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U.S. Army Corps
of Engineers
New York District

CULTURAL RESOURCES BASELINE STUDY

FLUSHING BAY ECOSYSTEM RESTORATION PROJECT

QUEENS COUNTY, NEW YORK

DRAFT REPORT

February 2003

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Under Contract To:

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New York District
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February 2003

Abstract

Panamerican Consultants, Inc., was contracted by Barry A. Vittor & Associates, Inc., Mobile, Alabama, under contract to the U.S. Army Corps of Engineers (USACE), New York District, New York, to conduct a cultural resources baseline study for eleven proposed ecosystem restoration sites within the Flushing Bay watershed as part of the Flushing Bay Ecosystem Restoration Project (FLUBERP), Queens County, New York. The USACE, New York District, in cooperation with the New York City Department of Environmental Protection and the Port Authority of New York and New Jersey, is evaluating sites and activities to be included in the project. The project sites considered for full feasibility analysis are Lower Flushing Creek; Upper Flushing Creek; daylighting of Flushing Creek in Flushing Meadow Park; Willow Lake; Inner Flushing Bay, including removal of the LaGuardia Airport Dike; and the Old Marina and Tallman's Island South areas of College Point's East River shoreline. Three additional areas--Meadow Lake, the west shore of College Point, and the Flushing Bay navigational channel--were researched as part of this study, but they are no longer considered for full feasibility analysis (USACE 2001, 2002a).

Potential activities include wetland reconstruction, removal of existing dikes, and bank stabilization. The investigation was conducted for the USACE in compliance with the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et. seq.*) through 1992 (which includes Section 106 compliance). The overall objectives of this documentary study were to describe the prehistoric and historic occupation, the use and development of the Flushing Bay/Flushing Creek area with an emphasis on the areas in the vicinity of the proposed restoration activities, and to evaluate the potential of these activities to impact possibly significant cultural resources.

The baseline investigation included archival and documentary research, including a review of archaeological site files of the New York State Office of Parks, Recreation and Historic Preservation (OPRHP); a review of regional and local prehistory and history; a synthesis of past environmental conditions; a walkover reconnaissance of the onshore portion of the project area; and photographic documentation of site conditions. Background research included a review of the files and documents from the OPRHP, Albany; New York Public Library, Map, Local History and Genealogy, Manuscript, and General Research Divisions; New York Public Library, Science, Industry and Business Library; Queens Borough Public Library, Long Island Division; Queens Borough Public Library, Poppenhusen Branch; New York City Municipal Reference Library; New York City Municipal Archives; New York City Landmarks Preservation Commission; and New York City Department of Design and Construction, Subsurface Exploration Section.

The study resulted in the identification of a number of cultural resources that are considered to be potentially eligible for listing to the National Register of Historic Places (NRHP). These include:

- Pilings and possible embankment associated with a late-nineteenth century railroad trestle (Lower Flushing Creek FLUBERP site)
- 1939-1940 and 1964-1965 World's Fair landscape elements (Upper Flushing Creek, Flushing Creek daylighting and Meadow Lake FLUBERP sites)

- Possible archaeological remains associated with 1939-1940 and 1964-1965 World's Fairs (Flushing Creek daylighting and Meadow Lake FLUBERP sites)
- 1939-1940 World's Fair tide gate and dam (Upper Flushing Creek site)
- Remains of early twentieth century shipyard (Old Marina Site)
- Possible archaeological deposits associated with a prehistoric site adjacent to the Tallman's Island south site

RECOMMENDATIONS. In general, these sites should be avoided, or, if avoidance is not possible, additional cultural resource investigations must be conducted for those sites that will be adversely impacted by ecosystem restoration project activities.

1. Lower Flushing Creek. The area adjacent to the banks of Flushing Creek within the FLUBERP area remained undeveloped into the twentieth century, and much of the area was never developed.

- ***Flushing & Woodside Railroad Bridge and Trestle Remains.*** Bridge and trestle remains are associated with the development of the railroad lines built in Queens County in the latter half of the nineteenth century and are considered National Register eligible under Criteria A and/or C. During the reconnaissance, a number of pilings were noted on the west bank of Flushing Creek near the northern end of the FLUBERP site. Visible pilings may be associated with the approaches to the drawbridge and suggest that additional pilings, as well as the later embankment may be intact beneath the twentieth-century fill. This area should be assessed further when more detailed project plans are available. Test trenching in the areas noted could determine if remains of the trestle are present.

- ***Flushing Bridge, Roosevelt Avenue Bridge, and the LIRR Drawbridge.*** The Flushing, Roosevelt Avenue, and Long Island Railroad bridges are considered potentially eligible to the NRHP. Features such as pilings and footings are extant and may relate to the earliest phases of operation, which along with the other rail lines played a role in the area's transportation development. The presence, condition and relationships of extant or undetected remains should be examined through additional mechanical and/or hand-test trenching.

- ***Jones Lumber Yard and Extant Wood Pilings.*** Test trenching is also recommended around the extant wood pilings that may relate to the operation of the Jones Lumber Yard in the early 1900s. The trenching would be implemented to establish a relationship and evaluate the condition and importance of the resource.

- ***Trestle/Trolley Line, Newtown & Flushing Railroad Bridge, 1870s Railroad Spur, and Modern Outfall.*** There is little or no likelihood of recovering remains from these three railroad lines, and the outfall is modern. No further work is recommended for these areas.

2. Inner Flushing Bay. The study area remained open water until it was filled for the construction of LaGuardia Airport, which resulted in siltation adjacent to the fill area. No airport facilities extended into the proposed FLUBERP site. The shoreline in this area does not include any known cultural resources potentially eligible for the NRHP. It is unlikely that

any undetected NRHP-eligible prehistoric or historic resources are present due to the man-made nature of the shorelines. The west shore of Flushing Bay south of the airport was initially included in the study area, but has been removed from consideration. No further investigations are recommended for this site.

3. LaGuardia Airport Dike. The Airport Dike was constructed in 1964 and is less than 50 years of age. It is neither a historically nor a technically significant structure, and it has already been disturbed by the removal of its upper portion. The dike is not a potentially NRHP-eligible cultural resource. No further work is recommended.

4. Willow Lake. Willow Lake was created for the 1939-1940 World's Fair but was used only for passive recreational purposes. It had the same function during the 1964-1965 Fair. No fair buildings were located at Willow Lake. After the 1964-1965 Fair, recreational fields and facilities were located here. The present landscape is the result of natural introgression into a former culturally created landscape and, unlike the other portions of Flushing Meadow Park, the present landscape was not the one created for the fairs. The wood wharf and bridge remnants are not considered eligible to the NRHP. While their exact date and function are not known, they likely relate to modern use of the lake and not to its historic use. No further cultural resources studies are recommended for this site.

5. Flushing Creek Daylighting and Upper Flushing Creek. These projects would affect portions of the sites of the 1939-1940 and 1964-1965 New York World's Fairs. These events were significant in the cultural history of not only New York City, but also the United States.

- ***World's Fair Landscape.*** The New York State Amphitheater (since demolished) has been determined eligible for listing on the NRHP, and the Unisphere from the 1964-1965 World's' Fair is a designated New York City landmark. Other properties and structures from the World's Fairs may be eligible, but have not yet been formally evaluated. In the vicinity of the FLUBERP site, the existing landscape design is more directly associated with the 1964-1965 Fair. The existing Flushing Meadows landscape is a cultural landscape, bearing no relationship to the "natural" salt meadow landscape that existed in the area prior to the twentieth century. This cultural landscape is definitely associated with "significant events in our history" [i.e., the New York World's Fairs] and thus potentially eligible for the NRHP under Criterion A, as a designed landscape. The creation of wetlands elements adjacent to the creek, however, would not be in keeping with the landscape of the fair. Re-establishment of an open channel as part of a potential recreation of the 1939-1940 Fair landscape would involve maintenance of an adjacent park landscape, and reconstruction of bridges and the park roadway system to their 1939 configuration. Further studies by historic preservation and historic landscape specialists should be conducted prior to FLUBERP project design.

- ***Tide Gate and Dam.*** The tide gate under the Porpoise Bridge was constructed prior to the 1939 World's Fair, and its construction enabled the creation of the landscape for both the 1939-1940 and 1964-1965 World's Fairs as well as the present Flushing Meadow Park. The tide gate and dam do not appear to have been substantially altered, and are potentially eligible for the NRHP as an element of the World's Fair/Park landscape, as well as for its key function in enabling the creation of the

World's Fair and the Park. The NRHP eligibility of the structure should be evaluated further and the specific FLUBERP construction plans evaluated for their impacts on the aspects of the dam contributing to potential eligibility.

- ***Long Island Railroad Embankment.*** The present Long Island Railroad embankment and culverts are relatively recent and are not eligible for the NRHP.

- ***World's Fair/Flushing Meadow Park Archaeology.*** It is not known whether construction of the Flushing Creek daylighting project would impact any significant archaeological resources. Such resources could be the remains (e.g., foundations) of World's Fair buildings, fill deposits underlying these buildings, or surficial deposits associated with fair and park visitors. It is not known if foundation remains of any of the buildings from either fair exist within the park. It is also not known whether any of the building foundations survived post-fair demolition. Pilings underlying the foundations, which apparently were left in place, would mark the building sites. Below the foundations, fill deposits of ash and refuse from the Corona dumps could remain intact. Deposits at the site of the Queens Museum showed that the fill contained nineteenth and early twentieth century artifacts.

  At sites not subject to construction after demolition of the 1939-40 Fair buildings (e.g., the site of Gardens on Parade and British Empire Pavilions), refuse accumulations dating after demolition of the 1939 buildings would more likely be present. Artifact deposits associated with fair visitors could be considered a significant cultural resource under NRHP Criteria A and/or D, as could underlying early twentieth-century landfill deposits. The extent and depth of disturbance should be evaluated when specific project plans become available. Test excavations utilizing backhoe trenching and/or manual excavations could determine if any such deposits are present.

6. North College Point/Old Marina. The proposed FLUBERP site was the location of a shipyard established between ca. 1916 and 1924. Shipyard facilities included a number of piers extending into the East River. Remains of these piers were noted during the reconnaissance and are visible on recent aerial photographs. Several derelict barges also were noted at the site. Remains of the shipyard, representative of College Point's marine-oriented commercial activities, are potentially eligible for the NRHP under Criteria C and D. Creation of tidal marsh and tidal shoreline environments by the proposed FLUBERP would most likely result in the removal of these features. A Phase II cultural resources investigation should be undertaken to evaluate the significance of these remains. The study should involve additional documentary research on the shipyard and examination of the ship and pier remains by a marine historian and/or archaeologist.

7. Powell's Cove/Tallman's Island. A prehistoric site and a twentieth century site were identified in this area.

- ***Prehistoric Site.*** A prehistoric site was noted on high ground that extended to the vicinity of the present 7th Avenue and 130th Street, near the southwestern portion of the proposed FLUBERP site. The FLUBERP site represented a tidal marsh environment prior to twentieth-century landfilling. While the prehistoric site would not have extended into this marsh environment, its occupants may have disposed of

refuse in adjacent marshlands (see Pickman 1980). FLUBERP plans should be evaluated to determine whether excavations would penetrate beneath the existing fill to impact underlying marsh deposits. If so, archaeological borings or test trenching should be conducted to evaluate the presence or absence of prehistoric material in the portion of the project site adjacent to the reported prehistoric site at 130th Street and 7th Avenue.

- ***Twentieth-Century Pier.*** The Powell's Cove area remained largely undeveloped until the early twentieth century. The only development within the project area was the construction of a pier/breakwater in the early twentieth century in the vicinity of the alignment of 6th Avenue. Pilings were noted at this location during the site reconnaissance. These remains do not meet any of the National Register eligibility criteria.

Due to project design changes, the following areas have been excluded from FLUBERP activities. Since the analysis had already been completed the recommendations for these areas have been included in case these locations are reconsidered for future ecosystem restoration activities.

1. College Point West Shore. This area has been removed from the list of sites for proposed FLUBERP activities (USACE 2002a). Recommendations for cultural resources in excluded areas have been provided in case these areas become subject to ecosystem restoration activities at a later date.

- ***Prehistoric Sites.*** In two areas of the College Point west shore (in the vicinity of Graham Court and 26th Avenue and south of 31st Avenue) prehistoric sites were noted atop the bluffs that border the shoreline. It is likely that these bluff-top sites have since been removed by construction. Prehistoric artifacts have been recovered from the beach below one of these sites. If the areas below the two bluff top prehistoric sites are reconsidered for future FLUBERP activities, archaeological borings could determine the presence of marsh deposits beneath the beach sands as well as the presence of prehistoric artifact deposits.

- ***Nineteenth-Century and Twentieth-Century Piers.*** Environmental restoration sites in this area could include the locations of the remains of various derelict piers and associated structures. It was not possible to obtain access to many of these sites. Should this area be considered for future environmental restoration activities, further evaluation of these remains should be made either after rights of entry for various properties are obtained or by means of marine reconnaissance.

2. Meadow Lake. The same cultural resources considerations noted for the Flushing Creek daylighting project apply to the Meadow Lake area, which served as the amusement area for both World's Fairs. This area has been removed from proposed FLUBERP activities (USACE 2002a), however, should activities for this area be reconsidered, impacts on the World's Fair landscape and building sites should be evaluated.

3. Flushing Bay Navigational Channel. As of April 2002, channel dredging was no longer being considered for further feasibility analysis (USACE 2002a).

- ***Flushing Bay Channel Dike.*** It is possible that pilings noted near the southern portion of the Flushing Bay channel could represent a portion of the nineteenth-century channel dike. Depending on the extent and condition of such remains, the dike could be considered eligible under National Register Criteria A or B. If dredging is reconsidered in the future, a Phase IB marine examination of the extent and condition of the dike, as well as a survey for possible unrecorded shipwrecks, should be undertaken. While no historic-period shipwrecks in or adjacent to the channel were noted, available sources do not necessarily list all actual ship remains.

- ***Submerged Prehistoric Sites.*** Submerged prehistoric sites could remain beneath the waters of Flushing Bay. Analysis suggests that if such sites are present at the location of the Flushing Bay channel, they would be approximately 30 feet below mean sea level. Means of further assessing the possible presence of such sites would only be considered if future dredging was to extend below this approximate depth. However, the potential for actually locating prehistoric sites in this area would be very low. Any proposed examination of these areas should only be considered in locations that have not been severely impacted by previous dredging activities.

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1.0 Introduction

1.1 PROJECT BACKGROUND

Panamerican Consultants, Inc., was contracted by Barry A. Vittor & Associates, Inc., Mobile, Alabama, under contract to the U.S. Army Corps of Engineers (USACE), New York District, New York, to conduct a cultural resources baseline study for portions of the Flushing Bay watershed as part of the Flushing Bay Ecosystem Restoration Project (FLUBERP), Queens County, New York. The USACE, New York District, in cooperation with the New York City Department of Environmental Protection and the Port Authority of New York and New Jersey, is evaluating sites and activities to be included in the project. Potential activities include wetland reconstruction, removal of existing dikes, and bank stabilization. The project sites considered for full feasibility analysis include Lower Flushing Creek; Upper Flushing Creek; daylighting of Flushing Creek in Flushing Meadows Park; Willow Lake; Inner Flushing Bay, including removal of the LaGuardia Airport Dike; and the Old Marina and Tallman's Island South areas of College Point's East River shoreline. Three additional areas, Meadow Lake, the west shore of College Point and the Flushing Bay channel were included in the study, but are no longer being considered for full feasibility analysis (USACE 2001, 2002a; Figure 1).

The cultural resources investigation included documentary research, pedestrian reconnaissance, and photographic documentation of site conditions. It was conducted to assist the USACE in meeting its cultural resources management requirements mandated by federal statutes and regulations, including Section 106 of the National Historic Preservation Act as amended through 1992, and the Advisory Council on Historic Preservation Guidelines for the Protection of Cultural and Historic Properties (36 CFR Part 800).

The overall objectives of the study involve the examination of the prehistory, history and development of the project area to determine the presence of known sites and to establish the probability for unknown settlements. Evaluation of the planned activities' impact to actual or potential National Register of Historic Places-eligible cultural resources was undertaken also.

In October 2001, seven areas within the Flushing Bay project area were identified by USACE (USACE 2001) as possible locations for ecosystem restoration activities. These locations consisted of Flushing Bay Navigational Channel, Lower Flushing Creek, Inner Flushing Bay, LaGuardia Airport Dike, Meadow Lake, Willow Lake, and College Point West Shoreline (USACE 2001). In April 2002, USACE modified the initial scope-of-work (SOW) by adding four additional sites for full feasibility analysis—Upper Flushing Creek, Flushing Creek-Corona/Meadow Park, Tallman Island/Powell's Cove, and the Old Marina site—and dropping three locations from consideration—College Point West Shoreline, Meadow Lake, and Flushing Bay Channel (USACE 2002a). As a result, the present report discusses the following eight ecosystem restoration areas: Upper Flushing Creek; Flushing Creek-Corona/Meadow Park; Tallman Island/Powell's Cove; the Old Marina site; Lower Flushing Creek, Inner Flushing Bay, LaGuardia Airport Dike, and Willow Lake (Figures 1, 2a and 2b). Nevertheless, information on the excluded sites also is presented in the current report to provide a comprehensive review of the general project area.

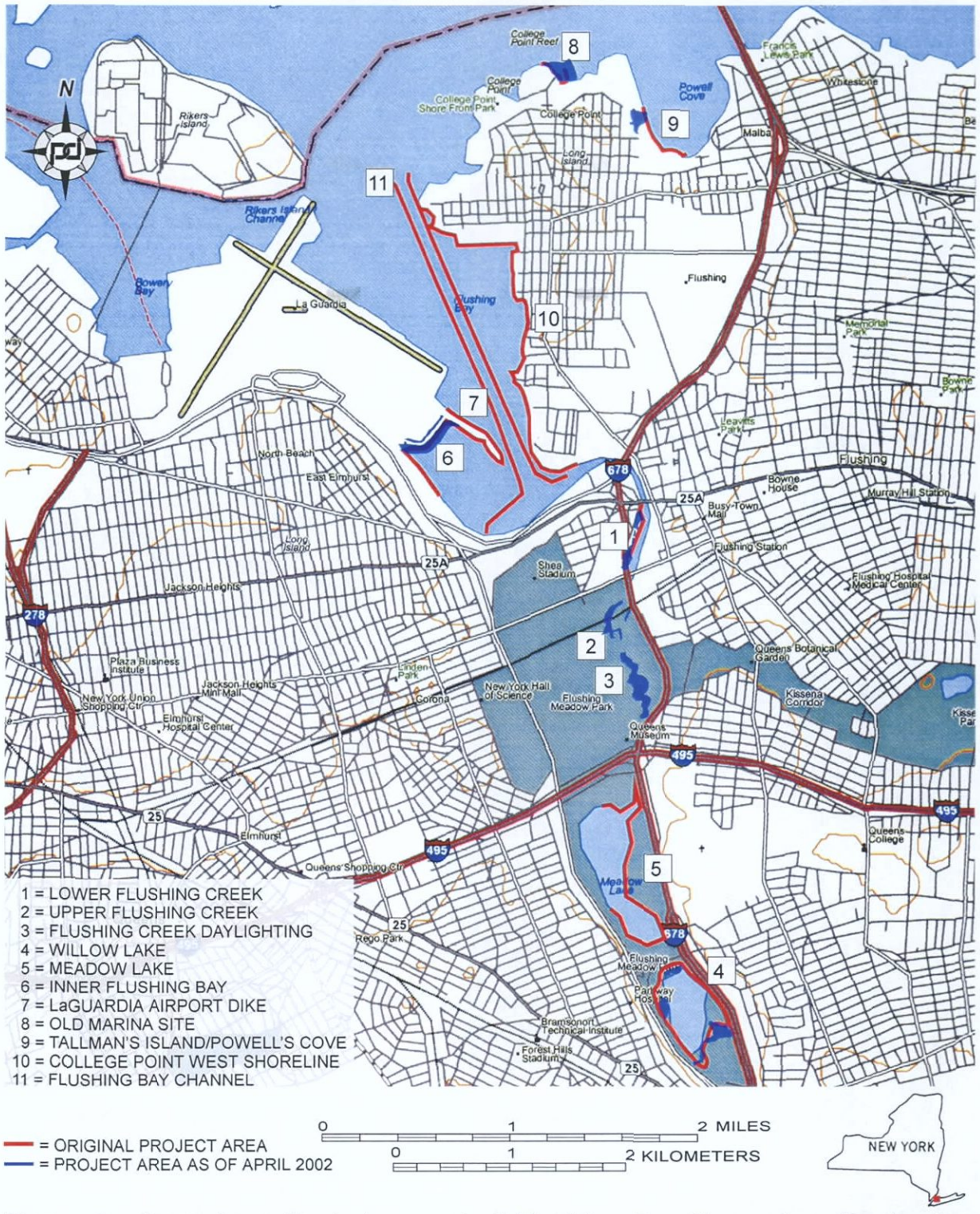

Figure 1. Areas investigated as part of Flushing Bay Ecosystem Restoration Project, Queens County, New York *(USGS 7.5' Quadrangles, Flushing, NY 1975 [1966], Jamaica, NY 1975 [1966], Central Park. NY 1975 [1966], Brooklyn, NY 1975 [1967]).*

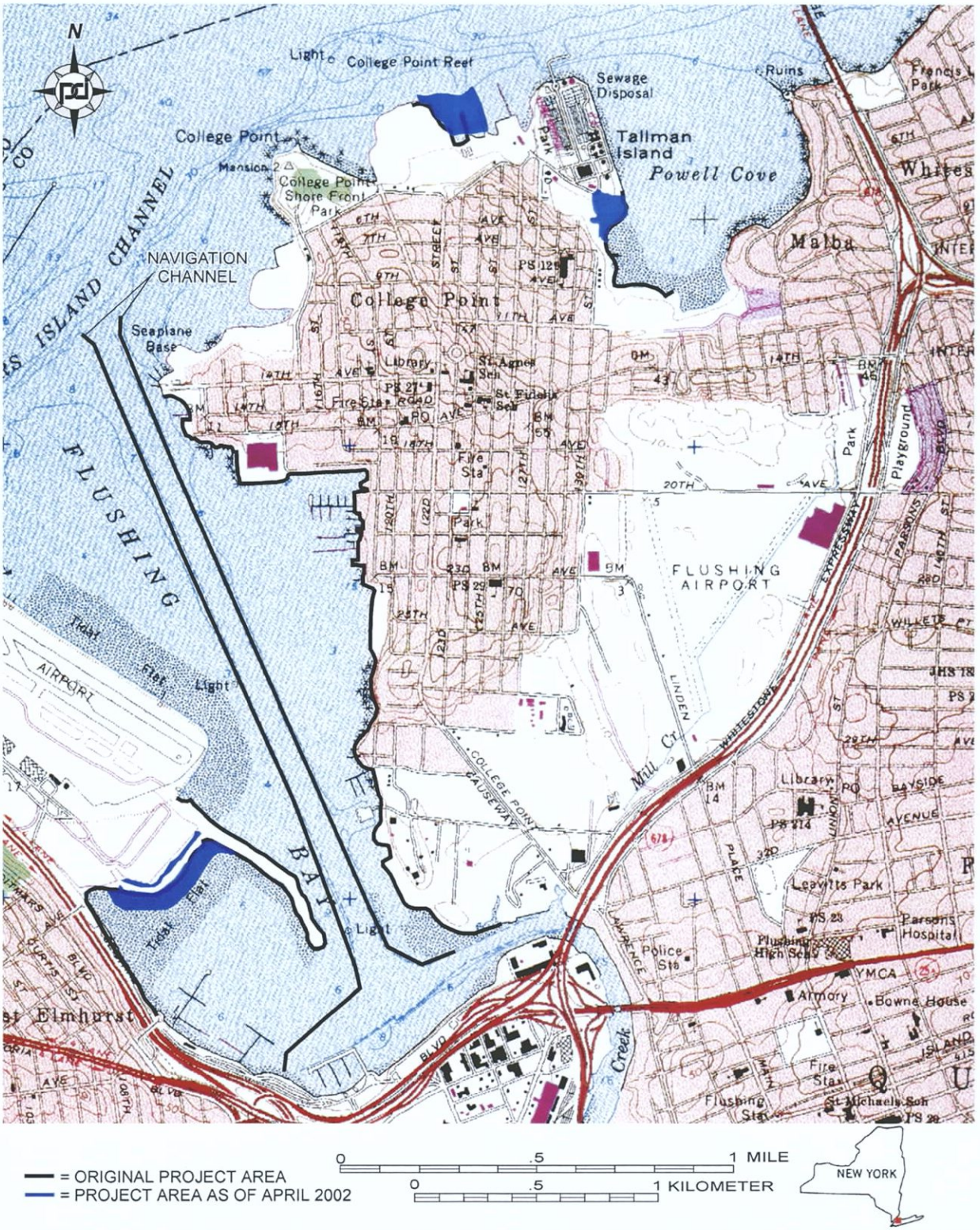

Figure 2a. Study areas along Flushing Bay and College Point within Flushing Bay Ecosystem Restoration project area, Queens County, New York *(USGS 7.5' Quadrangle, Flushing, NY 1975 [1966]).*

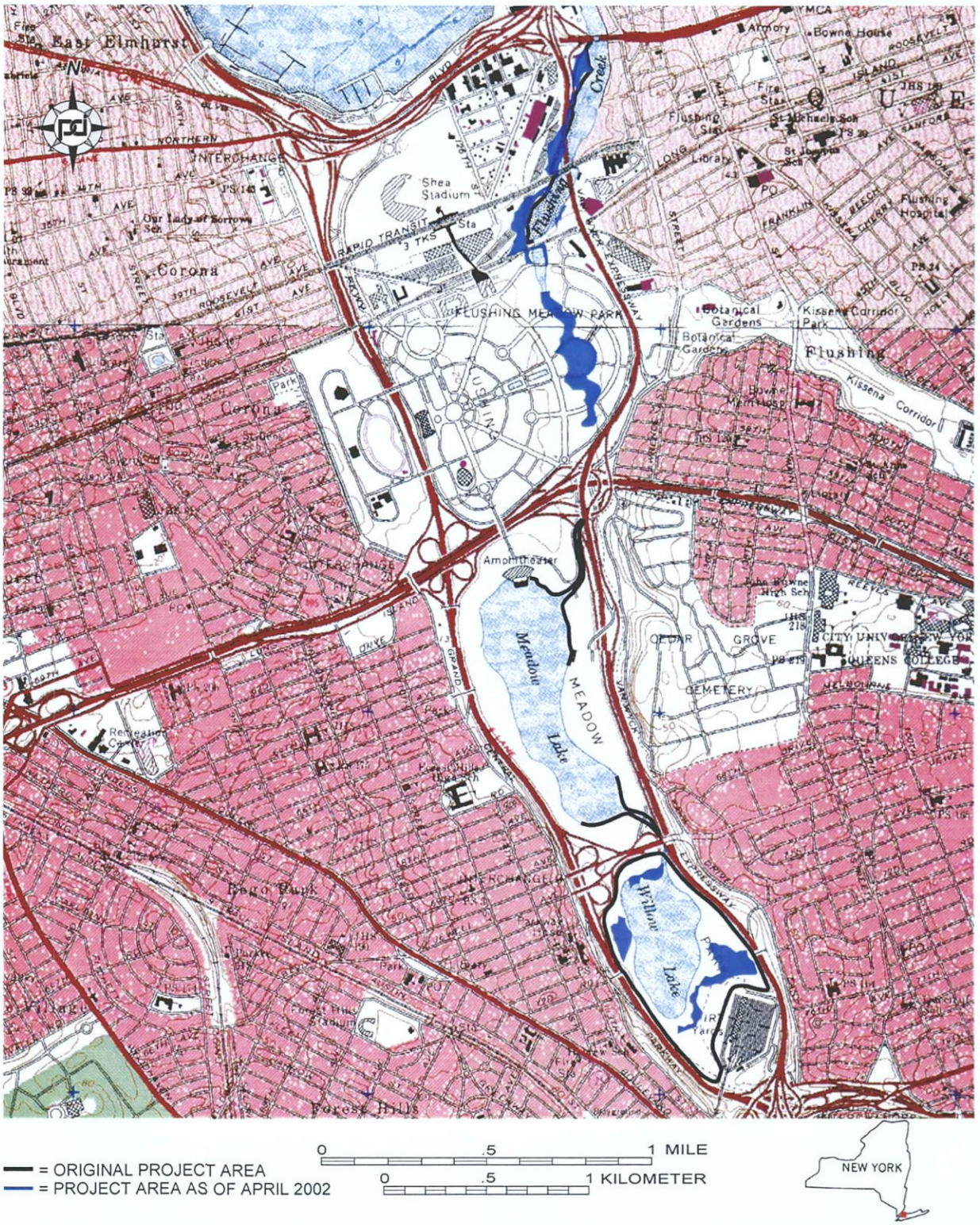

Figure 2b. Study areas along Flushing Creek, Meadow Lake and Willow Lake within Flushing Bay Ecosystem restoration project area, Queens County, New York *(USGS 7.5' Quadrangle, Flushing, NY 1975 [1966], Jamaica, NY 1975 [1966]).*

Documentary research was conducted at the following repositories:

- New York Public Library; Map, Local History and Genealogy, Manuscript, and General Research Divisions
- New York Public Library; Science, Industry and Business Library
- Queens Borough Public Library, Long Island Division
- Queens Borough Public Library, Poppenhusen Branch
- New York City Municipal Reference Library
- New York City Municipal Archives
- New York City Landmarks Preservation Commission
- New York City Department of Design and Construction, Subsurface Exploration Section

Site visits to the Flushing Bay, Flushing Creek and Meadow/Willow Lakes areas and the proposed restoration sites were made in November and December 2001 (Meadow/Willow Lakes; West Shore Flushing Bay; College Point shoreline; West Shore Flushing Creek) and October 2002 (Flushing Meadow Park/Upper Flushing Creek; Old Marina and Tallman's Island South/ Powell's Cove). Tide tables were consulted prior to conducting the reconnaissance of the tidal portions of the study area. The reconnaissance of these areas was conducted within two-and-one-half hours of low tide at Willet's Point, in order to provide visibility of shoreline and bay features. It should be noted that much of the College Point west shore area is accessible only by crossing private property. At the time the reconnaissance was conducted USACE had not obtained rights-of-entry for these properties. As a result it was not possible to examine all of the shoreline in this portion of the study area.

Mr. Arnold Pickman, M.A., RPA, served as Co-Principal Investigator, conducted the documentary research, and was the primary author of the report. Dr. Michele H. Hayward, RPA, served as Co-Principal Investigator and prepared the sensitivity assessment for the project. Dr. Michael A. Cinquino, RPA, served as Project Director. The report was produced under the supervision of Mr. Mark A. Steinback, M.A. Ms. Nancy Brighton, Archaeologist with the USACE, New York District, served as Point-of-Contact.

Copies of this report will be filed at the New York District, U.S. Army Corps of Engineers, the Field Services Bureau, New York State Office of Parks, Recreation and Historic Preservation, and the Offices of the New York City Landmarks Preservation Commission.

1.2 FLUBERP DESCRIPTION

The ecosystem restoration sites are located in the Borough of Queens, City of New York (Queens County) within the approximately 20,000-acre Flushing Bay watershed (see Figure 1). The watershed includes Flushing Bay, an approximately 6,200-acre embayment of the East River, and Flushing Creek, a tidal creek which enters the southern end of the Bay. It also encompasses two man-made, freshwater lakes—Meadow Lake and Willow Lake (both located within Flushing Meadow Park which is owned and maintained by the New York City Parks Department)—as well as the outflow stream at the northern end of Meadow Lake and a second outflow stream connecting the two lakes (Figures 3a through 3d).

