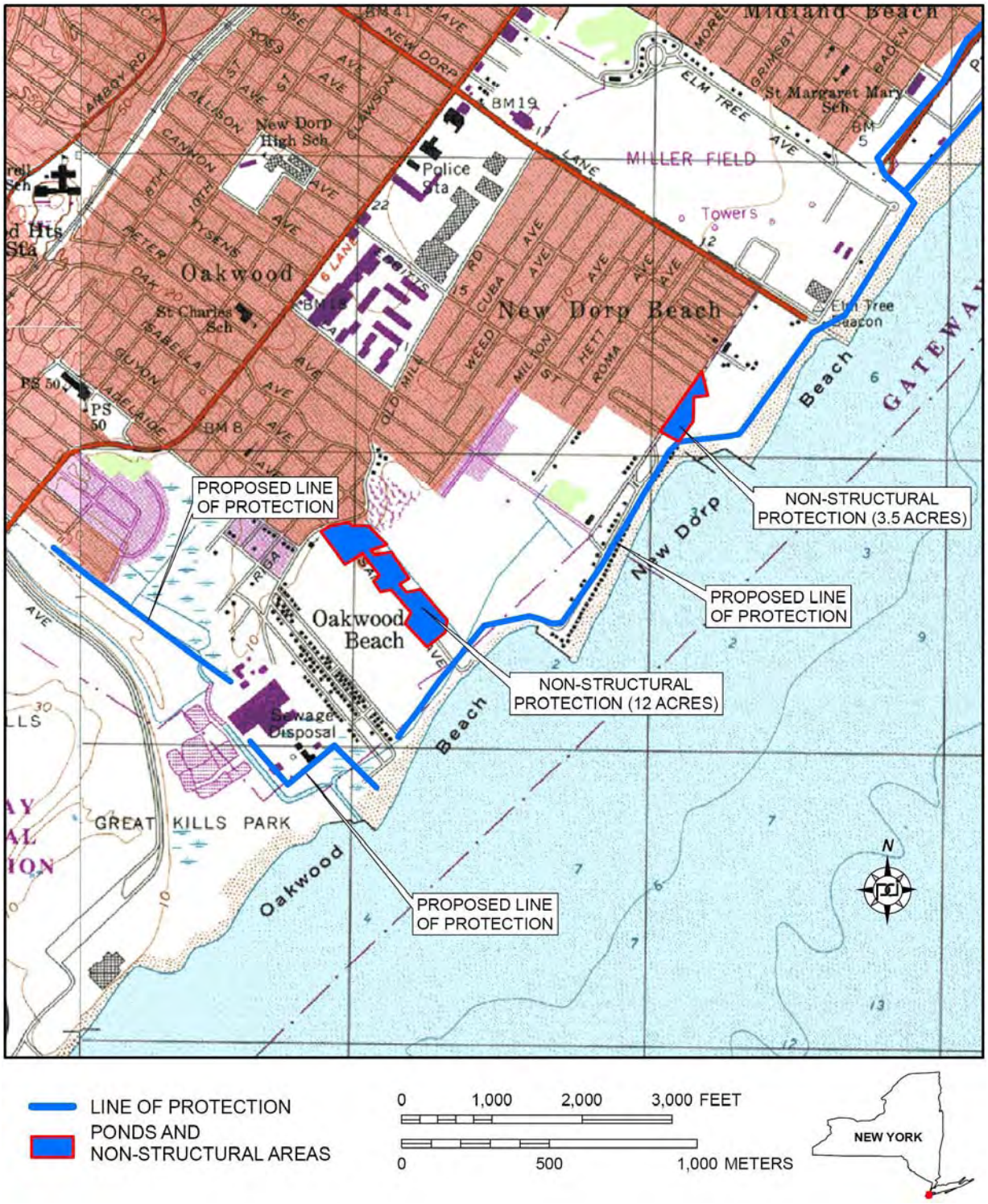


Figure 1.3. Location of the central portion of the project area in the Borough of Staten Island, Richmond County, New York *(USGS 7.5' Quadrangles, Arthur Kill, NY, 1975 [1966], The Narrows, NY, 1975 [1966]).*

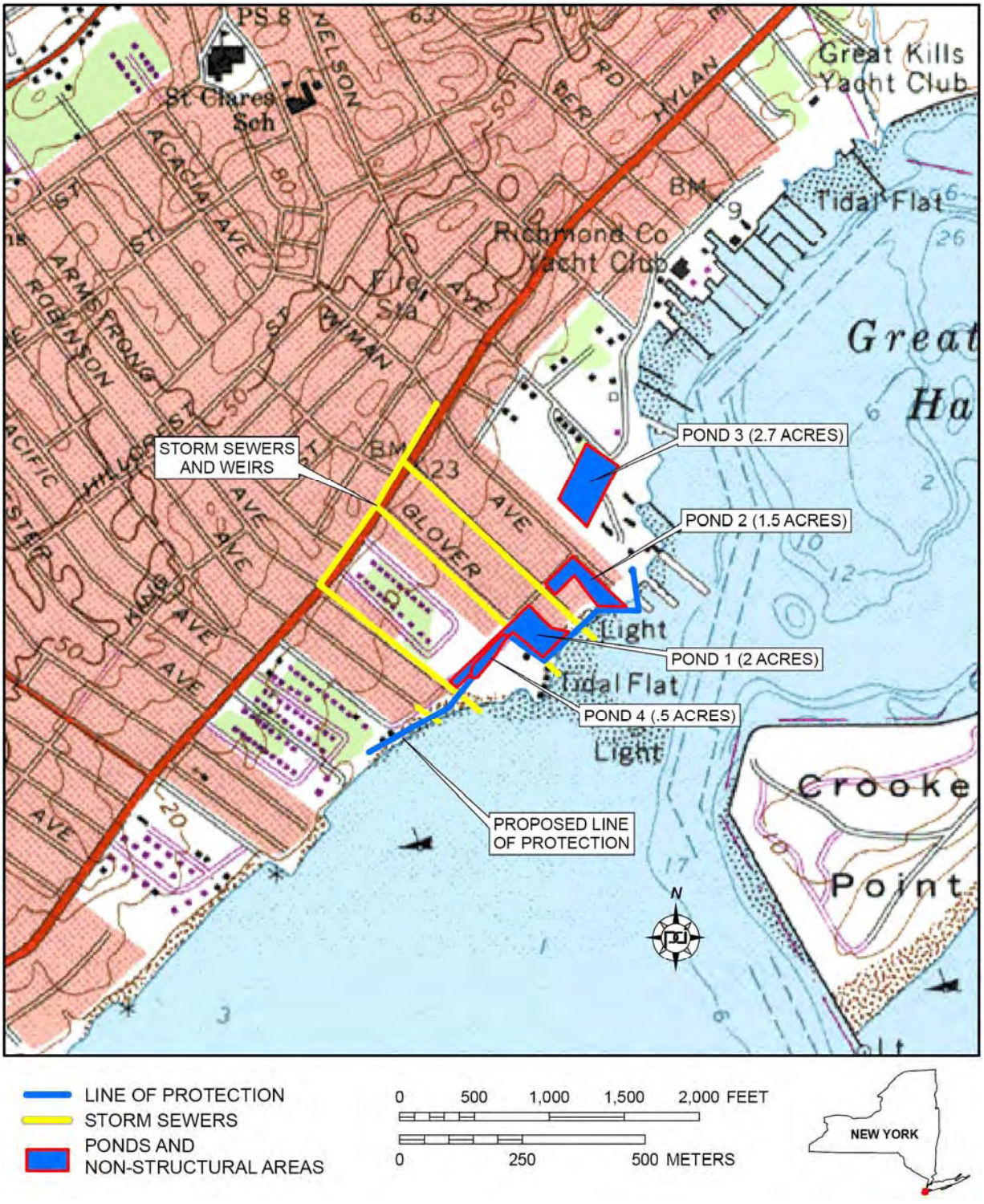


Figure 1.4. Location of the southern portion of the project area in the Borough of Staten Island, Richmond County, New York *(USGS 7.5' Quadrangles, Arthur Kill, NY, 1975 [1966], The Narrows, NY, 1975 [1966]).*

crest and abutment walls raised five feet (1.5 m) along with other modifications; the second one will be reinforced (USACE 2003b: Figures A3, G, H, J).

The sheet pile seawall for Crescent Beach will be placed directly seaward of the current concrete wall. A vinyl sheet pile and a composite sheet pile facing will enclose a 3.8-foot (1.2-m) wide vertical shaft some 11 feet (3.4 m) above and 25 feet (7.6 m) below surface. The alternative sloped stone seawall will also abut the concrete wall extending seaward 38 feet (11.6 m). A graded rock base set a few feet into the shoreline bottom will support the seawall where two sets of horizontal and sloped stone faces will be visible some 5.5 feet (1.7 m) above the surface (USACE 2003b:Figure K).

1.2 LEGAL FOUNDATION

The cultural resource investigation was conducted in compliance with the following federal laws and regulations: National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470 *et. seq.*) through 1992 (which includes Section 106 compliance); National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4371 *et. seq.*); Archaeological and Historic Preservation Act (AHPA) of 1974 (16 U.S.C. 469_469c); and the Advisory Council on Historic Preservation (ACHP) Guidelines for the Protection of Cultural and Historic Properties (36 CFR Part 800); as well as Army Regulation (AR) 200-4 "Cultural Resources Management."

1.3 INVESTIGATION GOALS

The goals of the investigation are:

1 To determine the presence or absence of cultural resources,
2 To evaluate standing structures which might be affected by the control measures,
3 To assess any resource's potential eligibility to the National Register of Historic Places [NRHP], and
4 To make recommendations concerning additional investigations involving offshore survey and deep-testing in areas not accessible during the present study, and resources needing further study for eligibility determinations (USACE 2003a:1-2).

1.4 METHODS

Methods included a review of the environment, prehistory and history of the project area, combined with intensive surface and subsurface examination (USACE 2003a:1). An on-site architectural assessment was conducted, as well as the excavation of 1,257 shovel tests. The field investigation was carried out in October and November 2003.

Project personnel served in the following capacities: Dr. Michael A. Cinquino, RPA, Project Director; Dr. Michele H. Hayward, RPA, Principal Investigator and Co-Field Director; Ms. Stacy L. Weber, M.A., Architectural Historian; Mr. Dubravko Lazo, M.A., Co-Field Director; and Mr. Arnold Pickman, M.A., Project Historian and Archaeologist. Ms. Kirsten Davis, in the USACE Environmental Assessment Section, served as the point of contact for the project.

1.5 RESULTS

1.5.1 Prehistoric Cultural Resources. An assessment of environmental conditions indicated that the probability of locating later prehistoric sites or materials within the entire project area would be low. Historic maps from the late eighteenth century depict an extensive marsh just behind the shoreline. While these environments would have been attractive for resource exploitation, they are unlikely to have served for permanent or long-term settlement. Incidental items or deposits might be expected along with smaller and short-term encampments on higher terrain surrounding the beach or extending into the marsh. These types of landforms did serve as the location for a few sites near, but not within the project area. The field survey also failed to uncover any evidence for late near-surface prehistoric sites or materials. Deeply buried earlier prehistoric sites under the current beach, near-shore zone and filled-in historic marshes remain a possibility.

1.5.2 Historic Cultural Resources

1.5.2.1 Fort Wadsworth to Miller Field

Archival. Recorded historic resources very near or in this portion of the project area were the Walton-Stillwell House (built in 1668 and razed in 1964), located just west of Fort Wadsworth; later nineteenth century Kettletas and W.H. Townsend properties with outbuildings along the shoreline, and a number of resort and amusement facilities from the late-nineteenth to mid-twentieth centuries set between the present Boulevard and boardwalk.

Architectural. Today's buildings along the boulevard present a diverse mixture of residential and commercial concerns, the majority of which date to the mid to late-twentieth century. A minor number of residences (ca. 1920-1960) can be found at the north end, which are typical of mid-twentieth century regional suburban dwellings; almost all have been modified. The boardwalk, named after Franklin Delano Roosevelt, was originally built between 1935 and 1938, but has subsequently been replaced. The few existing structures between the boulevard and boardwalk relate to post-1950 maintenance, comfort or concession buildings. The Verrazano-Narrows Bridge, that has been determined eligible to the NRHP, can easily be seen from Miller Field northward. No standing structures were within the pond areas. Modern residential development surrounds or lies adjacent to the project area with one ca. 1925 residence that has been considerably altered.

Field Survey. No near-surface (i.e., within 3 feet [or 1 meter]) prehistoric sites or materials were located. No surface or subsurface historic structural remains or associated features were identified. Historic nineteenth and early twentieth century materials were recovered in minor quantities compared to, and mixed with, post-1950s items. The artifact patterning and shovel test stratigraphies indicated contexts involving fill episodes and the reworking of the upper soil horizons for recreational purposes. Three pond areas were visually inspected to locate any testable areas within the defined wetlands.

1.5.2.2 Miller Field to Oakwood Beach Sewage Treatment Plant

***Archival*.** Acquired by the U.S. Army in 1919, Miller Field was listed on the NRHP in 1980 as the Miller Army Air Field Historic District (90NR01020). Extant contributing elements comprise one seaplane hanger and the Elm Tree Range Light and Airfield Beacon located at the south end of the field adjoining the shoreline. At the other side of the field can be found a

44-foot concrete fire control tower. Constructed in 1943, the tower was associated with the airfield's role in harbor defenses during World War II.

Other properties (dating from the seventeenth to twentieth centuries) whose presence might be detected involve: Revolutionary War fortifications; the Britton Cottage; the Barnes House; the Lighthouse and Light Keepers House; the Lakes Mill and Millers House; St. Johns Hospital; residences and resort facilities, and the Cedar Grove Beach Club community.

Architectural. A fire control tower associated with the Miller Army Air Field and Cedar Grove Beach Club community bungalows were examined in relation to their potential eligibility to the NRHP. Mid to late-twentieth century structures include the Oakwood Beach Sewage Treatment Plant and nearby (but outside the project area) residences.

Field Survey. No near-surface (within three feet or a meter) prehistoric sites or materials were located. Construction debris and a minor amount of historic materials point to additional structures, that, along with the World War II fire control tower, might be associated with the Miller Army Air Field. Five structural foundations were located at New Dorp Beach that specifically or generally could be linked to the documented historic development in this beach area. Primarily modern (mid-1900s to present) materials with a minor historic component were recovered from the present Cedar Grove Beach Club community bungalows. Foundations and construction debris denoting the locations of former bungalows were also noted. Evidence for other documented historic structures, such as the Lighthouse, was not detected.

1.5.2.3 Crescent Beach

Archival. Historic resources (late 1800s to early 1900s) depicted on maps for Crescent Beach comprised the Collins Hotel, the Crescent Beach Hotel and bungalows.

Architectural. No standing structures were within the pond or directly along the seawall alignment. Modern residential development surrounds the project area.

Field Survey. No near-surface (within three feet or a meter) prehistoric sites or materials were located. Construction of a new condominium at the north end of the seawall precluded any detection of the Crescent Beach Hotel and recent earth-moving activities provided only a general indication of the Collins Hotel or, perhaps, another structure. While dense undergrowth hampered attempts to locate the bungalows, materials from the shovel tests indicated their general and one specific location.

1.6 RECOMMENDATIONS

1.6.1 Deeply Buried Prehistoric Resources. The environmental review indicated that deeply buried early prehistoric sites could lie under the current beach, near-shore zone and filled-in historic marshes. This becomes an issue throughout the entire project area when sheet pile seawalls will be chosen as a protection measure option since their ending depths may reach these prior landforms and thereby impact potential resources. Borings are recommended along:

- The sheet pile seawall alignments in all three segments of the South Shore protection measure route, with the exception of the short portion at Miller Field, and depending upon the ending depths and construction measures
- Testing along storm sewer outfall sections in the Crescent Beach study area, depending upon the ending depths and construction measures

No underwater survey of the near-shore or tidal zone at Crescent Beach is recommended.

1.6.2 Fort Wadsworth to Miller Field

- Phase I archaeological survey of higher ground that encircles three defined wetlands that will be used for inland water control and the two adjoining pump stations areas

1.6.3 Miller Field to Oakwood Beach Sewage Treatment Plant

- Phase II field and documentary investigation of New Dorp Beach and inland structural features to define the nature and extent of and specific associations with the documented historic development in this area
- Phase II determination of Cedar Grove Beach Club Community's National Register of Historic Places eligibility status

1.6.4 Crescent Beach

- Pond 1: Phase II close-interval shoving testing to locate features or materials associated with the late 1800s to early 1900s bungalows.
- Pond 2: Phase II close-interval shoving testing to locate features or materials associated with the late 1800s to early 1900s bungalows.

1.7 LOCATION AND DISPOSITION OF PROJECT MATERIALS

Background and field data, artifacts, and other project materials will be kept at Panamerican's Buffalo laboratory until the final report is accepted. After which, they will be returned to the New York District USACE office for assignment to a permanent curation facility.

2.0 Environmental Background and Previous Research

2.1 PROJECT AREA DEFINITION

The 6-mile (9.7-kilometer) long project route contains various terrains and streetscapes that will be affected by the interconnecting shoreline protection measures (see Figure 1.1). The report discussion divides the route into three study areas: Fort Wadsworth to Miller Field, Miller Field to the Oakwood Beach Sewage Treatment Plant, and Crescent Beach.

2.1.1 Study Area A: Fort Wadsworth to Miller Field. Components within Study Area A that will be impacted by the alternatives of road promenade raising, buried/sheet pile seawalls, and interior drainage needs involve Father Capodanno Boulevard, structures along the west side of the boulevard, the intersection of Sea View Avenue with the boulevard, the Franklin Delano Roosevelt Boardwalk, four segments connecting the boulevard and boardwalk, two pump stations, and Ponds 1, 2 and 3 (see Figure 1.2). Father Capodanno Boulevard represents a four-lane highway divided by a grass-and-street-light median providing access to South and Midland Beaches (Figure 2.1). The study area includes almost the entire boulevard from Robin Road at the north end to a turnaround just before Miller Field at the south end or some 14,000 feet (USACE 2003c:2).

A fairly continuous strip of residences (Figure 2.2), interspersed with shops and restaurants occupies the western side of the boulevard. The shore side presents a contrast with a series of parking lots, ball fields, picnic areas, open parkland, maintenance buildings and recreational support facilities. One of the playing fields at the south end from Midland Avenue to Hunter Avenue is depicted in Figure 2.3, a very recent parking lot near the end of Sea View Avenue is illustrated in Figure 2.4, with the Cespino Russo Memorial Circle shown in Figure 2.5 at the end of Sand Lane to the north. Two extensive open parklands occupy the mid-section separated by the new parking lot and enclosed at either end by the recreational facilities. Vegetation in the open parklands varies from low-growth shrubbery (Figure 2.6) to treed portions with heavy undergrowth (Figure 2.7). Well-kept grass lawns in the playing fields and limited strips of grass and trees among the pavement and buildings can be found in the remaining inter-boulevard and boardwalk areas.

The boardwalk terminates the man-made additions to the near-shore area leaving a wide active sand beach. Construction of the boardwalk varies, with the portion from Sea View Avenue northward composed of a raised timber walkway (Figure 2.8), while the southern section becomes a simple non-elevated paved promenade (Figure 2.9). The project area includes all of the boardwalk, as well as a 300-foot diagonal extension across treed and off-beach terrain at the walkway's north end (see Figure 1.2 and Figure 2.10). Ruined or dilapidated timber piers are found in this and other study areas (Figure 2.11).

The four connecting segments to be tested are the Cespino Russo Memorial Circle, another turnaround near Hull Avenue (Figure 2.12), both of which will be elevated (USACE 2003c:2), and two undeveloped areas at the end of Sea View Avenue and the southern limit of Father Capadonno Boulevard. A short portion of Sea View Avenue from approximately Quincy Avenue to the boulevard intersection will be raised a foot (USACE 2003d:23).

Figure 2.1. Father Capodanno Boulevard, a four-lane highway with a grass and street light median. From its intersection with Drury Avenue at the north end, facing northwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.2. Residences along west or land side of Father Capodanno Boulevard. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.3. Study Area A: playing field at south end with Father Capodanno Boulevard at left of photograph. Note also the cyclone fence and strip of grass and trees adjacent to the boulevard, facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.4. Study Area A: new parking lot, middle shore side section of Father Capodanno Boulevard, facing east. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.5. Study Area A: Cespino Russo Memorial Circle northern turnaround, from the top of the boardwalk, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.6. Study Area A: open parkland with low-growth grasses, middle shore side section of Father Capodanno Boulevard, facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.7. Study Area A: open parkland with trees and heavy undergrowth, middle shore side section of Father Capodanno Boulevard, facing north. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.8. Study Area A: north end of elevated timber boardwalk, field technicians at Shovel Test A6, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.9. Study Area A: south end of paved promenade with wide sand beach at right of photograph, facing north. Note Verrazano-Narrows Bridge in background. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.10. Study Area A: 300-foot diagonal section at north end of Line of Protection across off-beach treed terrain, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.11. Study Area A: dilapidated timber pilings at north end of Line of Protection, facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.12. Study Area A: southern turnaround between Father Capodanno Boulevard and the Boardwalk, near Hunter Avenue, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

The three pond areas represent defined wetlands enclosed by old and newly encroaching residences. The pump stations are to be located on adjacent higher grounds. All display similar characteristics such as open expansive low-lying terrain with seven-foot high thick marsh grass as at 20-acre Pond 3 (Figure 2.13), a fringe of slightly higher ground with trees and thick undergrowth as at 12-acre Pond 2 (Figure 2.14), and free-flowing or near surface water as at 14-acre Pond 1 (Figure 2.15). The pond areas are to be visually inspected prior to recommending specific testing strategies.

2.1.2 Study Area B: Miller Field to Oakwood Beach Sewage Treatment Plant. The buried seawall, dune/levee refurbishing, sheet pile floodwall and new levee alignment for Study Area B primarily cross undeveloped beaches and wetlands (see Figure 1.3). A buried seawall or alternative buried seawall with raised promenade continues the boardwalk line of protection passing between Miller Field and the shoreline at the north end of New Dorp Beach (Figure 2.16). Sparse, low growth grasses and shrubs are evident, in addition to informal up-keep of the shoreline.

The seawall runs closer to the active beach for the remainder of the New Dorp shoreline until it connects to an existing rock-faced dune at the beginning of Oakwood Beach. A low rise or berm faces the active shoreline for about half of the beach's length with the nearest houses set well back (Figure 2.17) until leveling out just before the Cedar Grove Community bungalows (Figure 2.18) that border a wide sand beach.

Protection measures for the Oakwood Beach Sewage Treatment Plant comprise the raising of the existing levee running perpendicular from the plant to the shoreline and the addition of two new sections. One will hug the east end of the facility, while the other will be oriented east/west from the landside of the plant to just before Hylan Avenue. The alignment traverses defined low-lying wetlands and parallels an existing metal fence. A sheet pile floodwall is proposed for the narrow strip between the back of the plant and the man-made drainage channel.

One other measure will require testing and two others will not, since no impact is anticipated. A 3,200-foot (975-m) internal levee at the south end of the rock-faced dune will run westward along Fox Lane as far as Cedar Grove Avenue. Two non-structural protection areas involve the residences along Kissman Avenue and seaside of Cedar Grove Avenue from Ebbitts Street to Marine Way. The homes would be raised or receive flood-proofing (USACE 2003d: 21-22).

2.1.3 Study Area C: Crescent Beach. Nine components will be integrated to afford erosion control and shoreline protection for the Crescent Beach Study Area (see Figure 1.4). The sloped stone or vertical sheet pile seawall with levee composite alignment entails land, beach, and off-shore sections. North to south those sections comprise: a 100-foot landscaped portion of a recent (i.e., post-1995) condominium (Figure 2.19), an open beach (Figure 2.20), a tidal inlet (Figure 2.21), parkland from the shoreline to the end of Glover Street (Figure 2.22) continuing along or diagonally to Tennyson Drive from its intersection with Glover Street to the shoreline at the end of Robinson Avenue (Figure 2.23), ending with an active beach as far as Littlefield Avenue.

Combinations of four pond areas are under consideration involving removal of soil from three to six feet (1 to 2 m) deep (USACE 2003d:9-16). Pond areas 1 and 2 occupy 2 and 1.5 acres respectively on either side of Goodall Street. Pond 1 also includes a portion of the

Figure 2.13. Study Area A: Pond 3 Expansive low-lying terrain with thick marsh grass, from end of McLaughlin Avenue facing north and towards the proposed pump station. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.14. Study Area A: Pond 2, bordered by higher ground with trees and thick undergrowth along Dongan Hills Avenue, facing east. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.15. Study Area A: Pond 1, free-flowing water channel amid thick marsh grass expanse, facing southwest from Slater Boulevard. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.16. Study Area B: north end of Line of Protection, with Miller Field at right, fronting shoreline with sparse, low-growth vegetation, facing south. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.17. Study Area B: low rise section fronting New Dorp Beach, facing southwest. Note evidence of Structure 5A in front of the rise. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.18. Study Area B: Cedar Grove community bungalows, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.19. Study Area C: 100-foot landscaped condominium section of Line of Protection, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.20. Study Area C: open beach section of Line of Protection, with Pond 2 in background, facing southwest. Field Technician excavating at Transect 9 Shovel Test 2. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.21. Study Area C: intertidal zone section of Line of Protection, with Goodall Street outfall in foreground and timber pilings in background, facing south. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.22. Study Area C: parkland section of Line of Protection from the shoreline to end of Glover Street, also the southern border of Pond 1, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.23. Study Area C: parkland section of Line of Protection from Glover Street to Shoreline, also Pond 4 with high grasses, facing southeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

seawall alignment as does the one-half acre connecting Pond 4, a triangular-shaped area bordering Tennyson Drive from Glover Street to Robinson Avenue. The 2.7-acre Pond 3 abuts the western edge of the condominium complex with its trapezoid shape extending northward to Nelson Avenue and southward to the backyards of houses facing Wiman Avenue. Vegetation at Ponds 1 and 2 can be characterized as dense grass/shrub/thorny bush undergrowth with occasional mature trees (Figure 2.24). A newly cleared section for a memorial garden, a large artificial mound (local informants, October 2003), tall grasses and a few mature trees can be found in Pond 3 (Figure 2.25). A playground amid open tall grass describes Pond 4's surface conditions (see Figure 2.23). Associated pump stations are located at the intersection of Tennyson Drive and Goodall Street and in the southeast corner of Pond 4.

Existing storm sewers and outfalls will need to be upgraded, as well as installing new facilities. The two-lane Armstrong, Goodall and Glover streets run perpendicular to the shoreline and houses line both sides. Front lawns, sidewalks and grass and tree strips border the streets. The roads connect to Hyland Boulevard that runs parallel to the shoreline with only occasional strips of trees and grass along both sides in front of mostly commercial establishments. Storm lines are extant for all affected streets, except Glover Street.

Outfalls at the ends of Goodall, Armstrong, Glover and Robinson rest partially on land and up to 150 feet (45 m) directly offshore. The outfall for Armstrong Avenue already exists. The one for Goodall Street will be repaired and extended approximately 150 feet (45 m) offshore. New ones will be built at the end of Glover Street that follows the seawall alignment with a 50-foot (15-m) offshore section, and at the end of Robinson Avenue with 175-foot (53-m) land and 25-foot (7.6-m) offshore portions.

Finally, structures within or near the project areas, will need to be evaluated for potential effects to any National Register-eligible resources.

2.2 GEOLOGICAL SUMMARY

Much of the southern portion of Staten Island represents an outwash plain from the terminal Wisconsin glaciation, with the moraine extending across the Island (Rakos 1995). The immediate south shore terrain, however, was formed by Holocene events. Most of the shoreline extending from Fort Wadsworth to Great Kills Harbor actually represents a series of "mini barrier beaches" similar to those found along the south shore of Long Island. Such barrier islands are typically separated from the mainland by shallow lagoons or "back bays'. In the case of the Staten Island barrier island system, however, material washed down from the upland terminal moraine and glacial till resulted in the siltation of these back bays, leading to the creation of the salt marshes shown on the early historic period maps (see Section 3.2). Two barrier beaches were present along the south shore separated by "a peninsula of terminal moraine" material at New Dorp Beach (Rogers Surveying n.d.).

The barrier beaches north and south of New Dorp Beach were penetrated by several tidal inlets: New Creek at South Beach, Mill Creek at Oakwood, and Duck Creek at Great Kills. Both the back barrier salt marshes and the tidal creeks were filled-in during the twentieth century (Rogers Surveying n.d.).

Figure 2.24. Study Area C: Pond 2, with thick underbrush, occasional mature trees and open scrub vegetation. From Wiman Avenue, facing south along Transect 5. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 2.25. Study Area C: Pond 3, with grass-covered large artificial mound at right and recently cleared terrain at left, facing east. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

2.3 PREVIOUS CULTURAL RESOURCES INVESTIGATIONS

Research for this project included a review of reports presenting the results of cultural resources investigations previously conducted within or near the project area:

1) In 1976 a literature search and reconnaissance was conducted at selected sites along the south shore of Staten Island to be impacted by a proposed U.S. Army Corps of Engineers beach erosion and hurricane protection project (Russo et al. 1976). Two sites addressed in this report, South Beach (near Fort Wadsworth), and New Dorp Beach, are within the present project area. The report concentrates on the history of the Oude Dorp settlement, including the Walton-Stillwell house, as well as the Britton Cottage and the Elm Tree Light at New Dorp.

2) A revised version of the 1976 Russo report was prepared by Lipson et al. (1978) for the proposed U.S. Army Corps of Engineers beach erosion and hurricane protection project. The 1978 study included the excavation of 58 post-hole auger tests in the New Dorp Beach Area. In addition, 1-by-1.5-meter "trenches" were subsequently excavated at six of the auger test locations. Three additional post-hole auger tests were excavated at Oude Dorp. The results of these tests are summarized in Section 3.0.

3) A documentary study of historic land use within the Staten Island Unit of the Gateway National Recreation Area was prepared in 1980 (Baugher-Perlin and Bluefeld 1980). The report focuses on Fort Wadsworth (north of the present project area), the development of South, Midland, Woodland, New Dorp and Cedar Grove Beaches for recreational purposes, the Miller Field tract and Britton Cottage at New Dorp, and the area of the present Great Kills Park.

4) In 1995, the U.S. Army Corps of Engineers conducted a literature review and site reconnaissance of the south shore of Staten Island. The report (Rakos 1995) covered the entire south shore of Staten Island, including much of the present project area. Areas of higher ground along the shore were identified as being sensitive for possible prehistoric sites, including the area in the vicinity of Fort Wadsworth, New Dorp, and parts of the Oakwood Beach area. Historic resources noted included the Miller Airfield, the New Dorp Beach area between New Dorp and and Tysen's Lane, and the Cedar Grove Beach bungalow community.

5) John Milner Associates (1978) prepared a cultural resources inventory for the Gateway National Recreation Area, including the Staten Island Unit. The inventory included brief summaries for the prehistoric, early historic and "recent" periods, and preparation of a site inventory based on a site file review and site reconnaissance. The inventory includes a number of features located in the New Dorp and Cedar Grove beach areas. Most of these were of concrete construction and are not considered to be National Register eligible. They have however, been assigned site numbers and are included in the files of the New York State Office of Parks, Recreation and Historic Preservation.

6) A literature search and sensitivity assessment was conducted by the U.S. Army Corps of Engineers (Rakos 1994) in connection with the proposed construction of two levees located east and west of the Oakwood Beach Sewage Disposal Plant. The easternmost levee was located at or near the site of the easternmost portion of the proposed tie-off levee for the present project. The westernmost levee was located approximately 600 feet north of the proposed tie-off levee. The report notes that the westernmost levee alignment would traverse what was formerly an area of high ground extending into a surrounding marsh and would be

sensitive for possible prehistoric occupation. The easternmost levee location would traverse the former marsh area, a location not considered to be archaeologically sensitive.

7) U.S. Army Corps of Engineers archaeologists subsequently conducted shovel tests in the area of the then-proposed westernmost levee alignment as noted above (Rakos 1996). Most of the 15 shovel tests conducted in the area bounded by Merkel Place, Dougdale Street and Mill Road encountered an undisturbed former plow zone. Four of these tests yielded indications of prehistoric activity in the form of lithic flakes and a worked core. Each of the four tests yielded one artifact, with a second possible flake recovered from one of the tests. Two shovel tests placed some 200-300 feet southeast of those discussed above encountered fill deposits, with standing water in one of these. The latter tests may have been located east of the area of higher ground noted above.

8) Three backhoe trenches were excavated at the eastern end of the Oakwood Beach Water Pollution Control Plant in conjunction with the planned expansion of the plant (Roberts and Ponz 1990). A prior analysis (Roberts et al. 1990) had suggested that the area should be considered sensitive for the possible presence of prehistoric remains. The backhoe trenches encountered 7.5–9 feet (2.2-2.7 m) of fill. Only one of the trenches penetrated the fill to the underlying organic marsh deposits. None of these tests penetrated beneath the latter deposits to the strata in which any prehistoric remains would be encountered (see discussion in Section 3.0).

9) Shovel testing was conducted by National Park Service archaeologists in connection with the proposed construction of an ice skating rink and gas line at Miller Field (Synenki 1981). The tests were located approximately 100-150 feet (30-45 m) west of the beach. The deposits encountered were considered to mainly represent fill and few artifacts were recovered.

10) National Park Service archaeologists also conducted shovel testing in connection with planned road construction at Miller Field (Mueller and Linck 1991). The report discusses the history and location of buildings on the Vanderbilt Estate, and their subsequent destruction after Miller Field was constructed. The locations of four of the five shovel tests were in the western portion of the property, in the vicinity of Mill Road and some 3,600 feet (1.1 km) west of the present project area. The location of the sixth shovel test was approximately aligned with Cedar Grove Avenue, some 750 feet (228 m) west of the project area. None of the shovel tests encountered significant archaeological deposits.

11) Forty shovel tests were conducted at the site of a proposed post office on the south side of New Dorp Lane, between Mill Road and Hylan Boulevard (Zakalak and Grubb 1983). The location is approximately 3,700 feet west of the present project area. The only artifacts recovered reportedly derived from recent deposits of fill on the site.

12) A Phase IA investigation was conducted for a proposed condominium development located on the north side of Nelson Avenue, in the vicinity of one of the proposed ponding areas for the Crescent Beach section of the present USACE project (Historical Perspectives 1987). The report discusses the development of Crescent Beach including the hotels located within the present study area. It also discusses the results of borings taken in the area, including one located south of Nelson Avenue. The report recommended possible future investigations of possible ground surfaces that could exist beneath fill and peat deposits. It did

not however, include an assessment of the possibility that intact archaeological deposits could be associated with the hotel sites.

13) Five backhoe trenches were excavated along the route of proposed sewer construction along Tennyson Avenue in Crescent Beach, in the vicinity of the proposed levee construction (Rutsch 1984). The project area extended for two blocks northward from Robinson Street. The trenches were excavated to determine whether intact ground surfaces that could possibly include indications of prehistoric occupation could be present beneath fill and former marsh deposits. The backhoe trenches encountered some 3-7 feet of fill overlying organic silts and clays, representing the former marsh deposits, which extended to depths ranging from 10–15 feet below the surface. The sand and gravel deposits underlying the marsh were encountered in four of the five trenches. Examination of the marsh deposits and underlying sand removed from the backhoe trenches did not reveal indications of prehistoric activity.

3.0 Cultural History and Sensitivity Assessment

3.1 PREHISTORIC PERIOD BACKGROUND

Overviews of regional and local prehistory for Staten Island are presented in numerous sources. The following is adapted from the introduction to the New York City Landmarks Preservation Commission prehistoric site compendium prepared by Boesch (1994).

The prehistory of northeastern North America is typically divided into three major periods spanning approximately 12,000 years. These periods are the Paleo-Indian, Archaic, and Woodland. A Transitional period between the Archaic and Woodland periods is often used by prehistorians when discussing the accumulation of changes occurring at the end of the Archaic and the beginning of the Woodland. The earliest of these periods is the Paleo-Indian, which lasted from approximately 10,000 to 8000 BC. Living in seasonal camps near fresh water sources and lithic workshops, Paleo-Indians subsisted by hunting and gathering. The Archaic (8000-1000 BC) was characterized by seasonally occupied campsites and later by seasonal villages. The Archaic subsistence system was hunting and gathering with possibly incipient horticulture toward the end of the period. In general the Archaic refers to the time prior to the introduction of horticulture and pottery manufacture and is subdivided into Early, Middle, and Late periods. A Transitional period, occurring between 1700-1000 BC, witnessed a gradual change in Archaic lifestyles with the development of "Woodland"-period traits. After 1000 BC, Native Americans of the Woodland period (1000 BC-AD 1600) lived in seasonally occupied villages and campsites and subsisted by hunting, gathering and horticulture by AD 1000. During this period ceramics were first made in northeastern North America. It is also subdivided into Early, Middle, and Late periods. These periods are described in more detail below.

The Paleo-Indian period begins at the end of the Wisconsin glaciation (ca. 16,000-10,000 BC). The Wisconsin glacier reached its southernmost extent approximately 16,000 BC, at which time most of Staten Island was covered by glacial ice. After approximately 16,000 BC, temperatures worldwide began to rise and the ice sheet started melting, retreating northward. A continuous moraine feature consisting of mixed sands, silts, clays, and boulders, marks the southernmost advance of the ice sheets. On Staten Island the terminal moraine extends across the island from the Narrows and into New Jersey at Perth Amboy (Wolfe 1977). Sea levels were then much lower than at present and what is now Staten Island was a tract of raised ground surrounded by glacial lakes and meltwater rivers located well inland from the Atlantic coast.

During the late glacial and immediate post-glacial periods the environment of Staten Island can be characterized as tundra. As the glaciers retreated northward, water draining from the melting ice sheet created large inland lakes, bogs, and marshes. Two large lakes, Glacial Lake Passaic (present-day Great Swamp) and Glacial Lake Hackensack (present-day Hackensack Meadows), were located northwest and west of Staten Island.

The tundra and lacustrine landscape was rapidly succeeded by forest. Local forests consisted primarily of spruce and fir with small amounts of oak and other deciduous species (Snow 1980). Many faunal species now extinct or no longer native to the area were present. These included mammoth, mastodon, horse, caribou, giant beaver, sloth, elk, moose, and peccary (Wolfe 1977; Snow 1980; Ritchie 1980).

Little is known about cultural activities during the Paleo-Indian period although it is generally accepted that the region was first inhabited around approximately 10,000 BC (Funk 1976; Ritchie 1980). Small nomadic bands of hunters and gatherers probably subsisted on the animal species mentioned above, as well as small game, certain riverine resources, and a variety of plants. Population density, however, was very low (Eisenberg 1978; Kraft 1986).

Several functionally diverse Paleo-Indian site types have been identified based on intersite variability of artifact assemblages and environmental settings. These site types include base camps, quarry workshops, rockshelter habitations, open-air hunting camps, kill and butchering sites, and other temporary camps (Funk 1972; Moeller 1980; Gramly 1982). Most evidence of Paleo-Indian activity, however, is represented by scattered surface finds of Clovis fluted points, a diagnostic Paleo-Indian artifact (Funk 1976:205). Almost all of the fluted points found on Staten Island were recovered as surface finds.

Information from known Paleo-Indian sites in the New York-New Jersey-Pennsylvania-Connecticut region suggests that high, well-drained areas near streams or wetlands were the areas preferred for occupation. In addition, rockshelters, areas near lithic sources, and lower river terraces were subject to Paleo-Indian occupation and use (Funk 1976; Moeller 1980; Ritchie 1980; Marshall 1982). On Staten Island, evidence of Paleo-Indian occupation is most frequently found in the area between Rossville and Tottenville. Native American populations were apparently occupying the high, well-drained ground overlooking the Arthur Kill and exploiting subsistence resources located in that waterway and in the Fresh Kills wetlands to the north (Ritchie 1980:xvii-xviii).

During the Archaic period, the environment changed from a coniferous to an increasingly deciduous forest, which achieved an essentially modern character by 2000 BC (Salwen 1975). While Archaic cultures have been traditionally thought of as reflecting a forest-based adaptation, more recent research has produced a picture of an increasingly varied subsistence pattern based on the seasonal exploitation of various faunal and floral resources (Ritchie and Funk 1973; Funk 1976; Kraft 1986).

Early Archaic life styles and adaptations are generally considered to be similar to those of the Paleo-Indian period (Gardner 1974). Archaic hunter-gatherers were still nomadic and organized into small bands that occupied localities along the Atlantic coast and estuaries, including Raritan Bay, the Arthur Kill, the Kill van Kull, and their tributaries during the warmer months, and interior regions during the colder months (Ritchie 1980; Kraft 1986). Population growth throughout the Archaic period resulted in an increase in both site density and the number of functional site types represented in the archaeological record. Site types include spring fishing camps along major streams, fall open-air hunting camps, rockshelter habitations, shellfish collecting and processing stations, mortuary sites, quarry and workshop sites, and semi-permanent villages (Brennan 1974, 1977; Dincauze 1976; Barber 1980).

Ritchie (1980:32, 35) states that most Archaic sites were small and multi-component, lacking traces of substantial dwellings, fortifications, storage pits, and graves. Evidence of house patterns attributable to the Late Archaic period, however, has been reported from the Howard site in Old Lyme, Connecticut, near Long Island Sound (Pfieffer 1983).

Most information concerning the Archaic period in the Staten Island area comes from Late Archaic sites. Evidence for Early and Middle Archaic sites is almost as scarce for the region as it is for Paleo-Indian sites. Early Archaic components, however, have been identified

at several Staten Island sites. These sites represent the first definitive evidence of an Early Archaic presence in New York State (Ritchie and Funk 1973:38).

During the Middle Archaic (5000-2500 BC) the region's coniferous forests receded and were replaced by deciduous forests that provided more exploitable resources. Sites dating to this period tend to be located on flood plains and low terraces of major rivers and streams and in association with marsh, swamp, and estuarine environments (Ritchie and Funk 1973; Funk 1972, 1976; Ritchie 1980). Although rare (or rarely recognized) on Staten Island, Middle Archaic components have been identified at Wards Point and possibly at two other sites in southwestern Staten Island.

Human population, site density, and site size increased in the Staten Island region during the Late Archaic period (2500-1400 BC). Some sites appear to have been occupied on a semi-permanent basis. Late Archaic sites have been found in low-lying areas in proximity to area estuaries and along major interior streams. Temporary hunting camps associated with this period are frequently located on sandy knolls and localized areas of sandy soil.

Sites dating to the Transitional period (or Terminal Archaic; 1500-1000 BC) are most frequently found along the coast and major waterways (Funk 1976; Ritchie 1980; Vargo and Vargo 1983) although smaller sites are known from the interior (Funk 1976; Vargo and Vargo 1983). New and radically different broad-bladed projectile-point types appeared during this period as did the use, during the latter half, of steatite (soapstone) vessels. On Staten Island, Transitional period components have been found at several sites.

During the Early Woodland period (1000 BC-AD 1), the use of fired clay ceramic vessels gradually replaced the reliance on steatite vessels. Subsistence practices included a continuation of the hunting, gathering, and fishing of the Archaic but were supplemented by an increase in shellfish collecting. It has been suggested that this indicates a trend towards more sedentary lifestyles (see Funk 1976; Snow 1980). Evidence of Early Woodland occupation is fairly widespread in Staten Island.

Human populations during the Middle Woodland period (AD 1-800) gradually adopted a more sedentary lifestyle. Although it is generally felt that subsistence was essentially based on hunting and gathering supplemented by fishing and shellfish collecting (Williams and Thomas 1982), there has been speculation that domestication of various plants occurred during this period (Ritchie and Funk 1973; Snow 1980). Most Middle Woodland sites are located near estuaries, although smaller inland sites are also known (Funk 1976; Ritchie 1980). Middle Woodland components on Staten Island have been found at several sites, including one located in the Fort Wadsworth area.

By the Late Woodland (AD 900-1600) horticulture was the primary means of subsistence (Ritchie 1980; Snow 1980). Large base camps/villages are usually located adjacent to major rivers. These were probably occupied on a permanent basis. Smaller inland sites, usually located near a water source, were probably occupied on a seasonal or temporary basis (Funk 1976; Ritchie 1980; Snow 1980). Late Woodland subsistence apparently relied extensively on horticulture although hunting, gathering, and in some locations, shellfish collecting also continued to be practiced. Late Woodland sites are relatively numerous on Staten Island.

In the northeastern United States the first large-scale contacts between Native Americans and Europeans occurred beginning ca. 1600. At this time Staten Island Native

Americans were part of the widespread Algonquian cultural and linguistic stock. Most scholars believe that they were a group of Munsee (Minsi) speakers who migrated into Staten Island during the Late Woodland (Goddard 1978a, 1978b; Salwen 1978). The Munsee was one of three linguistic subgroups of the Lenape or Delaware; the other two being the Unami and the Unalachtigo (Goddard 1971, 1978a; Salomon 1982). The Lenape consisted of autonomous, loosely related bands or lineages living in small family groups or hamlets (Kraft 1975:61) but they never formed a politically united group.

The Munsee occupied most of the land south of the Catskill Mountains to a line drawn from the headwaters of the Lehigh River on the west through the Delaware Water Gap area to the Raritan River in New Jersey, and eastward approximately to the New York-Connecticut border and the New York City-Nassau County border (Goddard 1978a:214). They comprised a relatively large, loosely related group which shared the same totemic symbol, the wolf (Ruttenber 1872:47).

Munsee settlements included camps along the major rivers with larger villages located at the river mouths (Salomon 1982). Small hunting, gathering, and agricultural sites were located in the interior. Despite references to such sites by early European explorers and settlers, only a few Contact-period sites have been identified on Staten Island, including the Walton-Stillwell House (see Section 3.1.1).

The political, linguistic, and social relationships among the various bands of Munsee speakers are poorly understood. Depending on the source, the Munsee was reportedly divided into between 6 and 21 main groups or chieftaincies, and numerous smaller political and dialectic sub-groups and bands (Ruttenber 1872:47, 89-93; Goddard 1971, l978a, 1978b; Salomon 1982). Scholars have usually associated the Raritans and Hackinsacks with Staten Island (Ruttenber 1872:90; Bolton 1920).

Although the precise extent of the territories inhabited by each of these bands is uncertain, the Raritans have usually been associated with the valley of the Raritan River and its tributaries and areas east to the Atlantic Ocean and northeast to the Hudson River into the southern part of Staten Island (Ruttenber 1872:89-90). The Hackinsacks supposedly occupied the Hackensack and Passaic River valleys as well as northern Staten Island (Ruttenber 1872:90).

Problems, conflicts, and merely contact with the Dutch and other Europeans during the sixteenth and seventeenth centuries led to the deaths of large numbers of Native Americans (see Washburn 1978). The introduction of European diseases, such as smallpox, further devastated local Native American populations. In the seventeenth century, conflicts between Native Americans and European settlers as well as conflicts among Native American groups, possibly a result of disruptions caused by the Europeans, led to changes in Native American settlements. As a result of conflicts with Unami-speaking groups and the Dutch colonists in the 1640s, as well as natural flooding that destroyed their food supplies, the Raritans (and probably the Hackinsack as well) apparently moved inland to the Kittatinny valley and mountain area in northwestern New Jersey from their traditional homeland (Ruttenber 1872:90; Bolton 1920; van der Zee and van der Zee 1978; Goddard l978a:213). By 1649 members of the Wechquaesgeek, a sub-group of the Wappinger Confederacy traditionally associated with western Westchester County, had emigrated to the territory, seeking to escape their own troubles with the Dutch. To complicate matters the Europeans continued to refer to these Native American immigrants to the area as the “Raritans” (Goddard l978a:213).

Although Native Americans were leaving their traditional homelands on Staten Island by the early 1640s, their lands were not formally deeded to the settlers until 1651, 1655, and 1664 (Ruttenber 1872:90, 362). Native Americans, however, apparently still resided in the region late in the seventeenth century.

Staten Island was referred to in seventeenth-century deeds by different aboriginal names. In a 1631 deed, the island is referred to as Matawucks; in 1655, it is referred to as Eghquaous, and in 1655, as Monocknong with the clan occupying it referred to as Monatons (Ruttenber 1872:362).

3.1.1 Prehistoric Sites in the Project Vicinity. The presence of known prehistoric sites along the south shore of Staten Island is affected by the topography and physiography of the area as revealed by various historic-period maps. These maps show the extensive areas of salt marsh that formerly extended along the shoreline adjacent to much of the project area. The most detailed depiction of these areas was on an 1890 map (Vermuele and Bien 1890; Figures 3.1 to 3.3). Two 1780s maps (Figures 3.4 and 3.5), however, indicate much the same general configuration of the salt marsh (Plan du Camp Anglo-Hessois 1780-1783; Taylor and Skinner 1781).

As of 1890 (Vermuele and Bien 1890), the only part of the project area shoreline where the 10-foot contour approached the beach was in the northernmost portion of South Beach. The extensive area of salt marsh began just south of the present location of Doty Avenue and west of the approximate present location of Father Capodanno Boulevard (formerly Seaside Boulevard). Between the water and the marsh, a strip of barrier beach extended along the shoreline. The salt-marsh area extended unbroken southward until nearly the present location of Miller Field, in the New Dorp Beach area. From this point southward for approximately 1¼ miles to the location of Cedar Grove Beach, south of Ebbitts Avenue, there was a break in the band of salt marsh. Although the land along the shore in this area was apparently not marshy, it was lower lying than the area noted above at the north end of the study area. The 10-foot contour in the New Dorp Beach area approached the shoreline most closely in the vicinity of Miller Field and New Dorp Lane where it was located some 1,000 feet west of the shoreline (see Figures 3.1 and 3.2).

South of New Dorp Beach, the area of salt marsh again bordered the beach southward to the southern part of the project area at Oakwood Beach. In this portion of the salt marsh, however, several “islands” of higher ground were noted as well as a projecting spur of dryer land which bordered Mill Road (see Figures 3.2 and 3.3).

The extensive areas of salt marsh were not present in the Crescent Beach area (see Figure 3.3). In much of the latter portion of the study area, however, a less extensive band of salt marsh bordered the beach. As previously noted, testing along Tennyson Drive in the Crescent Beach area confirmed the presence of marsh deposits in this area. Another patch of salt marsh was identified in the vicinity of the proposed Nelson Avenue ponding site (CBI ALT #3A—Pond #3). It is likely that the boring placed south of Nelson Avenue referenced by Historical Perspectives (1987) was located here. However, as shown on the 1890 map (see Figure 3.3), a portion of this ponding area would have been dry land. As with the New Dorp Beach area, the 10-foot contour in the Crescent Beach area was located some 1,000 feet west of the shoreline.

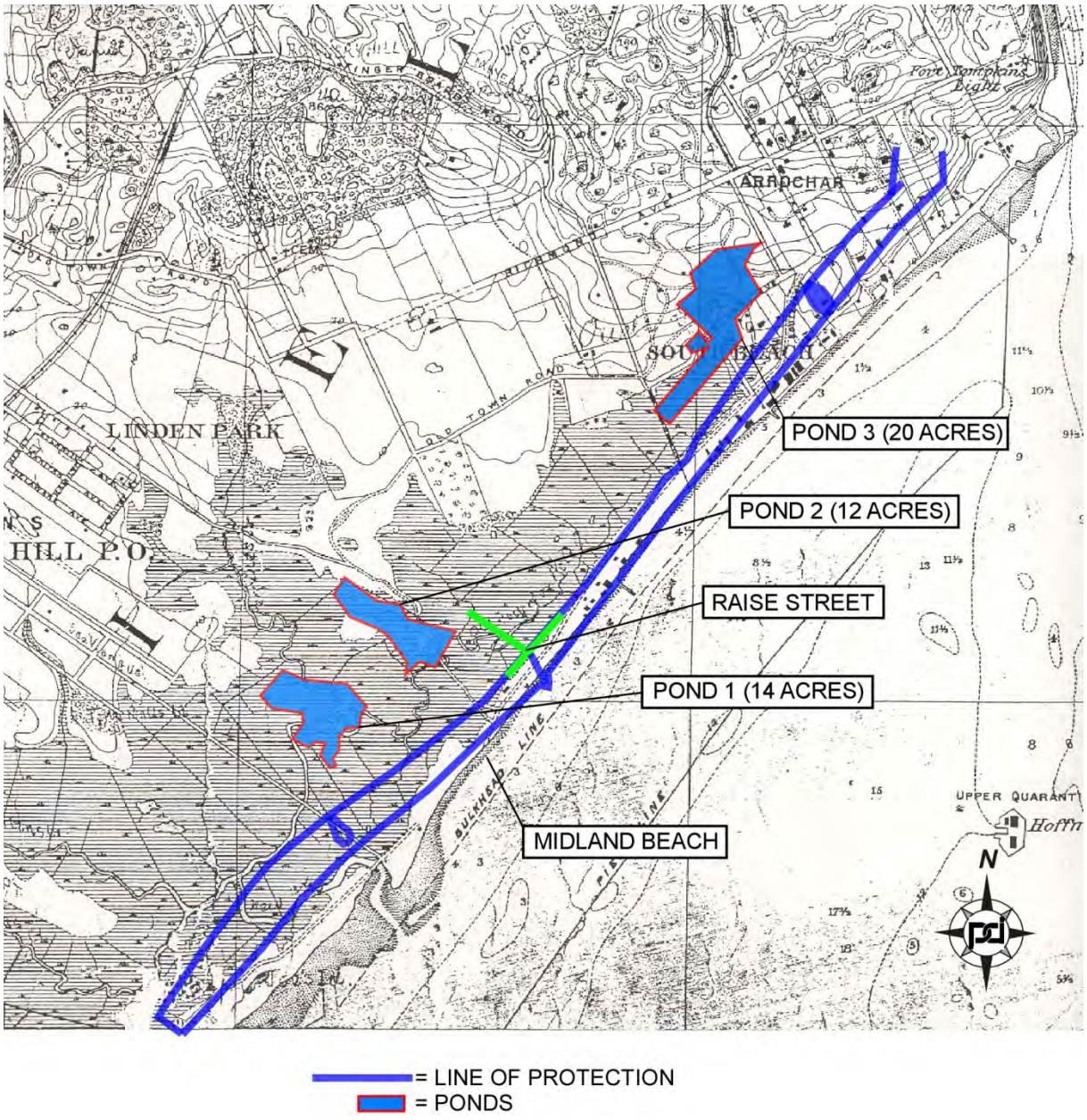


Figure 3.1. South and Midland Beach areas in 1890 with approximate location of Study Area A. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Vermuele and Bien 1890)*.

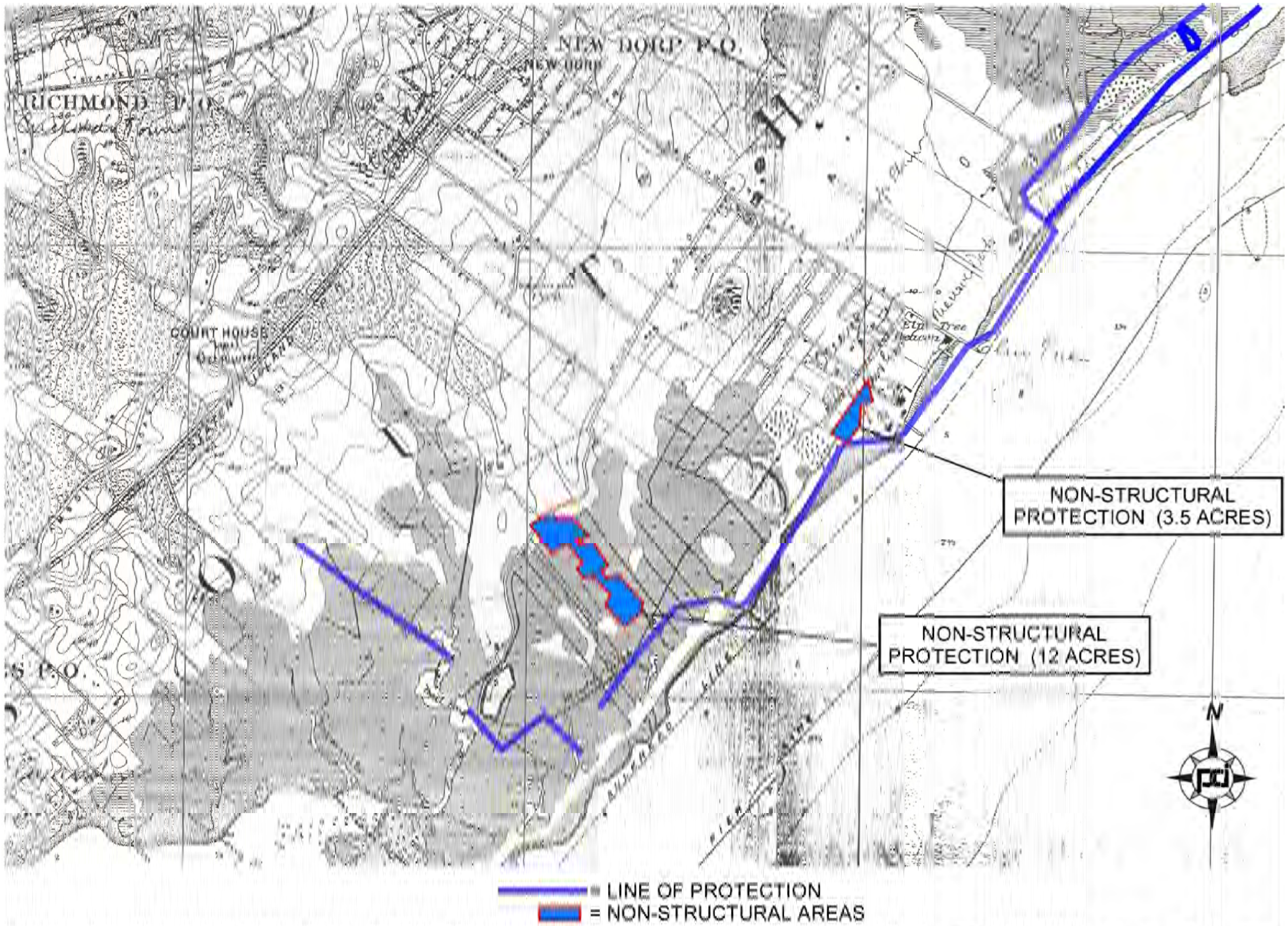


Figure 3.2. Midland, New Dorp, Cedar Grove and Oakwood Beach areas in 1890 with the approximate location of the study area B. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Vermuele and Bien 1890).*

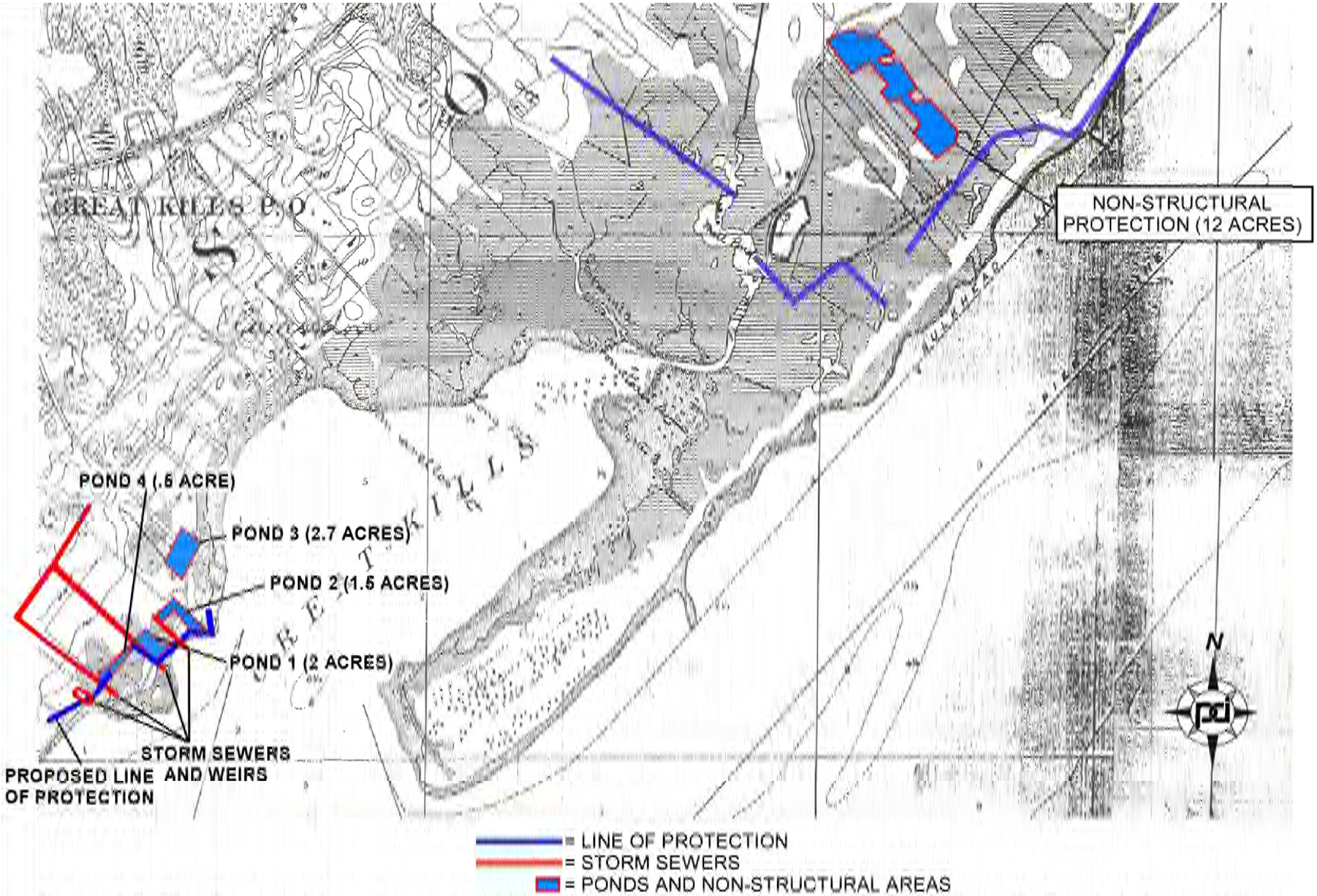


Figure 3.3. The Crescent Beach area in 1890 with approximate locations of Study Area C. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Vermuele and Bien 1890)*.

Figure 3.4. Staten Island, Plan du Camp Anglo-Hessios (1780-1783). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY.

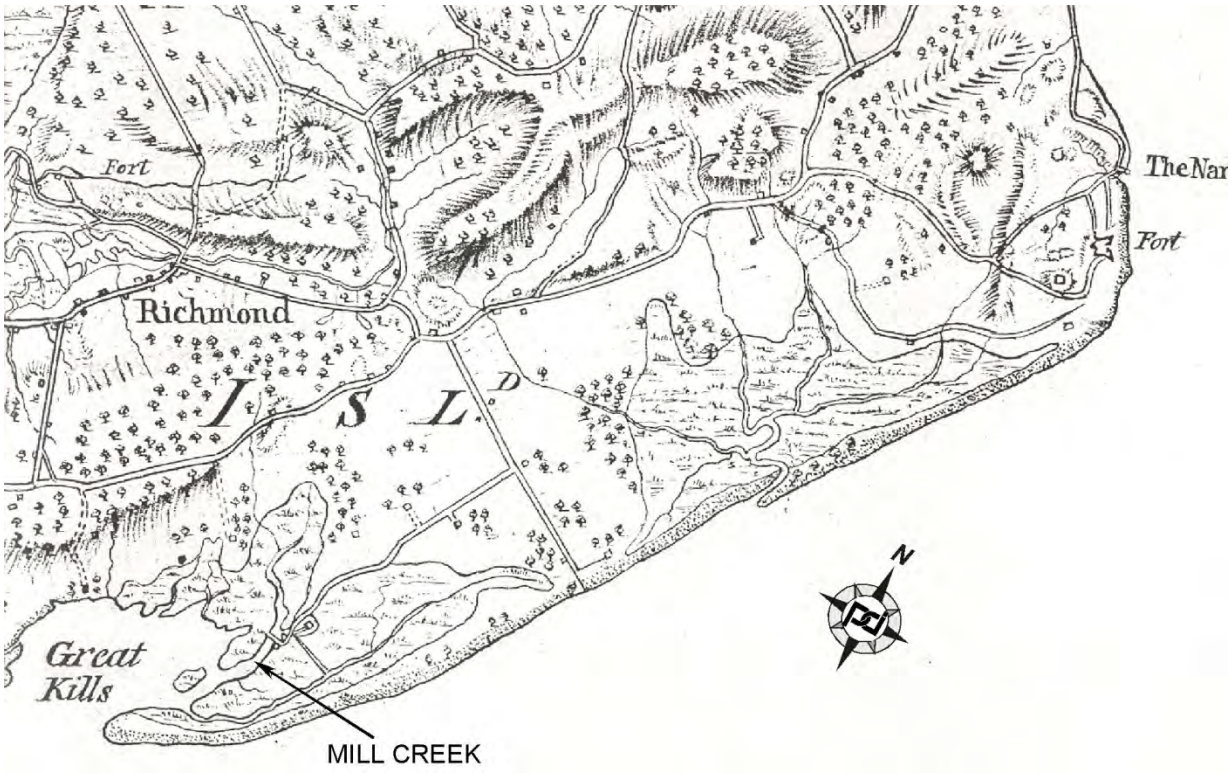


Figure 3.5. Staten Island in 1781. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Taylor and Skinner 1781).*

During the latter portion of the prehistoric period, areas of salt marsh would not have represented favorable environments for prehistoric settlement. Similarly, beach areas, although undoubtedly visited and utilized by Native Americans would not have represented likely areas for settlement or long-term occupation. Moreover, natural factors, in addition to historic-period and more recent construction and disturbance would make the recovery of intact prehistoric deposits unlikely within the near-surface portion of the South Shore beach zone. A beach is "one of the earth's most dynamic environments" (Nordstrom et al. 1986:12). "Almost all beaches are in a constant state of flux" (NJSPMP 1981 I:29).

In the short term, beaches undergo a cyclic change with the seasons. During stormy weather, which usually occurs during the winter, waves are generated by winds relatively close to shore. The resulting waves impact the beach and are steep; the wavelength (distance between waves) is only 10 to 20 times greater than the wave height. Such waves dissipate a relatively large amount of energy as they break. Furthermore, storm winds push the water toward the shoreline causing the waves to break higher on the beach, resulting in a flattening of the beach profile as sand is moved off the beach. This sand is generally stored in offshore sand bars.

During calm weather, which generally prevails during the summer, waves that impact the beach are generated by distant storms. These waves must travel far before reaching the beach zone, causing them to decay. The waves that reach the beach are relatively long and low, having wavelengths 30 to 50 times their height. The effect of these waves is to move sand from the offshore bars back onto the beach, thus rebuilding the beach profile. Long-term shoreline changes are caused by major storms. Between 1635 and 1962, 35 major storms and 98 other less severe storms were recorded in the New York City area (USACE 1965:26).