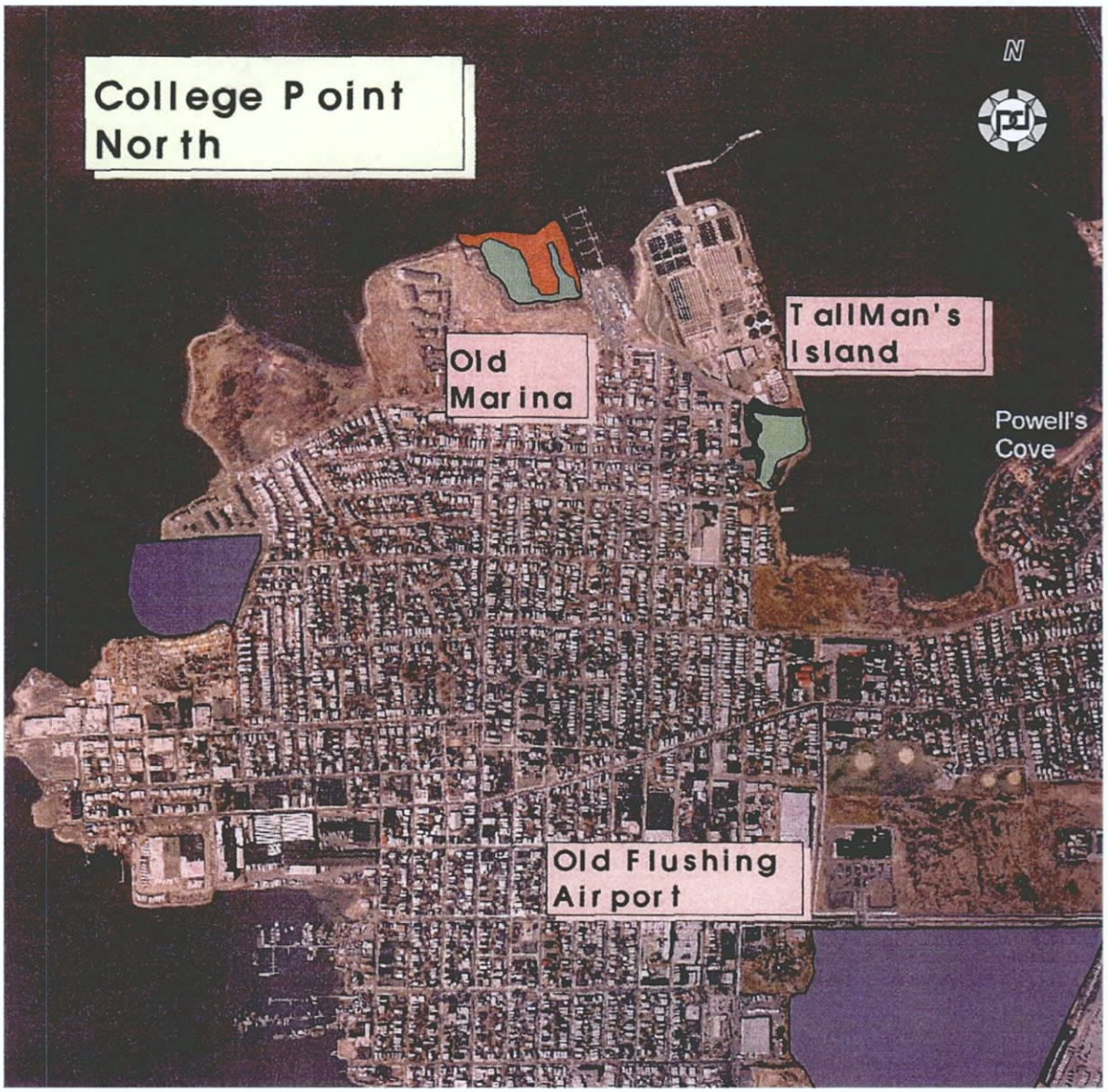

Figure 3a Project Sites Selected for Full Feasibility Analysis, April 2002 Lower Flushing Creek and Flushing Creek Daylighting Projects. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Army Corps of Engineers).*

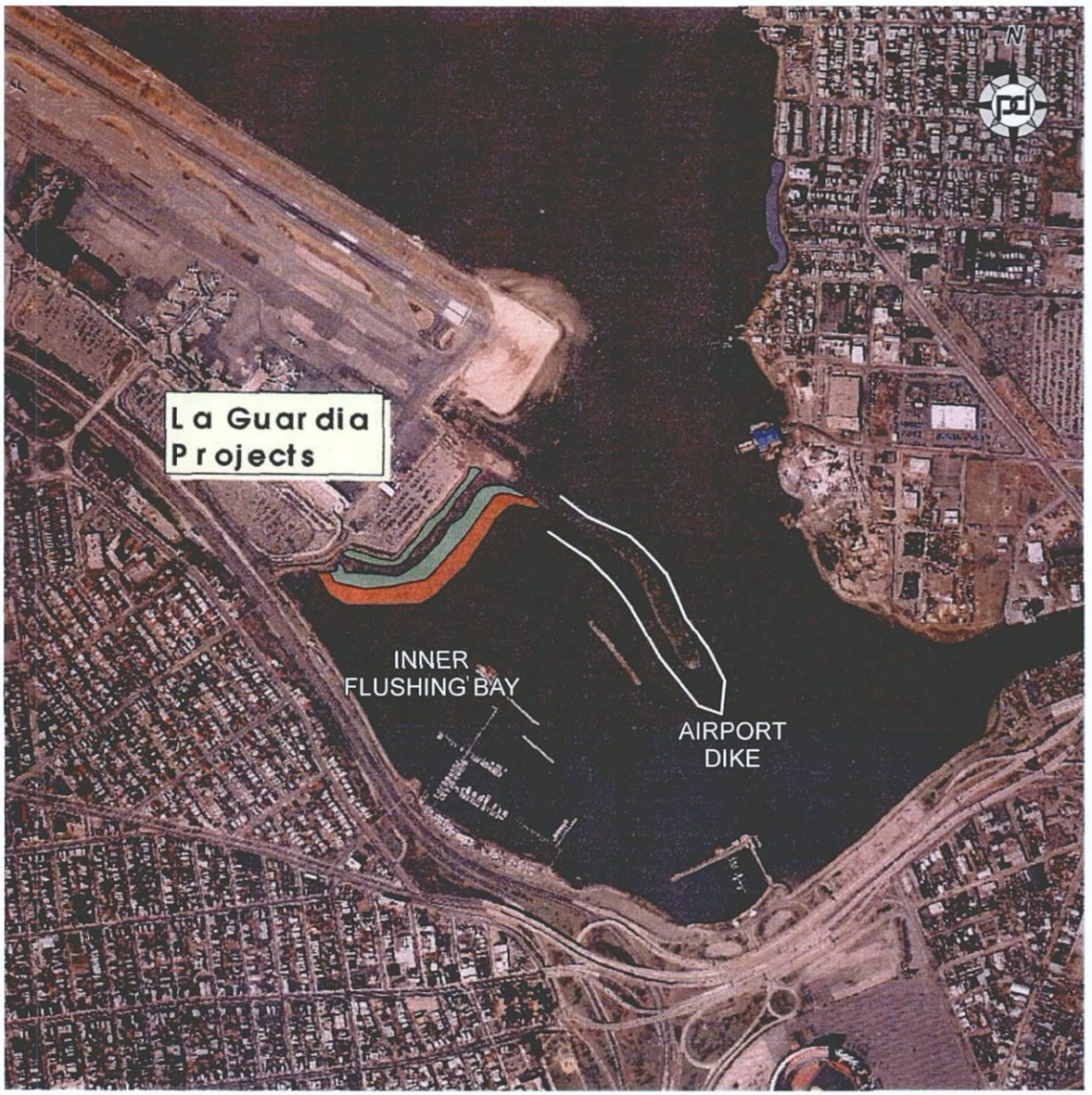

Figure 3b Project Sites Selected for Full Feasibility Analysis, April 2002 Inner Flushing Bay and LaGuardia Airport Dike Removal Projects. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Army Corps of Engineers).*

Restoration Habitat
- Forest
- Freshwater wetland
- Low Marsh
- Mud flat
- Site rejected
- Tidal Channel

0 1000 2000 FT
0 200 400 600 M

Figure 3c Project Sites Selected for Full Feasibility Analysis, April 2002 Willow Lake Project. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Army Corps of Engineers).*

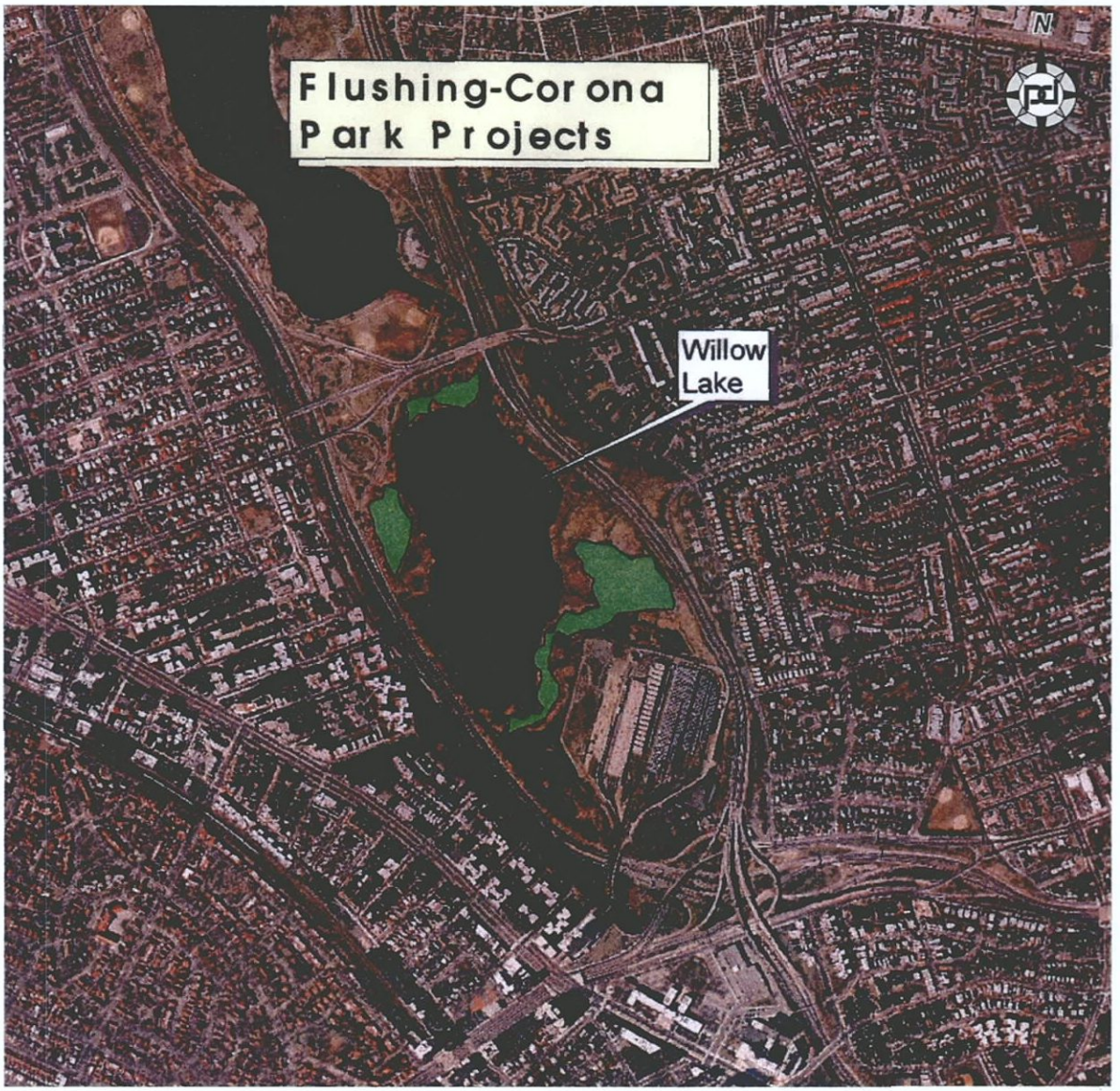

Figure 3d Project Sites Selected for Full Feasibility Analysis, April 2002 Old Marina and Tallman's Island South Projects. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Army Corps of Engineers).*

The planned ecosystem restoration activities involve tidal wetland restoration, partial or total removal of existing dikes, bank stabilization and, at Meadow and Willow lakes, freshwater wetland restoration. Tidal wetland restoration activities would include the regrading of sites to establish an elevation and slope conducive to the re-establishment of the appropriate salt marsh species (e.g., salt marsh cordgrass [*spartina alterniflora*]; salt marsh hay [*spartina patens*], salt grass [*distichlis spicata*]). At some sites excavated material could be used to create an upland buffer at the rear of the site (USACE 1996:6/26-27). Other considered actions to increase channel flows are discussed below.

1.2.1 Areas Initially Included for Full Feasibility Analysis. Four of the areas selected for full feasibility analysis as defined in October 2001 (with subsequent modifications) were still selected for feasibility analysis in April 2002. These areas included Lower Flushing Creek; Inner Flushing Bay: the LaGuardia dike; and Willow Lake (see Figures 2b, 3a, 3b, and 3c).

Lower Flushing Creek. The initial study area included the western shoreline of Flushing Creek, extending southward from Northern Boulevard to the Long Island Railroad embankment (see Figure 2b). The site selected for full feasibility analysis has been modified and extended (see Figure 3c). As described by USACE (2002b:37) this site would include "all of the most cost-effective sections of the left descending bank [i.e., the west bank] of Flushing Creek between the Van Wyck Expressway (Route 678) crossing at the mouth, to the tidal gates at Porpoise Bridge beyond the New York City Transit Authority yard and rail crossing." However, as shown on the site map (see Figure 3c), the site would actually begin a short distance south of the Northern Boulevard Bridge and would extend to Porpoise Bridge as noted above. The map also shows that the site as now defined includes a portion of the east bank of the creek north of the Long Island Railroad embankment as well as both banks of the creek between the embankment and Porpoise Bridge. Project construction for this site would include widening the existing low and high tidal marsh areas by lowering the grade through the presently *Phragmites*-dominated wetlands and adjacent uplands.

Inner Flushing Bay. A portion of the western shoreline of Flushing Bay, extending southward from LaGuardia Airport to the World's Fair Marina, was originally included in the study area (see Figure 2a). The portion of the southern shoreline of the airport from the LaGuardia Airport dike westward to the west shore of the bay was also included. In April 2002, only the area along the southern shoreline of the airport was selected for full feasibility analysis (see Figure 3b). The project envisions the creation and/or rehabilitation of up to six acres of low marsh and another six acres of new tidal shore mud flat. The 1.81 acres of *Phragmites* high marsh in this area would be regraded for conversion into cordgrass low marsh. The existing area of cordgrass and tidal mud flats would be expanded, involving the deposition of fill materials to raise the grade to support these environments.

Removal of LaGuardia Airport Dike. The total or partial removal of the remaining portion of an artificial dike also is included in the project. The dike extends for approximately 2,800 feet from the southern end of the airport (see Figures 1, 2a and 3b).

Willow Lake. The Willow Lake shoreline and the outlet stream connecting it with Meadow Lake formed a portion of the initially defined study area (Figure 2b). At present, the shoreline area has been selected for full feasibility analysis (Figure 3d). The proposed restoration at Willow Lake would involve minor grading, removal of the existing vegetation

(mainly *Phragmites*), planting and seeding of native vegetation, and construction of wildlife habitat structures and trails.

1.2.2 Additional Study Areas. Four locations not initially considered were added for full feasibility analysis in 2002. These areas are Flushing Creek (reconstruction and daylighting); Upper Flushing Creek; the Old Marina Site; and Tallman's Island/Powell's Cove (USACE 2002a).

Reconstruction and Daylighting of Flushing Creek. The route of Flushing Creek through Flushing Meadows Park was placed underground in preparation for the 1964 World's Fair. The proposed project would involve construction of an open channel reconnecting the existing above-ground section of Flushing Creek south of Porpoise Bridge with the open channel extending north of Meadow Lake (see Figure 3c). Such reconstruction would require the erection of associated bridges and/or utilities crossings at the new channel. One alternative being considered would continue to align the channel through the existing four-and-one-half-acre fountain. Another would create some five acres of marsh "in place of the old fountain" as well as eight acres of "riparian buffer habitat" (USACE 2002b).

Upper Flushing Creek. At this location proposed project activities include modification of the culverts beneath the Long Island Railroad embankment and the tidal gates under the Porpoise Bridge at the north end of Flushing Meadows-Corona Park (Figures 2a and 3a). These changes could improve the rate of tidal flushing of the upper creek and enable the restoration of tidal and/or freshwater wetlands along Flushing Creek as being considered by the New York City Department of Parks and Recreation (NYCDPR).

Old Marina Site. As shown on Figure 3a this site extends along the northern shoreline of College Point along the East River from a point east of Capstan Court eastward to the marina located north of the junction of Powell's Cove Boulevard and 125th Street. The proposed project would restore and create tidal low marsh, high marsh wetlands and tidal shoreline. Proposed activities could include placement of structures to reduce tidal energy gradients, grading of weed dominated sections of high marsh, filling of some deeper areas, and planting.

Tallman's Island/Powell's Cove. Proposed project activities at this location would create wetlands by lowering the grade of a fill area just south of the Tallman's Island Sewage Treatment Plant, and extending south to link with the tidal wetlands creation/ restoration project recently completed by the NYCDPR in Powell's Cove Park (see Figures 2a and 3a). As shown on the aerial photograph provided by USACE (see Figure 3a), the project area extends southward of the alignment of Powell's Cove Boulevard to the approximate location of 7th Avenue. Its western boundary is located between the alignments of 129th and 130th Streets between Powell's Cove Boulevard and 6th Avenue and approximately along the alignment of 130th Street between 6th and 7th Avenues.

1.2.3 Areas No Longer Considered for Full Feasibility Analysis. The following areas were initially included in the study, but as of April 2002 have been dropped from consideration. They are College Point West Shoreline, Meadow Lake, and Channel Dredging (USACE 2002a).

College Point West Shoreline. The shoreline of College Point, south of 14th Avenue, representing a portion of the eastern shoreline of Flushing Bay was originally considered for this project (see Figure 2a).

Meadow Lake. The proposed project originally included the eastern and southern shorelines of Meadow Lake and portions of its northern and western shorelines (see Figure 2b). While the channel entering Meadow Lake will still be addressed, none of the selected sites include the Meadow Lake shoreline. However, according to USACE (2002b:38), the NYCDPR is planning to construct approximately 20 acres of additional fringe wetlands at Meadow Lake.

Channel Dredging. The FLUBERP originally included dredging the navigation channel that extends through Flushing Bay from the East River to Flushing Creek and southward along the creek (see Figure 1, Area 11). As a result, the possible presence of submerged prehistoric sites, as well as recorded shipwrecks and other cultural resources in the bay, have been addressed in sections of this report.

2.0 Environmental Background

The study area includes Flushing Bay and Flushing Creek and portions of their shorelines and banks (see Figure 1). Flushing Creek extends for approximately 7,000 feet northward from Flushing Meadows before emptying into the bay.

2.1 GEOLOGICAL AND GEOMORPHOLOGICAL SUMMARY

The project area lies within the glaciated portion of the Atlantic Coastal Plain (USACE 1996:4-1). The most recent, Wisconsin, glacial stage of the Pleistocene resulted in the deposition of two terminal moraines across Long Island. The furthest advance of the Wisconsin glaciers deposited the Ronkonkoma moraine, which extends across Long Island from Montauk Point to the East River and then retreated. A later advance of the ice created a second and more recent moraine, the Harbor Hill moraine. On the eastern portion of Long Island, east of Lake Success, this moraine was located north of the Ronkonkoma moraine. To the west, including Queens County, however, the Harbor Hill moraine overrode the earlier deposits. Both moraines are represented by the high ground extending along the center of the island, south of Flushing Meadow Park (Schuberth 1968).

Circa 15,000 BP, the Wisconsin glacier began its final retreat from the New York City region. When this occurred, the terminal moraine blocked the mouths of several streams, forming natural dams. Meltwaters from the receding glacier became trapped behind these dams and higher ground along the eastern and western banks of the stream courses, resulting in the formation of several glacial lakes. In addition to Glacial Lakes Passaic and Hackensack in New Jersey, two connecting glacial lakes, Lake Hudson and Lake Flushing, were located in the New York City area. These latter lakes apparently formed when the outlet of the Hudson River was blocked at the Narrows by the terminal moraine.

Figure 4 illustrates the approximate extent of Glacial Lake Flushing, and shows that what are now Flushing Bay and the Flushing Meadows area would have been inundated by the waters of Lake Flushing. The present College Point area would have been located along the eastern shore of that lake. While the glacial lakes were in existence, thick deposits of varved clays were deposited on the lake bottoms. These varves represent annual sedimentary layers that give these clays a characteristic "banded" appearance. Studies of varves deposited in Glacial Lakes Hudson and Hackensack suggest that they existed for approximately 1,500 to 2,500 years (Schuberth 1968).

As the glacial ice retreated northward, there was a differential upwarping of the earth's crust to the northward. "With such postglacial uplift, the streams were again rejuvenated ... [permitting] them to transport and deposit larger and heavier particles, spreading gravel, sand and coarse silt over the seasonally stratified varved clay beds" (Schuberth 1968:195).

Around 12,500 BP, Glacial Lake Hudson/Flushing drained, likely due to the differential upwarping of the earth's crust that tilted the land southward, as well as possible erosion of the Narrows dam (see Pickman 1991:6). After the lakes drained, the former lake bed would most likely have represented a marshy, pond-filled plain containing small hills and rises overlooking the marshes (Boesch 1997:3). Flushing Creek, fed by springs in the vicinity of the present Willow Lake, would have flowed through this plain to the ancestral East River.

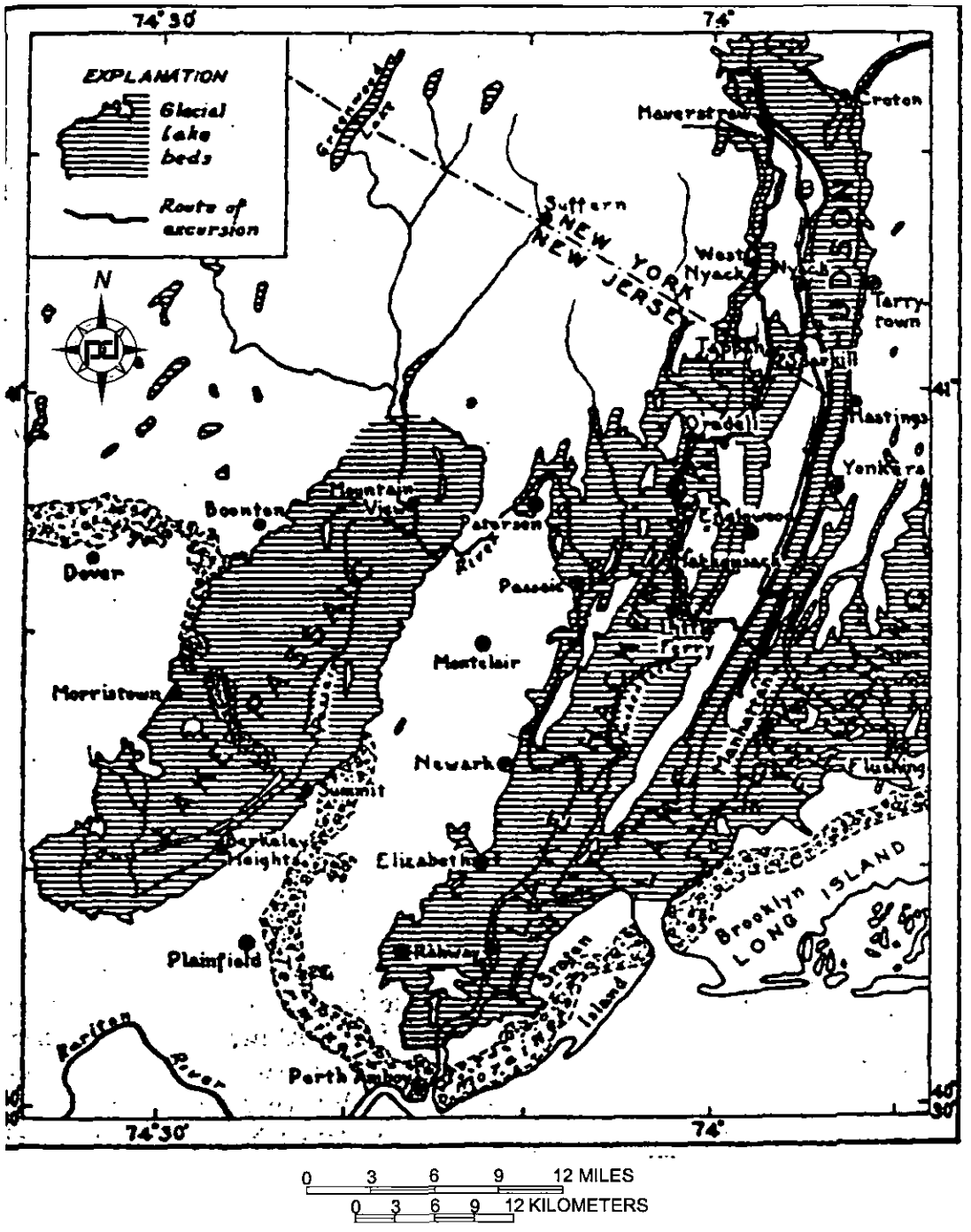

Figure 4. Glacial lakes in vicinity to New York City, Glacial Lake Flushing at right. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Wolfe 1977:160).*

With the subsequent rise in sea level caused by continual melting of the glacial ice, the marshy plain would have been inundated, resulting in the formation of Flushing Bay and the tidal marshes surrounding it. Small rises in the plain also would have been drowned, one exception being Yonkers Island, which in historic times, prior to twentieth-century landfilling, rose above the surrounding marshes immediately south of the south shore of Flushing Bay.

A number of theoretical graphs or "curves" have been constructed which show sea level elevations in the New York-New Jersey area at various times in the past. 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.

The most relevant curve for the study area is probably that published by Rampino (1979) and Rampino and Sanders (1980). 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 thereafter. 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.

2.2 STUDY AREA BORINGS

2.2.1 Flushing Meadow Borings. Borings excavated near the United States Tennis Association (USTA) center (Mueser Rutledge 1991) reveal that the base of the organic marsh deposits was encountered at depths between 30 and 65 feet below the surface. The deeper deposits were located in the westernmost portion of the area examined and the shallower depths were east of Flushing Creek. This suggests that the pre-inundation ground surface sloped downward from the eastern edge of the ancestral Flushing River, with the location of the river west of its present location. According to Rampino and Sanders, inundation in the lower area closer to the ancestral river would have occurred approximately 8000-9000 BP, while the area in the eastern portion of the valley would have remained dry until approximately 4250-5000 BP (Rampino and Sanders 1980).

2.2.2 College Point Marine Borings. In 1952, New York City conducted a series of marine borings prior to the construction of the existing Department of Sanitation facility on the College Point shoreline south of Cape Ruth (NYCDPW 1952). The borings were placed between the bulkhead and pierhead lines with the latter approximately 400 feet east of the Flushing Bay navigation channel. These borings were taken prior to the dredging of the area between the sanitation facility and the channel as delineated on recent marine charts (NOAA 2000).

The logs of these borings denote a water depth of approximately 7½ feet at the pierhead line (the closest point to the channel), with the bay bottom at this location consisting of 25½ to 26½ feet of organic silts. The uppermost 4½ to 6½ feet of these silts were somewhat softer than the underlying material and were characterized in some of the borings as "river mud." The organic silts were underlain by sands and silts of varying color and textures.

Interpretation of this stratigraphy can be made with reference to the results of the analysis of the USTA borings. The organic silts would represent material deposited subsequent to the inundation of the land by rising waters during the Holocene. The underlying sands would represent the "outwash sands" most likely deposited at the bottom of Glacial Lake Flushing. While these borings do not clearly distinguish between these outwash sands and the varved clays representing deposits in the glacial lake, which are noted in the USTA boring analysis, most of the logs indicate a "trace of clay" in the lower portion of the sand and silt deposits underlying the organics.

The lower portion of the organic material may represent deposition in a marsh environment, representing an extension to the north of the historic period Flushing Meadow marshes. The "river mud," which constitutes the upper portion of the stratigraphic column in these borings, could represent bay-bottom silts that accumulated after open water conditions were achieved. Any intact ground surfaces containing indications of prehistoric occupations would be located at the uppermost portion of the deposits of sand immediately underlying the organic silts deposited after the beginning of marine inundation during the Holocene.

The borings near the pierhead line show the top of the organic deposits at a depth of 32 to 33 feet below the Queens Highway Datum (i.e., approximately 30 feet below mean sea level). This depth corresponds with inundation at approximately 5000 years BP (see Rampino and Sanders 1980). This data is consistent with the time of inundation in the easternmost portion of the area covered by the USTA borings.

The College Point borings demonstrate that the thickness of the organic deposits progressively decreases from the pierhead line eastward to the bulkhead line, with the borings near the bulkhead line showing approximately 2 to 3½ feet of organic deposits. The base of these deposits at the latter location is at a depth of 9 to 10½ feet (approximately 6 to 7½ feet below mean sea level), corresponding with a period of inundation approximately 1500 to 2000 years BP.

The results of the boring analysis suggests that prior to marine inundation the ground surface would have sloped downward from the present shoreline westward toward the location of the Flushing Bay navigation channel. The limited data from this series of borings also suggests a slope upward to the south, at least locally within the limited area covered by the borings.

At the pierhead line the surface available for occupation by prehistoric inhabitants of the area is now some 30 feet below mean sea level. If the downward slope indicated by the borings continues to the west this would suggest that the pre-inundation surface would be even lower at the location of the navigation channel. Any channel dredging would impact the pre-inundation surface only if the dredging depths exceeded this depth.

2.2.3 Borings Near Mouth of Flushing Creek. Another series of borings were taken in 1998 near the mouth of Flushing Creek, north of Northern Boulevard and immediately south of the bulkhead at Harper Street (NYCDDC 1998). These borings also encountered deep deposits of fill and organic material representing the Flushing Meadow marsh deposits. Fill depths ranged from 8 to 32 feet followed by 30 to 50 feet of organic silts and clays, underlain by deposits of sand. The base of the organic materials ranged from approximately

2.2.4 Borings South of Willow Lake. A series of borings was excavated in 1992 for a sewer installation project south of Willow Lake (NYCDGS 1992). The borings traversed the former marshland a short distance north of the Metropolitan Transit Authority (MTA) subway yard. These borings encountered between 7 and 23 feet of fill overlying 16 to 41 feet of peat and organic clays and silts, with the exception of one boring where this latter stratum was only 6 feet thick. This latter boring was located on the extreme eastern side of the area, immediately west of the Van Wyck Expressway. In six of these borings, the base of the organic material was encountered at a depth between 38 and 55½ feet (35 to 52 feet below mean sea level), corresponding with inundation between 5500 and 7500 years BP.

These results suggest that at the end of the Pleistocene, the southern end of what later became the location of Flushing Creek and the adjacent meadows represented a deep valley which became the site of Glacial Lake Flushing and subsequently, during the Holocene, of Flushing Creek and the adjacent marshlands. Two borings had somewhat lesser depths of organic materials (beginning at approximately 19 to 22 feet below mean sea level) corresponding with inundation 3500-4500 BP. One of these borings was west of the Van Wyck expressway near the eastern edge of the former marsh area. The second was located 150 feet south of the location of the other borings. Both of these areas would have been at somewhat higher elevations prior to inundation.

The above sequence of events is reflected by the stratigraphy encountered in borings taken in the northern portion of Flushing Meadows Park, south of the Long Island Railroad (LIRR) tracks and west of Flushing Creek in the vicinity of the USTA facility (Mueser Rutledge 1991). Beneath an uppermost fill layer, mostly deposited in the early twentieth century (see Section 2.3, below) that ranged in thickness between 5 and 29 feet (average 13 feet), these borings encountered 20 to 60 feet (average 40 feet) of organic soils, representing tidal marsh deposits comprising the former Flushing Meadows area. These soils were followed by 5 to 70 feet (average 24 feet) of sand, varying in color and texture, occasionally with some clayey, silty or gravelly material. These sands were characterized in the cited report as "outwash sands" apparently deposited toward the latter portion of the glacial lake period as described above, and were underlain by 30 to 60 feet (average 38 feet) of varved clays deposited in the bed of Glacial Lake Flushing. These lacustrine deposits were, in turn, underlain by Pleistocene glacial sands deposited prior to the formation of Glacial Lake Flushing.

2.3 ENVIRONMENTAL SETTING

2.3.1 Flushing Creek and Meadow and Willow Lakes. At present the headwaters of the creek are Meadow and Willow Lakes, both manmade, freshwater impoundments. The 40-acre Willow Lake is fed by natural springs and flows into the 100-acre Meadow Lake, which is the largest lake in New York City (USACE 1996:4-5). The lakes are maintained as freshwater bodies by the presence of a dam and tidal gates beneath Porpoise Bridge, located approximately 250 feet south of the LIRR embankment. Prior to the extensive landfilling and creation of the lakes in the 1930s, Flushing Creek flowed in a sinuous course through tidal wetlands (see Section 2.2.3). Both lakes are within the bounds of Flushing Meadows/Corona Park. The land immediately bordering Meadow Lake is landscaped parkland with recreational facilities (Figure 5). Willow Lake, however, is bordered by fields of Phragmites (*phragmites australis*), as well as purple loosestrife (*lythrum salicaria*), and

Figure 5. Meadow Lake from southwest portion of lakeshore line, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001)*.

broad-leaf cattail (*typha latifolia*) (USACE 1996:4-6) as well as scrub vegetation (Figure 6). This portion of Flushing Meadow/Corona Park is designated by the New York City Department of Parks and Recreation as the Willow Lake Natural Area.

Some portions of the Meadow Lake shoreline (Figure 7), as well as the Meadow Lake outlet stream and the stream that connects the two lakes, are bordered by stands of Phragmites (Figure 8). Portions of the Meadow Lake shoreline are stabilized by stone rip-rap. Wooden bulkheading was noted along southwestern portion of the lake shoreline. Both Meadow Lake and Willow Lake are bounded on the east by the Van Wyck Expressway and on the west by the Grand Central Parkway. The Long Island Expressway separates Meadow Lake from the remainder of Flushing Meadows/Corona Park. A New York City MTA facility borders the southern end of the Willow Lake Natural Area.

The Meadow Lake outlet flows within a channel that passes beneath the Long Island Expressway and the Long Island Expressway/Van Wyck Expressway interchange. South of the interchange is approximately 250 feet of open water. From this point, Flushing Creek flows through an underground culvert that passes beneath the landscaped parkland of Flushing Meadows Park (Figure 9), and through a large fountain. The park area, the sites of the 1939 and 1964 New York World's Fairs, consists largely of lawn and roadway areas. The portion of the park immediately south of the open portion of the creek adjacent to Porpoise Bridge has been landscaped for use as a golf course. The banks of the open channel that extends 450 feet south of Porpoise Bridge are within the golf course grounds and include deciduous trees and undergrowth (Figure 10).

The study area along the west bank of the lower portion of Flushing Creek is bordered by the Van Wyck Expressway between Roosevelt Avenue and Northern Boulevard, and by MTA facilities between Roosevelt Avenue and the LIRR tracks. Stands of Phragmites are found between the Van Wyck Expressway and the MTA facilities and the creek (Figure 11), as well as along the creek banks between the LIRR embankment and Porpoise Bridge. At present, three crossings of the creek are within the study area north of Porpoise Bridge: a bridge at Northern Boulevard, at the northern end of the study area; a bridge at Roosevelt Avenue; and the LIRR embankment at the southern end of the study area. Flushing Creek flows beneath the embankment through a pipe culvert.

2.3.2 College Point Western Shoreline. Steep slopes along most of the College Point western shoreline "generally separate the dense urban development from the shorelines" (USACE 1996:3-1). Portions of the shoreline contain industrial facilities as well as a number of boatyards and boating facilities. A lower lying area near Tallman's Point contains dense stands of Phragmites vegetation. These stands represent a degraded tidal marsh environment.

2.3.3 Inner Flushing Bay and Flushing Bay West Shoreline. On the western shoreline of Flushing Bay, the study area extends along the southern shoreline of LaGuardia Airport. Originally, the study area extended southward along the western shoreline of the bay to the World's Fair Marina, which is the site of a recently constructed esplanade (Lee 2001) and is bordered on the waterside by rip-rap. Grand Central Parkway borders the esplanade to the west, separating it from a residential portion of East Elmhurst. Both the parkway and LaGuardia Airport were constructed on fill in the 1930s. The landfill at the southern end of the airport is bordered by a massive sheet pile bulkhead. Landfill deposits

extend for a short distance south of this bulkhead in the southwest corner of the airport property before the terrain descends to the bay and adjacent tidal flats. In most of the study area, however, the airport bulkhead is immediately bounded by dense stands of Phragmites and mud flats (Figure 12).

Within Flushing Bay, the original project area included the approximately two-mile navigation channel and the dike that extends approximately 2,800 feet into the bay from the southern end of the airport (see Figures 1 and 2a). The history of these features is discussed in Section 3.3.5.

2.3.4 Old Marina Site. The shoreline at this site is littered with debris eroding from the adjacent fill bank. There are also indications that the area has been used for possibly illegal dumping. Stone rip-rap appears to have been placed along the northwestern portion of the shoreline. The southern shoreline at this location is characterized by the presence of pilings, hulks and other remains associated with a shipyard that operated here beginning in the early portion of the twentieth century (see Section 3.3.5).

2.3.5 Tallman's Island/Powell's Cove. The shoreline is characterized by beach and fringe-marsh environments and is bordered by an extensive fill area (Figure 13). Near the southern end of the project area, immediately north of 7th Avenue, the project area is adjacent to what was a natural upland prior to twentieth-century landfilling (Figure 14).

Figure 6. Willow Lake from 73rd Road pedestrian overpass, facing southeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001)*.

Figure 7. Meadow Lake from southeastern portion of lakeshore line, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

Figure 8. View from bridge over Meadow Lake outlet, facing northeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001)*.

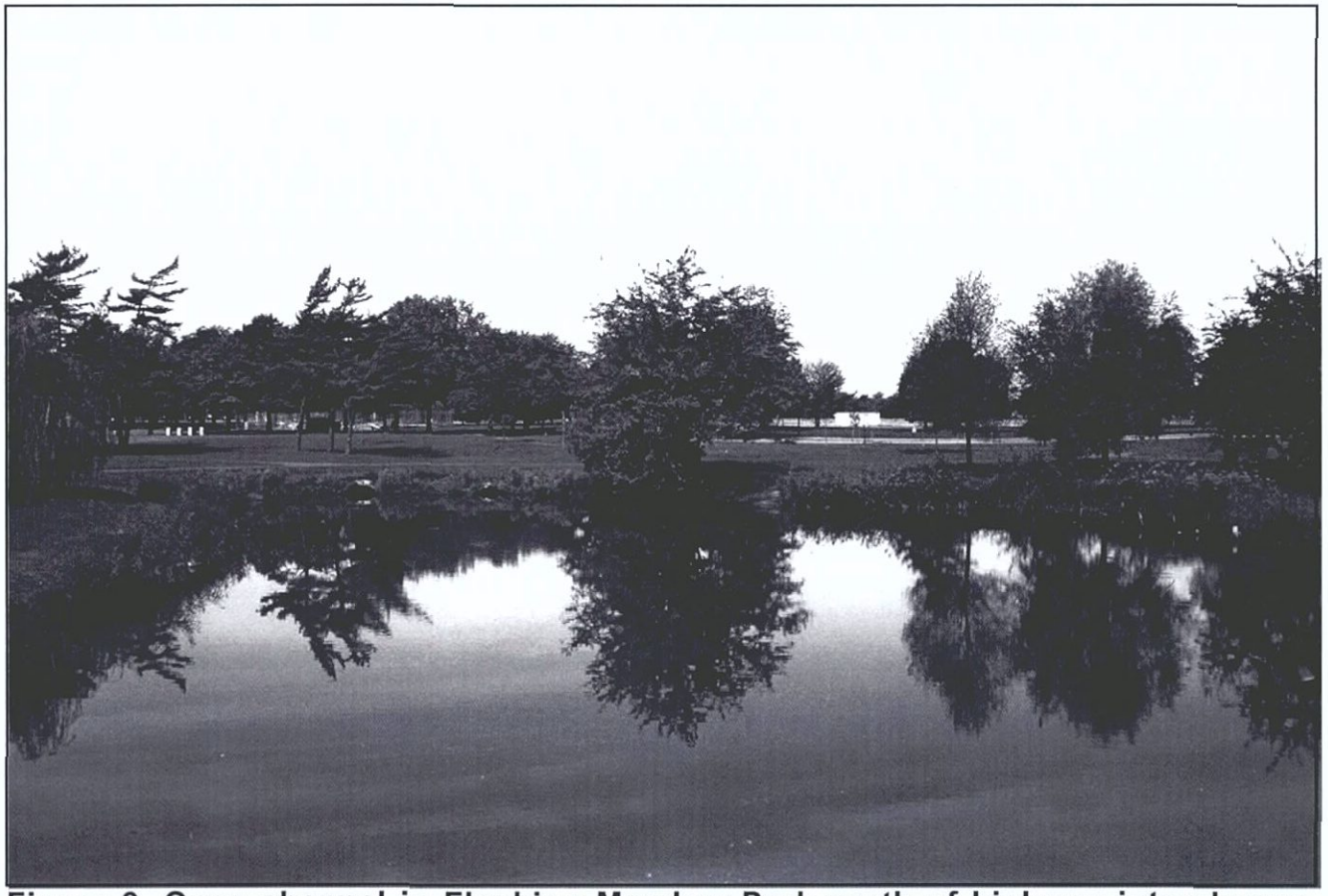

Figure 9. Open channel in Flushing Meadow Park north of highway interchange culverts at center left, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 10. Flushing Meadow Park - open channel south of Porpoise Bridge, facing south. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 11. West bank of Flushing Creek north of Roosevelt Avenue, facing southwest from east bank. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 12. Phragmites and mud flats south of LaGuardia Airport; LaGuardia Airport Dike in background, facing east from 27th Avenue pedestrian overpass. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

Figure 13. Tallman's Island South project area shoreline, facing north from southwestern shoreline of Powell's Cove. Tallman's Island sewage treatment plant in background. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 14. Upland area at southern end of Tallman's Island South project area, facing southwest. House at center right fronts on north side of Seventh Avenue. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

3.0 Cultural Background

3.1 PREVIOUS CULTURAL RESOURCES STUDIES

Dames and Moore (1996), as part of the reconnaissance study for this project (USACE 1996), provided a general overview of the prehistory, history and cultural resources of the study area. For the current investigation, the files of the New York City Landmarks Preservation Commission (NYCLPC) were examined to identify other pertinent cultural resources studies that may have been conducted within or in the immediate vicinity of the project area. The studies closest to the present project area primarily comprise Phase IA documentary research investigations.

Cobbs et al. (1999) investigated approximately one-half block between 26th and 27th Avenues in College Point. This location immediately borders the portion of the study area along the east side of Flushing Bay, and lies nearest to a previously reported prehistoric site (see discussion below). The report recommended subsurface testing prior to construction. The NYCLPC files do not indicate whether this testing was conducted.

Roberts and Adams (1989a, 1989b) investigated two development sites west of the Whitestone Expressway near Linden Place and Mill Creek, which represent former tidal marsh areas located some 4,000 feet northeast of the southernmost portion of the College Point shoreline study area at Tallman's Point. The authors acknowledge that prehistoric sites theoretically could be preserved beneath the marsh deposits (see discussion in Section 3.2.3). Logs of previously collected soil-boring samples were examined and sustained the conclusion that the lack of a "solid layer of shells" was due to the absence of prehistoric sites at these locations. However, evidence of such sites rarely would be reflected in driller's logs. These authors did not recommend any additional archaeological testing at these locations.

Kearns et al. 1991 researched an area immediately west of College Point Causeway near 31st Avenue. Lying approximately 1,500 feet northeast of the Tallman's Point shoreline, the study area was located in the former marsh. Two borings included in the report encountered marsh beneath approximately 20 feet of fill.

Historical Perspectives (1985) examined a proposed sports facility in an area bounded by Northern Boulevard, the Van Wyck Expressway, Roosevelt Avenue, and 126th Street. This site is located immediately west of the portion of the study area along the west bank of Flushing Creek. The location was identified as a former tidal marsh except for an elevated knoll situated well to the west of Flushing Creek.

An investigation of a proposed large storage tank immediately west of the Van Wyck Expressway in the vicinity of Fowler Street in Flushing is relevant to the present investigation (Kearns et al. 1992). Prior to twentieth-century landfilling, the site would have been along the edge of a marsh along the east side of Flushing Creek. The location at present is approximately 2,000 feet southeast of the portion of the present project area along the west side of Flushing Creek. Subsequent archaeological field testing of the location (Mascia et al. 1996) provided no indications of prehistoric archaeological sites, although two late nineteenth century-early twentieth century archaeological features were encountered.

Roberts and Ponz (1990) conducted a Phase IB archaeological survey of the area for a proposed expansion of the Tallman's Island Water Pollution Control Plant. The area tested was approximately 1,700 feet north of the Powell's Cove portion of the study area, and was located on what was Tallman's Island prior to twentieth-century landfilling. Two backhoe trenches were excavated in what were reported to be fill deposits.

A Phase IA documentary study of the Wilkins site was undertaken by Howson (1997). The prehistoric settlement was identified approximately 2,000 feet southeast of the Powell's Cove portion of the study area and is discussed further in Section 3.2.1. A Phase III investigation at this site was conducted by Boesch et al. (2000).

3.2 PREHISTORIC AND CONTACT PERIODS SUMMARY

Most of the known prehistoric sites near the shoreline and banks of Flushing Bay and Flushing Creek were noted in compendia prepared early in the twentieth century (Bolton 1920, 1922, 1934; Parker 1922), which include stylized maps showing the general locations of most sites. In addition, Harrington (1909) published a list of shell heaps in the New York City area. Most of the information in these accounts was obtained from earlier (e.g., nineteenth century and early twentieth century) collectors and avocational archaeologists. Later twentieth century development has obliterated surface indications of these sites. Thus, in most cases, only limited (if any) data are available regarding the exact location, extent, functional type and/or temporal affiliation of these sites.

Pertinent sites included in the files of the New York State Museum (NYSM) are mainly the same ones noted in the Parker compendium. A few sites recorded by Parker, however, are included in the NYSM files but were not described in his 1922 publication. These sites are noted in several cultural resources management reports on file at the NYCLPC. Another source of information about Queens County sites is Solecki's (1941) account of sites examined by the Flushing Historical Society in the 1930s. More recently, Boesch (1997), drawing mainly on the sources noted above, has prepared a list of prehistoric sites in the Borough of Queens for the NYCLPC.

While the compendia cited above enumerated most known sites, other published and unpublished accounts have been examined for this study and are discussed below. The following discussion focuses on prehistoric archaeological sites and archaeological investigations in the vicinity of the FLUBERP project area. Moreover, possible locations of unreported sites as well as possible submerged sites in Flushing Bay and in areas formerly covered by tidal marsh deposits are also discussed. The following overview provides a general introduction to the regional prehistory and primarily follows those presented by Boesch (1997) and Pickman (1991).

3.2.1 Overview of the Prehistory of Queens County. As a result of lower sea levels at the end of the terminal Wisconsin glaciation, the shoreline was located approximately 100 miles from its present location on what is now the submerged Continental Shelf. The land now constituting Queens County would have been located well inland from the coast at that time.

It is generally accepted that the earliest human occupation of what is now New York State occurred at the end of the Pleistocene and is referred to as the Paleo-Indian period.

Estimates for the beginning of the Paleo-Indian occupation of the northeastern United States vary but it is generally accepted as occurring between approximately 12,000 and 10,000 BP. At this time local forests would have consisted primarily of spruce and fir with only small amounts of deciduous species. Fauna would have included species now extinct or no longer native to the area.

Little is known about the Paleo-Indian period in the Northeast since few sites have been identified (most Paleo-Indian activity is indicated by scattered surface finds of Clovis fluted points, diagnostic of this period). While several fluted points have been recovered from Nassau and Suffolk Counties, only one such find, in the Bayside area, has been reported from Queens, until recently. Excavations at the Wilkins site, in the vicinity of Powell's Cove, resulted in the recovery of an additional fluted point (see below). Elsewhere a functionally diverse range of Paleo-Indian site types have been identified based on variability of artifact assemblages and environmental settings. Traditionally, Paleo-Indians were believed to have formed small nomadic bands of hunters and gatherers, although it is possible that there may have been seasonal exploitation of a more limited territory, similar to the settlement systems characteristic of later Archaic peoples.

The scarcity of Paleo-Indian sites in coastal New York is believed to be due to the fact that, as in later periods, most of the sites were located along the coast, which would have provided a greater amount and variety of subsistence resources. Sites in what is now Queens County would have represented inland environments during the Paleo-Indian period. As with sites dating to later periods, information from known Paleo-Indian sites in the Northeast reveals that preferred locations would have been well-drained higher ground near streams or wetlands, in addition to rockshelters, quarry sites and locations near the lower river terraces.

Coinciding with the beginning of the shift from a coniferous forest to an increasingly deciduous forest environment, there was a shift from the Paleo-Indian to the Archaic period of prehistoric occupation approximately 10,000 BP. The known cultural differentiation between these two periods is marked primarily by artifact typologies, but also involves significant shifts in settlement system and procurement strategies. In general, Archaic hunters and gatherers were organized into small bands with seasonal exploitation of varying resources in a specific area. On the north shore of Long Island warmer weather sites would have been located along the protected coves, inlets and bays along the shore, where marine resources would have been exploited. During cold months the group would have moved to interior regions.

In the early Archaic period (ca. 10,000 BP-7000 BP), subsistence strategies centered on both marine/riverine and forest resources and focused on the emerging deciduous forest environment. Low site densities during this period have been related to the persistence of coniferous forests and their relatively low carrying capacity. The Atlantic coastline still remained well offshore of its present location. As with Paleo-Indian sites, few major Early Archaic sites are known in coastal New York, but sites may be located on the submerged Continental Shelf. An Early Archaic site in Queens has been reported in the vicinity of Little Neck Bay (New York Institute of Anthropology 1993; Siegel 1994).

It was not until the Middle Archaic (ca. 7000-4500 BP) that coniferous forests receded and were replaced by deciduous forests that provided more exploitable resources. By 4000 BP forests had achieved an essentially modern character. Middle Archaic period sites have

been associated with floodplains and low terraces of major rivers and steams and with marsh, swamp and estuarine environments. In Queens, Middle Archaic components have been identified at sites located on high ground adjoining Little Neck Bay.

Population density and site size increased during the Late Archaic period (4500-3500 BP), with some sites apparently occupied on a semi-permanent basis. Along the north shore of Long Island, Late Archaic sites have been found on high ground bordering bays and inlets, in low-lying areas near estuaries and along major interior streams.

The Transitional or Terminal Archaic period (3500-3000 BP) is characterized by broad-bladed projectile points much different from earlier points, as well as the use of steatite vessels. Sites with Transitional components have been noted on high ground bordering bays and inlets along the north shore, including Queens.

The Early Woodland period (ca. 3000-2000 BP) is marked by the beginning of the utilization of fired clay ceramic vessels. During this period, the hunting/gathering/fishing subsistence strategy utilized by Archaic peoples continued, but an increasing reliance on shellfish collecting emerged. This, in turn, may reflect a trend towards more sedentary lifestyles. Early Woodland occupations have been noted in the area around Little Neck Bay.

Middle Woodland (ca. 2000-1200 BP) peoples appear to have gradually adopted an increasingly sedentary lifestyle. In addition to hunting and gathering, supplemented by fishing and shellfish collecting, various plants may have been domesticated (i.e., agriculture) during this period. Middle Woodland sites are located largely near estuaries with smaller sites further inland. Middle Woodland components in Queens have been reported from sites near Little Neck Bay and in Captain Tilly Park in Jamaica.

The Late Woodland period (ca. 1200-400 BP) is marked in coastal New York by the emergence of agriculture as a significant component of the subsistence strategy, although there is disagreement as to its extent and dating. The proximity of a major marine biomass represented by Long Island Sound and associated coves and bays may have reduced the reliance on agriculture in this region. While large habitation sites are known from this period, it is uncertain whether they represent permanent, year-round settlements or temporary, seasonal camps. Smaller, temporary and special purpose sites also are known. One suggested settlement system involves the periodic gathering at large sites of otherwise dispersed groups related through kinship, totemic, or other affiliations.

The larger Late Woodland sites are usually located near tidal inlets and major rivers, with the smaller inland sites also usually located near a water source. A number of Late Woodland sites have been reported throughout Queens, including in proximity to the study area. Based primarily on ceramic typologies, Smith (1950) saw a unified, "Windsor Tradition" culture occupying all of Long Island during the first portion of the Late Woodland. In the western portion of Long Island, including Queens, this tradition was supplanted later in the Late Woodland by an "East River" culture, which was probably intrusive into the region from New Jersey or southern New York. Smith further divides this "East River" culture into an earlier "Bowmans Brook" and later "Classons Point" phases.

The Contact period (ca. AD 1550-1750 [400-200 BP]) refers to the first large scale interactions between Native Americans and Europeans. At this time, Long Island was occupied by autonomous, loosely related bands living in small family groups of the Lenape

or Delaware culture, part of the Algonquian cultural and linguistic group. The Munsee subgroup occupied the western portion of Long Island, including Queens County, who shared the wolf as a totemic symbol. The larger Munsee villages were located at river mouths with camps along major rivers, estuaries, coves, inlets and bays.

Contact-period Native Americans on Long Island are politically divided into 13 groups, with the Matinecock, Canarsee and Rockaway occupying Queens County. The Matinecock occupied the northern portion of Queens from Newtown eastward, continuing to the Nissequogue River in Suffolk County. Contact period components have been reported from several Queens County sites, including several in the vicinity of the study area (see below).

At the beginning of the Contact period, the Matinecock were estimated to number some 1,200 persons, with the general Native American population of Long Island totaling approximately 7,500 individuals. By 1650 the Matinecock population had been reduced to only some 200 persons; only 1,000 Native Americans were estimated to inhabit all of Long Island. By the time of the American Revolution, the latter number had been reduced to only some 100 to 200 persons.

3.2.2 Reported Sites Near the Study Area. Several prehistoric or Contact-period sites have been identified in the vicinity of the project area, and have been listed in the files of the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP).

3.2.2.1 College Point Sites. The closest known sites to the initial FLUBERP study area were located along the western shoreline of College Point or the east side of Flushing Bay. This area, however, is no longer included as a restoration site (USACE 2002a). The two major sites are known as the Grantville and Graham Court sites.

The Grantville Site. This site is listed in the files of the OPRHP as #A081-01-0133, as #79 in the files of the Nassau County Museum (Historical Perspectives Inc. [hereafter referenced as HPI] 1985), and as #30 in the compendium of Queens sites (Boesch 1997). The location of this site corresponds with the site referenced as #130 by Bolton (1934). Parker (1922) does not enumerate this location, although he identifies a camp more than one-half mile to the east. Artifacts were collected from this site by M.C. Schreiner in the 1930s and excavations were conducted later by Ralph Solecki. Smith (1950:173) describes the site as "situated on a narrow promontory at the southwestern corner of College Point, Long Island ... [and] ... bounded on the west by Flushing Bay and on the east by a salt marsh." Solecki (1941) describes the site as located "on a wooded point on the east side of Flushing Bay," and considers the site "primarily a fishing station and workshop for flint implements." This site has reportedly yielded more than 300 projectile points in addition to large quantities of other material (Hecht 1976:3).

According to Smith (1950), most of the specimens at the Grantville site were found "on the top of the peninsula" within a foot of the surface. At least one refuse pit was excavated by Solecki "at the water's edge" some 50 feet south of the main deposits. Artifacts recovered indicate Archaic-period and Late Woodland-period (both Bowmans Brook and Classons Point) utilization, with some Transitional period material also reported. The location of the site is clearly determinable with reference to the early twentieth century topographic maps of the area, and was represented by a knoll extending along the shoreline south of Cape Ruth with tidal marsh to the east. The knoll-top area described by Smith would appear to have been located south of the present 31st Avenue (formerly Ticknor Avenue). The Grantville

site is delineated east of the correct location on the site map accompanying the Boesch compendium (Boesch 1997), which would place the site within the tidal marsh.

In the 1950s, artifacts were reportedly recovered on the beach below the Grantville bluffs. A human skull also may have been found there. Schneider reports digging a trench near the site

> below the eroded sand bank towering over the beach, I found a polishing stone, an abrading tool stone and a hammer stone at a depth of about three feet. These Indian implements had been washed out of the eroded bank fifty feet above the beach at Grantville and in time were covered with a few feet of sand and soil [1961:3].

As discussed in Section 3.3.5, the operations of sand-and-gravel and asphalt companies on top of the bluffs have severely disturbed the Grantville bluff-top area. It is unknown whether any artifacts buried on the beach prior to the initiation of the bluff-top industrial activities remain at that location.

The Graham Court Site. This site, located north of Cape Ruth, is listed in the NYSM files as #719 and #519, and in the Nassau County Museum files as #94 and #194. Boesch (1997) enumerates it as site #47. The NYSM files describe it as a village site with burials. Solecki (1941) noted that several burials were found in the vicinity of Graham Court. In 1934, road excavations uncovered a burial on 26th Avenue between 121st Street and College Point Boulevard (Hecht 1976:19, 21; Hoehlein n.d:18). Other excavations south of 26th Avenue, also between 121st Street and College Point Boulevard, recovered additional skeletal material (Hoehlein n.d:18; also see Cobbs et al. 1999). The Nassau Museum site files also note the recovery of a dog burial, as well as whole ceramic vessels from this site (see HCI 1985). Local residents have reported surface finds of stone tools in this area (Cobbs et al. 1999: 13). The available evidence suggests a Woodland-period affiliation for the site. An early twentieth-century topographic map revealed that this site was located near the shoreline along another promontory that extended from the shoreline to the northeast (Borough of Queens, Topographic Bureau 1912). The tidal marsh was southeast of the knoll. The reported finds would have been at or near the high point of the knoll.

NYSM Sites #4540 and #4542. The files of the NYSM list two other sites in the vicinity of the College Point West shoreline: sites #4540 and #4542, both reported by Parker. The southernmost of the two sites, #4542, is categorized as a camp, and #4540 is identified as a burial (e.g., Roberts and Adams 1989a). Disagreement exists among the sources (see New York State Museum [NYSM] site file maps; Parker 1922; Solecki 1941) concerning the locations of the sites with attendant opportunities for misidentification. For example, while Parker (1922) noted site #4540, he did not indicate a burial site in the vicinity of where the NYSM files place the site. It is possible that the NYSM file entry refers to the Grantville or Graham Court sites, neither of which is shown on Parker's map.

The College Point Site. Parker identified a village and burial site (#4 on his list) north of the Graham Court site at College Point and approximately 3,500 feet west of the Tallman's Island/Powell's Cove section of the FLUBERP project area (Parker 1922). He described the site as a "village and burial site at College Point on the E. Platt Stratton estate. Skeletons were found in 1861, when excavating for the foundation of Knickerbocker Hall." Bolton referenced it as the College Point or Lawrence Neck site and cited it as #129. The site is listed as #4527 in the NYSM site files and is shown outside the project area in

the vicinity of 12th/13th Avenues and 118th/120th Streets. Boesch includes this site as #1 in his compendium (Boesch 1997). Excavations at the site in the 1930s yielded an unusual burial of a dog that appeared to have been deliberately sacrificed (Lopez and Wisniewski 1958, cited in Cantwell and Wall 2001:104, 312).

Topographic maps reveal that this site was located near the height of land in College Point (Borough of Queens, Topographic Bureau 1912). It would be approximately 1,000 feet farther from the shoreline than the sites in the southern portion of College Point discussed above.

Other College Point Finds. In addition to the above sites, Hecht (1976:3) attests to the general sensitivity of the area for prehistoric occupations, and reports generically that "many other...discoveries [*of* prehistoric material] have been found in College Point, especially along the shoreline."

3.2.2.2 Tallman's Island/Powell's Cove Area Sites. Several sites have been reported in the vicinity of the Tallman's Island/Powell's Cove portion of the study area.

The Wilkins Site. The Wilkins site is located at 14th Avenue in the vicinity of 142nd Street, approximately 3000 feet southeast of the Powell's Cove FLUBERP site. Although Parker did not describe this site, Harrington noted a shell heap at this general location (Harrington 1909). The Wilkins site is listed as #100 in the files of the Nassau County Museum (HPI 1985); #20 in Smith (1950); #31 in the Boesch (1997); and A08101.007355 in the files of the OPRHP.

Prior to twentieth-century landfilling, the site was situated on a strip of high ground separating Powell's Cove to the north from marshlands to the south, southwest and east. It was also at the head of a freshwater stream flowing southward through the marshlands to Flushing Bay (Howson 1997:17). The site was first identified in the 1930s when topsoil was stripped for use at the World's Fair site (Schneider 1961), and first excavated by the Flushing Historical Society in 1939 and 1940. Burials were recovered from the location in 1950 (Howson 1997). Smith (1950) stated that the site was occupied during the early (Bowman's Brook) portion of the Late Woodland period. A few Early Woodland sherds also were recovered from the site. The presence of refuse pits and burials suggested that the location was most likely a permanent or semi-permanent occupation site. More recent excavations at the site yielded artifacts and faunal material, largely from disturbed contexts, dating mainly to the Late Archaic and Woodland periods. Material from the latter period included both lithic and ceramic artifacts. These excavations also resulted in the recovery of a Paleo-Indian period fluted point, one of only two such artifacts recovered from Queens (Boesch 2001; Boesch et al. 2000). The NYSM files contain Parker's notation of "traces of occupation" near Powell's Cove designated as #4541. The site files situate the remains north of the Wilkins site, inland from, but along, the southeastern shoreline of the inlet.

The Powell's Cove Site. The files of the Nassau County Museum (HPI 1985; Boesch 1997) record that a site was identified at 130th Street between 7th and 9th Avenues. Cited as #68 in Boesch, the site was categorized as a Contact-period site in the Nassau County Museum files. It would *have* been located on high ground along the western shore of Powell's Cove prior to twentieth-century landfilling (*Borough* of Queens, Topographic Bureau 1912). A fringe of tidal marsh bordered the shoreline adjacent to the higher ground in this area at that time.

An early twentieth century map depicted the northern portion of the area of higher ground adjacent to the shoreline between 6th and 7th Avenues (Borough of Queens, Topographic Bureau 1912). Site reconnaissance confirms that the present higher ground at the end of 7th Avenue (labeled Draper Avenue on the 1912 map), a short distance east of the line of 130th Street (labeled River View Terrace in 1912), represents the approximate natural topography as shown on the aforementioned map. As shown on Figure 3a, the southern end of the FLUBERP project area would be some 50-100 feet north of this location.

Tallman's Island Site. A site was reported on what was formerly Tallman's Island, which has been filled and connected to the mainland, and is now the location of a sewage treatment plant. Tallman's Island was a short distance north of the Powell's Cove FLUBERP site. The site is listed as #128 in the files of the Nassau County Museum and as #67 in the Boesch list of Queens County sites (HPI 1985; Boesch 1997). Material from the Late Archaic, Transitional, and Woodland periods has been recovered from it. Schneider (1961) reported finds of prehistoric artifacts at Tallman's Island prior to construction of the sewage treatment plant. Hecht (1976:3) also reports that burial mounds were found on Tallman's Island.

3.2.2.3 Flushing Sites. Several sites have been reported in and around the village of Flushing. Most of which were situated on the higher ground to the east of Flushing Creek.

Linnaean Gardens and Duryea Farm Sites. Two major sites were reported in the nineteenth century, Linnaean Gardens and Duryea Farm. Identified as Queens County site #1, Linnaean Gardens was described as a "burial site yielding 11 skeletons, in the Linnaean garden in Flushing in 1841" (Parker 1922). It was enumerated as #127 in Bolton (1934), #4524 in the NYSM site files, and #2 by Boesch (1997). Musket balls were apparently found in association with burials at this site, suggesting a Contact period or later affiliation. This site was located on what is now Prince Street (Mandeville 1860:67; Waller 1899:185-186) north of Northern Boulevard, which would place the site on high ground some 1,000 feet east of Flushing Creek.

Parker's Queens County #2 was a burial site "on Thomas P. Duryea's farm, a mile from Flushing" that was first reported in 1880. This site was listed by Bolton (1934) as #126 and as #3 in Boesch (1997). Bolton (1922:182) noted that this site also was occupied during the Contact period.

NYSM Sites #4544 and #4545. The NYSM files include two other Parker-identified sites near Flushing Creek, although both sites were not detailed in his 1922 monograph. Site #4544 is broadly identified as a camp site in the general area of the World's Fair site (see Kearns et al. 1992). Parker delineated a camp site west of Flushing Creek, opposite its junction with Ireland Creek (Parker 1922), which would correspond to the higher ground overlooking the tidal marsh in the general vicinity of the present 54th Avenue. Site NYSM #4545, also identified with broadly defined boundaries, refers to "traces of occupation" reported by Parker. These boundaries extend along the eastern side of the tidal marsh south of Ireland Creek (Kearns et al. 1992).