Disturbance to barrier beaches occur not only through wave action along the shore front but also as a result of migrating tidal inlets, such as the inlets formerly within the study area. The position of tidal inlets is a function of tidal current flow, waves and littoral drift. Depending on combinations of these factors, tidal inlets may be open or closed or their locations can migrate laterally (NJSPMP 1981:I:31-39). Morris noted the migration of New Creek, and that another Creek (Bass Creek) was located at Great Kills, which had closed up by the end of the nineteenth century (Morris 1898:361-362; see also Davis 1942).

Marsh areas could contain deeply buried evidence of early prehistoric utilization, but such deeply buried sites would not appear in historic-period site compilations (see Section 3.1.2). The most likely areas for prehistoric sites to have been noted were the higher and dryer areas bordering the beach and penetrating into the marsh areas. The few sites noted in the vicinity of the project area were, in fact, located in such environments.

3.1.1.1 Reported Sites. Although some prehistoric sites on Staten Island have been discovered as a result of more recent cultural resources investigations, most known sites were reported in the nineteenth century into the early twentieth century, prior to extensive land modifications that took place during and after the 1940s (primarily Skinner 1909; Parker 1922; Bolton 1922). Additional sites and find spots, many reported by Parker, are listed in the files of the New York State Museum (NYSM), the Field Service Bureau of the New York State Department of Parks, Recreation and Historic Preservation (OPRHP), and the Staten Island Institute of Arts and Sciences (SIIAS). Boesch (1994) reviewed these files and compiled the data for the New York City Landmarks Preservation Commission. The files of the NYSM and OPRHP also were reviewed as part of this investigation.

The above sources reveal that few substantial sites were located near the south shore of Staten Island in the vicinity of the project impact area. Those in the vicinity of the project area include:

Arrochar. Skinner (1909) was the first to report this site, which is #17 on his list of Staten Island sites (Figure 3.6). He wrote that

> on Richmond Avenue near Arrochar Station, there is a site apparently much older than many others, but still Lenapian in origin.… Grooved axes, arrow points, etc. with an occasional bit of pottery, are found and shell pits occur. From the appearance of the objects found, this is perhaps a very ancient camp site [Skinner 1909:16].

Parker included this site in his compendium as Richmond County site #21, southwest of Fort Wadsworth (1922:684) and Bolton (1922) listed it as site #96. The location as described by Skinner would place this site approximately one-half mile west of the project area. This site is included in the files of the NYSM as #4611 and as #75 in the Landmarks Preservation Commission compendium (Boesch 1994).

Walton-Stillwell. In 1964, Anderson and Sainz (1965) excavated five pits at the former site of the seventeenth-century Walton-Sillwell house, located in the northernmost portion of South Beach. The site yielded Native American as well as colonial artifacts. Although the report of these excavations lacks detail and the map provided (Figure 3.7) is not to scale, it seems that Native American material was recovered from at least two of four pits excavated near the house, with many additional surface finds reported. The house site was located west of the beach, and northwest of the present intersection of Drury Lane and Ocean Avenue.

Of particular interest for the present project was the location of the fifth pit of the excavation. The map accompanying the report, as well as the text, indicates that this pit was located “near the beach and down the slope of the land” (Anderson and Sainz 1965). Comparison of early twentieth-century maps with the current project maps reveals that the location of this pit would place it in the vicinity of the northern end of the proposed seawall under Alternative 3-FO2. The buried seawall itself would appear to be located some 200 feet or less from the approximate area where the pit is shown on the Anderson and Sainz map. Construction activity might impact the Walton-Stillwell deposits close to the beach.

The material recovered from pit #5 was not detailed, and it is unclear whether this pit yielded Native American artifacts. However, the report states “the material found in the fifth pit corresponded in time with that found in pits #3 and #4,” and the authors do note the presence of Native American artifacts in the latter pit (Anderson and Sainz 1965). The Walton-Stillwell site is NYSM site #750 and OPRHP site #A085-01-0027. It is #76 in the Boesch compendium.

In 1978, three post-hole auger tests were placed northeast of the intersection of Ocean Avenue and Drury Lane (Lipson et al. 1978). The test locations would place them near the edge of the beach a short distance east of the Walton-Stillwell site, in the vicinity of Anderson and Sainz’s pit #5. No prehistoric or early historic period artifacts were recovered from these tests. Some of the deposits encountered apparently represented recent fill.

Figure 3.6. Map of Staten Island archaeological sites. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Skinner 1909).*

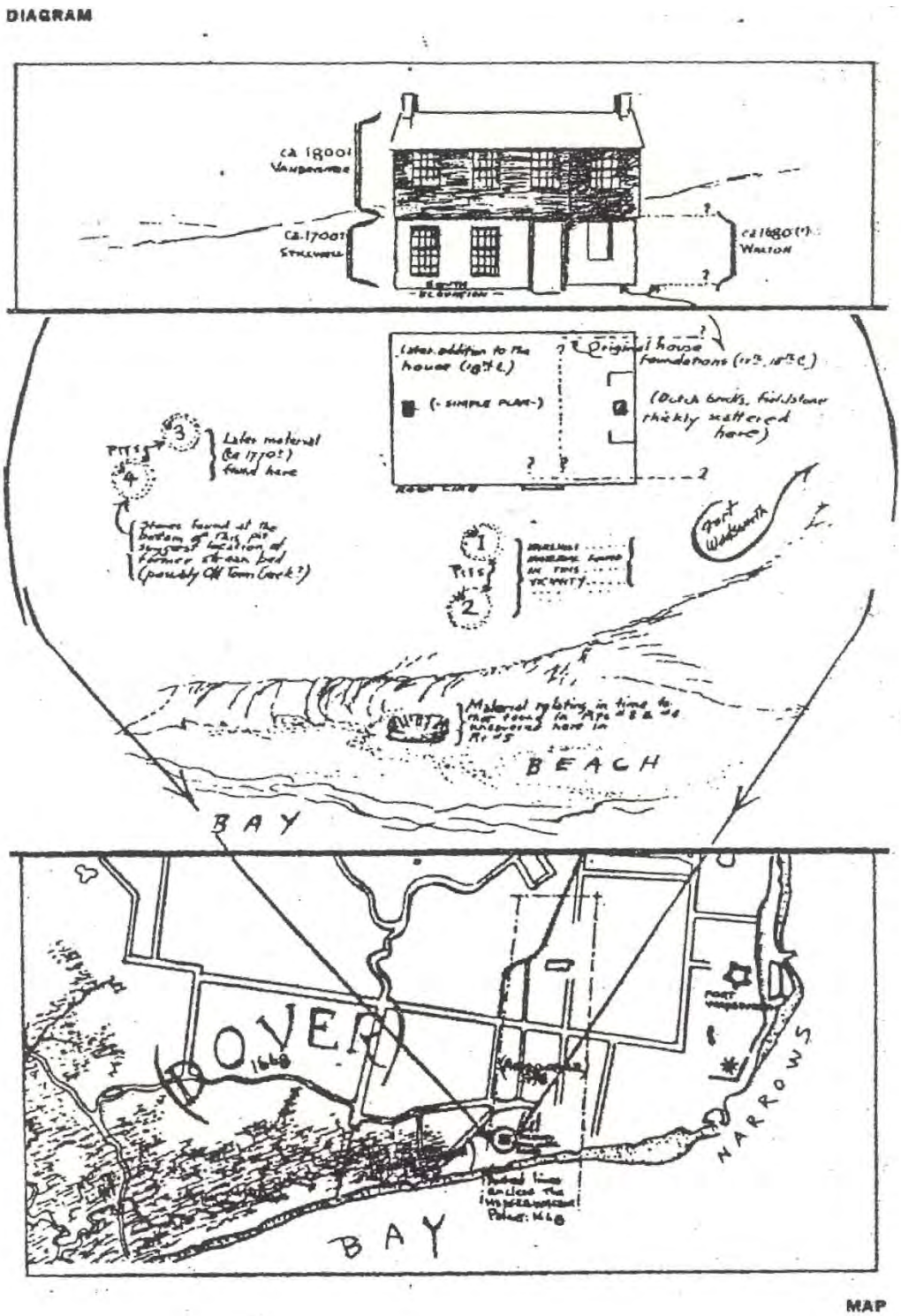


Figure 3.7. Location of Walton-Stillwell House excavations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Anderson and Sainz 1965:82).*

Oakwood/Lake's Mill. This site is listed as #23 on Figure 3.6.

> A shell-heap has been reported on the salt meadow near Lake's mill. A search by the writer has led to the discovery of a few shells, on the meadow toward Giffords, which are apparently aboriginal. No pottery or relics occur, but a few flint flakes are found. Apparently this is a 'clam-drying' place. We have been shown and have found a few arrow points in this vicinity, but they occurred on higher ground [Skinner 1909:17].

Parker (1922) included this site as #27 and repeated Skinner's description. He mapped the Oakwood site in this area as traces of occupation and a campsite, but placed site #27 at Great Kills, north of Great Kills Harbor and closer to the railroad. Parker's site placement most likely reflected his interpretation of Skinner's report of finds "toward Giffords."

It is likely that the finds mentioned by Skinner were found within the spur of dryer land that penetrated the marsh northwest of the former location of Lake's Mill. Recent shovel testing (Rakos 1996) in the vicinity of Dougdale Street and Mill Road indicated the presence of prehistoric lithic material in a plow zone stratum. This location would have been within the area of higher ground noted above and some 1,500 feet northwest of Lake's Mill.

The site near Lake's Mill would appear to correspond with Bolton's (1922) site #95, which he described as

> Shawcopshee, the modern Oakwood. The probable name of the Great Kills, which may have been the refuge, for about 16 years of the Nayack natives when they removed from Long Island. At the head of the kills there are signs of occupancy, but they are not indicative of long-continued residence.

The Oakwood site is included in the NYSM files as site #4617 and is OPRHP site #A085-01-0166.

Other Sites and Find Spots. Boesch (1994) includes several additional references to sites or find spots that are less well documented than those above.

Midland Beach Find. The SIIAS files (Archaeological File Folder Box 3/9F1) note that artifacts, including a chert biface, were collected along Midland beach in 1900 by members of a British Museum expedition (Boesch #87). The SIIAS files reportedly contain a notation that "a stone knife was unearthed among the surrounding boulder-wash" (Historical Perspectives 1987:11).

NYSM Site #4628. "Traces of occupation," as reported by Parker, are delineated on a map showing the sites associated with site #4628 and a large area west of New Dorp Beach. The map is apparently referencing the same traces of occupation shown by Parker (1922).

OPRHP site #A-085-01-0163. An isolated find of a fluted point northwest of the northwestern portion of Great Kills Harbor is located some 3,000 feet northwest of the Crescent Beach portion of the project area. It is also listed as Boesch site #84.

Boesch Site #85. Site refers to "a campsite containing traces of Native American occupation" at Crooke's Point (south of the southern end of the Oakwood Beach portion of the project area). It is included in the OPRHP files as site #A-085-01-0162.

3.1.2. Sensitivity Assessment for Possible Deeply Buried Prehistoric Sites. Portions of the South Shore Beach area north and south of New Dorp Beach and the marsh areas to the west are actually represented as barrier beach/lagoon systems prior to twentieth-century land modifications. Deeply buried prehistoric sites could remain intact beneath the beach zone, in the near-shore zone, and in the filled-in marshes, if one considers the processes leading to the formation of barrier beach/lagoon systems.

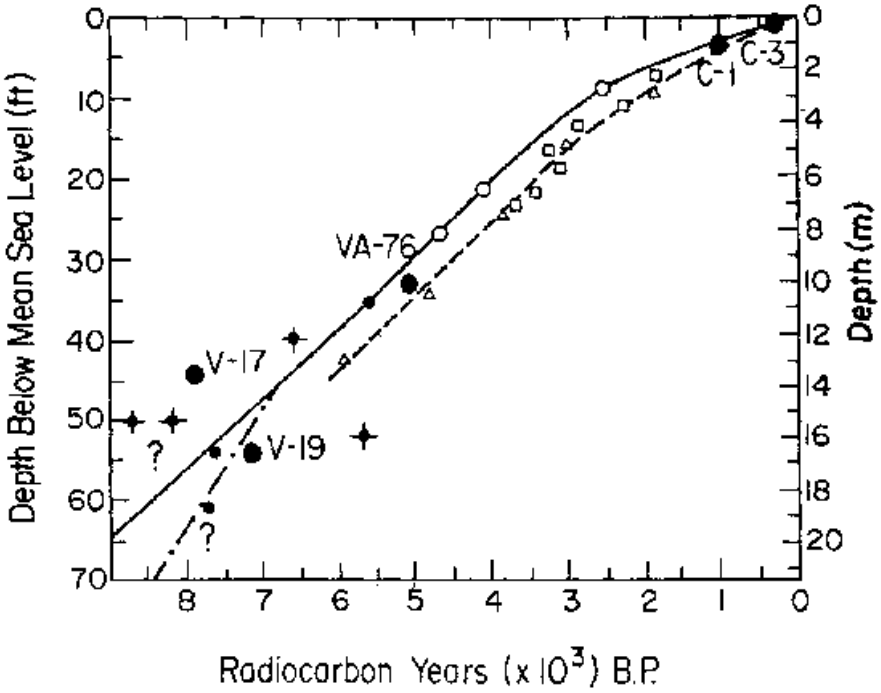
During the final Pleistocene glaciation (e.g., Wisconsin) sea water was tied up in glacial ice and sea level was as much as 400 feet (120 meters) lower than at present. The shoreline lay at the outer edge of the continental shelf, about 100 miles from the present shoreline. A major estuarine embayment was present at the location of the submerged Hudson River Canyon (Belknap and Kraft 1977; Kraft et al. 1983). Since the end of the Wisconsin glaciation, approximately 11,000 years ago, sea level has risen as the glaciers melted (Williams and Duane 1974:17) with the shoreline eventually reaching its present location. Thus large portions of the continental shelf remained available for human occupation and utilization during most of the Holocene. The retrieval of fossil remains of Pleistocene and early Holocene megafauna, including mammoth, mastodon and ground sloth, from the continental shelf off the coast of New Jersey and Long Island suggests that it was indeed exposed during early prehistoric times (Edwards and Emery 1977; Emery and Edwards 1966; Edwards and Merrill 1977).

A number of curves have been produced which show the time at which sea level reached various points below the present sea level. Such curves are constructed by radiocarbon dating of peat or other organic sediments immediately overlying pre-inundation surfaces. By correlating the age of various samples with the depth below present sea level from which each was obtained, curves of sea level rise with time are constructed.

Sea-level rise is a function of three factors: the world-wide (eustatic) rise in sea level caused by the release of water from the glacial ice; the (isostatic) rise in the land surface which occurred as the weight of glacial ice was removed; and any local crustal subsidence which may have occurred. Thus, sea-level curves vary with location (Kraft 1985; Newman 1966; Pardi 1983).

A sea-level curve for the south shore of Long Island was published by Rampino (1979) and Rampino and Sanders (1980; Figure 3.8). The curve incorporates data obtained from organic material recovered from cores taken near Fire Island as well as other data from the Long Island area. This curve shows an overall steady rate of sea level rise between ca. 7000 BP and 3000 BP, with a slowing rate of increase after the latter date. Prior to ca. 7000 BP, the rate of sea level rise may have been more rapid, although the small number of data points from this early period makes possible alternative interpretations of the data.

No archaeological sites have been found on the continental shelf. However, several prehistoric artifacts reportedly have been recovered by clam dredgers off the New Jersey coast. These include a granite mortar, reportedly recovered at a depth of about 50 feet about 7 miles southeast of Manasquan (NJSPMP 1981 II:100). More recently artifacts were recovered from sand deposited on the beach near Sandy Hook, New Jersey, during off shore dredging and beach enrichment by the U.S. Army Corps of Engineers (Linck 2001). An attempt was made by an underwater archaeological field school conducted by SUNY Stony Brook to investigate the area where the USACE dredging had taken place. While no intact sites were encountered, several flakes were reportedly recovered.



—Submergence curve for southern Long Island during the past 8000 years (solid curve). The curve is based on radiocarbon-dated samples reported in this paper (large solid circles) and on previously published dates from northern Long Island (Caldwell and Sanders, 1973; Williams, 1976) (crossed solid circles), southern Long Island (Kumar, 1973; Williams, 1976) (small solid circles), and Iona Island, New York (Newman and others, 1969) (open circles). The dashed and dotted curve indicates possible submergence rates of ~50 cm/100 years prior to 7000 YBP suggested for adjacent areas (Curray, 1965; Kraft, 1977). The dashed curve is drawn through points of dated samples from New Jersey (Stuiver and Daddario, 1963) (triangles) and Cape Cod, Massachusetts (Redfield and Rubin, 1962) (open squares). An assumption of relatively smooth change in sea level has been made in constructing these curves.

Figure 3.8. Submergence curve for southern Long Island during the past 8,000 years. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Rampino and Sanders 1980:1067).*

Although this raises the possibility of intact drowned archaeological sites being located on the Continental Shelf, the processes associated with inundation of the land during the Holocene restrict the locations of such sites. At the time that the transgressing shoreline reached a particular point on the shelf, that location would be subject to the same processes of disturbance as affect the present beach zone. However, the amount of disturbance at a given location on the shelf is actually highly variable. In general, the depth of erosion at any point would depend on "impinging wave energy, sediment supply, resistance to erosion, pre-existing topography, tidal range and rate of relative sea-level change" (Belknap and Kraft 1981:430).

If prior to the development of full shoreline conditions at a particular location, a deposition of sediments formed in a lower energy environment, such sediments could preserve any underlying sites. This would occur if the thickness of such deposits is greater than the depth of wave scour which occurs as full shoreline conditions develop.

One situation creating such a low energy transgressional environment is the development of barrier-lagoon systems, such as those which extend along the south shore of

Long Island, and which formerly existed within the present study area. Such systems involve the formation of lagoons behind offshore bars. Deposits of mud and marsh vegetation form during the process of siltation of the lagoon. The gradual inundation of the lagoon area, which enables the marsh deposits to form, would also result in relatively little disturbance to any archaeological sites that may be present at the lagoon site. As sea level continues to rise, the waves eventually attack the offshore barrier and the lagoonal deposits. It is possible that the erosion that occurs as further rise in sea level places the shorefront at the location of the initial lagoonal deposits may not completely remove these deposits. Any underlying archaeological site that may be present beneath the lagoonal deposits would therefore remain undisturbed (Kraft et al. 1983:97).

Two processes have been proposed as affecting barrier islands in response to a rise in sea levels; landward migration and drowning in place. Where there is an adequate sediment supply relative to the rise in sea level the barriers would be continually replenished and would remain in place. During this time the sea-level rise would cause the lagoon behind the barrier to widen and deepen. If, on the other hand, an adequate sediment supply is not available to match the rate of sea-level rise, the seaward side of the barriers would be continuously eroded while at the same time sand would be deposited shoreward of the barrier in the form of washover fans and tidal deltas. The result would be a continuous migration of the barriers landward. Swift (1975:38) notes that

> the lagoonal carpet of the Central Atlantic Shelf indicates that the modern barriers have retreated to their present positions from the shelf edge during the post-glacial transgression. Thus the immediate genesis of most central Atlantic barriers is a retreat in from the position of its immediate predecessor.

Long Island Shoreline Geomorphological Reconstruction. The barrier island-lagoon system along the south shore of Long Island has been studied by Sanders and Kumar (1975), Rampino (1979), and Rampino and Sanders (1980, 1981). These studies are based on an analysis of borings and vibracores taken both within the lagoon (Great South Bay) and offshore Jones Beach and Cedar Beach.

The strata underlying those formed during the processes of Holocene marine transgression represent glacial outwash deposits laid down during the Pleistocene. Two Pleistocene glacial outwash stratigraphic units, consisting of brown sands and gravels, have been recognized. At present the surficial sediments proceeding southward from the Long Island mainland and across the lagoon to a point offshore of the barrier islands represent

- the submerged Pleistocene highland
- a fringe of brackish-to-salt marsh composed primarily of *Spartina* grasses
- open-lagoonal silty clays
- backbarrier tidal delta and washover sand lobes
- backbarrier-fringe salt marshes
- barrier island sands of beach-ridge, dune, beach-berm and inlet fill origin
- shoreface sands
- inner shelf sands

With a slow rise in sea levels, salt-marsh peats or organic silts/clays would have formed in lagoons behind the barrier islands. Rampino (1979) suggests that accumulation of marshy peat deposits as opposed to open lagoonal silts and clays would be related to the rate of submergence, with a slower rate of submergence enabling sedimentation to build the lagoon floor to a level at which marsh grass could become established. He thus relates the development of the extensive salt marshes in the present lagoon to the reduced rate of sea-level rise, which began ca. 3000 BP (see Figure 3.8). In either case, the lagoonal peats, silts or clays would immediately overlie any prehistoric archaeological deposits.

In the area immediately landward of the present barriers, the peat and lagoonal silts/clays are overlain or mixed with backbarrier sands. Such sands are deposited during storms, leading to the creation of "wash-over fans," or by tidal currents flowing through present or former inlets, which deposit "flood-tidal delta lobes."

The submarine surficial deposits offshore of the barriers consist of sand that has been washed from the barrier island by wave action and deposited offshore, and a thin (<3 m) layer of reworked continental-shelf sand, which typically forms a series of ridges and swales. These sands would overlie the relict backbarrier sediments.

The Holocene deposits were formed as the rising sea levels transgressed the land surface. As the sea inundated the land, barrier islands and lagoons would continue to be interposed between the ocean front and the retreating mainland. The surficial sediments would over time consist of the types listed above, with each type being replaced by the next in the list. Thus, theoretically the deposits at a given point offshore of the present barrier islands, from bottom to top would consist of the types of deposits listed above in the same sequence. The repetition in the vertical stratigraphic section of the offshore sequence of horizontal environments is known as "Walther's Law" (Rampino and Sanders 1981:41).

Within the above sequence, any prehistoric sites should be present in accumulations of soil that formed during the Holocene prior to marine transgression. These should be located immediately overlying the Pleistocene deposits and beneath the marsh/lagoonal deposits resulting from marine transgressive processes.

Based on an analysis of borings and vibracores, as well as other data, Rampino and Sanders (1980, 1981), published schematic cross-sections of the deposits underlying the present lagoon, barrier beach and offshore areas of Cedar Beach and Jones Beach (Figures 3.9 and 3.10). The data indicate that in many locations the backbarrier/lagoonal transgressive sequence noted above is preserved wholly or in part within presently submerged portions of the continental shelf.

> The backbarrier-lagoonal sequence preserved on the Long Island shelf is up to 8 m. in thickness....in many cores the backbarrier sands in the upper part of the sequence are thin, possibly as a result of erosion in the present nearshore zone. However, some cores contain almost the entire transgressive backbarrier sequence [Rampino and Sanders 1980:1071].

Summary. The Staten Island south shore beaches may represent the final location of a shoreward migrating barrier beach-lagoon system. The silt and peat deposits that most likely exist in the former marsh areas west of the former barrier beaches north and south of New Dorp may have protected any former prehistoric sites in these areas. Moreover, it is possible that such silt deposits from relict lagoons, which existed when the barrier islands were further

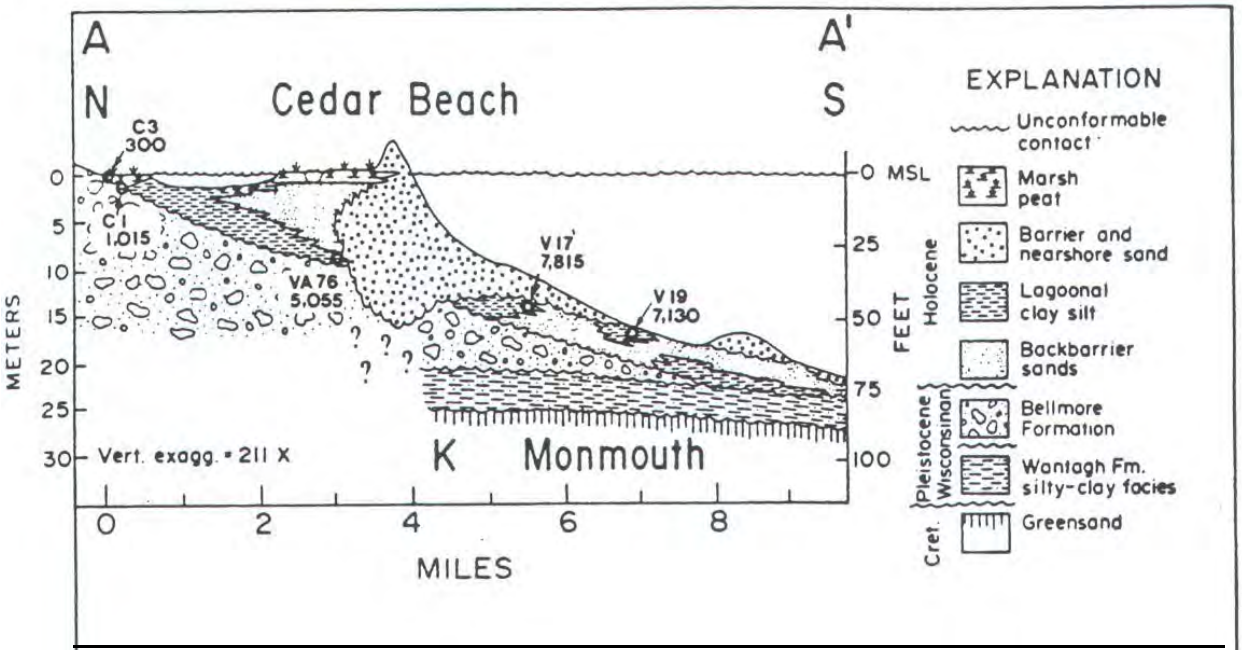


Figure 3.9. Reconstructed off-shore cross section in Suffolk County. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, New York *(Rampino and Sanders 1980:1067).*

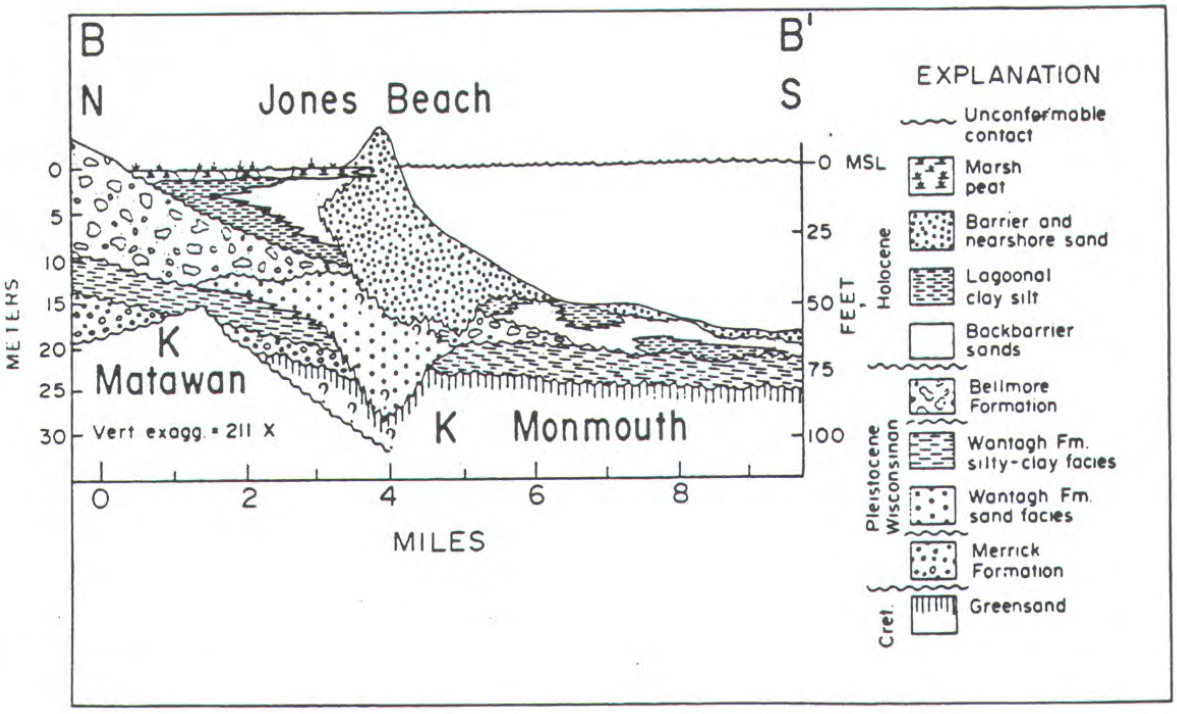


Figure 3.10. Reconstructed off-shore cross section in Nassau County. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, New York *(Rampino and Sanders 1980:1067).*

offshore, could underlie the existing beaches as well as the offshore zone. Such a hypothesis could be tested by the examination of borings taken at the location of proposed sea wall and sewer outfall construction. Such borings have not yet been taken. If undisturbed former lagoonal deposits are located here they should be represented by organic silt or peats encountered beneath overlying beach sand deposits. Depending on the depth of such deposits, any preserved underlying sites could be impacted by seawall construction as well as the proposed sewer outfall extensions.

3.2 HISTORIC PERIOD

3.2.1 Study Area A: Fort Wadsworth to Miller Field. The first European attempt to settle Staten Island was a plantation established by David Pietersz deVries, which was depicted on a 1639 map near the present Tompkinsville in the northeastern portion of Staten Island. This plantation, as well as additional attempts at settlement in 1642 and 1650 failed due to conflicts with local Native American groups.

The first permanent settlement on Staten Island did not occur until 1661, when Governor Peter Stuyvesant grated a petition to a group of 19 prospective settlers led by Peter Billou. In 1664 between 12 and 14 families resided in the settlement, located in the northern portion of the South Beach area, which was unnamed but came to be known as the Oude Dorp (i.e., Old Town) settlement. It consisted of a wooden blockhouse surrounded by several wooden houses.

After 1670, when Staten Island was purchased from the local Native Americans and a fortified settlement was no longer needed, Oude Dorp was largely abandoned, and by 1679 only three occupied houses comprised the settlement (McMillen 1958; Lipson et al. 1978).

A modern reconstruction of the location of the lots granted to the Oude Dorp settlers (McMillen 1958; Figure 3.11) shows the area of the settlement crossing the present Father Capodanno Boulevard, at the northern end of the project area for the road-raising alternative (FO3). The actual house lots for the settlement, however, were located along Old Town Road (along the alignment of the present Olympia Boulevard and Robin Road) (McMillen 1958; Lipson et al. 1978). These houses and any associated archaeological deposits would be located west of the project area.

In 1668, Thomas Walton constructed a house in the vicinity of the Oude Dorp settlement. Walton did not build his house near the older buildings along Old Town Road, possibly because of the decreased threat from the Native Americans. The house site was located closer to the beach and east of the present location of Ocean Avenue (see Figure 3.7). It was sold in 1698 to Thomas Stillwell, and later owners included the Van Deventer, Barrett and Fellowes families. The house was razed in 1964 (Anderson and Sainz 1965).

As noted in Section 3.1.1.1, archaeological excavations were conducted at the location of Walton-Stillwell House (Anderson and Sainz 1965). In addition to the Native American artifacts, the excavations yielded a substantial quantity of colonial materials. One of the pits (Pit #1) excavated near the location of the kitchen was characterized as a “colonial midden,” while another pit (#3) further from the foundation, as well as pit #5 near the beach, held material “of a later time.” The excavators noted that a number of artifacts found at the site date earlier than both the house and the New Dorp settlement. They speculate that the site of the

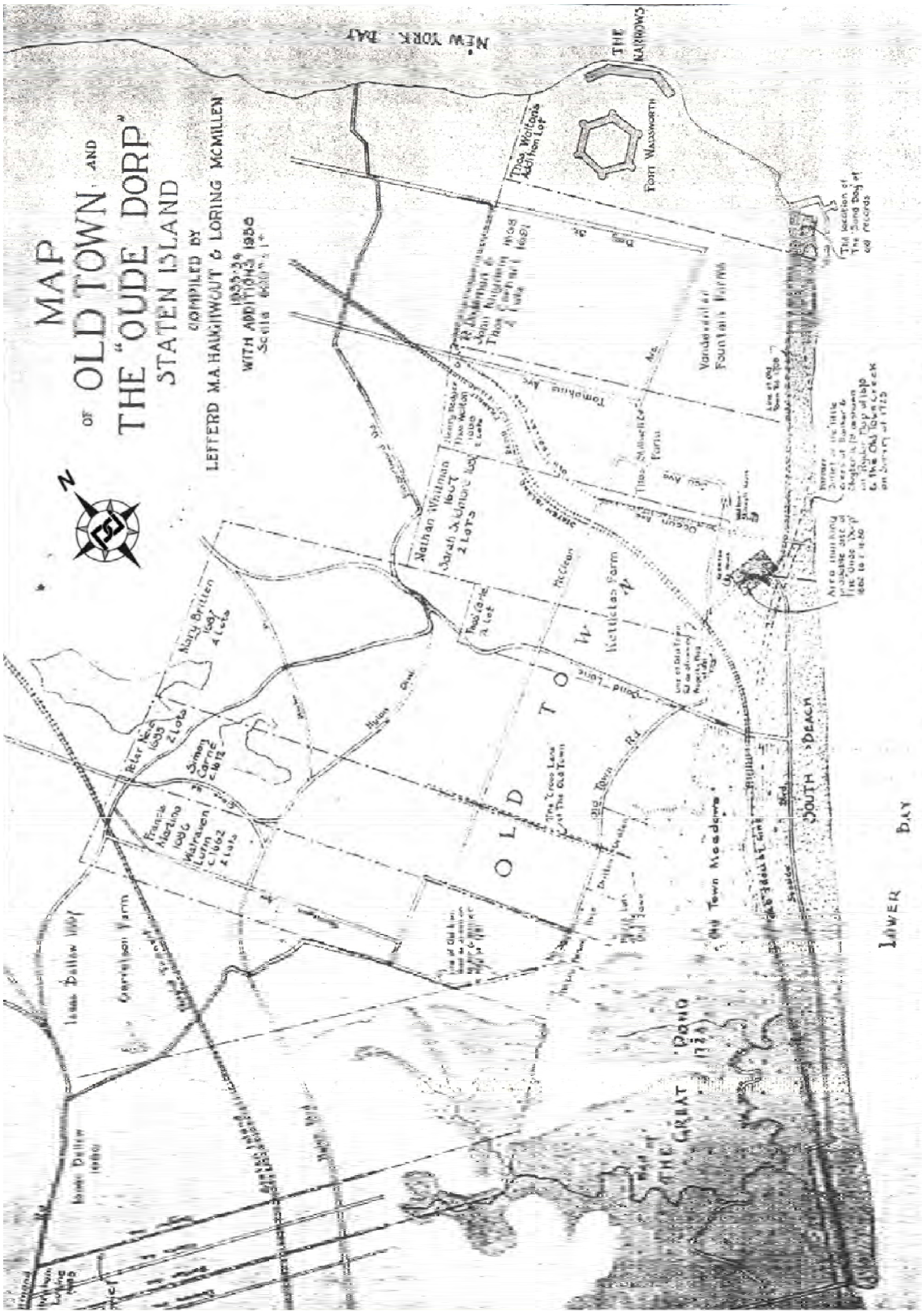


Figure 3.11. The Oude Dorp Settlement. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(McMillen 1958).*

earlier 1642 and 1650 attempts at settlement may have also been at Oude Dorp, rather than at Tompkinsville, as has been assumed.

The recovery of material associated with the historic period occupation of the house from the slope adjacent to the beach suggests that refuse was discarded in this area, as well as closer to the house. As noted previously, the northern end of the sea wall under project Alternative 1 - FO2 would affect the vicinity of the Walton-Stillwell finds near the beach.

3.2.1.1 Shoreline Development after 1850: South Beach. Through the 1870s, the South Beach shoreline area remained undeveloped. By 1874 only an outbuilding, possibly a boathouse, was depicted along the shore on the Ketteltas property (Beers 1874; Figure 3.12). The Ketteltas house, also shown on the 1874 map, was built ca. 1825 (McMillen 1958). Reference to later maps (e.g., Figure 3.13) indicates that this house was located approximately 350 feet west of the present location of Father Capodanno Boulevard. An older, eighteenth-century house was reportedly located on the Ketteltas property, but it was located farther west, closer to the present Robin Road. Another small outbuilding was illustrated along the shoreline on the property adjoining the Ketteltas tract to the west, owned by W.H. Townsend (see Figure 3.12). The marshland bordering the shoreline was shown beginning immediately south of the Townsend property. No development had occurred along the route of the present Father Capodanno Boulevard by 1874 (Beers 1874).

Development of the South Beach shoreline as a resort and amusement area began in the 1880s and was stimulated by the 1886 opening of a branch railroad that ran along the shore from Saint George to Arrochar (Steinmeyer 1958). Prior to 1888 only a few hotels had been built at South Beach (see Figure 3.13). Between 1874 and 1887, a boulevard, then known as Seaside Boulevard, had been constructed along the South Beach shoreline (Beers 1874, 1887; see Figures 3.12 and 3.13). The present Father Capodanno Boulevard follows the same route. Figure 3.13 shows the “Ocean House” owned by T. Brown, apparently a hotel, on the west side of the Boulevard on the property north of the Ketteltas tract. Tom Brown operated an early hotel at South Beach (Steinmeyer 1958). Just west of Ocean House is a building labeled “Bleak House,” owned by J. Seguine, which also may have been a hotel (despite its curious name), although no references to a hotel by that name have been uncovered. These facilities would be at or near the north end of the Father Capodanno Boulevard raising Alternative 1 (FO3).

The hotels were the only new construction shown in 1887. By 1890, however, additional facilities had been built, including hotels, dance pavilions, shooting galleries, a carousel, and other amusements (Steinmeyer 1958). By this time boat service had been initiated from Whitehall Street to a new pier that had been built at South Beach. The pier was located east of the location of the Kettletas house, at the approximate present intersection of Drury Avenue and Father Capodanno Boulevard (Robinson 1898; Figures 3.14 and 3.15). Like Coney Island, the South Beach resort was apparently designed to have mass appeal: “in its early years, before 1890, South Beach was decidedly low class, with gambling, shell games and similar operations at the Beach” (Steinmeyer 1958:18). However, the “moral tone” of the beach apparently improved after 1890.

The early development of the South Beach resort occurred at the northern end of the beach. Around 1890 another hotel was built here, north of the Brown hotel, by John Gebhart. It was shown on the 1898 Robinson and Sanborn maps (see Figure 3.14; Figure 3.16). By 1892, the South Beach Land Improvement Company had acquired all of the beach extending

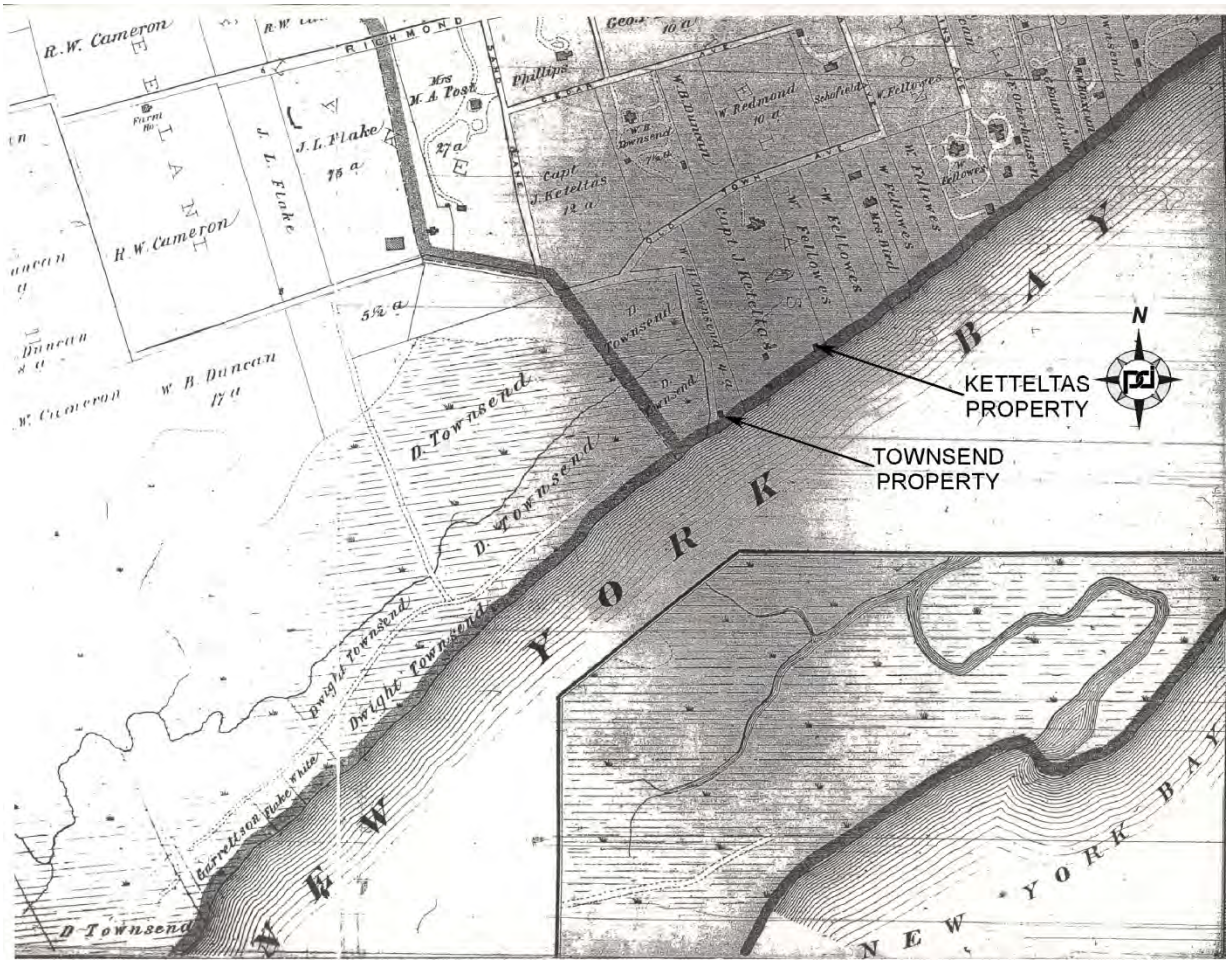


Figure 3.12. South Beach in 1874. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1874:Section 17).*

Figure 3.13. The South Beach-Midland Beach area in 1887. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1887:Section A).*

Figure 3.14. The northern portion of South Beach in 1898. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Robinson 1898:Plate 14).*

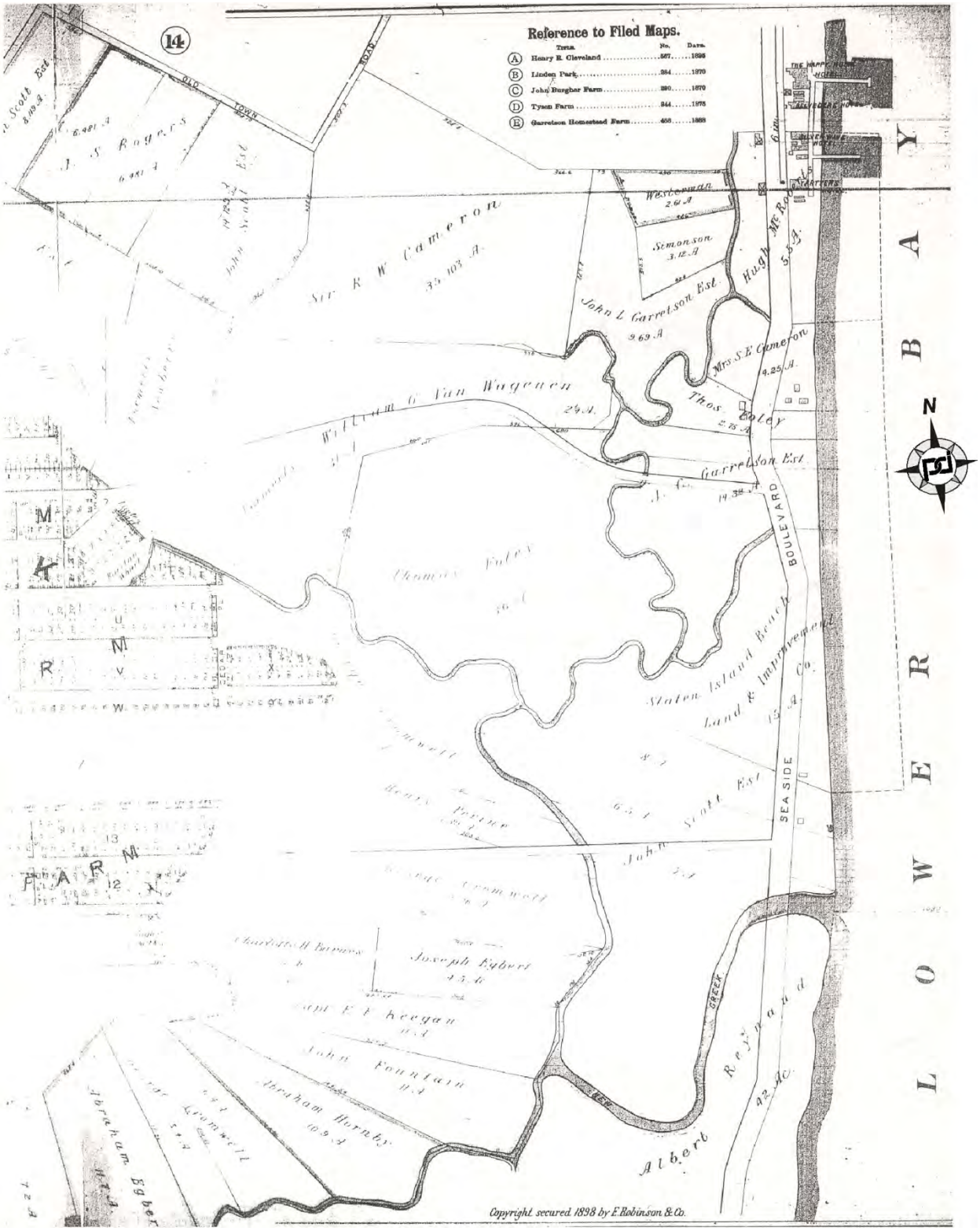


Figure 3.15. The southern portion of South Beach in 1898. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(Robinson 1898:Plate 15).*

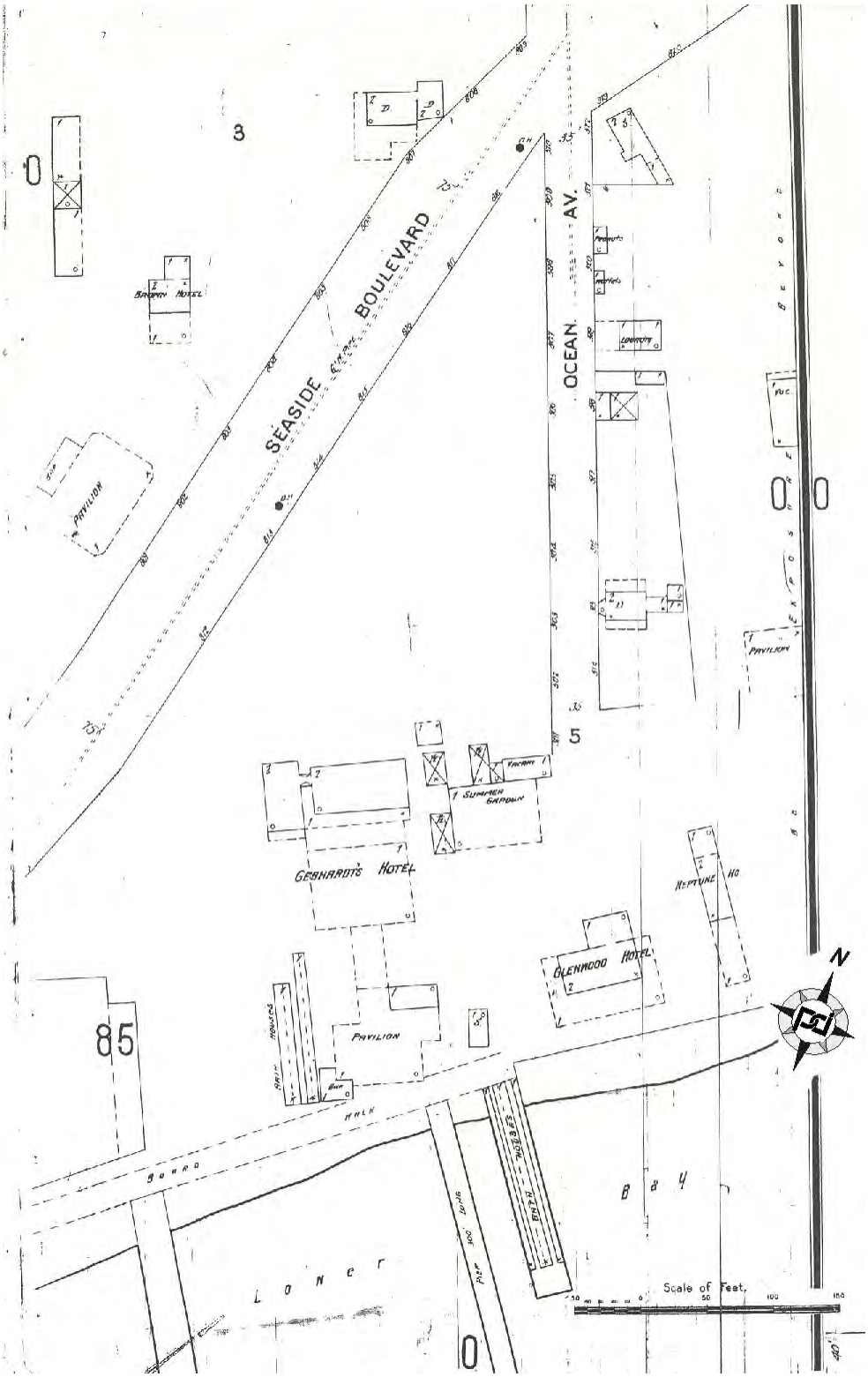


Figure 3.16. South Beach in 1898, showing location of Gebhardt's Hotel (center). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1898).*

south of Sand Lane. A boardwalk was constructed and the company rented plots to entrepreneurs who established bathhouses, merry-go-rounds, and various games. A toboggan was found at the Washington House as well as at the Silver Wave Hotel owned by Grann & Neilsen, which catered to Scandinavians (Steinmeyer 1958; Figure 3.17, for the latter establishment). A number of hotels and amusement attractions were depicted along the beach between the boardwalk and Seaside Boulevard, which was at the location of the present Father Capodanno Boulevard in 1898 (Figure 3.18; see Figures 3.14 and 3.17).

Other establishments operating in the 1890s included hotels named the Glenwood House, the Pleasant View House, the Palmer House, the Hotel Richmond, Warnecke's Hotel, the Eureka House, and the Morgan House, as well as Kohlman's Happy Home, a restaurant featuring clam chowder (Steinmeyer 1958). While some of these establishments were shown on the 1898 maps (see Figures 3.14 to 3.18), others had apparently changed hands by that time.

Two casinos and vaudeville establishments operated by William Nunley and Albert Hergenhan were also in existence in 1898 (see Figures 3.14 and 3.18). Nunley's was also pictured on a 1913 postcard (Figure 3.19). The Hergenhan complex of facilities at the north end of the beach, known as Little Germany (see Figure 3.18), included a large music hall known as Hergenhan's Olympia. This facility was destroyed by fire just after the turn of the century (Steinmeyer 1958).

In the 1890s the railroad extended its tracks along the beach with a new station built at Sand Lane. This stimulated further development along the beach by 1908 (Figures 3.20 to 3.22). At that time, hotels and amusements occupied most of the available space along South Beach, extending some 750 feet south of Sand Lane, with a somewhat lower density of development extending southward for approximately another 1,200 feet.

During the first decade of the twentieth century a group of Staten Island businessmen, inspired by the success of the Coney Island amusement parks, developed their own amusement park at South Beach. Known as Happyland, the park opened in 1906. Happyland was at the north end of the beach (see Figures 3.20 and 3.21), and included a restaurant, theater, bar, dance hall, an animal show and a scenic railway, another miniature railroad that ran around a central lagoon, and many other attractions. Some of the Happyland facilities were depicted on early twentieth-century postcards and photographs (Figures 3.23 and 3.24). Happyland was not a financial success and went into bankruptcy in 1909. It continued in operation, however, until 1917 (Figure 3.25). It was apparently destroyed by fire later that same year (Steinmeyer 1958).

Despite the destruction of the amusement park, South Beach remained a popular destination through the years of the First World War as hotels and amusements were situated along the beach south of Happyland (Figure 3.26; see Figure 3.25).

Pollution of the waters of New York Bay, however, lessened South Beach's attraction as a bathing facility, leading to a decline in its popularity. Another major fire occurred in 1929 (Lundrigan and Navarra 1997:121). The development of the Franklin D. Roosevelt Boardwalk in the 1930s led to the demise of many of the establishments that lined the old boardwalk (Steinmeyer 1958). A Sanborn map of 1937 (Figures 3.27a, b and c), however, shows that there were still a number of bathhouses and a carousel, as well as a few rooming houses and a hotel that remained in operation at South Beach.

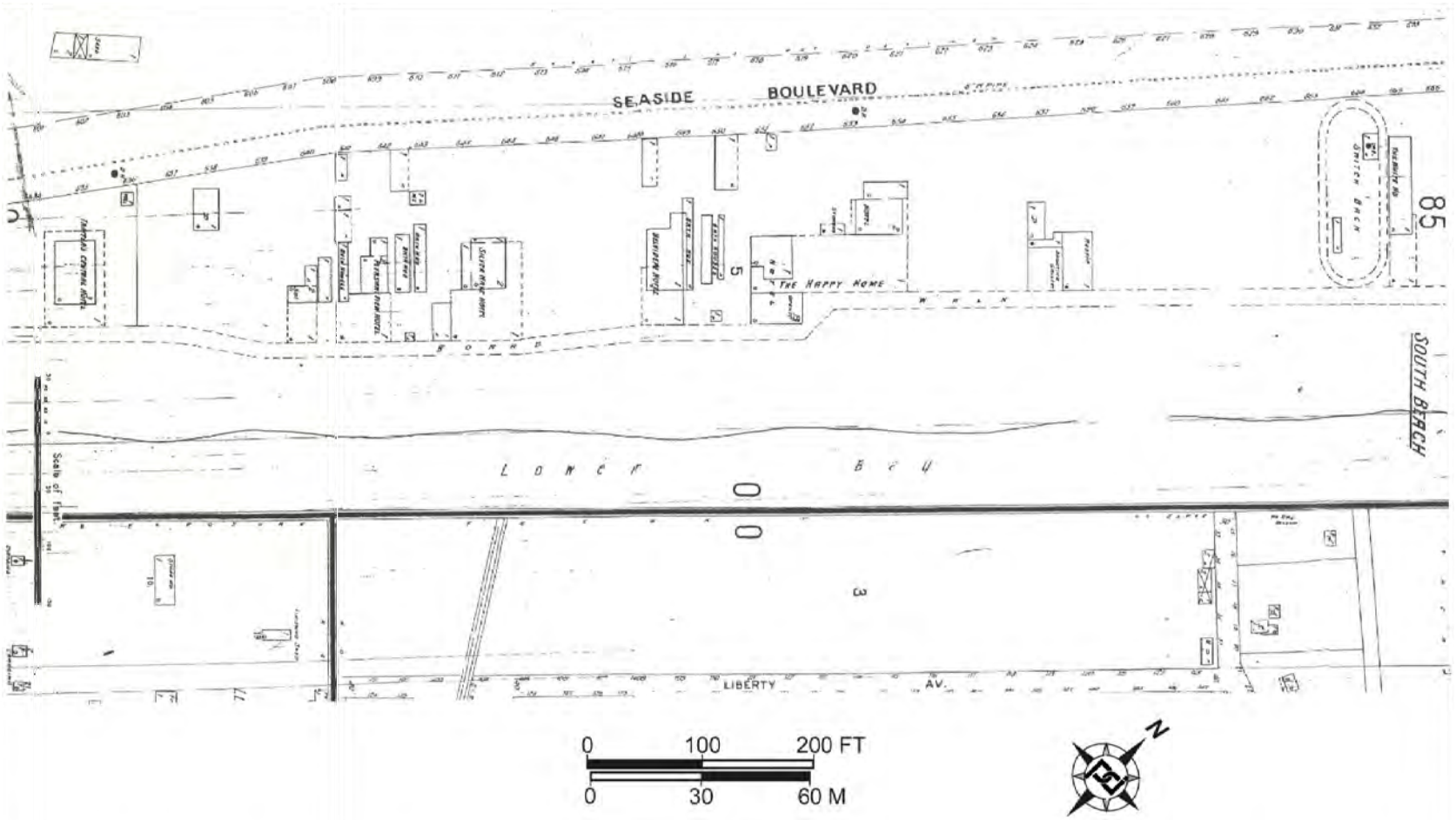


Figure 3.17. South Beach in 1898, showing location of the Silver Wave Hotel (center left). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1898:86)*.

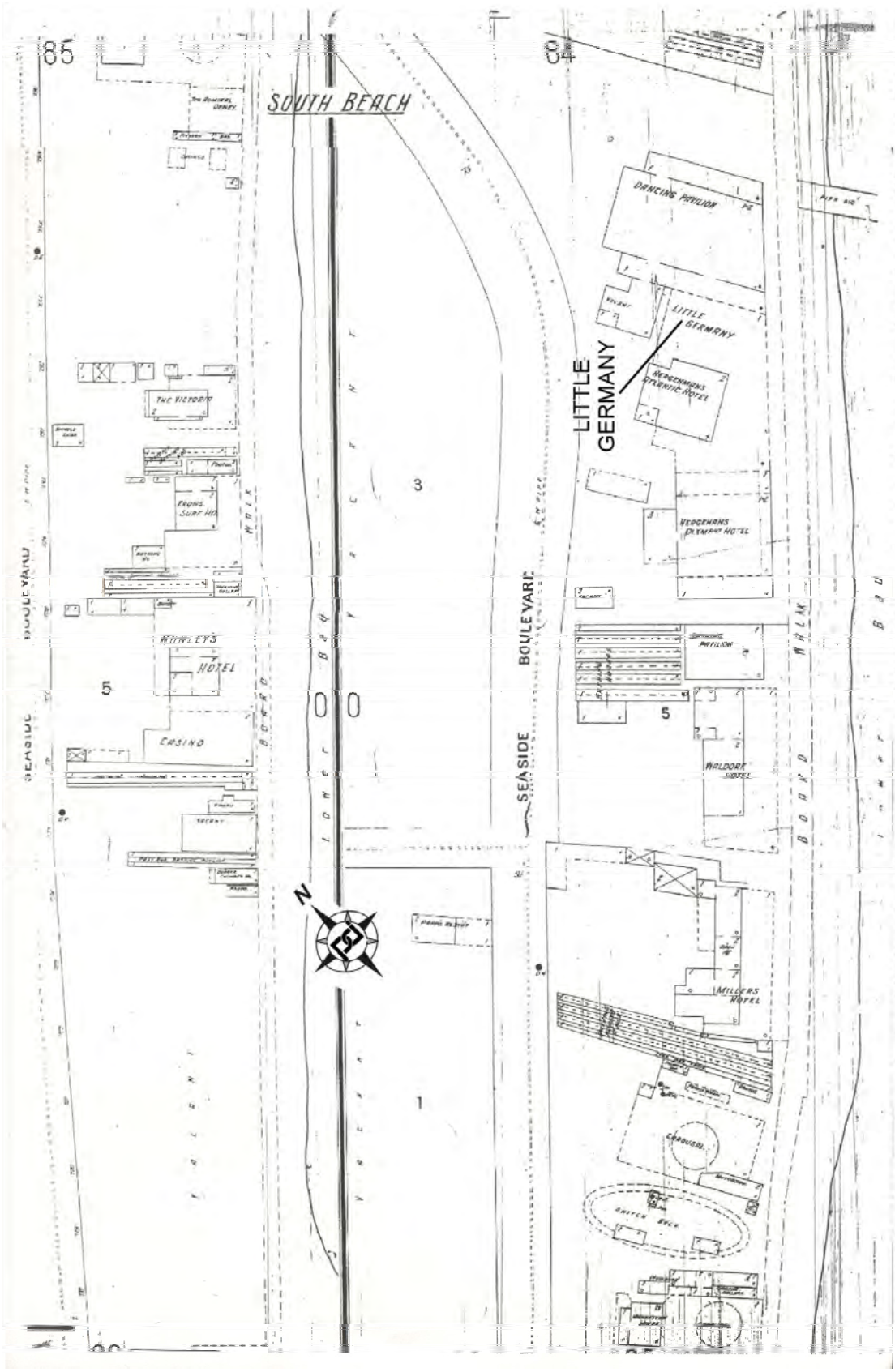


Figure 3.18. South Beach in 1898, showing location of hotels and attractions. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1898:85).*

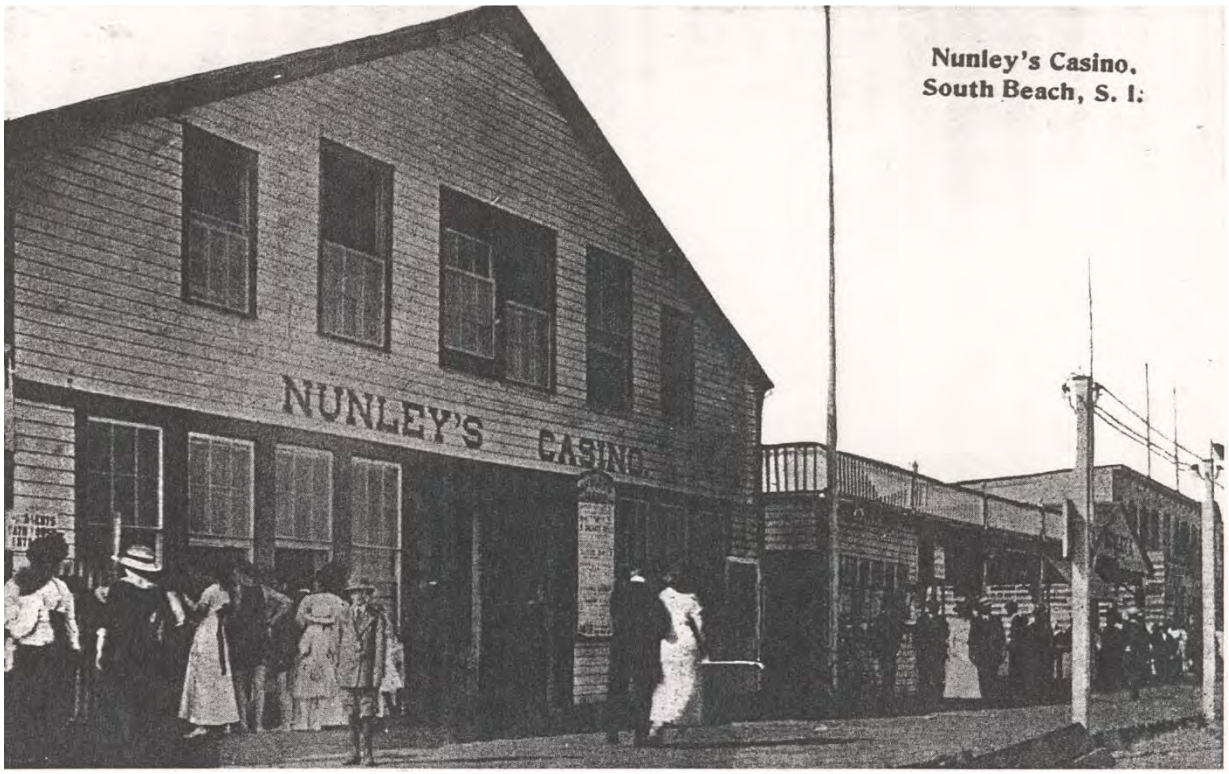


Figure 3.19. Postcard of Nunley's Casino in 1913. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Merlis and Stonehill 2002: 92).*

Figure 3.20. Northern South Beach in 1908, showing further development and attractions. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond Topographic Map:Sheet 42).*

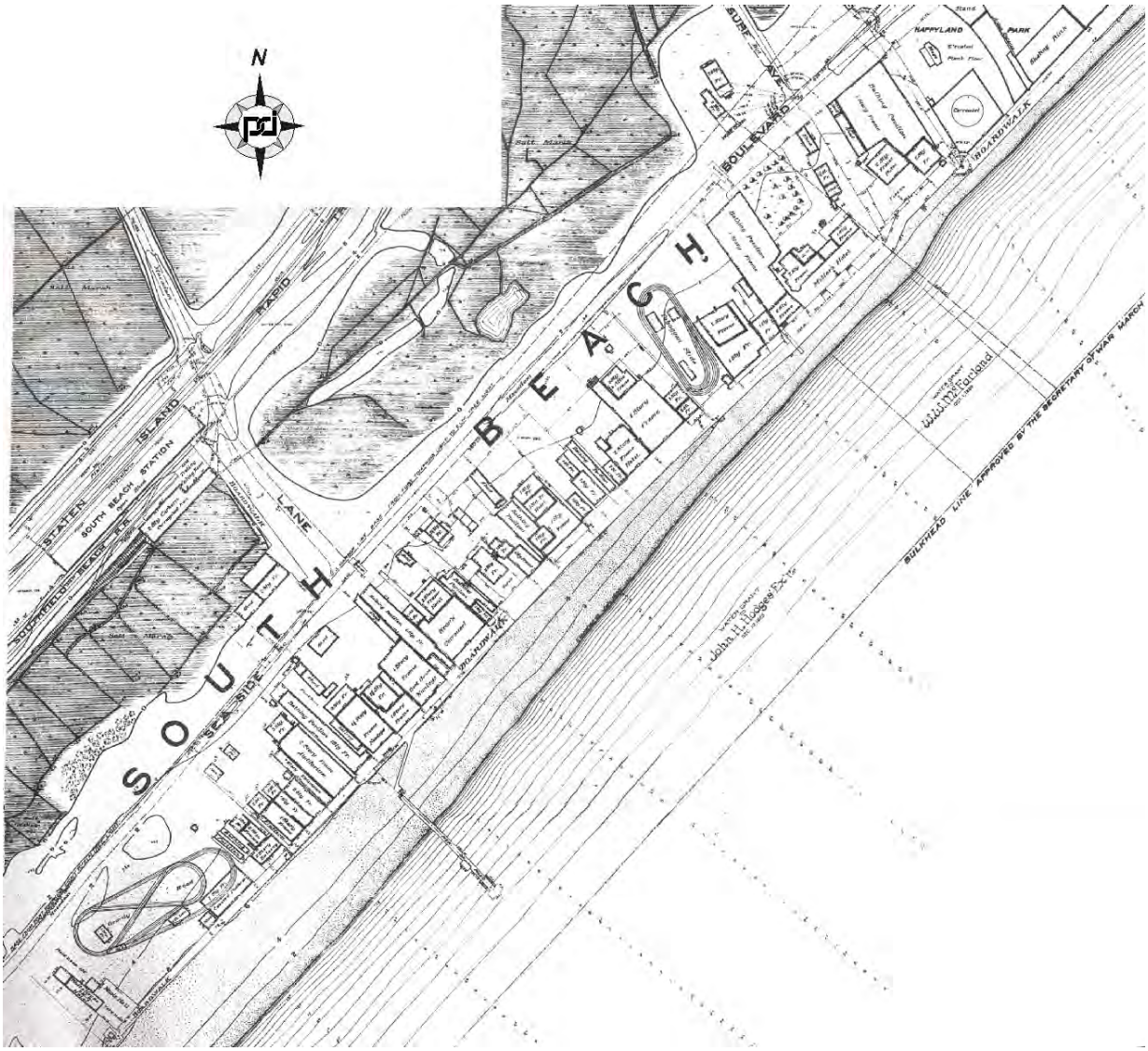


Figure 3.21. Central South Beach in 1908, showing further development and attractions. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond Topographic Map 1908:Sheet 50).*