Solecki (1941) noted that "the World's Fair obliterated a large site on Flushing Creek and another at Sanford and Fowler Avenues, Flushing." This description does not seem to refer to either of these Parker sites. Sanford and Fowler Avenues would have marked an

area south of the LIRR tracks extending for approximately 1,000 feet along the east side of Flushing Creek prior to twentieth-century landfilling.

The sites reported near Flushing Creek would have been situated on the higher ground overlooking the tidal marshlands adjacent to the creek, much like most of the reported sites in the College Point area. Those sites also would have had access to marshlands as well as the marine resources of Flushing Bay. Accessibility to marshlands must have been an important consideration in the choice of prehistoric site locations. The marshes would have provided a convenient nearby source of shellfish and a habitat favored by waterfowl and small mammals. The abundance of reeds and marsh grasses would have represented a source of useful fibers as well as edible plants. In addition, the tidal creeks that penetrated the marshes would have provided access by canoe to open water fishing.

Results from soil borings (see Kearns et al. 1992) and an examination of historic period maps reveal that the area immediately south of the railroad tracks (i.e., the edge of the former tidal marsh) was located immediately east of the present location of the Van Wyck Expressway. The amount of disturbance caused by the construction of the Grand Central Parkway, Van Wyck Expressway, Long Island Expressway, World's Fair venues, and Flushing Meadows/Corona Park in the vicinity of the presumed location of these sites suggests that no deposits associated with these sites would remain at any of the FLUBERP sites.

3.2.2.4 Flushing Bay South Shore. A wide band of marshland adjoined the south shore of Flushing Bay and extended west of Flushing Creek. The only reported site in this area was located on an island of high ground, known as Yonkers Island. This "island" was shown on various eighteenth-century and nineteenth-century maps (e.g., Figure 15). This area would have been the most likely location of finds reported in the Shea Stadium area by collectors prior to modern construction (HPI 1985:11).

3.2.2.5 Flushing Bay West Shore. Prior to twentieth-century development a number of prehistoric sites were reported near the section of the Flushing Bay shoreline adjoining LaGuardia Airport. The most widely reported sites are Parker's Queens County sites #9 and #10. The former was described as a "burial site on the Riker and Titus Estates on the Bowery road to Steinway and North Beach" and the latter as a "shell heap on the Jackson property on Poor Bowery at North Beach" (Parker 1922).

Other sites were apparently documented in the area.

> The Jackson's Creek and Bowery Bay area was a very fertile field for exploration up to the time of the enlargement of the municipal airport [e.g., LaGuardia]. There was a site just south of Hangar No. 3, off Ocean Avenue, and a large kitchen midden about 100 x 50 feet in area. Another kitchen midden lay behind the Riker house at Bowery Bay, and another near the Rapelye Cemetery. There is not a trace of these sites today [Solecki 1941].

These sites would have been located along the shoreline north of the west shore area initially considered as a part of the FLUBERP project. No references have been noted for sites along the shoreline further to the south. In any event, the shoreline prior to twentieth-century landfilling and construction was located west of the Grand Central Parkway, some 600 feet west of its present location.

3.2.3 Possible Submerged Sites. As noted, during the last (Wisconsin) glaciation, the sea level was as much as 394 feet lower than at present. The shoreline was at the outer edge of the Continental Shelf, about 100 miles from the present shoreline, with a major estuarine embayment at the location of the submerged Hudson River Canyon (Belknap and Kraft 1977; Kraft et al. 1983).

Since the end of the Wisconsin glaciation, sea level has risen as the glaciers melted (Williams and Duane 1974:17). However, 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 demonstrates that it was indeed exposed during early prehistoric times. Most of these remains were found by scallop and surf-clam fishermen, most frequently in locations where the water depths are about 262 feet (Edwards and Emery 1977; Edwards and Merrill 1977).

It is significant that no sites from the early prehistoric Paleo-Indian and Early Archaic periods have been identified on Long Island, although there have been isolated finds of artifacts attributable to these periods (e.g., Saxon 1973). It has been suggested (e.g., Emery and Edwards 1966) that these sites were located close to former shorelines and are now submerged.

No archaeological sites have been found on the Continental Shelf, despite several prehistoric artifacts reportedly recovered by clam dredgers off the New Jersey coast. These artifacts include a granite mortar, reportedly recovered at a depth of 50 feet about 7 miles southeast of Manasquan (NJSPMP 1981:II:100). More recently, USACE offshore dredging in the vicinity of Sandy Hook, New Jersey, has resulted in the deposition on the present beaches of material containing prehistoric artifacts (Linck 2001).

As noted, at the end of the Pleistocene, the area covered in historic times by Flushing Bay and the Flushing Creek marshes was the site of Glacial Lake Flushing. Although dates for both the draining of this lake and the initial occupation of the area by Paleo-Indian peoples are approximate, it would appear that the lake drained prior to such occupations. After drainage of the lake, Flushing Creek, fed by springs at its southern end, most likely would have flowed through a narrow valley bordered by the high ground that later bordered tidal marsh. This high ground overlooking the stream would have represented the most advantageous location for hunting camps. These areas served as sites of such camps during later prehistoric periods.

Farther to the north, the environment most likely would have been a pond-filled plain, possibly with freshwater marshes, which would probably also have contained small hills and rises (Boesch 1997:3). The ancestral Flushing Creek would have flowed through this plain. The higher ground that now borders Flushing Bay may have been an attractive locus for sites at this time. Others may have been represented by smaller knolls overlooking the early creek and the ponds and freshwater marshes elsewhere on the plain.

During the Paleo-Indian period, many sites

> probably were submerged beneath the rising waters of Jamaica Bay, Flushing Bay, Little Neck Bay, and the other bays and inlets along the north and south coasts of Long Island.

> Meltwater rivers were formerly associated with most of these areas. Prior to submergence, the areas would have contained productive environments (i.e., marshes, lakes, streams) that could have been exploited for subsistence purposes by Paleo-Indian populations [Boesch 1997:9].

As the glacial ice continued to melt during the Holocene, sea levels began to rise and gradually the land surface was inundated. As this inundation occurred tidal marshes formed in portions of the area.

Fuller (1914:185) provides a description of the marsh formation process.

> The marshes begin to form wherever the water is shallow enough for eel grass to obtain a foothold, usually a foot or two below low-water mark, and where no strong currents are flowing. The dead grass and the fine silt entangled with it gradually accumulate until the ground rises well above low-water mark and marsh grass takes root upon it. The upbuilding continues until the marsh reaches a level covered only by occasional high tides.

This description of the marsh-formation process indicates that in a period of continuously rising sea levels the formation of the marsh will continue, with the marsh surface at any period being at, or slightly above, the level of high water. Marsh deposits take the form of peat or organic silt.

In considering possible locations of preserved drowned prehistoric sites, it is necessary to take into account processes of disturbance associated with inundation by rising waters. On the exposed Continental Shelf, inundation was accompanied by wave action similar to that on present-day exposed ocean beaches. Inundation in such a high energy environment would have destroyed any pre-existing prehistoric site not protected by other geomorphological processes. One source notes that in such an open environment on the Continental Shelf, "the transgressing ocean reshapes and redistributes the top five to ten meters of soil" (Edwards and Merrill 1977:3). However, even on the shelf 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, such as tidal marsh deposits, that 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.

In the relatively protected location of Flushing Bay, impinging wave energy would have been much less than on exposed ocean beaches. Even so, there probably would have been some disturbance as a result of tidal processes. However, the description of the marsh-formation process noted above suggests that for marshes to form inundation by rising sea levels would have to have been gradual. Thus, any prehistoric sites present at locations where tidal marshes subsequently formed are likely to have remained substantially undisturbed. Prehistoric deposits or artifacts have been found beneath or in association with peat deposits during dredging activities and in archaeological excavations at a number of

locations along portions of coastal New York and New England not exposed to open ocean conditions (Salwen 1968; Bourn 1972; Glynn 1953; Powell 1965).

Locations where tidal marshes formed would have depended on the pre-existing topography and the rate of sea level rise. In historic times the tidal marsh extended south of the waters of Flushing Bay. It is possible, however, that earlier in the Holocene, a portion of the area later inundated by Flushing Bay also was covered by tidal marsh deposits.

3.2.4 Prehistoric Sensitivity Assessment. To address the prehistoric sensitivity of the FLUBERP project areas, the background information detailed above has been summarized in Table 3.1. All eleven areas are included, with those no longer considered for restoration activities as of April 2002 indicated. The specific activity is provided in Column 2. A listing of prehistoric resources in or within approximately 1 mile and ½ mile of the project areas is given in Column 3 along with any comments relevant to a sensitivity determination. Column 4 contains the assessment for possible surface (up to a meter in depth) and subsurface finds for each of the study areas.

With the exception of remains reported by Solecki (1941) and Schneider (1961) below the hill-top Grantville site along College Point's western shoreline, no other resources were noted in the project areas during the literature review or field reconnaissance. The number and type of nearby sites coupled with a favorable past environmental setting attest to a sustained prehistoric presence for the Flushing Bay region from the Paleo-Indian to European Contact. An overall medium probability for locating in-context or not-in-context surface finds could be assigned, were it not for documented historic and modern landscape alterations.

Very low probabilities for encountering incidental not-in-context surface to near-surface remains have been assigned to Inner Flushing Bay, LaGuardia Airport Dike, Willow and Meadow Lakes, Flushing Creek at Flushing Meadows-Corona Park, Upper Flushing Creek, and Flushing Bay Navigational Channel project areas. Restructuring of the inner Flushing Bay western shoreline beginning in the 1800s and including the LaGuardia Airport Dike construction, the man-made creation of Willow and Meadow Lakes in the 1930s, the altered upper and middle Flushing Creek banks in 1900s, and a dredged channel within Flushing Bay would all mitigate against finding National Register-eligible sites. The Lower Flushing Creek, North College Point/Old Marine Site, Powell's Cove and College Point West Shoreline project areas present a similar likelihood determination and resource expectation due to modern transportation facility construction, in-filling along the shoreline and present beach sections.

The prehistoric Flushing Bay region comprised a changing series of features including ponds and later an inlet interconnected to fresh- and salt-water creeks bordered by marshes and high ground areas. While prehistoric peoples would have settled on upland terrain, they would have exploited the shoreline and marsh areas with the attendant possibility of leaving behind evidence of that exploitation. The probability of locating former marsh or submarsh associated resources is placed at low to low-moderate for nine of the project areas. A reordered Flushing Creek waterway, man-made lakes, an airport and extensive in-filling have affected or overlie these prior landforms.

The remaining two project areas—Powell's Cove and College Point West Shorelines—are considered to possess a higher probability for locating subsurface prehistoric materials.

Table 3.1 Prehistoric Sensitivity Assessment by Location for the Eleven Study Areas

Location	Restoration Activity	Prior Prehistoric Recorded Sites In or Near Study Area and Background Comments	Prehistoric Sensitivity Assessment
Lower Flushing Creek west/east banks of creek	widening existing tidal marsh areas	In: None Nearby: 1 Yonkers Island, prehistoric material reported; south shore of Flushing Bay, 1400 feet northwest of project area Comments: modern transport facilities, bridge crossings and marshes along creek banks	Surface: low Subsurface: low-moderate
Inner Flushing Bay western and southern shorelines adjacent to LaGuardia Airport; western shoreline excluded as of April 2002	rehabilitation and extension of marsh and shore mud flats involving grading and deposition of fill materials	In: None Nearby: 1 Parker 9; burial site; near shoreline some 1½ miles north of project area 2 Parker 10; shell mound; near shoreline 1½ miles north of project area 3 Other sites reported before airport enlargement Comments: western shoreline and south end of airport built on fill in 1930s; prior to 1900s shoreline located 600 feet west of present location; fill deposits grade to wetlands along southern shoreline	Western Shoreline Surface: very low Subsurface: very low Southern Shoreline: Surface: very low Subsurface: low-moderate
LaGuardia Airport	removal of artificial dike at south end of airport	In: None Nearby: None Comments: 2,800 foot man-made structure	Surface: very low Subsurface: low-moderate
Willow Lake shoreline	reordering of vegetation; construction of wildlife habitat structures and trails	In: None Nearby: None Comments: man-made freshwater lake in 1930s; formerly creek and tidal wetlands area	Surface: very low Subsurface: low-moderate
***Flushing Creek at* Flushing Meadows-Corona Park**	reordering of stream channel above ground	In: None Nearby: 1 Parker 1 Linnaean Gardens (NYSM 4524); prehistoric burial site and Contact Period items; 1000 feet east of Flushing Creek 2 Parker 2 Duryea Farm; prehistoric burial site and Contact Period; east of Flushing Creek 3 Parker (NYSM 4544); camp site; World's Fair location; 1000 feet west of Flushing Creek in Flushing 4 Parker (NYSM 4545); traces of occupation; east of Flushing Creek 5 Two other sites; one on Flushing Creek; one in Flushing Comments: altered channel course in late 1930s; remains of sites 3 thru 5 very unlikely in or near any current project areas	Surface: very low-low *Subsurface: low-moderate*
Upper Flushing Creek north end of Flushing Meadows-Corona Park	modification of culverts and tidal gates/dam at *Long Island* Railroad and Porpoise Bridge creek crossings	In: None *Nearby:* None Comments: modern altered creek banks	Surface: very low Subsurface: low-moderate
North College Point/ Old Marina Site north shoreline of College Point	restore and create marches and tidal shoreline involving placement of structural features, grading, planting and in-filling	In: None Nearby: 1 Parker 4 or College Point or Lawrence Neck site; village and burial location; 3300 feet south of project area Comments: recent dumping, stone rip-rap and remains of early 1900s shipyard	Surface: low Subsurface: low-moderate

Location	Restoration Activity	Prior Prehistoric Recorded Sites In or Near Study Area and Background Comments	Prehistoric Sensitivity Assessment
Tallman's Island/Powell's Cove College Point east shoreline area	creation of wetlands between Tallman's Island and Powell's Cove Park	In: None Nearby: 1 Wilkins; village with burials; Paleo-Indian point, Late Archaic and Woodland; 3000 feet southeast of project area 2 Powell's Cove; Contact Period site; on high ground overlooking shoreline within 100 ft of project area 3 Parker (NYSM 4541) traces of occupation; 4200 feet northeast of project area 4 Tallman's Island Site; Late Archaic, Transitional, Woodland material;; just north of project area 5 Other prehistoric artifacts and burial mounds reported from Tallman's Island Comments: beach/marsh shoreline with 1900s fill areas; modern construction and fill on Tallman's Island	Surface: low Subsurface: moderate
Study Areas	**Excluded as of April**	**2002 (USACE 2002a)**	
College Point West Shoreline eastern shoreline of Flushing Bay	upgrading of marshes	In: 1Grantville; fishing station and flint workshop; Archaic, Transitional, Late Woodland; reports of materials found along shoreline below the knoll top site Nearby: 1 Grantville; fishing station and flint workshop; Archaic, Transitional, Late Woodland; on knoll overlooking shoreline 2 Graham Court; village site with burials; Woodland; on knoll overlooking shoreline 3 Parker (NYSM 4542); camp site; 1400 feet northeast of shoreline 4 Parker (NYSM 4540); burial site; 1500 feet west of shoreline; also may refer to Grantville or Graham Court sites 5 Parker 4 or College Point or Lawrence Neck site; village and burial location; 1600 feet north of shoreline 6 other reported resources along/near by shoreline Comments: area of steep slopes, urban development, industry, boating facilities and marshes	Surface: low Subsurface: moderate
Meadow Lake shoreline	wetland restoration	In: None Nearby: None Comments: man-made fresh water lake in 1930s; formerly creek and tidal wetlands	Surface: very low Subsurface: low-moderate
Flushing Bay Navigational Channel	approximately two miles of channel dredging	In: None Nearby: None Comments: 12,500 BP Glacial Lake Flushing drains followed by marshy ponded plain; sea level/glacial changes later result in Flushing Bay, the creek and marshes	Surface: very low Subsurface: low-moderate

The Powell's Cove, Grantville and Graham Court sites were located on higher ground overlooking the shoreline or very likely former marshlands. Middens or other features associated with these or other unknown sites may be present beneath the current reworked and in-filled shorelines. However, the College Point West Shoreline area is no longer considered for FLUBERP activities (USACE 2002a).

3.3 HISTORIC PERIOD

During the historic period, Flushing Creek formed a portion of the boundary between the towns of Flushing and Newtown. Because the creek's course lay closer to the higher ground in Flushing than that in Newtown, the history of the former town is of greatest relevance to historic period cultural resources in the study area. Flushing Bay is one of a series of fjord-like harbors along the north shore of Long Island that are separated by necks of land rising steeply above the water on either side. At the head of each of these harbors, small colonial fishing settlements were established, which later developed into large villages. One of these settlements was Flushing (Seyfried 1955:23).

The first settlement on Flushing Bay took place in 1643 with the arrival of a group of English colonists from New England. These colonists arrived in the Dutch colony of New Netherland, seeking the religious freedom that they did not have in the Puritan colonies from which they came. They obtained a charter from Governor Kieft in 1645. Several explanations have been postulated regarding the origin of the settlement's name. One version has the settlers naming the town Vlissingen, after a town in Holland in which they had lived (Munsell 1882:74); "Flushing" representing an Anglicization of this name. Waller (1899:15), however, noted that the town charter referred to a creek already "commonly called and knowne by the name of fflushing Creeke." Trebor (1952) maintained that a Dutch ship captain had named the region in 1628 after sighting the salt meadow and noting its resemblance to the landscape of Vlissingen in Holland.

Despite the promise of religious liberty, Governor Pieter Stuyvesant attempted to tax the Flushing settlers, many of whom were Quakers, for the support of the Dutch church as an official state church. Harassment and arrest of a number of settlers ensued and in 1657 Henry Townsend was fined for calling together Quaker meetings. After this event, the Quaker settlers presented a written protest to Stuyvesant, known as the Flushing Remonstrance.

This protest did not end Stuyvesant's persecution of the Quakers, and subsequently John Bowne, who had invited the Quakers to hold their meetings in his house, was fined. When he refused to pay, Bowne was jailed and ultimately sent to Holland for trial. The verdict of the Directors of the Dutch West India Company in favor of Bowne established an important precedent for religious freedom (Kupka 1948). The remaining buildings associated with these seventeenth-century events are the Bowne house, built by John Bowne in 1661, and the Friends Meeting House. Both of which are listed on the National Register of Historic Places. Neither is located in the immediate vicinity of the FLUBERP project area.

In 1666, after the English had taken control of New Netherland from the Dutch, the Flushing settlers obtained a grant from the English Governor, Thomas Dongan. Finally, in 1684 Flushing freeholders obtained a deed from a group of Matinecock in order to extinguish Native American claims to the land.

Each settler was allotted tracts of land on the high ground near the river as well as upland farm acreage. Further, they were allocated shares of the salt hay harvested from the tidal marsh. This was an important natural resource, as salt hay was used as cattle fodder, bedding material for cattle and other purposes. The importance of salt hay was reflected in the 1684 Indian deed in which the Native American grantors reserved to themselves the right to harvest salt hay from the meadows in perpetuity (Trebor 1952).

By the end of the seventeenth century regular marine trade had been opened with New York City, and a boat landing established on the east side of Flushing Creek, a short distance south of what is now Northern Boulevard (Figure 16). By 1700, the town's population had grown to approximately 500.

A notable eighteenth-century event was the establishment at Flushing of the one of the first plant nurseries in America by William Prince about 1737. Named the "Linnaean Botanic Garden," the nurseries gained renown; in 1789 George Washington made a trip from New York to Flushing expressly to visit them (Mandeville 1860:133; Munsell 1882:127). This business continued to be operated by the Prince family into the nineteenth century. By 1860 the gardens and nursery of W.R Prince & Co. covered some 113 acres (Waller 1899). This establishment was the forerunner of several plant nurseries established in the Flushing area in the late eighteenth and early nineteenth centuries. The original site of the Prince Linnaean Gardens was north of Bridge Street in the village of Flushing (Lawson 1952). As shown on an 1852 map (Figure 17), however, the facility had expanded by that time to a site located on high ground immediately east of the Flushing Creek marshes. The site would appear to have been a short distance north of the present LIRR tracks and outside the Area of Potential Effect (APE).

During the American Revolution, Flushing was occupied by British troops. In 1782, the First Battalion of Grenadiers was encamped at "Ireland Heights, near Flushing" (Waller 1899:143). This location presumably was high ground near Ireland Creek, which entered Flushing Creek north of the present location of the Long Island Expressway. In that same year several other British units were reported at or near the "Head of the Fly," a term that refers to an area south of Flushing Creek (see Figures 17 and 15). In 1783, several other British units were reported at Flushing (Waller 1899:143).

Through the mid-nineteenth century, Flushing's economy continued to be primarily agrarian. A number of grist mills, powered by tidal action, were established to serve local farmers. Three such mills—the Hamilton mill, Bowne's or Ireland Creek mill, and the Coe mill—were located on Flushing Creek's tributary streams and are shown on 1850s maps (see Figures 15 and 17). None of these mills were within the FLUBERB study area.

The Hamilton mill was located on Mill Creek, which entered the eastern side of Flushing Creek a short distance from its mouth. Waller (1899:185) noted that this mill was operated by William Hamilton, which was confirmed by the 1852 Dripps map (see Figure 17). Little information remains about the mill, which would have been situated north of present location of Northern Boulevard at the approximate location of the Whitestone Expressway. By the early twentieth century the mill was already in ruins (Shiel 1964:14).

Bowne's mill or the Ireland Creek mill was built ca. 1797 and was acquired by the Bowne family a few years later (Lawson 1952:10). Munsell (1882:109) maintained that Bowne's mill was erected on the site of an earlier mill, known as the Burling mill, which was constructed in the seventeenth century. Munsell described the Bowne mill, constructed ca. 1800, as "a frame structure forty feet square and four stories high, and has four runs of stones." Lawson (1952:1880) states that the mill, located at Rodman Street, was run by two iron turbine wheels. According to Shiel (1964:14), it was located within the World's Fair grounds and was torn down when the fair was built in the 1930s. Ireland Creek entered the east side of Flushing Creek at about the present location of Elder Avenue, and the mill was

located east of the present College Point Boulevard (see Figure 17). This places the mill site east of Flushing Meadow Park and well to the northeast of the FLUBERP project area.

The Coe Mill, comprising a mill and associated house, were located on Horse Brook, which entered the west side of Flushing Creek at about the present location of 62nd Road, a short distance south of the former location of Strong's Causeway (see below) and the present Long Island Expressway. The mill site would have been well to the west of the present Grand Central Parkway. The parkway is slightly east of Peartree Avenue, which is shown on the 1914 Sanborn map and which forms a portion of the present Grand Central Parkway service road. The mill house and mill apparently were constructed in the seventeenth century by one of the early settlers in the Corona section of Queens, Robert Coe (HPI 1985:14). The mill was owned by Daniel Rapelye ca. 1852 and was destroyed by fire in 1875 (Dripps 1852; Riker 1852; Shiel 1964; see Figures 15 and 17). The Coe house was torn down and its foundations are located at the site of the expressway (Shiel 1964:15).

The Village of Flushing was incorporated in 1837 (Mandeville 1860:76). At that time, the west bank of Flushing Creek consisted of marshland and remained undeveloped until the twentieth century, with the exception of hotels and recreational facilities. The portion of the east bank of Flushing Creek south of what is now Northern Boulevard also remained largely undeveloped until the latter part of the nineteenth century, although it was the location of the homestead tract of the Lawrence family, descended from one of Flushing's original settlers. As shown on the 1841 town map (see Figure 16), the Lawrence homestead was approximately 500 feet south of Flushing Bridge, placing it between the present Northern Boulevard and Roosevelt Avenue. Later maps that show the street grid (e.g., Figure 18) depict the location of the Lawrence house as a short distance north of Washington Street (present-day 37th Avenue). The original house was destroyed by fire and was replaced in 1835 (Munsell 1882:132). The property also contained a dock (see Figure 16 and 18).

In the second half of the nineteenth century, Flushing underwent industrial development. By 1886 the eastern shoreline of Flushing Creek between Northern Boulevard and the Lawrence property had become the site of the North Side Coal Company (Sanborn Map Company 1886b). The western shoreline between the present Roosevelt Avenue and the LIRR embankment remained largely undeveloped until the turn of the nineteenth century.

3.3.*1 Lower Flushing Creek.* The Lower Flushing Creek FLUBERP site extends along the west shore of Flushing Creek, beginning a short distance south of Northern Boulevard and extending southward to the LIRR embankment, and along both shores of the creek between the LIRR embankment and Porpoise Bridge, approximately 250 to 300 feet south of the embankment. The project area also extends along the east bank of Flushing Creek for 375 feet, beginning 300 feet north of the railroad embankment (see Figure 3c). With the exception of the facilities immediately south of Northern Boulevard discussed below, the only cultural resources in this area until the twentieth century were the various vehicular and railroad crossings of Flushing Creek.

3.3.1.1 Vehicular/Pedestrian Bridges.

Flushing Bridge. Until the beginning of the nineteenth century, the only way to cross Flushing Creek was by boat. As late as 1781, no bridges crossed the creek (Taylor and

Skinner 1781). Moreover, the road from Flushing to Brooklyn and New York City ran circuitously through Jamaica, southeast of what are now Meadow and Willow Lakes. In 1801, the Flushing and Newtown Turnpike and Bridge Company, headed by William Prince, was formed to build a bridge over the creek. The original bridge was washed away in a flood shortly after its construction, but was soon rebuilt (Riker 1852:258; Carman 1972). The original bridge was constructed of wood and was a toll bridge (Works Progress Administration [hereafter cited as WPA] 1938:Vol. 6:162). The bridge, as well as those that later replaced it, was located at the site of the present Northern Boulevard (Halleran 1932; see Figures 15 through 18), which was originally known as Broadway and later as Jackson Avenue.

It appears that the one-lane wooden bridge built in the early nineteenth century stood until the last decade of the century. The Jackson Avenue bridge was inventoried as a wooden bridge in 1886 and was apparently replaced by an iron bridge ca. 1892, at which time the road was widened (Sanborn Map Company 1886b, 1892b; Seyfried and Asadorian 1991:8; Halleran 1932). The 1892 iron bridge only stood for fourteen years. In 1906, the new model was a lift bridge (Bozeman 1978), whose construction may have been in response to the need to accommodate larger boats passing under the bridge. At this time an inclined roadway was constructed as an approach to the bridge (Business Men's Association 1906; WPA 1938 6:16). The bridge was detailed in a contemporary account:

> The new Bridge is of the Scherzer rolling lift type, is 196 feet long and 52 feet wide. The centre or movable span is 60 feet and each shore span 68 feet. The Bridge has two Trolley Tracks, two Driveways and 8 foot Sidewalks on either side. Concrete, Granite and Steel are the principal Materials used in its construction. The Bridge is operated by Electricity and can be opened in 25 seconds [Business Men's Association 1906].

The 1906 lift bridge at what is now Northern Boulevard continued to stand until its replacement prior to the opening of the World's Fair in 1939, (FMI 1937f:8; New York Times 1938). This bridge was apparently the "Bascule" bridge shown on the 1951 Sanborn map, which was later replaced by the existing high bridge at Northern Boulevard (Sanborn Map Company 1951). It would appear that the massive piers for the existing bridge would have removed any remains of the previous structures. No evidence of the latter was noted at the northern end of the FLUBERP site during the reconnaissance for this project (Figures 19 and 20).

Roosevelt Avenue Bridge. In the nineteenth century into the early twentieth century, the only other roadway across Flushing Creek was Strong's Causeway, the present location of the Long Island Expressway. It was not until 1926 that a third crossing for vehicular and pedestrian traffic was constructed at Roosevelt Avenue (Kupka 1950), which was a drawbridge (Figures 21 and 22). In the 1930s the drawbridge was replaced by an elevated bridge. A 1938 photograph (Figure 23) showed subway cars crossing the two-level elevated bridge. The bridge illustrated in the 1938 photograph still carries Roosevelt Avenue and what was formerly known as the IRT subway line over Flushing Creek and the Van Wyck Expressway (Figure 24). Cut-off timber pilings and what appears to be an old stone pier footing were noted immediately north of the existing Roosevelt Avenue bridge during the reconnaissance (Figure 25). These features may be associated with the 1926 drawbridge.

3.3.1.2 Railroad Bridges.

Flushing Railroad (Long Island Railroad) Bridge. A major improvement in the accessibility of the Flushing area came in 1854 with the opening of what was then known as the Flushing Railroad (Munsell 1882:103). Construction of the single-track railroad began in 1853. The tracks crossed the Flushing Meadow marshes on a wooden trestle supported on pilings driven through the marsh deposits to solid ground, which underlay the surface of the marsh at depths of 5 to 20 feet. The railroad then crossed the creek on a drawbridge, described as a "swinging draw" (Seyfried 1963:11). The creek crossing shown on the 1859 Walling map (see Figure 18) was at the approximate location of the existing LIRR embankment near 41st Avenue. In 1859 the Flushing Railroad was reincorporated under the new name of the New York & Flushing Railroad Company (Seyfried 1963:21). In 1870 a major improvement to the railroad involved the replacement of the then-existing wooden drawbridge over Flushing Creek with a new iron drawbridge that measured 88 feet in length, 16 feet wide, and 8-½ feet high, including sides (Seyfried 1963:68). Later in the 1870s, the New York & Flushing Railroad would be incorporated into the Long Island Railroad system.

The railroad drawbridge was depicted on documents, including aerial photographs, through the first half of the twentieth century (Sanborn Map Company 1917; Fairchild 1924; DeBevoise 1930; Queens Borough Public Library 1938a; Figure 26; see Figures 23 and 24). The photographs show what appear to be pilings associated with the piers supporting the draw extending north and south of the bridge. In 1951 the railroad continued to cross the creek utilizing a trestle (Sanborn Map Company 1951). This trestle has been replaced by an embankment, with Flushing Creek flowing beneath the embankment through a pipe culvert (Figure 27). Construction of the embankment apparently involved deposition of fill behind a wooden bulkhead and associated cribbing, which is partially visible on the northern side of the embankment (Figure 28).

During the reconnaissance, deteriorated pilings were noted north of the embankment. These included a row of four piling clusters extending an estimated 75 to 100 feet northward from the eastern portion of the embankment (Figure 29). These may represent the remains of the supports associated with one of the piers that supported the old drawbridge. Their location corresponds with the northeastern-most set of supports seen on the 1924 aerial photograph (see Figure 26). Additional pilings were identified east of the northern end of those noted above, as well as several pilings along the western bank of Flushing Creek (see Figure 29).

Flushing & Woodside Railroad Bridge. In the 1860s a rival to the Flushing & North Shore railroad emerged. Known as the Flushing & Woodside Railroad, the new line was to run from Woodside to College Point and Whitestone. One of its leading organizers was Conrad Poppenhusen, who was largely responsible for the development of College Point (see discussion below) (Kupka 1950; Shiel 1963). Construction of the Flushing River drawbridge for the new railroad line occurred in 1865. The wrought iron bridge was built by the Watson Manufacturing Co. of Paterson, New Jersey (Seyfried 1963:53-54, 68). Legal, financial, and political problems delayed the opening of the line, which was reincorporated as the Flushing & North Side Railroad in 1868. During that year, the new corporation acquired the older New York & Flushing Railroad. The corporation, now operating both lines, decided to connect them at a point in Flushing Meadows to be known as Whitestone Junction (Seyried 1963:60). The connection between the two lines, carried on piles across

the meadow, was built in 1869, with service on the new line beginning later that year (Seyfried 1963:60-61).

The new Flushing River railroad bridge south of what is now Northern Boulevard as well as the New York & Flushing Railroad bridge and the trestle across the marsh west of the creek connecting the two lines were detailed on maps dating to 1872 and 1873 (Figures 30 and 31). In 1874 the Flushing & North Side Railroad consolidated with other lines to become the Flushing, North Shore & Central Railroad. Two years later, in 1876, all of the competing rail lines on Long Island were joined to form the LIRR (Seyfried 1963:99, 124).

Figures 30 and 31 illustrate the former Flushing & Woodside rail line crossing the creek in two different positions. It would appear that the location shown on the 1872 map (see Figure 30) is too far to the south and that the bridge was, in fact, located as shown on the 1873 map (see Figure 31). According to Shiel (1963:4-5),

> About 150 feet south of ... [Northern Boulevard] ... at the Corona end, was a large earth fill about 250 feet long, formerly used by the Flushing and Woodside Railroad. The railroad continued on to Flushing on piles. This particular transportation line was abandoned in the 1880's [sic].