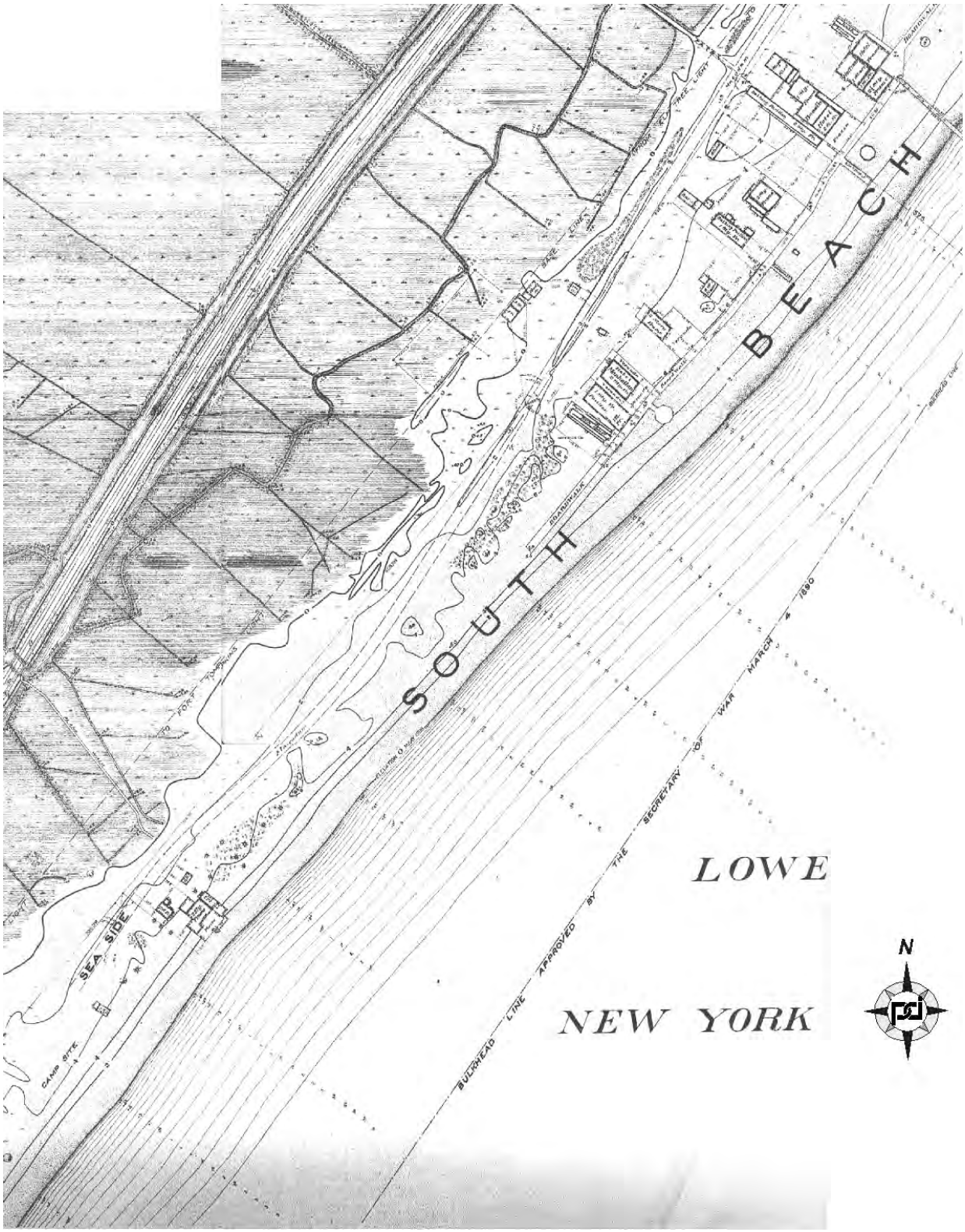


Figure 3.22. Southern South Beach in 1908, showing further development and attractions. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond Topographic Map:Sheet 49).*

Figure 3.23. Postcard of Happyland in 1906. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Merlis and Stonehill 2002: 92).*

Figure 3.24. Early 20th century photograph showing Happyland buildings. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Lundrigan and Navarra 1997: 121).*

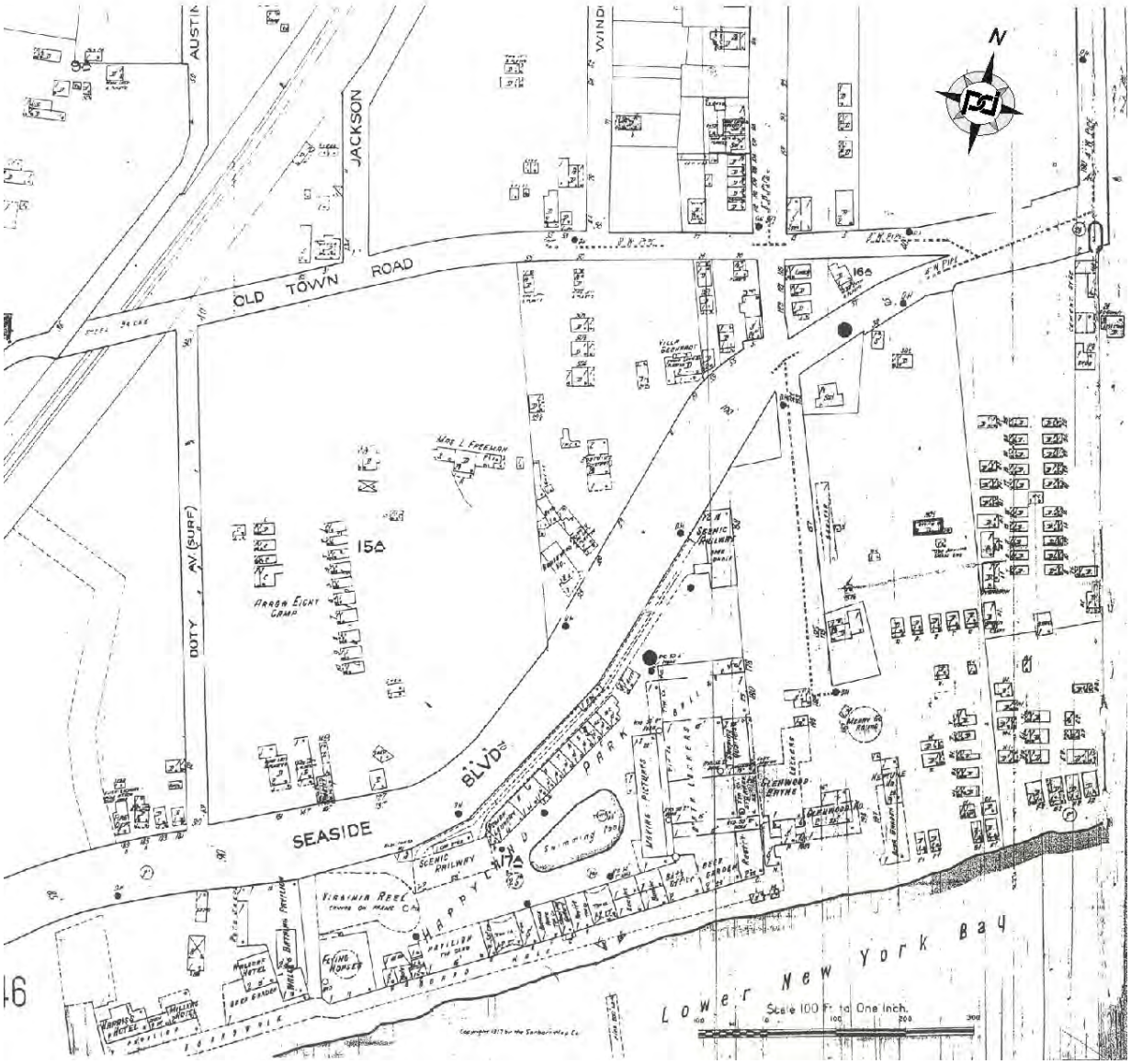


Figure 3.25. Northern portion of South Beach amusement area in 1917. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1917:I:45).*

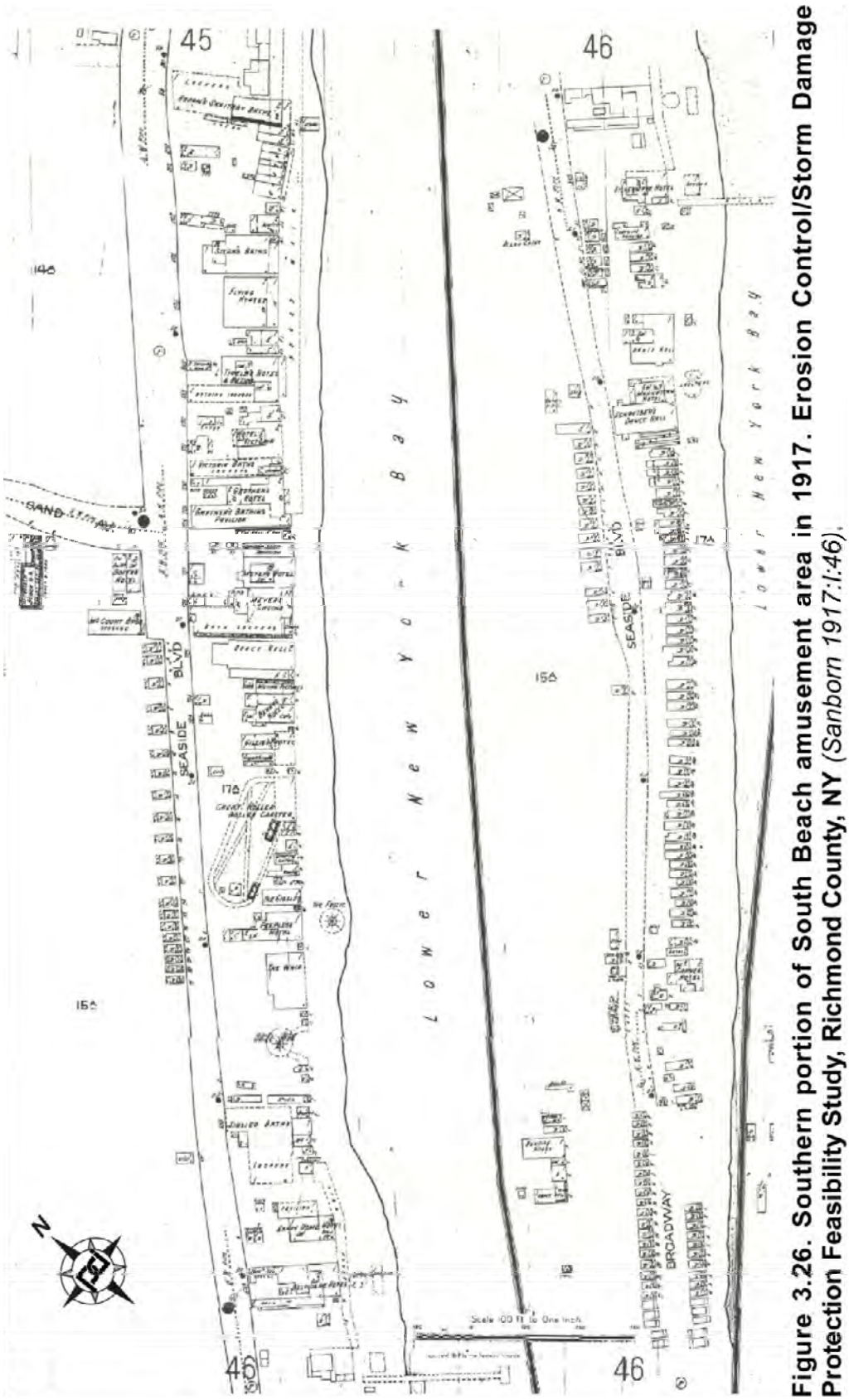


Figure 3.26. Southern portion of South Beach amusement area in 1917. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1917:I:46)*.

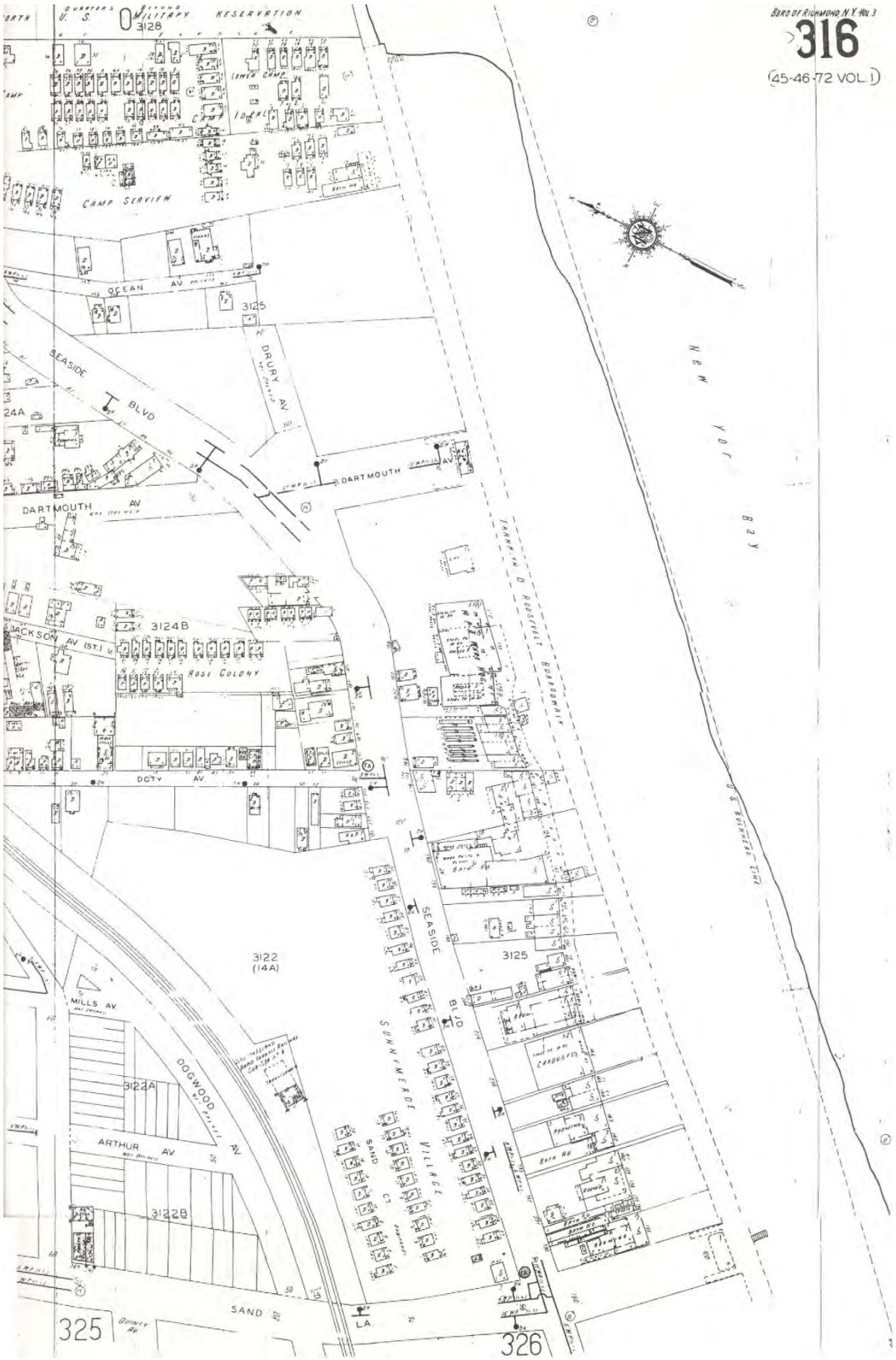


Figure 3.27a. Northern portion of South Beach. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:III 316).*

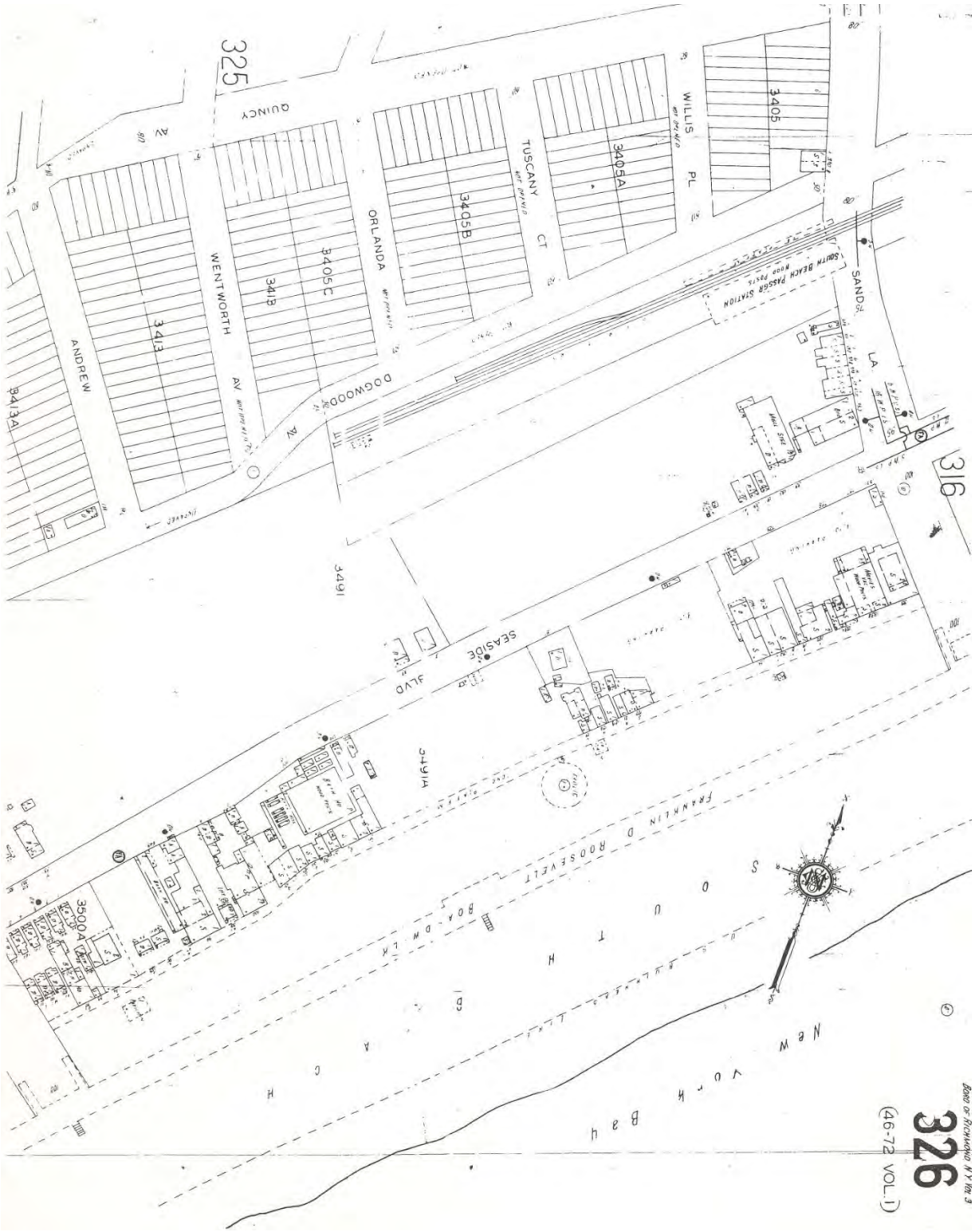


Figure 3.27b. Northern portion of South Beach (continued). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:III 326).*

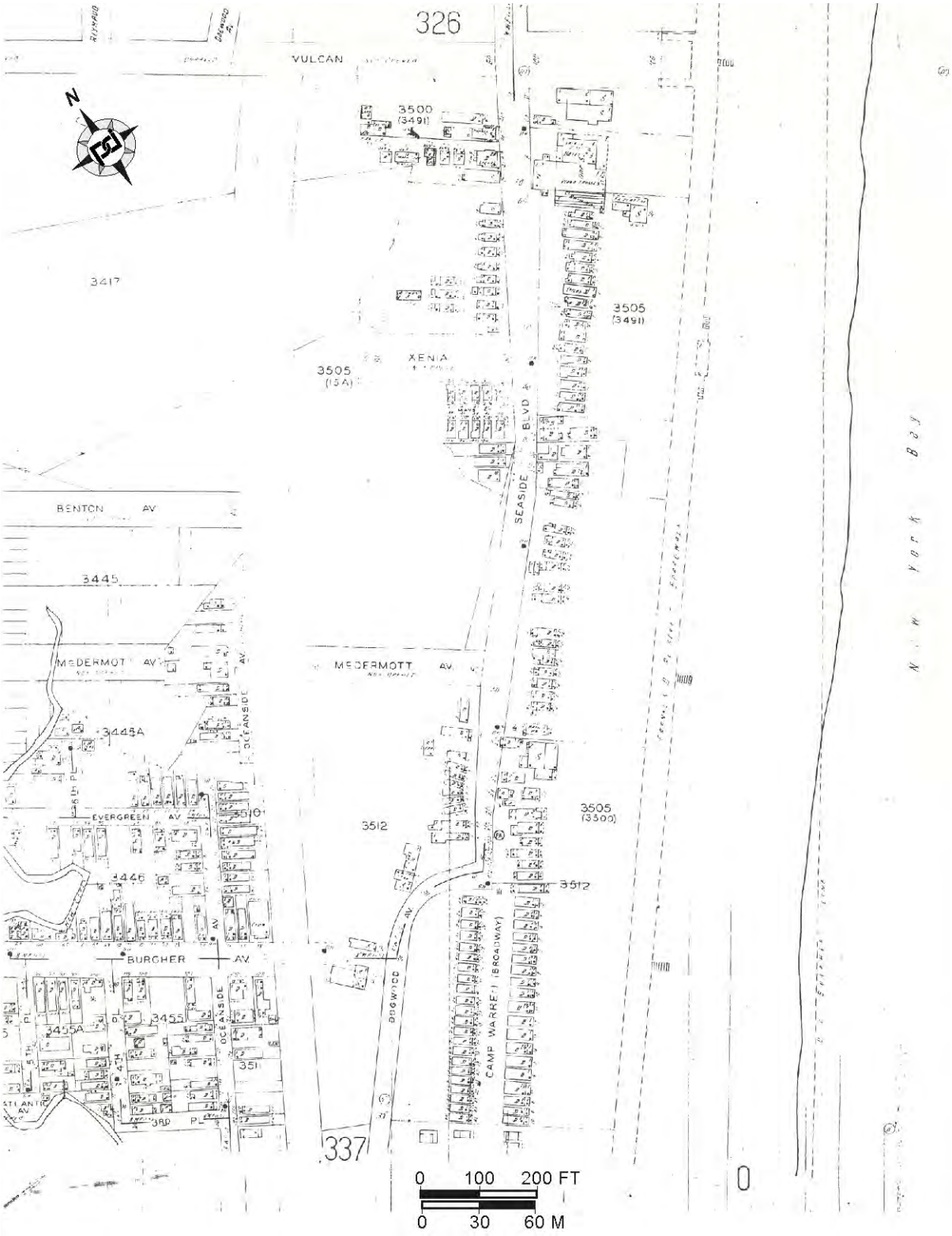


Figure 3.27c. Bungalow colonies at the southern portion of South Beach. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:III-334)*.

Project Impacts. At South Beach the construction of the buried and sheetpile sea wall (Alternative 3-FO2) will occur on the shoreward site of the boardwalk. The sites of the nineteenth-century and early twentieth-century hotels and amusements that stood between the boardwalk and Sea Side Boulevard (present-day Father Capodanno Boulevard) are unlikely to be affected by construction excavations.

The raising of Father Capodano Boulevard under Alternatives 1-FO3 or 2-FO7 will involve near surface impacts due to breaking-up of the present road surface and along the boulevard. Although some disturbances would occur due to the passage of equipment, grading, and utility replacement, the activities are expected to be confined to the immediate vicinity of the boulevard. Raising of the northern turnaround at Sand Lane would affect the area between the boulevard and the boardwalk. This location was the former site of two South Beach hotels, known, in 1898, as Nunley's Hotel and the Surf House (see Figures 3.14 and 3.15).

Structures along the land side of Father Capodanno Boulevard will need to be raised under either Alternative 1 or 2. Comparison of project maps with the 1908 topographic maps (see Figures 3.20 and 3.21) reveals that structures were present in 1908 along the boulevard. A one-story frame dwelling and two outbuildings were illustrated at the approximate present location of the building shown at the southwest corner of Seagate Avenue and Father Capodanno Boulevard on the project map (see Figure 3.20). This building was also depicted in 1898 (see Figure 3.14). The structures were apparently located on the Ketteltas estate (the Ketteltas house itself being well to the west of this location). Four small structures were shown in this area in 1917 (see Figure 3.25). It is uncertain whether any of these represent the same buildings shown in 1908 or the one that presently stands at this location. The other structures depicted on the 1908 map (see Figure 3.21) include two frame buildings on the southwestern corner of Surf Avenue (the present Doty Avenue) and Father Capodanno Boulevard. In 1917 four buildings stood in this area, one of these being a firehouse (see Figure 3.25). It is uncertain if any of the structures presently standing at this location are the same buildings shown on the early twentieth-century maps.

Three structures along Father Capodanno Boulevard are included in the OPRHP Historic Building-Structures Inventory. One of these, at 93 Father Capodanno Boulevard (#085-01-1088), is located near the northern end of the project area. Project maps show that this building would not be impacted by project construction. The other structures listed in the inventory are two early twentieth-century bungalows (#085-01-1089) on the north side of boulevard north of Quintard Street. Although they are indicated as #476 Father Capodanno Boulevard on the inventory sheet, the accompanying map shows them at the rear of the building fronting the boulevard at #469. The project map indicates that this latter structure will be raised, but that the buildings at the rear included in the inventory might remain at grade. The inventory was compiled in 1979 and it is uncertain if the structures listed are still standing.

Ponds. The proposed flood control project also will include the deepening of three currently defined wetlands. Pond 3, under Alternative MSSB #2, will be located west of Sand Lane and north of Father Capodanno Boulevard (see Figure 2.13). This location was within the area of salt marsh that formerly extended along the shoreline. No development had occurred here by 1937, and later maps reveal that it was never developed. However, the South Side Railroad embankment that extended along South Beach in the early twentieth century (see Figures 3.20 to 3.22) apparently was within or close to the southern portion of the ponds. Project topographic maps show that this embankment no longer remains.

Under Alternative MB #2, Ponds 1 and 2 would be excavated in the southern portion of South Beach. Their locations would place them west of the former locations of the Midland Beach and South Beach amusement areas. Pond 2 would be located in an open area between Olympia Boulevard and Quincy Avenue, east of Dongan Hills Avenue (see Figure 2.14). Pond 1 would be located south of Olympia Boulevard between Graham and Slater Boulevards (see Figure 2.15). These areas were originally within the salt marsh and appear to never have been developed. Pond 1 would be located a short distance north of the "Island" of higher ground known in the nineteenth century and early twentieth century as "Poppy Joe Island." The stream shown on project maps within Pond 1 is apparently a remnant of the tidal creek known as New Creek on historic period maps.

3.2.1.2 Midland Beach. While development of the South Beach resort area was well underway by 1890, Midland Beach remained undeveloped. South Beach had become accessible by rail, while Midland Beach remained accessible only by horse and buggy or by foot. The Midland Beach resort was developed by a subsidiary of the Midland Beach Railway Company. By 1896 the company had installed trolley lines on Lincoln Avenue (formerly Red Lane) and Midland Avenue, providing access to the shore from the railroad. The resort opened in the same year, although the main attractions were apparently not completed until 1897 (Steinmeyer 1954). Midland Beach was conceived as a more genteel resort than the existing South Beach resort: signs at Midland Beach told visitors "This is a Respectable Place, Be Respectable" (Steinmeyer 1954:1).

The Midland Beach facilities included the Midland Beach Casino and Hotel at the south end of the beach and a carousel and Ferris wheel at the north end (Figures 3.28 and 3.29). The casino was completed in 1897 and the Ferris wheel was built the following year (Steinmeyer 1954) (Figures 3.30 and 3.31). "The Casino was a full-size theatre with an Ionic columned façade" (Steinmeyer 1954:2). Two other major hotels were shown in 1898, the Richmond Hotel and Cables Hotel. A steamboat pier, with a miniature railroad carrying visitors along its length, opened in 1899 (Steinmeyer 1954) and was shown in 1909 (Figures 3.32 and 3.33). The pier was located at the south end of the beach just north of Lincoln Avenue.

The resort apparently thrived during the first decades of the twentieth century, with access improved still further by the opening of the steamboat pier and the inauguration, in 1901, of the Southfield Beach Railroad's trolley service along the shore from South Beach to Midland Beach (see Figures 3.32 and 3.33; Figures 3.34 and 3.35). By 1917, a roller coaster had been built on the north end of Midland Beach and a scenic railway at the south end, near the pier. By then Midland Beach had lost its more genteel image, becoming more like South Beach. In fact, as early as 1909 a description of the two south shore resorts did not distinguish between the two. "Within easy access of all parts of Staten Island are the two delightful pleasure resorts, known as Midland Beach and South Beach … at both places may be found all the delights of 'a Coney Island'" (Fach 1909; Steinmeyer 1954).

In 1924 a major fire destroyed most of the buildings at Midland Beach (Steinmeyer 1958) and several large fires had occurred during the 1920s (Lundrigan and Navarra 1997:123). Some of the facilities apparently either escaped the fire or were rebuilt. By 1937 the pier, which apparently had been rebuilt as a concrete pier, and a roller coaster and carousel at the north end of the beach were still in existence (Figure 3.36). No hotels were shown here in 1937, although several bathhouses had been built. Some facilities continued in operation at Midland Beach through 1949, when much of the property along the beach was sold at auction and subsequently acquired by New York City (Steinmeyer 1954:3).

Figure 3.28. Hotels and attractions at Midland Beach and New Dorp Lane in 1898. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Robinson 1898:Plate 16)*.

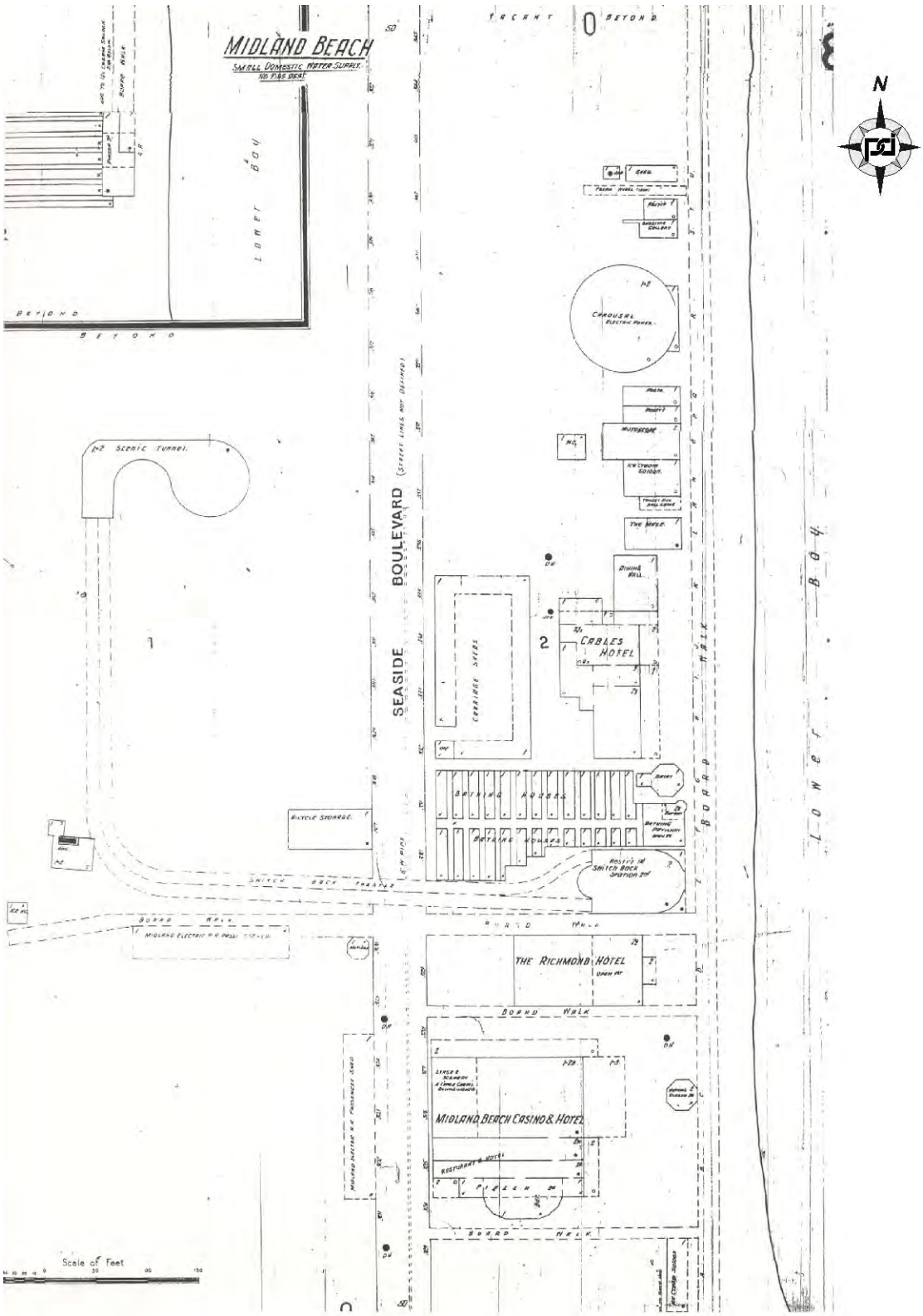


Figure 3.29. Hotels and amusements at Midland Beach in 1898. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1898:88)*.

Figure 3.30. Midland Beach, early 1900s. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Smith 1968:121)*.

Figure 3.31. Midland Beach, ca. 1905. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Photograph by P.L. Spehr; New York Public Library Collection #1295/E3).*

Figure 3.32. Northern Midland Beach and Poppy Joe Island in 1909. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond Topographic Map 1909:Sheet 57)*.

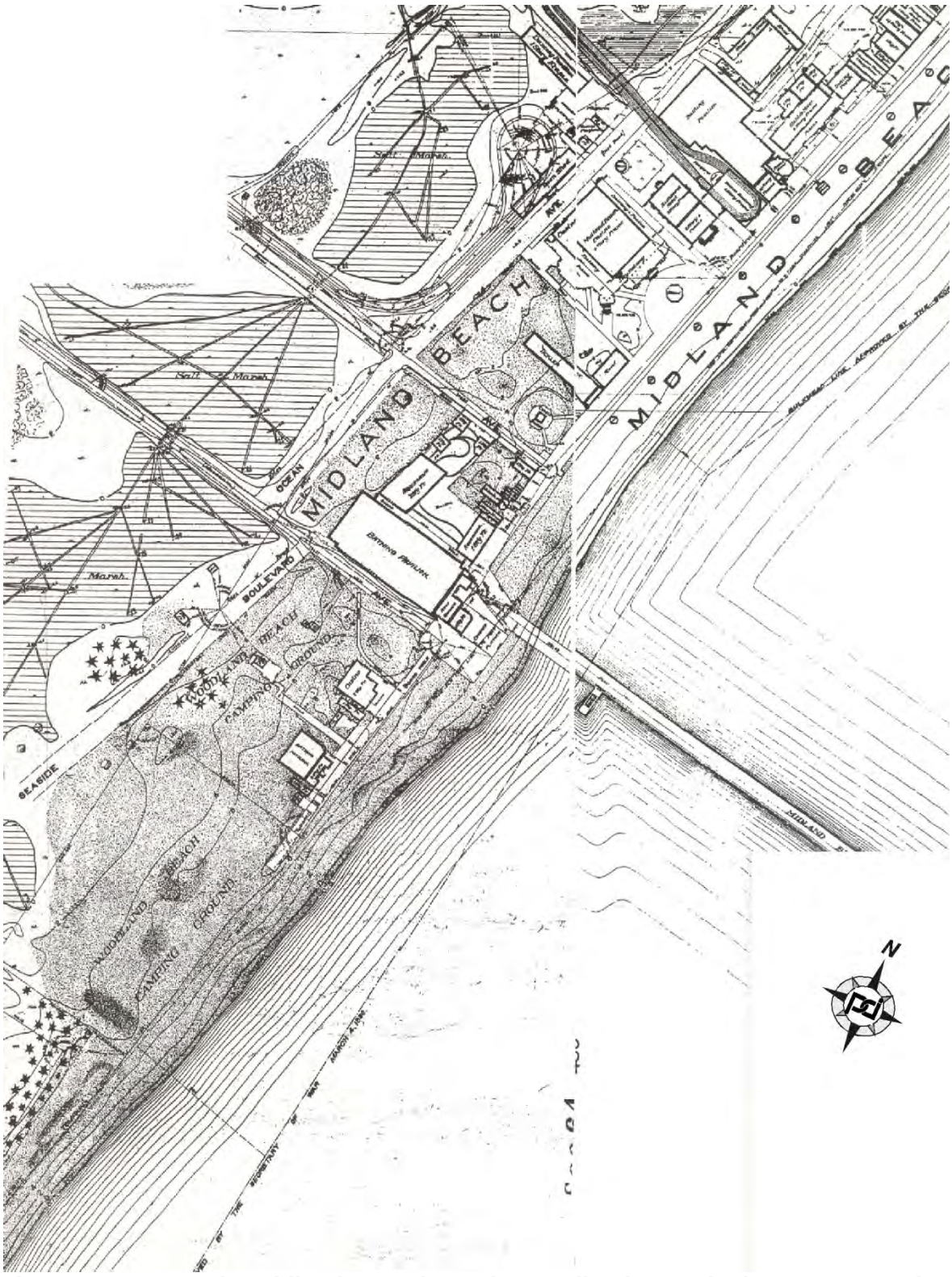


Figure 3.33. South Midland Beach and Woodland Beach in 1909. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond Topographic Map 1909:Sheet 57)*.

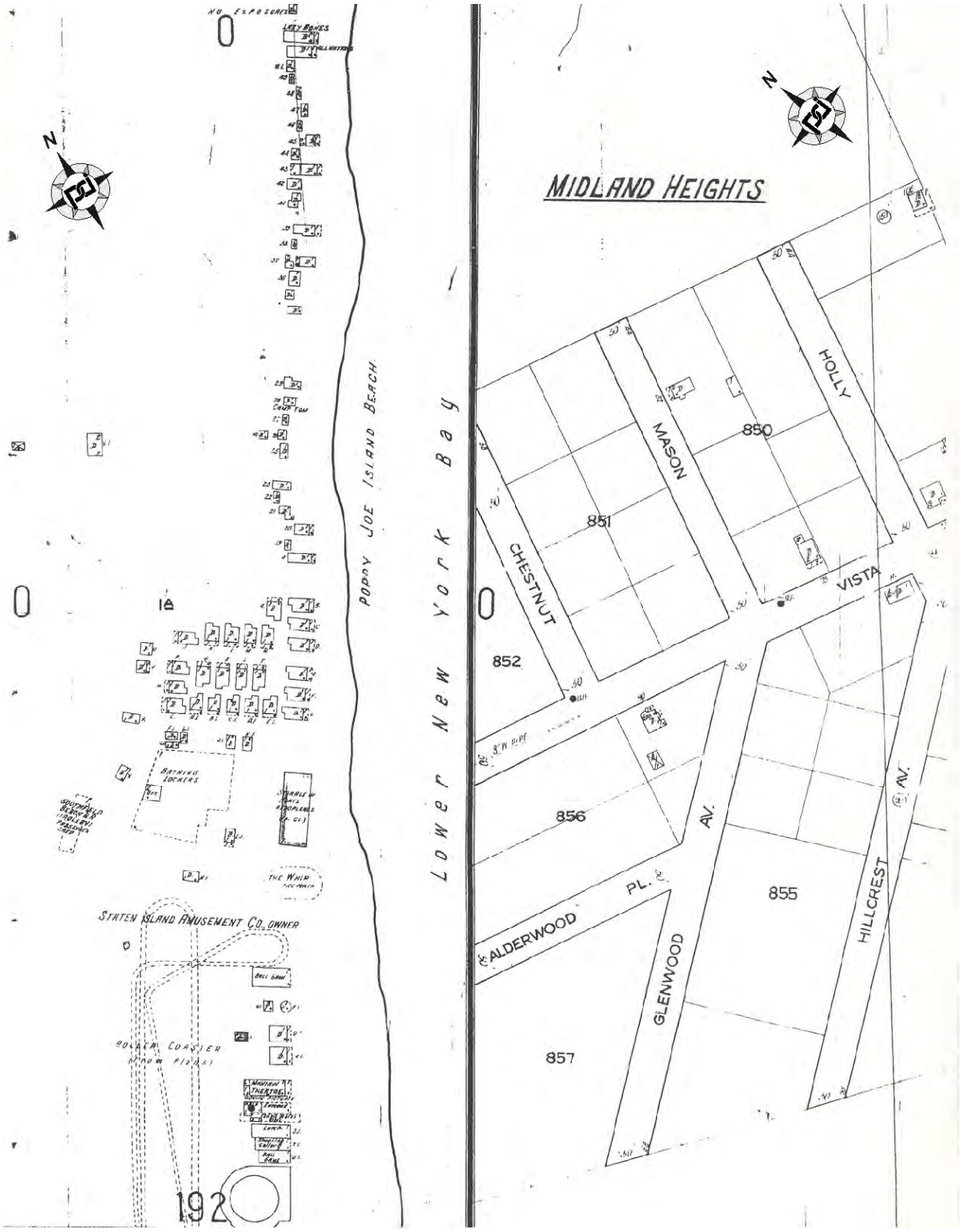


Figure 3.34. Poppy Joe Island Beach and northern Midland Beach in 1917. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1917:II-186)*.

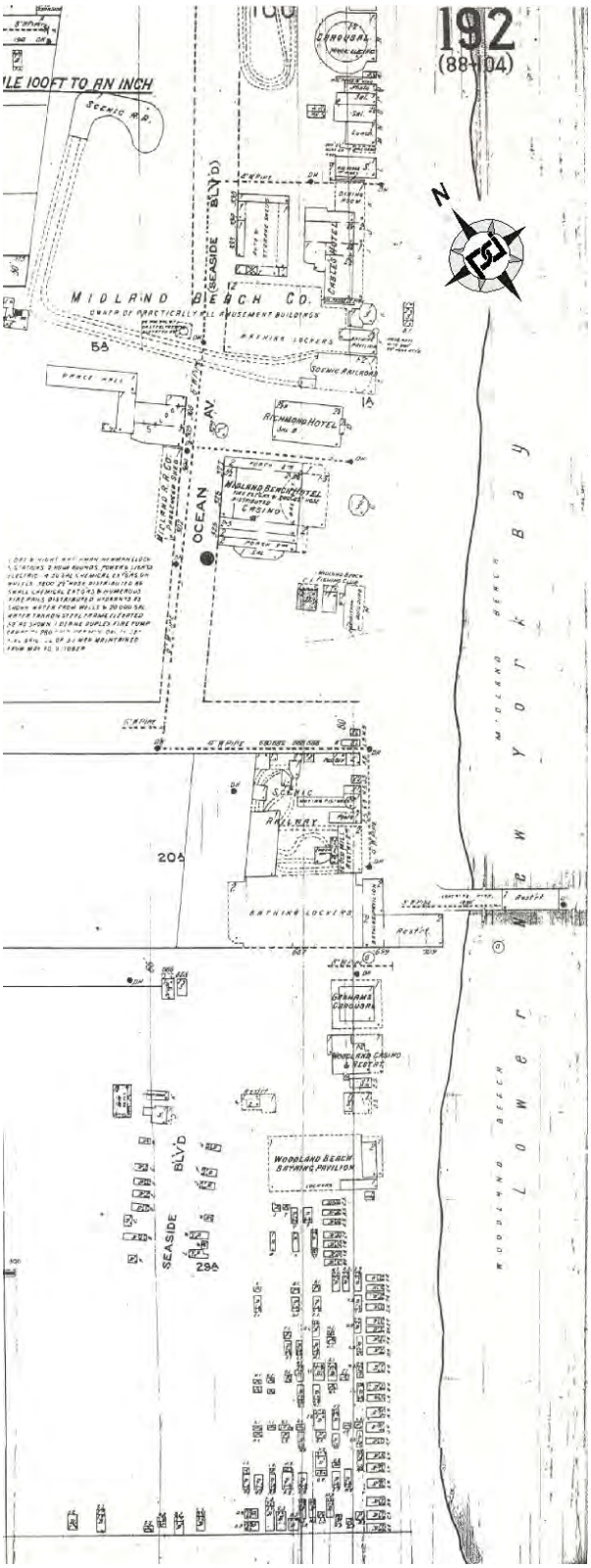


Figure 3.35. Midland Beach and Woodland Beach in 1917. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1917:II-192).*

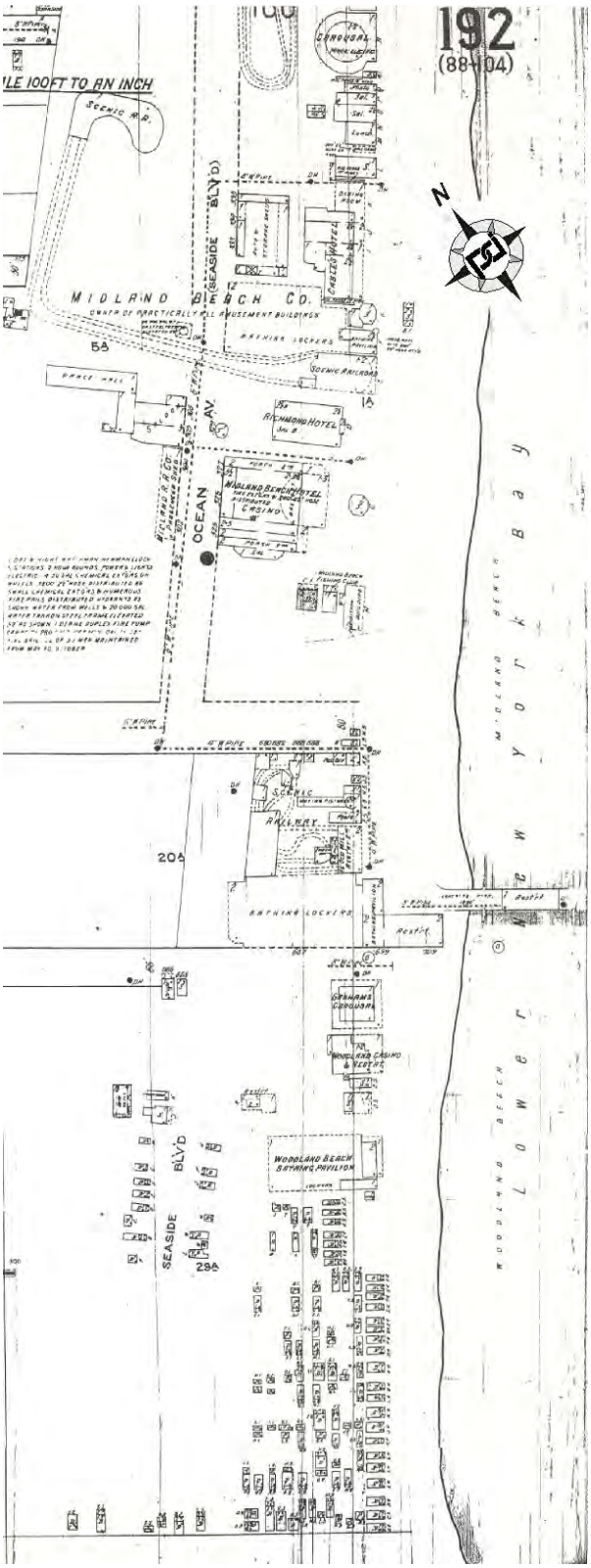


Figure 3.36. Midland Beach in 1937. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1917:II-192).*

Baugher-Perlin and Bluefeld (1980:34) write, citing Steinmeyer (1958:20), that "even though these buildings [at the South shore beaches] had elaborate facades, they were constructed of nothing more than pine boards on posts set into the sand." However, a check of their source finds no such mention of construction details at the Staten Island resorts. Photographs dating to the first two decades of the twentieth century (see Figures 3.19, 3.23, 3.24, 3.30 and 3.31) appear to show that some of the structures at both Midland Beach and South Beach were substantial buildings. The buildings were obviously of wooden construction, and their beachfront location would most likely require the use of pile foundations. However, it is likely that some of the buildings, at least the hotels, were of better construction than that indicated by Baugher-Perlin and Bluefeld.

Project Impacts. Comparison of early twentieth-century maps with project maps reveals that the Midland Beach hotels and amusements were located in a strip about 200 to 300 feet wide extending eastward from the present location of Father Capodanno Boulevard, which appears to be at the approximate location of Ocean Avenue as shown on the historic maps. The beach in this area now appears to be considerably wider than it was in the early twentieth century.

The buried seawall with promenade Alternative 2-FO7, lying seaward of the current promenade, is not expected to impact the area where the Midland Beach hotels and amusements stood in the nineteenth and early twentieth centuries. The sheetpile seawall Alternative 3-FO2 that would align landward of the promenade, in addition to the buried seawall section at the south end of Father Capodanno Boulevard, would traverse sections of the Midland Beach development (see Figures 3.33 and 3.35). The southern turnaround project area components appear to be beyond the northern end of the amusement area.

3.2.1.3 Other Beachfront Development – South Beach to Miller Field. At the end of the nineteenth century, the sections of beachfront between the South Beach and Midland Beach amusement areas, including the southern portion of South Beach, and between Midland Beach and what is now Miller Field remained undeveloped (see Figures 3.15 and 3.28). The latter beachfront area was part of the Barnes property (see Section 3.2.2.2) and known as Barnes Beach, while the section of beach immediately north of Midland Beach was known as Poppy Joe Island Beach (later known as Graham Beach).

No construction had occurred at Poppy Joe Island Beach by 1909 (see Figure 3.32), although it was in use for camping. By 1917 bungalows lined the shore here (see Figure 3.34). Bungalow colonies and campgrounds also lined the beach from New Creek northward to the South Beach amusement area (see Figure 3.26; Figures 3.37 and 3.38). They continued to be located here in 1937 (Figures 3.39 and 3.40). The bungalow colonies and campgrounds along the beach in these areas were known at various times as Graham Beach, Camp Warren, Hungarian Town, Bungalow Town, Ocean Breeze Beach and Moore's Camp.

By 1910 Barnes Beach had been renamed Woodland Beach (see Figure 3.33). A casino and bathing pavilion had been built in the northern portion of the area, south of Lincoln Avenue. The remaining area was a campground (Figures 3.41 and 3.42). By 1917 (see Figure 3.35) further development had taken place at Woodland Beach, with a carousel constructed near Lincoln Avenue and the campsites replaced by small bungalows. The Woodland Beach facilities still stood in 1937 (Figure 3.43).

Figure 3.37. Postcard showing bungalows and tents at Camp Warren (later Hungarian Town) in 1912. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Merlis and Stonehill 2002:90).*

Figure 3.38. Postcard showing bungalows at Ocean Breeze/Moore's Camp (located immediately north of New Creek) in 1915. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Merlis and Stonehill 2002:90).*

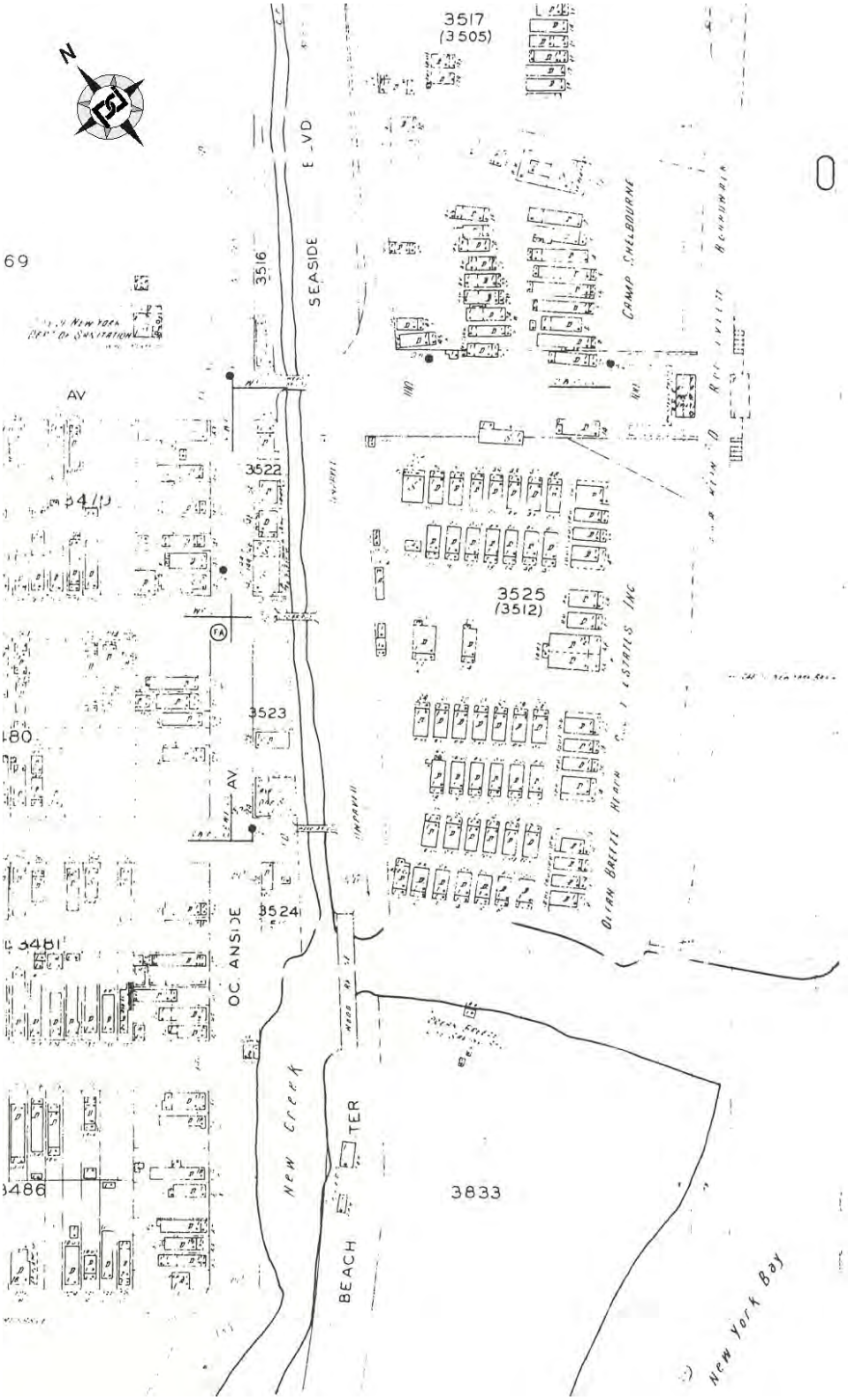


Figure 3.39. Bungalow colonies at southern South Beach in 1937. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:III-337).*

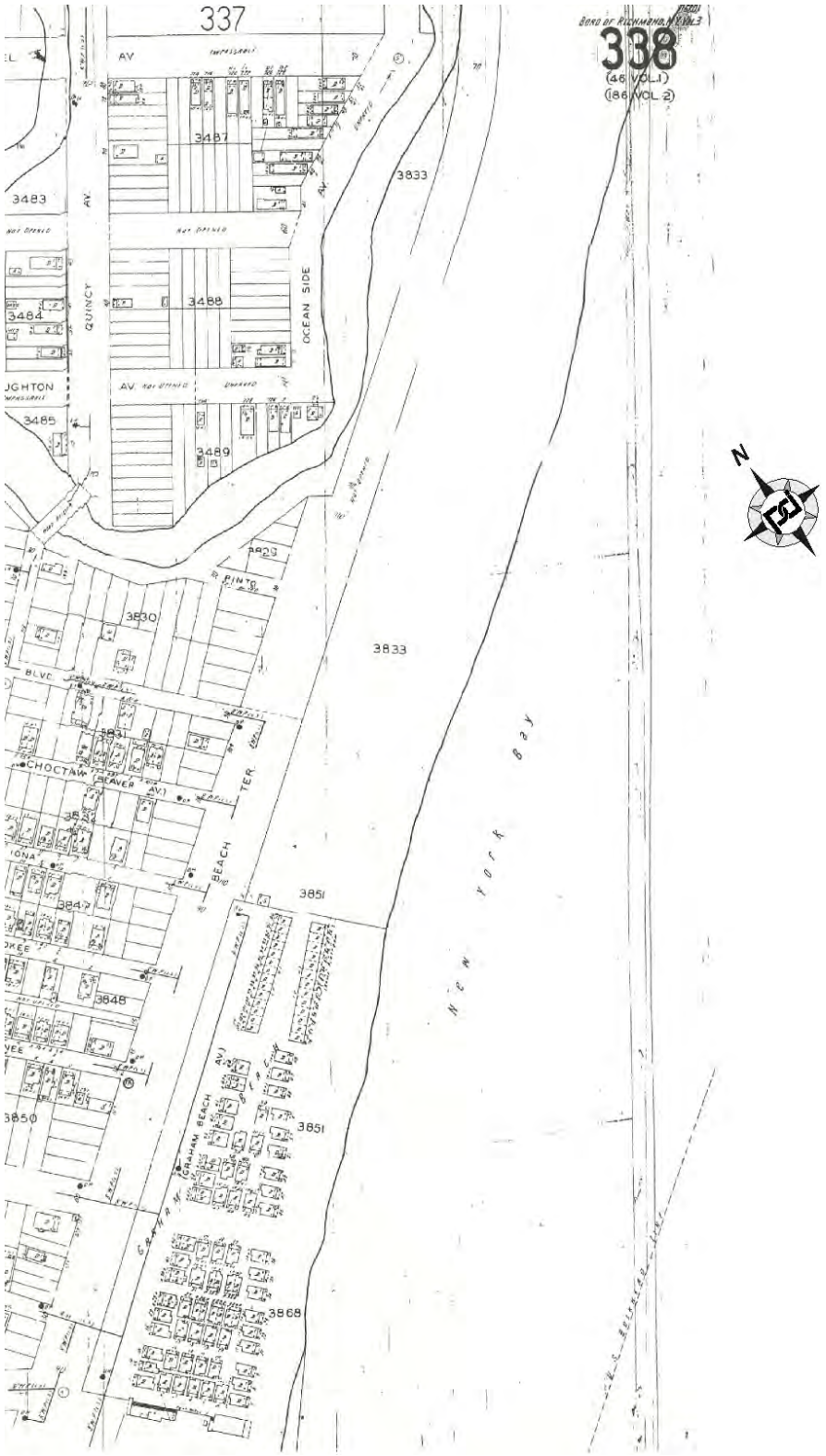


Figure 3.40. Bungalow colony at Graham Beach (formerly Poppy Joe Island Beach) in 1937. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:III-338).*

Figure 3.41. Postcard showing Woodland Beach Casino (foreground) and Pavilion (background) in 1910. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Merlis and Stonehill 2002:141).*

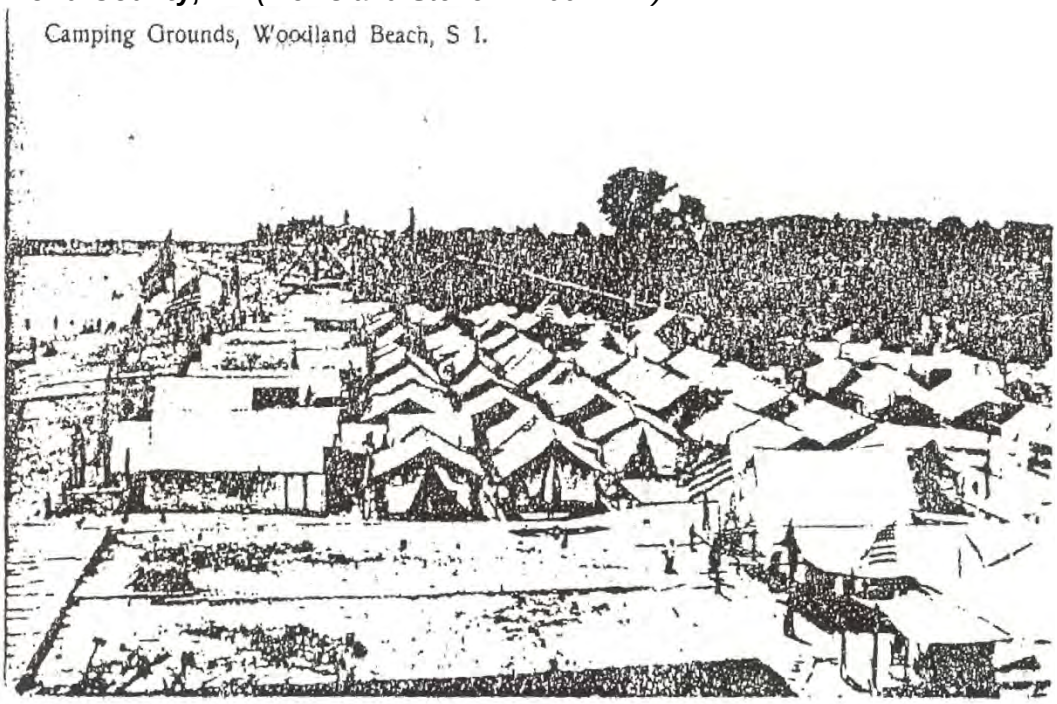


Figure 3.42. Postcard showing Woodland Beach campground (after 1907). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Staten Island Historical Society Collection; from Baugher and Bluefeld 1980:46).*

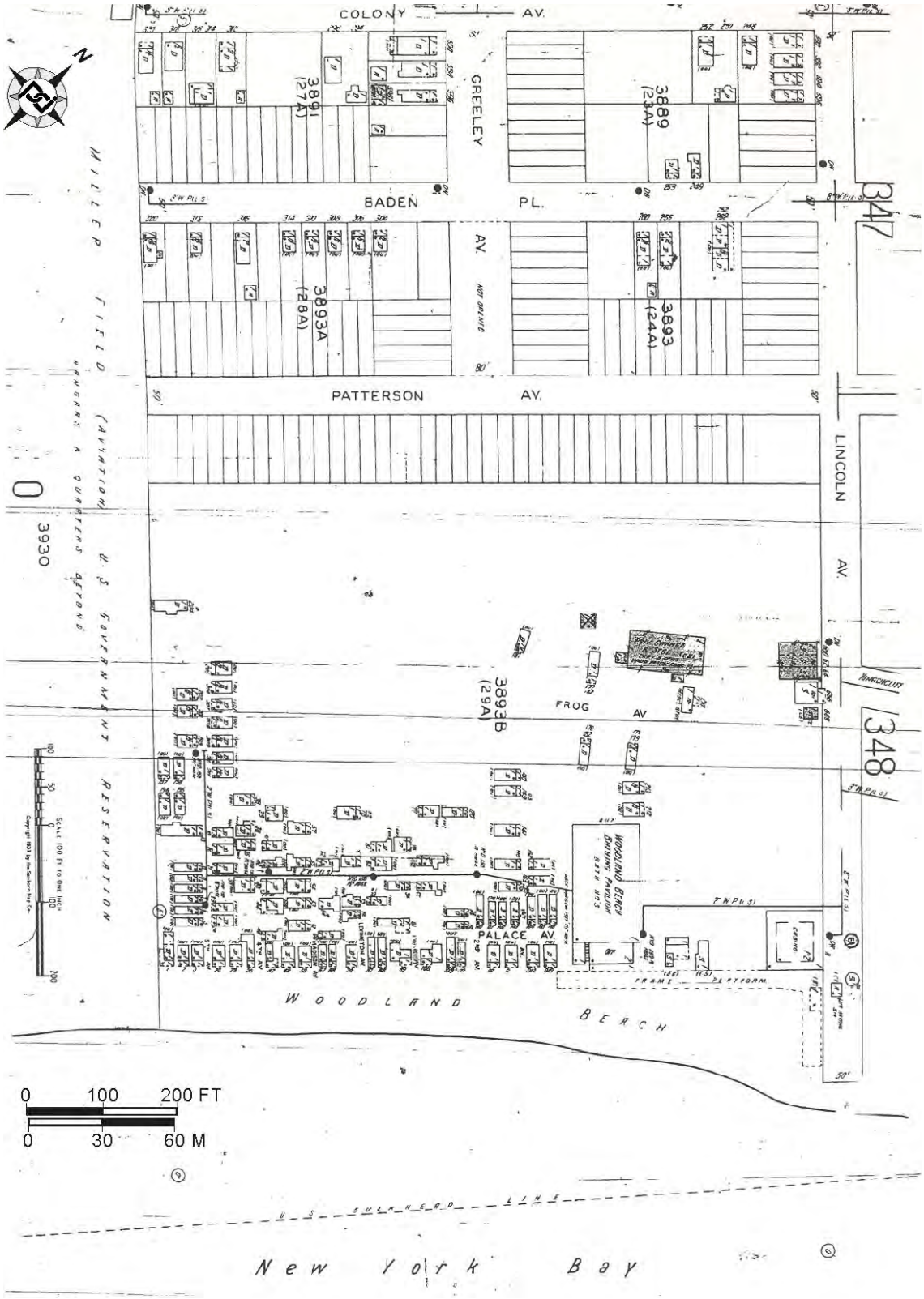


Figure 3.43. Woodland Beach. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:III-350).*

3.2.2 Study Area B: Miller Field to Oakwood Sewage Treatment Plant

3.2.2.1 Britton Cottage. A number of houses were depicted along the south shore of Staten Island in the 1780s (see Figures 3.4 and 3.5), most of which were located well back from the shoreline. The closest structure to the beach was the seventeenth-century Britton Cottage and the Barnes house.

Britton Cottage, a one-story fieldstone structure, was built by Obiadiah Holmes shortly after his acquisition of the property in 1677. Additional sections were added to it in the eighteenth century. Nathaniel Britton purchased the house and property in 1714. It was subsequently acquired by Thomas Walton, who sold it to Isaac Cubberly in 1761. The house was labeled Cubberly on the ca. 1780 "French Map" (see Figure 3.4), and it remained in the Cubberly family until 1847 when it was sold to Harriet Lord. Her son, Dr. Nathaniel Lord Britton, deeded the house to the Staten Island Institute of Arts and Sciences in 1915. It was subsequently moved from this site to the Richmondtown Restoration complex (Lipson et al. 1978; McMillen 1940).

The house was originally included within a tract of 96 acres, but by the late nineteenth century it stood on a 154-by-120-foot parcel located on the southeastern corner of New Dorp Lane and Cedar Grove Avenue, approximately 600 feet west of the beach. The house site also included a well and a barn adjacent to the house. In the mid-nineteenth century (Figure 3.44) the barn was rendered on the east side of the house, closer to the shore.

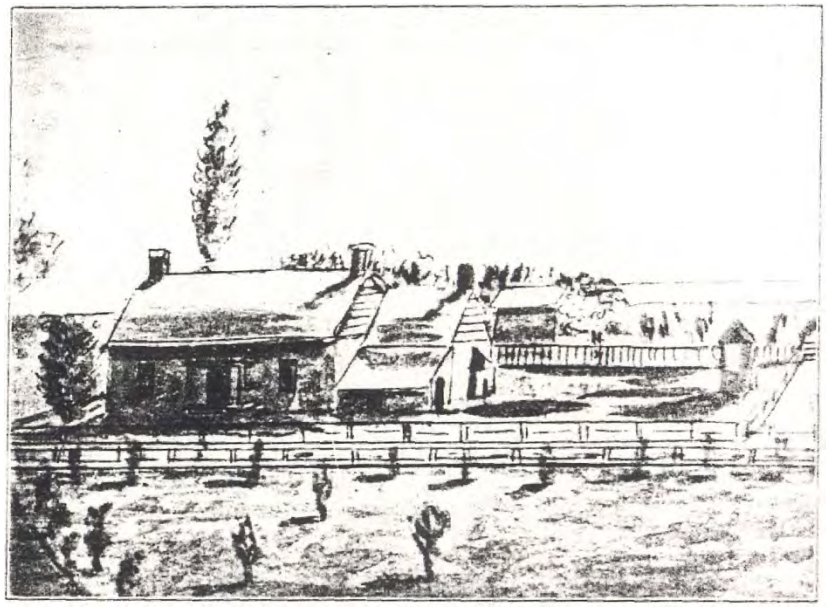


Figure 3.44. Mid-nineteenth century sketch of Britton Cottage and outbuilding. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(McMillen 1940).*

Limited archaeological testing at the house site conducted at the time the structure was moved (see Lipson et al. 1978:53-54) uncovered archaeological deposits associated with its occupation. Remains associated with the Britton Cottage have been hypothesized to exist near the shore, west of the beach zone (Rakos 1995). (A refuse pit was found near the beach at the Walton-Stillwell site.) However, the Britton Cottage was situated further from the beach than the latter house, and the construction of the Elm Tree Light and lighthouse keeper's house (see Section 3.2.2.6) would have created disturbances along the beach front east of the Britton Cottage.

3.2.2.2 The Barnes House. A house owned by "Barnes" was illustrated north of the Britton/Cubberly house and somewhat closer to the shore in 1780-1781 (see Figures 3.4 and 3.5). Although no references to this house have been encountered in the literature, it continues to be shown on maps through the latter portion of the nineteenth century (Figures 3.45 to 3.48). While indicated as owned/occupied by J.L. White in 1850 (see Figure 3.45), the house was noted as remaining in the Barnes family in 1859 and 1874 (see Figures 3.46 and 3.47). The house was located east of the present Miller Field tract (see Figures 3.47 and 3.48).

The house was not shown in 1898 (Robinson 1898, although two other houses owned by the Barnes family were depicted farther to the west, and the beachfront at this location is labeled "Barnes Beach" (see Figure 3.28). Early twentieth-century maps (see Figures 3.33 and 3.35) rendered a very small structure in the approximate vicinity of the earlier Barnes house, but it is doubtful that the designation represented the earlier structure. At this time the property was operated as the "Newsboys Camping Ground."

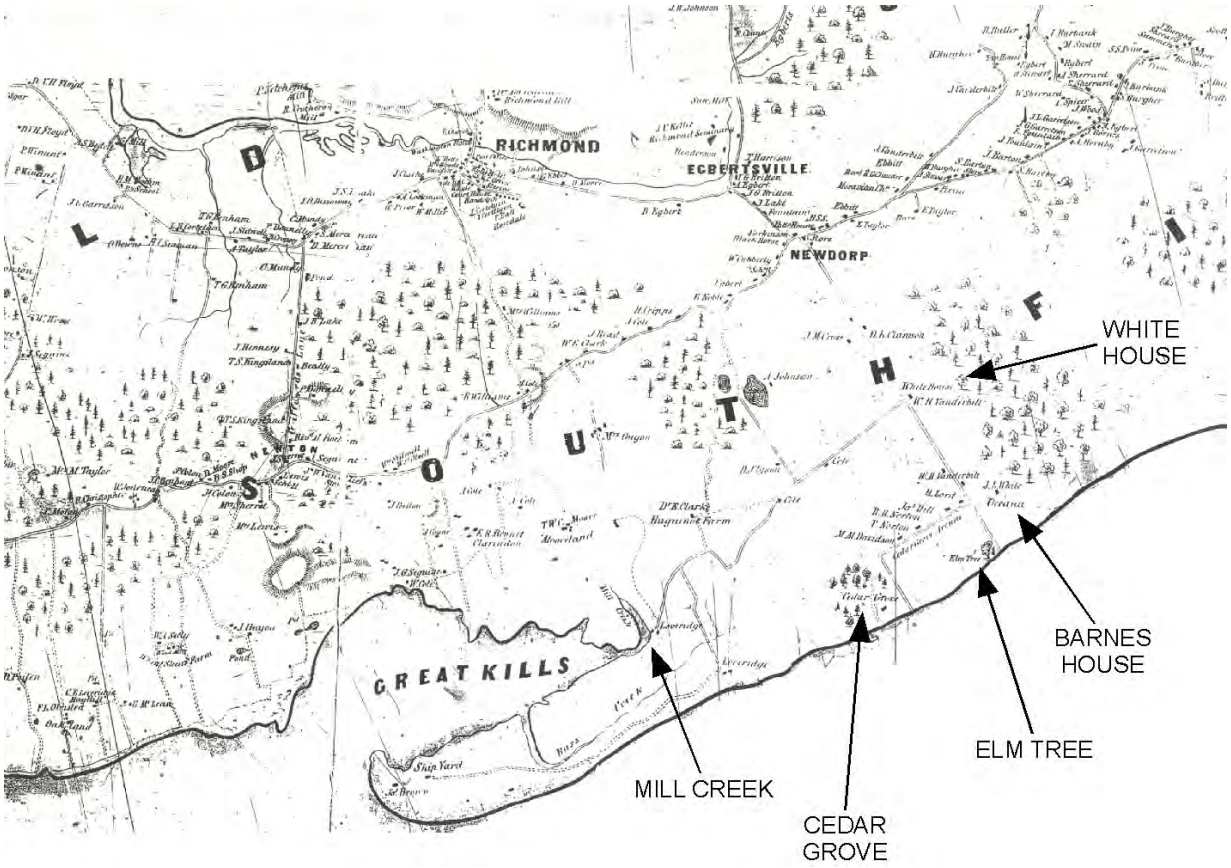


Figure 3.45. The South Beach project area in 1850. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Dripps 1850).*

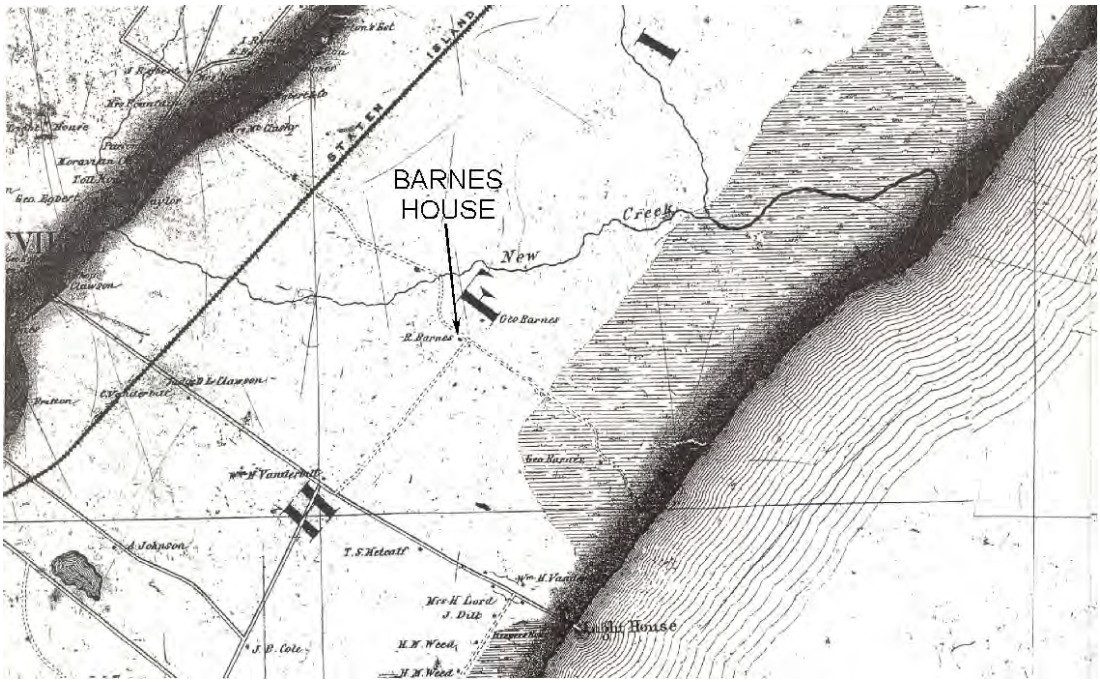


Figure 3.46. South Shore area. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Walling 1859).*

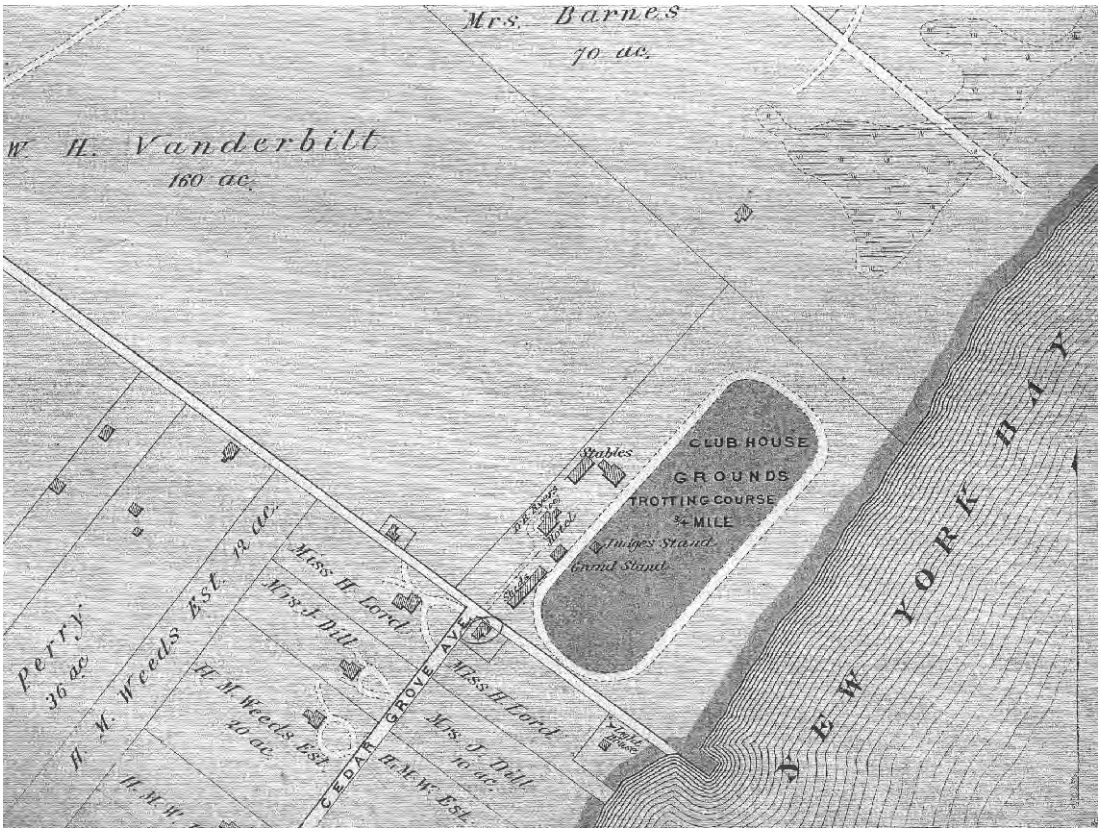


Figure 3.47. Northern portion of New Dorp Beach and Miller Field area. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1874:21).*

Figure 3.48. New Dorp Beach and Oakwood Beach in 1887. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1887:B).*

3.2.2.3 Lake House and Mill. A mill is shown at the end of a road on the banks of a tidal creek (Mill Creek) on maps dating as early as 1781 (see Figure 3.5). The mill site probably was acquired in 1696 by Daniel Lake and road records indicate that the mill was built between 1709 and 1723. It was situated where a firm bank bordered the creek (McMillen 1951). In 1891, the mill was illustrated on dry ground at the edge of the tidal creek and associated marshland (Figure 3.49). The mill site was at the southwestern end of a spur of dry land that penetrated the surrounding salt marsh.

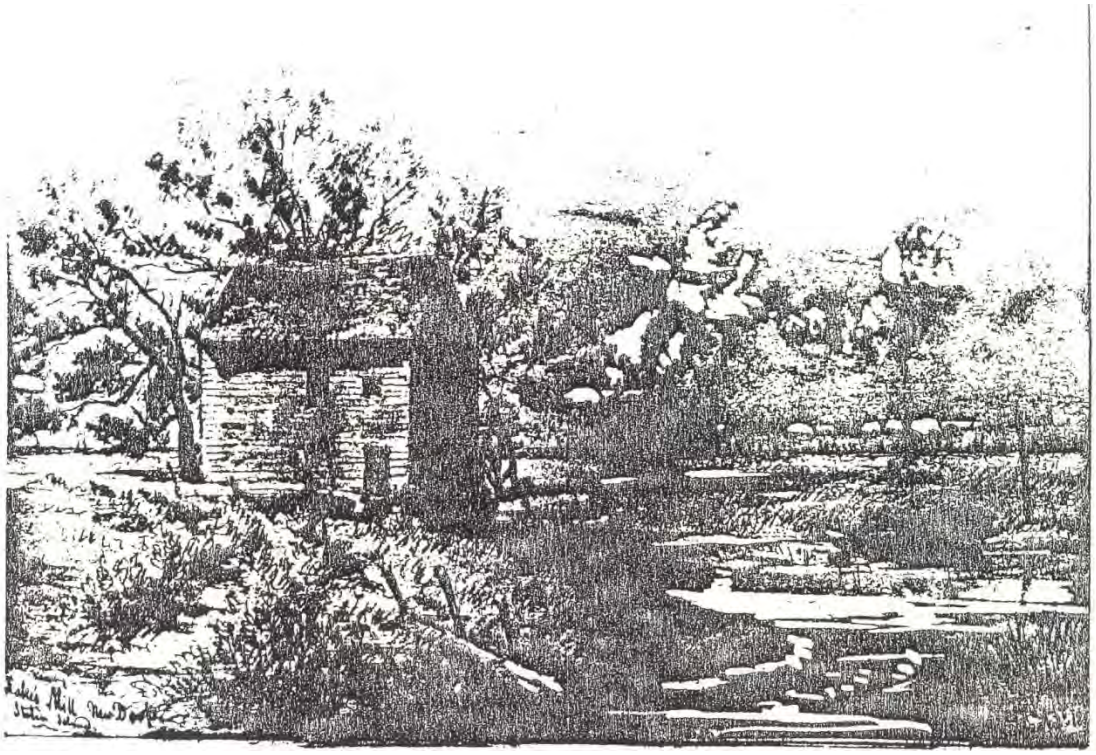


Figure 3.49. Drawing of Lake's Mill (from an 1891 print in the Collection of the Staten Island Institute of Arts and Sciences). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Baugher-Perlin and Bluefeld 1980:90.)*

The Lake House, home to generations of millers and their families, stood on the south side of Mill Road a short distance east of the tide mill (see Figure 3.5). McMillen speculates that the two structures were built at the same time. The house was reportedly surrounded by a 3-to 4-foot high earthen dike to protect it from the high tides that periodically flooded the Great Kills salt marshes. The miller's family farmed the land enclosed within the dike.

The Lake Mill was a tide mill that ground grain for neighboring farmers (McMillen 1951). Tide mills utilized water power created by construction of a dam across a tidal creek. After the rising tide filled the pond behind the dam the gates were shut and the water trapped in the pond. When the tide fell sufficiently, the gates were opened and the water released through a millrace to turn the mill wheel. Approximately five hours milling time would have been available for each of the two daily tides (Hampshire County Council 1999).

While most accounts and maps identified the mill and nearby house with members of the Lake family, Dripps labeled it "Loveridge" in 1850 (see Figure 3.45). The same name is associated with two buildings closer to the shoreline and it is possible that the attribution of Loveridge to the mill is incorrect. Subsequent documents identified the owners of the mill and house as "Lake & McCluse" in 1859 (see Figure 3.46, lower left), A. Lake in 1874 (Figure 3.50), and A.G. Lake in 1887 (see Figure 3.48, lower right). The mill was standing, but unused, in 1891, and it was demolished four or five years later (Davis 1942; McMillen 1951). The mill was not shown in 1898 (Figure 3.51), but the miller's house, which was owned by the estate of A.G. Lake, was. The house and surrounding dike were recorded in a 1911 photograph (Leng and Davis 1930; Figure 3.52). The dike can be discerned on a 1910 map (Figure 3.53). This figure also depicted a small bridge crossing the head of Mill Creek, which presumably marks the former mill site. The Lake estate continued to own the house in 1917 (Bromley 1917).

Because of the relatively small scale of the eighteenth-century and nineteenth-century maps and the questionable accuracy of some of them, it is difficult to determine the exact location of the Lake mill and house with respect to the present landscape. The measurements provided by Lipson et al. (1978) to locate the mill would place it west of the present location of the Oakwood Beach Water Pollution Control Plant. However, measurements made from the detailed 1910 topographic map (see Figure 3.53), place both the mill site and the Lake house at the site of the plant.

3.2.2.4 Revolutionary War Fortifications. Shortly after the outbreak of the American Revolution in 1776, the British army landed on Staten Island, which was lightly defended by the Patriot forces. After landing in the vicinity of Clifton, British forces marched to a camp at New Dorp, where General Howe established his headquarters at the Rose and Crown Tavern (or at an associated farm house). The tavern was located at the head of New Dorp Lane, at the intersection of Amboy and Richmond Roads, some two miles from the New Dorp shoreline (Morris 1898:204-205, 1900:179). The British army then erected fortifications at several places on Staten Island. For example, "along the shore below New Dorp, for a mile or so, there was a chain of earth-works calculated to defend the encampment on the plain back of it" (Morris 1898:209). No further information is available regarding the location of these earthworks. No fortifications were detailed in this area ca. 1780 (see Figures 3.4 and 3.5).

3.2.2.5 Miller Field. The property that later became Miller Field was acquired by Cornelius Vanderbilt in 1843. He erected a house on the property shortly thereafter, which became the home of his son, William H. Vanderbilt. The house was shown in 1850 near the intersection of New Dorp Lane and Mill Road, more than 3,500 feet west of the shoreline project area (see Figure 3.45). Between 1887 and 1898 it was relocated farther from New Dorp Lane, and somewhat farther to the east, but still far from the shore (Mueller and Linck: 1991; see Figures 3.48 and 3.28).

Between 1859 and 1874 (see Figures 3.46 and 3.47) a trotting course and grandstand were built along the shoreline on the Vanderbilt property. The course was developed by William Vanderbilt, who was president of the private course (Baugher-Perlin and Bluestone 1980). A hotel, which apparently served as the trotting course's clubhouse, and stables were shown west of the track on the east side of New Dorp Lane opposite Cedar Grove Avenue in 1874 (see Figure 3.47). Although still in existence in 1887 (see Figure 3.48, upper right), the track and associated buildings were apparently demolished prior to 1898 (see Figure 3.28). The track and associated facilities would have been located west of the project impact area.

Figure 3.50. Oakwood Beach and Lake's Mill in 1874. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1874:26)*.

Figure 3.51. Detail showing Oakwood Beach and Lake's Mill area in 1898. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Robinson 1898:Plate 18).*

Figure 3.52. Lake House and surrounding dike in 1911. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Leng and Davis 1930).*

Figure 3.53. Oakwood Beach area in 1910, showing Lake House and former mill site. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond topographic map 1910:Sheets 79 and 80).*

A Vanderbilt-era dairy house stood near the shoreline between New Dorp Lane and the Miller Field seaplane hangar and west of the project impact area (Mueller and Linck 1991; see Figure 3.54). It is not clear when this building would have been constructed, since it is not shown on any of the nineteenth-century and twentieth-century maps, including the detailed 1910 map (Figure 3.55). The Vanderbilt property also included a dock at the foot of New Dorp Lane (see Figure 3.47). By the end of the nineteenth century only a "moldering remnant" of this dock was left (Morris 1900:137). All of the remaining Vanderbilt buildings were demolished by 1939 (Mueller and Linck 1991:10).

In the 1890s, the Elm Tree Light (see Section 3.2.2.6) was moved from its location south of New Dorp Lane to a new site north of the lane near the beach (see Figures 3.28 and 3.55). The original wooden structure was replaced in 1939 by a steel and concrete aviation tower that remained in service until 1964 (Crowley 2001). A second light, contemporaneous with the original lighthouse and known as the New Dorp Rear Range Light, is located inland of Miller Field. It was placed on the NRHP in 1973. Mariners would line up the two lights to locate the Swash Channel in lower New York Bay (Lighthouse Research for Preservation nd).

A 1979 map of Miller Field (Figure 3.56) shows that a new lightkeeper's house also had been built north of New Dorp Lane. This structure was not shown in 1898 or 1910 (see Figures 3.28 and 3.55). A structure was depicted at this location in 1917 (Figure 3.57, upper right), but it was identified as a vacant Episcopal Church. This building was shown on a 1924 aerial photograph (Fairchild Aerial Camera Company 1924; Figure 3.58). A 1911 photograph shows the lighthouse north of New Dorp Lane, but does not show a keeper's house nearby (Figure 3.59).

In 1919, the U.S. government purchased the former Vanderbilt estate and constructed an airfield that was later named Miller Field in honor of Captain James Ely Miller, an airman killed during World War I. Construction of the field was completed in 1921, at which time it was the only coast defense air station in the east. The field had a sod runway, seaplane ramps and four hangars. The seaplane hangar (Miller Field Building #38) still stands (Figure 3.60), and is considered "the most important structure at Miller Field due to its direct association with early aviation history" (Greenwood and Torres-Reyes 1976). Included in the HABS inventory, it was placed on the NRHP in 1980 as "an example of one of the earliest structures of its kind in the United States" (HABS 2003). It is part of the National Register Miller Field Historic District.

Since the war was over by the time the field was completed, it never saw extensive activity. In 1923, it became the home of the New York National Guard's 102nd Observation Squadron, which was headquartered there through the 1930s. During World War II Miller Field served as a supply depot for materiel being shipped overseas. It also served as the site of a harbor defense gun battery. From June 1943 until 1946, the U.S. Army Coast Artillery Corps manned a battery of twin 90mm Anti-Motor Torpedo Boat guns (designated as AMTP Battery #11) at Miller Field. The guns were mounted on concrete platforms supported on pilings, had a range of 8,000 yards and were serviced by 15 men. In 1943, a 44-foot tall fire-control tower was built that served as an artillery observation tower not only for the Miller Field guns, but also for twin 6-inch guns mounted at Fort Wadsworth (Historic Miller Field 2003). This tower still stands on the beach (Figure 3.61), approximately 25 to 50 feet from the location of the planned buried seawall (see Figure 3.56). Milner (1978:Appendix B) lists the fire-control tower as a NRHP-nominated property, but the Miller Field Historic District nomination form states that the area is "limited solely to Seaplane Hangar No. 38 and the [ca. 1939] Elm Tree Light and their immediate surroundings" (Greenwood and Torres-Reyes 1976).

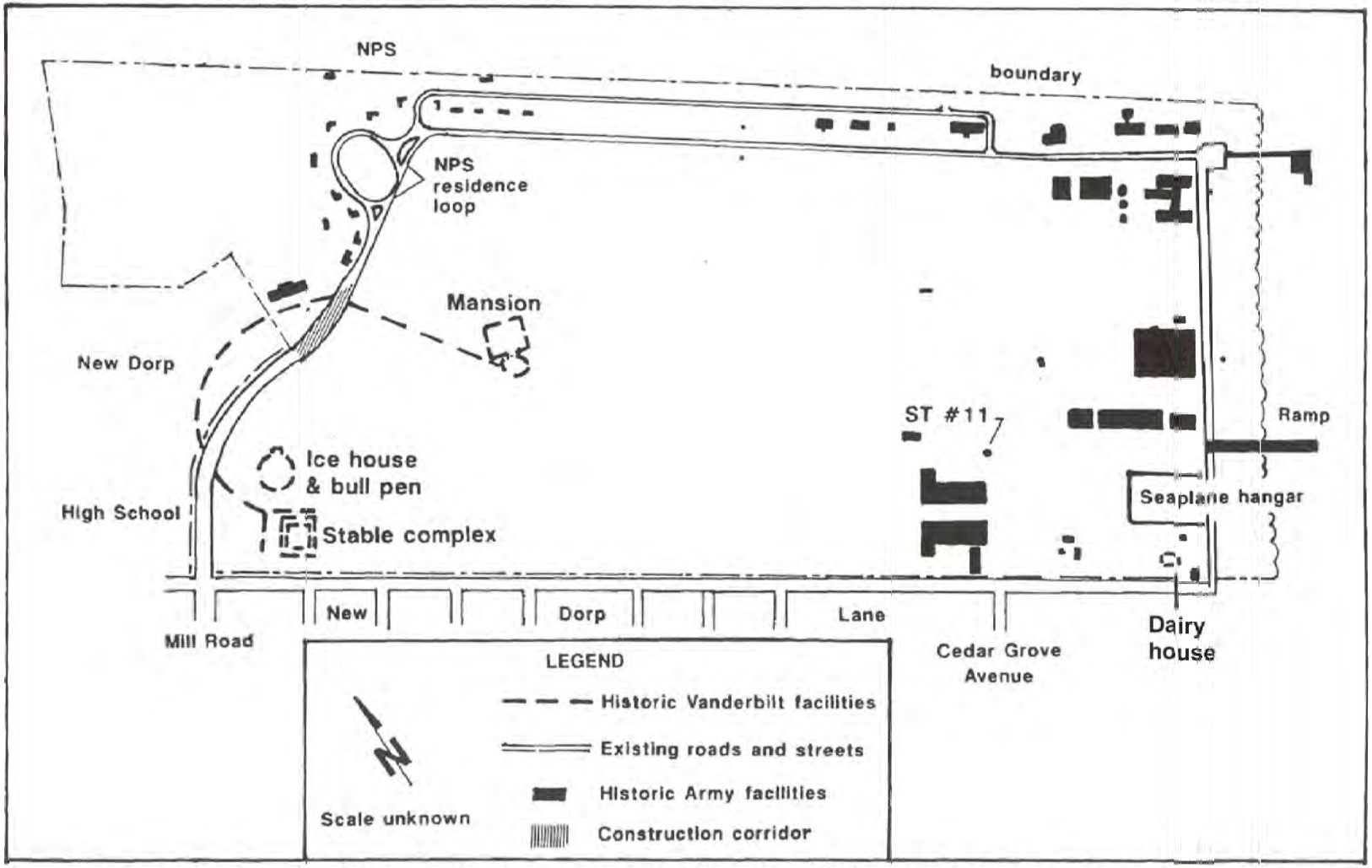


Figure 3.54. Map showing Vanderbilt-era and later buildings at Miller Field. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Mueller and Linck 1991:6).*

Figure 3.55. Northern New Dorp Beach (including Miller Field area) in 1910. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond topographic map:Sheet 63)*.

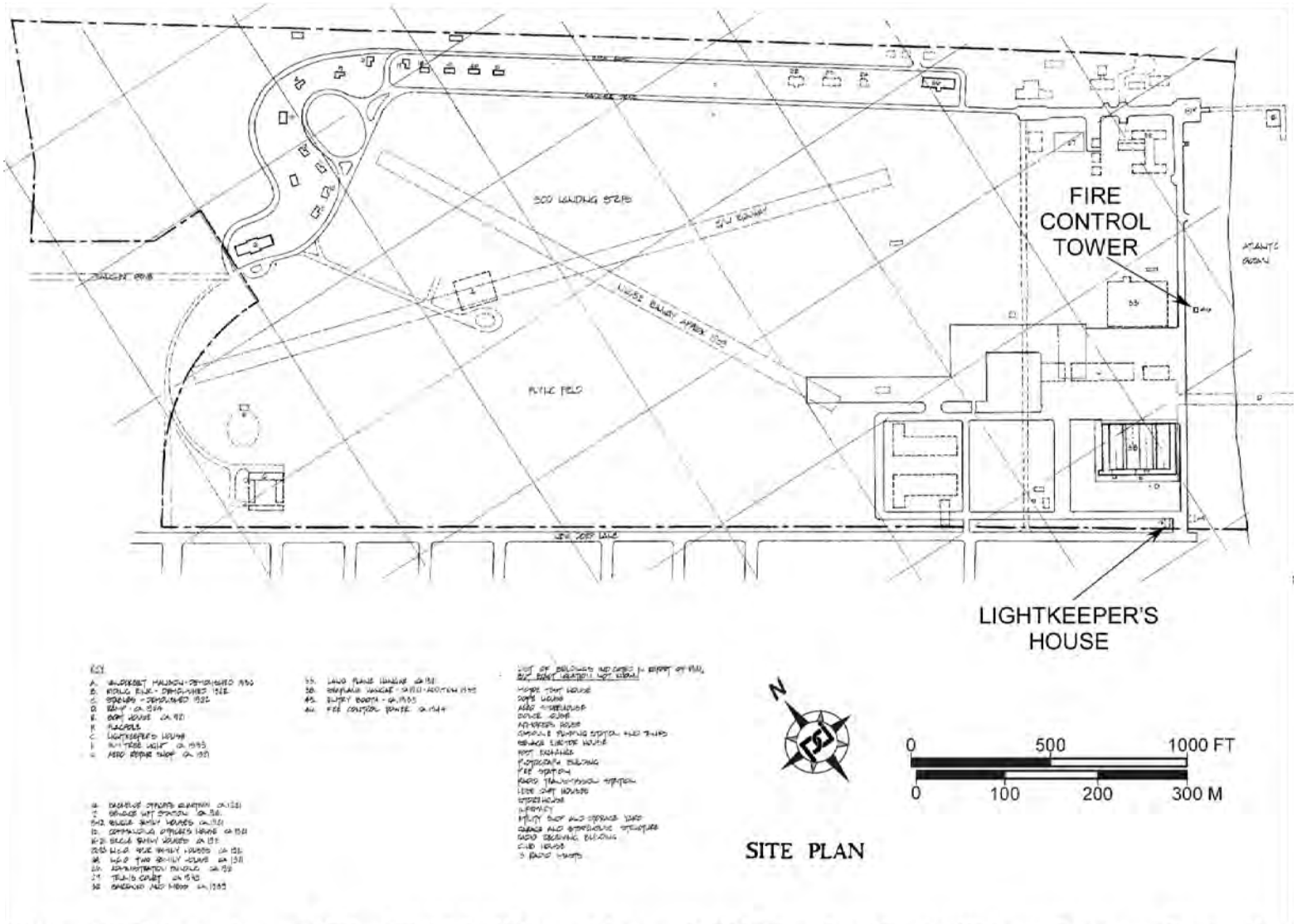


Figure 3.56. Location of Miller Field buildings (drawn 1979). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(HABS 2003).*

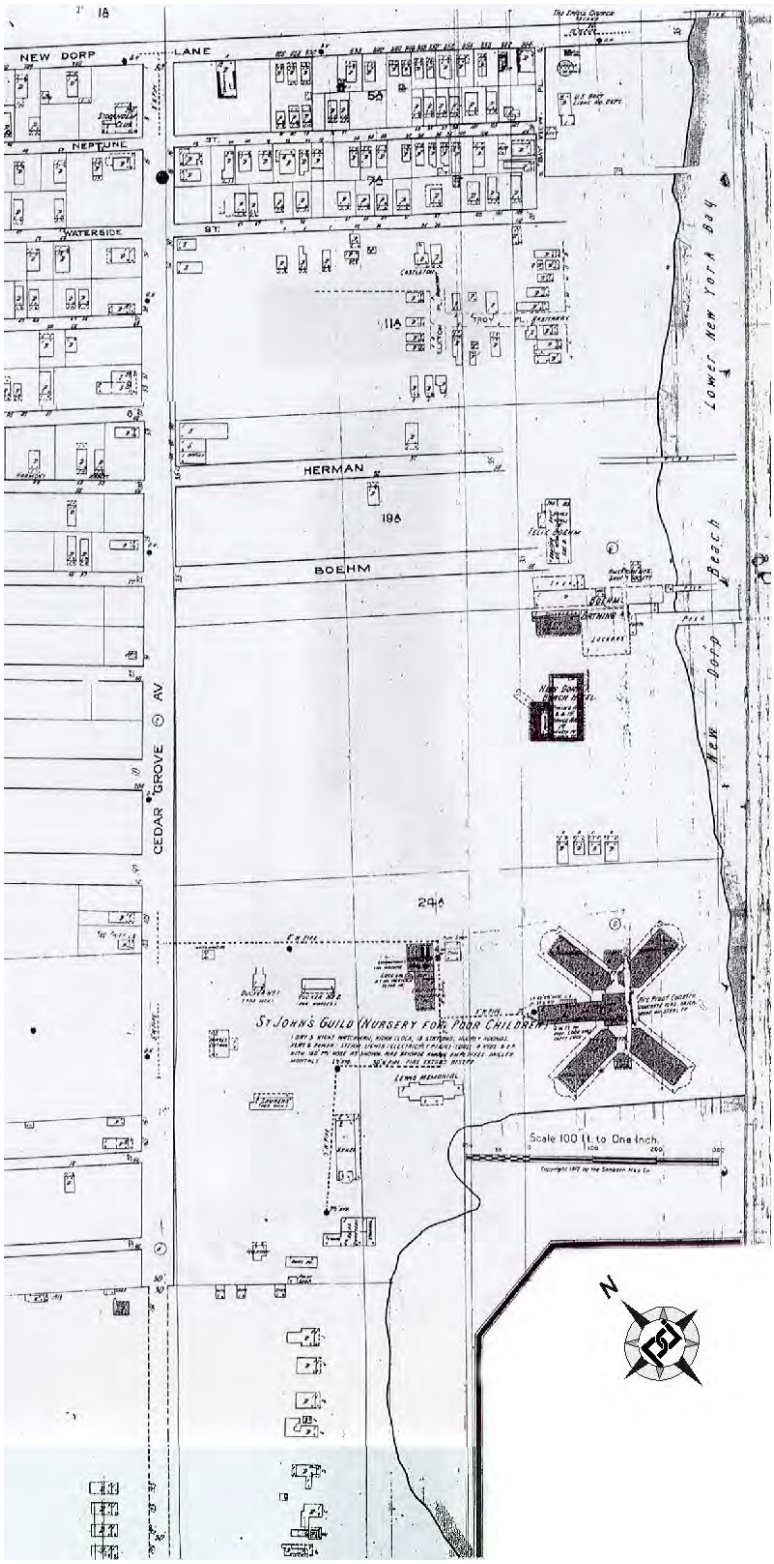


Figure 3.57. New Dorp Beach in 1917. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Merlis and Stonehill 2002:90).*

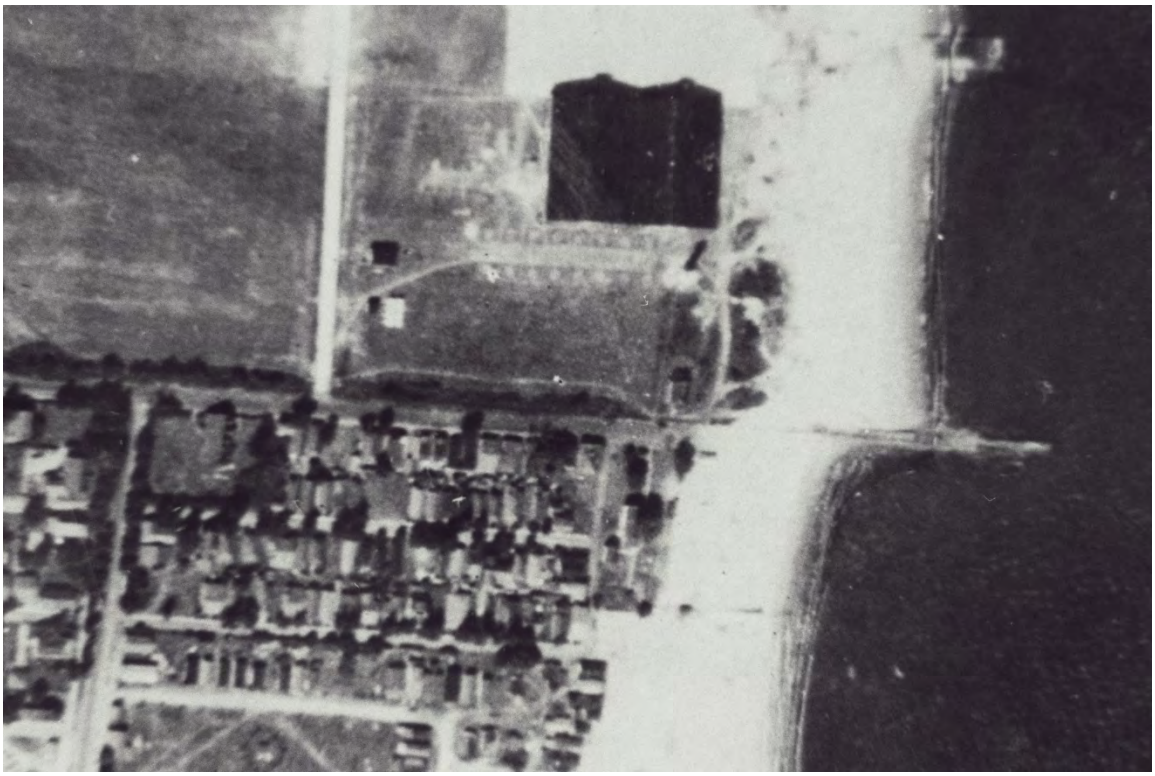


Figure 3.58. Aerial photograph of the Miller Field area in 1924. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(Fairchild 1924)***.**

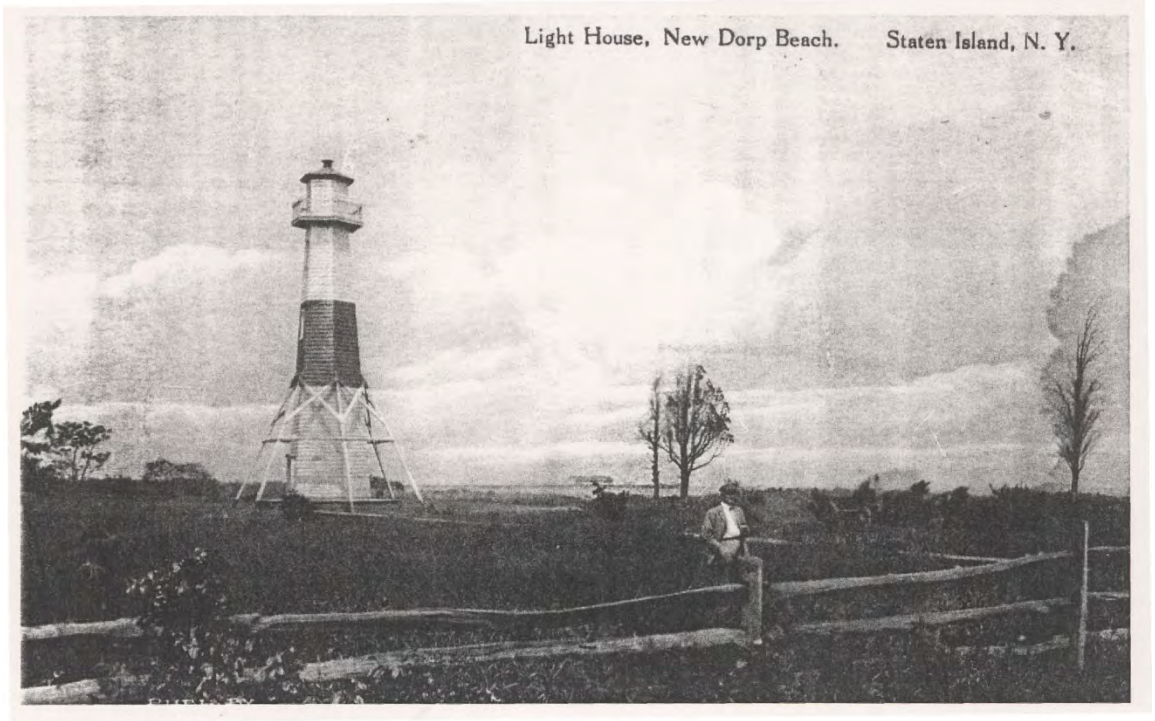


Figure 3.59. Postcard depicting the Elm Tree Light in 1911. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Merlis and Stonehill 2002:58).*

Figure 3.60. Miller Field seaplane hanger. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(HABS 2003).*

Figure 3.61. Fire control tower (built 1944) at Miller Field. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Lynn Rakos 1995).*

After World War II, Miller Field continued as a military base, and, in 1950, during the Cold War, a battery of four radar-controlled 120mm guns was installed. The anti-aircraft guns in the New York City area were subsequently replaced by Nike missiles, and Miller Field became a regional maintenance facility for the missiles. Miller Field served as a military post until 1969, when it was deactivated. It was transferred to the National Park Service and became part of the Staten Island Unit of the Gateway National Recreation Area in 1972 (Historic Miller Field 2003).

3.2.2.6 New Dorp Beach. The New Dorp Beach section of the project area extends some 2,000 feet (600 m) from New Dorp Lane on the north to the vicinity of Ebbitts Avenue on the south. This section is divided into six subsections, beginning at New Dorp Lane and discussed in order of development. Previously conducted subsurface testing in the New Dorp Beach area (Lipson et al. 1978) encountered domestic artifacts and structural debris. Much of this material was of mid-to-late twentieth century origin, although some of them were datable to the nineteenth century and were probably associated with the development of the beachfront properties for recreational purposes. These test locations were west of the impact area of the present project (Figure 3.62). Concrete and brick foundations were also noted at New Dorp Beach (John Milner Associates 1978). Those foundations near the project impact area are noted below.

Elm Tree Light and Keepers House. In the eighteenth century a large tree stood along the shore at the end of New Dorp Lane. A 1797 map (Figure 3.63) identified this tree as "Large Elm Tree Standing by the shore, a mark for vessels coming and going from New York to Amboy and New Brunswick." The tree was still in existence in 1850 (see Figure 3.45). Erosion reportedly caused the relocation of this tree some 400 feet offshore of the late-nineteenth-century shoreline (Leng and Davis 1930:24). However, a comparison of the shoreline on various maps reveals that this assertion is unlikely. In any event, the tree was not shown in 1859 (see Figure 3.46), as a lighthouse was depicted at the end of New Dorp Lane. The elm tree may have been cut down to make the light more visible or it may have been destroyed during a coastal storm.

The lighthouse, known as the Elm Tree light, was constructed in 1856 (Crowley 2001). Joseph Swain was appointed as the lighthouse keeper in that year (Lighthouse Research n.d.). A dwelling for the lighthouse keeper also had been constructed by 1859 (see Figure 3.46). While the lighthouse was shown in 1874 and 1887 (see Figures 3.47 and 3.48), a separate keeper's house was not. Since it appears in 1898, the house no doubt continued to stand during this period (Figures 3.64 and 3.65).

The Elm Tree Light was relocated on July 1, 1891 to a new site on the north side of New Dorp Lane. Maps from this period (see Figures 3.55 and 3.28) also suggest that after the lighthouse was moved, its hexagonal base was still present at the old site south of New Dorp Lane. A small outbuilding was also shown closer to the lane. The 1917 Sanborn map (see Figure 3.57) continued to show these structures, detailing that a one-story superstructure had been constructed over what was possibly the old lighthouse base, and that the building was used for storage. The small outbuilding closer to New Dorp Lane was depicted as an "oil house." The buildings south of New Dorp Lane in 1917 continued to stand in 1937 (Figure 3.66).

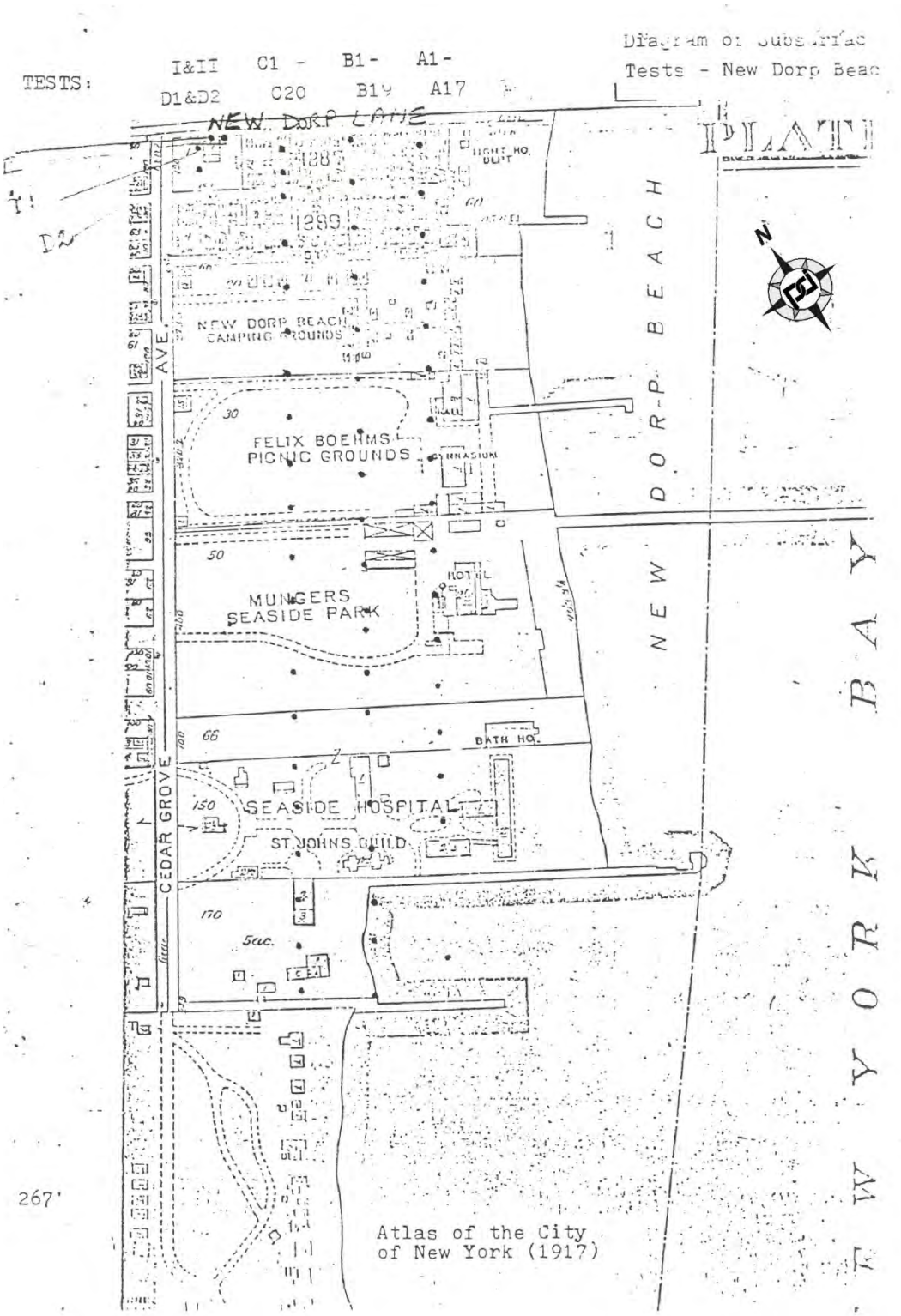


Figure 3.62. Location of 1978 subsurface testing at New Dorp Beach. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(HABS 2003).*

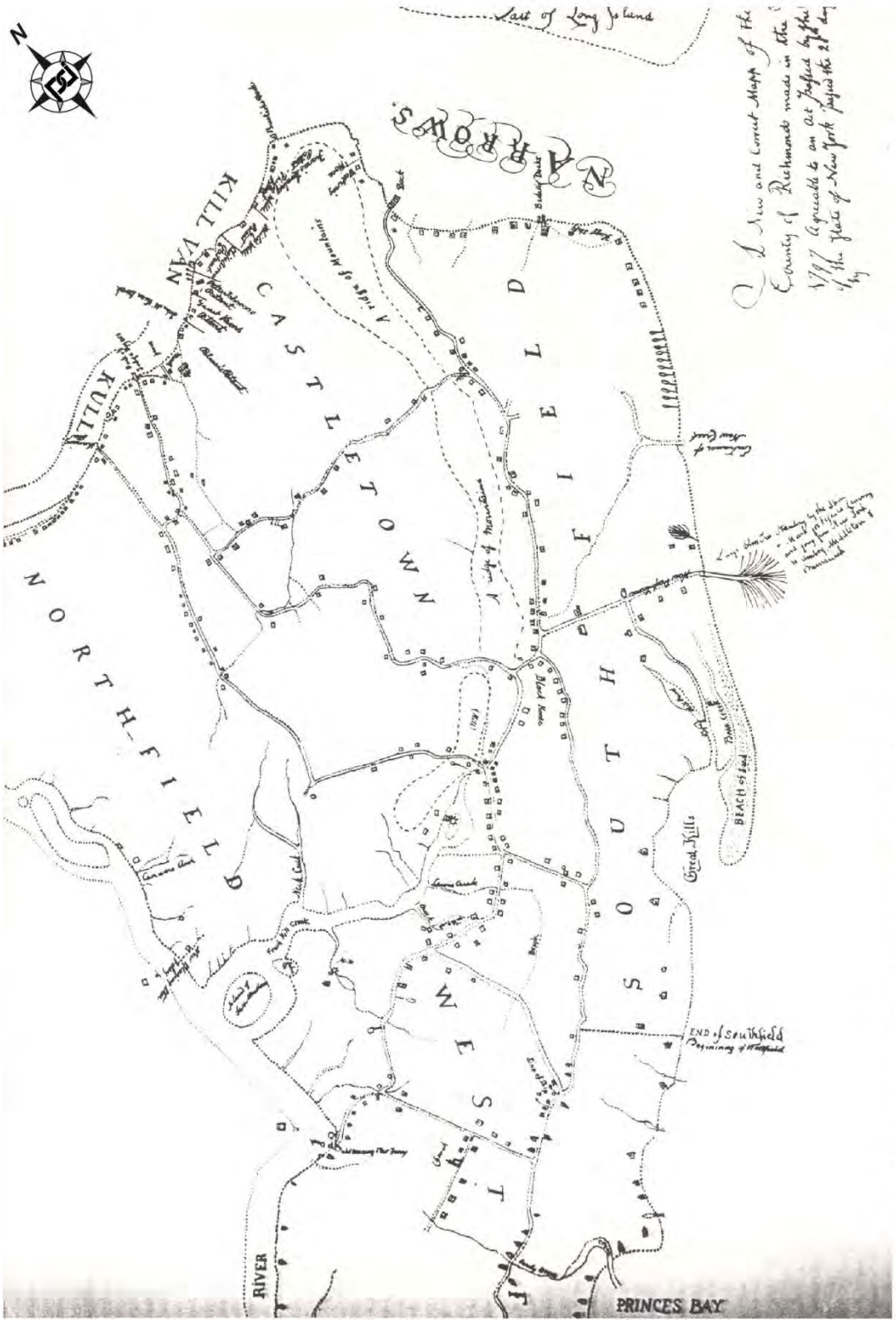


Figure 3.63. Connor and Sprong map of New Dorp Beach, 1797. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(copy from Historical Records Survey 1942).*

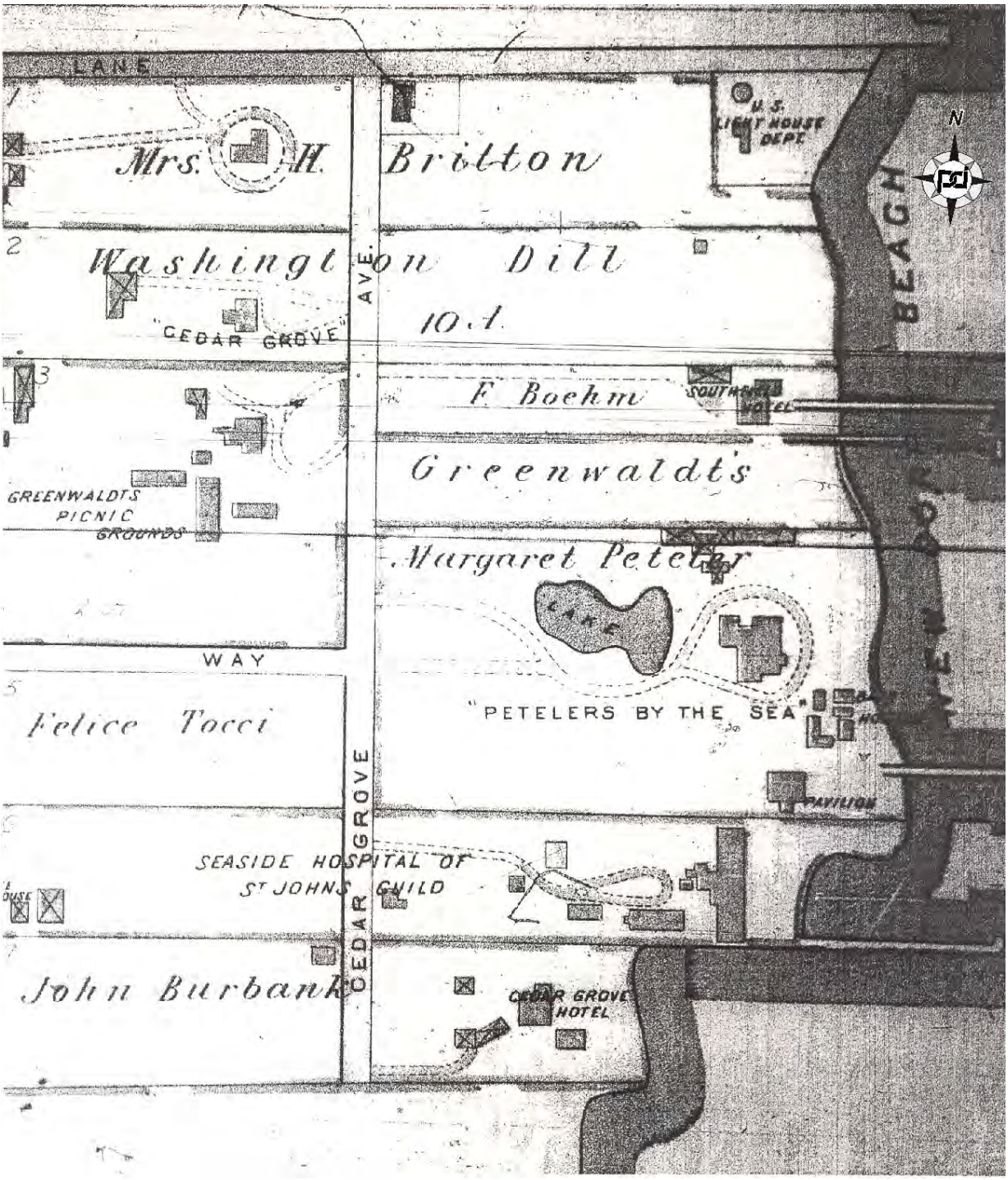


Figure 3.64. Detail showing New Dorp Beach Area—South of New Dorp Lane. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Robinson 1898:Plate 17).*

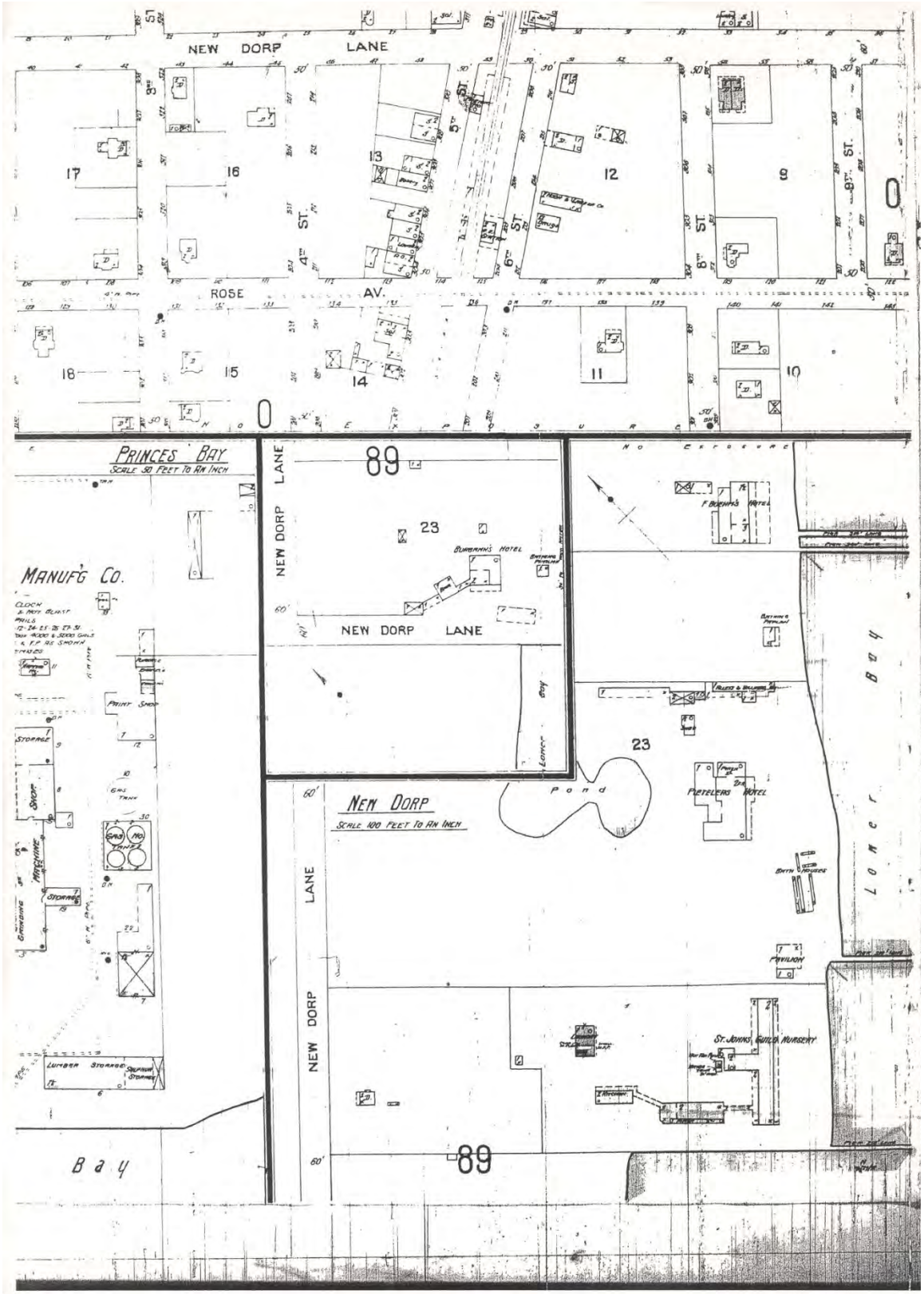


Figure 3.65. New Dorp Beach in 1898. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1898:89).*

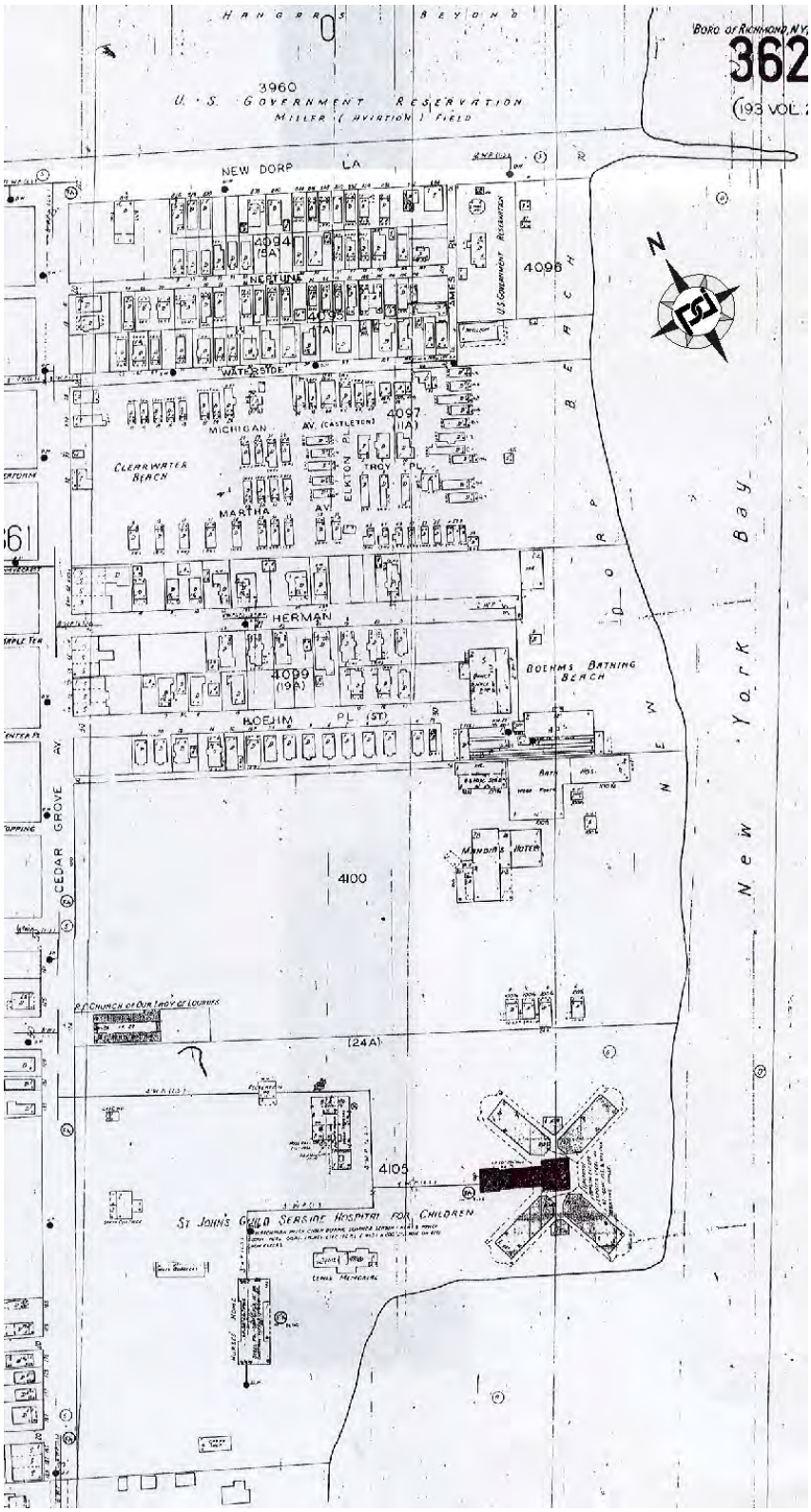


Figure 3.66. New Dorp Beach in 1937. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:III:362)*

. An old photograph (Figure 3.67), although undated, most likely shows the lighthouse and keeper's house at their original site south of New Dorp Lane. The proximity of the two structures accords with the relationship of the two buildings as shown on various maps prior to the relocation of the lighthouse. The building shown near the north side of New Dorp Lane on some maps and photographs dating after the lighthouse's relocation would have been farther from the lighthouse. In addition the configuration of the extension and outbuildings associated with the house as shown in this photograph accords with that of the building south of New Dorp Lane as illustrated in Figures 3.55 and 3.58.

Analysis of project maps indicates that the area of construction of the proposed levee/seawall would be immediately east of the original site of the lighthouse and keeper's house as shown in 1910 (see Figure 3.55).

Cedar Grove Hotel (vicinity of Ebbitts Avenue). This area appears to have been vacant in 1850 (see Figure 3.45), although a house was located south of the future location of Ebbitts Avenue. However, the house may have been the one labeled "Mrs. Peerman" on the 1859 map (see Figure 3.46).

By 1874, John Burbank had purchased the property and erected a structure labeled "Gangerrolf House" (Figure 3.68). This structure appears to have been a hotel later known as the Cedar Grove Hotel (see Section 3.2.2.7). Two structures were illustrated on the property in 1874, a main house and a smaller outbuilding, possibly a bathhouse, closer to the shore. Later maps suggest that the shoreline may have eroded at this location since the main building is shown closer to the shore than as depicted in 1874. Burbank still owned the property in 1887 (see Figure 3.48), which was called the Cedar Grove Hotel in 1898 (see Figure 3.64). The hotel seems to be the same building on all the maps (Beers 1874, 1887; Robinson 1898). Further, the 1898 Sanborn map (see Figure 3.65, center inset) identifies the complex as "Burbank's Hotel," reinforcing the inference (although the 1874 map is not without its misattributions).

By 1910, this property had been incorporated into the Sea Side Hospital complex (Figure 3.69). One of the structures as depicted in 1910 could have represented the former hotel building. A building at approximately the same location was depicted in 1917 (see Figure 3.57) as "help's quarters" for the hospital. By 1937 (see Figure 3.66) the site of the former hotel was vacant.

Comparison of the project map with the early twentieth-century maps reveals that the shoreline at this location has been built up eastward of its ca. 1910 location, either due to littoral drift or intentional filling. The proposed seawall/levee construction would appear to traverse this filled-in area, intersecting the extreme southeastern portion of the ca. 1910 shoreline.

A concrete foundation was noted near the shoreline on this property in the vicinity of the present project impact area (John Milner Associates 1978). This feature (designated as SI-15) was "partially exposed in the beach sand…the exposed portion is about one foot wide, and perhaps 20 feet long. Approximately one-half of its overall length, rather than being straight, follows a semi-circular contour" (John Milner Associates 1978:75; see also Section 6.2.2 of the present report). This feature is included in the OPRHP files as site A085-01-0154.