The Flushing & Woodside rail line and the associated Flushing Creek bridge continued to exist through the early twentieth century (Sanborn Map Company 1886b, 1914). The 1914 Sanborn map (Figure 32) identified an "iron draw bridge" at this location.

In the 1880s the railroad company replaced the trestles that crossed the meadows with earthen embankments. The trestle work, however, was not pulled up, but simply buried under fill.

> Tons of dirt and ashes were dumped over the long single-track trestle [along the Corona meadows from Flushing Creek to 1,000 feet west of the drawbridge] which was beginning to rot and track placed on a solid earth basis. Three times the fill and track sank but afterwards became stabilized (1882) ... In 1886, 2,700 feet of trestle work on the Flushing meadows between Whitestone Junction and Bridge Street draw were filled in and the track raised above the former trestle level. This settled considerably and in 1887 was raised another foot [Seyfried 1975:122-123].

The bridge was reconfigured or modified between 1904 and 1926, probably between 1904 and 1907 (Ullitz 1904; Belcher Hyde 1926:Plate 5; Queens Borough Public Library 1907).

The Flushing & Woodside bridge was depicted on aerial photographs dating to 1924 and 1930 (Figure 33; see Figures 22 and 26). It was removed prior to 1950 (Sanborn Map Company 1951). During the field reconnaissance, pilings were observed along the west shore about 400 to 500 feet south of Northern Boulevard (Figure 34). Based on their location, they may be the remains of the former railroad trestle/bridge.

In 1895 another trestle, carrying a trolley line, was laid across the marshes running diagonally from 114th Street and 43rd Avenue to Flushing Bridge. The line was extended across the bridge to Flushing later that year. It ran until 1915, when the marshes were filled (Seyfried 1950; Sanborn Map Company 1902; see discussion below).

Newtown and Flushing Railroad Bridge. An attempt to open a railroad to compete with the Flushing & North Shore Railroad was undertaken in the early 1870s. Construction began in 1871 on a route that crossed Flushing Creek via a bridge located south of the original Flushing Railroad bridge site. The Newtown & Flushing Railroad, known as the "White Line," opened in 1873 (see Figure 31). The Newtown & Flushing Railroad was not a success and only operated regular service for less than three years. Subsumed by the LIRR in 1875, it ceased regular operation in 1876. Despite the removal of all the line's trestle work and tracks, its route was rendered on maps and photographs dating to the late nineteenth and early twentieth centuries (Seyfried 1966:77-79; Wolverton 1891; Ullitz 1904).

1870s Rail Spur Bridge. Another railroad line crossed Flushing Creek during the 1870s, but it also had a brief existence since it only appears on the 1873 map (see Figure 31) crossing the creek diagonally north of the original Flushing Railroad crossing (i.e., present location of the LIRR bridge). From the railroad yard near Sanford Avenue and Delong Street, "a spur led northwest, crossed Flushing Creek on its own trestle and connected with the Woodside Branch track and the Flushing Bay dock spur on the open meadows" (Seyfried 1963:104). This spur apparently represented a freight line since the dock near the mouth of the creek was labeled "Freight Dock" on the 1873 map. As shown on this map, the spur would have been at the approximate location of the present Van Wyck Expressway crossing of the creek (see Figure 31).

3.3.1.3 West Bank, South of Northern Boulevard. Maps dating to the 1850s (see Figures 15 and 17) rendered all of the land bordering Flushing Creek in the area of the present FLUBERP project area as marshlands. No structures were delineated in this area.

By 1873, two structures are shown adjacent to Broadway (now Northern Boulevard) on the west side of the creek (Figure 35). The structure north of the road is outside the APE. Labeled "R. Sands," it was a hotel and restaurant operated by the Sand (or Sands) family. A well-known local landmark, it was known at one point as Sand's Pavilion or the "Flushing Bridge Hotel" (Lawson 1952:11; WPA 1938 VI:163). Accounts by members of the Sand family disagree about the date of construction of this facility (WPA 1938 VI:162-165). The structure was built shortly before the 1873 map was drawn, although some accounts state that it was built by Captain Richard Sand in 1874 or 1875 (WPA 1938 VI:162-163). One account stated that the hotel was built on the site of an earlier tavern, and another gives the date of construction as 1850 (WPA 1938 VI:163). Yet another account states that Richard Sand acquired this "saloon and boathouse" in 1864. Map evidence reveals that the building was not present prior to 1860 (see Figures 15, 17 and 18) and was built between 1860 and 1873. The structure was still standing in 1932 (Halleran 1932), but was demolished in the mid-twentieth century (Carman 1972). The location north of Northern Boulevard is north of the FLUBERP area.

The second structure, labeled "J. Jones," on the west bank of the creek was immediately south of Broadway (what is now Northern Boulevard) (see Figure 35). Oral accounts by members of the Sands family maintained that this building was also a hotel, constructed by Treadwell Sand, and operated as a "saloon and boathouse." He subsequently sold the business to "Captain Jones," who apparently owned it in 1873. It was eventually acquired and operated by Captain William Sand, brother of Richard Sands, who operated the facility on the north side of the bridge. The hotel was apparently known locally as "the Hotel deCreek" (WPA 1938 VI:163). It is unlikely that any remains of this facility would have remained undisturbed by the widening of Northern Boulevard and construction

of the existing bridge. The location of this hotel would be north of the APE of the FLUBERP site (see Figure 3c).

The "Hotel deCreek" was shown on early twentieth-century maps (Sanborn Map Company 1902; Bromley 1909; Figure 36). A boat house and dock had been constructed south of the hotel prior to 1902. This facility originated as the Nereus Boat Club, which was organized and the structures erected in the 1870s, apparently after 1873 (Sanborn Map Company 1902; Halleran 1932; see Figures 30 and 31). The Nereus Boat Club was a gathering place for prominent men who were rowing enthusiasts, and the club held regattas on Flushing Bay (Carman 1972). The most notable member was Charles Dana Gibson, the illustrator and originator of the "Gibson Girl" drawings (Halleran 1932). By 1900 the facilities of the Nereus Boat Club had been taken over by the Wahneta Boat Club (Lawson 1952:104). The Wahneta Boat Club's headquarters were adjoined by a large dock (Sanborn Map Company 1914; see Figure 32). The 1924 aerial photograph (see Figure 33) showed a bulkheaded area at the location of the former boat club dock. The boat club site is near the northern end of the FLUBERP project area.

Maps and photographs of this area suggest that all of the buildings that stood in this area during the late nineteenth and early twentieth centuries were constructed on piles over the marshes. No remains of these pilings are visible in the area north of those possibly associated with the railroad bridge as discussed above (Figure 37).

By 1927 the boat club facilities appear to have been demolished, although one structure, perhaps the "Hotel deCreek" building, continued to stand immediately south of the Northern Boulevard bridge (Belcher Hyde 1927). By 1951 this building had been removed and a few small buildings of the Empire Millwork Corporation had been constructed approximately 125 feet west of the Flushing Creek shoreline (Figure 38). By the last quarter of the twentieth century, construction of the Van Wyck Expressway and associated ramps had resulted in the demolition of these structures and the isolation of the portion of the creek's west bank between Roosevelt Avenue and Northern Boulevard from the area to the west (Figure 39). Examination of historical maps reveals that the west bank of Flushing Creek between Roosevelt Avenue and the LIRR tracks has never been developed. As discussed below, the entire area was filled during the first half of the twentieth century.

3.3.1.4 East Bank, North of LIRR Embankment. The proposed FLUBERP project area on the east bank of Flushing Creek north of the LIRR embankment (see Figures 2b and 3c) remained undeveloped during the nineteenth century, except for a dock shown north of the APE in 1859 (see Figures 18 and 30; Wolverton 1891:Plate 9). At the turn of the nineteenth century, a lumber yard operated by D.S. Jones was established along the east bank of the creek (Figure 40). The large shed shown on the 1904 map would have been located within the APE of proposed FLUBERP activities.

By 1917 (Figure 41) the former lumber yard had become the site of the H.K. Lines Coal & Wood Yard. A coal house stood on the creek bank approximately 600 feet north of the LIRR drawbridge near the north end of the proposed FLUBERP site. A smaller building labeled "Cement Ho" stood along the creek near the south end of the coal yard. These facilities also were shown on the 1924 aerial photograph (see Figure 26). By 1951 (Figure 42) the former coal/wood yard had been replaced by the facilities of the Eastern Steel Tank Corporation. What appears to be a new coal-loading facility had been constructed along this portion of the shoreline, which is near the south end of the proposed FLUBERP site. This

latter facility is apparently shown in photographs taken in 1938 (Figure 43, see Figure 23), indicating construction between 1924 and 1938.

Field reconnaissance identified a New York State Department of Environmental Conservation (NYSDEC) outfall and associated concrete headwall near the southern end of the proposed FLUBERP area (Figure 44; see Figure 31). In addition, derelict pilings were noted along the eastern bank of the creek north of the headwall (Figure 45), most likely the remains of wooden bulkheading constructed in association with the early nineteenth-century industrial facilities noted above.

3.3.1.5 South to Porpoise Bridge. Various nineteenth century and early twentieth century maps and photographs (see Figures 17, 18, 22, 26 and 30) depicted both banks of Flushing Creek in this area as undeveloped until the creation of the World's Fair Grounds/Flushing Meadow Park in the 1930s. With the exception of an outfall located on the west bank of the creek a short distance north of Porpoise Bridge (Figure 46), no cultural features were noted along the creek banks in this area during the reconnaissance.

3.3.2 Upper Flushing Creek/Daylighting and Meadow and Willow Lakes Projects. Proposed FLUBERP project activities would involve work extending from Porpoise Bridge southward through Flushing Meadow Park, an area that was the site of the two New York World's Fairs held in 1939-40 and 1964-65. The Upper Flushing Creek project also would involve modifications to the culvert beneath the LIRR embankment, discussed in Section 3.4.1 of this report.

3.3.2.1 Flushing Meadows Landfilling. At the beginning of the twentieth century a plan was initiated under the leadership of Michael Degnon to fill the Flushing Meadows marshes to create land for development (Seyfried 1986). A portion of the marshes were filled from the LIRR tracks on the north to what is now the Long Island Expressway (then Strong's Causeway) on the south beginning in 1910. The company formed for this purpose was known as the Brooklyn Ash Removal Company (Seyfried 1986; Oats 1980a). A dock was constructed on the west side of Flushing Creek at which scows containing fill material from other parts of New York City were unloaded. Their contents were spread over the marshes and railroad tracks were laid to enable additional fill material to be brought to the as yet unfilled sections (Shiel 1964:21-22). The dock is shown on the 1924 aerial photograph approximately 1,200 feet south of the LIRR embankment (see Figure 26). The creek has been subsequently rechanneled. The location of this dock would have been west of the current project area.

Over a period extending into the 1930s a total of 50,000,000 cubic yards of material were brought to the fill site. The amount of refuse dumped in the former marsh area far exceeded that needed for landfilling, and by 1934 the dumps on the west side of the meadow reached heights of up to 90 feet (Moses 1938). The fill material was to consist of ashes, most of which came from Brooklyn. The supposed nature of the landfill led F. Scott Fitzgerald to refer to this project as "the valley of ashes" in *The Great Gatsby* (Oats 1980a). However, the odor of the landfill testified to the fact that a large amount of unburned garbage was, in fact, included in the fill material (Seyfried 1986). This was confirmed in 1980 when excavation for an elevator shaft at the Queens Museum lead to the recovery of late-nineteenth century and early twentieth century artifacts (Driscoll 1980:10).

In 1916, the Borough Development Company, under contract with the City of New York, began a project to fill a total of 217 acres between Northern Boulevard and the LIRR, utilizing material dredged from the bottom of Flushing Bay (Seyfried 1986). The area south of the railroad, which now includes Meadow and Willow Lakes, remained unfilled at this time (Shiel 1964:21-22).

3.3.2.2 The World's Fair Grounds and Flushing Meadows Park. In the 1930s the City of New York, led by Robert Moses, acquired the Corona dumps for the purpose of construction of a park and Grand Central Parkway. At about the same time a proposal was made to use the area for a World's Fair, which was subsequently held in 1939 and 1940. A private corporation was formed to finance and run the fair in cooperation with New York City and the State of New York. The plan included conversion of the site after the closing of the fair back to its original proposed use as a park (Moses 1938). From the beginning, the concept of the creation of a permanent park was paramount to Robert Moses and he saw the proposal for the 1939 World's Fair as "the obvious bait for the reclamation of the meadow" (Moses 1938:72). Moses' concept was that creation of the fairgrounds would include permanent improvements that would form part of the new Flushing Meadows Park after it closed. These improvements would include roads, plantings, water and sewage pipes, electric lines and fountains (Miller 1989:48). All other fair facilities would be demolished after it closed in 1940.

In 1936 work began as the piles of rubbish forming the Corona dumps were leveled and spread over the meadows. Seyfried (1963:6) notes that as a result some 15 to 20 feet of "ashes and rubble" overlay the former marsh deposits. The difference between the original Flushing Meadows ground elevation and that existing after construction of the World's Fair grounds is illustrated by a photograph of the Porpoise Bridge abutments under construction (Figure 47). Topsoil for the fair was obtained by processing the muck dredged out of the meadows to create Meadow and Willow Lakes (Moses 1938), as noted below in the discussion of the proposed Meadow Lake FLUBERP site.

When Moses became president of the second (1964-65) New York World's Fair Corporation, he saw an opportunity to complete Flushing Meadow Park by providing additional permanent recreation facilities. Meanwhile, the second fair reused many elements of the park's roadways, fountains, and underground infrastructure, initially developed for the first fair (Miller 1989 56-57). After the second fair, the site reopened as a city park in 1967. Additional improvements, including a botanical garden, a zoo, and a collection of park sculpture were added to the landscape elements remaining from both fairs (e.g., the boating lake, ice-skating rink, open fields, walkways and fountains) (Miller 1989:72). From the standpoint of the creation of the present landscape, the two World's Fairs and the existing park form a continuum.

3.3.2.3 Porpoise Bridge and Tide Gates. The design for the World's Fair grounds and Flushing Meadow Park involved the creation of two freshwater lakes. In order to accomplish this, control of the tidal flow into the lakes was required. While a supply of fresh water was provided by storm runoff from the adjacent higher ground, the waters of Flushing Creek were saline since the creek experienced a normal tidal range of some six feet, with a recorded range of sixteen feet. Salt-water flow into the proposed lakes would prevent the growth of freshwater plant species, and the tidal range would result in the draining of the lakes at periods of low tide.

To solve this problem, a dam and tide gate were constructed south of the LIRR embankment. The dam would prevent salt water from flowing into the lakes at periods of high tide. A spillway was constructed to permit excess water to drain from the lakes, which on the upstream side of the dam is at the desired water level of the lakes. The spillway slopes downward to the downstream face of the dam to permit runoff when water elevations exceed the desired normal level. The spillway is blocked by a pivoted gate so that when tidal level exceeds the elevation of the downstream side of the spillway, saline water is prevented from flowing upstream of the dam (see Figure 46). Extra flumes with mechanically controlled gates are placed at a lower level to permit the drainage of the lakes and channels if necessary. The weight of the dam was supported by a foundation of "cells" constructed of steel sheet-pilings and filled with sand (FMI 1937c; Figure 48). This dam, constructed to carry one of the World's Fair/Park roadways, is now known as Porpoise Bridge. Its location was chosen to protect all of the water area within the park from tidal action (FMI 1937c).

The reinforced-concrete arch bridge was designed to "harmonize architecturally with the World's Fair buildings and ... later merge into the landscaped park features" (FMI 1937c:4). The dam has not been substantially altered (although it could benefit from refurbishment) and still appears as constructed for the 1939 World's Fair.

3.3.2.4 Flushing Creek and the World's Fairs. Construction of the 1939-1940 World's Fair grounds necessitated the channelization of Flushing Creek. As can be seen on maps and photographs of the fair grounds (e.g., Figures 49 and 50), the channelized waterway ran southward from the tide gate to a large fountain, known as the "Lagoon of Nations." A bridge crossed the creek between the tide gate and the fountain. A roadway around the periphery of the fountain was carried over the creek by bridges at the northern and southern ends of the fountain. The channelized creek ran southward to Horace Harding Boulevard (renamed "World's Fair Boulevard" for the fair), continuing south of the boulevard to Meadow Lake (called Fountain Lake at the time). The stream was crossed by two additional bridges between the fountain and the boulevard. In addition, exhibit pavilions were constructed adjacent to the creek, with the stream flowing beneath the pavilions. The site of the northernmost of these bridges and the adjacent pavilion placed them a short distance south of the proposed rechannelization project. The southernmost of the two bridges and associated pavilions were at the approximate location of the present Long Island Expressway interchange complex.

After the World's Fair closed in 1940, all of the exhibits in the vicinity of the FLUBERP site were demolished, including the "Lagoon of Nations" fountain. The northernmost of the World's Fair bridges, south of Porpoise Bridge and dam, was still intact. The bridge south of the site of the former fountain was apparently a wooden bridge that replaced the World's-Fair bridge, most likely at the time the adjacent building was demolished (Sanborn Map Company 1951). It is uncertain if the southernmost bridge, a short distance north of the Long Island Expressway, is the 1939 World's Fair bridge or whether the latter was also replaced when the adjacent buildings were demolished (Figure 51).

Construction of the second World's Fair grounds dealt differently with the Flushing Creek channel. It remained an open channel for only 500 feet south of the tide gate and dam. From this point, the stream ran underground through a large buried conduit, feeding a pool ("The Pool of Industry") and a fountain ("The Fountain of the Planets') that were at the same location as the first fair's "Lagoon of Nations" (see below). Reconnaissance discovered that the underground facility is actually a twin culvert (Figure 52), which enters

and exits the fountain near its western side (Figure 53). South of the fountain, the stream continued underground for approximately 750 feet to a point north of the first of the two bridges for the first fair. It reemerged above ground south of this point. A new bridge carried the fair's Marginal Road over the open channel 200 feet from the point where it left the culvert and a short distance north of the present highway interchange. This is apparently the same bridge that still stands at this location (Figure 54).

The remaining 1939-40 bridges were removed and fill was deposited over the culverts. One discussion of fair construction stated that deposits of muck at the bottom of Flushing Creek were to be dredged out as part of the planned construction. The major planned source of fill material for fair use consisted of 700,000 cubic yards of burned incinerator residue obtained from the City of New York (Potter and Whipple 1961). It is assumed that much of this was used to fill in the former Flushing Creek bed, but some may have been used for other purposes. Portions of the newly made land were utilized for construction of exhibits and roadways for the 1964-65 World's Fair. Most of the building foundations for the fair were supported on piles driven through fill and the underlying marsh deposits (Potter and Whipple 1961; Dickerson 1963).

Fair Layout and Landscape Design. Comparison of maps delineating the 1939-40 and 1964-65 fairs (Figures 49 and 55) documents that the layouts of the fairs were similar west of Flushing Creek. The decision to fill the creek and rebuild the fountain, however, led to changes in the layout of the second fair's eastern portion. With the creek filled, bridges to cross it were unnecessary. A circular roadway (the Promenade of Industry) was built around the new fountain which traversed the former locations of the bridges north and south of the 1939 Lagoon of Nations. Another circular roadway (the Avenue of Progress) was constructed concentric with the Promenade of Industry. To the west of the filled creek, the Promenade of Industry connected with the Avenue of Commerce, which also was part of the 1939 fair (then called Rainbow Avenue). To the east of the Pool of Industry two radial roadways (the Avenue of Research and the Avenue of Discovery) connected the two concentric roadways (the Promenade of Industry and the Avenue of Progress) and extended further east to connect with the fair's Meridian Roadway. All of the above roadways are now part of the Flushing Meadow Park layout (Figure 56).

3.3.2.5 Daylighting Project. The FLUBERP project proposes to excavate the overlying soil and remove the underground conduit so the creek would once more run in an open channel. The project area as shown on the map provided by USACE (see Figure 3c), however, would not exactly match that of the 1939-40 World's Fair channel, but would be more closely aligned with the 1964-65 World's Fair channel. Locations of some of the former exhibits from the first and second World's Fair that were adjacent to the channel as well as the former channel location would be impacted by the proposed excavations. Overlays of the proposed project onto both World's Fair layouts are included as Figure 57a, b. These exhibits and features are discussed below, from north to south.

The 1939-40 World's Fair. The fair opened April 30, 1939. The grounds comprised 1,216½ acres (only the 1904 St. Louis fair was larger) and some 375 structures, including 100 major exhibit buildings and 50 major amusement concessions (see Figure 49). The 1939 World's Fair was divided into seven zones: 1) Amusement; 2) Communications and Business Systems; 3) Community Interests; 4) Food; 5) Government (subdivided into foreign and American states areas); 6) Production and Distribution; and 7) Transportation (World's Fair Corporation [WFC]1939a). The APE of the Flushing Creek daylighting project area is

within the former Government Zone, including the Gardens on Parade exhibit, the United Kingdom and Australia pavilions, and the Lagoon of Nations (see Figures 3c, 49 and 57a).

The Gardens on Parade Exhibit. This exhibit was located east of the channelized Flushing Creek between the tide gate/bridge and the bridge over the creek between the tide gate and fountain. Although it was within the "Government Zone," the exhibit was a privately run operation covering five landscaped acres containing various types of gardens. It also included an 800-foot long building with a striped roof and "tent-like rotunda entrance" that housed horticultural displays and flower shows as well as a restaurant (WFC 1939a). The impact area would include the western portion of the rotunda/exhibition hall building, those gardens designated as the "Formal Garden," and Blue and White Garden" and a portion of the "Garden of Tomorrow" (Figures 58 and 59). The garden layout appears to have remained intact after demolition of the fair buildings (see Figure 51). Maps of the 1964 World's Fair (e.g., see Figure 55) suggest that most of the site of the Gardens on Parade Exhibit remained undeveloped for the later fair.

The United Kingdom and Australia Pavilions. Between the bridge noted above and the Lagoon of Nations, the FLUBERP APE would be east of the former course of the channelized Flushing Creek. This area contained two buildings that were separated by one of the fair roadways but joined by a second floor passageway. These buildings can be seen in Figure 58. The northernmost of these buildings was the United Kingdom pavilion while the smaller one, on the south side of the roadway, housed the exhibits of Australia, New Zealand and the British colonial empire. The area to be affected was the "English Garden" on the west side of the large exhibit building. This enclosed, three-quarter-acre garden utilized paving stones derived from "old stone slabs taken from Whitehall Gardens and the Tower of London" (British Commission 1939). The former location of the southwestern portion of the exhibit building also appears to be in the APE, and was the "British Buttery," a restaurant (WFC1939a:129). The western part of the smaller building housed the Australian exhibit and also may be within the APE of the project. This area remained vacant for the 1964 Fair.

The Lagoon of Nations. The daylighting of Flushing Creek would impact the former site of the large pool known as the Lagoon of Nations. The central portion of this pool housed a large fountain (Figure 60). At night, the fountain was utilized for *son et lumiere* shows utilizing synchronized fireworks, flames, and colored fountains with musical accompaniment (Wurts 1977:102).

Area South of the Lagoon of Nations. The daylighting project south of the Lagoon of Nations would largely affect only the area of the 1939 channel. The southern end of the FLUBERP site appears to be just north of the Pennsylvania exhibit, which was constructed immediately north of the bridge removed after the fair and replaced by a wooden bridge as noted above.

Post-Fair Demolition. The terms of all the contracts between the various vendors and the World's Fair Corporation called for all of the structures to be removed to a depth of at least four feet below the surface. However, it was subsequently agreed that where removal of foundations to this depth would disturb the "subsurface," clean fill could be deposited over the area to a height of four feet above the tops of existing pile caps or other structural members (Spargo 1940). For example, it was agreed that demolition of the Merrie England

building in the Meadow Lake Amusement Area would include a cutting of the supporting piles at a depth not to exceed 12 inches below the existing ground surface (WFC 1940b).

An open cut excavated for the installation of Flushing Meadow Park facilities was observed during the reconnaissance. The location was west of the proposed FLUBERP APE (and at the northeast corner of the intersection of the 1964 Fair's Avenue of Commerce and Avenue of Progress) and as at the site of the 1939 Fair's Washington State Pavilion (see Figure 49). No buildings were shown at this location on the 1964 Fair map (see Figure 55). Observation of the walls of the approximately four-foot deep cut did not reveal any structural features associated with fair construction.

The 1964-65 World's Fair. The location of the 1964-65 World's Fair exhibits are shown on Figure 55, and the APE vis-à-vis the 1964 fair layout is delineated on Figure 57b. Like the earlier fair, the 1964 Fair was divided into zones: 1) Industrial; 2) International; 3) Federal and State; 4) Transportation; 5) Lake Amusement (Wood 1964:7). The FLUBERP APE is located within what was designated the "Industrial" zone (see Figure 57). The former exhibits and features affected are described below, again from north to south.

Maestro Pizza. This restaurant was located at the approximate former location of the Flushing Creek channel, north of the roadway designated as the "Avenue of Progress" (see Figure 55). The road is at the approximate location of the 1939-40 fair bridge between the tide gate and the fountain. The restaurant was described as a "counter restaurant" serving pizza, beer and soft drinks. Displays of pizza-making also were conducted at the restaurant (Wood 1964:70).

Equitable Life. This exhibit also was at the former location of the creek channel, immediately north of the fountain (see Figure 55). This building was an open concrete pavilion housing electronic tabulation boards and map displays depicting American and international demographic data. The "two-way grandstand" offered views of the displays on one side and the fountain (see below) on the other (Wood 1964:74, 76; Bollman 1964; Figure 61).

Pool of Industry and Fountain of the Planets. The 1964-65 fair had a pool and fountain in the approximate location as the 1939-40 Fair's Lagoon of Nations. However, a 1960 aerial photograph (see Figure 51) shows that the earlier fountain had been removed. The new pool built for the 1964 Fair, known as the Pool of Industry, was somewhat larger than its predecessor with an overall circular design into which the "Court of the Universe" intruded on the west (see Figure 61). As in 1939, the pool contained a fountain display, known as the Fountain of the Planets. This 25,000-square-foot fountain featured synchronized displays of water spouts, fireworks, and lights with music (Wood 1964:82). The largest of nine fountains within the fairgrounds, the fountain consisted of "piping, lights and fireworks apparatus mounted on a series of wood decks, built to hold this equipment one foot above the water level in the pool." Lighting for the fountain was provided by the then recently developed sodium iodide lamp, and the fountain was the "first application anywhere" of this type of lamp (AEN 1963). The lights were mounted in boxes set on the floor of the fountain.

The Pool of Industry still remains as a feature of Flushing Meadow Park (Figure 62; see Figure 56). The island in the fountain on its western side (see Figure 62) corresponds with the location of the element of the World's Fair fountain designated as the "central

structure" (AEN 1963:43). It is uncertain if this is the same structure constructed at a later date. Due to the murky nature of the water during the field reconnaisance, the existence of piping for the fountain could not be observed. Flagpoles present on the west side of the pool correspond to flagpole locations in 1964 (AEN 1963:43; see Figure 62). The ornamentation atop these flagpoles suggests that they may be surviving fair elements.

General Electric. The General Electric pavilion was the largest of three pavilions formerly within the FLUBERP APE. It was located on the south side of the Pool of Industry (see Figures 55 and 61). These pavilions were at or immediately adjacent to the 1939 location of the Flushing Creek channel. The General Electric exhibits were housed in a large dome-shaped pavilion "suspended from spiraling pipes," considered a structurally advanced building at the time (Wood 1964:90; Bletter 1989:124; Figures 61 and 63). The steel-pipe frame for the dome, 200 feet in diameter and 78 feet high, was the first roof frame of this nature built in the United States (Schneller 1964).

The overall exhibit was called "Progressland" and illustrated the history of electricity. One of the most noted exhibits was an actual experimental device producing controlled nuclear fusion using magnetic fields (Reaven 1989), which represented the "first time nuclear fusion was demonstrated for a public audience" (Bletter 1989:126). There was also a moving ramp that carried visitors past animated exhibits produced by Walt Disney (Wood 1964:90). The interior of the dome was used as a large screen on which 87 coordinated projectors showed audiences various dramatic aspects of electricity. At the time the dome represented the largest screen ever built (Reaven 1989:75).

Clairol Pavilion. Adjoining the General Electric pavilion to the east was the Clairol Pavilion (see Figure 61). Only women were allowed into this pavilion, which was operated by the manufacturer of hair-coloring products. The building was a round glass structure called the "Clairol Carousel," that had 40 private booths on a moving turntable. Each booth took six minutes to complete a circuit of the building, during which time the visitor received a hair-coloring analysis. Each visitor filled out a card with personal information that was fed into a computer to suggest hair shades (Wood 1964:90).

Parker Pen Pavilion. The easternmost of the three pavilions adjoining the pool was the Parker Pen exhibit (see Figure 61). It included displays illustrating the history of the company's products and writing desks where visitors could begin corresponding with "pen pals" from other countries. The pen pals were selected based on computerized matching of visitor and pen pal interests (Wood 1964: 86; Reaven 1989:84).

Continental Insurance Company. Approximately 400 feet south of the Pool of Industry, the former route of the Flushing Creek channel intersected the southern portion of a circular roadway constructed for the 1964-65 fair known as the Avenue of Progress (see Figure 55). The sites of three exhibits formerly located on the north side of this roadway are within the proposed FLUBERP APE. The easternmost and largest of these was the pavilion of the Continental Insurance Company (see Figure 61). The exhibit—great moments of the American Revolution—included an outside projection screen which showed "a musical cartoon view of history" (Wood 1964:86, 88).

Chunky Candy. The pavilion of this candy manufacturer was adjacent on the west side of the Continental Insurance Pavilion. It included two glass-walled buildings connected by a cooling tunnel, where visitors could observe candy being made (Wood 1964:88; see

Figure 61). The remainder of the site consisted of a children's playground with 13 "abstract sculptures" on which they could climb (Wood 1964:88).

Brass Rail Restaurant. The Brass Rail Restaurant chain ran a series of concession structures around the fair. One of these was located immediately southwest of the Chunky pavilion. The concession stands were made of vinyl plastic and inflated with air and supported by 75-foot high steel masts and a cable system (Wood 1965:96; Schneller 1964; see Figure 61).

Julimar Farm. South of the Avenue of Progress the proposed FLUBERP APE narrows to join with the existing open channel. The APE here will traverse the former site of the Julimar Farm pavilion, which was sponsored by a corporation that sold garden designs (see Figure 55). The exhibit included several types of gardens and a small pavilion designed by the noted architect Edward Durrell Stone. The gardens at the site were designed by his son, Edward Jr. (Wood 1964: 93). It is uncertain whether the FLUBERP APE would include the site of the pavilion or only the gardens.

Better Living Center. The large building housing the "Better Living Center" adjoined Julimar Farm to the east. This three-story building was the third largest at the fair and housed 250 separate exhibitors who did not have their own pavilions (see Figure 55). The exhibits were divided into six major categories: food, fashion, home, leisure, health, and security. The building included a seven-room "dream house" and an amphitheater for fashion shows. Visitors could ride to the third floor on a glass-enclosed escalator and descend through the exhibits on ramps, or they could ride an elevator to the roof housed in an exterior tower for a scenic view of the fair (Wood 1964:92). The FLUBERP APE apparently includes the western portion of the building site.

Post-Fair Demolition. As was the case with the first World's Fair, all exhibitors were contractually bound to demolish their buildings after the fair closed in 1965. "The demolition clause in exhibitors' contracts requires that at the Fair's end everything must be removed to a depth of four feet and the plot must by graded and planted with grass" (Wood 1964: 93).

3.3.2.6 Meadow Lake and Willow Lake. The Meadow Lake/Willow Lake FLUBERP areas are within what was the southern portion of the Flushing Meadows marshland prior to twentieth-century filling and other landscape modifications. During the 1780s the area was characterized as marshlands bordered by bluffs on either side. The only cultural feature was a structure near the bluff edge east of the marsh (Taylor and Skinner 1781). This structure was located on the large estate known as "Spring Hill Farm" in 1852 (see Figure 17). The estate was a 120-acre tract purchased in 1762 by Cadwallader Colden, a prominent resident of Flushing who served as Lieutenant Governor of New York. The tract extended from about the present location of the Long Island Expressway southward to the approximate end of the marshlands. The former Colden house was apparently labeled "Boerum" on the 1852 map (see Figure 17). By 1891, the former Spring Hill Farm was the location of two large estates owned by H. Durkee and T. Miller (Figure 64). A large cemetery called Cedar Grove Cemetery was established on the former Durkee Estate in 1896 (Figure 65). Subsequently the western portion of this cemetery became the Mt. Hebron Cemetery (Shiel 1964:14).