Figure 3.67. Undated photograph of Elm Tree Light and keeper's house. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Historic Miller Field 2003).*

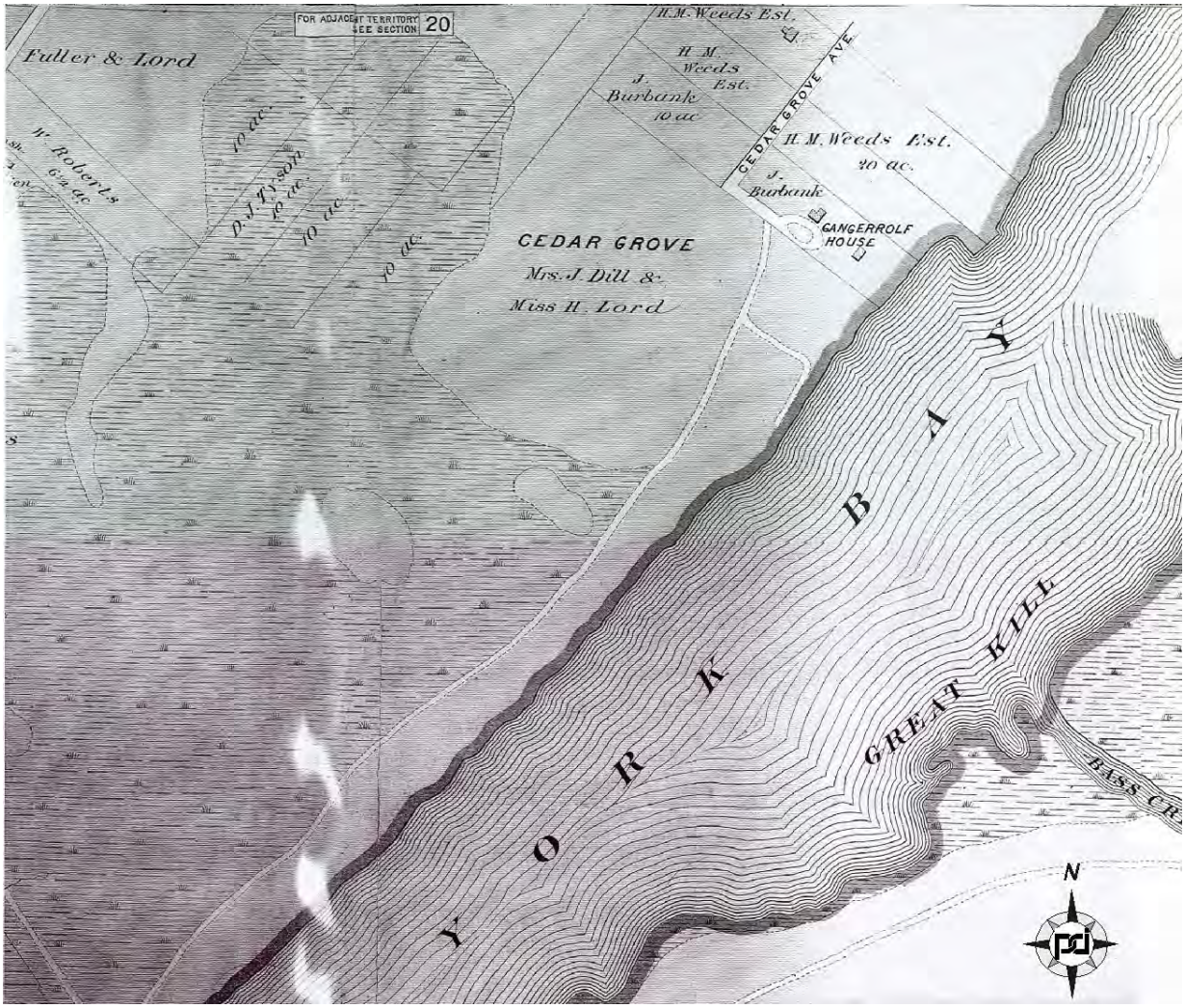


Figure 3.68. Southern portion of New Dorp Beach and Cedar Grove Beach in 1874. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1874:26).*

Figure 3.69. South New Dorp Beach in 1910. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond topographic map:Sheet 72).*

Sea Side Hospital. This property (immediately north of the former Cedar Grove Hotel parcel) was undeveloped in an 1874 map (see Figure 3.68). A facility for the care of poor sick children, the Sea Side Nursery was built on this tract in 1881 (Lynd 1909). At that time, the hospital building was described as having

> a total frontage of 215 feet, of which the central part measures 25 x 60 feet, and each of the two wings 95 x 25. The stories range in height from ten to twelve feet…wards have been fitted up with cots for the children, as well as beds for the sick mothers; and there are also a doctor's room, a matron's room, a dining-room and bath rooms [*Frank Leslie's Illustrated Newspaper* 1881].

An 1881 print (Figure 3.70) shows the long two-story building extending along the beach. A steamboat pier was also shown. The barge shown tied up at the pier was the Guild's "floating hospital" (*Frank Leslie's Illustrated Newspaper* 1881).

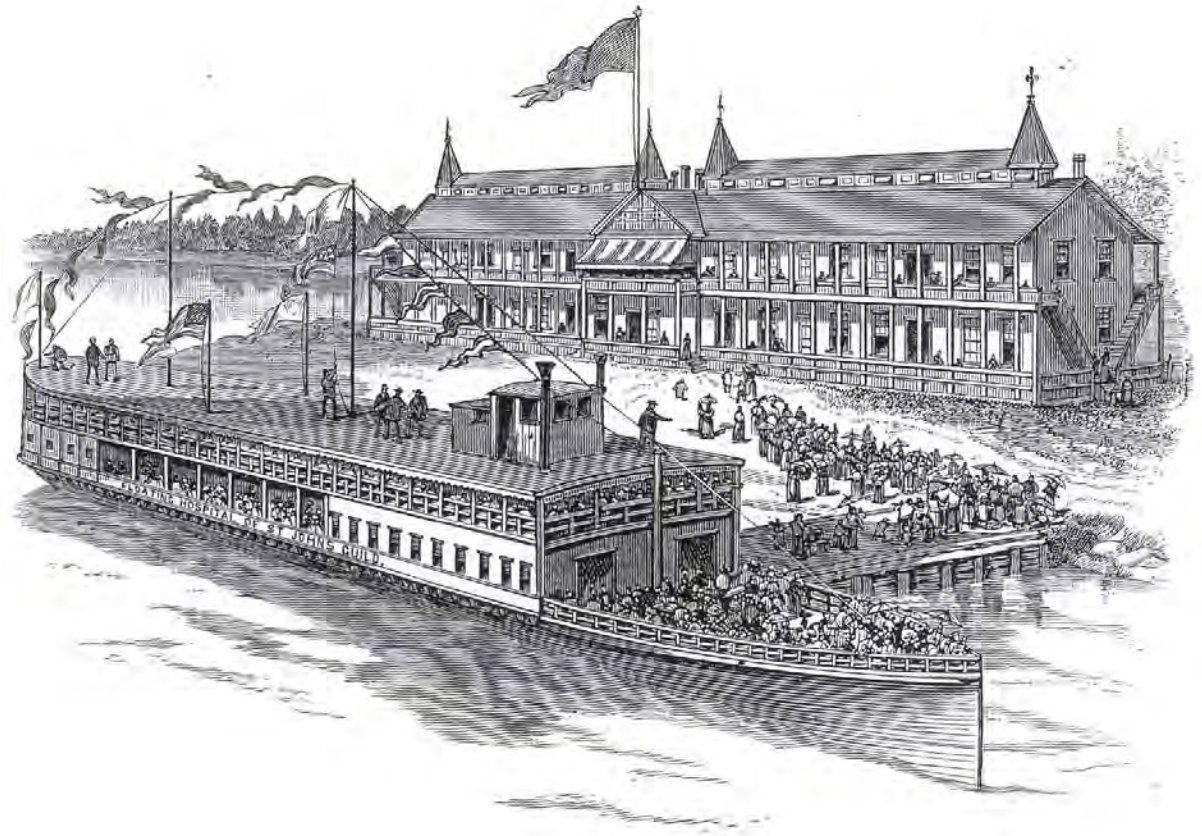


Figure 3.70. St. John's Guild Church Nursery as depicted in 1881 (*Frank Leslie's Illustrated Newspaper7 1881; photocopy courtesy of the Staten Island Institute of Arts and Science*).

In 1887 the name of the hospital was changed to the Sea Side Hospital of St. John's Guild (Lynd 1909; see Figures 3.64 and 3.69). An east-west oriented wing was added to the original north-south wing prior to 1911 (Robinson 1898). A description of this facility in 1909 stated that,

> Within are accommodations for 400 women and children. It draws its own water from its own artesian well; it has its own refrigerating plant; its own electric lighting; and its own heating plant. Its diet kitchen for prepared foods is unexcelled, and its operating equipment is complete. Admissions to the hospital are by tickets widely distributed through the Department of Health, hospitals, day nurseries, churches, physicians, etc. The ministrations of the hospital are *absolutely free.* No sick child is denied admission. Neither is a sick child detained pending an investigation as to whether it is entitled to care. The sole bar is a contagious disease. It is the mecca of the sick child of the tenements and the good which it is doing is immeasurable [Lynd 1909: 53-54].

By 1917 the hospital building had been renovated (see Figure 3.57). The original north-south wing was apparently demolished and four, one-story diagonal wings added to the 1901 east-west oriented building. Although these changes were not shown on the 1911 map (see Figure 3.69), notations on later maps (see Figures 3.57 and 3.66) indicate that two of the wings were added in 1909 and the others in 1911. The two easternmost wings would be at the location of the proposed seawall/levee construction. The building remained in use until at least 1951 and was extant in 1988, but vacant (Figure 3.71; Sanborn Map Company 1937, 1951, 1988). It has since been demolished.

Figure 3.71. 1929 photograph showing St. John's Guild Hospital. View north from Cedar Grove Beach *(P.L. Sperr photographer; New York Public Library Collection #1295/C6).*

A concrete and brick foundation (SI-16) in the southwestern corner of this property was noted near the shoreward end of the jetty (John Milner Associates 1978). This location would place it in the vicinity of the project impact area.

> The foundation is roughly rectangular, although its exact shape cannot be determined due to its partial burial beneath beach sands. The size of the visible remnant is approximately 50 by 20 feet, and there appears to be the foundation of an interior wall visible as well [John Milner Associates 1978:75].

This feature is included in the OPRHP files as site A085-01-0155. Both foundations SI 15 and 16 could represent portions of the hospital wings added in 1909/1911 (see Section 6.2.2 for further discussion).

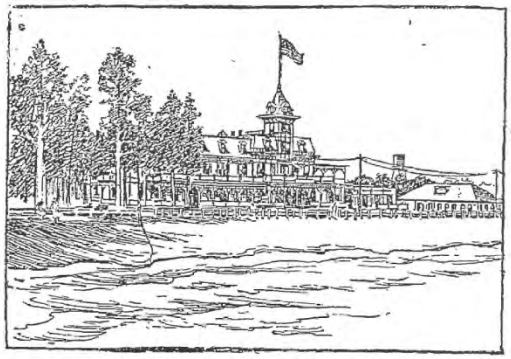
Peteler's Hotel. This property (north of the former Sea Side Hospital parcel) was shown as vacant in 1874 (see Figure 3.68). By 1887 a beachfront hotel, then known as the South Side Pavilion, had been built on the site (see Figure 3.48). This hotel was operated by the Peteler family, which also operated a large hotel at New Brighton. Their New Dorp hotel was in operation as early as 1882, since it was described as a "well conducted hotel" in a directory of that year (cited in Leng and Davis 1930:314). An 1882 newspaper advertisement for "A. Peteler's South Side Pavilion, Cedar Grove, S.I." promised "good fishing and boating" and offered breakfasts, dinners and suppers, as well as concerts every afternoon and evening (*Richmond County Gazette* 1882).

An 1888 publication enthused about the hotel "at New Dorp beach with its models of the old Rhenish castles of Heidelberg and Stolzenfels, made of shells and pebbles, and the Pompeiian room of the ladies' parlor, with its richly colored walls, softened by the stained glass of the dome" (Leng and Davis 1930:938). Peteler's hotel at New Dorp Beach was known by several names over the years, as identified by various maps, including "Peleter's by the Sea" and "the New Dorp Beach Hotel." The latter name apparently continued to be applied to the establishment during several later changes in ownership.

By the end of the nineteenth century the hotel had some 72 rooms and was about 200 feet long. At one time it was known as "one of the finest seaside resorts on the coast" (*Richmond County Advance* 1902). Maps dating to this period (see Figures 3.64 and 3.65) showed the large hotel building, with smaller bathhouses and a pavilion closer to the beach. Shortly after the turn of the nineteenth century, the property was purchased by Edward Hett, who "spent a small fortune in making improvements. He built a fine stable and installed a complete electric-lighting system, and the place was up-to-date in every respect" (*Richmond County Advance* 1902). A 1901 advertisement for the New Dorp Beach Hotel depicted the large two-story frame building (Figure 3.72), and described the hotel as having undergone "extensive improvements since last season, under new management" (*New York Times* 1901). This presumably refers to the hotel's purchase by Hett. In December 1902 the hotel was destroyed by fire (*Richmond County Advance* 1902).

Rebuilt after the fire, a 1905 postcard shows the building (see Figure 3.72). Shortly thereafter, the hotel came under new ownership. A 1913 advertisement rendered it as "Munger's by the Sea" (see Figure 3.72), and in 1917 it was known as Munger's Seaside Park Hotel (Figure 3.73), although the name New Dorp Beach Hotel still lingered (see Figure 3.57). The hotel was in operation as Mandia's Hotel in 1937 (see Figure 3.66).

The route of construction of the proposed seawall/levee would pass just east of the hotel building as shown on the 1910 map (see Figure 3.69). Some of the outbuildings and bath houses, as shown on the 1898 maps (see Figures 3.64 and 3.65), and the bath houses shown on the east side of the property in 1910, would be at the location of the planned construction.



1901 New York Times

NEW DORP BEACH HOTEL

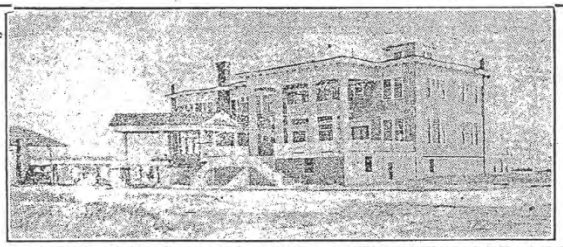
(THE MANHATTAN OF STATEN ISLAND.)

Extensive improvements since last season, under new management, with every convenience and comfort for permanent and transient guests, including steam heat, electric lights, etc.

OPEN THE YEAR ROUND.

New Dorp Beach Electric 'Bus Line meets all trains and trolley cars.
Booklets on application. Telephone No. 33 NEW DORP.

1913 New York Times



At NEW DORP BEACH, STATEN ISLAND

MUNGER'S BY THE SEA

(EUROPEAN PLAN) 'Phone New Dorp 338

and

CEDAR GROVE BEACH CAMP

FOR TENTS AND BUNGALOWS—'Phone Cortland 6330

Offer a delightful Summer by the sea
WITHOUT LEAVING NEW YORK CITY

45 minutes from Battery via Staten Island Ferry and train to New Dorp Station. Motor Bus meets all trains. Visit us Sunday.

Figure 3.72. Promotional material for the New Dorp Beach Hotel: (top) advertisements from 1901 and 1913 *(New York Times 1901, 1913);* **(bottom) a 1905 postcard** *(Merlis and Stonehill 2002:58).* **Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY.**

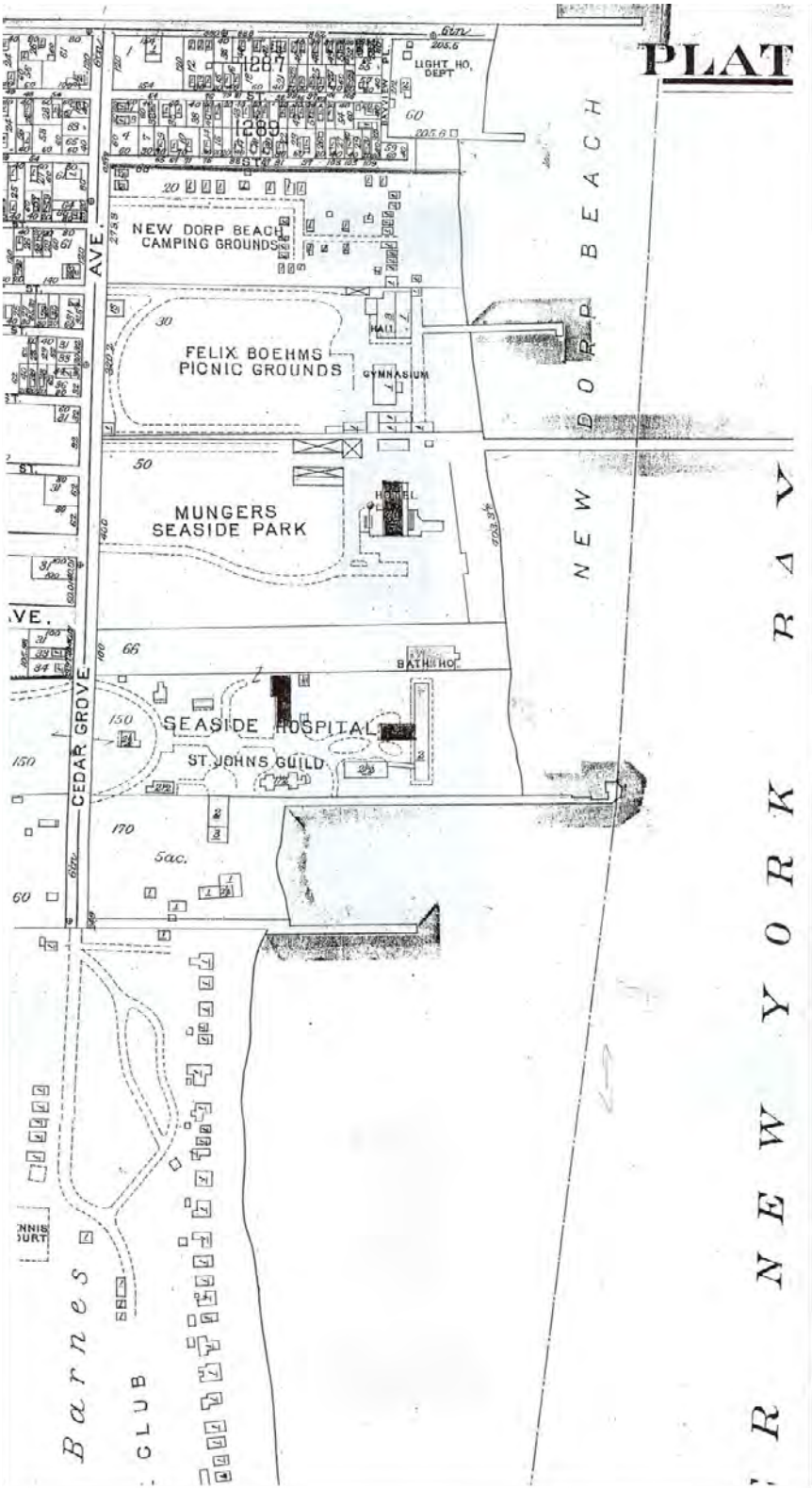


Figure 3.73. The New Dorp Beach area in 1917. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Bromley 1917:Plate 18).*

Boehm's Hotel. North of Peteler's/Munger's hotel, this property was shown vacant in 1887 (see Figures 3.47 and 3.48). Prior to 1898, Felix Boehm acquired the northern portion of the property and built a hotel, known as the Southside Hotel, in the northeastern corner of this tract (see Figure 3.64). He continued to own it through 1937. In 1910, Boehm had acquired the southern portion of the tract, and operated the entire property as "Boehm's Picnic Grounds" (see Figure 3.55, 3.57 and 3.73). Bathhouses and a bowling alley had been built on the southern portion of the property by 1911 (see Figure 3.69) and a gymnasium had been constructed south of the former hotel building (labeled "hall") by 1917 (see Figure 3.73).

The 1917 Sanborn map (see Figure 3.57), apparently completed after the Bromley map (see Figure 3.73), no longer showed the former hotel building, and indicated that the former "gymnasium" housed a dance hall and bowling alley. In 1937, the property was operated as Boehm's Bathing Beach. The former dance hall apparently still stood then (see Figure 3.66).

The route of planned construction would appear to be a short distance east of the buildings shown on various nineteenth-century and early twentieth-century maps. It should be noted that piers extended from the shoreline on this property as well as the other New Dorp Beach tracts.

Camp-Bungalow Colony. The property between Boehm's Hotel and the Lighthouse tract remained vacant through the end of the nineteenth century. In 1910 this property was operated as the New Dorp Beach Camping Ground (see Figure 3.55). By 1917 a number of bungalows had been built on the grounds (see Figure 3.73), which remained until at least 1937 (see Figure 3.66).

3.2.2.7 Cedar Grove Beach. In 1850, a house was shown near the shore in this area with a pier depicted approximately 500 feet farther south (see Figure 3.45). This house does not appear on any other maps and was possibly a mis-location of the Peerman house shown farther north in 1859 (see Figure 3.46). This portion of the shoreline remained undeveloped through the remainder of the nineteenth century into the second decade of the twentieth century (see Figure 3.69). At that time the beach was apparently used for camping. An advertisement offered a "first class camping outfit for sale cheap on private beach, fitted for housekeeping… Cedar Grove Beach, New Dorp, Staten Island" (*The New York Times* 1909).

The Cedar Grove Beach colony developed between 1910 and 1917 (see Figure 3.74). The Cedar Grove Club included a clubhouse set back from the beach approximately 1,200 feet south of Ebbitts Avenue. By the 1930s, bungalows of the Cedar Grove Beach Club lined the beach from Ebbitts Avenue south to a point a short distance north of Kissam Avenue (Figures 3.75 and 3.76).

The constitution and by-laws of the Cedar Grove Beach Association provide some insights into the nature of the community. The object of the club was to "maintain a private beach for the comfortable dwelling of its members and their families." Prospective new members had to be proposed by an existing member and approved by the Board of Governors of the club. Sublets to non-member of the club also required approval of the Board of Governors. The plans of all buildings or building additions had to be approved by the board (Cedar Grove Beach Club 1924).

The club had rules governing various aspects of life at the beach. For example, rules governing waste disposal stated that

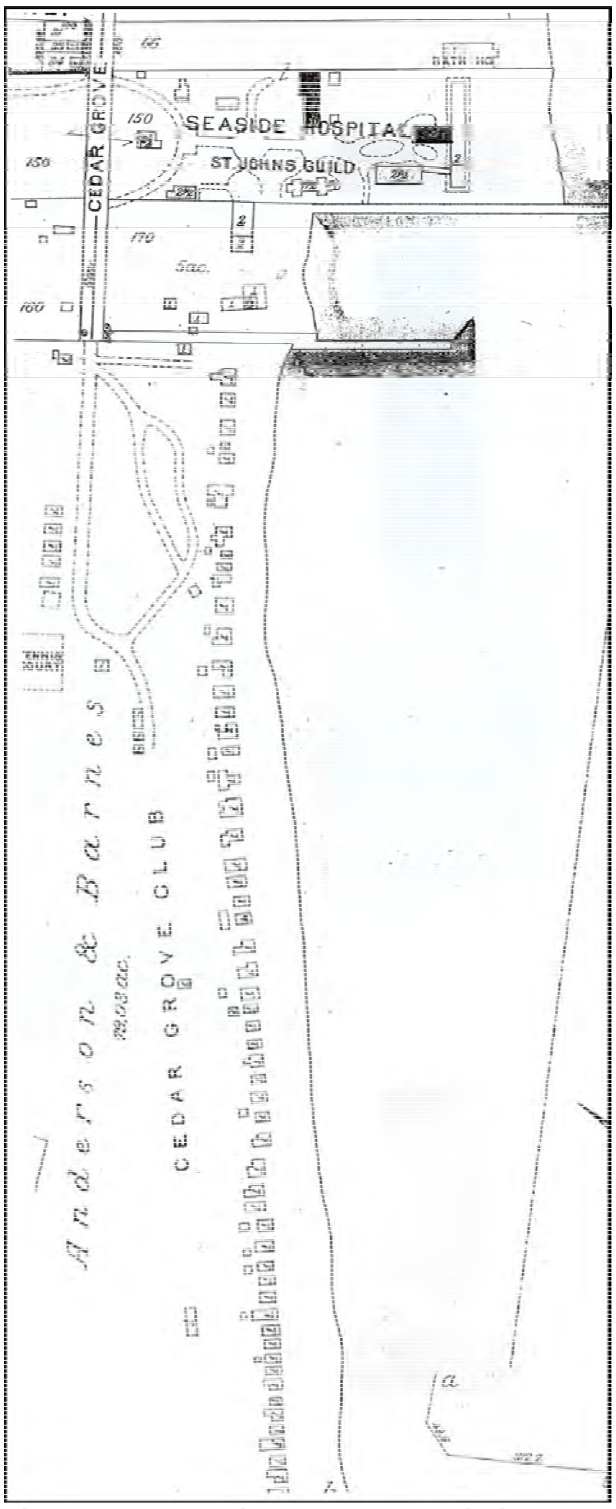


Figure 3.74. Cedar Grove Beach in 1917. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Bromley 1917:Plate 18).*

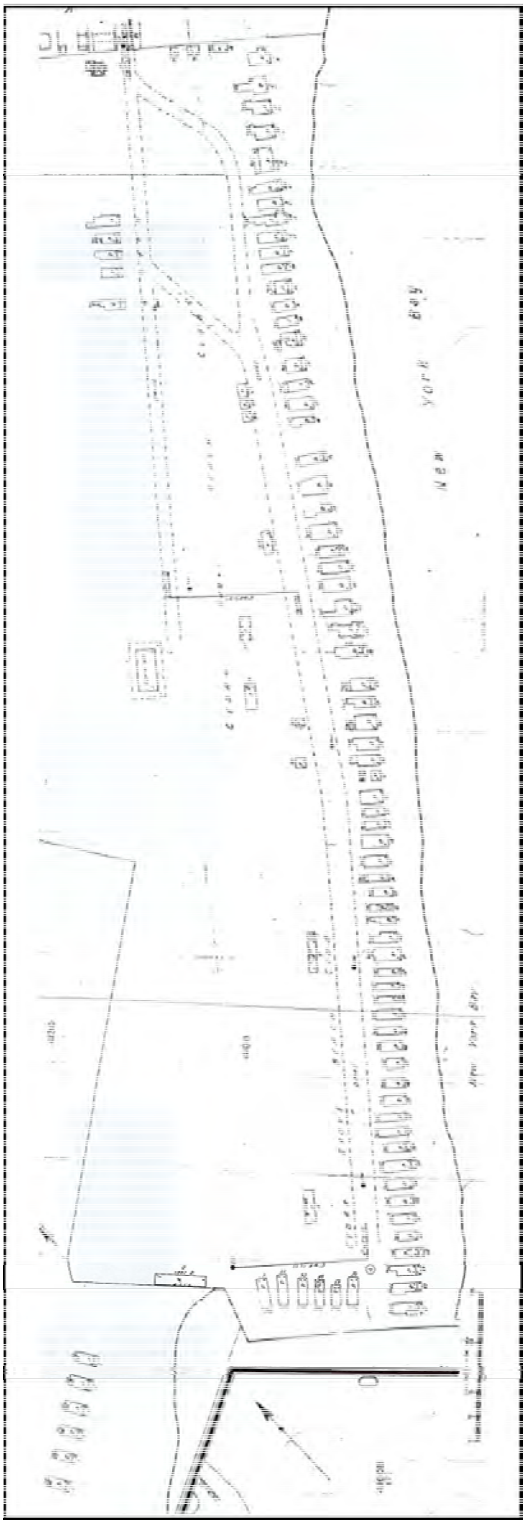


Figure 3.75. Cedar Grove Beach in 1937. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937: IV:433-434).*

Figure 3.76. Cedar Grove Beach in 1929. View north from about Kissam Avenue. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(P.L. Sperr photographer; New York Public Library Collection #1295/C5).*

> Toilet and garbage cans must be kept tightly closed and reliable disinfectants liberally used.
>
> Waste water should be emptied as far as possible from the source of water supply.
>
> All burnable refuse should be burned on the beach.
>
> Unburnable matter should be kept in a receptacle at the rear of the Bungalow, for removal by the caretaker.
>
> The owners or occupants of bungalows are regularly to keep the beach in front of their place clear from refuse.
>
> A prize cup will be offered for the best kept place [Cedar Grove Beach Club 1924].

If these rules were observed, the presence of substantial archaeological deposits at the club site would be unlikely. The route of the proposed seawall will cross the bunglalow sites (see Section 5.3).

A concrete feature on the beach near the southern end of Cedar Grove Beach was noted approximately 400 to 500 feet north of Kissam Avenue. The feature (SI-17) is described as "a small circular subterranean well constructed of concrete. The diameter of the feature is about eight feet, and it is elevated approximately five feet above existing grade" (John Milner Associates 1978:77). It is included in the OPRHP files as site A-085-01-0156.

3.2.2.8 Cedar Grove Beach Club to Oakwood Beach. A small "Fish House" was illustrated along the shoreline north of Oakwood in 1859 (see Figure 3.49). It was not shown on any other map examined for this project. This section of shoreline remained undeveloped during the nineteenth century through the early twentieth century. In 1917 only a few

bungalows were situated south of the Cedar Grove Beach Club. By 1937, more bungalows had been built, particularly in the area immediately south of Kissam Avenue (Figure 3.77), but this portion of the beach remained relatively undeveloped.

3.2.3 Study Area C: Crescent Beach. The Crescent Beach area remained vacant from the late eighteenth century through the mid-nineteenth century (see Figures 3.4, 3.5, 3.42; Figure 3.78).

The Collins Hotel. Sometime between 1874 and 1881, the Collins Hotel, owned by J.P Collins, had been built on the south side of Nelson Avenue (Figures 3.79 to 3.81). The site of this hotel would be within the proposed Ponding Area #3, south of Nelson Avenue (CBI ALT #3A). A small structure was illustrated in about the same location as the Collins hotel in 1874, although it is uncertain if this was the same building (see Figure 3.79). It was located on the southern boundary of the Seguine property, which later formed the route of Nelson Avenue. Another hotel, Fitzgerald's Excelsior Hotel, was located on the north side of Nelson Avenue (not within the project area) opposite the Collins Hotel. It is likely that these hotels served fishermen and others utilizing the Great Kills area for recreational purposes. An early twentieth-century advertisement for the Collins Hotel hoped to attract "fishermen and family parties" (cited in Historical Perspectives 1987:19).

The Collins Hotel was detailed on maps through 1917 (Figures 3.82 to 3.84). The 1898 and 1913 maps (see Figures 3.82 and 3.83) delineated the hotel with an extension to the south. Two small outbuildings were also shown on the later map some 150 feet west of the hotel. These do not appear to have been the same outbuildings that were shown closer to the hotel on the 1898 map. By 1926, the former Collins Hotel was known as the Lindsay Hotel (Figure 3.85) and by the 1930s it was operated as a dance hall (Historical Perspectives 1987:19-20). The structure was no longer standing by 1937 (Figure 3.86). However, two small buildings indicated on this map as a carpenter's shop appear to be at the same location as the outbuildings shown in 1913, and may represent the same structures.

The other building shown in the area, the Guyon/Wiman House, was located near Wiman Avenue, west of Hylan Boulevard, and not within the project area.

Early Twentieth-Century Development. Between 1898 and 1913, bungalows were built along the Crescent Beach shoreline southward to the location of Guyon Avenue (present-day Glover Street), and two other hotels had been constructed in the area. They were the Bay View Hotel and the Crescent Beach Hotel in 1917 (see Figures 3.83 to 3.84). The Bay View Hotel site is not within the project impact area. The Crescent Beach Hotel site is approximately 100 feet north of the northern end of the proposed levee (Alternate CB1).

A 1911 postcard (Figure 3.87) shows the Crescent Beach bungalows. They appear to have been more substantial buildings, similar to those at Cedar Grove Beach and unlike those at the bungalow colonies on the northern beaches. A later view of the beach depicts additional construction (Figure 3.88). Bungalows and both of the shoreline hotel buildings rendered in 1917 (see Figure 3.84) remained until at least 1937 (see Figure 3.86).

Approximately 13 bungalow sites immediately west of Wiman Avenue, as shown on the 1913 map (see Figures 3.83) would be located within the site of proposed Pond 2 (CBI ALT #3A). Five to seven other bungalow sites east of the present Glover Street (formerly Guyon Avenue) would be located at the site of proposed Pond 1.

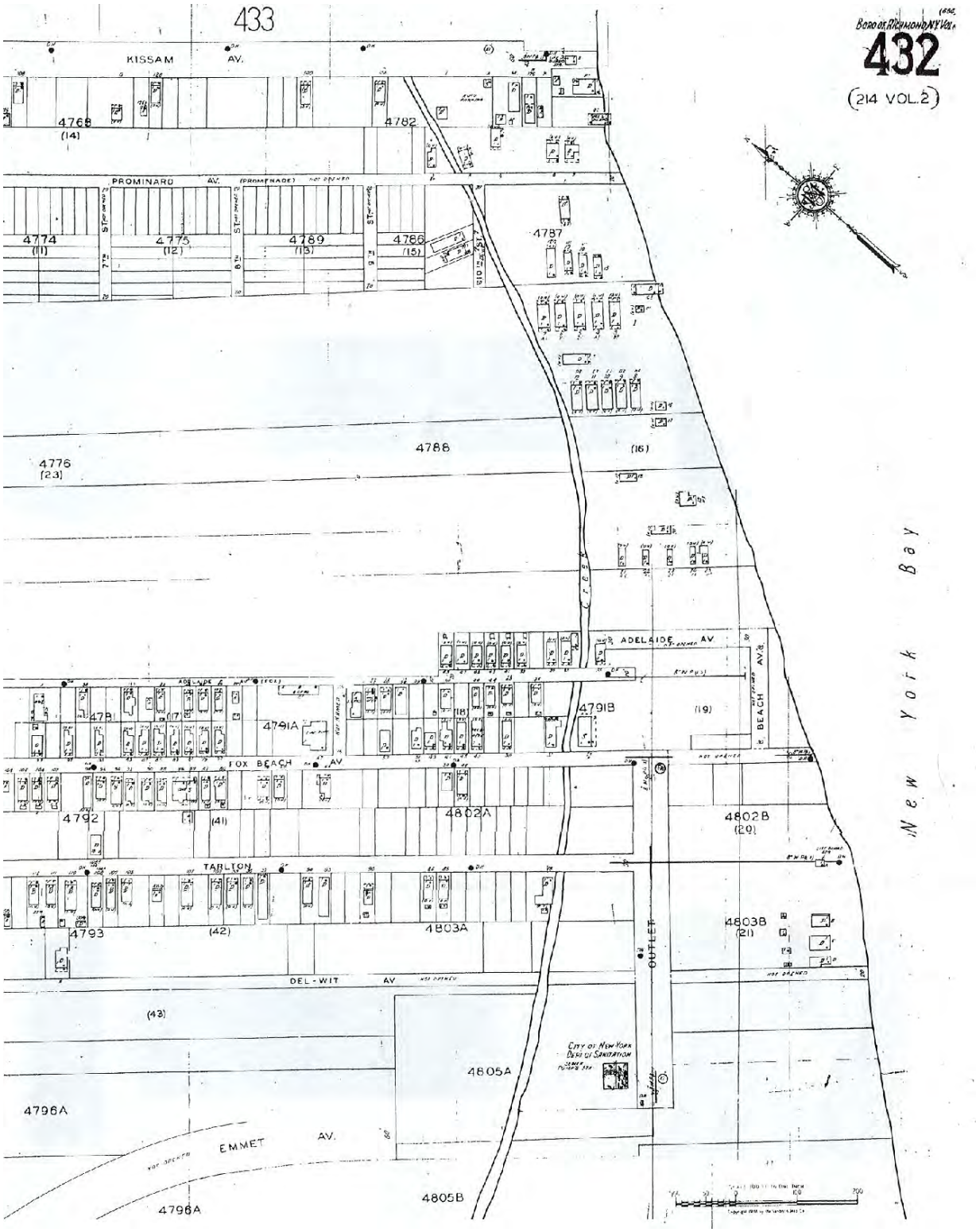


Figure 3.77. Oakwood Beach in 1937. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:IV:432).*

Figure 3.78. The Crescent Beach area in 1859. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Walling 1859).*

Figure 3.79. The Crescent Beach area in 1874. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1874:Sections 25 and 30).*

Figure 3.80. An 1881 rendering of hotels in the Crescent Beach area. The Collins Hotel is in center. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Collection of the Staten Island Institute of Arts and Sciences; copy from Historical Perspectives).*

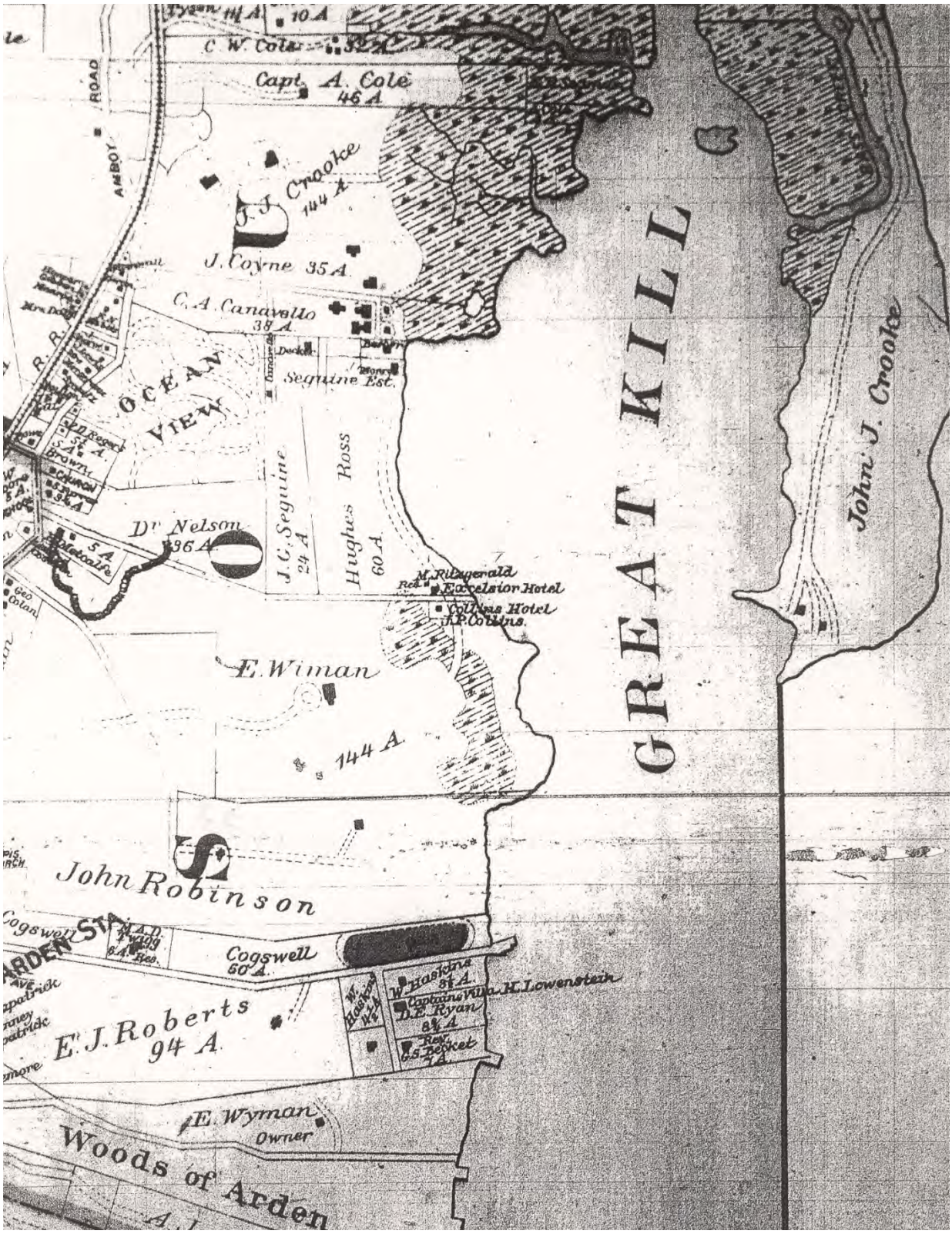


Figure 3.81. Crescent Beach in 1887. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Beers 1887: Section B).*

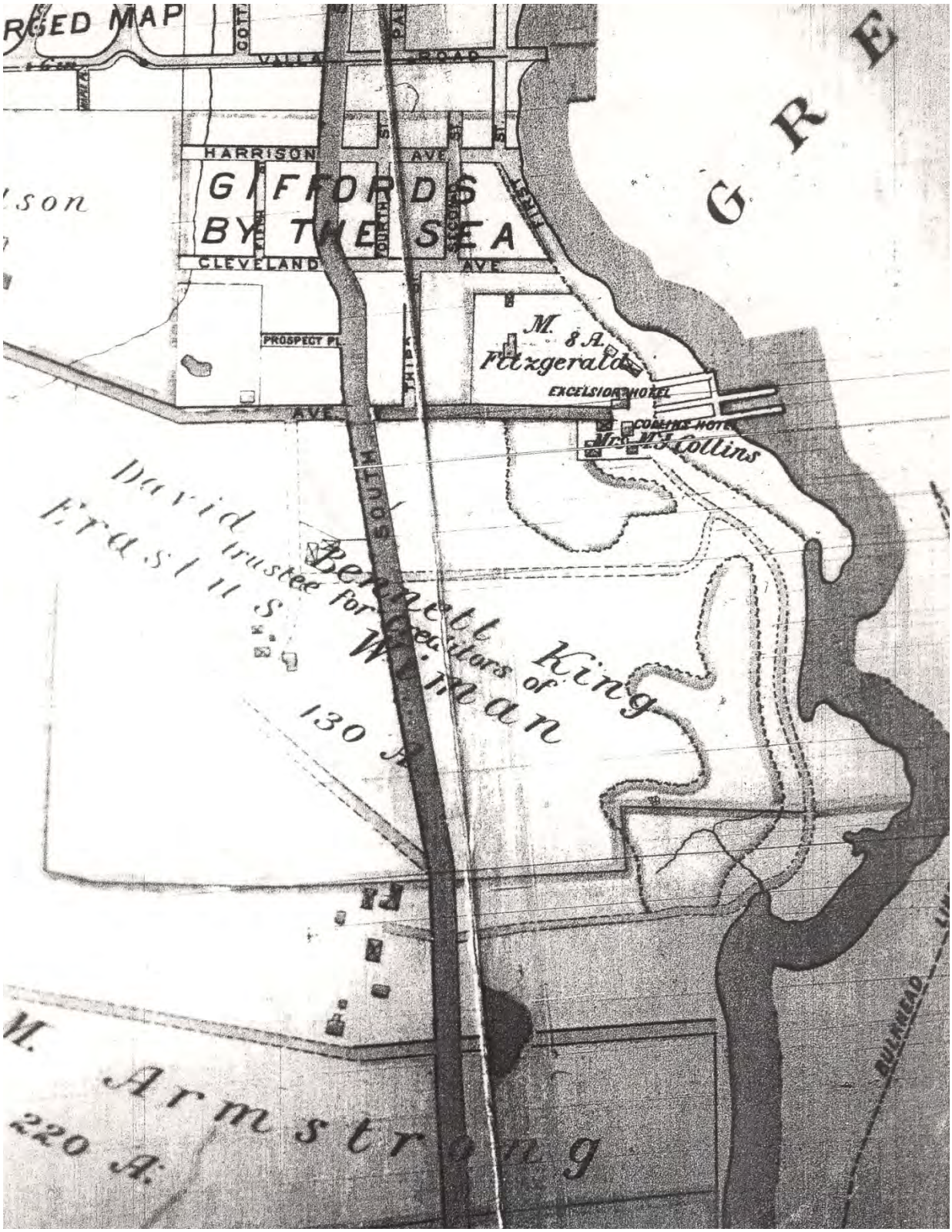


Figure 3.82. The Crescent Beach area in 1898. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Robinson 1898:Plate 17).*

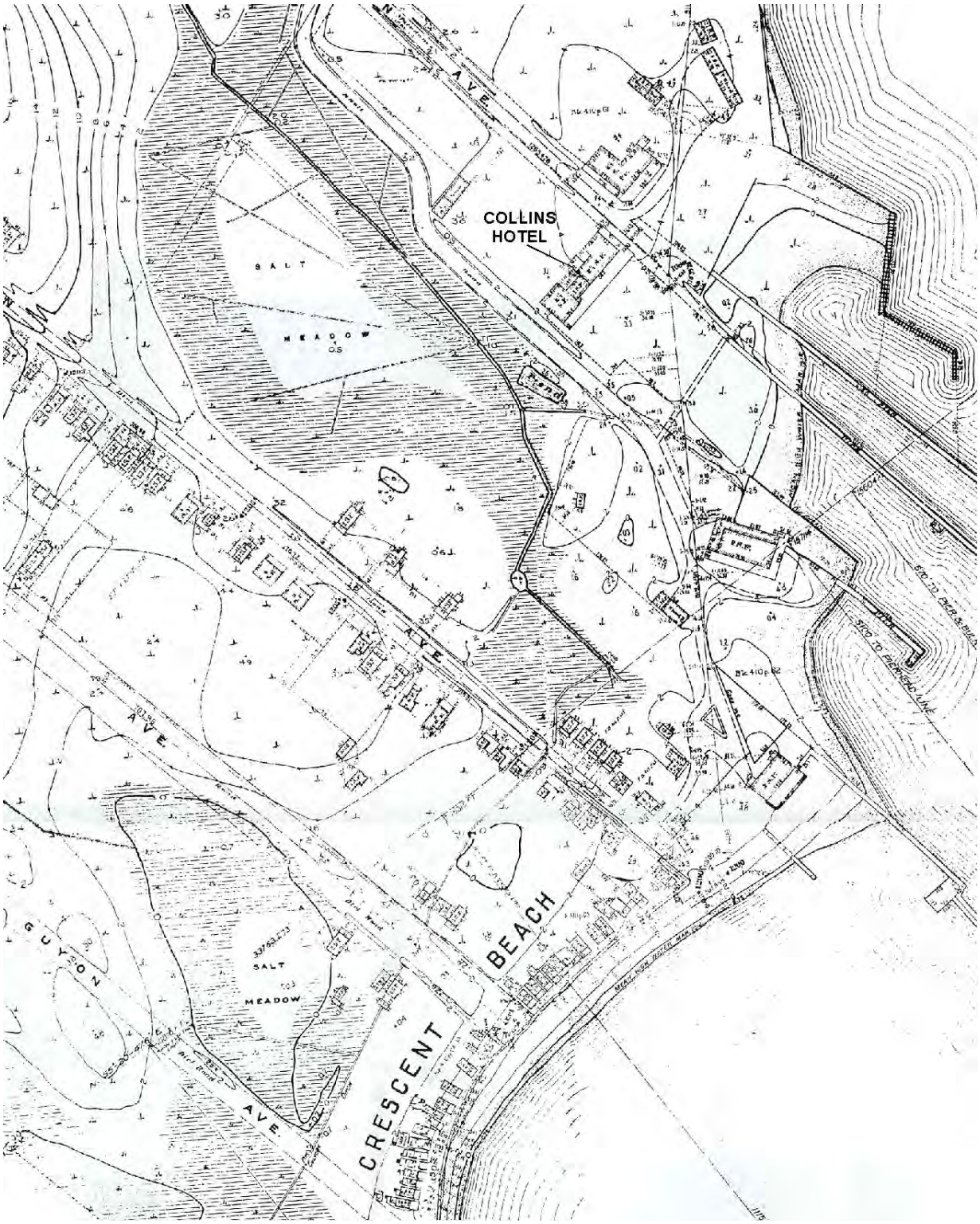


Figure 3.83. Crescent Beach in 1913. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Borough of Richmond topographic map 1913:Sheet 86)***.**

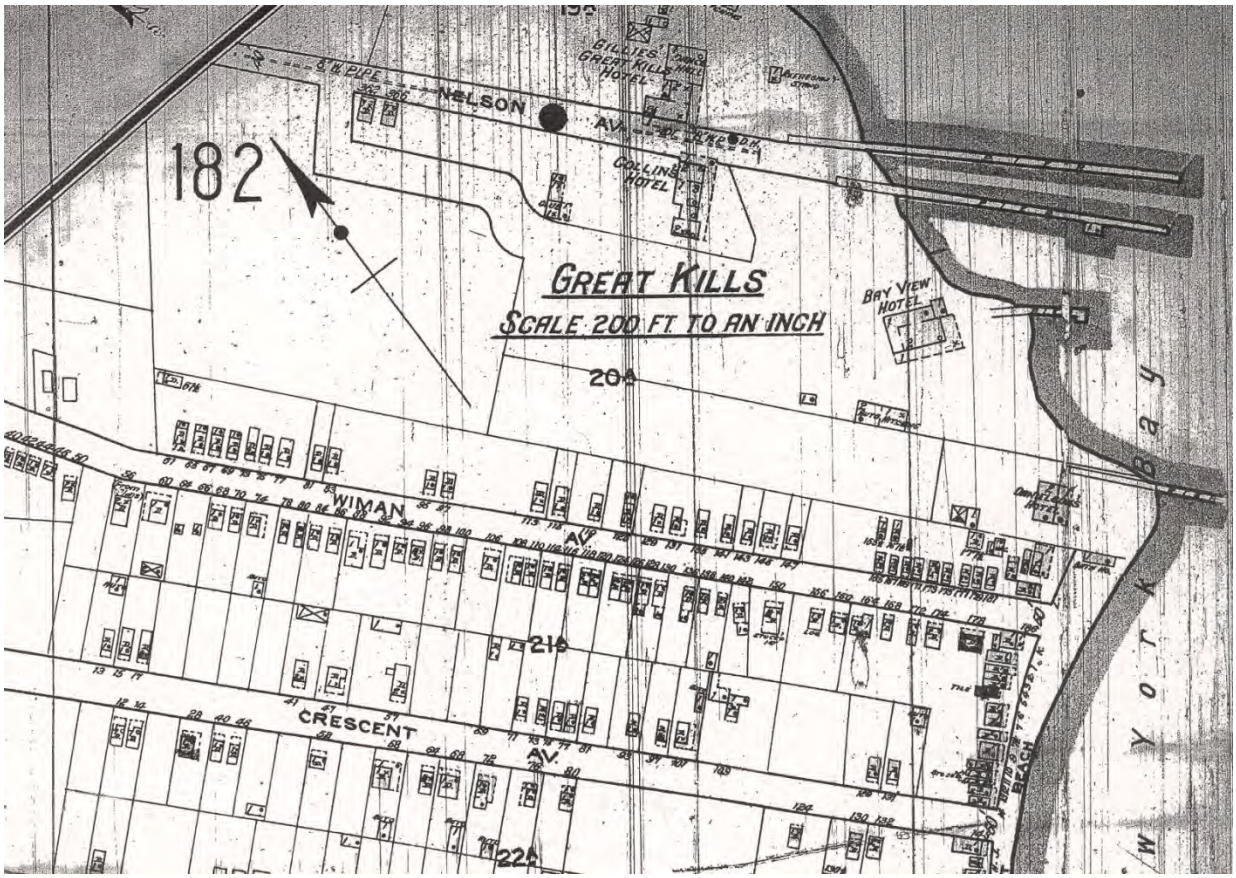


Figure 3.84. Crescent Beach in 1917. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1917:II:166).*

Figure 3.85. Crescent Beach on a 1926 Sanborn map (corrected from 1917 map). Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(copy from Historical Perspectives 1987:52).*

Figure 3.86. Crescent Beach in 1937. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Sanborn 1937:IV:412).*

Figure 3.87. 1911 postcard showing view of Crescent Beach. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Collection of the Staten Island Institute of Arts and Sciences: PC SI 75455-57 hp).*

Figure 3.88. Undated postcard showing later view of Crescent Beach. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(Collection of the Staten Island Institute of Arts and Sciences: PC 8475458 hp).*

4.0 Research Design

4.1 RESEARCH CONTEXT

An interrelated set of erosion control and shoreline protection measures are scheduled for six miles (9.7 kilometers) of Staten Island's south shore from Fort Wadsworth in the north to Crescent Beach in the south (see Figure 1.1). Those measures involve different types of seawall construction (e.g., buried, sheet pile, sloped stone); the elevation of a highway, boardwalk or both, as well as adjacent structures, and implementation of water control devices such as ponds and storm sewer arrangements (see Sections 1.1 and 2.1 for details).

The objective of the present investigation is to locate known or unrecorded prehistoric and historic resources within the project area. Once identified, the resources are evaluated for their potential eligibility to the National Register of Historic Places (NRHP). Their continued study or preservation, as well as any additional work, is then recommended.

The control or protection measures, with minor exceptions, will directly impact near surface (up to 3 feet or 1 meter) or deeper strata of the entire project area. Road elevation and breakup of the present highway or boardwalk in conjunction with a fill overburden will affect upper horizons in addition to significantly reducing access to potential resources. Buried seawalls and levees would have a similar effect. Sheetpile and sloped-stone seawalls may penetrate up to 25 feet (7.6 m) below the present surface. Raising or flood-proofing historic structures would need to take into account their particular characteristics in order to maintain their integrity.

Methods developed to accomplish the goals factored in the complete range of protection measures and anticipated impacts. A 100 percent survey of the project area was assumed. Discussion of the methods follows a three-fold division: Archival Review, Architectural Assessment Procedures and Field Testing Strategy.

4.2 ARCHIVAL REVIEW

Background research provided contextual information to aid in the elaboration of a field testing strategy and in the evaluation of prehistoric or historic resources. Material reviewed includes reports of previous cultural resources investigations; compendia listing reported prehistoric archaeological sites; maps and secondary sources presenting the history of the south shore of Staten Island; and published and unpublished photographs and prints of buildings and locations within the study area.

Sources of information include the Map, Local History and Genealogy, and General Research Divisions of the New York Public Library; the New York City Landmarks Preservation Commission; the New York State Office of Parks, Recreation and Historic Preservation Field Services Bureau; the Staten Island Institute of Arts and Sciences, and the U.S. Army Corps of Engineers, New York District. The staffs of these institutions were consulted to assist in the identification of relevant materials.

4.3 ARCHITECTURAL ASSESSMENT PROCEDURES

An architectural reconnaissance was conducted for all buildings and structures in and immediately adjacent to the project area. The purpose was to identify historic properties or districts that might be eligible for listing on the NRHP. The study also served to identify and evaluate potential impacts to cultural resources associated with the various protection measures. The architectural field investigation focused on the exteriors of structures and involved photographic documentation of buildings 50 years old or older, as well as general streetscapes and viewsheds along the project route. Basic data gathered for selected structures included location, function, and age of construction. Other pertinent information collected in the field focused on building materials, architectural features and details, visible exterior modifications, integrity, associated outbuildings and landscape features.

4.4 FIELD TESTING STRATEGY

The description of the field testing strategy is aided by collating factors affecting the selection of testing procedures in three tables, one for each study area. The first column lists the range of considered protection measures, paired with the specific survey components or areas that would be affected by those measures in the second column. The third column notes current surface conditions. The fourth column contains a summary assessment of the likelihood of locating prehistoric and historic resources derived from the environmental and cultural background contexts. The chosen survey methods occupy the last column.

4.4.1 Study Area A: Fort Wadsworth to Miller Field. Shovel testing at a 50-foot (15-meter) interval was considered an effective strategy to locate any near-surface prehistoric or historic sites along Study Area A's lineally-defined survey components (Table 4.1). Single artifact or isolated finds might not be detected, but even low-density deposits and limited subsurface features would stand a high probability of being located at this interval. The widths associated with road raising, seawall and access berm construction (i.e., 2 to 75 feet [0.6 to 23 m]) indicated that a single transect line would be sufficient, and moreover that a single line could incorporate all of the study area's lineal components.

Additional shovel tests off of Transect A's initial sampling points were undertaken to further define the contexts of the artifact distribution throughout the study area. Numbers and intervals of extra tests varied from one to four and from five to twenty-five feet (1.5 to 7.5 meters). Factors affecting the particular choice of the number and distances of extra tests involved the nature of the artifacts (only recent versus a mix of recent and historic materials) and stratigraphic characteristics (fill stratum for a ball field versus open parkland), as well as the physical location (sidewalks, fences precluding a certain distance or direction).

Transect A began at the north end with the short 300-foot off-beach section and then continued the entire length of the boardwalk and promenade on the immediate seaward side (see Figure 1.2). The land side of the promenade was also included before the transect turned west at the south end to connect to the seaside of Father Capodanno Boulevard for almost its entire length to Robin Road. Shovel tests were placed either 50 feet (15 meters) from edge of the boulevard as in playing fields and the open parklands or along the grass and tree strips between the boulevard and the recreational sections (parking lots, picnic areas). The transect loped around the two turnarounds and the access berm segment, with the Sea View Avenue section considered a discontinuous portion.

Table 4.1. Study Area A: Field Testing Strategy Summary

Protection Measure	Survey Component	Survey Conditions	Sensitivity Assessment	Survey Methods
Road Raising	Father Capodanno Boulevard	Four-lane road divided by a grass and street light median West side: pavement, grass and tree strip between road and sidewalk, infrequent open vegetation East side: series of parking lots, open parkland, ball fields, recreational/ maintenance facilities	Prehistoric: low to moderate Historic: high	50-foot (15-m) interval shovel tests
Road Raising	End of Sea View Avenue	Four-lane road with grass and tree strip between the road and sidewalk	Prehistoric: low Historic: low	50-foot (15-m) interval shovel tests
Sheet Pile and Buried Seawall Adjacent to Boardwalk	Franklin Delano Roosevelt Boardwalk and Promenade	Raised timber walkway and at-grade paved promenade	Prehistoric: low to moderate Historic: moderate to very low	50-foot (15-m) and 100-foot (30-m) interval shovel tests
Raising, Buried Seawall and Access Berm	Four Connecting Segments Between Boulevard and Boardwalk	Two are paved turnarounds with adjacent grass and landscaped strip; two areas with grass or low-growth grass and shrubbery	Prehistoric: low Historic: moderate	50-foot (15-m) interval shovel tests
Inland Water Control	Pond 1	Defined wetland	Prehistoric: very low Historic: low to moderate	Visual Inspection
Inland Water Control	Pond 2	Defined wetland	Prehistoric: very low Historic: low to moderate	Visual Inspection
Inland Water Control	Pond 3	Defined wetland	Prehistoric: very low Historic: low to moderate	Visual Inspection
Two Pump Stations	Ponds 2 and 3	Adjacent to wetlands on higher ground	Prehistoric: very low Historic: low to moderate	Visual Inspection
Deep Sheet Pile Seawall	Boardwalk/ Promenade	Former barrier beach/lagoon system under current beach and offshore zone	Prehistoric: possible buried sites	Not addressed in present survey

The seaside of Father Capodanno Boulevard presented the most accessible and higher sensitivity length than the landside. Substantial late-1800s to mid-1900s amusement and recreational facilities were concentrated between the boulevard and the boardwalk. The seawall fronting the boardwalk/promenade passes through an active beach, with a rather low sensitivity assessment for near-surface prehistoric or historic resources except at the north end. Here, two loci of prehistoric activity and one historic residence were identified during the background research that might have left beach-side traces. A 50-foot (15-m) testing interval

was maintained for this northern portion and the landside of the promenade, but extended to 100-feet for the remainder of the beach side of the boardwalk/promenade. The defined wetlands and adjacent pump station areas of the projected Ponds 1, 2, and 3 were visually inspected for any testable sections, such as fringe higher ground or elevated terrain within the wetlands. The sheet pile seawall extending several feet below the present surface that would front the boardwalk or run behind the promenade, could not be tested to the affected depth with shovel tests. Prehistoric sites might be present on buried former barrier beach/lagoon landforms that underlie the current beach and offshore zone.

Study Area B: Miller Field to Oakwood Beach Sewage Treatment Plant. Shovel testing at a 50-foot (15-meter) interval was again considered adequate to locate cultural resources in Study Area B and for the same reasons as those in Study Area A. A single Transect D followed the buried and sheet pile seawall, as well as the levee alignment from Miller Field to west of the Oakwood Beach Sewage Treatment Plant (see Figure 1.3). Gaps occurred for the existing dune and levee that were not tested. Both structures are man-made and their alternations are not likely to cause further impacts (Table 4.2).

Table 4.2. Study Area B: Field Testing Summary

Protection Measure	Survey Component	Survey Conditions	Sensitivity Assessment	Survey Methods
Buried seawall with or without raised promenade	South Midland, New Dorp, and Cedar Grove Beaches	Active or open with sparse vegetation beach	Prehistoric: low Historic: various 17th to early 20th century resources	50-foot (15-m) interval shovel tests
Sheet Pile Seawall and Sheet Pile Floodwall	Miller Field , 150 feet (46 m) and Oakwood Beach Sewage Treatment Plant, 675 feet (206 m)	Beach with sparse vegetation and off-beach thick undergrowth	Prehistoric: low Historic: low; near-surface, known buried resources in vicinity	50-foot (15-m) interval shovel tests
Levees	Oakwood Beach Sewage Treatment Plant and Oakwood Beach	Low-lying wetlands	Prehistoric: very low Historic: very low	50-foot (15-m) interval shovel tests
Existing Levee and Dune	Oakwood Beach	Rock and earthern raised level-topped platforms	Prehistoric: very low Historic: very low	Not tested, already existing, no further impact
Non-structural protection areas	Oakwood and New Dorp Beachs	Residences	Prehistoric: low Historic: low	Not tested, no direct impact
Deep Sheet Pile Seawall	Oakwood Beach Sewage Treatment Plant and Miller Field	Former barrier beach/lagoon system under current beach and offshore zone	Prehistoric: possible buried sites	Not addressed in present survey

Significant off-transect shovel testing occurred in this study area. Tests were placed around the known World War II fire control tower associated with the National Register of Historic Places Miller Army Air Field Historic District (90NR01020); a previously identified set of historic structural foundations and elements at New Dorp Beach (John Milner Associates 1978), and the extant Cedar Grove Beach Club bungalows.

A short 150-foot (45.7-m) long sheet pile seawall at Miller Field and a 675-foot (205-m) long sheet pile floodwall at the Oakwood Beach Sewage Treatment Plant might affect buried prehistoric resources. Deeper testing methods would be needed to locate any former barrier beach and lagoon landforms.

4.4.2 Study Area C: Crescent Beach. Shovel testing at Crescent Beach served to follow the sheet pile/sloped stone with levee seawall alignment along the beach with a single transect; the four pond areas with a grid system, that also included seawall/levee segments, and storm sewer lines and outfalls. A 50-foot (15-meter) interval line or grid was employed. Additional tests were excavated to explore artifact patterns according to a similar set of factors as those discussed for Study Area A (Table 4.3).

Non-tested portions comprised the short 100-foot (30-m) seawall/levee alignment on private condominium property and the segment in the inter-tidal zone; the storm sewer lines along Hyland Boulevard, Armstrong Avenue, and Goodall Street since they are extant; the storm sewer outfalls on land at Goodall Street, Armstrong Avenue and Robinson Avenue since they are also extant or are on private land; the storm sewer near-shore outfalls in the inter-tidal zone, and the one pump station which is under Tennyson Drive.

As with the other two study areas, the sheet pile seawall may reach deeply buried former landforms with possible prehistoric resources. Testing would require mechanical methods such as trenching or borings.

4.4.3 Shovel Test Characteristics. Shovel tests measured between 40- to 50-centimeters [cm] in diameter and frequently a depth of one meter (3 feet). The objective was to penetrate as deeply as possible into beach and near-beach deposits. Excavation proceeded by natural levels, with all soil screened through ¼-inch hardwire mesh. Cultural materials were kept and placed in plastic bags identified by individual provenience. After the stratigraphy and any features were recorded, tests were refilled with the same soil.

4.4.4 Field Documentation Procedures. The two field supervisors maintained daily field logs, noting project progress, rationales for testing strategies, and administrative details. Standardized forms were employed to record information including the designation, location, stratigraphy (soil type, color, texture), presence of cultural materials, and depths for each shovel test. The complete shovel test log can be found in Appendix A. The U.S. Army Corps of Engineers supplied two sets of project area maps at different scales that were amended to depict project area locations and shovel test results. Digital color prints were taken to document the project area locations and field procedures. A photographic log provides the roll and frame identification and a detailed description.

Table 4.3. Study Area C: Field Testing Strategy Summary

Protection Measure	Survey Component	Survey Conditions	Sensitivity Assessment	Survey Methods
Sheet Pile Seawall/Levee Alignment – Public	Crescent Beach	Open beach, tidal area, high grass and recreation portions	Prehistoric: low Historic: low	50-foot (15-m) interval shovel tests
Sheet Pile Seawall/Levee Alignment – Private	Condominium 100 feet (30 m) at north end of alignment	Landscaped section of condominium	Prehistoric: very low Historic: very low	Not addressed in present survey
Inland Water Control	Pond 1	Scattered mature trees and dense undergrowth	Prehistoric: low Historic: 5 to 7 bungalow sites	50-foot (15-m) interval shovel test grid
Inland Water Control	Pond 2	Scattered mature trees and dense undergrowth	Prehistoric: low Historic: some 13 bungalow sites	50-foot (15-m) interval shovel test grid
Inland Water Control	Pond 3	A few mature trees; tall grass; large artificial mound; recently cleared area for new public garden	Prehistoric: low Historic: Collins Hotel	50-foot (15-m) interval shovel test grid
Inland Water Control	Pond 4	High grasses	Prehistoric: low Historic: low	50-foot (15-m) interval shovel test grid
Storm sewer	Hyland Boulevard	Major four lane divided highway with occasional strips of trees and grass	Prehistoric: very low Historic: very low	Not tested; utility lines extant
Storm sewer	Armstrong Avenue	Two lane street with grass and tree strip between sidewalk and street	Prehistoric: very low Historic: very low	Not tested; utility lines extant
Storm sewer	Goodall Street	Two lane street with grass and tree strip between sidewalk and street	Prehistoric: very low Historic: very low	Not tested; utility lines extant
Storm sewer	Glover Street	Two lane street with grass and tree strip between sidewalk and street	Prehistoric: very low Historic: very low	50-foot (15-m) interval shovel tests
Storm sewer outfall, land areas	Goodall and Armstrong existing; Glover Street new; Robinson Ave. 175 feet (53 m) on private land and beach	Two lane streets with grass and tree strip between sidewalk and street; landscaped lawn and open beach	Prehistoric: very low Historic: very low	No testing for Goodall and Armstrong Streets; Glover Street tested at 50 foot interval; Robinson Avenue not tested on private land with one test on beach
Storm sewer outfall near shore areas	Goodall and Armstrong existing; Glover St new, 50 feet (15 m); Robinson Ave. new, 25 feet (7.5 m)	Inter-tidal zone	Prehistoric: very low Historic: low	Not tested
Pump Stations	End of Robinson Avenue and Tennyson Drive	On open grass near beach location and a paved Tennyson Drive	Prehistoric: very low Historic: very low	Tested near beach location; no testing of Tennyson Drive location
Deep Sheet Pile Seawall	Crescent Beach	Former barrier beach/lagoon system under current beach and offshore zone	Prehistoric: possible buried sites	Not addressed in present survey

4.5 LABORATORY METHODS AND ARTIFACT ANALYSIS

The recovered materials were brought to Panamerican's laboratory in Buffalo, New York, for preparation and analysis. Most items were lightly washed in tap water and allowed to air dry. Metal artifacts were mechanically cleaned. Artifacts were sorted by major material class, followed by identification or division into finer categories (e.g., blue transfer-printed pearlware body sherd, molded aqua bottle glass, a wire nail). Attributes normally coded for comprised: count, form type (body, neck, rim), complete form if known (bottle, plate, tea cup), colors, particular identifying marks, and particular dates. Identification was aided with the use of various standard reference guides, such as Noël Hume (1970) and South (1977). Classification data for ceramics, glass, metal and miscellaneous items have been organized into Tables C1 through C4 found in Appendix C. For example, the ceramic categories of Table C1 involve: the type (pearlware, redware), decoration details (paste color, slipped, shell-edged, floral designs), form (tablewares, utilitarian), dates and places of manufacture as well as references.