Maps dating to 1852 (see Figures 15 and 17) showed only one house, owned by Ascan Backus, along the western edge of the Flushing Creek marsh south of Horse Brook.

This house had been owned by Capt. Luke Remsen early in the nineteenth century (Riker 1852:391).

In the late nineteenth century, Cord Meyer purchased large tracts of land in Newton for development. In order to attract buyers he had to provide water and transportation facilities. In 1893 he organized the Citizens Water Supply Company, which grew into a million dollar business over the next ten years (Seyfried 1950:14). Two pumping stations were located at the western edge of the Flushing Meadow marshland, immediately east of Peartree Avenue (Sanborn Map Company 1914:10:100-101). Peartree Street now forms a portion of the Grand Central Parkway service road. One pumping station, which was not in use by 1914, was located at Ibis Avenue (the present 70th Avenue). The second pumping station was located at Meteor Avenue (the present 68th Drive). These locations place the pumping station sites along the west side of Grand Central Parkway, west of the Meadow Lake FLUBERP APE (Figure 66).

Strong's Causeway. Nineteenth-century maps show what was known as "Strong's Causeway" crossing the marshes and Flushing Creek a short distance north of Horse Brook (see Figures 15 and 17). This roadway was located at what was later the Horace Harding Boulevard (see Figure 66) and is now the site of the Long Island Expressway (Shiel 1963:5-6).

Prior to the construction of Meadow Lake, Flushing Creek was west of the present Meadow Lake outlet near the western edge of the marshland. The bridge that carried Strong's Causeway over the creek, therefore, would have been west of the present Meadow Lake outlet stream and north of Meadow Lake itself, and would not be within the FLUBERP project area. In 1914, the facilities of the Corona Coal Company were located along the south side of the Causeway, at the western end of the bridge (Sanborn Map Company 1914: 10:113). The site was along the higher ground at the eastern edge of the marsh and is now at the location of the Long Island Expressway.

From the east side of the bridge, Strong's Causeway would have extended eastward across the marsh. Maps dating to the 1930s (see Figure 66) reveal that Strong's Causeway, near the east side of the marshland in the vicinity of the present Meadow Lake outlet, would have been slightly south of the area of construction of Horace Harding Boulevard, and at the site of the later construction of the Long Island Expressway and the associated highway interchange. A photograph taken during the construction of the Meadow Lake outlet channel in 1937 (Figure 67) showed what may be remnants of Strong's Causeway south of the new roadway. Later, during construction of the World's Fair, a portion of the Ballantine Exhibit building was noted as

> [straddling] the old Strong's Causeway and the two story section of the building was located there. The foundations are plank and timber grillage bearing on the soil at 1000 pounds per square feet. The ash fill south of Strong's Causeway is not very deep and is no doubt settling [Glick 1938].

Thus a portion of the causeway remained intact beneath the1930s era landfill. The World's Fair map (see Figure 49) illustrated the Ballantine building approximately 320 to 520 feet south of what was then World's Fair Boulevard (now the Long Island Expressway). This would place the location of Strong's Causeway at the eastern side of the meadows at the location of the existing Long Island Expressway/Van Wyck Expressway interchange, a short

distance north of the FLUBERP APE. In this area, any remains of the Causeway would have been impacted not only by the construction of the Meadow Lake outlet, but also by the construction of the Long Island Expressway and the associated interchange.

Creation of Meadow and Willow Lakes. As part of the World's Fair construction beginning in 1936, mounds of refuse north of the current Long Island Expressway route were spread over the formerly unfilled southern portion of the meadows. In addition, meadow "muck" south of the expressway was excavated to form two lakes totaling approximately 136 acres. The excavated muck was then processed in order to make topsoil that was spread over the ash and refuse fill (Moses 1938). The excavation of the lakes "was accomplished largely with power scoop shovels, tractors, clamshells, drag-line cranes and trucks. It went on day and night under huge arc lights mounted on towers and stationed along the ground "(Moses 1938:74).

In 1937, 303,000 cubic yards of marsh deposits were removed from the northern and eastern shores of Meadow Lake (Figure 68). The muck was transported to two storage areas by means of overhead cable tramways. Towers were erected at the north end of Meadow Lake along Strong's Causeway and the lines extended northward to a storage area located along the east shore of Flushing Creek. The material was treated with lime and processed with farm equipment to make the topsoil near the creek. Material excavated from the eastern shore of Meadow Lake was moved by means of another line of towers along the eastern boundary of the site to the second storage area near what is now the MTA facility. After processing, the soil in this area was to left for use in landscaping the park after the demolition of the World's Fair buildings (FMI 1937e).

Meadow Lake Outlet Stream. Prior to the creation of the lakes, Flushing Creek followed a sinuous course through the marshes (Figure 69). In the area that is now near the head of Meadow Lake, the creek was situated on the western side of the marsh and bent back to the east north of the present location of the Long Island Expressway (see Figure 66). The existing outlet stream from Meadow Lake, therefore, does not represent the original stream channel, but was artificially created in the 1930s.

Meadow Lake Amusement Area at the 1939-1940 World's Fair. The Amusement Area exhibits for the 1939-1940 World's Fair were grouped around the man-made impoundment now called Meadow Lake. When the fair opened in 1939, this lake was identified as Fountain Lake, but was renamed Liberty Lake for the 1940 season (Wurts 1977). This area was the only portion of the fair located south of Horace Harding Boulevard (then "World's Fair Boulevard," now the Long Island Expressway). Attendance at the fair during its first year was less than expected with disappointing financial returns. As a result, a number of changes were made for the 1940 season. New concessions were introduced at the Meadow Lake Amusement Area; generally of a rowdier nature than those operating in 1939. The Amusement Area was also re-named as the "Great White Way." The attractions and features located along Meadow Lake and the portion of the outlet stream indicated as possible areas of FLUBERP activity are listed below.

Amphitheater and Music Hall. The concessions around Meadow Lake in the 1939 and 1940 seasons are portrayed on Figures 49 and 70. A 10,000-seat amphitheater was constructed at the head of the lake by New York State, and was the site of the Billy Rose Aquacade. As depicted on the World's Fair maps the amphitheater faced a stage separated from the seating area by an arc-shaped tank that could be screened from the viewing area

by a 26-foot long line of fountains that functioned as a curtain. The Aquacade featured Olympic champions Eleanor Holm and Johnny Weismuller (who starred as Tarzan in Hollywood films). The shows included singers, dancers, comedians and a large supporting cast and featured precision swimming and diving stunts (Gelerntner 1995). The amphitheater survived the initial phase of demolition after the closing of the fair in 1940, but was recently demolished by the NYCDPR (Sanborn Map Company 1951:19:25; see Figure 51). The site has been impacted by the construction of a new NYCDPR pavilion that was under construction in November 2001 (Figure 71). A 2,500-seat music hall, in which concerts of semi-classical music as well as more popular shows were held, was located back from the shoreline immediately northwest of the amphitheater (Gelerntner 1995; Wurts 1977).

Merrie England. An attraction known as "Merrie England" was found along the shore immediately east of the amphitheater in 1939 (see Figure 49). It extended from the amphitheater to the entrance to the Meadow Lake outlet to Flushing Creek. The official World's Fair Guidebook described this attraction,

> Here is a faithful reproduction of an old English Village, its exterior wall simulating the Tower of London, its main entrance resembling that of Hampton Court. Occupying more than an acre of ground on the shore of Fountain Lake immediately to the left of the Amphitheatre, the village consists of crooked streets, village greens, quaint inns, grim castles and picturesque people. Reproductions of Shakespeare's House, the Cheshire Cheese, the Jolly Mermaid, the Old Curiosity Shop and the John Harvard House, furnish an authentic background representative of Merrie Old England. And here you may enjoy historical pageants, Punch and Judy shows, Welsh Choral singing, and entertainment on the village green. Condensed versions of Shakespearian plays are given in a replica of the Globe Theatre where they were originally produced. Numerous shops offer souvenirs, novelties and other merchandise for sale. Eating and drinking places include "pubs" and inns. Admission 25 cents [WFC 1939a:58-59].

Merrie England was not part of the fair in the 1940 season, having been replaced by "Dancing Campus" and "Opry House" (see Figure 70). The Dancing Campus was described as "so big it fits into a city block" and was apparently a large ballroom. The Opry House presented shows and movies of the type described as "deep, dyed-in-the-wool 'mellerdrama'; and movies of the custard-pie-throwing era" (WFC 1940a).

Outlet Stream Bridges. The 1939 and 1940 World's Fair maps (see Figures 49 and 70) illustrated two bridges over Flushing Creek outlet from the lake. These bridges remained as part of Flushing Meadows/Corona Park after the fair closed (Figure 72). The westernmost bridge (Bridge #14) was removed prior to the 1964-65 Word's Fair (Boilmann 1965). A few concrete and wooden pilings were noted in this area during the reconnaissance and may represent supports for this bridge. The easternmost bridge (Bridge #13) was at the approximate location of the existing bridge over the outlet stream (Figure 73). It is not known if the existing bridge was the one constructed for the 1939 fair or was replaced at a later date.

Old New York/Artists' Village/Gay New Orleans. The north side of the outlet stream, east of Bridge #13, was the location of the "Old New York" concession in 1939 with "alpine shop" and "artists' village" immediately adjacent to the stream (see Figure 49). The Old New York attraction was described as

> the New York of a bygone era, its streets lighted by gas; horsecars, hansom cabs and patrol wagons clatter over its cobblestones. Attendants are clad in the dress of yesteryear, and street vendors, organ grinders, street fakers strolling entertainers and musicians add color to the old town environment [WFC 1939a:62].

Old New York included a 100-foot high reproduction of the Brooklyn Bridge that featured a reenactment of Stephen Brodie's fatal jump. Other buildings included a reproduction of P.T. Barnum's museum, a sailor's tattooing parlor, an "old blacksmiths shop," McFadden's Flats and Hogan's Alley, a police station and night court, and a "ghetto" restaurant (WFC 1939a).

The "Artist Village" on the north bank of the outlet stream represented

> A gigantic palette adorned with the proverbial daubs of paint and paint brush tops the two long wings of the Artist Village building on Fountain Lake. In open booths that face each other a group of artists from many lands practice their art [WFC 1939a:46].

The Old New York and Artist Village concessions were replaced for the 1940 season by "Gay New Orleans" (see Figure 70). This attraction was produced by Michael Todd, who also produced the Opry House and Dancing Campus attractions, noted above. Gay New Orleans reportedly presented three musical shows (WFC 1940a).

Boat House and Docks. Meadow Lake itself served as an amusement area for the fair. A ferry transported fairgoers to various points on the shore, and row boats, power boats and pedal boats for children could be rented (WFC 1937a). A boat house was built along the eastern shore of the lake, approximately 750 feet south of the mouth of the outlet stream. This building was planned as a permanent structure (WFC 1937a) and it is one of only three structures from the 1939-40 fair which are still standing (Figure 74). As shown on the 1939 and 1940 fair maps (see Figures 49 and 70), a dock located at the mouth of the outlet stream served as a ferry landing, and, at least in 1939, was the location of pedal boat rentals. This latter function may have been shifted to the boathouse in 1940. In 1939 two other boat docks were found on the lake: one on the east side, south of the boathouse; and the other on the west side, south of the Florida Pavilion (see Figure 49). The 1940 map demonstrates that the dock locations were changed for the second season.

Heineken's. On the southern side of the outlet stream between the two bridges was the attraction known as Heineken's on the Zuider Zee (see Figures 49 and 70). "Here is a generous bit of Holland, even to a windmill, a fishing boat, Netherlanders in Dutch costumes and wooden shoes, and an exact replica of Heineken's Dutch tavern on the Zuider Zee (WFC 1939a). The shoreline of the outlet stream at this amusement was bulkheaded and the remains of a few wooden pilings noted during the reconnaissance could be remains of this bulkheading.

Meadow Lake East Shore Exhibits. A penny arcade operated farther south along Meadow Lake's eastern shore, immediately north of the boathouse. Open during both seasons, the arcade was "a modernistic building, bearing a brilliantly illuminated invitation 'Everbody (sic) With a Yen For Relaxation-Welcome'" (WFC 1939a:63). The space between the penny arcade and the boat dock at the mouth of the outlet stream was shown as vacant and utilized as a picnic ground in 1939 (see Figure 49). In 1940, it was the location of the "Pabst Garden," a 1,300-seat restaurant also operated by a brewery (see Figure 70; WFC 1940a).

Immediately south of the boathouse a building labeled "Washington Hall" was shown on the fair maps. The hall was the "Sons of the American Revolution Building ... erected in keeping with the purpose of the Fair to celebrate the 150th Anniversary of the inauguration of George Washington as the first President of the United States." The "colonial style" building included an exhibition of Washington memorabilia, meeting rooms, and "a large terrace extending to the edge of the lake" (WFC 1939a).

No structures were situated between Washington Hall and the boat dock located to the south (see Figures 49 and 70). In 1939, "Cuban Village" was located immediately south of this boat dock. This "authentic reproduction of a Cuban Village" included a restaurant and an "exact replica of 'Sloppy Joe's' famous Havana bar." The contract for this concession was canceled after the first season (WFC 1939b), and this part of the shoreline was apparently vacant in 1940.

In 1939, the famous Parachute Jump was located approximately 350 feet east of the shoreline, immediately south of the southernmost boat dock. This ride, based on an aviators' training device, was moved to the northern portion of the amusement area, immediately south of the present Long Island Expressway, for the 1940 season of the fair. After the fair closed it was moved to Coney Island (Gelerntner 1995).

Meadow Lake West Shore Exhibits. The western shoreline of Meadow Lake between the amphitheater and the boat dock was the location of two buildings: the Terrace Club and the Florida Pavilion. This portion of the shoreline and the western shoreline boat dock are not within the FLUBERP APE.

The western shoreline south of the boat dock and the Fountain Lake entrance gate (the same location as the existing Grand Central Parkway overpass) was the site of a military camp known as "Camp George Washington" (see Figures 49 and 70). The camp covered eleven acres and housed 800 members of the Army, Navy and Marine Corps in pyramidal tents throughout the fair. The buildings were timber constructed and a headquarters building, infirmary, officers' quarters, mess halls and other camp buildings (WFC 1939a). As shown on the fair maps the southern boundary of the encampment would have been located near the proposed FLUBERP APE in the southwestern portion of Meadow Lake.

None of the World's Fair maps show the southern end of Meadow Lake, which apparently was open space used for informal recreation without structures. There is reference, however, to a dock located at the south end of the lake that was utilized by boats engaged in insect-control activities and for clearing debris along the shore (New York City Department of Parks 1940b). The exact location of this dock is not known.

Post-Fair Demolition. The New York World's Fair closed on October 27, 1940 and most of the structures were demolished soon thereafter. The New Jersey Pavilion and the Aviation Building (both located north of the Long Island Expressway) were utilized for a few years but were demolished in 1942. Only three buildings remained: the New York City Building (now the Queens Museum), which served as the meeting place for the United Nations General Assembly while the organization's New York headquarters was under construction; and the two buildings along the shores of Meadow Lake (the Amphitheater, recently demolished as noted, and the Boathouse, which still stands) (Oats 1980b).

The terms of all of the contracts between the various concessionaires and the World's Fair Corporation called for all structures to be removed to a depth of at least four feet below the surface. However, it was subsequently agreed that where removal of foundations to this depth would disturb the "subsurface," clean fill could be deposited over the area to a height of four feet above the tops of existing pile caps or other structural members (Spargo 1940). For example, it was agreed that demolition of the Merrie England building would involve cutting off the supporting piles at a depth not to exceed 12 inches below the existing ground surface (WFC 1940b).

The Meadow Lake Amusement Area at the 1964-1965 World's Fair. The second New York World's Fair opened in 1964. Robert Moses, who played a key role in the planning of Flushing Meadows Park and the first fair, was a major figure in the planning of the second fair. He served as President of the World's Fair Corporation (Miller 1989). Like the earlier fair, Meadow Lake, which had now become the official name of the northernmost of the two lakes, functioned as the fair's amusement area. During the 1964 season, this area drew the most criticism, mostly because of the puritanical values which informed the selection of attractions. Unlike the earlier fair, the rules for the 1964 season barred "girlie and garish side show attractions." For the second season, however, rules were loosened and attractions were added such as a water ski show at the old Aquacade, a dancing porpoise spectacular at the Florida Pavilion, discotheques with go-go girls, and many more carnival-style amusements (Dickstein 1989; Oats 1980c).

The 1964-65 World's Fair map (see Figure 55) revealed that, unlike the earlier fair, the amusement area was confined to the head of Meadow Lake. The rest of the shoreline area was apparently utilized for parking. The only structures south of the outlet stream were the boathouse and dock from the 1939 fair, which were rehabilitated for use in the 1964 fair (WFC 1965). The shoreline features for the 1964-65 fair are noted below.

Amphitheater and Docks. The amphitheater from the earlier fair was refurbished and utilized for the second fair. The description of the shows held during the second fair was similar to those that described the shows in 1939-40. The 1964-65 fair guidebook described them as a "$2 million extravaganza" with 250 singers, dancers, swimmers, divers, comedians and acrobats. The visual effects included a 22,000-gallon per minute giant waterfall, and the launching of "a lady astronaut in a moon rocket" (Wood 1964).

Adjacent to the amphitheater on either side were docks where visitors could board a plexiglass canopied boat for a 20-minute lake cruise. The dock east of the amphitheater also served as the location of the Amphicar ride (utilizing a vehicle that could function on land or water). In addition, a Mississippi Riverboat attraction was immediately east of the amphitheater (see Figure 55). It consisted of a 226-foot replica moored at the end of a pontoon levee "in a setting that resembles a small-town waterfront of the 1800's." This attraction was apparently not present during the fair's second year (Wood 1964).

Hawaii. The shoreline between the dock east of the amphitheater and the mouth of the lake outlet was the site of the Hawaii attraction. This attraction occupied a portion of the site that held the "Merrie England," "Old New York" and "Gay New Orleans" concessions in 1939-1940 (see Figures 55 and 49). The entrance to the Hawaii complex was the 80-foot high Aumakua tower, which had a ring of flaming torches at the 55-foot level. The structure on the shoreline next to the Amphicar ride was the "Five Volcanoes' restaurant (Bollmann 1965). The building south of the restaurant at the mouth of the outlet stream was the Aloha

Theater. The theater housed the "Hawaiian Extravaganza," a one-hour show repeated six times daily. The theater was "built on a man-made peninsula jutting into Meadow Lake" (Wood 1964), although this description may actually apply to the nearby restaurant. The Hawaii complex also included the Aloha theme pavilion (a hexagonal building), a tourism-and-industrial-exhibits building, an arcade of shops, and an "ancient Hawaiian village" where "craftsmen demonstrate native skills." The Hawaii complex was landscaped with coconut trees, orchids and other tropical plants (Wood 1964).

Other Attractions. West of the amphitheater, the only attractions along the Meadow Lake shoreline were a reproduction of Columbus' ship the *Santa Maria*, and the Florida Exhibit, which included a "250 foot tower topped by a giant plastic orange" (Wood 1964). These locations are not within the FLUBERP APE.

After the second World's Fair closed in 1965, the site was restored for use as a park, and Flushing Meadow/Corona Park reopened in 1967 (Miller 1989). The contracts for the 1964-65 fair contained similar demolition provisions as those of the earlier fair: Exhibitors were required to remove structural foundations to a depth of at least four feet below finished grade and restore the site to this grade (Andrews & Clark, Inc; Clarke & Rapuano Inc. 1960).

Willow Lake. From the initial planning of Flushing Meadows Park, the Willow Lake area was conceived as a "natural" area and bird refuge.

> In Flushing Meadow Park, the Willow Lake area is that portion furthest removed from the section of highest development in formal design. It is therefore fitting that the wildest character should be displayed at this point. Topographically the Willow Lake section is also the most sheltered spot in the park, a feature of considerable importance in determining its suitability for a bird refuge [FMI 1937g:17-18].

Features of the plan for the Willow Lake area included the planting of willow trees, an undergrowth of berry-bearing shrubs and trees in the low areas near the water, and provisions for "water plants growing entirely submerged and ... marsh plants growing partly in the water." Pond weed, pickerel weed, wild rice and bulrushes were to be planted around the lake borders, as well as "small colonies of flag, cardinal flower and loose strife," as well as white and yellow water lilies, arrowheads, and wild millet or barnyard grass. In some places provision was to be made for open lawns sloping to the waters edge to provide observation points for bird watchers (FMI 1937g:18). The lake also was stocked with fish (New York City Department of Parks 1940b).

Although at least a portion of the area was landscaped, no structures were built at Willow Lake as part of the two World's Fairs. However, a ca. 1960 aerial photograph shows baseball or softball diamonds along the eastern shore of Willow Lake (see Figure 51).

Since the closing of the 1964-65 Fair, a subsidence of the filled-in surface surrounding Willow Lake has created "depressional areas that are frequently inundated or saturated. This environment, in turn, has led to the extensive growth of common reeds (*Phragmites australis*), as well as plant communities classified as sedge meadow wetlands, continuing soft rush (*Juncus effusus*), wool grass (*Scirpus cyperinus*) and common three square (*Scirpus pungns*)" (USACE 1996: E1). Observations recorded in 1974 show that the growth of Phragmites and the other species noted above occurred after this time, as the lake continued to be bordered by parkland and playing fields (Fried 1980).

During the field reconnaissance the remains of a wooden wharf, extending along the shoreline of the lake for approximately 25 feet, was noted along the southwestern portion of the shoreline (Figure 75). This could be a dock formerly used by insect control boats, similar to the one at the southern end of Meadow Lake. Further, the plan drawing for a series of borings taken in 1992 between the southern end of Willow Lake and the MTA subway yard noted the presence of a "dilapidated bridge (wood)" (New York City Department of General Services 1992). The bridge was situated approximately 75 feet south of the lake and 150 feet east of Grand Central Parkway between 75th Avenue and 76th Road. It would have post-dated the creation of Willow Lake in the late 1930s. Unfortunately, this area could not be examined during the field reconnaissance.

3.3.3 Inner Flushing Bay/Flushing Bay West Shore.

3.3.3.1 Flushing Bay West Shore. Historic maps dating to the eighteenth through the mid-nineteenth centuries (e.g., Figures 15, 17 and 18) illustrated a number of farms located along the west shore of Flushing Bay. A mill at Jackson's Creek, at the approximate present location of 94th Street, some 3/4 mile northwest of the study area, was shown also (Seyfried and Asadorian 1991:146).

By the early twentieth century, development of the area was underway. The shoreline at this time was located approximately 100 to 150 feet east of Ditmars Boulevard. By 1909 several houses had been constructed along the east side of what was then Bay Shore Terrace (now Ditmars Boulevard). The 1909 map (Figure 76) depicted a pier extending into the bay a short distance south of Manhattan Avenue. This street (later known as Grand Avenue) is the present 27th Avenue. By 1914 a clubhouse had been constructed next to this pier (Sanborn Map Company 1914:10:22). The 1924 aerial photograph (Figure 77) and 1927 map (Figure 78) continue to show this pier and the clubhouse, with the map identifying the pier and clubhouse as the "East Elmhurst Club." Another large pier was detailed south of 31st Road. In addition, several smaller piers or breakwaters were located between the two larger piers (Belcher Hyde 1927:16; Sperr 1935; see Figure 77).

Prior to the 1930s, bluffs extended along much of the western shoreline of Flushing Bay. In the 1930s two major developments occurred which transformed the shoreline. Beginning in 1934, an extension of the Grand Central Parkway was constructed along the shore, north of the Flushing Meadows. The parkway was built east of the bluffs, extending the shoreline approximately 300 feet into the bay. Its construction involved the placement of some 3,500,000 cubic yards of hydraulic fill along the bay (FMI 1937d).

Recent maps show the shoreline in the study area approximately 450 feet east of Ditmars Avenue, approximately 350 to 400 feet east of the 1914 shoreline. Remains of the piers formerly located along this portion of the shoreline that may have survived the construction of the Grand Central Parkway would be located under the landfill which underlies the present shoreline area. No pier remains were noted along the shore during the reconnaissance. This area had been excluded from proposed FLUBERP activities (USACE 2002a).

3.3.3.2 LaGuardia Airport. The second major project in this area during the 1930s was the construction of New York City's second municipal airport. Initially known as the North Beach airport, it was renamed for New York's mayor Fiorello LaGuardia. Construction began in 1937, with most of the airport erected on landfill (WPA 1939; Kupka 1950). The

airport opened in 1939 in time to provide service for visitors to the World's Fair (Lopez 1964). The airport originally comprised four concrete runways, each between 3,532 and 4,688 feet in length, with both land and seaplane facilities. Most of the original buildings at the airport were replaced subsequent to World War II; the present central terminal, the control tower and the central garage all date to 1965 (Wilensky and White 2000:822). However, a few buildings from the original construction of the airport still stand. Most notable is the Art Deco marine air terminal located at Ditmars Boulevard and 82nd Street in the western side of the airport. It was listed on the National Register of Historic Places in 1982 (NRIS 2003). Hangars that flank the main terminal are also of 1939 vintage (Wilensky and White 2000:822).

A stone wall, extending approximately 150 feet, was noted during the pedestrian reconnaissance at the western end of the airport's southern shoreline (Figure 79). The wall was noted some 6 to 10 feet south of the sheet pile bulkhead that now marks the end of the landscaped area adjacent to the airport parking lot and driveway. It is possible that this stone wall dates to the early period of airport construction and utilization. The location of this wall places it west of the proposed FLUBERP site as shown on Figure 3b.

3.3.3.3 LaGuardia Airport Dike. In 1963 and 1964, the New York City Department of Parks and the New York World's Fair Corporation constructed a 2,800-foot long earthen breakwater (also referenced as an "earthdike"), extending from the southern end of LaGuardia Airport, to protect the World's Fair marina. Between 1967 and 1992, the breakwater was maintained by the U.S. Army Corps of Engineers. The presence of this breakwater greatly reduced the circulation in the southwestern portion of Flushing Bay. To increase the circulation, the top of the breakwater was reduced to the elevation of +2' MLW in 1995. To protect the World's Fair Marina, the dike was replaced by a floating breakwater (USACE 1996:6-19; Galvin 1981). The top of the dike is still visible at low tide (see Figures 12 and 80).

3.3.4 The College Point Shoreline and College Point North. The original patentees of the Town of Flushing were two brothers, William and John Lawrence. Upon the apportionment of the land among the settlers, William Lawrence received 900 acres in the town then known as Tews Neck, later as Lawrence Neck and now as College Point. While two other brothers, Nathaniel and Michael Tue (Tew), lived in Flushing at the time, they apparently never resided on this land and there is no record explaining their association with this tract (Hecht 1976).

In 1645, William Lawrence built on his land the first house on College Point (Hecht 1976). Located in the vicinity of what later became Chisolm Park, now known as MacNeil Park, no other houses were in the College Point area (Taylor and Skinner 1781). Hecht (1976:11) notes that the descendants of William Lawrence were the "sole white inhabitants" of College Point until after the Revolution. The somewhat inaccurate 1795 Stewart map of Flushing illustrated a building and flag in a position corresponding with either Tallman's Island or the northern tip of College Point. These symbols could represent the Lawrence house or a military installation on Tallman's Island. This map also included a notation that seemed to indicate a burial plot in this area (Stewart 1795).

As supporters of the American Revolution, the Lawrence family and their property were subjected to depredations by the occupying British and Hessian troops. Hard pressed due to losses sustained during the war, William Lawrence (a descendent of the original

settler) sold a tract of 320 acres, including College Point, to Elaphalet Stratton in 1789. Stratton built a house on high ground overlooking Flushing Bay on the east side of what is now College Point Boulevard, between 25th Avenue and 25th Road, which stood until 1924. The area subsequently became known as Strattonport (Hecht 1976:12). The Stratton house was shown on nineteenth-century and early twentieth-century maps (e.g., Figure 17).

A second large private home was subsequently constructed by Captain John Graham on a tract of land south of the Stratton house, at a location approximately corresponding to the present 26th Avenue and College Point Boulevard (WPA 1938 IX:226). While local lore maintains that Graham settled in College Point in the 1830s, his house did not appear on maps until after 1860 (compare Figures 81 and 82), and photographs document it as consistent with construction in this latter period (Hecht 1976:115). The house was demolished in the late 1920s. The Graham house site also included a number of underground vaulted-roofed structures traditionally assumed to be tunnels used by slave smugglers (Cobbs et al. 1999). As Hecht (1976) points out, however, these structures most likely represent underground storage facilities.

In 1852 Elaphalet Stratton's daughter sold the portion of the property that later became the village of College Point (WPA 1938 IX:176), while the portion that included the homestead farm was inherited by Elaphalet Stratton's son, E. Platt Stratton.

In 1835, the Reverend William Muhlenberg, rector of St. George's Episcopal Church in Flushing, purchased 175 acres on the northern tip of College Point, the location of today's McNeil Park, and planned to construct a seminary to train Episcopal ministers on the property. Although Muhlenberg began construction of a large building in 1836, the financial panic of 1837 forced him to erect a much more modest wooden building, near what is now the foot of the present 119th Street, facing MacNeil Park. The site is not within any of the proposed FLUBERP project areas.

Muhlenberg's St. Paul's College opened in 1838. The facility included a chapel, dormitory and school building, and the area subsequently became known as College Point. The seminary only operated until 1848, however. After the college closed, a portion of the property was acquired by a former student, William E. Chisholm, who built a stone mansion on the property. The Chisholm mansion later lent its name to Chisholm Park, subsequently renamed MacNeil Park (Hecht 1976:27-28). When Muhlenberg founded the college, he constructed a plank walkway over the salt marsh, connecting College Point with Flushing. In 1855 Muhlenberg's walkway was replaced by a causeway across the Meadows to Flushing (Waller 1899:226). Comparison of an 1852 map (see Figure 17) with those drawn later in the nineteenth century (e.g., see Figure 81) reveals that the causeway was at approximately the same location as the earlier Muhlenberg walk.

In the 1850s several events occurred which led to the development of the College Point community later in the century. One of these was the sale of large private estates to developers, who then sold house lots. The first of these sales apparently occurred in 1851, when John A. Flammer and Peter W. Longley purchased 141 acres of the Stratton estate. The purchase was bounded approximately by the present 15th and 23rd Avenues and 119th and 130th Streets. This area, which subsequently became known as "Flammersberg," was subdivided into 800 50-by-100-foot plots. A number of houses had been built by the end of 1851. In addition, a steamboat dock was constructed at the end of 22nd Avenue, then named Washington Avenue (Hecht 1976:13-14; Holmes 1851). A May 1851 notice in the

Flushing Journal stated that "The steamboat *Jenny Lind* which came up on Sunday last, to Strattonport with a band of music, was chartered by the persons who had bought lots in the new village" (cited in Hecht 1976:14). The boat apparently would have landed at the dock discussed above.

The 1852 map (see Figure 17) also illustrated the dock and the first houses that had been constructed in the "Flammersberg" (or Strattonport) area, where a street grid had been laid out. The western portion of College Point was then part of a tract of 100 acres owned by George Bradish, and the shoreline of the Bradish property is shown as completely undeveloped. The Stratton house was shown south of the property sold to Flammer and Longley.

3.3.4.1 College Point West Shore. The second major development in the 1850s was the establishment of Conrad Poppenhusen's Enterprise Works. The founding of this factory on the south shore of College Point marked the beginning of the late-nineteenth century commercial and industrial development in the western part of College Point. At one time, the western shore of College Point was part of the FLUBERB study area, but was subsequently removed from consideration (USACE 2002a).

Poppenhusen Factory Site. Conrad Poppenhusen arrived in New York from Germany in 1843 and started a business in Brooklyn with a man named Meyer to manufacture brushes, combs, corset and dress stays, and buttons from whalebone. By the 1850s the supply of whalebone had grown scarce and a new material was required for the manufacture of the company's products. In 1839, Charles Goodyear had invented the process of vulcanization, which enabled natural rubber to be processed for various uses. In 1854 Poppenhusen obtained sole rights to Goodyear's invention for a period of seven years, and in this same year Poppenhusen and Meyer built a factory in College Point, which they named the Enterprise Rubber Works, where they began manufacturing combs and other objects from this new material (Hecht 1976 36-38; Walling 1859). By 1860, the factory employed approximately 500 people (Mandeville 1860:92).

According to Hecht (1976:39), prior to 1868 Poppenhusen had bought out his partner and changed the firm's name to the "Indian Rubber Company." An 1860 map (see Figure 81) designated the factory as the "India Rubber and Whalebone Factory," indicating that some products continued to be manufactured from the latter material. This map also noted the owners of this factory as Poppenhusen and Konig (Fritz Konig had been a partner of Poppenhusen's in Brooklyn). Later nineteenth-century maps (e.g., Figure 82) label the factory as the "India Rubber Comb Co." The site, as shown on these maps, extended between Third and Fifth Streets (the present 112th and 14th Streets) from Third Avenue (now 15th Avenue) south to the shoreline (Beers 1873; Wolverton 1891), which had been bulkheaded in association with construction of the factory complex. It is uncertain if, or to what extent, fill had been deposited behind the bulkhead to create all or part of the factory site. Until 1872, the India Rubber Comb Company was "the sole manufactory in the country of combs and many articles made from hard rubber." By 1888, the factory was being powered by five Corliss engines with a total of 800 horsepower (*New York Daily Graphic* Aug 3, 1888, quoted by Hoehlein n.d.).

Conrad Poppenhusen was a relatively progressive and civic-minded businessman. He built homes to rent and eventually sell to his employees, and five of these, built in 1854 on what is now 14th Road between 112th and 114th streets are still standing (Hecht 1976:38).

Three "tenements" had been constructed on the waterfront immediately south of the factory buildings by 1886 (Sanborn Map Company 1886a:7), which probably served as housing for Poppenhusen's workers. Poppenhusen was also responsible for the construction of a cobblestone causeway to Flushing which replaced the earlier plank walkway.

He encouraged his workers to enlist during the Civil War and provided for their families. He also started a medical plan for his employees and paid death benefits to their survivors. In 1868, Poppenhusen erected and gave to the community the Poppenhusen Institute, "a school to educate men and women in the mechanical arts," at 114th Road at 114th Street (Hecht 1976:38-39). The extant building is listed on the NRHP.

Poppenhusen died in 1883, and by 1885 the name of the company changed to the American Hard Rubber Company, which at that time employed some 1,000 persons. One of the company's products during the turn-of-the-nineteenth-century period was hard rubber bowling bowls, which were exhibited at the 1904 St. Louis World's Fair (Hecht 1976:35, 65). The company continued to occupy its original site through the second decade of the twentieth century (Sanborn Map Company 1886a:7; Bailey 1896; Belcher Hyde 1926). An 1896 Bird's-eye view (Figure 83) showed a wharf extending along the waterfront in front of the plant with a boat-loading trestle.

By the 1920s the shoreline east of the American Hard Rubber Company site (between 114th and 119th Street) had been filled and bulkheaded. By 1926 the American Hard Rubber Company had expanded to occupy a portion of this area, with the eastern portion of the newly formed land occupied by the Tulip Cup Corporation (Belcher Hyde 1926). In the 1930s, the American Hard Rubber Company moved to Butler, New Jersey (Hecht 1976:38) and the Tulip Cup Corporation, later known as the Lily-Tulip Company, eventually took over the American Hard Rubber Company site. It made paper cups and containers there through the 1950s (Hecht 1976:65; Trebor 1952). By 1990 the site was occupied by the Kirsch Bottling Company's plant (Sanborn Map Company 1990:5:26). The plant is now operated by the Pepsi Cola Bottling Company. The building on the site is a modern aluminum-sided structure.

Steamboat Docks. Circa 1852, the Washington Street (now 22nd Avenue) steamboat dock was the only such facility at College Point, with the exception of a steamboat dock at the north end of the point that provided access to St. Paul's College (see Figure 17). By 1860, however, two additional steamboat docks had been built (Walling 1859; Higginson 1860; see Figure 81). This development may have been due to the increase in traffic resulting from the establishment of the Enterprise Works in 1854. The old Washington Street dock was not shown on later maps and was apparently demolished after 1859. The two new docks were located at the end of 14th and 15th Avenues, both more than one mile west of the College Point FLUBERP project areas. During the late nineteenth century regular ferry service was established from College Point to New York City. At this time the ferry slip and terminal was located at the 15th Avenue dock (WPA 1938 IX:155, 177; Wolverton 1891). By the end of the century, however, the ferry slip and terminal had been relocated to 14th Avenue (Sanborn Map Company 1897:9). A ferry slip at this time was located on the north side of the western end of 14th Avenue. Before ferry service was terminated later in the twentieth century, another slip was added at the end of 14th Avenue (Sanborn Map Company 1990:5:28). Remains of what appear to be a ferry boarding gangway were noted at the end of 14th Road during the field reconnaissance.

Late Nineteenth-Century Development. Conrad Poppenhusen hired many fellow German immigrants to work in his factory, thus creating a population of working class Germans at College Point, which served to attract other manufacturers to the area (Hecht 1976:38; Munsell 1882:96). The Germans brought with them their cultural traditions, such as the beer garden and the area soon became a resort frequented by German-Americans from New York City. The German sense of community was reinforced by the establishment of private boarding schools taught by German-speakers as well as German choral societies and "saengerbunds" (Munsell 1882:97).

Increases in domestic housing, in commercial and industrial establishments, and in resort facilities were manifested on historical maps of the period. With the exception of the Poppenhusen factories and the docks noted above, the College Point shoreline was largely undeveloped in the early 1870s. By the final decade of the nineteenth century, the shoreline blossomed with both commercial/industrial structures and recreational facilities (Dripps 1872; Beers 1873; Wolverton 1891; see Figures 82 and 84). This growth continued into the early portion of the twentieth century (Belcher Hyde 1926).

Fourteenth Avenue - Fifteenth Avenue Area. On the south side of 14th Avenue (then known as 1st Avenue), opposite the College Point ferry terminal, stood Zehden's Hotel and Casino (see Figure 84). Built by Max Zehden between 1886 and 1891 (WPA 1938 IX: 211; Wolverton 1891) the facility was destroyed by fire in 1908 (Hecht 1976:90) and rebuilt on the north side of 14th Avenue. Neither the ferry terminal nor the casino site is within the proposed FLUBERP project area. The factory of the Chilton Paint Company was located along the shoreline immediately north of 15th Avenue. The factory was in operation by 1885, at which time it employed 100 persons. The company had relocated from Maine to College Point in 1876 (WPA 1938 IX:174; Hecht 1976:56, 85). The factory burnt down in 1888 and was rebuilt with the large smokestack and with the former ferry dock serving as a wharf (Sanborn Map Company 1903:5:10; see Figure 84). The Chilton Paint factory continued in operation through the twentieth century and the building still stands.

Southern Shoreline of College Point. The southern shoreline of College Point between the end of 15th Avenue and the India Rubber Company factory was the site of a coal yard, possibly associated with the Chilton factory. East of the coal yard was a boat house and out-buildings (Sanborn Map Company 1886a:7). Figure 84 illustrates the boat house and two piers extending into the bay as it appeared ca. 1896. The Harlem Yacht Club operated a pier at 1st Street (now 110th Street). An adjacent trestle may have been a marine railway used for boat launching (Sanborn Map Company 1892a:7, 1916:5:2; Fairchild 1924:Sheet 10a). Two piers were depicted at the same locations as in the early twentieth century (Sanborn Map Company 1990). This area is no longer part of proposed FLUBERP activities and access to these structures could not be obtained.

The site immediately east of the Poppenhusen factory, extending along the shoreline from 114th Street to 117th Street, remained undeveloped through the first decade of the twentieth century (Bromley 1909:23). By 1916, however, the shoreline had been bulkheaded and a one-story brick building had been constructed. It was occupied by the British-American Chemical Company and the Empire Art Metal Company. By 1924 additional landfilling had created the present shoreline. As noted above this became the site of the Tulip Cup Co. plant in the 1920s (Sanborn Map Company 1916:5:15; Fairchild 1924:Sheet 10a).

In the late nineteenth century the Rhenania Silk Mills, founded by Hugo Funke, occupied a site extending east of 117th Street between 15th and 18th Avenues (WPA 1938 IX:208). At the time this factory site included a small portion of the Flushing Bay shoreline. This factory was later operated as the John W. Ropo Metal and Cabinet Works (Hecht 1976:85; Bromley 1909). As a result of the early twentieth-century landfilling noted above, the site of this factory does not abut the present shoreline.

The East Shore of Flushing Bay. Between 18th and 20th Avenues (formerly 4th and 5th Avenues), numerous domestic structures were built during the late-nineteenth and early twentieth centuries (Sanborn Map Company 1886a:4, 1916:16). By 1924, landfilling had extended the shoreline westward, further from the houses, and the present shoreline is west of its historical location (Fairchild 1924:Sheet 10a). This area is no longer part of proposed FLUBERP activities (USACE 2002a).

The shoreline between 20th and 22nd Avenues (formerly 5th and 6th Avenues) was the site of the Kraemer Brothers lumber business, established by Henry Kraemer prior to 1885 (WPA 1938 IX:174; Sanborn Map Company 1886a:4). The property included a pier and several dwellings, one of which may have been Kraemer's house (Figure 85). Kraemer also reportedly ran a saloon on this property, which he named Kraemer Hall (Sanborn Map Company 1897:7, 1916:16; WPA 1938 IX:152).

By 1897, a planing mill, powered by a 120-horsepower steam engine, had been erected and the pier had been expanded into a large wharf extending along the shoreline of most of the lumber yard. Kraemer may have left the saloon business by 1897 as the building south of the planing mill was then called "J. Angenbroich's Hotel Garden." Part of this building was identified as a saloon (Sanborn Map Company 1897:7). The planing mill was a substantial building with a large smokestack (see Figure 85). During the early twentieth century, the wharf was widened to the north and two piers were added (Sanborn Map Company 1916:16; Fairchild 1924:sheet 10a). The Kraemer Brothers facility, as well as the pier adjacent to the Kraemer yard on the south remained in 1951, but the pier immediately north of 22nd Avenue had been removed (Sanborn Map Company 1951:5:17). The southern portion of the Kraemer Bros. yard was occupied by the Mayer boat works at that time. It was not possible to observe the shoreline in the vicinity of the Kraemer site during the reconnaissance for this project.

Between 22nd and 23rd Avenues, Hugo Funke, who also owned the Rhenania Silk Mills, apparently owned property along the waterfront (Wolverton 1891:22). By 1896 an industrial facility—"Geo. Ilch and Sons, Coal and Wood, Wholesaler and Retail"—had been constructed immediately south of the domestic structures (Sanborn Map Company 1897). The Ilch yards covered some 25,000 square feet with "steam power used for hoisting and unloading coal" and for sawing wood. The business had been established in 1866 and initially dealt only in wood. Coal was added in 1880 (Mercantile Publishing Co. 1893:55). Figure 86 shows the Ilch yard, with what appears to be a large loading trestle extending to the wharf immediately north of the main building of the facility. The Kraemer family, which operated the lumber yard on the block to the north, took over operation of the coal yard by 1916. The trestle was replaced by a coal elevator by 1926 (Sanborn Map Company 1916: 5:23; Belcher Hyde 1926:13)

The R.A. Weber Silk Dyeing Company operated a facility south of the Kraemer yard in 1916, and was called New York Silk Dyeing Company, Inc. in 1926. Some of these facilities,

including the steam engine shown, may have been the same as those formerly operated as part of the Ilch yard. The H.W. Biffar coal yard was immediately south of the silk dyeing plant in 1916. This coal yard also utilized a loading trestle on its wharf. The Biffar Coal yard and trestle had been replaced by National Rock Fire Block Company by 1926 (Sanborn Map Company 1916:5:23; Belcher Hyde 1926:13). The Kraemer & Co. coal yard was still in operation in 1951 with the silk dyeing plant operated as the College Point Finishing Co. (Sanborn Map Company 1951:5:18). A brick building that still stands on the west side of 119th street may be one of the industrial buildings from the late-nineteenth century or early twentieth century. Immediately south of Sixth Avenue (now 22nd Street), a pier, currently part of the Arrow Yacht Club, had been constructed ca. 1916. The yacht club has been in existence at the site since at least 1951 and portions of the pier, as well as the building at its shoreward end may be the original structures, ca. 1920s (Sanborn Map Company 1916: 5:23, 1951:v5:18; Fairchild 1924:Sheet 10a; Belcher Hyde 1926:13). It was not possible to examine the shoreline in this area.

Maps dating to the late-nineteenth century and early twentieth century reveal that the shoreline turned abruptly to the east immediately south of 23rd Avenue, forming a large cove (see Figure 86). The Stratton and Graham estates were east of this shoreline area. A bathing pavilion, a boathouse, and pier south of 25th Avenue (formerly 7th Avenue) were in this area (Sanborn Map Company 1903:5:22). The pier and boathouse may have been part of the Stratton estate. The pier was extant until sometime before 1951 (Ullitz 1904; Sanborn Map Company 1916:5:27, 1951:5:15, 18; Fairchild 1924:Sheet 10a; Belcher Hyde 1926:13). By 1951, the shoreline immediately south of 23rd Avenue had become the site of the Sunrise Oil Company's loading facility. Historical maps (e.g., Wolverton 1891) document that the shoreline between 23rd Avenue and 25th Road was located immediately west of 120th Street (formerly 11th Street). Recent maps reveal that this area has been filled, since the existing shoreline is one block to the west at 119th Street. The filling episode for the shore between 23rd and 25th Avenues occurred in 1966 (Cobbs et al. 1999:11).

The shoreline represented by the bluff top area extending south of 25th Avenue to 28th Avenue remained undeveloped until after 1951 (Sanborn Map Company 1951:5:15). This was the location of the Graham Court prehistoric site. Several nursing homes and apartment complexes have since been built atop the bluffs. A short-lived pier was a short distance north of 28th Avenue in 1924 (Fairchild 1924:Sheet 10a).

The area between 28th and 29th Avenues (formerly 10th Avenue and Victoria Place) also remained undeveloped through the first decade of the twentieth century (Bromley 1909: 23). By 1926, several residential structures had been erected (Belcher Hyde 1926:13), some of which are still extant. Although the shoreline elevation here is lower than that to the north, it is elevated 10 to 15 feet above the beach. Existing piers and pilings from dilapidated piers extend to the rear of these houses and are present on the beach. In addition, a derelict boat was noted on the beach to the rear of the house immediately south of 29th Avenue.

The name "Cape Ruth" is applied to the shoreline extending into the bay at 29th Avenue. A pier and boathouse were situated here beginning in the first decade of the twentieth century. While the WPA oral history collection (WPA 1938 IX:228) reported that the Flushing Boat Club erected its Cape Ruth facility in 1911, cartographic evidence places a pier and boathouse here ca. 1904 (Ullitz 1904:13; Bromley 1909:23). By the 1930s this facility was known as the Sewanhaka Boat Club (WPA 1938 IX:228). The name had been

changed to the Williamsburgh Yacht Club by 1943 (Sanborn Map Company 1943:5:13). The facility is still in operation under this name.

The shoreline south of Cape Ruth remained undeveloped until the third decade of the twentieth century. A number of small structures, including a long pier, were constructed along the shoreline in the vicinity of 31st Avenue and extending along the shoreline between 30th and 31st Avenues by the middle of the 1920s (Belcher Hyde 1926:19; Fairchild 1924:sheet 10a). The location of this pier would have been north of the existing New York City Department of Sanitation facility, located between 30th Avenue and 31st Avenue. A 1969 marine chart (Figure 87) shows a marina at this approximate location. Pilings were noted during the site reconnaissance in the vicinity of the ca. 1924 pier and the later marina.

Between 1926 and 1951 a number of sand-and-gravel and asphalt companies established their facilities in the blufftop area known as Grantville, after Homer D. Grant who built about a dozen bungalows here (WPA 1938 IX:228). A number of sand-and-gravel facilities are still in operation at this location. The Metropolitan Sand and Gravel Corporation operated a loading facility, consisting of a wooden pier on piles with a steel conveyer, extending into the bay between 31st Avenue and 31st Road (Sanborn Map Company 1951:5:13). This area was vacant in 1943 (Sanborn Map Company 1943:5:13). The loading facility is no longer in operation, but still stands at this location. It may have extended further to the south at one time, supported on the derelict pilings visible at this location. Comparison of 1924 and 1998 aerial photographs (Figures 88 and 89) suggests that landfilling, possibly associated with the establishment of the sand-and-gravel facilities noted above, may have resulted in an extension of the bluffs south of the loading facility a short distance to the west of their original location. East of the sand-and-gravel and asphalt facilities at Tallman's Point, a number of commercial/industrial facilities have been built on landfill north of the shoreline. A band of Phragmites borders the shoreline east of Tallman's Point.

3.3.4.2 College Point North/Old Marina. The peninsula on which Capstan Court is now located did not exist until after 1926 (see Figures 17, 81 and 82; Figures 90 and 91). This peninsula was created as a result of twentieth-century land-filling, and constitutes the western boundary of the proposed FLUBERP site. Prior to landfilling, the southern shoreline of the project area was the base of a bluff, on which a number of structures had been erected (Figures 92 and 93). The large building on Figure 93 was most likely the Hugo Funke house (Hecht 1977). The house is shown on Figure 90 north of North Boulevard (the present 5th Avenue) at Thirteenth Street (the present 122nd Street), south of the project area shoreline.

A shipyard, operated by the College Point Dry Dock and Supply Company, Inc., had been established along the shoreline west of the line of 125th Street by 1926. The shoreline had been bulkheaded and shipyard buildings constructed on made land behind the bulkhead (Sanborn Map Company 1916:5:11; Belcher Hyde 1926). These buildings would have been situated approximately 75 to 100 feet south of the northern edge of the bulkhead (Figure 94). Comparison of the 1924 photograph with an 1996 aerial photograph (Figure 95) as well as field observations (Figure 96) suggest that filling and dumping at the top of the bank has extended the higher ground more than 50 feet farther to the north. The building sites would be beneath this fill.

In the 1920s, shipyard facilities included two piers and several small structures with railroad tracks connecting the piers and structures. The shorter pier, closest to 125th Street,

was a coal-loading facility. The larger structure extending into the East River, with its adjacent pier including railroad tracks, may have been a drydock (see Figure 94). The College Point Dry Dock and Supply Company was listed in Queens classified telephone directories published in 1927 and 1934 (Donnelly 1927; New York Telephone Co. 1934) under the heading of "ship builders," with the company's address given as #123-45 Lax Avenue.

The 1943 Sanborn map noted that this entire shoreline was U.S. government property, and did not show any of the ca. 1920s piers. The government may have taken over the shipyard during World War II and the facilities may have been omitted from the 1943 map for "security" reasons. The College Point Dry Dock and Supply Co. and its facilities were shown again in 1951, although the yard was noted as vacant at this time (Figure 97). The facility was then operated as the Sound Ship Building Corporation in 1963 (Sanborn Map Company 1963:5:41-42). The 1969 marine chart (Figure 98) depicts the shipyard still in operation. By 1986, the shipyard was no longer in operation, although two of the former piers sill existed, and the filling of land on which Capstan Court is now located had taken place (Sanborn Map Company 1986:5:41).

The locations of the former shipyard piers, including the two ca. 1920s piers, fall within the boundaries of the FLUBERP APE. The 2000 marine chart (Figure 99) delineates the ruins of the piers. A 1996 aerial photograph (see Figure 95) also shows these ruins as well as several derelict ships/barges. What appear to be derelict barges are also indicated in this location on various twentieth century marine charts.

Site reconnaissance revealed that remains of the shipyard wharf and the pilings associated with the shipyard piers are present at the site. The remains of several derelict barges also are visible (Figures 100 and 101). Figure 95 identifies the various features to facilitate reference to the field photographs. The features are shown in Figures 96 and 100 through 112. Features F, G, G1, I and possibly B and C1 represent remains of barges; Feature G being the most intact of these. The 1924 aerial photograph (see Figure 94) showed what appears to be a substantial number of barges at the site. Feature A (see Figure 102) is most likely not a barge; it appears to be a large wooden platform, possibly the coal-loading platform in this area in 1926 (Belcher Hyde 1926). Features C, E, E1, H and H1 are pier remains. Feature K represents remains of the shipyard bulkhead and wharf. The pilings indicated as Feature D could represent a short pier or loading platform extending outward from the wharf. The ruins identified as Feature J are at the northern end of the Capstan Court landfill area and in the vicinity of the northwestern corner of the FLUBERP APE. These ruins appear to be associated with a pier rather than a derelict barge and are probably not associated with the shipyard.

South of the visible shipyard remains, the ground rises steeply to the top of an embankment approximately 15 to 20 feet above the wharf. This most likely represents a northward extension of the naturally higher ground shown along the shoreline augmented by twentieth-century landfilling and illegal dumping (see Figure 91). The site of the former shipyard buildings would be located beneath this fill. Illegal dumping is suggested by the presence of debris including a 1942 grave headstone (Figure 113) as well as fragments of footstones. There are no indications that a graveyard was located in the immediate area.

3.3.4.3 Tallman's Island/Powell's Cove. The British occupied the north shore of Queens after their capture of New York at the beginning of the American Revolution. A troop

of Hessian soldiers were quartered on Tallman's Island "where they could be in a good position to intercept supplies being ferried out of Powell's Cove to Washington's army at White Plains" (Hecht 1976:12). A contemporary (1777) British military map placed three brigades (1st, 2nd, and 6th brigades) along the north shore of Long Island east of College Point. The westernmost location was south of Powell's Cove, although the scale of the map does not enable the site to be precisely located (Faden 1777; Lucas 1962).

Eighteenth-century maps (Taylor and Skinner 1781; Stewart 1795) provided a somewhat inaccurate view of the Tallman's Island/Powell's Cove area. The 1795 Stewart map rendered a building and flag, and a possible burial plot, in a position corresponding either with Tallman's Island or the northern tip of College Point. These symbols could be intended to represent the Lawrence House (located at College Point) or possibly the military installation cited by Hecht, although the latter is unlikely given the date of the Stewart map.

Nineteenth-century and early twentieth-century maps (see Figures 17, 90 and 91; Figures 114 and 115) revealed that Tallman's Island was separated from the mainland by a stream, known as Morris Creek, and an adjacent band of marshland. A band of marshland also extended along the west shore of Powell's Cove during this time. Mid-nineteenth-century maps (see Figures 17, 81 and 82) depicted a house on Tallman's Island. The owner was indicated as Mrs. Van Wyck in 1859 and 1860 (Walling 1859; Higginson 1860) and as A. Morris in 1873 (Beers 1873); the creek was apparently named after Morris. In the later nineteenth century, what is now Tallman's Island was known as Garvey's Island.

By the early 1890s, the island was leased by Joseph Witzel, who developed it as a resort named Point View Island. Witzel's resort covered 27 acres, including a number of buildings and a steamboat dock (Hecht 1976; Freidrich 1964; Sanborn Map Company 1903; see Figures 90 and 93). The resort operated until 1919 (Hecht 1964). In the 1930s, a large sewage treatment plant, still in operation, was constructed on Tallman's Island as part of preparations for the 1939-40 World's Fair (Moses 1938). This project involved large scale landfilling and grading on the island. Tallman's Island, including the site of the former resort facilities, is located to the north of the FLUBERP APE. The west shore of Powell's Cove, including the FLUBERP site, remained undeveloped through the nineteenth century (see Figure 114).

During the early twentieth century, the project area shoreline continued to be largely undeveloped (Sanborn Map Company 1903; see Figures 115 and 116). Although a street grid was configured for the area, it is unlikely that these streets had actually been laid out. As shown on the early twentieth century maps, Avenue F corresponds to the present 7th Avenue and North Boulevard with 5th Avenue, with the present 129th Street indicated as North 20th Street and 130th Street as North 21st Street, although the latter street was never opened north of 7th Avenue. By 1909, a few frame structures had been constructed east of the present 129th Street, in the vicinity of the present 6th Avenue (then designated as Avenue G) (Bromley 1909:23; see Figure 115). In 1916, these structures included boat storage sheds and a small domestic structure, and an associated pier extended from the shoreline in the vicinity of 130th Street and 6th Avenue (Figure 117). These facilities appear to be part of a boat club and were within the present project area. Also at this time the names given to the streets correspond to their present designations.

The facilities depicted in 1916 persisted into the mid-1920s (Belcher Hyde 1926:3:3). By 1926, the extant pier was lengthened and a smaller pier had been constructed south of it.

An aerial photograph (Figure 118) reveals that this facility included a large bulkheaded docking area extending north of 6th Avenue. The piers on earlier maps appear on the aerial photograph to be a large, possibly floating, breakwater. This may have replaced or incorporated the earlier pier shown in 1916. In 1941 a pier at the location as depicted in 1916 remained, but the larger bulkhead/breakwater configuration illustrated in the aerial photograph no longer existed. By 1943, no piers were identified along the shore (Sanborn Map Company 1941:5:13, 1943:5:40).

During the reconnaissance, the remains of a pier and associated bulkheading were noted along the shoreline in the vicinity of the approximate alignment of 6th Avenue (which ends at 129th Street) at the approximate location shown on the 1916 and subsequent maps (Figures 119 and 120; see Figures 117 and 118). Any remains west of the present shoreline, including the large boathouse north of the pier shown on the 1924 aerial photograph would be buried beneath late twentieth century landfill.

Sanborn maps dating to the second half of the twentieth century do not record any construction within the bounds of the FLUBERP during this period. The pier and associated structures historically located a short distance south of 7th Avenue are south of the FLUBERP site, and belong to the Ariel Rowing and Tennis Club (Fairchild 1924; Sanborn Map Company 1941:5:13; see Figure 126). The club was reportedly founded in 1886, but this pier was not noted prior to the 1920s. The pier appears to have been constructed atop an old derelict barge (Figure 121). This type of construction may have been used to erect the "breakwater" in the 6th Avenue area discussed above. The remains of another pier also were noted immediately north of the line of 7th Avenue (Figure 122). This pier, which would be immediately adjacent to the southern boundary of the FLUBERP APE, was not shown on any of the maps examined for this study. The filling in of the marshland along the west side of Powell's Cove occurred during the latter years of the twentieth century, as illustrated through a comparison of marine charts (see Figures 98 and 99).

3.3.5 Flushing Bay Channel and Shipwrecks. As early as the end of the seventeenth century regular maritime trade, utilizing large canoes, was conducted between Flushing and New York. This method was succeeded by the use of sailing ships, and by 1760 John Wilson was operating a regular service via sloop between the village of Flushing and New York. Prior to 1822, a sailing packet service was begun by Howell Smith and subsequently operated by Samuel Pryor and Jonathan Peck. Regular steamboat service started to supplant sailing ships in the early nineteenth century, beginning with the steamboat "Linnaeus" in 1823 (Munsell 1882). In 1859, a service was run by the Flushing, College Point and New York Ferry Company, which did business as the "Peoples Line" (Munsell 1882:103). The first steamboat operated by this company was named the "Enoch Dean" with the line subsequently operating "the first Iron [steam] Boat ever run on the East River" (Mandeville 1860:72-73). Steamboats docked in Flushing on the east side of the creek immediately north of what is now Northern Boulevard. The presence of steamboat docks and steamboat service in the College Point area is noted above.

The channel in Flushing Bay was dredged in 1833, 1857 and 1859 (Mandeville 1860:72; Munsell 1882:103). In 1844, a channel had been dredged in the upper portion of Flushing Creek, above what is now Northern Boulevard, with water depths between 7 and 14 feet in this area, although information on the upper bay was not noted (U.S. Coast Survey 1844). Most of the bathymetric readings in 1844 revealed water depths between ½ and 3½ feet in the lower bay and two readings of 5½ and 4½ feet immediately beyond the

end of the dredged channel (U.S. Coast Survey 1844). These data suggests that the channel may have been more extensive and may have silted-in in this area. Further, any steamboats operating in the bay at this time would have had to have had an extremely shallow draft.

By the early 1860s, water depths in the bay were deeper than those recorded in 1844 (U.S. Coast Survey 1857, 1861). Water depths in the bay were approximately 4 to 5 feet in areas where the earlier map indicated 2 to 3½ feet, with depths in the upper bay generally about 5 to 7 feet. The 1861 survey showed generally similar depths, with the bathymetry ½ to 1 foot deeper than on the 1857 map in some locations. In general, these maps infer that a dredged channel did not exist in Flushing Bay at this time; a channel was present, however, only in the upper portion of the creek. Nevertheless, the fact that what would become the Federal channel was initially only 6 feet deep suggests that a shallow channel may have been previously dredged by local interests as noted above.

The first documented channel dredging in Flushing Bay occurred after the passage of the Harbors and Rivers Act of 1878. Pursuant to this act a channel extending from deep water in the East River inland to the Main Street (i.e., Northern Boulevard) Bridge was dredged to a depth of six feet at mean low water (USACE 1996:2-8). One source (FMI 1937d:8) maintained that the original channel was dredged in 1881 and was 11 feet deep and 200 feet wide. These specifications are inaccurate as recorded on a 1909 chart (Figure 123), which depicted the channel depth as six feet. In fact, it was not until 1911 that the 61st Congress authorized deepening the channel to 10 feet to the Broadway (i.e., the present Northern Boulevard) Bridge, with a seven-foot channel below this point. In 1925, the authorized channel was deepened to 12 feet to the Broadway Bridge. The present channel depth of 15 feet was specified in 1962 (USACE 1996:2/11-12).

Dredging to depths of 8 and 12 feet was conducted in the southwestern portion of Flushing Bay in the 1930s in connection with construction of a Municipal Marina along the south shore of the bay in preparation for the 1939-40 World's Fair (WFC 1937c). This marina is still in operation. The existing World's Fair marina along the southwestern shore of the bay was constructed in conjunction with the 1964-65 World's Fair. Dredging in the southwestern portion of the bay in the vicinity of these facilities was conducted in 1963 and 1964 to depths of between 6 and 12 feet (Galvin 1981).

3.3.5.1 Flushing Bay Channel Dike. The USACE (1996) reconnaissance study states that between 1880 and 1889 a 4,663-foot dike was constructed parallel and adjacent to the navigation channel in Flushing Bay. An 1878 marine chart (Figure 124), however, shows what looks like the dike, suggesting that it may have been constructed immediately after the enabling legislation and, as a result, earlier than noted in the USACE study. The top of this dike was at the mean high water elevation. Its purpose "was to prevent shoaling and sediment transport from the Bay into the channel. The dike consisted in part of rock fill between two parallel rows of closely spaced creosoted timber piles, about 55 feet long, and in part of a single row of creosoted timber piles" (USACE 1996:2/8, 10). A small "lighthouse" was situated at either end of the dike. Originally these lighthouses utilized kerosene lamps, and were reached by rowboat and lit every night (Shiel 1963:6). An 1893 Army Engineer map (Figure 125) details the dike on the west side of the channel, which was shown with a 7-foot depth beginning at the north end of the dike. A light was noted only at the northern end of the dike.

The nineteenth-century dike apparently never succeeded in its intended function of preventing the silting of the channel. In 1910 it was noted that

> the southern end of the dike is still intact, but the northern end, which was not so substantially constructed, has long since been destroyed by winds and tides and the timbers have kept many a poor family along the shores of the bay in firewood during the cold winter months [Brooklyn *Daily Eagle* 1910].

Legislation passed in 1913 authorized construction of a new dike and repair of the old one (USACE 1996:2-11), but in 1930 it was noted that the "old dike ... sank into the sediments" (Galvin 1981). A 1937 map showing the channel noted that the dike was slated "to be removed" (WFC 1937c) although it is not certain that the dike was actually removed at this time. According to the USACE reconnaissance study, "Federal maintenance of the dike was abandoned in 1962. Although abandoned and in disrepair, portions of this dike still exist today" (USACE 1996 2-10). The 2000 NOAA marine chart (Figure 126) indicates the presence of a "submerged dike" west of the channel. Pilings can be seen from the Flushing Bay shoreline near the southern end of the channel (see Figure 80) and are also visible in a recent aerial photograph. These could possibly represent remains of the old dike.

3.3.5.2 Shipwrecks. Several published compilations detail shipwrecks and marine accidents in proximity to the project area (Berman 1972; Rattray 1973). In some cases data is provided as to the disposition of the wreck, but in others the location of the vessel remains is uncertain. In addition, these sources often do not provide precise information on the location of the event. Prior to the second half of the nineteenth century, few systematic compilations of marine accidents were kept. As a result, wrecks that occurred prior to this period are underrepresented, and when early wrecks are reported, their locations tend not to be specific. Since the waters of the study area are extremely shallow, it can be expected that at least portions of most wrecks would be visible at low tide.