The recognized artifact attributes for each individual provenience were ordered into tables for ready statistical manipulation and presentation into master tables. Master tables with all the attributes by shovel test number and stratum for each study area are found in Appendix B. Totals for master material classes and certain other summary figures are presented in Section 6.0 to complement the field results discussion.

4.6 CURATION

Following identification, an acid-free paper card with project, provenience, and identification information was placed within each polyethylene, zip-lock bag of artifacts. All bags are kept in acid-free boxes until their disposition to a permanent curation facility is determined in consultation with the New York District Corps of Engineers. An artifact inventory, as well as additional documentation to provide a context for the assemblage, will accompany the collection.

4.7 SAFETY CONSIDERATIONS

A number of Federal Occupational Safety and Health Administration (29 CFR 1926) regulations governed the present project. Proper clothing, excavation adjacent to vehicular traffic, location of nearest medical facility, and proper tool use were among the issues. The frequent fieldwork concerns of heat stress, sun exposure and insects were eliminated or significantly reduced due to the cooler, but not severely cold, overcast days of October and November. Even though safety remained a priority, a painful pinched nerve requiring a doctor's visit and occasional minor acres and pains were nonetheless reported.

5.0 Architectural Assessment

5.1 STUDY AREA A: FORT WADSWORTH TO MILLER FIELD

Documentary research and field investigations revealed that almost no historic buildings or structures remain within this study area. According to historic maps of the area, the architectural character of Father Capodanno Boulevard (originally Seaside Boulevard), especially to the east, was defined throughout the late nineteenth and early twentieth centuries by the beach resorts and recreation industry associated with Midland Beach and South Beach. The development of both beaches followed the expansion of rail and ferry service throughout the 1860s and 1870s, and by the late 1890s the area contained an assortment of hotels, casinos and amusement centers. Maps of the vicinity from 1898 also show a boardwalk paralleling the shoreline in the approximate location of the present Franklin Delano Roosevelt boardwalk (see Figure 3.14).

Late nineteenth-century and early twentieth-century structures along the east side of Seaside Boulevard consisted largely of flimsy pine buildings masquerading behind elaborate facades. Poorly constructed and highly flammable, most of these structures burned to the ground shortly after the turn of the nineteenth century. They were soon replaced by new structures of a similar nature and function, although the haphazard development of the nineteenth century gave way to more carefully planned, grand scale amusement parks such as Happyland Park (see Figures 3.20 and 3.21). While initially successful, these amusement parks ultimately found themselves facing financial ruin, which was precluded only by a second great fire in 1924.

With the exception of a few scattered structures, mostly dwellings, the west side of Seaside Boulevard remained largely undeveloped during the nineteenth and early twentieth centuries. The 1898 Robinson Atlas shows that the northern portion of the study area, opposite South Beach, was subdivided into city blocks and lots, although no structures are depicted (see Figure 3.14). When development did occur, most likely sometime after 1910, it took the form of middle class residential development. Sanborn Fire Insurance Maps of 1917 and 1937 depict numerous one- and two-story dwellings, clustered together in groups of similarly sized and shaped houses (see Figure 3.26). By 1937, numerous dwellings interspersed with a few shops and commercial structures had also replaced many of the recreation-oriented structures along the east side of Seaside Boulevard (see Figure 3.27c).

The present Father Capodanno Boulevard was renamed in 1971 for Father Vincent Robert Capodanno, a Staten Island native turned Catholic missionary who was killed in the Vietnam War while serving as a U.S. Navy Chaplain with the U.S. Marines (Reverend Vincent Robert Capodanno Foundation, Inc. 2000). The architecture along the boulevard now displays a diverse mixture of residential and commercial structures, the majority of which date to the mid- to late-twentieth century, reflecting the bedroom community real estate boom that hit Staten Island following the opening of the Verrazzano-Narrows Bridge in 1964. Most of the 1920s and 1930s residential development depicted on the above-mentioned maps long ago gave way to the condominium developments, strip malls and industrial parks that now typify much of Staten Island (New York Public Library 2001).

Presently, the southern portion of the right-of-way is lined almost entirely by modern structures. Between Miller Army Air Field and Graham Boulevard, the streetscape is dominated by

late twentieth-century multi-story apartment complexes and condominiums (see Figures 5.1 to 5.5). North of Graham Boulevard, several modern commercial buildings are interspersed with the residential structures. These include structures such as On The Job Uniforms and Toto's Restaurant and Bar at 829 and 809 Father Capodanno Boulevard respectively (Figures 5.6 to 5.8).

The South Beach Psychiatric Center, a modern medical center under the administration of the New York State Office of Mental Health, borders the west side of the APE for approximately one-half mile north of Seaview Avenue. This location appears to have been part of a residential neighborhood that occupied the entire area between Hylan Boulevard and the present Father Capodanno Boulevard. A 1937 Sanborn map of the vicinity shows the area was once divided into city blocks and occupied by numerous early twentieth-century residences (see Figure 3.27c). All dwellings and other structures between Mason Avenue and Father Capodanno Boulevard have since been removed, and the former through-streets have been truncated at the western edge of the psychiatric center property. Although the psychiatric center borders the project right-of-way on the east, all associated buildings are modern and appear to be located at least one-quarter of a mile west of Father Capodanno Boulevard (Figures 5.9, 5.10, 5.11 and 5.12).

Pre-1954 structures appear with somewhat greater frequency near the northern end of the project area. A small area of early to mid-twentieth-century residential development remains north of Sand Lane. Buildings here consist largely of modest vernacular residences constructed between 1920 and 1950. Of simple wood frame, Minimal Traditional design, these structures are typical of mid-twentieth century suburban dwellings found in abundance throughout the region and country (Figures 5.13 and 5.14). A few additional pre-1954 structures remain interspersed with numerous modern structures at the northern end of Father Capodanno Boulevard, especially in the vicinity of Doty Avenue (Figures 5.15 and 5.16). Just north of Doty Avenue is a small cluster of early twentieth-century structures including a ca. 1910 apartment building with subtle Prairie-influences, a ca. 1930 Minimal Traditional residence, and another ca. 1930 residence (Figure 5.17). As with almost all of the older structures within the study area, numerous modifications are apparent. These include synthetic siding, replacement windows and doors, and porch reconstruction. However, the prevalence of much more modern structures such as the ca. 1979 apartment complex and Senior Citizen Center located at 94 and 70 Father Capodanno Boulevard respectively define the prevailing architectural character at the north end of the study area as well (Figure 5.18).

An OPRHP Building / Structure Inventory Form was located for one previously surveyed building at 93 Father Capodanno Boulevard. According to the 1979 inventory form, this structure was a ca. 1900 two-and-one-half-story residence located on the northwest corner of the present Linda Avenue. The structure appears to have been demolished. Structures in the vicinity of Linda Avenue currently include a number of modern residences and apartment buildings. Even accounting for the possibility of significant alteration, none of these structures bears a resemblance to the documented structure in form or appearance (Figure 5.19).

The Franklin Delano Roosevelt Boardwalk, which once followed the entire South/ Midland Beach shoreline between Miller Field and Fort Wadsworth, was constructed between 1935 and 1938 by FDR's Works Progress Adminstration (WPA). While the entire length of the walkway is still designated as the FDR boardwalk, its southern half (south of Seaview Avenue) actually consists of a modern, at-grade asphalt and pavement promenade (Figure 5.20). North of Seaview Avenue, the walkway is composed of a traditional wood boardwalk, although the original 1935 construction has been replaced in-kind (Figures 5.21 and 5.22).

Figure 5.1. View along the west side of Father Capodanno Boulevard from the corner of Lincoln Avenue. Facing west-southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.2. View along the west side of Father Capodanno Boulevard from the corner of Lincoln Avenue. Facing north-northeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.3. View along the west side of Father Capodanno Boulevard in the vicinity of Peggy Lane. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.4. View along the west side of Father Capodanno Boulevard north of Jefferson Avenue. Facing north-northeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.5. View along the west side of Father Capodanno Boulevard in the vicinity of Graham Boulevard. Facing northeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.6. Toto's Restaurant and Bar at 809 Father Capodanno Boulevard. Facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.7. On the Job Uniforms at 829 Father Capodanno Boulevard. Facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.8. Typical mix of commercial and residential development along the west side of Father Capodanno Boulevard. Facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.9. Intersection of Father Capodanno Boulevard and Seaview Avenue, looking toward the South Beach Psychiatric Center. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.10. View along the west side of Father Capodanno Boulevard in the vicinity of Henry Fair Field. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.11. Modern multi-family residential structures identified by project maps as "typical" of the structures to be raised along Father Capodanno Boulevard. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.12. 385-393 Father Capodanno Boulevard, identified by project maps as "typical" of the structures to be raised. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.13. View along the west side of Father Capodanno Boulevard north of Sand Lane showing some of the remaining early to mid-twentieth century residential structures. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.14. View along the west side of Father Capodanno Boulevard north of Sand Lane showing some of the remaining early to mid-twentieth century residential structures. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.15. View along the west side of Father Capodanno Boulevard south of Doty Avenue showing some of the remaining early to mid-twentieth century residential structures. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.16. View along the west side of Father Capodanno Boulevard south of Doty Avenue showing some of the remaining early to mid-twentieth century residential structures. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.17. Pre-1954 structures north of Doty Avenue. Facing north. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.18. 70 and 74 Father Capodanno Boulevard. The prevalence of numerous modern structures such as these define the architectural character of Study Area A. Facing east. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.19. Modern structures on the west side of Father Capodanno Boulevard in the vicinity of Linda Avenue. 93 Father Capodanno Boulevard, a ca. 1900 residence once located in the area, appears to have been demolished. Facing west. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.20. Southern portion of the Franklin Delano Roosevelt Boardwalk showing the asphalt and pavement construction. Facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.21. Northern portion of the Franklin Delano Roosevelt Boardwalk showing traditional raised wood structure. The NRHP-eligible Verrazano-Narrows Bridge is visible in the background. Facing northeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.22. Northern portion of the Franklin Delano Roosevelt Boardwalk showing traditional raised wood structure. Facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Historic maps of the area show that boardwalks associated with various resorts and amusement parks were present in this location as early as the late nineteenth century (see Figure 3.14). By 1937, when the current boardwalk was nearing completion, most of these earlier establishments (with the exception of few bath houses) were gone, replaced by "bungalow towns" and small shops located along the east side of Seaside Boulevard (see Figure 3.39). At present, few structures remain in the area between the boardwalk and Father Capodanno Boulevard. This area consists almost entirely of large parking lots interspersed with areas of green space and various playing fields associated with the Gateway National Recreation Area. A few scattered structures are present within the vicinity of the boardwalk and promenade, but they do not appear to be associated with the original WPA project. Rather, they consist of simple, concrete block comfort stations and concessions buildings added in the 1950s, 1960s and 1970s (Figures 5.23 and 5.24).

The Verrazano-Narrows Bridge, which spans New York Bay between Staten Island and Brooklyn to the east, is visible along the entire length of Father Capodanno Boulevard, particularly at its northern end. Designed by Othmar Amman and completed in 1964, the bridge has previously been determined NRHP-eligible by the New York OPRHP (USN 08501.002780) (see Figure 5.21).

Pond 1

The vicinity of Pond 1 is characterized by open, marshy areas that appear to be giving way to modern, suburban residential development (Figure 5.25). New duplexes and condominiums were documented immediately adjacent to the north and west of the proposed pond along Olympia Boulevard and Baden Place (Figure 5.26). One ca. 1925residence was identified at 51 Graham Boulevard, just east of Patterson Avenue (Figure 5.27). This structure is a simple, one-story vernacular dwelling with a front-facing shed roof dormer that serves as its only nod to the Craftsman style. This structure has undergone numerous alterations since its original construction, including wholesale window replacement and the installation of aluminum siding.

Pond 2

The area proposed for Pond 2 consists of a large, open marshy area. There are no structures located within it. Surrounding structures consist of late twentieth-century residential structures, mainly suburban duplexes and condominiums (Figures 5.28 to 5.30).

Pond 3

The area proposed for Pond 3 consists of a large, open marshy area. No structures are located within or immediately adjacent to the location.

Figure 5.23. Late twentieth-century comfort station located on the west side of the FDR Boardwalk. Facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.24. Typical late twentieth-century men's and women's comfort stations situated near the southern end of the FDR Boardwalk. Facing west. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.25. Location of Pond 1. Facing southeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.26. Modern residential structures immediately adjacent to the north and west of the proposed Pond 1 along Olympia Boulevard and Baden Place. Facing east-southeast. . Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.27. Ca. 1925 residence at 51 Graham Boulevard, just east of Patterson Avenue. Facing north-northwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.28. Location of Pond 2. Facing east. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.29. View of modern residential development surrounding Pond 2. Facing northwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.30. Typical modern residential structures located immediately adjacent to Pond 2. Facing west-northwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

5.2 STUDY AREA B: MILLER FIELD TO OAKWOOD BEACH SEWAGE TREATMENT PLANT

One NRHP-listed property, the Miller Army Air Field Historic District (90NR01020), was identified within Study Area B. The Miller Air Field, now part of the Gateway National Recreation Area, demarcates the northern boundary of the study area, and is also situated at the western terminus of the FDR Boardwalk and Promenade. Constructed between 1919 and 1921, the airfield property occupies a portion of the former Vanderbilt Estate, a 350-acre "gentleman's farm" established by Cornelius Vanderbilt in 1836. When the U.S. Army acquired the land in 1919, numerous changes were made in order to adapt the property to air field use. Although the Army initially attempted to utilize existing buildings, the requirements of military use led to the eventual demolition of all structures associated with the Vanderbilt family, including the family mansion (Baugher-Perlin and Bluefeld 1980).

Because its location was particularly well suited to both land and sea planes, Miller Field was authorized in 1917 as an Aero Coast Defense Station (Rakos 1995). Its mission was to assist the Coast Artillery in defending New York Harbor. When completed in 1921, it was the only Air Service Coast Defense Station on the east coast (Historic Miller Field 2004). At that time the Coast Artillery Corps utilized a number of locations around the harbor and up the river for this purpose. These sites included two early nineteenth century forts, Fort Totten and Fort Hamilton.

From its establishment in 1919, until 1974, when it became part of the Gateway National Recreation Area, the air field served a number of different purposes, including functioning as an Army Air Field, a training base, a Coast Guard Artillery gun site, a Nike Missile Repair Depot, a U.S. Army Special Forces Base, and a temporary prisoner-of-war camp (Historic Miller Field 2004).

Few buildings associated with military activities remain on the Miller Field property. Extant contributing elements of the historic district include one seaplane hanger constructed in 1920 and the 1939 Elm Tree Range Light and Airfield Beacon (Figure 5.31). The seaplane hangar was included in the Historic American Buildings Survey around 1978, and the entire air field was listed on the National Register of Historic Places (NRHP) in 1980. Both structures are located near the south shore, adjacent to the project APE.

In addition to the structures noted above, a 44-foot concrete fire control tower was constructed in 1943 northwest of the seaplane hangar (Figure 5.32). During World War II, Fort Hancock, Fort Tilden, Fort Wadsworth and Fort Hamilton were tasked with the defense of New York Harbor. Miller Field was chosen as a site for the erection of a tactical gun battery. Presumably because of its location, Miller Field also was selected as the site for a base end station for Battery Livingston at Fort Hamilton and Battery 218 at Fort Wadsworth (Historic Miller Field 2005).

According to the Historic Miller Field website (2004-2005), the Coast Artillery Corps constructed "a 44-foot tall concrete fire control tower [in September 1943] … This tower was a base end station for the four 6-inch guns of Battery Livingston at Fort Hamilton in Brooklyn, and the twin 6-inch guns of Battery 218 at Fort Wadsworth." A base end station acts as a spotting tower to locate targets and help triangulate their position by reporting the observed azimuth over a dedicated telephone line to a plotting room. The emplacement at Fort Wadsworth was completed but never armed (CDSG 2005).

Figure 5.31. NRHP-listed Seaplane Hangar and Elm Tree Range Light and Airfield Beacon, Miller Army Airfield Historic District. Facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.32. Concrete fire control tower (1943), Miller Army Air Field Historic District. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

The 1980 nomination form for the Miller Army Air Field Historic District states that the nominated area is "limited solely to seaplane hangar No. 38 and the Elm Tree Light and their immediate surroundings" (Greenwood and Torres-Reyes 1976). The presence of the fire control tower, now over 50 years old, necessitates an evaluation of its NRHP-eligibility as a contributing element of the Miller Army Air Field Historic District.

Apart from Miller Field, documentary research and field investigations revealed that almost no historic buildings or structures remain within Study Area B. Overall, the area contains a small but diverse mixture of standing structures which lack a truly cohesive architectural character.

The southern half of the area is characterized by mid-to late twentieth century structures, beginning with the Oakwood Beach Sewage Treatment Plant, which delineates the area's southern boundary (Figures 5.33 and 5.34). A complex comprised of boxy brick and metal buildings, the pollution control plant is located on what was formerly the Staten Island Marine Park, as shown on a 1937 map of the area (see Figure 3.27c).

Several residential streets are situated just north of the plant. These streets are depicted on the 1937 map as well. However, the majority of houses shown on the historic map appear to have been replaced by modern suburban dwellings. Moreover, current project maps show these houses to be well outside the project area (Figure 5.35).

The Cedar Grove Beach Club, a bungalow community that developed between 1910 and 1917, is located near the northern end of the study area, at the western end of Cedar Grove Avenue. The community currently consists of a number of small, one-story wood frame beach houses situated immediately adjacent to the waterfront (Figure 5.36). During the early twentieth century, it was one of a number of bungalow communities built along Staten Island's south shore, including similar beach colonies at Woodland Beach and South Beach. Most of these other communities burned or were abandoned and eventually razed, leaving the Cedar Grove Beach Club as one of the few remaining developments of its kind on Staten Island.

Historic maps of the Cedar Grove Beach area show that this section of the south shore kept pace with the recreation and resort development occurring between Oakwood Beach and Fort Wadsworth in the late nineteenth and early twentieth centuries (see Figures 3.2 and 3.69). This area was apparently used as the New Dorp Beach camping ground during the first decade of the 1900s, as is indicated by a 1909 New York Times advertisement that offered a "first class camping outfit for sale cheap on private beach, fitted for housekeeping … Cedar Grove Beach, New Dorp, Staten Island." The Cedar Grove Beach Club was formally organized in February 1911 as a family vacation resort whose name was supposedly derived from the numerous cedar trees that grew along the beach in this location (Brittain 1962). A dozen Staten Island businessmen invested $60,000 to acquire a half mile of beach front and gradually the resort was transformed from a campground to a bungalow colony. This transition is documented in a 1913 New York Times advertisement touting the Cedar Grove Beach Camp "For Tents and Bungalows," which offered a "delightful summer by the sea without leaving New York City."

At first, the Club members built only lean-tos, driftwood shacks, and other temporary shelters, but more permanent structures, namely bungalows, quickly followed. The first beach houses were built by J.L. Rose and consisted of large one-room structures with green burlap room dividers (Brittain 1962). By 1917, a map of the beach depicted a long line of small, one-

Figure 5.33. Oakwood Beach Sewage Treatment Plant. Facing west-northwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.34. Oakwood Beach Sewage Treatment Plant. Facing southwest Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.35. Modern suburban residential neighborhood along Foxbeach Avenue. Facing northwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.36. Cedar Grove Beach bungalow community. Facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

story dwellings extending from south of Ebbitts Avenue to a point just north of Kissam Avenue. A significant number of these original beach houses are still in existence today, although many of them have since evolved through the addition of dormers, wings, porches, and patios into much more elaborate structures (Brittain 1962). Historic photographs of the bungalows at Cedar Grove Beach show structures that were typically much more substantial than those at the bungalow colonies on Woodland Beach or South Beach (see Figure 3.76).

The constitution and by-laws of the Cedar Grove Beach Association provide some insight into the nature of the community. The object of the Club was to "maintain a private beach for the comfortable dwelling of its members and their families." Prospective new members had to be proposed by an existing member and approved by the Board of Governors. Subleases to non-members also required Board approval, as did all new construction within the community, including building additions (Cedar Grove Beach Club 1924). According to local historian Philip J. Brittain (1962), the club was maintained as a resort for a limited group of families, and houses at the beach were "handed down to children much like prize china. Others were sold to heirs of families already established in the club and still others were swapped as family needs changed."

5.3 STUDY AREA C: CRESCENT BEACH

The architecture in the vicinity of the Crescent Beach study area consists almost entirely of modern residential development. There are few standing structures immediately adjacent to the proposed protection measures. Several new beachfront dwellings are situated at the foot of Goodall Street (Figure 5.37 and 5.38), as well as a modern (post-1995) condominium located north of Wiman Avenue (Figure 5.39). Along Tennyson Drive and Goodall Street to the north, a mixture of late twentieth-century single family and multiple family residences and apartment buildings comprise the architecture within the viewshed of the study area (Figures 5.40 to 5.43).

Figure 5.37. Modern beach front dwellings at the foot of Goodall Street. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.38. Modern beach front dwellings along the water front at Crescent Beach. Facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.39. Modern condominium complex at the foot of Wiman Avenue. Facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.40. Late twentieth-century residences along Tennyson Drive. Facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.41. Late twentieth-century residences along Tennyson Drive from the corner of Point Street. Facing northeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.42. View from the seawall/levee alignment in Pond 4, looking toward Robinson Avenue and Groton Street. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

Figure 5.43. View from the seawall/levee alignment in pond 4. Facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2004).*

6.0 Field Results

Discussion of the field results follows the study area and survey component categories outlined in Section 4.4, the field testing strategy. Shovel test stratigraphies and artifact samples are detailed and linkages with previously recorded resources made (presented in full in Appendix A: Shovel Test Log and Appendix B: Artifact Catalog). Photographs, artifact tables, shovel test location maps, and historic feature plans complement the textual presentation. Identification of artifacts was made with reference to a series of ceramic, glass, metal, and miscellaneous tables found in Appendix C. Descriptions, dates or date ranges and sources for the different artifact categories are provided.

6.1 STUDY AREA A: FORT WADSWORTH TO MILLER FIELD

6.1.1 Franklin Delano Roosevelt Boardwalk and Promenade

6.1.1.1 Buried Seawall North End. The 300-foot (91-meter) long buried seawall at the very north end of Study Area A will run diagonally for 200 feet (60 m) across an off-beach section covered with trees and undergrowth (see Figure 2.10). The seawall then connects with the Franklin Delano Roosevelt Boardwalk for a further 100 feet (30 m) along the beach. Four 50-foot (15-m) interval shovel tests, A through A4a with two radials, were excavated in the 200-foot section to look for deposits or features associated with the further inland prehistoric Arrochar site and the near-beach prehistoric and historic components of the Walton Stillwell House (Figure 6.1). No evidence was located of these or other pre-modern resources.

Very recent garbage was noted on the surface around Shovel Test A. One undecorated semi-porcelain; five clear, five aqua, three green, two amber, and two clear melted glass fragments; one round nail, a possible tin-type seal to a container, a piece of square iron tubing; seven asphalt roofing shingles; three bone remains; two white spin-caps, and one piece of charred wood made up the assemblage for a total of 34 items (see Appendix B). A candy bar wrapper and other plastic were noted and then discarded in the field. The grouping clearly dates to mid-1900s or later. Asphalt roofing shingles were advertised as early as 1917 (Appendix C:Table C4), but these seven fragments do not appear to have been made or deposited that early. Porcelains have been in the New World since the seventeenth century, but again this particular sherd more likely dates to the later 1900s.

The stratigraphy reflected a variety of soil colors and textures indicating, especially in conjunction with the artifacts, a non-historic association. Stratum 1 comprised sand, sandy loam, silty loam, and silty sand soils ranging in color from black, dark brown, and very dark brown to brownish yellow and pale brown. Four tests possessed a second horizon of brownish sand, silty loam or silty sand.

6.1.1.2 50-Foot (15-Meter) Tested Franklin Delano Roosevelt Boardwalk. The possibility of locating remains of the prehistoric Arrochar site or the Walton Stillwell House carried over to the northern end of the Franklin Delano Roosevelt Boardwalk (see Figure 2.8). Testing occurred at a 50-foot (15-meter) interval, even though the project area fronted the beach side of the boardwalk. Shovel tests A4b to A60 in this section (see Figure 6.1) confirmed the active beach nature of the area in the upper strata, i.e., the depth of sand in the first brown, brownish yellow, light brown) predominated. Six tests (A10, A14, A20, A24, A47 and

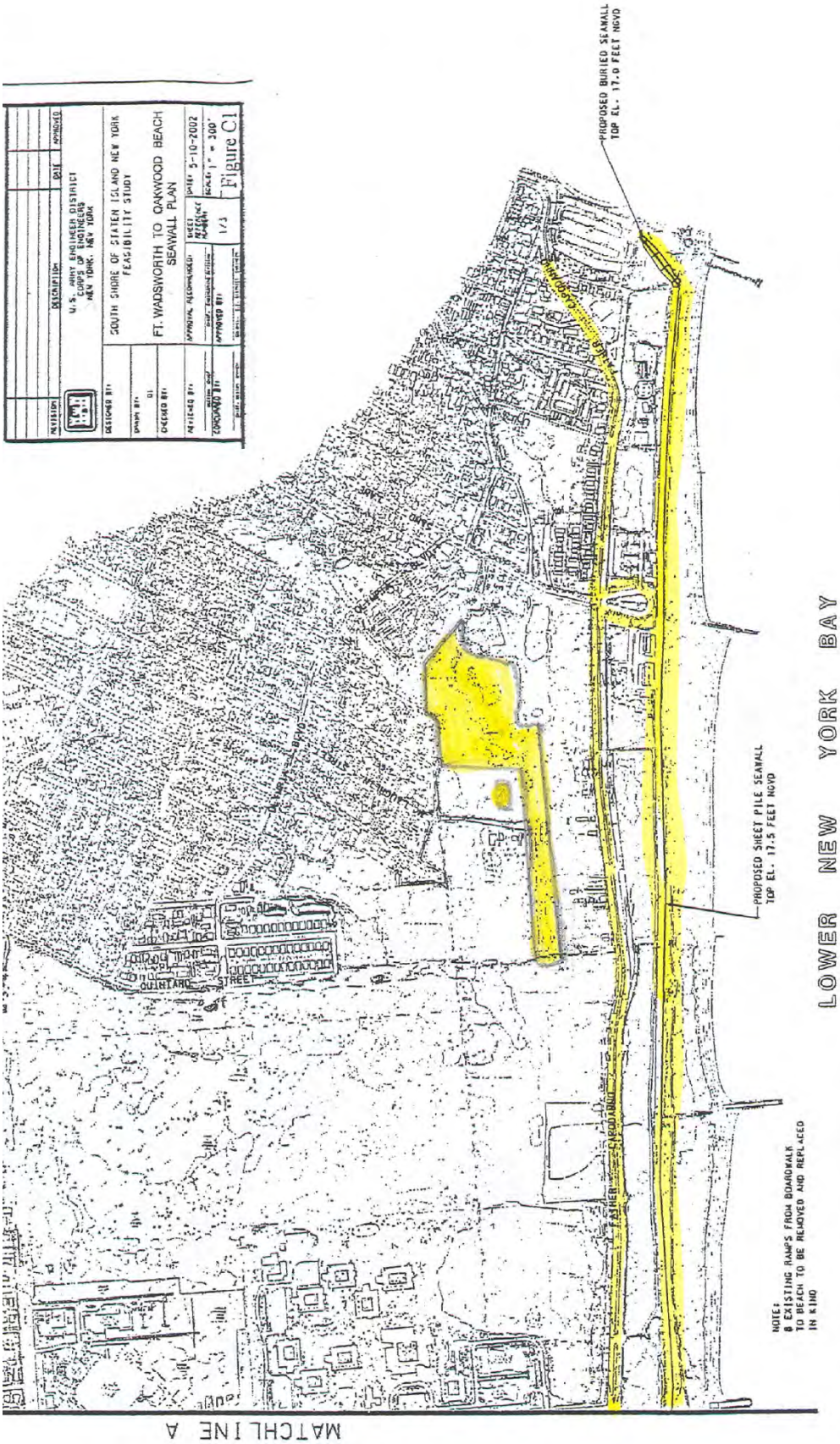


Figure 6.1. Study Area A: shovel test and survey component locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(adapted from USACE 2002:Figure C1).*

A58) possessed a second, third, or both layers of mostly brown sand. A gray clay second stratum and a brown to dark brown sandy clay third stratum were also recorded. Shovel Test A24 reached an ending depth of 140 centimeters.

All 57 shovel tests yielded exclusively mid-twentieth century to later materials (see Appendix A). Glass accounted for the majority of the 139 artifacts with 95 sherds or 68 percent. The 50 clear glass fragments included two twist-top or continuous-thread finished bottlenecks introduced by 1919 amid the more recent bottle fragments. Other colored glass involved two light green safety glass, fifteen green, and 28 amber fragments with at least six identifiable examples of modern beer bottles. Safety glass was first invented in France around 1915 and used in automobile windows after World War I (Appendix C: Table C2). Although the safety glass like the continuous-thread bottlenecks could date to the early 1900s, their deposition given the present context more likely came within recent years.

One unglazed buff-bodied coarse earthenware sherd; one round nail; an aluminum chain-link fence fragment; crown bottle cap and welding rod piece; two unidentifiable metal fragments; one drain/sewer and one glazed tile fragment; four shell; six Styrofoam; seven wood fragments, and eighteen plastic pieces including clear film, cigarette filters, a possible toy fragment, three plastic fast-food beverage lids and a medicinal bottle cap completes the recovered assemblage. Items noted but not collected comprised wax candles, plastic pieces, foil wrap, paper, and beer bottle remains.

6.1.1.3 100-Foot (30-Meter) Tested Franklin Delano Roosevelt Boardwalk. The shovel testing interval was increased to 100 feet (30 meters) for the remainder of the beach-side boardwalk and promenade (see Figures 6.1 and 6.2). No prehistoric or historic resources were anticipated and the already tested north end strongly suggested that shovel testing would primarily serve to examine recent active beach strata. Brown to lighter brown sand was recorded for Stratum 1 of most of the 106 shovel tests (STPs A61 through A166). Stratum 1 continued to at least a depth of 107 cm.

Stratigraphic variety increased; nine tests (STPs A100, A104, A108, A113, A118, A121, A126, A130 and A133) possessed a strong brown sandy clay first layer, two tests a brown sandy loam (A80 and A79), and another two tests a reddish brown (A107) or very dark grayish brown (A102) silty sand. Thirteen tests had a second horizon and lighter brown to grayish sands were noted in eleven (STPs A80, A88, A93, A98, A142, A147, A152, A157, A162, A115 and A127). The other two tests (A102 and A107) contained dark yellowish brown silty sand. A layer of loose asphalt and stone and indications of a recently bulldozed area at STP 102 suggest the sandy clays represent former construction or landscape efforts.

Almost half of the shovel tests (n=51) produced materials, with glass accounting for approximately half of the artifacts (Appendix B: Tables B6 to B9). Four milk glass, 19 clear, one aqua, one light green, six green, and 27 amber fragments made up the 58-count glass category. Distinguishing items included clear modern beverage bottles, a light green unidentified fluted body fragment; several amber beer bottles, some with the Anheuser-Busch embossing; one complete base, and a small-mouthed bottle with twist cap neck. The complete base represents a Johnson Control Glass company product with a 1996 date, while twist cap necks were made as early as 1919. Opaque white milk glass was first made in 1743, but became common after 1880 (Appendix C: Table C2).

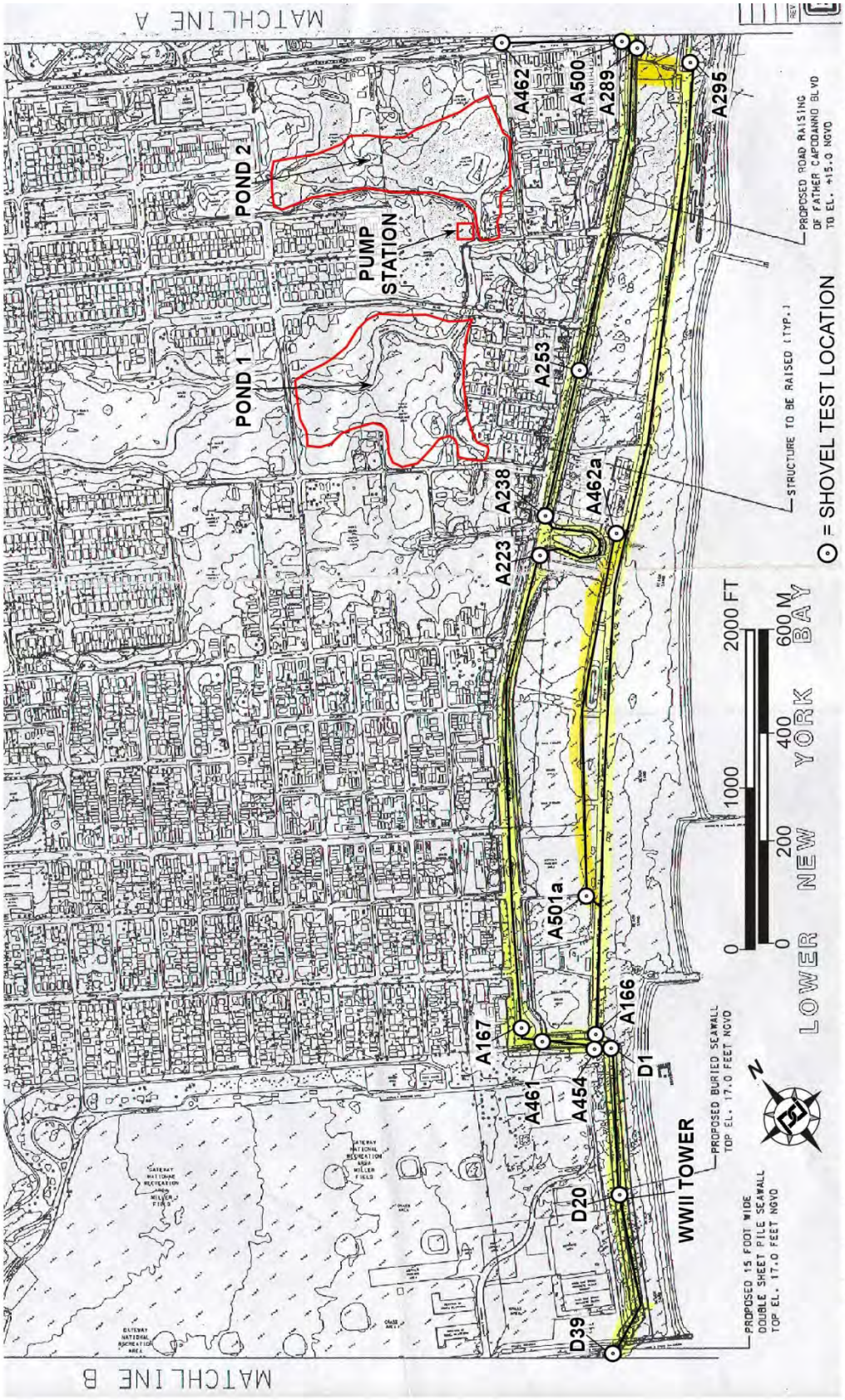


Figure 6.2. Study Areas A and B: shovel test and survey component locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(adapted from USACE 2002:Figure 20).*

No ceramics were recovered. Other materials comprised: one machine head common square nail; six round nails; one possible aluminum chain-link fence fragment; one flat metal piece; three brick fragments, two of which are decorative brick-like remains; one drain/sewer tile; four other tile fragments; one asphalt piece; five slag; four coal; nineteen shells; fourteen plastic, one wood fragment and two Styrofoam pieces. The plastic items included tubing, coffee lid, drink stirrer and flip-top lid fragments. Modern glass, plastic, a candy wrapper, a shotgun shell, and cigarette butts were among the materials (Appendix A: Shovel Test Log) discarded in the field.

Square or cut nails with machine-made heads were first manufactured by 1805, while wire or round nails were introduced in France by 1850 and become common after the 1880s. Asphalt paving can be as early as 1871. Plastic materials began to be made by the early 1900s with a subsequent increasing range of manufactured items and applications. Styrofoam was invented in 1944, with styrofoam cups introduced in 1962 (Tables C2 and C3, Appendix C). These figures represent *terminus post quem* dates or the earliest possible dates for materials.

Time lag must also be taken into account when assessing the occupational or depositional date of a site, feature or artifact assemblage (Miller 2000; Adams 2003). An artifact was made, transported, sold, used and then discarded. A primarily modern to very recent deposition of the artifacts from this grouping, and those of the other two boardwalk beach sections is deduced. A few items may be older, with their origin or context remaining unclear.

6.1.1.4 Alternative Franklin Delano Roosevelt Boardwalk/Promenade. Shovel tests A462a through A501a at a 50-foot (15-meter) interval were employed to examine the land side of the promenade (see Figure 6.2) where a sheet pile seawall may be used for a protection measure instead of a raised promenade/buried seawall arrangement. The project route arcs from the southern turnaround (see Figure 2.12), passes an oval tree and park bench section before reconnecting with the promenade. A chain-link fence follows the alignment (Figure 6.3) with the 71 initial shovel tests and radials placed between the fence and promenade.

The shovel tests' stratigraphic sequences revealed an upper reworked stratum overlying near-shore sand horizons. A variety of soil colors and textures were observed for Stratum 1 that extended to 40 centimeters. Textures comprised varieties of sand mixed with silt, loam or clay, combined with brown, pale brown, dark brown, light brown, very dark brown, yellowish brown, and black. The most frequent combinations involved darker brown sandy or silty loams. Sand predominated in the remaining three strata, where reddish brown defined Stratum 2 (70 tests) and brown or reddish brown Stratum 3 (37 tests). The two tests (STPs A496a and A471a-4m south) with a fourth stratum offered a pale brown or reddish brown sand designation.

Artifact density increased compared to the active beach sections with 311 artifacts from 64 tests. Glass comprised the single highest category with 186 or 60 percent of the sample. One safety glass, a Heineken green bottle (discarded), and Anheiser-Busch amber bottle fragments were among the 47 clear, 14 aqua, one olive green, 31 green, 91 amber, and two cobalt blue mostly bottle glass total. Whitewares (plain, decorated and transferprint) accounted for most of the recovered ceramics, with an additional ironstone and yellow ware, three porcelains, and three stonewares.

Figure 6.3. Study Area A: chain-link fence-indicated alignment of alternative Franklin Delano Roosevelt Promenade project route. A tree and bench-lined oval park section in right background. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

The 53 metal items comprised one square nail, 18 round nails, 13 unidentified nails, 10 unidentified metal, 10 miscellaneous (bottle caps, stake, wire pieces, ring, aluminum can fragments), and one 1995 U.S. penny. Twenty-one brick, three mortar, one asphalt, one drain/sewer tile, five slag/clinker, two coal, nine charcoal, one oyster shell, two plastic pieces, two wood fragments, one styrofoam and one rubber stop with a coarse screw thread were also recovered. Discarded materials included an asbestos house siding tile, an elastic hair tie, tin foil, a plastic spray can nozzle, cellophane, and more asphalt, brick, slag/ash, and concrete.

Dating issues concerning certain non-ceramic items have already been covered. Whitewares and yellow wares date from the early to mid-nineteenth century (1805-1840) with production continuing into the 1900s. Initial dates for most ironstone varieties range from the mid-1800s into the early 1900s. Oriental porcelain manufacturing began around 1550 with worldwide made varieties common today for home, decorative and industrial uses. Stonewares also carry an early start date from 1620, with salt-glazed varieties beginning in the early 1700s and Albany Slip wares by 1775 (Appendix C: Table C1).

Chronological indicators among the Alternate Promenade sample consisted of a plain whiteware base with a maker's mark date of "1851"; three porcelains representing industrial insulator fragments, and a gray-bodied salt-glazed stoneware fragment. The sample as a whole points to a mix of mostly modern materials with a minor late 1800s to early-1900s component.

6.1.2 Father Capodanno Boulevard

6.1.2.1 Father Capodanno Boulevard to Miller Field Connect. A buried seawall would connect the raised Father Capodanno Boulevard at its south end to the beginning of the Miller Field Study Area B line of protection. Seven shovel tests (STPs A454 to A461), placed at 50-foot (15-meter) intervals were placed along this short distance (see Figure 6.2). The stratigraphic profiles paralleled those of the Alternative Promenade section where a variety of colors and textures were recorded for the four strata. Brown, pale brown, very dark brown sand, sandy loam, silty loam and silty sand were noted for Stratum 1. Six tests possessed a second layer of dark reddish brown, brown, dark brown, reddish brown or dark grayish brown sand, sandy clay, sandy loam or silty sand. Pale brown, dark grayish brown, reddish brown and dark brown sand or sandy clay comprised a third stratum in three tests (STPs A456, A459 and A460), while reddish or strong brown sand comprised a fourth horizon in two tests (STPs A456 and A460).

Nineteen glass fragments were retained from a field sample of modern debris, plastic, cellophane, aluminum pull tab, asphalt, styrofoam, brown bottle glass, and rusted metal. Ten of the sherds were clear glass: a post-1903 machine lip Perry Davis style rim; four aqua flat and container glass; three green container and two amber curved glass fragments. The stratigraphic and artifact patterns point to reworked or non in-situ origin for the upper two (if not three) layers containing primarily modern materials.

6.1.2.2 Father Capodanno Boulevard Southern Ballpark/Picnic/Parking Areas. The southern end of Father Capodanno Boulevard contains three ball fields, a handball court, a picnic area, two parking lots, a maintenance/playground area and one of the turnarounds until encountering open parkland (see Figure 6.2; also Figure 2.3). Shovel tests were placed either 50 feet (15 meters) from the east side of the boulevard for the ball fields, or in the tree and

grass strips between the boulevard and the parking/picnic/handball court/maintenance area's paved edges. The series begins with STP A167 at the south end continuing at a 50-foot (15-meter) interval until the open parkland just before Slater Boulevard with STP A252. Shovel Tests A223 through A238 covered the turnaround at the same testing interval bringing the total to 141 initial transect tests plus radials.

Stratum 1 throughout this alignment tended to comprise darker brown silty loam extending, in one test (A212), to 75 centimeters, but normally to 40 centimeters below the surface (Appendix A: Shovel Test Log). Alternative textures included sandy loam, sandy silty loam, and silty sandy loam, with occasional higher content clay soils registered. Alternative colors comprised black, dark yellowish brown, and very dark gray. Reddish brown sands primarily made up Stratum 2 in 133 of the tests. Forty-eight shovel tests possessed a third layer of brown, light brown or reddish colored sand, while five tests contained a reddish brown sand fourth stratum. Broken concrete, asphalt, very compact soil, gravel fill, asphalt/concrete impasses and possible old roadbed (STP A184-4m west) stand out among the shovel test log comments for the upper three strata.

The shovel tests yielded 562 collected materials. Glass accounted for 56 percent of the sample total, with seven milk glass, 181 clear, 20 aqua, three light green, three olive green, 28 green, 67 amber and five miscellaneous, mostly container glass fragments (see Appendix B). Specific datable remains included: twelve pieces of safety glass; three clear late-1800s/early 1900s embossed bases; a post-1948 aqua crown neck from a possible soft drink bottle; various modern lime green and amber beer bottle fragments; two clear 1900s embossed bottle remains; a post-1919 clear screw bottle lip; an amber bottle lip (1880-1900); two clear and one amber container lips with continuous thread finish, post-1919; a clear 8-panel fluted tumbler base (post-1850s); a clear milk bottle top (ca. 1880 to 1940); an aqua bottle sherd, paneled-type form (late 1800s to early 1900s).

The 49 ceramics comprised two terra cotta flowerpot fragments; one plain pearlware; 15 whitewares including two estimated 1900s decorated polychrome and brown transfer-printed examples; a cobalt sponge-decorated ironstone sherd (1845 to 1930) among nineteen ironstones; a Rockingham-typed glazed yellow ware sherd; six porcelains; one Albany Slipped-type stoneware fragment and one embossed vertical linear design kaolin pipe bowl. Historic pearlwares were made from 1779 to 1840. Rockingham or Bennington yellow wares were first produced out of Rockingham England from 1788, with limited potteries set up in New York around the mid 1800s. Albany Slipped stonewares originated in Albany, New York with production spreading nation wide; examples could be as early as 1775 with the prime period of production from the early 1800s to 1910 (Appendix C: Table C1).

Metal items numbered 51 with two square, 13 round, and one unidentifiable nails; 21 other; 12 unidentifiable pieces, and two U.S. 1984 and 1988 quarters included in the sample. Other artifacts consisted of a post-1953 crown beverage bottle cap; a modern screw thread bottle cap with tamper-proof segmented edge; three post-1960s crown bottle caps with plastic inner seal; three aluminum pull tabs, 1963 to 1975; a modern threaded aluminum bottle cap with segmented tamper seal, and a very large horseshoe, draft animal size (see Appendix B).

Remaining materials comprised 48 brick, four mortar, five drain/sewer tile, three floor or wall tile, 26 decorated tile, eight asphalt, five slag, one coal ash, two coal, one roofing shingle, one bone, 14 shell, ten plastic, six wood fragments with no indication of human modification and 11 miscellaneous items. Of note within the grouping are three laminated broad fragments

with a white surface, the decorated tiles, some coarse red earthernwares, other refined earthernwares, and two mica flakes or sheets ½ inch in diameter. The latter may be natural, but mica was used for oven windows from the 1800s and earlier (see Appendix B). The following materials were noted in the upper three strata but not collected (see Appendix A): foil, plastic, modern debris, a tin can opener, small shell fragments, amber glass, and cellophane.

Materials were concentrated in Stratum 1, although remains were found in all four strata. The mostly modern items combined with a low frequency of later 1800s to early/mid 1900s were widespread and fairly evenly distributed. A concentration or area of artifacts appears to involve five consecutive shovel tests (A194 to A198) and their radials, located in the ball field opposite Hempstead Avenue. The grouping contained 13 (or 27 percent) of the ceramics (five whitewares, two ironstones, one yellow ware, two porcelains, one Albany-Slipped stoneware, two others); 89 (or 29 percent) of the glass (66 clear, curved, and window with three 1900s fragments, four aqua, one light green, six green, nine amber with an 1880-1900 and late-1900s example, three others); nine or 18 percent of the metal (one square, four round and one unidentified nail; one post-1960s crown bottle cap; a possible tack; the iron twisted wire dating to perhaps 1875 to 1910); most of the brick, all of the drain/sewer tile fragments, almost all of the decorated tile pieces, the possible roofing shingle and the three laminated wood/board fragments. While these materials may represent a former structure or structures, the low quantity of historic amid modern items renders direct associations with particular historic recreational or amusement facilities very unlikely.

The artifact pattern is consistent with a fill or reworked native upper stratum related to the recreational development of the area. The largely reddish brown second layer pairs with the second layer noted for the alternative promenade section that lies opposite. These lower strata likely correspond to near-beach deposits that may be natural; even so they are obviously disturbed.

6.1.2.3 Father Capodanno Boulevard Open Parkland 1. Shovel Test A253 picks up the Father Capodanno Boulevard transect at the beginning of open parkland with grass, low-growth shrubbery and an occasional tree (see Figures 6.2 and 6.3; also Figure 2.6). The parkland ends with STP 306 at the edge of a new parking lot, a little beyond Sea View Avenue. The access berm that would be needed to connect the raised boulevard with the raised promenade is included, defined by STPs A289 to A295. A total of 72 shovel tests were dug 50 feet (15 meters) from the east boulevard border and at a 50-foot (15-meter) interval.

Brown to darker brown silty or sand loam characterize Stratum 1 soils. Seventy tests had a second stratum, usually a reddish brown sand (see Appendix A). A brown to lighter brown sand predominated in the 43 tests with a third stratum. Four tests contained a fourth stratum, depicted by reddish brown sand that reached a depth of 105 centimeters.

Artifact density is lower than that of the proceeding survey component segment, as is the number of positive shovel tests (32 percent) (see Appendix B). No ceramics were noted. One decorated porcelain tile, one shell and one Crackerjack bag, copyright 1974 (STP A256 4 m south) were collected along with eight metal and 81 glass fragments. Fifty-nine clear, one aqua, eleven green, nine amber, and one red-molded fragment accounted for the glass remains.

Modern amber and green bottle glass could be identified in the sample as well as 18 Pepsi-Cola bottle fragments from STP A256 4m south, one of three radials off of STP A256. The crown lip with mold lines could be as early as 1903, but the remaining sherds carry a post-1935 date. This test pit also contained the Crackerjack bag, in addition to eight modern green bottle glass fragments. Two other Pepsi-Cola bottle fragments with raised lettering from the 1940s to 1950s came from STP A274. A threaded lip clear rim, post-1967, was among 23 other clear glass fragments from another radial A287 10' east. The two radial tests accounted for 62 percent of the glass, a majority of the entire recovered sample. Otherwise the artifacts were widely and thinly scattered. This may relate to the fact that the open parkland is undeveloped, though kept generally free of litter, and infrequently used by the general public. The two high-density test areas most likely represent single or limited incidental modern trash deposits.

Shovel Test A296 opposite Sea View Avenue also yielded a higher incidence of materials: two clear curved, two green bottle and three modern amber glass fragments; three round nails, a possible fixture/hardware pull, three flat metal pieces, and a possible lock plate (see Appendix B). This shovel test exhibited seven strata, where the additional Strata 5, 6 and 7 were distinguished on the basis of different colored sands (dark, pale or reddish brown). A buried A or former horizon was identified in the field as corresponding to two thin 3-centimeter layers, Strata 3 and 5 overlain by two reddish brown horizons, Strata 2 and 4. The nails and all the glass came from Stratum 2 while the other metal items were from Strata 4/5. Four radials placed at a 10-foot interval produced a modern window glass sherd, a clear glass fragment, and a piece of cellophane (all discarded) and failed to duplicate the stratigraphy of the initial STP A296. A remnant former surface may be indicated dating to the pre-modern period. A linkage with specific documented recreational facilities in the area is unlikely.

6.1.2.4 Father Capodanno Boulevard New Parking Lot. The central open parklands along Father Capodanno Boulevard are interrupted by a new parking lot opposite the South Beach Psychiatric Center (see Figure 6.1, also Figure 2.4). Shovel Tests A307 through A316 were placed along the grass and tree median. The 10 tests plus three radials displayed a mix of different hued (dark brown, very dark brown, reddish brown, dark reddish brown, black, very dark brown, dark gray) mostly sandy or silty loams. Browns and reddish brown sands were normally recorded for the remaining four strata. Modern items, concrete and asphalt debris, plastic and an asphalt lens were noted but not collected (see Appendix A).

The materials collected from the ten positive tests confirm the modern origin of the fill or local reworked soils for the new parking lot (see Appendix B). The sample comprises 13 bottle glass fragments (nine clear with at least one identifiable modern example, one modern light green, one modern green, two modern amber); one transfer-printed whiteware and one plain ironstone.

6.1.2.5 Father Capodanno Boulevard Open Parkland 2. The shovel testing strategy involving 98 shovel tests (A317 to A366 plus radials) for the Open Parkland 2 area (see Figure 2.7) follows that of the Open Parkland 1 section (see Figure 6.1). Stratigraphic and artifact patterns were also similar and for the same reasons. Soil colors and textures tended to comprise brown to darker brown sandy loams in Stratum 1, reddish brown sands in Stratum 2, brown or lighter brown sands in Stratum 3, brown sands in Stratum 4, and pale brown sand in Stratum 5. Ninety-eight tests contained a second layer, 52 a third, seven a fourth and three a fifth (Shovel Test Log, Appendix A).

Modern debris and glass, concrete, rusted metal, plastic, foil, gravel/ash/cinder, and asphalt found in the shovel tests (see Appendix A) reinforce the largely modern nature of the recovered 198 artifacts. Their widespread light dispersal, punctuated by occasional higher density areas repeats the pattern of Open Parkland 1. Six transect tests and their radials yielded 137 items or 70 percent of the total (see Appendix B). A possible 1900s decorative planter or plate; a Decalcomania porcelain where similar designs on ironstone date to post-1890; two milk glass sherds; a post-1960s clear bottle fragment; three clear glass container sherds; an Owens-Illinois Glass Co. 1929 to 1954 clear bottle base; a clear screw-type bottleneck; two flat aqua glass pieces; two dark olive and two green bottle fragments came from Shovel Tests A319 and A319 10' south.

Shovel Tests A343/A343 N4 East/A343 4mEast and A362 contained only glass, plus one light bulb fragment from A362. Five clear and 15 amber curved and one flat glass fragment were recovered from the Shovel Test A343 grouping, while one clear, one green, and 13 amber bottle fragments were obtained from Shovel Test A362.

Shovel Tests A330/A330 4mEast, A331/A331 10fNorth/A331 10ftSouth, and A332/A332 4mWest, yielded a wider variety of materials (see Appendix B). The A330 Shovel Test grouping produced fifteen (7 clear curved and flat; 7 modern amber; one post-1967 clear continuous threaded liquor bottle rim with plastic cap) mostly modern bottle glass fragments, along with one round nail and one post-1950s red automotive taillight. The A332 Shovel Test grouping contained ten items: five clear curved and flat glass sherds, one cobalt blue curved glass fragment, one modern amber bottle fragment, one round nail, one plaster fragment, and one yellow flat plastic piece with impressed squares.

The STP A331 grouping possessed the single highest number of artifacts with 61. One flower pot rim, one thick-walled porcelain bathroom fixture fragment; eight clear curved and window and two aqua window glass sherds; 13 round nails; one broken iron rod; one screw hook; a corroded iron fragment; two mortar pieces; seven asphalt roofing shingles; one painted tar paper; seven plaster slabs; one slag/clinker, and 13 burnt wood pieces. The assemblage suggests debris from a structure or construction site dating to the mid- to late-twentieth century. A pale brown former or "A" horizon was identified in the field for STP A331 10' south, suggesting the materials represent an in-situ deposit. Alternatively, the assemblage could represent a singular off-site trash deposit.

The 51 items from the remaining shovel tests included: one plain ironstone; nine clear glass, three light green, nine modern green, eighteen amber, one iron loop, one decorated tile, eight shell, and a yellow plastic cone with ball top from a possible child's toy.

6.1.2.6 Father Capodanno Boulevard Northern Recreational/Parking Lot/Road Areas. After passing through open parkland, Transect A once again follows the grass and tree median between the boulevard and a series of parking lots, recreational facilities, and the north end segment of the boulevard until Robin Road. Shovel Tests A367 to A453 (plus radials) were employed to test these areas, as well as the second turnaround or the Cespino Russo Memorial Circle (see Figures 2.5 and 2.1). A 50-foot (15-meter) interval was maintained with variable distances for radials depending on the type of materials in the initial transect tests (only modern versus possible historic) and space available for placement.

The 101 shovel tests excavated exhibited four strata beginning with a predominantly darker brown silty or sandy loam in Stratum 1. While brown or reddish brown sands were

frequently recorded for the 94 tests with a second stratum, various shades of brown sandy or silty loams were also present. Thirty-six tests with a third stratum contained brown, reddish brown, dark reddish brown, or pale brown sands as did the 12 tests with a fourth stratum.

The highest number of ceramics, 97, was recovered from this survey component. The sample comprises: two flower pot fragments; two redwares; one mocha decorated pearlware; one creamware; two plain yellow wares; 19 plain whitewares; two decorated whitewares; eight transfer-printed whitewares; one hand-painted whiteware; 43 plain ironstone; six plain and one decorated porcelain; one salt-glazed stoneware; a Jackfield-type stoneware; three Albany Slipped-type stonewares; two other stonewares, and two miscellaneous sherds.

Production dates for particular ceramic types include: mocha pearlware (1795-1840); creamwares (1740 to 1833); plain yellow wares (circa 1827-1922); whitewares in general (1805 into 1900s); ironstones in general (1813 into 1900s); American salt-glazed stonewares (1705 to 1930), and Albany-Slipped stonewares, (locally 1825 to 1940) (Appendix C: Table C1). The earliest tending pearlware and creamware, and yellow wares and stonewares form a minority within the later sample dominated by historic to modern ironstone and whiteware.

Glass still accounts for the single highest category within the entire assemblage, totaling 244 fragments. The remains include 143 clear bottle, window and safety glass; 32 aqua curved and mostly flat sherds; four light green flat fragments; six olive green sherds; 13 green container glass; 40 amber container glass, and six miscellaneous fragments. Datable pieces from a green stopper (late 1800s to early 1900s), to a post-1901 machine-made marble, to post-1964 Budweiser amber beer bottles indicate a mix of mostly modern with some historic glass, comparable to the ceramic component.

Twelve square, 28 round and seven unidentifiable nails; other metal items such as another horseshoe, a flat-headed screw, steel base of a tin can, an expansion spring and a metal pull tab (ca. 1963-1975) make up the metal category. Three whole or nearly whole bricks, 40 brick fragments, 16 mortar remains, eight drain/sewer tiles, three floor or wall tiles, 30 decorated/asbestos/wall plaster tiles and minor amounts of asphalt, slag, coal, and other fragments comprise the construction material class. One shell, two plastic pieces, five wood fragments and an opaque glass 2-holed button were also collected.

Artifacts were recovered from all four strata with a fairly even distribution. A concentration of artifacts could be discerned around Shovel Tests A413 to A418 and their radials. The grouping is located at the end of the transect and contained 81 (or 33 percent) of the glass, 38 (or 39 percent) of the ceramics, 19 (or 24 percent) of the metal, 22 (or 15 percent) of the construction material, and up to 50 percent of the faunal/miscellaneous categories.

The grouping's ceramics consisted of one redware, 14 whitewares (plain, decorated and transferprint), 21 plain ironstones, and two porcelains. Fifty-three clear safety, bottle and window, 14 aqua bottle and window, one olive green container, three green container, and ten amber bottle fragments made up the glass category. Other items included six round or unidentified nails, the 1963-1975 metal pull-tab, five brick, two mortar, one ceramic tile, a minor amount of asphalt/slag/coal and four wood fragments. Although the grouping would be in the general area of the Walton Stillwell House and former beach recreational facilities, the assemblages suggest a primarily, if not exclusively modern date. Further, the earliest ceramics were recovered from non-contiguous and non-adjacent shovel tests.

Highly compact rubble, asphalt, recent landscaping (STP A409), modern debris, fill (concrete and debris), aluminum pull tabs, hard-packed soils, and coal ash/slag were also present in several shovel tests.

6.1.2.7 Father Capodanno Boulevard And Sea View Avenue. Transect A ends with Shovel Tests A462 through A500 which were placed along Sea View Avenue from approximately Quincy Avenue to Father Capodanno Boulevard and then on either side of the boulevard (see Figure 6.2). The 54 tests placed at a 50-foot (15-meter) interval amid the grass strips exhibited the common four-layer stratigraphic sequence observed in the other non-active beach sections of Study Area A. An increased degree of soil color and texture variability is indicated, in line with the reworked or added fill soils reflecting past road construction.

Materials were recovered from all four strata; distribution was even, although non-continuous. Thirty of the shovel tests yielded primarily, if not exclusively, modern items including one plain ironstone; two 1971 clear glass stippled foot rims amid 16 other clear mostly bottle glass; six aqua bottle fragments; three green glass sherds; 15 amber bottle glass fragments; one pink and two gray smoked glass sherds; one round nail; and minor amounts of brick (see Appendix B). Uncollected materials comprised additional modern debris, a plastic pill bottle top, concrete, slag, asphalt, and cinder.

6.1.3 Ponds 1, 2 and 3. Three defined wetlands west of Father Capodanno Boulevard will be deepened to aid in the regulation of inland water flow (see Figures 6.1 and 6.2). Pond 1 possesses water-filled channels and is enclosed by Slater Avenue, Quincy Avenue, Graham Boulevard and Olympia Boulevard (see Figure 2.15) amid an open expanse of marsh grass. The grass and terrain are fairly level with the road surfaces along Slater Avenue, Olympia Boulevard and Graham Boulevard (Figure 6.4). The channel and marsh grass abut the higher ground houses facing Quincy Avenue, with the remainder of the Graham Boulevard pond alignment passing through a treed section and enclosing a knoll area overlooking the wetlands in the southwest corner (see Figure 2.15).

Pond 2, enclosed by the Dongan Hills, Olympia Boulevard and Quincy and Seaview Avenues also contains a central expanse of marsh grass and standing water (Figure 6.5). Most of this pond is fringed by tree and undergrowth higher terrain (see Figure 2.14), except at the west end where a new subdivision is being constructed and most of the east end where the wetland levels to the current Quincy Avenue grade. The pump station will be located on a small section of adjacent upland that already possesses a level built surface.

Pond 3, south east of the Father Capodanno Boulevard and Sand Lane intersection, exhibits similar topographic characteristics. Trees and undergrowth ring most of the wetland (Figure 6.6; see Fig 2.13), which because of its size and shape may contain internal areas of higher ground. The pump station for this pond is projected for undeveloped land at the end of McLaughlin Avenue.

Figure 6.4. Study Area A: Pond 1 Graham Boulevard southern border with marsh grass and terrain fairly level along the boulevard, facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.5. Study Area A: Pond 2 central open expanse with marsh grass and standing water, from Dongan Hills Avenue, facing northeast. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.6. Study Area A: Pond 3 tree and undergrowth fringe around the pond, from the end of McLaughlan Avenue, facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

6.1.4 Shovel Test, Stratigraphy and Artifact Collation. To aid in the summary discussion of Study Area A's field results, shovel test, stratigraphic and artifact information has been collated into Table 6.1. For each of the foregoing survey components, the table provides the figures for the following categories: total excavated shovel tests; the number of positive and negative tests; the number of ceramics, glass, metal, construction materials, faunal remains, miscellaneous items and their totals. Stratigraphic and artifact characterizations are also provided according to the study area divisions.

Stratigraphically, Study Area A is defined by active beach sands in front of and near-beach deposits behind the boardwalk. These near-beach deposits tend to exhibit a four-fold sequence beginning with a brown to dark brown sandy/silty loam stratum over a reddish brown sand layer, succeeded by variable brown sand horizons. Alternative hues (black, grays) and textures (clay, clayey loam) were recorded, as well as the presence of concrete, asphalt, and coal/ash. Artifacts extended into the four strata. Shovel tests were placed either in the grass and tree strips between Father Capodanno Boulevard and the edges of parking lots/recreational facilities, or in open playing fields/parkland. Two former surface layer remnants were identified in the field in the parkland sections. Stratum 1, if not the other strata, is considered to represent reworked local soils, fill brought into the area, or a combination of both. The stratigraphic patterning is consistent with this interpretation, as is the documentation of very recent, modern and historic large-scale construction in the study area.

Conversely, this documentation suggested that remains from the further inland prehistoric Arrochar site, the early historic settlement of the island, and a number of nineteenth century to early twentieth century recreational structures and facilities might be extant. No prehistoric artifacts or sites, and no historic structures or features were located. Resources that were identified involved an overall low density of primarily modern materials with a minor concentration of nineteenth century to early twentieth century artifacts.

The open parkland was expected to provide the most likely indications of past occupation or use, but actually contained lower concentrations of materials compared to the developed portions. This may relate to the fact that the latter are actively in use and still receiving materials, while the parklands are less used and kept clean of major trash. Distribution tended to be fairly continuous in the developed portions and scattered in the open parkland. A few artifact concentrations were noted, with most representing single or limited, largely modern depositional episodes. The historic materials may reflect the 1800s to early 1900s development along the boulevard and boardwalk; their very low numbers and lack of context or integrity meant that direct associations with this development as a whole or with particular structures could not be made.

6.2 STUDY AREA B: MILLER FIELD TO OAKWOOD BEACH SEWAGE TREATMENT PLANT

***6.2.1 Miller Field*.** Transect D follows the buried seawall/sheet pile seawall/levee/dune line of protection that fronts South Midland, New Dorp and Oakwood Beaches before turning inland at the Oakwood Beach Sewage Treatment Plant (see Figures 6.2 and 6.7). At six points along the transect, further testing grids were laid out to examine discovered cultural resources. Shovel Tests D1 through D43 covered Miller Field at South Midland Beach (see Figure 2.16). Forty-one tests contained a brown sand layer up to 120 centimeters deep overlaying three additional strata with variable-hued brown sands (Appendix A: Shovel Test

Table 6.1. Study Area A: shovel test, stratigraphy and artifact collation

	Shovel Tests				Artifact Totals							
Survey Area	**T**	**P**	**N**	**Stratigraphic Summary**	**C**	**G**	**Me**	**Con**	**F**	**M**	**T**	**Artifact Summary**
North Seawall	6	6 100%	0	Near beach deposits; 2 strata	1	17	3	7	3	3	34	Low density Late 1900s
Boardwalk 50 feet	57	56 98%	1 2%	Active beach sands 2 strata	1	95	6	2	4	31	139	Low density; continuous distribution Late 1900s
Boardwalk 100 feet	106	51 48%	35 52%	Active beach sands 2 strata	0	58	9	18	19	17	121	Low density Primarily late 1900s with minor historic component
Alternate Promenade	70 1 not dug	64 91%	6 9%	Reworked upper or fill layer over near beach sand horizons; 4 strata	20	186	53	45	1	6	311	Low-moderate density; material in all 4 strata Fairly continuous distribution Primarily late 1900s with minor late 1800s to early 1900s component
BLVD to Miller Field Connect	7	5 71%	2 29%	Reworked upper 2 to 3 or fill layer (s) over near beach sand horizons; 4 strata	0	19	0	0	0	0	19	Low density Materials in first 3 strata Primarily late 1900s with very minor early 1900s component
BLVD South End	141	105 74%	36 26%	Reworked upper or fill layer over near beach sand horizons; 4 strata	49	314	51	113	14	21	562	Low-moderate density; fairly continuous distribution with one concentration Primarily late 1900s with minor later 1800s to early 1900s component; material in all 4 strata
Open Park 1	72	23 32%	49 68%	Reworked upper or fill layer over near beach sand horizons Buried former horizon; 7 strata	0	81	8	1	1	1	92	Low density Wide light scatter w/ occasional (3) higher concentrations Materials into Strata 4/5 Primarily late1900s with minor historic component
New Parking Lot	13 1 not dug	10 77%	3 23%	Reworked upper or fill layer over near beach sand horizons; 4 strata	2	13	0	0	0	0	15	Low density; materials into Stratum 3 Primarily late 1900s with possible minor mid-1800s to early 1900s component
Open Park 2	98 1 not dug	40 41%	58 59%	Reworked upper or fill layer over near beach sand horizons Buried former horizon remnant; 5 strata	7	124	19	23	8	17	198	Low density Wide light scatter with occasional (6) higher concentrations; materials into Stratum 4 Primarily late 1900s with minor mid-1800s to early 1900s component
BLVD North End	101 3 not dug	76 75%	25 25%	Reworked upper or fill layer over near beach sand horizons; 4 strata	97	244	79	145	6	8	579	Low-moderate density; materials in all 4 strata Primarily late 1900s with minor 1800s to early 1900s component
Sea View Avenue	54 1 not dug	30 56%	24 44%	Reworked upper or fill layer over near beach sand horizons; 4 strata increased variability	1	45	3	11	0	1	61	Low density Materials in all 4 strata Primarily or exclusively late 1900s
Totals	**725** 7 not dug	**466** **64%**	**259** **36%**		**178**	**1196**	**231**	**365**	**56**	**105**	**2131**	

Key: T=total; P=Positive; N=Negative; C=Ceramics; G=Glass; Me=Metal; Con=Construction; F=Faunal; M=Miscellaneous; BLVD=Father Capodanno Boulevard

Figure 6.7. Study Area B Shovel Test and Survey Component Locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(adapted from USACE 2002: Figure C3).*

Log). Alternative colors and textures included dark yellowish brown, pale brown, strong brown, reddish brown, sandy loams, clay, and silty sand. Modern debris and glass, plastic, asphalt, charred wood, asphalt shingle fragments, an aluminum pull tab, and Styrofoam were noted but not collected.

The collected sample from 29 of the shovel tests consisted of: two plain whitewares; one porcelain; four milk glass; 43 clear mostly bottle glass; four aqua container glass; one olive green curved glass; one green bottle neck; three amber bottle glass; 38 unidentifiable nails; one sheetmetal ribbon; 26 unidentifiable other metal; and two brick fragments. One asbestos tile, mortar, slag, coal, charcoal, plastic, wood and paper wads were noted and then discarded in the laboratory. Distribution was fairly even and widespread, except in the cases of STPs D31 and D22, where D31 yielded two whitewares, 22 glass, and 19 metal fragments from a layer of metal, and D22 contained 35 of the 38 nails.

The NRHP-listed property, Miller Army Air Field Historic District (90NR01020) lies just landward of the buried seawall alignment. While the Air Field will not be affected by the seawall construction, the associated concrete fire control tower built in 1943 will be impacted, as well as raising viewshed concerns should the tower be considered NRHP-eligible (see Figure 5.32). One of the six extra-transect testing grids was placed around the tower, with Shovel Test D20 serving as the reference point, depicted in Figure 6.8.

A high degree of stratigraphic variability was noted among the eight units, where only three tests repeated the same sequence (see Appendix A). Colors and textures mirrored those of the other tests fronting Miller Field, as did the recovered artifact assemblage. Seven clear (mostly bottle) glass, one green curved glass, one amber bottle, two round nails, two unidentified nails, one modern metal clasp, six unidentifiable metal pieces, slag, coal, one plastic fragment and one piece of wood made up the grouping.

Materials from both the Miller Field alignment and WW II tower testing grid shovel tests were recovered from all four strata. A mix of very recent and modern items with a minor early 1900s component is indicated. The nature and distribution of the artifacts, in combination with the high degree of stratigraphic variability also point to a reworking of the upper strata, most likely reflecting the towers and other related elements construction. The existence of other elements associated with the tower or airfield is confirmed by the presence of the adjacent cement block. In addition, demolished structures were noted just to the north of the transect amid weeds and small trees (STPs D15 and D23). The transect runs in front of a paved and tiled walkway leading to a historic monument memorial.

John Milner Associates (1978:74) reported on the remains of three mid-1900s structures within Miller Field for their reconnaissance survey of the Staten Island Unit of the Gateway National Recreation Area. SI-7, representing a 15-by-20-foot (4.5-by-6-m) rectangular concrete structure, was found on a small artificial hill in the northern corner of the field. A 20-by-80-foot (6-by-24.3-m) concrete foundation, SI-9, was linked to the former Miller Field Administration Building built in 1921 and razed in 1975. The concrete foundation remnants of a second structure built in 1921 and razed in 1975 (SI-19) were located at the corner of Sanchez and Shore Drive; the building housed the airfield's troops. None of the resources were considered eligible to the National Register of Historic Places (NRHP).

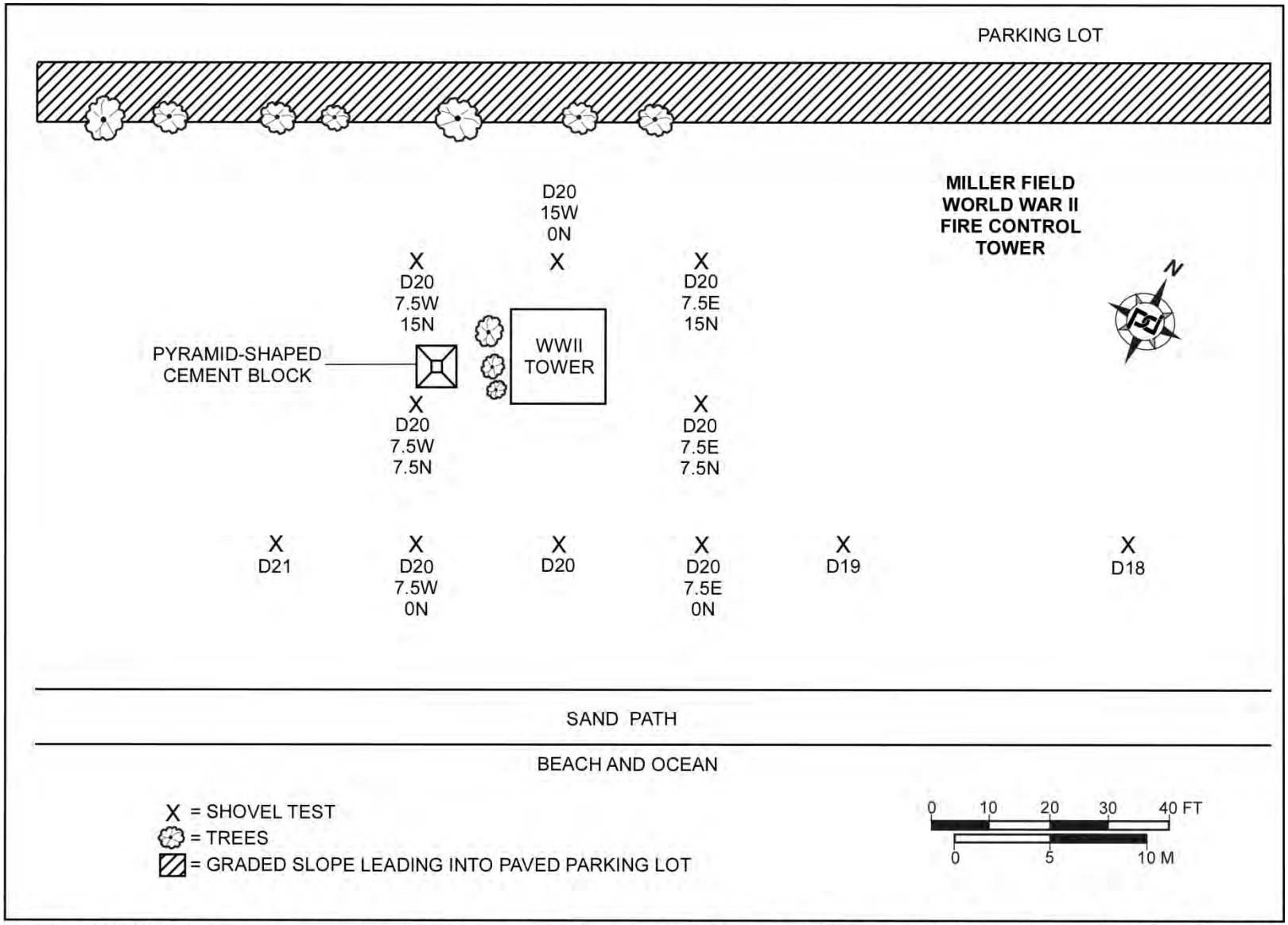


Figure 6.8. Study Area B: World War II fire control tower sketch plan with shovel test locations. Erosion Control/ Storm Damage Protection Feasibility Study, Richmond County, NY.

6.2.2 New Dorp Beach and Structures. Transect D and the seawall alignment continue south along a section of New Dorp Beach that once fronted or contained a number of early nineteenth to late twentieth century complexes including Britton Cottage, the New Dorp Lighthouse and Light Keepers House, St. Johns Hospital and later Home for Poor Children, and resorts (see Section 3.2.2). Their general remains are attested to by five obvious structural groupings on the beach, as well as construction materials recovered from or noted in the shovel tests located on the 6- to 9-foot (2- to 3-m) high off-beach berm (see Figure 2.17). Lipson et al. (1978) and John Milner Associates (1978) also reported structural elements from this portion of New Dorp Beach (see Section 3.2.2.6).

Structure 1A lies just seaward of a concrete pier upon a slight rise, but still within the beach as seen in Figures 6.9 and 6.10. The area also marks the transition between this shoreline section and the next wide, curving beach in front of the Cedar Grove Beach Club bungalows. The remains represent a structure with robust concrete walls reinforced by solid steel bars and wire mesh, in addition to concrete supporting beams and columns (Figures 6.11 and 6.12). Multiple outer walls and a prominent semi-circular section are visible. The latter may have been part of an outdoor terrace or glass-enclosed room, now measuring 5 feet (1.5 m) in height. Some of the walls formed inner partitioned rooms of the building and served as supports for the beams. Buried floors in the beach sand are indicated by the frequent concrete impasses observed in the field. The other walls are no more than 6 feet (2 m) high. Partially buried concrete beams can be found in the immediate vicinity of the ruins. Wave action currently impacts the structural elements and surrounding soil matrix.

The 48 shovel tests placed at intervals of 5 meters or less defined the structure's matrix as a single stratum of brownish sand reflecting the present active beach positioning. Modern debris and fill, wooden planks and plastic—all uncollected—supplement the 65 recovered items (see Appendix B). One thick-walled porcelain hotelware; three clear (one cup rim, two curved), one light green flat, four green bottle (one continuous thread neck, post-1919), and 21 amber (one 1985 bottle base) glass fragments, including a few weathered; two round nails; eight other metal items (one spring, three staples); four brick and mortar fragments; ten tile remains, and one melted and burned plastic piece made up the assemblage.

John Milner Associates' (1978:75) description and the Office of Parks, Recreation and Historic Properties' (OPRHP) location of their feature SI 16 provides a close match to that of the present Structure 1A element grouping. A mostly concrete foundation with a minor amount of scattered brick rubble was located on New Dorp Beach near a stone jetty. They estimated the size and shape of the foundation as a 50-by-20-foot rectangle, noting that partial burial beneath sands obscured a precise determination of the feature's extent. A mid-twentieth century date was provided on the Historic Site Survey Record maintained by the OPRHP, with the site designation A085-01-0155. The foundation was not considered eligible to the NRHP.

Structure 2A is located 100 to 130 feet (30 to 40 m) north of Structure 1A at the shoreline edge (Figures 6.13 and 6.14). Robust concrete walls also define this feature complex, whose structural integrity is less than that of 1A. The complex can be described as a debris field of concrete blocks, of square and quadrangular shapes. Dimensions of the blocks range from approximately 1-x-1-x-1 meters to 7-x-5-x-2 meters. The ocean-edge of the debris field is characterized by curved walls, discontinuous in character, blocky and forming a crescent shape. It is not evident that these blocks formed outer walls, rather they seem to have fallen into place from a formerly intact section of the feature complex. Large, long wood beams lying half-buried in beach sand are also present. Waves and storms have damaged the remains in the past and continue to do so.

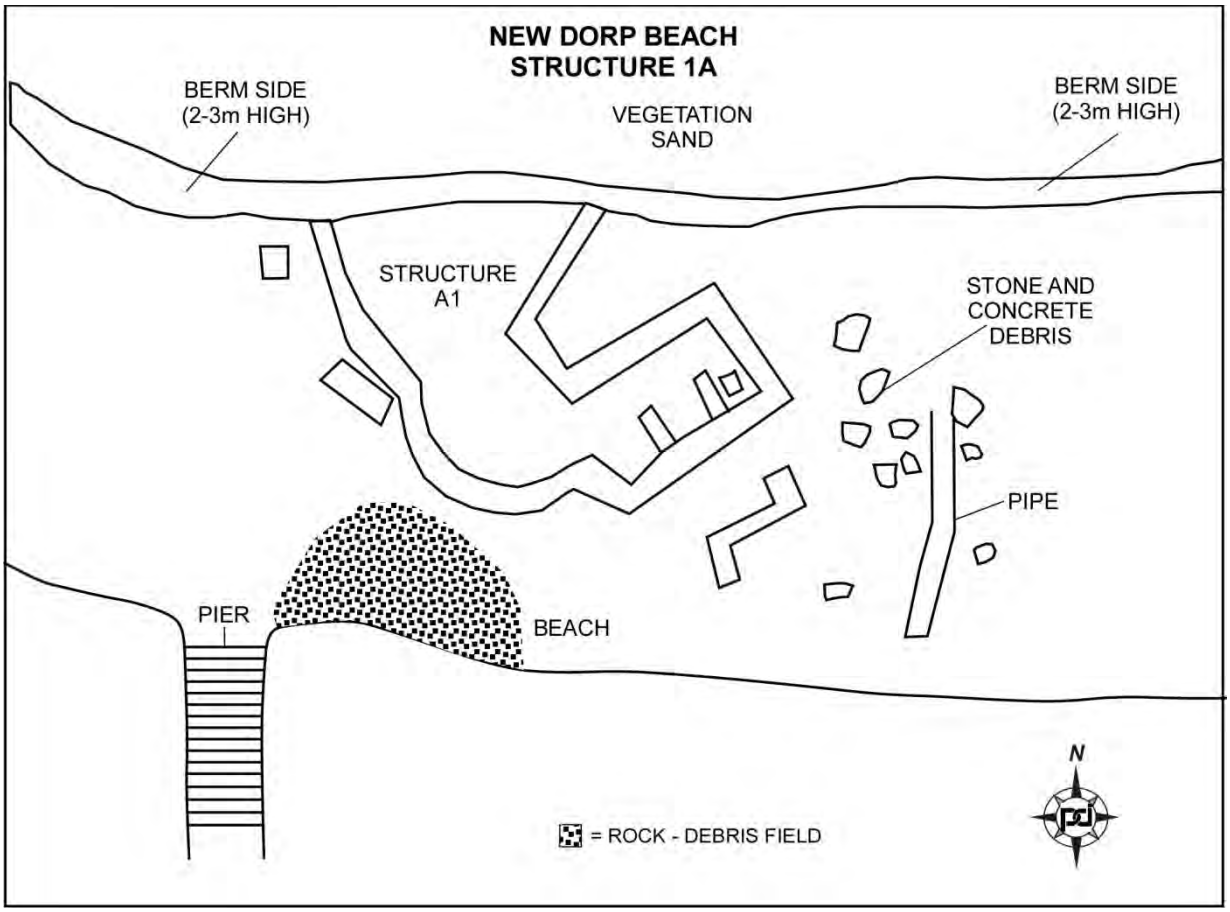


Figure 6.9. Study Area B: New Dorp Beach Structure 1A general location sketch plan. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003)*

Figure 6.10. Study Area B: New Dorp Beach Structures 1A and 2A with a pier in foreground, the concrete block remains of Structure 1A in the middle, and the partial concrete block ruins of Structure 2A in the far background. Erosion Control / Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

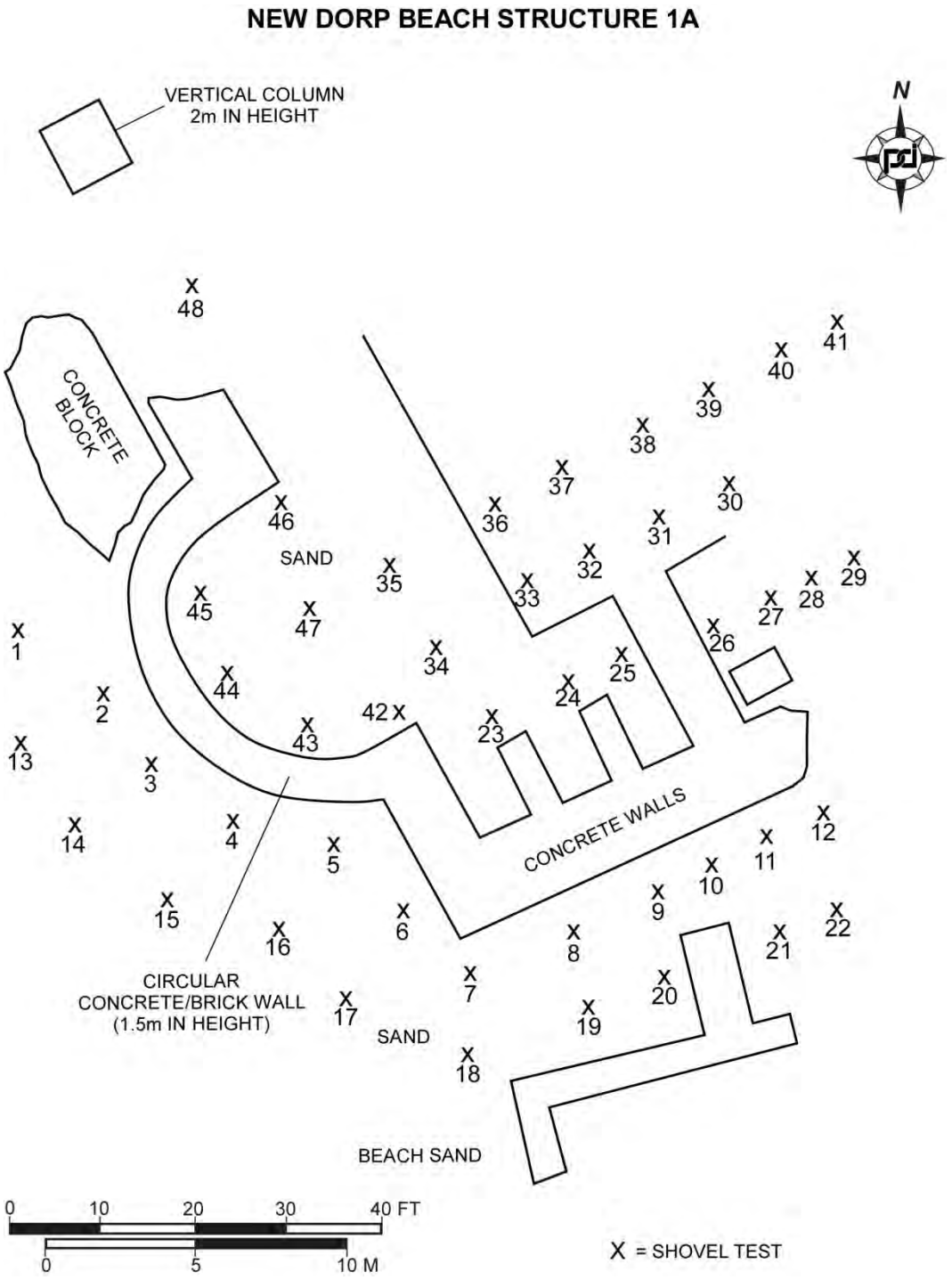


Figure 6.11. Study Area B: New Dorp Beach Structure 1A site plan with shovel test locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.12. Study Area B: New Dorp Beach Structure 1A oval concrete and brick section along with linear wall portions, from the pier facing northeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.13. Study Area B: New Dorp Beach Structure 2A concrete block remains at shoreline edge, facing north. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

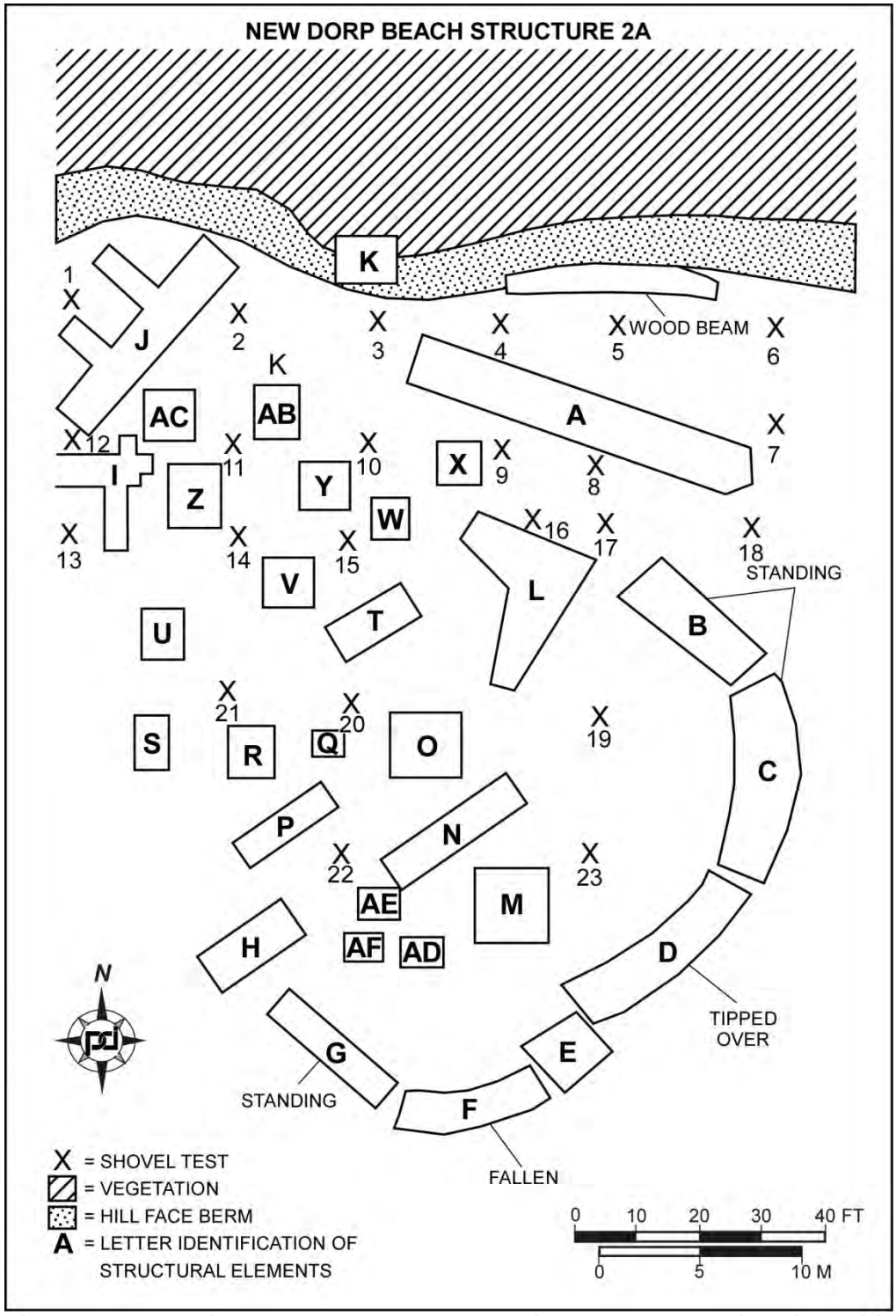


Figure 6.14. Study Area B: New Dorp Beach Structure 2A site plan with shovel test locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

The 23 extra-transect 12-meter or less shovel test grid in the feature area recorded a predominantly brown sand single stratum (see Appendix A). Two shovel tests (STPs 2A-7 and 2A-9) possessed a second layer of brown or dark yellowish brown sand. Modern debris, plastic, other subsurface concrete and wood plank elements were found but not collected, in addition to 43 collected artifacts (see Appendix B). Those items comprised: one transfer-printed ironstone and three porcelain hotelwares; seven clear curved and flat, one clear faceted drinking base, one aqua curved, four light green flat, four green curved and flat, one amber curved glass fragments, some weathered; six round nails; one metal plate, one wire, one possible hardware or tool, one metal disc (possible lid to machinery or hardware), one flat piece; two mortar fragments; three tile pieces; four plastic items, and one burnt piece of wood.

Similarities in composition, materials, locations and artifact assemblages strongly suggest that Structures 1A and 2A represent the same or similar feature complexes. That they are parts of the same feature complex is also indicated by documentary sources. Their characteristics correlate well with the location and outline of the historic Seaside/St. Johns Hospital. A long narrow building parallels the beach with additional inland structures in the 1898 New Dorp Beach map (see Figure 3.64), replaced in the early 1900s with a five-winged complex, four of which possess rounded ends (see Figure 3.66). The scale on the map places the two wings facing the beach some 100 feet (30 meters) apart, as are the structural areas. Artifacts such as the weathered glass, the drinking glass fragment, the hotelwares, and nails would be consistent with a hospital/residence from the very late 1800s to the early 1900s. Several informants, some having lived in the area for forty years, volunteered that Structure 1A served as a hospital during and after World War II. They also reported that parts of this or Structure 2A were used for housing World War II prisoners.

The remaining three structures are located north of Structures 1A and 2A (see Figure 6.7). A 3-meter long concrete floor projecting from the face of the near-beach berm with three concrete slabs on the beach below defines Structure 3A (Figures 6.15 and 6.16). Compared to Structures 1A and 2A, the feature is more circumscribed and exhibits fewer structural elements, indicating a less expansive building. Brown sand comprised the upper stratum; a darker brown or very dark gray clay soil made up a second horizon, while two tests (ST 3-2 and ST 3-4) contained a brown sand third layer (see Appendix A). The second and third strata may relate to former near-beach deposits under the current active beach sands.

Nine shovel tests 25 feet (7.5 m) apart yielded one each of the following: kaolin pipe stem, modern complete medicinal glass vial with plastic/metal cap, iron bar, and Styrofoam. Modern debris, plastic, brick and concrete chunks, further concrete elements (that is, concrete impasses) and wood/wood plank were found but not collected. The pipe stem is curious amid the rather small sample of primarily modern items; it could represent an incidental deposit, transported item or even past historic occupational remnant.

Structure 4A also represents a projecting concrete floor from the side of the berm with further elements directly in front on the beach (Figures 6.17 and 6.18). Located from 230 to 260 feet (70 to 80 m) north of Structure 3A, it also is more circumscribed than 1 and 2. The floor measured 25 to 29 feet (8 to 9 m) long above a low semi-circular brick element positioned some 10 feet (3 m) away and 16 feet (5 m) south of a concrete block 6 feet (2 m) long and 20 to 24 inches (50 to 60 cm) wide.

Figure 6.15. Study Area B: New Dorp Beach Structure 3A projecting concrete floor at berm edge with concrete blocks in front, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

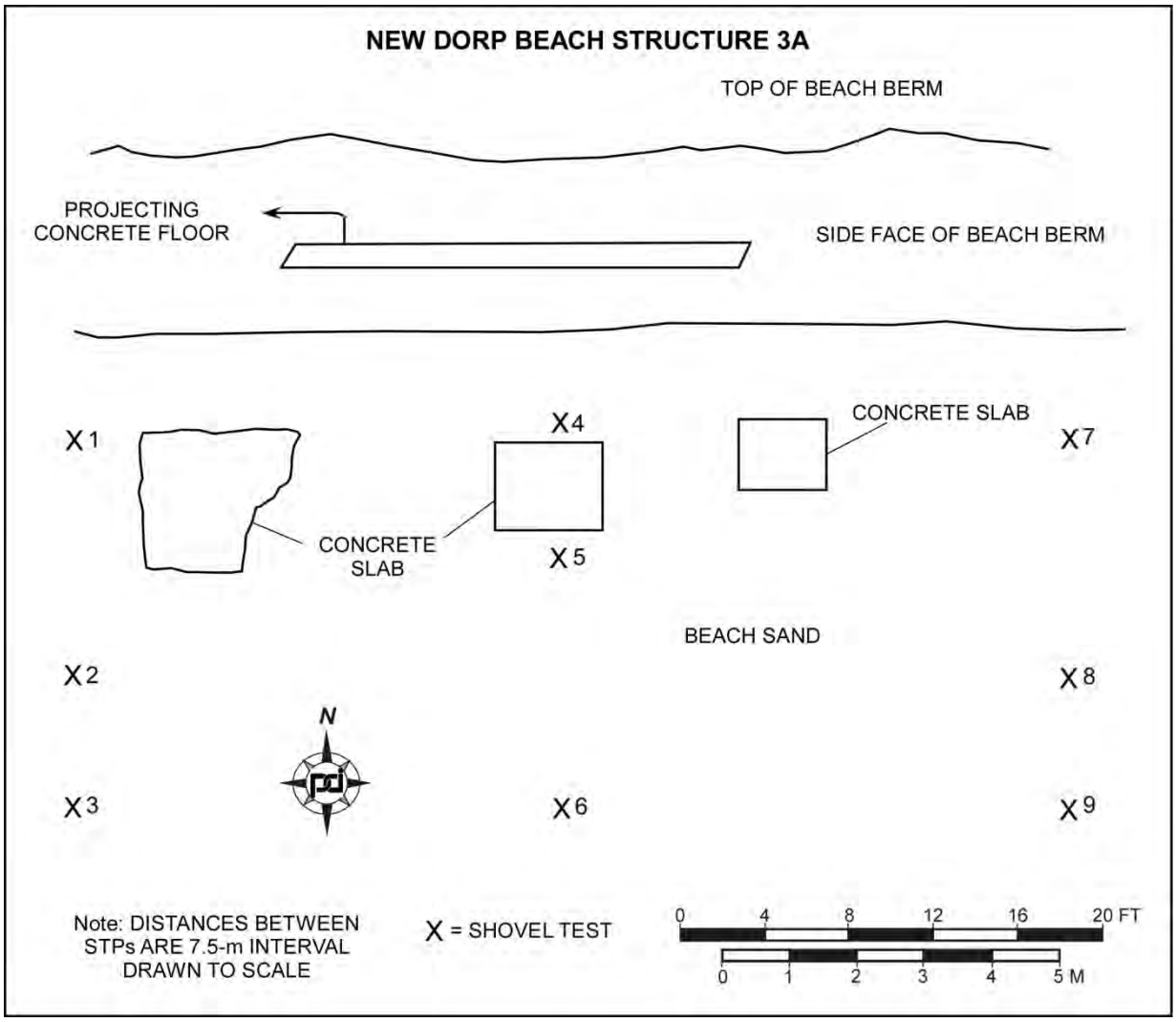


Figure 6.16. Study Area B: New Dorp Beach Structure 3A site plan with shovel test locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.17. Study Area B: New Dorp Beach Structure 4A, projecting concrete floor at berm edge with additional on-beach structural elements, facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

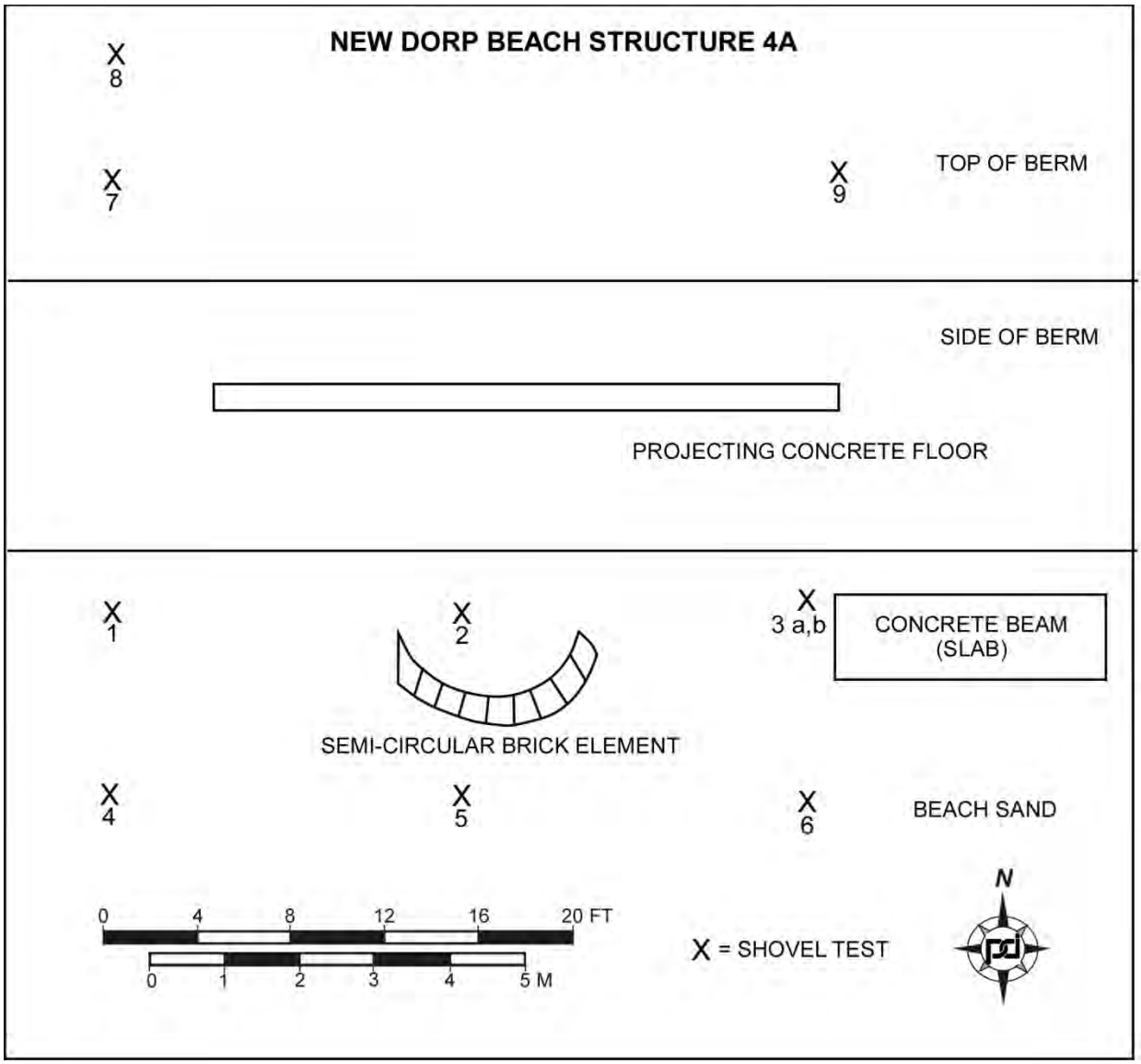


Figure 6.18. Study Area B: New Dorp Structure 4A site plan with shovel test locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Nine tests in the grid of three tests on the berm and six (plus one radial) on the beach, exhibited brown sand for the first and normally only layer. One beach shovel test, ST 4A-4, contained three strata: a light yellowish brown sand, a yellowish brown sand over a third grayish clay. The later horizon might represent a former buried surface or a natural micro-depositional anomaly.

Three clear curved/flat glass fragments and a clear modern bottle base; one light green curved glass fragment; one piece of slag; twenty bone fragments; one piece of Styrofoam, and one piece of charred wood comprised the recovered artifacts. Also found, but not collected, were brick and concrete block fragments, modern amber bottle glass, charcoal, slate, and plastic. The artifacts point to a former building with imprecise dating.

A concrete projecting floor is lacking among the nine structural elements enclosing a 20-x-20 to 25 meter area, located 50 to 60 meters north of Structure 4A (Figure 6.19; see Figure 2.17). The concrete block grouping of Structure 5A contains three robust rectangular sections, A, B and C, that seem to be nearly in-situ. They could be part of the outer walls of the building or internal partitions. The elements begin at the edge of the berm and extend some fifteen meters into the intertidal zone, where ocean surf and waves have impacted the integrity of the concrete blocks and eroded the soil deposits.

Primarily brown or grayish/reddish/yellowish brown sand comprised the first stratum in fifteen shovel tests and two radials from the area's 4- or 7.5-meter interval testing grid (see Appendix A). Clay soils predominated in the second stratum with variable hues including reddish brown, strong brown, black, brown, dark yellowish brown, and light grayish brown. A third stratum of light yellowish brown clay or grayish brown sand was found in two tests, STPs 5A-1 and 5A-8. STP 5A-8's stratigraphy continued with a fourth layer of reddish brown sand before a clay bank impasse was recorded at 40 centimeters. A similar clay impasse at the same depth was noted for STP 5A-1. Active beach sands overlying former near-beach deposits may be indicated.

Only eight artifacts were recovered comprising: one plain ironstone bowl fragment; one clear curved, one light green, one green, three modern amber curved glass fragments, all with abraded wear; and one round nail. Modern debris, concrete chunks and impasses, paper lumps, cigarette filters, ceramic sewer pipe fragments, and a buried utility pipe were noted.

Transect D in this portion of the study area picks up with STP D44 running along the berm edge until STP D86 at the beginning of the Cedar Grove Beach Club bungalows. A 50-foot (15-meter) interval was maintained. Brown sand was the most frequently noted soil color and texture combination among the 43 tests for Stratum 1 (see Appendix A). Alternative colors included dark brown, dark yellowish brown, light yellowish brown, reddish brown, strong brown, yellowish brown, black and dark grayish brown, while alternative textures comprised silty or sand loams and one case of silty sand. Different hued brown (reddish, dark, light red, dark grayish) sand or sandy/silty loams normally distinguished Stratum 2 in thirteen tests. Two tests possessed a gray or grayish brown silty sand third layer; two a yellowish brown clay or strong brown sandy fourth horizon, and one a yellowish brown sand fifth stratum.

Cellophane, Styrofoam, a plastic cap, a melted plastic bottle, gravel, construction materials, modern glass, plastic, foam, concrete impasses, and buried recent trash bags were found but discarded. The collected sample consisted of a variety of items totaling 114. Seven unglazed coarse earthenwares, with three terracotta flower pot examples; two plain whitewares;

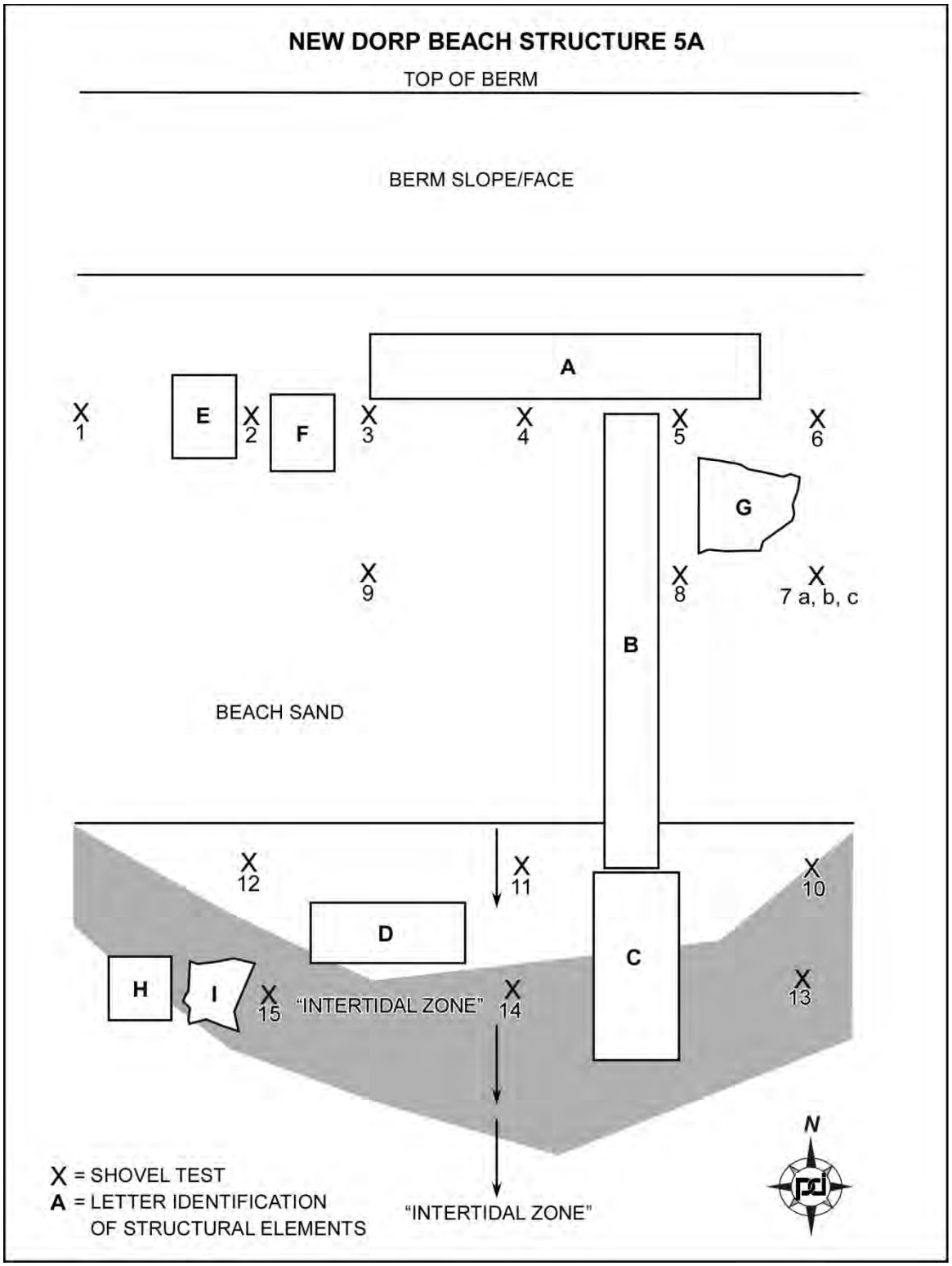


Figure 6.19. Study Area B: New Dorp Beach Structure 5A site plan with shovel test locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

five plain ironstones; one decorated ironstone; one plain stoneware, and one kaolin pipe stem with a maker's mark (indeterminate date) made up the ceramics. The glass comprised: one milk glass, 22 clear bottle and one flat glass, 13 aqua curved and flat, three green container, and five amber bottle fragments, plus one modern light bulb glass sherd. Five round and nine unidentified nails, in addition to one large iron spike, three wire fragments, one iron hook and five concretions accounted for the metal. The remaining materials included: brick, mortar, drain/sewer tiles, decorated tiles, an asbestos tile, slag, coal, plaster fragments, and plastic.

Materials extended into Stratum 4. The construction materials, indications of subsurface structural features (concrete impasses) and other artifacts can probably be related to the later 1800s and early 1900s development in the area, as was argued for the adjacent five beach structures. Reworked upper soils are nonetheless indicated, with continued deposition of modern and very recent items.

Three structural features were identified during the John Milner Associates (1978:74-75) reconnaissance survey located on this higher ground between Cedar Grove Avenue and the current shoreline. A concrete and brick foundation near the foot of Boehm Street (SI-13), a nearby rectangular concrete foundation (SI-14), and another partially exposed concrete foundation with a semi-circular section (SI-15) were recorded. The latter, in light of the present investigation, probably forms another early 1900s wing of the St. Johns Hospital complex. The three were assigned OPRHP site numbers A085-01-0129, A085-01-0153, A085-01-0154 respectively and were not recommended as eligible to the NRHP.

Lipson et al.'s (1978) subsurface testing in this same New Dorp Beach area encountered domestic artifacts and structural debris (see Figure 3.62). Much of the material dated to the mid-to-late twentieth century, although some carried a nineteenth century date and were probably associated with the development of the beachfront properties for recreational purposes.

***6.2.3 Cedar Grove Beach Club Bungalows*.** Shovel Test D87 and D123 delimited the section of Transect D where the seawall alignment will pass directly in front of the Cedar Grove Beach Club community bungalows (see Figure 5.30). With the exception of the first four tests (D87 to D90), a double line of tests ran in between the house fronts and a wood-slat storm fence approximately 50 feet (15 m) seaward. The initial transect tests skirted the bungalows at a 50-foot interval, while the radials or second line were located 25 feet (7.5 m) towards the beach to ensure adequate testing of the early twentieth-century community.

Brown sand representing active beach deposits defined the first and usually only stratum for the 68 initial transect tests and radials (see Appendix A). Very recent and modern materials accounted for the majority of the 122 collected and uncollected plastic, burnt wood, foam, and Styrofoam fragments. Plastic (straws, toys), wood fragments, Styrofoam, blue paint chips and a straw paper fragment, 52 percent of the recovered artifacts, were discarded in the laboratory. The other items comprised: one shell; one unglazed redware; one plain whiteware; one molded porcelain; 21 clear container glass including one piece of flat glass and one continuous thread wide-mouth bottle rim, post-1919; four aqua curved and flat glass; one worn olive green curved glass sherd; one green curved glass fragment; two round nails; eleven other or unidentifiable metal; one 1964 U.S. penny; brick, coal and roofing shingle fragments.

6.2.4 South End of Cedar Grove. Shovel Test D124 picks up Transect D as it continues to parallel Cedar Grove until turning inland to meet an existing dune or levee at Oakwood Beach (see Figure 6.7). Shovel Test D150 marks the meeting point with tests placed at a 50-foot (15-meter) interval. A double line of tests was maintained until D130, even though no bungalows are currently present in this south end portion of New Dorp Beach.

Though the tests were located behind the active beach, the stratigraphy and artifact characterizations were similar to the Cedar Grove Beach Club bungalow section. Brown to dark brown sand occurred most frequently in the upper stratum of 35 tests (see Appendix A). Eight tests possessed a second layer of brown sand, sandy clay, or sandy loam. A third brown sand or dark brown sandy silty loam stratum was present in two tests, with a fourth brown sand horizon in one test. Wood plank and concrete impasses as well as the surface presence of two demolished buildings around Shovel Test D137 attest to former structural features along the beach front.

Modern materials again made up the primary component of the recovered and field-observed samples (see Appendix A). The recovered assemblage contained: one molded whiteware rim; one clear curved, two flat aqua, one worn olive green container, three green container and two modern amber bottle glass fragments; one square, five round, and one unidentifiable nail; two other metal; brick, drain sewer tile, asbestos tile, plaster, and cinder block fragments.

6.2.5 Oakwood Beach Internal Levee. Transect D restarts at the south end of the Oakwood Beach existing dune, to examine an area along Fox Lane between Cedar Grove Avenue and the dune where an internal levee is planned (see Figure 6.7). The twelve shovel tests (D151 to D165) were placed 50 feet (15 m) apart. The first stratum consisted of black sandy or silty loams, while variable colors and textures made up the second and third strata. Modern debris, rock, gravel, fill and a high water table point to heavy disturbance of the near-surface deposits and the defined wetland character of this survey component (see Appendix A). Modern surface and buried trash combined with one plain whiteware foot rim, one horseshoe, mortar/decorated tile fragments, and plastic to form the artifact sample and reinforce the disturbed nature of the survey area.

John Milner Associates during their Staten Island reconnaissance survey reported a concrete well (1978:77), that, judging from the description and OPRHP's location map, place the feature landward of the existing dune at the end of Kissam Avenue. The feature (SI-17) represented a concrete subterranean well, eight feet (2.4 m) in diameter, with an approximately five-foot (1.5-m) section above ground. The well was given a site number, A085-01-0156, but not considered eligible to the NRHP.

6.2.6 Oakwood Beach Sewage Treatment Plant. An existing rock-faced dune along the shoreline, a section where no protection measures are planned, and a second existing levee were not tested. Testing continued around the east and south sides of the Oakwood Beach Sewage Treatment Plant (see Figure 6.7). The reinforcement of the two levees is not likely to cause further impacts, which are in any case flanked on both sides by defined wetlands or the active Oakwood Beach. Shovel Tests D600 and D630 bracket the levee alignment along the Treatment Plant's east edge and the sheet pile seawall alignment along approximately half of the south edge. Heavy trees and undergrowth mark the plant's east side, with vegetation covering the thin testable south side between the back of the plant and a man-made channel.

Thirty shovel tests were excavated at 50-foot (15-m) intervals. Various brown clayey soils, silty and sandy loams were almost exclusively recorded for the four observed layers (see Appendix A). Fill, root and rock impasses, plastic, high water tables, and building materials were frequently noted throughout the four strata. Seventeen tests contained a second layer, while only one test (D621) possessed both a third and fourth layer. The disturbed and likely fill nature of the strata echoes the Roberts and Ponz (1990) backhoe trench results at the plant, where 7.5 to 9 feet (2.2 to 2.7 m) of fill were encountered. No evidence for near-surface prehistoric or historic resources, including the former tide mill and Millers House, was found in the 1990 study or the present investigation. Any remains would be under several feet of fill.

The recovered sample (see Appendix B) comprised two terracotta flower pot fragments; seven ironstone sherds, with one post-1908 decorated example; one burnt porcelain; eight milk glass sherds (common in the 1880s to 1930s); 25 clear mostly bottle glass, with one post-1938 base, and post-1915 safety glass; two aqua window or flat glass fragments; six amber glass with a post-1903 complete bottle and a post-1940 base; three cobalt blue glass sherds; one unidentifiable nail; one square-headed bolt with nut, and brick, mortar, decorated tile, ceramic insulator fragments. Both the modern and minor early twentieth century materials were largely confined to the first stratum.

6.2.7 West of Oakwood Beach Sewage Treatment Plant. No protection measures are planned for the remaining south side of the sewage treatment plant, but a levee running perpendicular to the plant's west side is anticipated (see Figure 6.7). Shovel Tests D631 to D673 covered this alignment at a 50-foot (15-meter) interval, where similar variable-brown clay and silt loam soils predominated among the three recorded strata (see Appendix A). Although the soils were comparable to those east of the plant, the soil characteristics here reflect the proximity of the wetlands. Heavy undergrowth and trees obscure the high water table, where almost half of the shovel test placements were not dug due to standing water.

The artifact assemblage also proved comparable, where linkages with general or specific early historic components could not be made due to very low numbers and uncertain contexts. The items consisted of: one glazed redware; two ironstone serving vessel bases; 10 porcelain fragments including an egg cup, a rim cup and a hotelware plate sherd; eight clear glass fragments with post-1892 security glass, post–1915 safety glass, and 1920-1964 base examples; one sherd each of olive green, green and amber container glass; one spring; brick, drain/sewer tile, decorated tile, and plastic fragments.

6.2.8 Shovel Test, Stratigraphy and Artifact Collation. Table 6.2 displays shovel test, stratigraphy and artifact summary data for the tested survey components of Study Area B. Stratigraphically, the line of protection passes through mainly brown near-beach to active beach sands before the fill layers and defined wetland soils with increased clay and silt content around the Oakwood Beach Sewage Treatment Plant. The beach section also contains areas of reworked natural upper strata or fill deposits along the New Dorp Beach berm, the south end of Cedar Grove Beach, and the internal levee that were related to historic and modern construction.

Very recent to modern materials comprise the majority of the low density, widely spread artifact sample. New Dorp and Oakwood beaches have long attracted people for recreational and residential purposes. The minor historic component of the collected artifact sample can be associated in a general, if not specific, manner with known military, recreational and

Table 6.2. Study Area B: shovel test, stratigraphy and artifact collation

	Shovel Tests				Artifact Totals							
Survey Area	**T**	**P**	**N**	**Stratigraphic Summary**	**C**	**G**	**Me**	**Con**	**F**	**M**	**T**	**Artifact Summary**
Miller Field	41	29	12	Near beach deposits; 4 strata	3	52	65	35	0	20	175	Low density; fairly continuous with occasional high density tests; primarily post-mid-1900s with minor early 1900s component
Miller Field WW II Tower	7	5	2	Near beach deposits 4 strata	0	9	11	20	0	2	42	Low density Primarily post-mid-1900s with minor early 1900s component
New Dorp Beach S1A	48	40	8	Active beach sand 1 stratum	1	29	10	24	0	1	65	Low density Primarily post-mid-1900s with minor very late 1800s to early 1900s
New Dorp Beach S2A	22 1 not dug	16	6	Active beach sand; 2 strata	4	18	11	5	0	5	43	Low density Primarily post-mid-1900s with minor very late 1800s to early 1900s
New Dorp Beach S3A	9	5	2	Active beach sand over poss. former surface layers; 3 strata	1	1	1	0	0	1	4	Very low density Primarily post-mid-1900s with very minor historic component
New Dorp Beach S4A	10	7	3	Active beach sand over poss. former surface layer; 3 strata	0	5	0	1	20	2	28	Low density Primarily post-mid-1900s with minor historic component
New Dorp Beach S5A	17	9	7	Active beach sand over poss. former surface layers; 4 strata	1	6	1	0	0	0	8	Very low density Primarily post-mid-1900s with very minor historic component
New Dorp Beach	43	33	10	Reworked near beach horizons 5 strata	17	45	24	25	0	3	114	Low density; fairly continuous distribution Primarily post-mid-1900s with late 1800s to early 1900s component
Cedar Grove Beach Homes	68	36	32	Active beach sands 2 strata	3	27	14	14	1	63	122	Low density Primarily post-mid-1900s with minimal historic component
End of Cedar Grove Beach	35	27	8	Reworked near beach horizons 4 strata	1	9	9	24	0	20	63	Low density; fairly continuous distribution Primarily post-mid-1900s with minor historic component
Internal Levee	12 3 not dug	8	4	Reworked strata Defined wetland 3 strata	1	0	1	5	0	2	9	Low density; likely disturbed context Modern materials with very minor historic component
Sewage Plant	30	11	19	Fill horizons 4 strata	10	44	2	17	0	0	73	Low density Primarily modern with minor early 1900s component from disturbed context
West of Sewage Plant	24 22 not dug	9	15	Defined wetland soils 3 strata	13	11	1	9	0	2	36	Low density Primarily modern with minor early 1900s component
Totals	**363**	**235**	**128**		**55**	**256**	**150**	**179**	**21**	**121**	**782**	

Key: T=total; P=Positive; N=Negative; C=Ceramics; G=Glass; Me=Metal; Con=Construction; F=Faunal; M=Miscellaneous; S=Structure

residential development of the later 1800s to early 1900s. A stronger case for associations comes from the identified structural remains noted during the survey.

The beach section in front of Miller Field contains the largely intact World War II Fire Control Tower in addition to other less intact elements possibly associated with the tower or airfield. Just to the south, historic maps depicted nineteenth-century recreational facilities, hotels, residences and even a hospital/home for poor children (see Section 3.2). Five structures on the beach, the artifacts and construction debris on the adjoining berm, in addition to prior reports of three structural remains by John Milner Associates (1978) and of domestic materials and structural debris by Lipson et al (1978) between the New Dorp Beach shoreline and Cedar Grove Avenue confirm this historic period development. A direct association was suggested among the present survey's Structures 1A and 2A, Milner Associates' Structures SI15 and SI16 and the early twentieth-century reconfigured St. Johns Hospital.

Construction of bungalows in what would become the Cedar Grove Beach Club community began in the early 1900s; many still stand. Shovel testing of the upper (three feet/ one meter) active beach sands in front of the current bungalows indicated that no associated structural features or artifact deposits were present. Further shovel testing collaborated the continuance of additional former bungalows/residences to the end of Cedar Grove Beach.

No evidence was found for prehistoric sites or materials, nor remains of the seventeenth century Britton Cottage, the Lighthouse compound, and the Lakes Mill complex. The latter may be buried under several feet of fill or under the Oakwood Beach Sewage Treatment Plant.

6.3 STUDY AREA C: CRESCENT BEACH

6.3.1 Seawall/Levee Public Alignment. Seventeen shovel tests at a 50-foot (15-m) interval along Transect C9 and Transects C42 to 53, covered the north near-beach and south active-beach sections of the seawall/levee alignment at Crescent Beach (Figure 6.20; see Figure 2.20). The variant alignment sections in between were either tested as part of the examination of Ponds 1 and 4 or fell in the inter-tidal zone (see Figure 2.21). Brown sand was the most frequently recorded color and texture combination for the two strata of these sections (see Appendix A). Alternative hues included light brown, strong brown, and sandy loams or sandy clays.

Modern glass, an aluminum can, plastic, and other modern debris were noted in addition to a collected sample of 182 items. Glass accounted for most of the artifacts with 126 fragments. The 42 clear glass remains included a partial jug neck (likely made after 1903); a post-1892 partial crown-type lip; a modern continuous thread small mouth bottle lip; a post-1903 base; wire-reinforced glass patented after 1892; a molded neck (post 1880-1900), and several weathered pieces. Other glass comprised 27 aqua flat or window glass; one olive, 22 green, and 34 modern amber bottle fragments. The remaining materials consisted of one decorated ironstone; two wire nails; two screws and seven unidentified metal; decorated floor or wall tiles; shell; plastic, and other modern miscellaneous items.

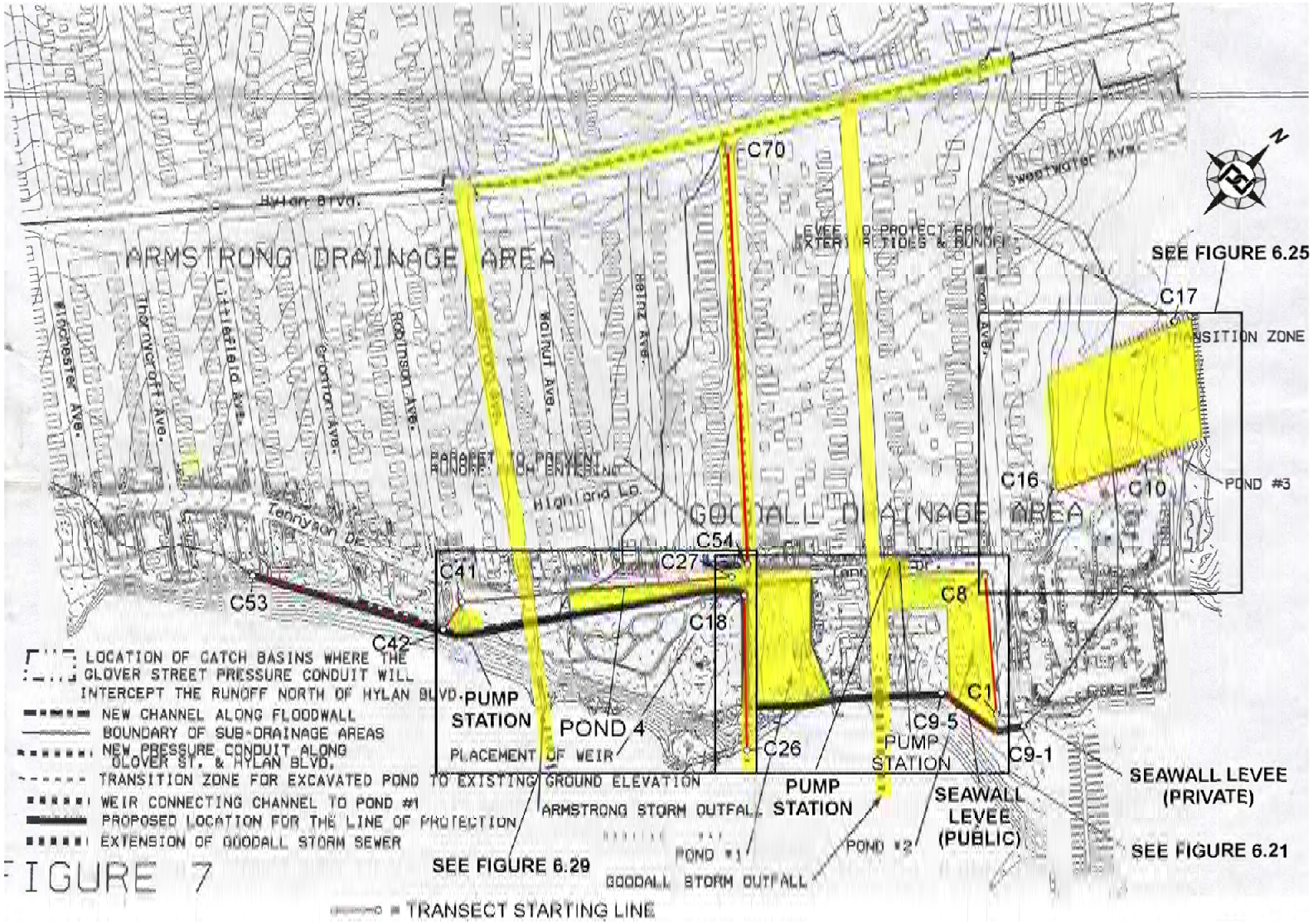


Figure 6.20. Study Area C: transect and survey component locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(USACE 2002: Figure 7).*

The majority of the modern dominated sample came from the northern end that adjoins Pond 2 and a recently built condominium complex. Bungalows in the Pond area and the Crescent Beach Hotel in the condominium area were noted on late-nineteenth and early-twentieth century maps and discussed in Section 3.2. The modern materials reflect the continued use of the beach for recreational, if not trash disposal purposes. The scant historic artifacts may relate to the early 1900s occupation of the area, but certainly lack sufficient integrity and numbers to make direct associations.

6.3.2 Pond 1. The intersection of Tennyson Drive and Glover Street marks the southwest corner of Pond 1 whose two acres are further enclosed by residences that front Goodall Street and the seawall/levee alignment (see Figure 6.20). That alignment, with minor variations, follows what would be the logical extension of Glover Street (see Figure 2.22) through parkland to the beach before turning to follow the shoreline and inter-tidal zone. The alignment also served as the baseline (Figure 6.21) from which Transects 18 through 26 were laid out north to south to cover the pond area, the variant seawall/levee routes and the land portion of the to-be-installed Glover Street sewer line and storm outfall. A 50-foot (15-m) testing grid was maintained, with the exception of Transect 21 which was placed between Transects 20 and 22 (at a distance of 25 feet [7.5 m] from either) to test an alternate seawall/ levee route.

The 29 shovel tests normally registered a brown sandy/silty loam with clayey soils for the first two strata (see Appendix A). Three tests possessed a third and fourth layer, one test a fifth, that in four cases consisted of ash or gravel deposits. In addition to uncollected modern items (plastic, toy gun) the recovered sample contained 102 glass fragments including modern clear and post-1964 Anheuser Busch beer bottle examples, safety glass, and one possible amber drugstore bottle fragment from the late 1800s to early 1900s. One plain ironstone plate rim; two round nails; the base of a hollow-cast toy army figure; two modern bottle tops; one bolt; one possible spike; brick, drain/sewer, a number of floor or wall tile fragments; an old railroad-telegraph porcelain insulator, from around 1915 to 1940; shell and miscellaneous items completed the assemblage.

Five to seven 1898 to early 1900s bungalows were located within Pond 1 (see Section 3.2.3). The clay and silt content of the upper two strata and gravel layers provide support for their former presence, as do the scant historic artifacts. No surface or subsurface structural features were located amid the dense vegetation. Direct linkages between the artifacts and bungalows could not be made, except in the general sense that these materials might reflect the early twentieth century development in the area.

6.3.3 Pond 2. Pond 2 opposes Pond 1 occupying 1.5 acres between Tennyson Drive, Goodall Street, Wiman Avenue, residences, and the seawall/levee alignment (see Figure 6.21). Transects 1 through 8 defined the 50-foot (15-m) survey grid for this pond, where two additional Transects 2A and 3A were located 25 feet (7.5 meters) on either side of Transect 3 to examine an artifact concentration. The 29 tests yielded similar stratigraphic results to those of Pond 1 (Shovel Test Log, Appendix A).

A definite increase in surface materials could be found, reflecting the area's use as a current and recent past garbage dump. Gravel deposits, brick, plastic garbage bags, building materials such as the plywood and carpet remnants at the back of a house near STP C6-2 depicted in Figure 6.22 were observed. Evidence of past storm damage was noted around STP C5-1 where part of a wharf or boat lay over a fallen tree as seen in Figure 6.23

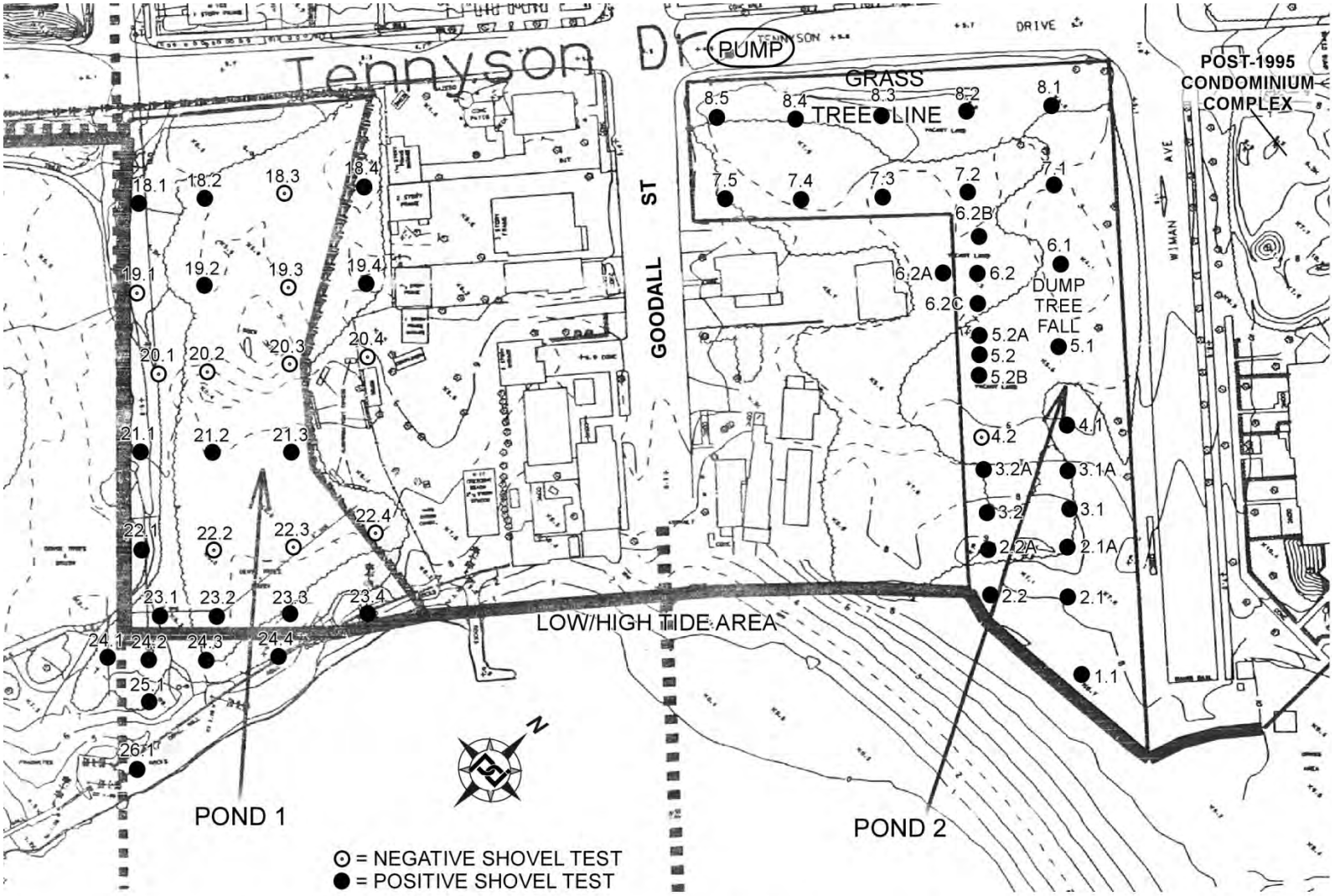


Figure 6.21 Study Area C: Ponds 1 and 3 shovel test locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(adapted from USACE 2002: Figure 7 CBI ALT #3A).*

Figure 6.22. Study Area C: plywood and carpet remnants at back of house near Shovel Test C6-2, facing southwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.23. Study Area C: part of a wharf or boat over fallen tree, between Shovel Tests C5-1 and C5-2, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

While the surface materials were widespread, the subsurface artifacts concentrated along Transects 2, 2A, 3 and 3A whose shovel tests produced 89 percent of the 662-item sample. Glass from the eight tests included: amber Anheuser post-1964 beer bottles; a Perry Davis clear bottle rim from the late 1800s to early 1900s; clear and amber continuous threaded rims from post-1919; safety glass; window and container glass fragments; and a "blob type" clear neck and rim from around the 1880s. Ceramics comprised: three flower pot sherds; two whitewares; eleven ironstones including a foot rim from a possible plate and five burnt fragments; and one porcelain. Other notable remains consisted of: round and roofing nails, mesh screen pieces, a 1980 Lincoln penny, drain/sewer tiles, decorated floor or wall tiles, linoleum tiles (post-1863), asphalt roofing shingles (advertised by 1917), modern composite board, paneling fragments, and fiberglass insulation pieces (introduced in 1938). The remaining shovel tests yielded a thin scatter of twentieth century materials.