In some instances, it is unclear whether events actually occurred in Flushing Bay or the East River. Several of the wrecks listed were subsequently salvaged, but in other cases salvage status is unknown. Nevertheless, data of this type provide an indication of the extent to which wrecks have occurred in the study area. Since Flushing Bay represents a relatively protected marine environment, it is to be expected that the number of wrecks would be relatively small, compared to more exposed environments. Events reported in the vicinity of the study area are listed below in chronological order.

December 24, 1811	70 vessels driven on Long Island's north shore in gale and snowstorm... other vessels stranded at Oak Neck, Little Neck and Flushing (Rattray 1973:243).
August 21, 1872	Canal steamer *Cathcart*, cargo coal, collided at Hallett's Point, Hell Gate with government scow, ashore at College Point (Rattray 1973:251).
1905	Sloop *Annie E. Leete*, "died at Flushing under the ministry of Captain Stummey" (Rattray 1973:264).
April 26, 1925	*Visitor*, steam screw, 70 tons, built 1892, burned, Flushing, Long Island (Berman 1972 - #4293).

September 24, 1932	*Norwalk*, steam screw, 110 tons, built 1908, burned College Point (Berman 1972 - #3190).
February, 1945	Steamer *Colonel Clayton*, sunk at College Point, L.I., raised after four months (Rattray 1973:271).
November 15, 1953	*Jeanne*, barge, 316 tons, built 1930, foundered at College Point (Berman 1972 - #2169).
March 12, 1969	Tug *Ocean Queen*, Red Star Line, sunk off Queens shore after collision in Hell Gate with tanker Four Lakes, 4 saved, 1 missing (Rattray 1973: 276-277).
Date unknown	*Hannah Willets*, schooner, sunk off College Point, L.I. (Rattray 1973:177).

For Flushing Bay, the major source of data on the locations of existing wrecks is the NOAA marine chart of this area (see Figure 126). In addition, NOAA maintains a list of known shipwrecks and obstructions called the Automated Wreck and Obstruction Information System (AWOIS).

Flushing Bay. Four visible wrecks are noted in Flushing Bay; three of these are located immediately offshore of LaGuardia Airport, but are not in the vicinity of the project area (see Figure 126). The closest wreck to the project area is approximately 750 feet southwest of the Flushing Bay channel (see Figure 126). The chart symbol indicates that a portion of the wreck's superstructure is visible at the chart datum (i.e., mean low water). This wreck, shown on prior marine charts at least as early as 1937 (U.S. Coast and Geodetic Survey 1937), can be seen at low tide from the College Point shoreline (Figures 127 and 128). The 1937 marine chart (see Figure 127) delineated two wrecks immediately offshore Cape Ruth. One of these was shown on the 1969 chart (see Figure 87), but is absent from the current chart (see Figure 126). Neither of these wrecks was noted during the site reconnaissance.

The AWOIS system lists six wrecks and obstructions within the area shown on chart #12339. None of these are within Flushing Bay or Flushing Creek. AWOIS lists three wrecks and obstructions between 40° 45' North and 40° 48' North and between 73° 50' West and 73° 52' West, coordinates that include all of the proposed FLUBERP APE. One of these represents the visible wreck noted above near LaGuardia Airport and west of the navigation channel. AWOIS lists this wreck as Record No. 1688, unidentified wreck.

Tallman's Island/Powell's Cove Area. The NOAA chart (see Figure 99) shows one wreck located approximately 150 to 200 feet offshore of the northern end of the Powell's Cove FLUBERP APE. The symbol for this wreck indicates that one or more masts are visible above mean low water. This wreck is also shown on previous charts dating at least as early as 1937 (Figure 129). The AWOIS printouts do not include this wreck, however, and it was not noted during the site reconnaissance.

Old Marina Area. The NOAA chart (see Figure 99) shows three wrecks immediately adjacent to the shoreline of the FLUBERP APE. The symbol shown for the wreck at the northern end of the APE indicates that only masts are visible at low tide. The symbols for the two wrecks along the southern shoreline of the APE indicate that portions of the hulls of

these wrecks are visible at low tide. The wrecks are shown on either side of the remains of a pier that forms the eastern end of the site.

The 1937 marine chart (see Figure 129) showed a single wreck in this general area, while later editions document two wrecks (U.S. Coast and Geodetic Survey 1941, 1969; see Figure 98). All of these wrecks are indicated as having only masts visible at low tide. One of these wrecks may be the same as the northernmost one of those shown on the most recent chart (see Figure 99), although this is only conjecture because of changes to the shoreline configuration during the latter part of the twentieth century.

While none of the wrecks shown on the marine charts are listed in the AWOIS printouts, several were noted during the site reconnaissance. These were apparently associated with the operation of the shipyard formerly located in this area and discussed earlier in this section.

3.3.6 Historic Sensitivity Assessment. The historical background information discussed above has been summarized in Table 3.2 to address the historic sensitivity of the FLUBERP project areas. All eleven areas are included, with those no longer selected for restoration activities as of April 2002 noted (USACE 2002a). Column 2 contains the restoration activity. Column 3 is a listing of historic resources in, adjacent or near the project areas. Comments germane to a sensitivity determination are also included in Column 3, with the assessment given in Column 4.

The attraction of the Flushing Bay region for settlement documented in the prehistoric period continues into the historic and modern eras. A wide range of commercial enterprises (lumber, shipyard), transportation links (steamboat, rail lines), residential areas, recreational sites (marinas, boat clubs) and special purpose locales (World's Fair) have been and are present within the project areas. All but two of the project areas have been assigned a high sensitivity assessment since the literature and field reconnaissance uncovered known historic sites that would be affected by the restoration activities.

A low probability of locating historic resources is considered for the western and southern shorelines of Inner Flushing Bay and the LaGuardia Airport dike. The current shorelines are both the product of early to mid-1900s encroachment into the bay with little likelihood of other than incidental, not-in-contact historic and modern resources being found. The dike was constructed in 1963-1964 as an extension from the airport southward into the bay. Again, an expectation of non-National Register eligible materials would apply.

Table 3.2. Historic Sensitivity Assessment by Location for the Eleven Study Areas

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
Lower Flushing Creek (east/west banks)	widening existing tidal marsh areas	*In*: Vehicular/Pedestrian Bridges 1 Flushing Bridge - early 1800s to present with various structures at same location; most recent post-1951 bridge may have removed remains of previous structures 2 Roosevelt Avenue Bridge - 1926 to present with three different types of bridges in same approximate location; extant timber pilings and stone pier footing may relate to earlier 1926 bridge Railroad Bridges 3 Flushing or present Long Island Railroad Bridge - 1854 to present with reconstruction periods; extant timber pilings may relate to earlier remains 4 Flushing & Woodside Railroad Bridge and Trestle - 1865/1869 to 1930/1950 with different configurations; trestle connected bridge to Flushing Railroad tracts, buried under embankment ca. 1880s with possibility of trestle remains under later fill; extant wood pilings may represent earlier bridge remains 5 Trestle/Trolley Line of 1895 to 1915 - no longer in use due to in-filling of marshes 6 Newtown & Flushing Railroad Bridge - 1871-1876; post-1876 trestle work and tracks pulled up 7 1870s Rail Spur Bridge - probable freight line section only in operation in 1870s connecting/in between present Van Wyck expressway crossing and a point north of current Long Island Railroad Bridge Other Structures 1 D.S. Jones Lumber Yard/ H.K. Lines Coal and Wood Yard/Eastern Steel Tank Corporation with new coal loading facility - 1904 to 1951; east bank of Flushing Creek and north of Long Island Railroad 2 New York City outfall and headwall and wood pilings present in eastern creek bank area; later remains likely represent wooden bulkheading associated with the early 1900s industrial facilities of number 2 *Nearby*: 1 1860/1873 Sand Hotel, west bank of Flushing Creek and north of Northern Boulevard/project area; demolished mid-1900s 2 Hotel deCreek saloon and boathouse; ca 1873, west bank of Flushing Creek, south of Northern Boulevard; hotel may be just outside of project area with any remains unlikely due to subsequent construction for the Northern Boulevard bridge 3 Nereus/Wahneta Boat Club facilities (boat house, dock, bulkhead) - 1870s to 1951 when all features demolished replaced by small buildings of Empire Millwork Corporation and later 1900s by Van Wyck	High

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
		Expressway; west bank of Flushing Creek, near northern end of project area 4 Nearby structures likely built on piles over marshes; no remains encountered during reconnaissance *Comments:* - no structures on Flushing Creek west bank before 1850; only marsh - Flushing Creek west bank from Roosevelt Avenue to LIRR tracks never developed; entire area filled-in with dredged material from Flushing Bay 1916-1950 - Flushing Creek east bank north of LIRR, portions undeveloped to 1900 - LIRR south to Porpoise Bridge, Flushing Creek west and east banks, no development till 1930s World's Fair construction; during reconnaissance only a modern outfall located on west bank	
Inner Flushing Bay (western & southern shorelines adjacent to LaGuardia Airport; western shoreline eliminated as of April 2002)	rehabilitation /extension of marsh and shore mud flats involving grading and deposition of fill materials	*In:* None *Nearby:* 1 farms and Jackson's Creek Mill along west shoreline from 1700s to mid-1800s; two houses along west shoreline by 1909 2 pier and clubhouse of East Elmhurst Club by 1909 at north end of project area with other smaller piers and/or breakwaters between it and, by 1924, second large pier at southern end 3 prior to 1934 bluffs along west Flushing Bay shoreline; by 1934 construction of Grand Central Parkway along shoreline involving in-filling into the bay *Comments:* - present shoreline 350 to 400 feet east or bay-side of 1914 shoreline - pier remains or other resources would be located under highway and its base of fill material; no remains observed during reconnaissance	Low
LaGuardia Airport	removal of artificial dike at south end of airport	*In:* 1 1963-1964 earthen breakwater; in 1995 dike elevation lowered *Nearby:* 1 1939 Art Deco Marine Air Terminal, listed on NRHP and associated hangers *Comments:* - 1937/1939 LaGuardia airport constructed over landfill in former Flushing Bay west shoreline area	Low
Willow Lake (shoreline)	reordering of vegetation; construction of wildlife habitat structures and trails	*In:* 1 1960 to ca 1974 Willow Lake bordered by parkland and playing fields 2 remains of wood wharf some 25 feet long along southwest shoreline noted during reconnaissance; date and function unknown; possibly used by insect control boats	High

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
	and trails	3 bridge remains along south end of lake; post-1930s to 1992, unable to examine during reconnaissance *Nearby*: 1 structure noted on east side bluffs above former marshlands in 1781; east bluff area location of subsequent estates and by 1896 cemeteries 2 house shown in 1852 on west side of former marshlands 3 water pumping stations 1893/1914 at west edge of former marshlands 4 Strong's Causeway - 1800s; crossed former marshlands; site of current Long Island Expressway with portions of Causeway possibly intact under 1930s landfill *Comments*: - prior to 1936 in-filling with refuse and landscape modifications, Willow Lake in southern Flushing Meadow marshlands - Willow Lake formed from excavation of marshlands with the processed material used to top adjacent ash/refuse filled-in marshland - 1964-1965 World's Fair site restored for use as Flushing Meadow/Corona Park opening in 1967 - 1937s planning for Flushing Meadows Park envisioned Willow Lake as a natural area/bird refuge - from 1964-1965 World's Fair subsidence of filled-in surface surrounding Willow Lake with frequently inundated or saturated depression areas	
Flushing Creek at Meadows-Corona Park	reordering of stream channel above ground	*In*: 1 1939-1940 World's Fair structures: Gardens on Parade, United Kingdom and Australia pavilions, Lagoon of Nations, 1939 channel location 2 1964-1965 World's Fair structures: Maestro Pizza, Equitable Life Building, Pool of Industry/Fountain of Plants with extant features; General Electric Pavilion, Clairol Pavilion, Parker Pen Pavilion, Continental Insurance Company Pavilion, Chunky Candy Pavilion, Brass Rail Restaurant, Julimar Farm Exhibit, Better Living Center *Comments:* - Northern Boulevard south to Long Island Expressway marshes filled-in with burned/ unburned garbage and dredged Flushing Bay material from 1910 to 1930s; fill depths possible up to 90 feet - Long Island Expressway southward to current Meadow/Willow Lakes filled-in 1936 to 1939-1940 for World's Fair site and subsequent Flushing Meadows-Corona Park; 15 to 20 feet of ash and rubble fill -1939-1940 World's Fair all structures to be removed to at least 4 feet below surface or clean fill on top of below-ground structural elements at end of fair;	High

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
		reconnaissance at a fair site outside of project area showed no features at an approximate 4-foot depth - 1964-1965 World's Fair all structures to be cleared to a 4-foot depth at end of Fair	
Upper Flushing Creek (north end Flushing Meadows-Corona Park)	modification of culverts and tide gates/dam at LIRR and Porpoise Bridge crossings	*In:* - LIRR - post-1951 trestle crossing replaced by an embankment, creek flows beneath through a pipe culvert; embankment construction involved fill behind wood bulkhead/cribbing; currently partially visible - Porpoise Bridge - reinforced concrete bridge with tidal gates/dam for Meadow/Willow Lake water control; 1937-present with few alternations to the original	High
North College Point/ Old Marina Site (north shoreline of College Point)	restore and create marshes and tidal shoreline involving placement of structural features, grading, planting and in-filling	*In:* 1 shipyard facilities between 1916 and 1926 of College Point Dry Dock and Supply Company, changed name to Sound Ship Building Corporation by 1963, ceased operation by 1986; bulkheading and in-filling along shoreline; shipyard piers, wharf, pilings possible other features still extant as are derelict barges; shipyard buildings may be beneath 1900s land fill *Nearby:* 1 1645 /1781 Lawrence House 2 1795 building/flag/possible cemetery possibly representing the Lawrence House at College Point or military installation on Tallman's Island 3 1789/1924 Stratton House 4 1860/1920s Captain John Graham 5 1836/1848 Muhlenberg St Paul's College; Chisholm Mansion 6 1836/1838 Muhlenberg St Paul's College wood walkway over salt marsh from College Point to Flushing; 1855 replaced with a causeway 7 by 1851 individual housing developments 8 1851 steamboat dock 9 several structures overlooking shoreline by 1896 including possibly Hugo Funke house ca 1880 *Comments* - until mid-1850s western portion of College Point shoreline undeveloped - Capstan Court peninsula result of 1900s in-filling marking west boundary of this project area section - prior to 1900s land filling of south project area shoreline located at base of a bluff	High

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
Tallman's Island/ Powell's Cove (College Point east shoreline area)	creation of wetlands between Tallman's Island and Powell's Cove Park	*In:* 1 likely boat club facilities including boat storage sheds, small domestic building and pier by 1909 along Powell's Cove shoreline; by 1920s large bulkhead or breakwater structure; pier and bulkhead gone by 1943 map; pier and bulkheading remains noted during reconnaissance in same general area; any other remains including boathouse under late 1900s fill *Nearby*: 1 1795 building/flag/possible cemetery possibly representing the Lawrence House at College Point or military installation on Tallman's Island 2 1777 British 1st, 2nd, 6th brigades stationed east of project area 3 Van Wyck house on Tallman's Island by 1859; new owner A. Morris in 1873 4 early 1890s to 1919 Point View Island resort with steamboat dock on Tallman's Island 5 1930s sewage treatment plant still in operation on Tallman's Island 6 pier and structures of Ariel Rowing and Tennis Club by 1924 to 1941 along Powell's Cove shoreline 7 pier remains adjacent to south limit of Powell's Cove project area noted during reconnaissance *Comments:* - into early 1900s Tallman's Island separated from mainland by Morris Creek and marshland - mid-late 1800s island known as Garvey's Island - Powell's Cove shoreline undeveloped through 1800s - Powell's Cove shoreline no construction during 1950-1999, but in-filling of marshland along west side during later 1900s	High
Study	**Areas**	**Excluded as of April 2002**	
College Point West Shoreline (eastern shoreline Flushing Bay)	upgrading of marshes;	*In:* 1 piers and wharfs associated with following historic structures *Along or near shoreline:* 1 Poppenhusen Factory Site (Enterprise Rubber Works 1854; Indian Rubber Company 1868; American Hard Rubber Company 1885; Tulip Cup Corporation/Lily-Tulip company 1930s to 1950s; Kirsch Bottling Company 1990; Pepsi Cola Bottling Company present) - 1850/present; northern section of project area; by 1891 shoreline bulkheaded in association with factory complex with extent of fill behind the bulkhead unknown; by 1920s additional bulkheading and in-filling with factory site expanding onto part of the new land along with the Tulip Cup Corporation by 1926; wharf along waterfront in front of factory site with a boat-loading trestle by 1896	High

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
		2 five houses 1854 to present; built for factory workers 3 three post-1886 tenements on waterfront likely for factory workers 4 post-1850s cobblestone causeway to Flushing replaced an earlier plank walkway 5 Poppenhausen Institute 1868 to present; listed on National Register 6 various steamboat docks 1852 to later 1900s within and adjacent to project area; remains of possible ferry boarding gangway noted during reconnaissance <u>Post-1890s to early 1900s shoreline development extending southward</u> 1 Chilton Paint Company 1885 to present; reuse of former ferry dock and a new ferry slip to serve company's needs; 14th to 15th Avenues 2 coal yard, boat house, out-buildings and two piers by 1886; two piers at same locations on 1990 map and piers noted during reconnaissance 3 British American Chemical Company and Empire Art Metal Company by 1916 along with bulkheading to extend shoreline 4 Rhenania Silk Mills/John W. Ropo Metal and Cabinet Works by late 1800s; due to in-filling the factory site does not abut present shoreline 5 domestic structures late 1800s to early 1900s with one pier; in-filling makes present shoreline west or bayside of these structures 6 Kraemer Brothers Lumber complex - prior to 1885 to at least 1951, with pier later converted to large wharf and two additional piers; unable to examine site 7 Funke house complex by 1891 8 George Ilch and Sons Coal and Wood by 1896 with large loading trestle and wharf later converted to coal elevator by 1926; taken over by Kraemer lumber by 1916 9 R.A. Weber Silk Dyeing Company by 1916 with part of operation in former Ilch yard; by 1951 College Point Finishing Company in same location 10 H.W. Biffar Coal Yard with loading trestle and wharf by 1916 to 1926 - New York Rock Fire Block Company by 1926 11 extant brick building likely one of the industrial buildings from late 1800s to early 1900s 12 unable to examine shoreline to determine if any facilities extant 13 pier at site of Arrow Yacht Club by 1916; club still present as are portions of pier and a building that may relate to original 1920s structures 14 bathing pavilion, boathouse, piers by 1896; all piers removed by 1951; parts of facilities possibly relate to Stratton estate; area later site of Sunrise Oil company's loading facility	

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
		15 in-filling of shoreline between 23rd and 25th Avenues occurred in 1966 16 bluff area between 25th and 28th Avenues former location of Graham Court prehistoric site; post-1951 site of nursing homes and apartments; possible ca. 1924 pier 17 houses by 1926 between 28th and 29th Avenues; some still extant as are piers and pilings and derelict boat along shoreline 18 pier and boathouse at 29th Avenue ca 1910s; pier/boathouse of Flushing Boat Club, by 1930s the Sewanhaka Boat Club, by 1943 the Williamsburgh Yacht Club; still extant 19 small structures and a large pier by 1924 and a marina by 1969 around 30th and 31st avenues; pilings noted during reconnaissance in area of 1924 pier and later marina 20 sand and gravel and asphalt companies between 1926/1951 on Grantville bluff area with a loading facility; some companies still in operation and loading facility still extant along with derelict pilings *Nearby:* 1 Zehden's Hotel and Casino 1886 to 1908 *Comments:* - area of steep slopes, urban development, industry, boating facilities and marshes	
Meadow Lake (shoreline)	wetland restoration	*In or Adjacent:* 1939-1940 World's Fair Structures 1 Amphitheater and Music Hall; recently demolished and impacted by new city-sponsored pavilion 2 Merrie England/Dancing Campus and Opry House 3 bridges over Meadow Lake outlet stream; western bridge removed prior to 1964-1965 World's Fair; extant concrete and wood pilings may represent remains; eastern bridge still extant, but unclear if it is earlier or later fair bridge 4 Old New York/Artist's Village/Gay New Orleans exhibits (same location) north of outlet stream 5 boat house and docks; boat house still extant 6 Heineken's exhibit 7 shoreline at outlet stream was bulkheaded; extant wood pilings may represent remains of builkheading 8 Meadow Lake east shore exhibits: penny arcade, Pabst Garden restaurant, Washington Hall, Cuban Village, Parachute Jump 9 Meadow Lake southern shoreline informal recreation area; one dock for lake maintenance activities 1964-1965 World's Fair Structures 1 Amphitheater from prior World's Fair refurbished; adjacent docks for boating activities 2 Mississippi Riverboat attraction	High

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
		3 Hawaii Exhibit complex; partially on prior World's Fair Merrie England/Old New York/Gay New Orleans exhibits 4 boathouse and docks from prior World's Fair refurbished 5 remainder of shoreline for parking *Nearby:* 1 structure noted on east side bluffs above former marshlands in 1781; east bluff area location of subsequent estates and by 1896 cemeteries 2 house shown in 1852 on west side of former marshlands 3 water pumping stations 1893/1914 at west edge of former marshlands 4 Strong's Causeway 1800s crosses former marshlands; site of current Long Island Expressway with portions of Causeway possibly intact under 1930s landfill 5 1939-1940 World's Fair exhibits, west shoreline: Terrace Club, Florida Pavilion, Camp George Washington 6 1964-1965 World's Fair exhibits, west shoreline: reproduction of *Santa Maria* and Florida exhibit *Comments:* - prior to 1936 in-filling with refuse and landscape modifications, Meadow Lake in southern Flushing Meadow marshlands - Meadow Lake formed from excavation of marshlands with the processed material used to top adjacent ash/refuse filled-in marshland and to landscape Flushing Meadows Park after demolition of 1939-1940 World's Fair - existing outlet stream from Meadow Lake created in 1930s - 1939-1940 World's Fair all structures demolished by 1942; three exceptions: New York City Building now Queens Museum; Amphitheater, recently demolished and Boathouse, still extant - 1939-1940 World's Fair structures to be removed at least four feet below surface or clean fill on top of below ground structural elements - 1964-1965 World's Fair structures to be removed at least four feet below finished grade - 1964-1965 World's Fair site restored for use as Flushing Meadow/Corona Park opening in 1967	
Flushing Bay Navigational Channel	± two miles of channel *dredging*	*In or Adjacent:* 1 Dike parallel and adjacent on west side of channel, 4,663 feet long, ca 1878, federal maintenance abandoned in 1962; dike in disrepair, but portions still extant and pilings noted during reconnaissance may relate to the dike	High

Location	Restoration Activity	Recorded Cultural Resources In or Near Study Area with Comments	Sensitivity Assessment
		Nearby: 1 since 1811 multiple vessels shipwrecked on north shore of Long Island and Flushing 2 1872 *Cathcart* collided with another ship near College Point 3 1905 *Annie E. Leete* wrecked at Flushing 4 1925 *Visitor* burned, Flushing 5 1932 *Norwalk* burned College Point 6 1945 *Colonel Clayton* sunk at College Point, later raised 7 1953 *Jeanne* foundered at College Point 8 1969 *Ocean Queen* sank off Queens shore 9 *Hannan Willets*, sunk off College Point, date unknown 10 four wrecks in Flushing Bay, with nearest one to channel visible at low tide as seen during reconnaissance; ca 1937 11 two wrecks off Cape Ruth portion of eastern Flushing Bay shoreline; ca 1937, not visible during reconnaissance and not on current charts 12 AWOIS system lists two wrecks/obstructions within all 11 project areas 13 NOAA chart has one wreck, 150 to 200 feet offshore at north end of Powell's Cove; ca 1937; should be visible at low tide, but was not noted during reconnaissance 14 NOAA chart has three wrecks in former shipyard/College Point area; all should be visible at low tide; ca 1937 for possibly one wreck; several wrecks noted during reconnaissance, may be related to shipyard operation 15 1937, 1941, 1969 marine charts show up to two wrecks; in same general as number 14; should be visible at low tide *Comments:* - beginning late 1600s regular maritime trade in Flushing Bay area - dredging of a channel indicated in Flushing Bay in 1833, 1857, 1859; sources conflict on details - ca. 1878 channel created in Flushing Bay to depth of 6 feet; subsequent increases in depth authorized, present 15-foot depth specified in 1962 - dredging up to depths of 12 feet also conducted in southwestern section of Flushing Bay in association with the two Worlds Fairs in late 1930s and in 1963-1964 - shallow depth of channel suggests that portions of most wrecks would be visible at low tide	

Figures for Section 3.0

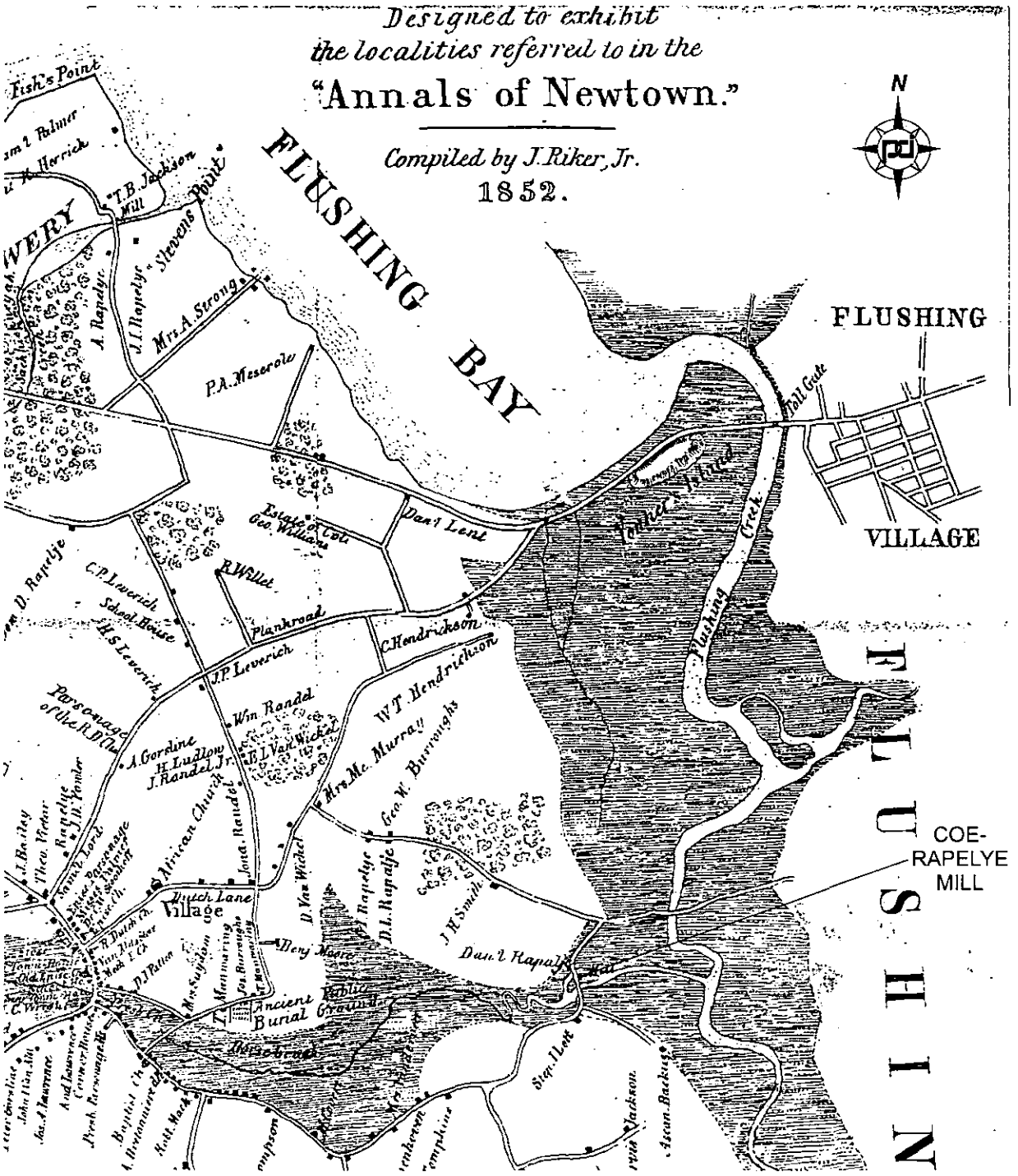

Figure 15. Southern Flushing Bay and Flushing Creek ca. 1852. Note Yonkers Island south of convergence of Flushing Creek and Flushing Bay and extensive marsh on both sides of creek. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Riker 1852).*

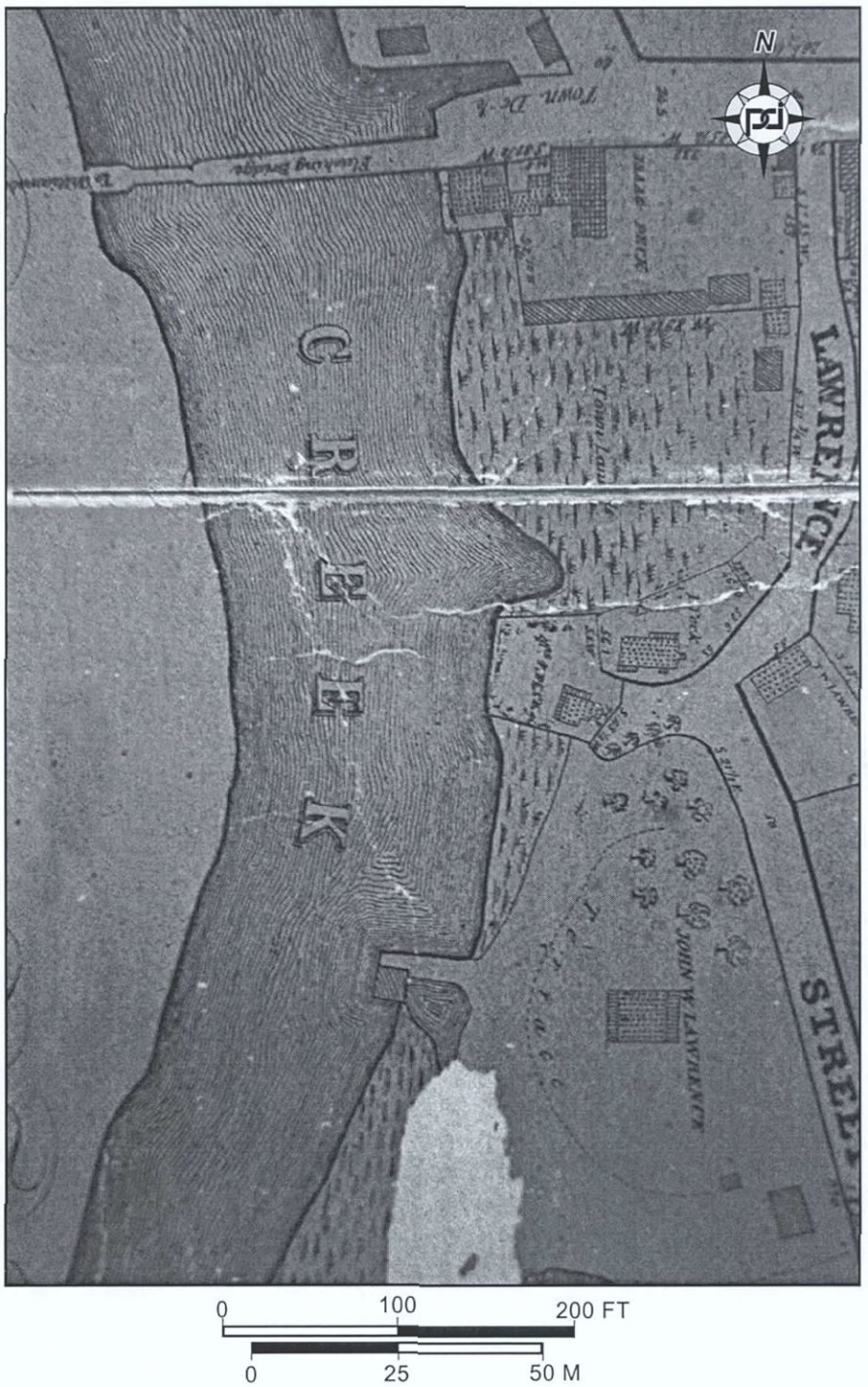

Figure 16. Flushing Village, 1841. Note Flushing Bridge marks approximate crossing of what is now Northern Boulevard; project area is on west bank of creek. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Smith 1841)*.