Like Pond 1, bungalows were built in this section of Crescent Beach early in the twentieth century. Unlike Pond 1 a clearer likely association with the bungalows can be made. While no subsurface structural features were located in the Transect 2/3 area, the artifacts point to a former structure from the early to mid-1900s. Modern items were present as well.

6.3.4 Pond 3. Pond 3 is bordered on the east by a post-1995 condominium complex, on the north by Nelson Avenue, on the south by the backyards of residences fronting Wiman Avenue and on the west by open, tall grass terrain (see Figure 6.20). The current surface conditions within the 2.7 acres necessitated altering the standard shovel testing grid. An unused paved road traverses the pond area roughly east/west (Figures 6.24 and 6.25). Almost the entire area north of the road to Nelson Avenue has been stripped (Figure 6.26); three prominent push piles are also evident with modern materials present. The area has received new non-local topsoil and is being landscaped as a memorial garden to the September 11th World Trade Center victims. Individuals undertaking the garden memorial informed that the area's soil had been placed, along with other cleared surface soils, on the rather expansive mound that dominates the southern two-thirds of the pond area (see Figure 2.25).

Small push piles and other piles of trash, garden waste or construction material are found along the mound's east edge, while large ruts and uneven ground are noticeable along the mound's west edge (Figure 6.27). The adjacent condominium complex is likely responsible for some of the waste piles. The large central mound would appear to be largely artificial and the result of local or perhaps extra-local land preparation activities.

The revised testing strategy involved a surface examination of the stripped area, non-testing of the mound, and shovel testing at a 50-foot (15-m) interval over the remaining terrain. The stripped area yielded a minor amount of modern and historic items, cut stone and brick, and a concrete pad or surface adjoining the paved road at the west end (Figure 6.28). Brown to darker brown clay, sandy or silty loams were most frequently recorded for the 40 tests of Transects 10 through 17 containing a single stratum. Clay and silt content increased for the 22 tests with a second layer and the two tests with a third layer (see Appendix A).

Modern materials and assorted construction debris including a complete ceramic drainage tile at STP C11-7 were noted in the field. The recovered ceramic sample comprised three flowerpot sherds, two hand-painted whitewares, one plain and 21 decorated ironstones, one flow-blue type porcelain, and one stoneware. One hundred and thirty-one glass fragments included: one late 1800s/early 1900s medicinal or commercial clear bottle rim; an olive green

Figure 6.24. Study Area C: former paved road running east/west through survey area, with stripped section at right, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

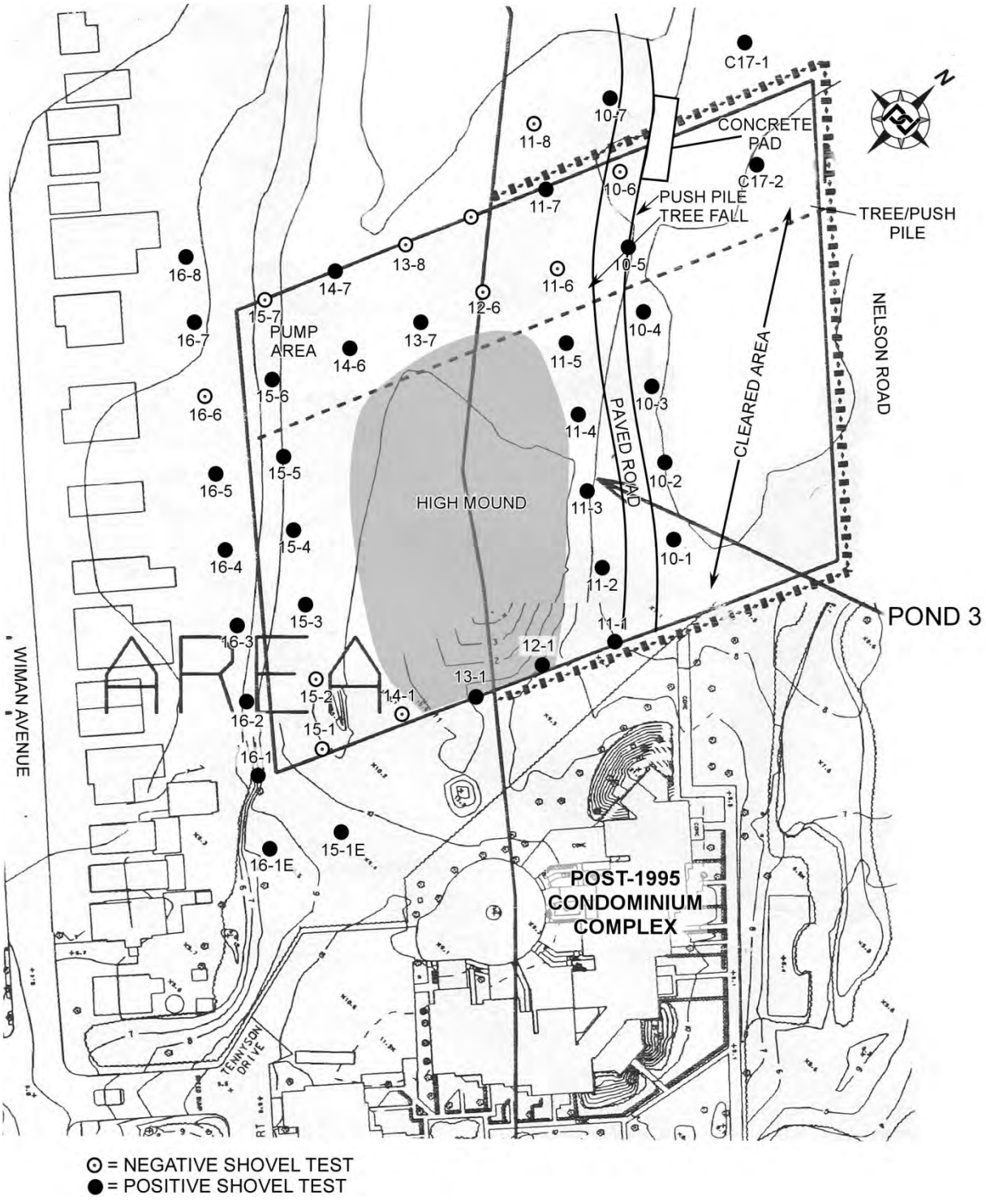


Figure 6.25. Study Area C: Pond 3 shovel test and land feature locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(adapted from USACE 2002: Figure 7 CBI ALT #3A).*

Figure 6.26. Study Area C: Pond 3 northwest corner of stripped section with Nelson Avenue along right side and tree / large push pile of soil and vegetation in background, facing west. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.27. Study Area C: Pond 3 large ruts and uneven ground with high vegetation along western edge of large centrally located mound at left background of photograph, facing southeast. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

Figure 6.28. Study Area C: Pond 3 rectangular concrete pad adjacent to former east/ west road, facing northwest. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(PCI 2003).*

post-1903s rim; a modern continuous thread clear bottle rim, a post-1892 wire-reinforced flat clear fragment, a possible clear plate molded bottle sherd from the early 1900s, and post-1915 safety glass. Remaining items consisted of a door hinge and one other flat metal piece with holes; brick, mortar, drain/sewer tile, decorated floor/wall tile, asbestos tile, asphalt, slag, and roofing shingle fragments; one bone and twelve shell remains; and modern pieces. A fiberglass and resin item was found, an innovation dated to 1936, along with a vinyl record fragment from the 1950s to 1970s.

The presence of modern materials in the upper two strata and clay/silty nature of the soils, strongly suggests that these layers represent reworked native horizons, fill deposits or both. The minor late 1800s to early 1900s artifacts do not provide sufficient numbers or contextual integrity to link them to the 1874-built Collins Hotel, placed cartographically within the pond area (see Section 3.2.3). A former structure or structures were apparently in or near Pond 3, but their nature and dating remain unclear.

6.3.5 Pond 4. The half-acre Pond 4 lies southwest of the Glover Street and Tennyson Drive intersection in open parkland with medium-high grasses and shrubs (see Figure 2.23). The pond area was extended for the archaeological survey to include variant seawall routes and the new storm sewer outfall at the beach end of Robinson Avenue. A 50- or 25-foot (15- or 7.5-m) interval for the tests of Transects 27 to 41 was employed to conform to the triangular shape of the impact area (Figure 6.29). A playground is located at the end of Armstrong Avenue (see Figure 5.42).

Brown to darker brown sandy/silty loams were most frequently recorded for the first stratum of the 39 shovel tests. This pattern continued for the 16 tests with a second layer with an increase in clay content for the seven tests with a Stratum 3 and the single test with a fourth stratum (see Appendix A). Modern glass, plastic, cellophane, asphalt chunks and disturbed soils (probable playground construction), metal fence post top, electrical tape, gravel fill, and a high water table were found or observed in the field.

The recovered sample comprised (see Appendix B) 58 glass fragments including a whiskey/gin clear bottle rim from around 1900; a continuous threaded clear large mouth rim (late 1900s); an aqua curved sherd and four lime green crown type lip or bases (1900s); and six post-1903 amber rims or bases. Other items consisted of 24 round nails and a few construction (modern copper piping, cement paver), shell and modern miscellaneous materials.

Materials extended to all four strata with an uneven distribution across the survey area. The loams, clay content, artifact distribution of the surface strata point to reworked, fill layers or both, especially given the presence of the playground. The glass, nails (23 examples) and the rather minor construction materials from Shovel Tests C33-1 and C36-4 may reflect a likely post-mid-twentieth century structure or perhaps recreational facility; none were evident on historic maps reviewed prior to the investigation.

6.3.6 Glover Street. Transects 42 to 70, with one shovel test each at a 50-foot (15-m) interval were located along the north side of Glover Street in the grass and tree median between the road and sidewalk. The 15 shovel tests that were dug contained primarily brown to dark brown silty/sand loams or silt clays for two strata, as well as an electrical wire utility and modern items such as plastic, paper and cardboard (see Appendix A). Four flower pot fragments; 14 bottle glass sherds with one identifiable clear probable 1900s commercial

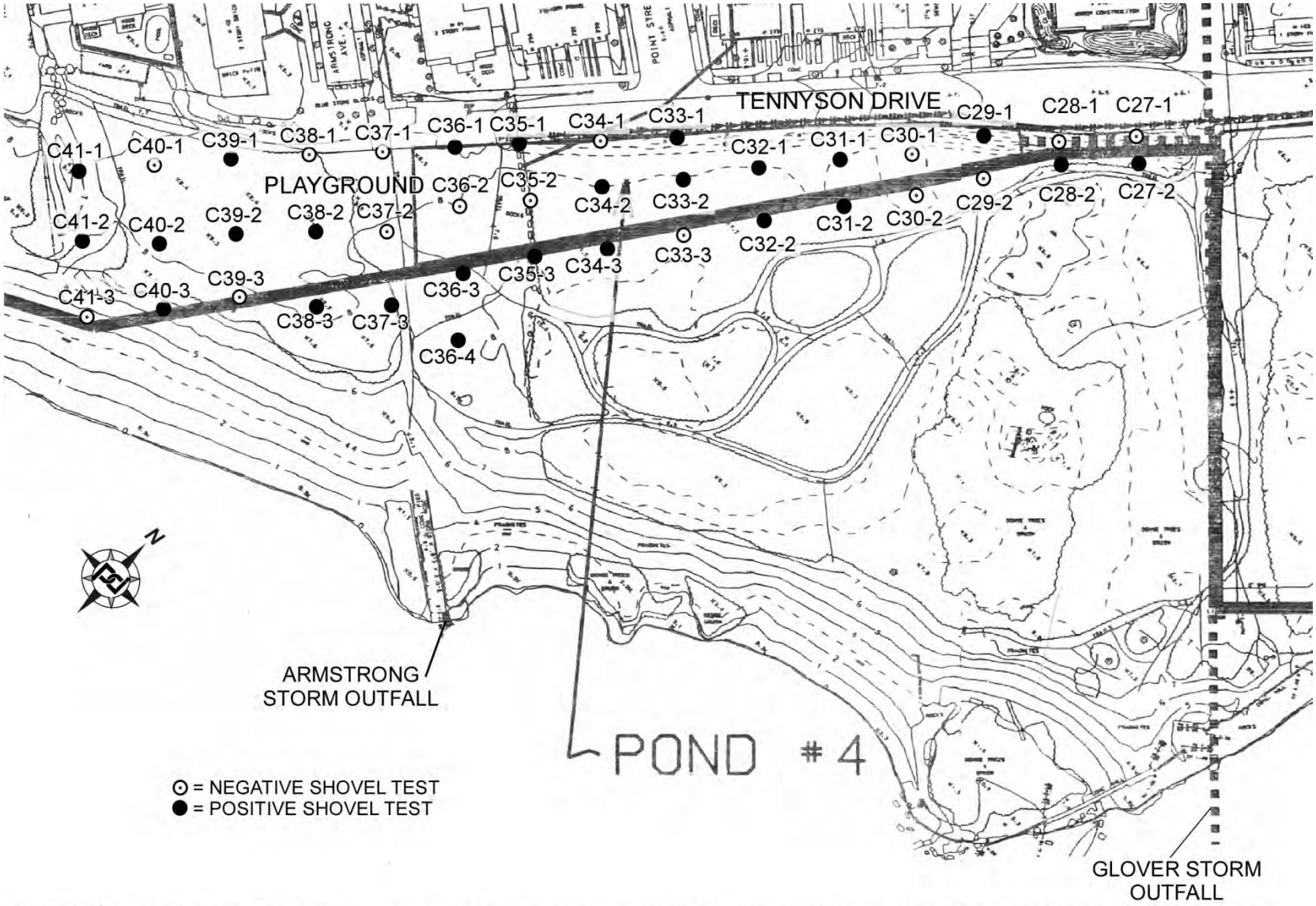


Figure 6.29. Study Area C: Pond 4 shovel test locations. Erosion Control/Storm Damage Protection Feasibility Study, Richmond County, NY *(adapted from USACE 2002: Figure 7 CBI ALT #3A).*

bottle, one light green thick-walled flat glass fragment; one cement and two linoleum fragments; four mammal bones; and nine modern plastic, Styrofoam and aluminum foil items made up the recovered sample (see Appendix B). Confinement of all collected and uncollected materials to the first stratum, the silty/clay textures and location of both strata strongly suggest that they represent fill or heavily reworked on-site soils.

6.3.7 Shovel Test, Stratigraphy and Artifact Collation. Table 6.3 repeats the same summary data organizational categories as Table 6.1. The Crescent Beach Hotel (built between 1898 and 1917); the Collins Hotel (established earlier, 1874 to 1887, with continued operation into the early 1900s), and bunglows (constructed by 1898 and in use until at least the second quarter of the 1900s) were depicted on maps and known prior to the field investigation. The Crescent Beach Hotel would be located at the north end of the seawall/ levee alignment that is currently occupied by a post-1995 condominium complex. The Collins Hotel would have been located in all or part of Pond 3, which demonstrated clear evidence of heavy reworking of near-surface strata with a scraped portion and large central mound, likely the result of local or non-local earth-moving activities. Historic maps showed several bungalows in the present locations of Ponds 1 and 2, now covered with dense undergrowth and used as current trash dumps.

No associated subsurface structural features were located. Minor amounts of later nineteenth to early twentieth century materials provided indirect evidence for this historic presence, and one possible direct linkage. Construction and other materials located along Transects 2, 2A, 3 and 3A in Pond 2 were consistent with an early to mid-twentieth century bungalow/structure or structures. Modern materials, beach sands and impacted or fill soils characterized the remaining survey components of Pond 4, the seawall alignment and Glover Street. No prehistoric sites or materials were identified.

Table 6.3. Study Area C: shovel test, stratigraphy and artifact collation

	Shovel Tests				Artifact Totals							
Survey Area	**T**	**P**	**N**	**Stratigraphic Summary**	**C**	**G**	**Me**	**Con**	**F**	**M**	**T**	**Artifact Summary**
Seawall Levee Public	17	16	1	Near beach sands north end; active beach sands south end 2 strata	1	126	11	10	20	13	182	Low density Fairly continuous distribution within north and south sections Primarily post-mid 1900s with late 1800s to early 1900s component
Pond 1 and Seawall Levee	29	22	7	Reworked soils; fill deposits 5 strata	1	102	7	30	4	16	160	Low density Wide distribution Primarily post-mid 1900s with late 1800s to early 1900s component
Pond 2	29 1 not dug	25	4	Reworked soils; fill deposits 3 strata	24	327	47	161	51	52	662	Moderate density Wide thin scatter with one area of high concentration Modern surface trash; Subsurface modern materials with primarily early to mid-1900s component
Pond 3	40 2 not dug	33	7	Striped area; reworked or fill soils 3 strata	29	131	2	41	13	16	232	Low density Fairly continuous distribution Primarily post-mid 1900s with minor late 1800s to early 1900s component
Pond 4 and Seawall Levee	39 1 not dug	19	20	Reworked soils; fill deposits; high water table 4 strata	0	58	28	8	9	7	110	Low density Uneven distribution Primarily post-mid 1900s with minor possible early 1900s component
Glover Street	15 1 not dug	9	6	Fill deposits; heavily reworked native soils 2 strata	4	15	0	3	4	9	35	Low density Uneven distribution Primarily if not exclusively post-mid 1900s
Totals	**169**	**124**	**45**		**59**	**759**	**95**	**253**	**101**	**113**	**1381**	

Key: T=total; P=Positive; N=Negative; C=Ceramics; G=Glass; Me=Metal; Con=Construction; F=Faunal; M=Miscellaneous

7.0 Recommendations

7.1 STUDY AREA A: SUMMARY RESULTS AND RECOMMENDATIONS

The architectural inspection of structures west (i.e., land side) of Father Capodanno Boulevard that might be impacted by the raising of the road, revealed that the majority are of modern construction (Table 7.1). Structures greater than 50 years old, consisting mainly of modest vernacular residences built between 1920 and 1950, are located at the north end. Many remain interspersed among buildings of more recent construction. Larger clusters of pre-1954 residences also remain between Sand Land and Doty Avenue, including an uninterrupted stretch of residential development north of Sand Land. Nearly all older structures along the boulevard display significant modifications, including synthetic siding, replacement windows and doors, and porch reconfigurations. The ca. 1900 2½-story residence at 93 Father Capodanno Boulevard, listed by the OPRHP, could not be located, most likely due to having been demolished sometime after 1979.

No structures presently located adjacent to the boulevard display the architectural or historical significance necessary for NRHP eligibility, either individually or as an historic district. Extant pre-1954 buildings consist of simple mid-twentieth century Minimal Traditional structures typical of those still found in abundance throughout the region and country. While representative of their time and place, these structures are greatly diminished in their significance by their commonness. The potential NRHP-eligibility of these buildings is also lessened by the obvious lack of integrity displayed by most of the structures. Almost all of the buildings have been altered extensively and retain negligible original historic fabric.

A few scattered structures are present on the sea side of the boulevard and within the vicinity of the Franklin Delano Roosevelt boardwalk and promenade. They consist entirely of comfort stations, concession and maintenance buildings added between 1950 and 1970. The buildings represent simple concrete block construction and do not meet NRHP-eligible criteria.

The early 1935/1938-built boardwalk followed the entire South and Midland Beach shorelines between Fort Wadsworth and Miller Field. The current elevated timber north half boardwalk represents a replacement of the former entirely elevated structure, while the alignment is continued with a recently constructed at-grade asphalt and pavement promenade in the south section. These are conditions that make for a tenuous association with Roosevelt's New Deal public works initiatives and unlikely criteria for inclusion in the NRHP. The placement of a buried seawall just beyond and the sheet pile seawall immediately seaside of the boardwalk is not expected to directly impact the structure. The sheet pile wall will extend to the current height of the boardwalk and thus be visible from only the beach. An even newer promenade will top a partially buried seawall or be flanked by a sheet pile seawall with sections above and below ground.

The NRHP-eligible Verrazano-Narrows Bridge can be seen to the north of the boardwalk. Potential visual impacts to the bridge will be negligible, since the bridge's setting is already composed of an ever-changing modern suburban setting, much of which can be traced to the construction of the bridge. Moreover, even from the northern end of the study area, the bridge is located at least 3,800 feet (1,150 m) away and is of such a large scale that visual impacts resulting from the proposed protection measures will be virtually unnoticeable when looking out from the bridge toward the surrounding landscape.

Table 7.1. Study Area A: Summary Results and Recommendations

Survey Component	Protection Measure	Impacts	Documented or Possible Resources	Survey Results	Recommendations (for all options unless otherwise specified0
Existing Structures landside of Father Capodanno Boulevard	Raising	Negative affect to integrity of historic structures	Possible NRHP eligible structures; OPRHP Building Inventory form for 93 Father Capodanno Boulevard, ca. 1900 residence	Primarily mid to late-1900s residences, commercial establishments, condominiums, and South Beach Psychiatric Center; 1920 to 1950 built residences at north end, typical of suburban dwellings normally with many modifications; ca 1900s residence not located, apparently demolished	No further work
Existing Structures seaside of Father Capodanno Boulevard	Raising and buried seawall; sheet pile seawall construction	Negative affect to integrity of historic structures or boardwalk and negative visual impact to Verrazano-Narrows Bridge	Possible NRHP eligible structures; Franklin Delano Roosevelt Boardwalk initially built 1935/1938; Verrazano-Narrows Bridge, NRHP eligible (USN 08501.002780)	Modern comfort, concession, maintenance buildings; current boardwalk and promenade a replacement for early 1900s alignment	No further work
North 300-foot end of boardwalk	Buried seawall	Stone/earth fill above ground; 3 feet (1 meter) below ground	Possible remains of: prehistoric Arrochar site; prehistoric and historic 1600s components at Walton Stillwell House	No prehistoric or historic resources; low density of mid-1900s to recent materials	No further work
Boardwalk	Sheet pile seawall	Above ground and several feet (meters) below ground sections	Late 1800s to early 1900s recreational development	*Near-surface*: No prehistoric resources; low density of primarily post-mid-1900s materials with minor historic component *Not tested* for possible deeply buried prehistoric resources	Under Alternative 3 or FO2 Borings along sheet pile seawall alignment; conditional upon construction techniques
Promenade Seaside	Elevation and buried seawall	New promenade above stone and earth fill above ground; 3 feet (1 meter) below ground	Late 1800s to early 1900s recreational development; later 1800s near shore structures on properties	No prehistoric resources; low density of primarily post-mid-1900s materials with minor historic component	No further work
Promenade Landside	Sheet pile seawall	Above ground and several feet (meters) below ground sections	Late 1800s to early 1900s recreational development	*Near-surface*: No prehistoric resources; low-moderate density of primarily post-mid-1900s materials with minor late 1800s to early 1900s component *Not tested* for possible deeply buried prehistoric resources	Under Alternative 3 or FO2 Borings along sheet pile seawall alignment; conditional upon construction techniques
Father Capodanno Boulevard	Road raising	Fill over broken current surface; upper 2 to 3 feet (0.6 to 1 meter)	Early historic settlement; Late 1800s to early 1900s recreational development	No prehistoric resources; low-moderate density of primarily post-mid-1900s materials with minor 1800s to early 1900s component; occasional higher artifact concentration loci	No further work
Boulevard to Miller Field Connect	Buried seawall	Stone/earth fill above ground; 3 feet (1 meter) below ground	Late 1800s to early 1900s recreational development	No prehistoric resources; primarily post-mid-1900s with very minor early 1900s component	No further work

Table 7.1 continued.

Survey Component	Protection Measure	Impacts	Documented or Possible Resources	Survey Results	Recommendations (for all options unless otherwise specified0
Two turnarounds along Boulevard	Road raising	Fill over broken current surface; upper 2 to 3 feet (0.6 to 1 meter)	Late 1800s to early 1900s recreational development	No prehistoric resources; low density of primarily post-mid-1900s materials	No further work
Boulevard Access	Berm	Fill primarily above ground; 1 to 3 feet (0.3 to 1 meter)	Late 1800s to early 1900s recreational development	No prehistoric resources; low density of primarily post-mid-1900s materials with	No further work
Pond1	Inland water control	Excavation to 1 foot (0.3 meter)	Possible historic structures on higher adjacent ground	*Architectural Survey*: modern suburban residential development with one ca 1925 residence at 51 Graham Boulevard *Field Survey*: Visual Examination	Phase I shovel testing on adjacent higher ground
Pond 2	Inland water control	Excavation to 1 foot (0.3 meter)	Possible historic structures on higher adjacent ground	*Architectural Survey*: late 1900s residential structures *Field Survey*: Visual Examination	Phase I shovel testing on adjacent higher ground
Pond 1(3)	Inland water control	Excavation to 5 feet (1.5 meters)	Possible historic structures on higher adjacent ground	*Architectural Survey*: no structures within or immediately adjacent *Field Survey*: Visual Examination	Phase I shovel testing on adjacent higher ground and internally on any localized higher micro-landforms
Pump Stations	Inland water control	Estimate 1 to 3 feet (0.3 to 1 meter) below surface	Possible historic structures	*Architectural Survey*: no structures within (Pond 3) or late 1900s residences in vicinity (Pond 2) *Field Survey*: Visual Examination	Phase I testing at Ponds 2 and 3
Sea View Avenue	Road raising	Fill over broken current surface; upper 2 to 3 feet (0.6 to 1 meter)	Late 1800s to early 1900s recreational development	No prehistoric resources; low density of primarily or exclusively post-mid-1900s	No further work

None of the present structures along the land side of Father Capodanno Boulevard or between the boulevard and the Franklin Delano Roosevelt Boardwalk display the architectural significance or integrity necessary to meet NRHP-eligibility criteria. Most are modern and those that were built during the early 1900s represent common and altered examples. The New Deal era-associated boardwalk has been replaced with modern timber and paved sections. The Verrazano-Narrows Bridge lies to the north of the study area, but the flood control measures are not expected to have a visual impact on the historic bridge. No impacts to NRHP-eligible standing structures under any of the three protection measure options are anticipated. No further investigations are recommended.

These same conclusions and recommendations are also advanced for near-surface archaeological resources identified in Study Area A. No prehistoric sites or materials were located, although elements of the Arrochar site, the prehistoric component at the Walton Stillwell House or Staten Island's prehistoric occupation in general could have been located. Subsequent historic and modern period developments, as well as sampling error (testing limited to a circumscribed lineal route) comprise probable reasons for non-identification of any remains.

A low to low-moderate density of widely spread modern materials characterizes the various survey components along Father Capodanno Boulevard, the boardwalk/promenade and sections in between. Occasional higher artifact concentrations were noted that most often represented single or limited recent trash deposition. A minor amount of 1800s to early 1900s artifacts, such as ceramics and glass, were recovered from largely reworked fill upper strata. No subsurface structural features were located. Early historic settlement, later 1800s near beach structures at the Kettletas and Townsend properties, in addition to a significant late 1800s to early 1900s recreational complex, have been documented for the study area. Though the materials may relate to this development, their low numbers and lack of contexts precluded making direct associations with particular structures or particular types of structures.

The three open, marsh grass dominated pond or defined wetland areas were visually examined for possible testable portions, as were two pump station locations. The pump stations will be located on nearby higher ground that also fringes most or part of the wetlands. Pond 3 is odd-shaped and large enough that pockets of higher terrain may be present within the wetland. A Phase I shovel testing examination of the higher ground fringes is recommended for all three ponds and the two pump stations.

Either no structures within or modern residences adjacent to the ponds and pump stations were noted during architectural survey. The ca. 1925 residence at 51 Graham Boulevard adjoining Pond 1 has been modified to the extent that the building is not considered National Register-eligible.

While the raising of Father Capodanno Boulevard and associated sections (Miller Field Connect; end of Sea View Avenue; two turnarounds; landside structures) under Alternative 1 (FO3), and the combined raised boulevard/promenade with buried seawall/access berm under Alternative 2 (FO7) are expected to affect up to three feet below the surface, the sheet pile seawall along the boardwalk and promenade under Alternative 3 (FO2) will impact several feet underground. The seawall construction may reach the former barrier beach/lagoon system associated with the prehistoric period under the current beach and offshore zone.

Borings are recommended along the alignment to test for the possible presence of buried early prehistoric landforms under the historic period marsh or organic soils. This recommendation is conditional. The depth of fill above the former barrier beach and lagoon system varies. At the Oakwood Beach Sewage Treatment Plant fill was encountered up to 9 feet (2.7 meters) below the surface, while at the Crescent Beach Tennyson Drive location it extended to 7 feet (2.1 meters). Sheet pile construction techniques should be taken into account involving such factors as actual depths and if trenching or pile driving will be employed to position the seawall segments. Borings will serve to determine if the seawall construction will create an impact and if additional deep mechanical testing is warranted.

7.2 STUDY AREA B: SUMMARY RESULTS AND RECOMMENDATIONS

Certain sections within Study Area B were left unexamined involving the existing rock-lined dune and levee at Oakwood Beach as well as two non-structural protection areas inland from Oakwood and New Dorp Beaches (Table 7.2). Modifications will be made to the existing dune and levee, but impacts will be minimal or nonexistent. Further, defined wetlands or an active beach occupy either side of the man-made structures. No further work is recommended

Table 7.2. Study Area B: Summary Results and Recommendations

Survey Component	Protection Measure	Impacts	Documented or Possible Resources	Survey Results	Recommendations
Miller Field or South Midland Beach	Buried seawall with or without raised promenade; double sheet pile seawall for 150 feet (46 meters)	Stone/earth fill above ground, 3 feet (1 meter) below ground for buried seawall; Above ground and several feet (meters) below ground sections for sheet pile seawall	1944 World War II Fire Control Tower associated with the Miller Army Air Field Historic District 90NR01020	*Architectural Survey*: Fire Control Tower is not a contributing element to the Miller Army Air Field Historic District due to lack of integrity *Field Survey*: additional structural features in and around tower; primarily post-mid-1900s with minor early 1900s component; no prehistoric resources *Not tested* for possible deeply buried prehistoric resources	No further work No borings along double sheet pile seawall recommended
New Dorp Beach	Buried seawall with or without raised promenade	Stone/earth fill above ground; 3 feet (1 meter) below ground	Possible remains of: -Revolutionary War Fortifications -Late 1600s Britton Cottage -1780/1781 Barnes House -1850s to mid-1900s Lighthouse complex -1874/1887 to mid 1900s Sea Side/St John's Hospital complex -Various post-1859 residences and resort facilities	Five structural features located; Structures 1A and 2A at shoreline; Structures 3A, 4A, 5A on adjacent higher ground/berm, along with other reported domestic materials and structural features from two previous surveys John Milner Associates 1978 and Lipson, et al. 1978; likely direct association between Structures 1A, 2A and SI- 15 (A085-01-0154) SI-16 (A085-01-0155) of Milner survey and St John's Hospital complex; Low density, primarily post-mid-1900s with minor late 1800s to early 1900s component; no prehistoric resources	Phase II field and documentary investigation to define specific structural features and make direct linkages with documented structures from the shoreline inland to Cedar Grove Avenue
Cedar Grove Beach	Buried seawall with or without raised promenade	Stone/earth fill above ground; 3 feet (1 meter) below ground	Possible remains of 18501853 house and pier Existing and demolished 1910 to 1917 established Cedar Grove Beach Club community	*Architectural Survey*: visual inspection suggests Cedar Grove Beach Club community may be National Register eligible. *Field Survey*: former or demolished bungalows located; Low density, primarily post-mid-1900s with minor historic component	Phase II evaluation of Cedar Grove Beach Club community's National Register of Historic Places eligibility
Oakwood Beach Existing Dune	Reinforce	No direct impacts	Very low probability of prior prehistoric or historic resources	Not tested	No further work
Oakwood Beach landside	Internal levee	Earthen fill; most of levee above ground with portion up to 3 feet or 1 meter below ground	Very low probability of prehistoric resources; a few mid-1800s to early 1900s structures and bungalows	Low density, likely disturbed context; modern materials with very minor historic component	No further work
Oakwood Beach Existing Levee	Raising of crest and abutment walls	No direct impacts	Very low probability of prior prehistoric or historic resources	Not tested	No further work

Table 7.2 continued.

Survey Component	Protection Measure	Impacts	Documented or Possible Resources	Survey Results	Recommendations
Oakwood Beach Sewage Treatment Plant	Levee and sheet pile floodwall for 675 feet (206 meters)	Earthen fill; most of levee above ground with portion up to 3 feet (1 metr) below ground; vertical single sheet pile, 16 feet (4.9 meters) above and 22 feet (6.7 meters) below ground	Possible remains of 1700s and 1800s Lakes Mill and Millers House	*Architectural Survey:* mid to late 1900s structures including the Sewage Treatment Plant and near-by residences, the latter are not within the project area *Near-surface*: No prehistoric resources; Low density, primarily modern with minor early 1900s component from disturbed context *Not tested* for possible deeply buried prehistoric resources	Borings along sheet pile floodwall; conditional upon construction techniques
West of Oakwood Beach Sewage Treatment Plant	Levee	Earthen fill; most of levee above ground with portion up to 3 feet (1 meter) below ground	Very low probability of prehistoric or historic resources	Low density, primarily modern with minor early 1900s component	No further work
New Dorp Beach non-structural protection area	No action	No impact	Possible historic structures or prehistoric resources	No testing	If no action, no further work If protection measures planned, a Phase I architectural, field or combined survey
Oakwood Beach non-structural protection area	No action	No impact	Possible historic structures or prehistoric resources	No testing	If no action, no further work If protection measures planned, a Phase I architectural, field or combined survey

here or for the two non-structural protection areas, as no action is planned. Should plans change for the later two areas, a Phase I archaeological, initial architectural, or both types of survey is recommended depending on the specific protection measure.

The buried seawall with or without raised promenade alignment will not impact the Miller Army Air Field Historic District, but will pass through the ground now occupied by the associated Fire Control Tower (built 1944). Shovel testing around the tower produced primarily modern materials with a minor early 1900s component and evidence of former structures (e.g., building debris, monument marker) between the tower and Air Field. While Miller Field and the surrounding Forts Hancock, Tilden, Wadsworth, and Hamilton undoubtedly played a significant role during World War II, this intricate coastal fortification system no longer exists. The battery system has been destroyed by the continuous construction activities associated with an active harbor and numerous attempts to “clean-up” the various sites. Battery Livingston at Fort Hamilton was wiped out by the construction of the Verrazano-Narrows Bridge and Belt Parkway and is now no more than a series of terraced stone steps. The Miller Field base end station still exists for the battery, although the battery itself no longer exists. The tower alone does not possess sufficient integrity to be considered a contributing element to the Miller Army Air Field Historic District (90NR01020). The viewshed concern which would have been raised by the construction of the seawall alongside the tower is thus rendered moot, despite its arresting presence.

A number of historic features were documented for New Dorp Beach from Revolutionary War Fortifications to a hospital to resort facilities. The present survey located two structural features along the beach and three on a low berm or higher ground overlooking the beach. Two prior investigations (John Milner Associates 1978; Lipson et al. 1978) also located structural elements (SI-13 a concrete and brick foundation; SI-14 a concrete foundation) and domestic materials.

The location and configuration of the present survey's Structures 1A and 2A, along with the descriptions of Foundations SI-15 and SI-16 (John Milner Associates 1978) strongly suggest that they represent three components of the early 1900s St. John's Hospital complex. Structure 1A and Milner's SI-16 are considered to represent the same feature, a portion of the southeast wing of the hospital's main building. Structure 2A likely represents a portion of the northeast wing and Milner's SI-15 a portion of the southwest wing. Primarily modern materials with a minor late 1800s to early 1900s component were recovered from the shovel tests around the five structures and along the berm edge.

A Phase II field and archival investigation is recommended from the beach inland to Cedar Grove Avenue to define structural features and to help make direct linkages with documented structures. The results of the 1978 studies (John Milner Associates 1978; Lipson et al. 1978) should be incorporated into the investigation. Systematic close-interval (15- or 25-ft/4.6- or 7.5-m) shovel testing may be needed to identify specific residences or building complexes and any associated features. Although Milner (1978) did not consider the four foundations—SI-13, SI-14, SI-15, SI-16—located at New Dorp Beach as NRHP-eligible, this determination was made in the absence of the expanded field results and documentary context now provided. Present and future structural elements in this area should be evaluated for eligibility individually and collectively.

Existing and former bungalows of the Cedar Grove Beach Club Community front Cedar Grove Beach. Even though the shovel testing yielded only a minor amount of historic artifacts, the well-built and extant nature of the bungalows invites a Phase II level review of the community's National Register-eligibility.

The remaining survey components inland from Oakwood Beach produced no evidence that either standing structures or archaeological materials from these sections merited inclusion within the NRHP. A modern Sewage Treatment Plant and surrounding near-by residences are modern and only minor amounts of historic artifacts were recovered from uncertain contexts. No near-surface prehistoric sites or materials were located in Study Area B.

The issue of deeply buried prehistoric resources and possible remains of a seventeenth to eighteenth century mill complex is of concern in Study Area B, where sheet pile seawalls are planned for a 150-foot (46-m) section at Miller Field and for a 675-foot (206-m) portion around the Oakwood Beach Sewage Treatment Plant. The short length of the section at Miller Field makes it unlikely that the seawall would directly impact any NRHP-eligible prehistoric resources. Borings are not recommended here, but are for the portion around the Treatment Plant where the seawall is expected to reach a 22-foot (6.7 m) depth. The recommendation is again made subject to specific sheetpile floodwall construction techniques.

7.3 STUDY AREA C: SUMMARY RESULTS AND RECOMMENDATIONS

Non-tested survey components within Study Area C consisted of Hyland Avenue, Armstrong Avenue, and Goodall Street where existing utility lines will be upgraded; the Tennyson Drive pump station that would be placed under the present road bed; a 100-foot (31-meter) section at the very north end of the seawall alignment that crosses the post-1995 condominium complex, and a 175-foot (53-meter) portion for a new storm sewer outfall that will traverse privet property at the end of Robinson Avenue (Table 7.3). Utility upgrades and the placing of a pump station under Tennyson Drive are unlikely to affect any significant resources. The short lengths of the sections on privet land and their location in obviously surface disturbed matrices argues for no further investigation.

Table 7.3. Study Area C: Summary Results and Recommendations

Survey Component	Protection Measure	Impacts	Documented or Possible Resources	Survey Results	Recommendations (for both alternatives unless otherwise specified)
Standing Structures	Pond and seawall construction	Structural and visual	Possible National Register eligible structures	Modern residential development	No further work
Crescent Beach Public Alignment	Sheet pile or sloped stone seawall with levees	Above and belowground portions affecting from a few feet to 25 feet (7.6 meters) below ground	Low probability of near-surface prehistoric or historic resources	*Near-surface*: No prehistoric resources; Low density, primarily post-mid 1900s with late 1800s to early 1900s components *Not tested* for possible deeply buried prehistoric resources	Under sheet pile seawall option Borings along seawall; conditional upon construction techniques
Crescent Beach Privet (100 feet/31 meters) Alignment	Sheet pile or sloped stone seawall with levees	Above and below ground portions affecting from a few feet to 25 feet (7.6 meters) below ground	Very low probability of prehistoric or historic resources	*Near-surface*: not tested *Not tested* for possible deeply buried prehistoric resources	No further investigation Under sheet pile seawall option Borings along seawall; conditional upon construction techniques
Pond 1	Inland water control	Excavation to 4 or 6 feet (1.2 to 1.8 meters)	5 to 7 1898 to early 1900s bungalows	No prehistoric resources; Low density, wide distribution with primarily post-mid-1900s with late 1800s to early 1900s components	Phase II additional close-interval shovel tests at a 15 or 25 foot (4.6 to 7.5 meter) interval for features/materials associated with the bungalows
Pond 2	Inland water control	Excavation to 3 feet (1 meter)	Approximately 13 1898 to early 1900s bungalows	No prehistoric resources; Modern surface trash; wide thin scatter with one area of high concentration with mix of modern and light early to mid 1900s materials	Phase II additional close-interval shovel tests at a 15 or 25 foot (4.6 to 7.5 meter) interval for features/materials associated with the bungalows
Pond 3	Inland water control	Excavation to 5 feet (1.5 meters)	1874/1887 to ca 1917 Collins Hotel	No prehistoric resources; Low density, primarily post-mid 1900s with minor late 1800s to early 1900s components	No further work
Pond 4	Inland water control	Excavation to 5 feet (1.5 meters)	Low probability of prehistoric and historic resources	No prehistoric resources; Low density, primarily post-mid 1900s with minor possible early 1900s components	No further work
Hyland Street	Inland water control	Upgrade existing storm sewer line	Very low probability of prior prehistoric and historic resources	Not tested	No further work

Table 7.3 continued.

Survey Component	Protection Measure	Impacts	Documented or Possible Resources	Survey Results	Recommendations (for both alternatives unless otherwise specified)
Armstrong Avenue	Inland water control	Upgrade existing storm sewer line	Very low probability of prior prehistoric and historic resources	Not tested	No further work
Goodall Street	Inland water control	Upgrade existing storm sewer line	Very low probability of prior prehistoric and historic resources	Not tested	No further work
Glover Street	Inland water control	Install new storm sewer line	Very low probability of prehistoric and historic resources	No prehistoric resources; Low density, primarily if not exclusively post-mid 1900s	No further work
Storm sewer outfall land sections	Water control	Upgrade existing storm sewer line along Goodall Street and Armstrong Ave	Very low probability of prior prehistoric and historic resources	Not tested	No further work
Storm sewer outfall land sections	Water control	Install new storm sewer line along Glover Street and 175 feet (53 meters) along Robinson Ave on privet land and public beach	Very low probability of prehistoric and historic resources	No prehistoric resources and primarily post-mid-1900s materials with minor historic components	No further work
Storm sewer outfall near shore sections	Water control	Extend Goodall Street 150 feet (46 meters); repair Armstrong Avenue; new 50 feet (15 meters) for Glover Street and new 25 feet (7.6 meters) for Robinson Avenue	Very low probability of near-surface prehistoric and low probability of historic resources	*Near-surface*: not tested *Not tested* for possible deeply buried prehistoric resources	Under sheet pile seawall option Borings along outfall alignments; conditional upon construction techniques
Pump stations	Water control	One at shoreline other under paved Tennyson Drive	Very low probability of prehistoric or historic resources	No testing at Tennyson Drive; Beach area low density of primarily post-mid-1900s materials	No further work

Remains of the Collins Hotel (1874/1887 to c. 1917) were expected to be located in Pond 3. Instead, recent landscaping for a memorial to the September 11th World Trade Center victims, several small trash and construction debris piles along with a large high mound most likely representing past earth moving activities made identification with the hotel highly unlikely. Structural elements such a ceramic drain, concrete pad and a mix of primarily modern materials with a late 1800s to early 1900s component point to only a generalized former and modern occupation of the area. No further work is recommended.

Ponds 1 and 2 presented similar terrains with heavy dense undergrowth and mature trees and yielded similar results. At both locations bungalows were depicted on historic maps. The minor component of late 1800s to early 1900s materials likely reflects this past occupation, with one specific locus or residence identified along Transects 2, 2A, 3 and 3A in Pond 2. The dense undergrowth and modern trash hampered adequate surface inspection that along with the present results prompts a recommendation of additional close-interval shovel testing at a 15- or 25-ft (4.6- to 7.5-m) to locate features or artifact deposits associated with the bungalows within both pond areas. Little remains of comparable former communities

along the south shore of Staten Island, and extant or yet-to-be-found remains may meet NRHP-eligibility criteria.

Testing along the sheetpile or sloped-stone seawall with levees alignment; the proposed storm sewer land lines; along Glover Street where a new storm sewer line will be placed, and within Pond 4 (which also covered the second pump station and alternative seawall alignments) failed to locate any subsurface structural features. A light scatter of historic materials was collected. Standing structures within the study area represent modern residential development from individual family residences to suburban duplexes with none considered NRHP-eligible. No impacts to architecturally or archaeologically significant resources are likely to result from the proposed protection measures in these sections, and no further work is recommended.

Under the sheetpile seawall-with-levee option, the wall would extend 25 ft (7.5 m) below the current surface. Like the other study areas, the seawall construction and, in this area, the storm sewer outfalls, may reach below the historic barrier beach/lagoon system under the current beach and offshore zone. Borings are again recommended with the same caveats along the alignments to test for the possible presence of buried early prehistoric landforms. The locations and depths of any such soils would serve to determine if the seawall/storm sewer construction will create an impact and if additional deep mechanical testing is warranted.

No underwater survey for historic resources is recommended for the near-shore zone at Crescent Beach. Under the sheetpile seawall-with-levee option, borings may be used to test this area that would include historic period horizons. Under the sloped-stone seawall-with-levee option limited near-surface impacts to the inter-tidal zone are anticipated from the seawall and new or upgraded storm sewer outfalls installation. No shipwrecks and one set of non-eligible ruined timber pilings were noted along the shoreline. A side-scan or magnetometer sweep is not considered justified under these circumstances.

8.0 References Cited

Anderson, Albert, and Donald R. Sainz
1965 Excavations at Oude Dorp in *The New Bulletin*. Staten Island Institute of Arts and Sciences 14: 82-96.

Barber, Russell J.
1980 Post-Pleistocene Anadromous Fish Exploitation at the Boswell Site, Northeastern Massachusetts. *Man in the Northeast Occasional Publications in Northeastern Anthropology* 7:97-113.

Baugher-Perlin, Sherene, and Frederick A. Bluefeld
1980 *A Background Study of Historic Land Use of the Gateway National Recreation Area, Staten Island Unit*. Staten Island Institute of the Arts and Sciences, NY. Prepared for the National Park Service. On file at the U.S. Army Corps of Engineers, New York District, New York.

Belknap, D.F., and J.C. Kraft
1977 Holocene Relative Sea-level Changes and Coastal Stratigraphic Units on the Northwest Flank of the Baltimore Canyon Trough Geosyncline. *Journal of Sedimentary Petrology* 47: 610-629.

1981 Preservation Potential of Transgressive Coastal Lithosomes on the U.S. Atlantic Shelf in *Sedimentary Dynamics of Continental Shelves,*. edited by C.A. Nittrouer, pp. 429-442. Elsevier Scientific Publishing Co., Amsterdam.

Beers, J. B., and Company
1874 *Atlas of Staten Island, Richmond County, New York*. J. B. Beers and Company, New York.

1887 *Atlas of Staten Island, Richmond County, New York*. J.B. Beers and Company, New York.

Boesch, Eugene J.
1994 *Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York*. Submitted to the New York City Landmarks Preservation Commission.

Bolton, Reginald Pelham
1920 New York City in Indian Possession. *Indian Notes and Monographs*, Vol. 11:7:1-170. Museum of the American Indian, Heye Foundation. Reprint 1975.

1922 Indian Paths in the Great Metropolis. *Indian Notes and Monographs*. Miscellaneous #22. New York: Museum of the American Indian, Heye Foundation.

Borough of Richmond
1908 to 1910 Topographical maps of the Borough of Richmond, New York.

Brennan, Louis A.
1974 The Lower Hudson: A Decade of Shell Middens. *Archaeology of Eastern North America* 2:81-93.

1977 The Lower Hudson: The Archaic. In *Amerinds and Their Paleoenvironments in Northeastern North America*, Walter S. Newman and Bert Salwen, editors. Annals of the New York Academy of Sciences, No. 288.

Brittain, Philip J.
1962 Storm-Hit Cedar Grove Beach Soon to Be but a Memory. *Staten Island Advance* 4 April:11.

Bromley, George W., and Walter S. Bromley
1917 *Atlas of the City of New York. Borough of Richmond*. G.W. Bromley & Co., Philadelphia.

CDSG (Coast Defense Study Group)
2005 List of American Military Reservations and Concrete Gun Batteries, U.S. Mid-Atlantic, Harbor Defenses of Southern New York. Coast Defense Study Group, Zionsville, IN. Online (available) http://www.cdsg.org/cdnotes.htm

Cedar Grove Beach Club
1924 *Constitution and By-laws of the Cedar Grove Beach Club*. New Dorp, Staten Island. Pamphlet in the Collection of the Staten Island Institute of Arts and Sciences.

Conner, Richard, and Bernard Sprong
1797 *A New and Correct Map of the County of Richmond*. Collection of the New York Public Library.

Crowley, James
2001 Lighthouses of New York. New York: National Lighthouse Museum. Elm Tree Lighthouse history section. Online (available) http://www.lighthousemuseum.org/nylights/elmtree.htm

Davis, William T.
1942 The Old Lake Tide Mill. *Proceedings of the Staten Island Institute of Arts and Sciences* 9:137-138.

Dincauze, Dena F.
1976 The Neville Site: 8,000 Years at Amoskeag. *Peabody Museum Monographs* No. 4, Harvard University, Cambridge.

Dripps, Matthew
1850 *Map of Staten Island or Richmond County, New York*. R.E.O. Connor and Matthew Dripps, New York.

Edwards, Robert L., and K.O. Emery
1977 Man on the Continental Shelf. In *Amerinds and Their Paleoenvironments in Eastern North America*, edited by W.S. Newman and B. Salwen. New York Academy of Sciences (Annals of the New York Academy of Sciences, Vol. 288). pp. 245-256.

Edwards, Robert L., and Arthur S. Merrill
1977 A Reconstruction of the Continental Shelf Areas of Eastern North America for the Times 9,500 B.P. and 12,500 B.P. *Archaeology of Eastern North America* 5:1-43.

Eisenberg, Leonard
1978 *Paleo-Indian Settlement Pattern in the Hudson and Delaware River Drainages.* Occasional Publications in Northeastern Anthropology No. 4, Franklin Pierce College, Rindge, NH.

Emery, K.O., and R.L. Edwards
1966 Archaeological Potential of the Atlantic Continental Shelf. *American Antiquity*. 31:733-737.

Fairchild Aerial Camera Company
1924 Aerial Photographs of New York City. New York City Board of Estimate and Apportionment.

Fach, Clara V.
1909 "Amusements" in *Staten Island and Staten Islanders,* edited by Margaret Louise Lynd, pp. 55-57. The Grafton Press, New York.

Frank Leslie's Illustrated Newspaper
1881 "New Seaside Nursery of St. John's Guild." LII:400. August 13, 1881.

Frank Leslie's Illustrirte Zeitung
1881 Print of St. Johns Hospital and Wharf. p. 125.

Funk, Robert E.
1972 Early Man in the Northeast and the Late Glacial Environment. *Man in the Northeast* 4:7-39.

1976 Recent Contributions to Hudson Valley Prehistory. *New York State Museum and Science Service Memoir* No. 22, Albany.

Gardner, W. M.
1974 The Flint Run Paleo-Indian Complex: A Preliminary Report, 1971-1973 Seasons. T*he Catholic University of America, Archaeology Laboratory, Occasional Publication 1.*

Goddard, Ives
1971 The Ethnohistorical Implications of Early Delaware Linguistic Materials. *Man in the Northeast* 1:14-26.

1978a Eastern Algonquian Languages. In *Northeast*, edited by Bruce G. Trigger, pp. 70-77. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978b Delaware. In *Northeast*, edited by Bruce G. Trigger, pp. 213-239. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Gramly, Richard N.
1982 The Vail Site: A Paleo-Indian Encampment in Maine in *Bulletin of the Buffalo Society of Natural Science*s No. 30.

Greenwood, Richard E., and Ricardo Torres-Reyes
1976 National Register of Historic Places, Inventory–Nomination Form. National Park Service. On file, New York State Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford.

Hampshire County Council
1999 Eling Tide Mill. Hampshire County Council, np.
Online (Available) http://www.hants.gov.uk/leisure/millmons/elingtid/

Historic Miller Field
2003/2004 History of Miller Field. Online (available) http://www.geocities.com/miller_field/

2004/2005 Various subsections discussing the history and development of Miller Field. *Historic Miller Field, Staten Island, NY* website. Online (available) at http://www.geocities.com/miller_field/ww2.html

Historic American Buildings Survey (HABS)
2003 Miller Field-Seaplane Hangar. Online (available)
http://memory.loc.gov/cgi-bin/query/r?ammem/hh:@field(NUMBER+@band(NY1106))

Historical Perspectives, Inc.
1987 *Phase IA Archaeological Assessment Report for the Regatta Cove Condominums (sic), Staten Island, N.Y*. CEQR 87-197R. Historical Perspectives, Inc., np. On file at the New York City Landmarks Preservation Commission.

Historical Records Survey
1942 *Transcriptions of Early Town Records of New York: The Earliest Volume of Staten Island Records*: 1678-1813. W.P.A.

John Milner Associates
1978 *A Cultural Resources Inventory of the Gateway National Recreation Area*. National Park Service, Denver Service Center. On File, New York State Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford.

Kraft, Herbert C.
1975 *The Archaeology of the Tocks Island Area*. Archaeological Research Center, Seton Hall University Museum, South Orange, NJ.

1986 *The Lenape: Archaeology, History and Ethnography*. New Jersey Historical Society, Newark.

Kraft, John C.
1985 Marine Environments: Paleogeographic Reconstruction in the Littoral Region in *Archaeological Sediments in Context,* ed. by Julie K. Stein and William R. Farrand, pp. 111-125. Center for the Study of Early Man. Orono, ME.

Kraft, J.C., D.F. Belknap, and I. Kayan
1983 Potentials of Discovery of Human Occupation Sites on the Continental Shelves and Nearshore Coastal Zone in *Quaternary Coastlines and Marine Archaeology,* edited by P.M. Masters and N.C. Fleming, pp. 87-120. Academic Press, London.

Leng, Charles W., and William T. Davis
1930 *Staten Island and Its People*. Vols. I and II. Lewis Historical Publishing Company, New York.

Lighthouse Research for Preservation
nd Elm Tree Front Range Light. Sheet in Lighthouse loose-leaf binder. Staten Island Institute of Arts and Sciences.

Linck, Dana
2001 Presentation made at March meeting of Professional Archaeologists of New York.

Lipson, Clara, John Piet, Michael Alterman, and Kris Egelhof
1978 *Cultural Resources Reconnaissance, Beach Erosion Control and Hurricane Protection Project at Staten Island*. On File, New York State Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford.

Lundrigan, Margaret, and Tova Navarra
1997 *Staten Island*. Arcadia Publishing, Dover, NH.

Lynd, Margaret Louise, ed.
1909 *Staten Island and Staten Islanders*. The Grafton Press, New York.

Marshall, Sydne
1982 Aboriginal Settlement in New Jersey During the Paleo-Indian Cultural Period, ca..10,000 BC-6000 BC. In *New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities*, edited by Olga Chesler, pp. 10-51. Office of Cultural and Environmental Services, Department of Environmental Protection, Trenton.

McMillen, Loring
1933 A Map of Staten Island During the Revolution 1775-1783.

1940 "The Britton Cottage: The Story of Its Construction." The Staten Island Institute of Arts and Sciences, Staten Island, NY. Pamphlet in the Collection of the New York Public Library.

1951 "Lake's Tide Mill (Old Mills of Staten Island, Part Seven)" in *The Staten Island Historian* XII 1;4.

1958 "Oude Dorp" in *The Staten Island Historian* IX: 1-6; 9-12.

Merlis, Brian, and Bob Stonehill
2002 *Staten Island in Old Post Cards*. Israelowitz Publishing, Brooklyn, NY.

Moeller, Roger
1980 6LF21: A Paleo-Indian Site in Western Connecticut. *American Indian Archaeological Institute Occasional Paper* No. 2.

Morris, Ira K.
1898 *Memorial History of Staten Island*, Vol. I. Memorial Publishing Co., New York

1900 *Memorial History of Staten Island*, Vol. II. Self-published, New Brighton, NY.

Mueller, James W., and Dana C. Linck
1991 *Archaeological Testing for Two Miller Field Road Improvements; Gateway National Recreation Area, Staten Island, New York, Gate Package 185*. On file at the New York City Landmarks Preservation Commission.

NJSPMP
1981 *New Jersey Shore Protection Master Plan*. 2 Volumes. State of New Jersey Department of Environmental Protection, Division of Coastal Resources, Trenton.

New York Public Library
nd. Photographs of New York City. Collection of historical photographs on microfiche. Local History and Genealogy Division.

New York Times. The
1901 Advertisement for the New Dorp Beach Hotel. June 23, 1901, p. 18.

1909 Classified advertisement for Cedar Grove Beach camp site. August 8, 1909, p. 15.

1913 Advertisement for Munger's by the Sea Hotel. June 8, 1913, p. X3.

Newman, Walter S.
1966 Late Pleistocene Environments of the Western Long Island Area. Unpublished Ph.D. dissertation, New York University.

Noël Hume, Ivor
1970 *A Guide to Artifacts of Colonial America*. Alfred A. Knopf, New York.

Nordstrom, Karl, P. Gares, N. Psuty, Orrin Pilkey, Jr., W. Neal, and Orrin Pilkey, Sr.
1986 *Living with the New Jersey Shore*. Duke University Press, Durham, NC.

Pardi, Richard R.
1983 Changing Sea Level and Shoreline (Appendix II, Section II) in Westside Highway Cultural Resource Survey, Archeological Work Program:Cultural Resources Research. Historic Conservation and Interpretation, Inc., pp. A7-A22.

Parker, Arthur C.
1922 The Archaeological History of New York, Part Two. *New York State Museum Bulletin*, Nos. 237, 238. Albany.

Pfeiffer, John
1983 The Howard Site: A Late Archaic Laurentian Village in the Lower Connecticut Valley. Paper presented to the Archaeological Society of Connecticut, October 15, 1983.

Plan (No. 31) du Camp Anglo-Hessois dans Staten Island.
1780-1783 Map in the Collection of the New York Public Library.

Pickman, Arnold
1982 *Reconnaissance Level Cultural Resources Investigation, Jones Inlet–Freeport Channel, Nassau County, New York City*. Submitted to U.S. Army Corps of Engineers, New York District.

Rakos, Lynn
1994 *A Cultural Resource Reconnaissance Study, Oakwood Beach, Staten Island, Richmond County, New York*. Report on file at the New York City Landmarks Preservation Commission.
1995 *A Cultural Resource Reconnaissance Study of the South Shore of Staten Island, Richmond County, New York*. Report on file at the U.S. Army Corps of Engineers, New York District, New York.

1996 *Summary of Archeological Investigations in Connection with the Oakwood Beach Section 103 Storm Damage Reduction Project, Oakwood Beach, Staten Island, Richmond County, New York*. Report on file at the New York City Landmarks Preservation Commission.

Rampino, Michael R
1979 Holocene Submergence of Southern Long Island, New York. *Nature* 280:132-134.

Rampino, Michael R. and John E. Sanders
1980 Holocene Transgression in South-Central Long Island, New York. *Journal of Sedimentary Petrology* 50:1063-1080.

1981 Evolution of the Barrier Islands of Southern Long Island, New York." *Sedimentology* 28:37-47.

Reverend Vincent Robert Capodanno Foundation, Inc.
2000 Online (available) http://www.father-capodanno.org/

Richmond County Advance
1902 “Destroyed by Fire.” 20 December. West New Brighton, NY.

Richmond County Gazette
1882 Advertisement for South Beach Pavilion. 4 May. Stapleton, Staten Island.

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

1973 Aboriginal Settlement Patterns in the Northeast. *New York State Museum and Science Service Memoir* No. 20. Albany.

Roberts, William I., IV, and Jesse Ponz
1990 *Stage IB Archaeological Survey of the Oakwood Beach Water Pollution Control Plant Expansion Project, Borough of Staten Island, New York City, Richmond County, New York*. Greenhouse Consultants, Inc. On file at the New York City Landmarks Preservation Commission.

Roberts, William I. IV, et al.
1990 *Archaeological Sensitivity Evaluation for Eight Water Pollution Control Plant Expansions in New York City*. Greenhouse Consultants, Inc. Greenhouse Consultants, Inc. Prepared for Stone and Webster Engineering Corporation, New York.

Robinson, Elisha
1898 *Atlas of the Borough of Richmond, City of New York*. E. Robinson & Co., New York.

Rogers Surveying
nd *Study Area–South Shore of Staten Island–Local Knowledge*. Report to the U.S. Army Corps of Engineers, New York District, New York.

Russo, Peter, John Piet, and Clara Lipson
1976 *Cultural Resources Reconnaissance, Staten Island Beach Erosion and Hurricane Protection Project (Richmond County, New York)*. Final Report. Museum of Archaeology at Staten Island. On file at the U.S. Army Corps of Engineers, New York District, New York.

Rutsch, Edward S.
1984 *Stage 1B Cultural Resource Survey of the Proposed Intercepting Sewer in the Proposed Tennyson Drive between (and including) Robinson Street and Proposed Point Street, Oakwood Beach Borough of Staten Island, New York*. On file at the New York City Landmarks Preservation Commission.

Ruttenber, Edward M.
1872 *History of the Indian Tribes of Hudson's River*. Rpt. Kennikat Press, Port Washington, NY.

Salomon, Julian Harris
1982 *Indians of the Lower Hudson Region, The Munsee*. Historical Society of Rockland County, New City, NY.

Salwen, Bert
1975 Post-Glacial Environments and Cultural Change in the Hudson River Basin. *Man in the Northeast* 10:43-70.

1978 Indians of Southern New England and Long Island: Early Period. In *Northeast*, edited by Bruce G. Trigger, pp. 160-176. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Sanborn Map Company
1898 *Insurance Maps of Staten Island, Borough of Richmond, New York*.

1917 *Insurance Maps of Staten Island, Borough of Richmond, New York*. Vol. II. Collection of the New York Public Library.

1937 *Insurance Maps of Staten Island, Borough of Richmond, New York*. Vols. III & IV. Collection of the New York Public Library.

Sanders, John E., and Naresh Kumar
1975 Evidence of Shoreface Retreat and In-Place 'Drowning' During Holocene Submergence of Barriers, Shelf Off Fire Island, New York. *Geological Society of America Bulletin* 86:65-76.

Skinner, Alanson Buck
1909 The Lenape Indians of Staten Island. *Anthropological Papers of the American Museum of Natural History*. Vol. 3, pp. 1-62.

Smith, Dorothy Valentine
1968 *This Was Staten Island*. The Staten Island Historical Society, Staten Island, NY.

Snow, Dean
1980 *The Archaeology of New England*. Academic Press, New York.

South, Stanley A.
1977 *Method and Theory in Historical Archeology*. Academic Press, New York.

Steinmeyer, Henry G.
1954 "Too Late the Phoenix" in *The Staten Island Historian* XV:1-3.

1958 "South Beach: The Resort Era" in *The Staten Island Historian* XIX:17-22.

Swift, Donald J.P.
1975 Barrier-Island Genesis: Evidence from the Central Atlantic Shelf, Eastern U.S.A. *Sedimentary Geology* 14: 1-43.

Synenki, Alan T.
1982 *Archaeological Investigations at Miller Field, Staten Island Unit, Gateway National Recreation Area, Richmond*. National Park Service North Atlantic Regional Office.

Taylor, George, and Abraham Skinner
1781 *Map of New York and Staten Island and Part of Long Island Surveyed by Order of His Excellency General Sir Henry Clinton, K.B*. Collection of New York Public Library.

U.S. Army Corps of Engineers, New York District (USACE)
1965 *Cooperative Beach Erosion Control Study and an Interim Hurricane Survey of the Atlantic Coast of New York City from East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York*. Included in House Document No. 215, 89th Congress, 1st Session. U.S. Government Printing Office, Washington, D.C.

2002 *South Shore of Staten Island New York Feasibility Study*. Series of maps.

2003a *Scope of Work and Request for Cost Proposal Phase 1 Cultural Resources Survey for the South Shore of Staten Island Combined Erosion Control and Storm Damage Protection Feasibility Study, Borough of Staten Island, Richmond County, New York.*

2003b *South Shore of Staten Island Feasibility Study, New York.* Series of figures.

2003c *South Shore of Staten Island, NY. Line of Protection Analysis.* 9 pp.

2003d *South Shore of Staten Island, New York. Preliminary Analysis and Screening of Alternatives for Interior Drainage*. *Draft.* 32 pp.

Van der Zee, Henri, and Barbara van der Zee
1978 *A Sweet and Alien Land: The Story of Dutch New York*. The Viking Press, New York.

Vargo, Jack, and Donna Vargo
1983 The Rabuilt Cave Site - PKE 4-4 Site Report. *Bulletin and Journal of Archaeology for New York State* 87:13-39.

Vermuele and Bien
1890 *A Topographical Map of Staten Island, Richmond County, State of New York*. Vermuele and Bien, New York.

Walling, H.F.
1859 *Map of Staten Island, Richmond County, New York*. Collection of the New York Public Library.

Washburn, Wilcomb E.
1978 "Seventeenth Century Indian Wars." In *Northeast*, edited by Bruce G. Trigger, pp. 89-100. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Williams, Lorraine, and Ronald Thomas
1982 The Early/Middle Woodland Periods in New Jersey. In *New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities*, edited by Olga Chesler. Office of Cultural and Environmental Services, Department of Environmental Protection, Trenton.

Williams, S. Jeffress, and David B. Duane
1974 *Geomorphology and Sediments of the Inner New York Bight Continental Shelf. Technical Memorandum No. 45*. U.S. Army, Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, VA.

Wolfe, Peter
1977 *The Geology and Landscapes of New Jersey*. Crane, Russak and Company, New York.

Zakalak, Ulana, and Richard C. Grubb
1983 *Report on the Preliminary Archaeological Investigation of the Proposed New Dorp Postal Station Site, Staten Island, New York*. On File, New York State Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford.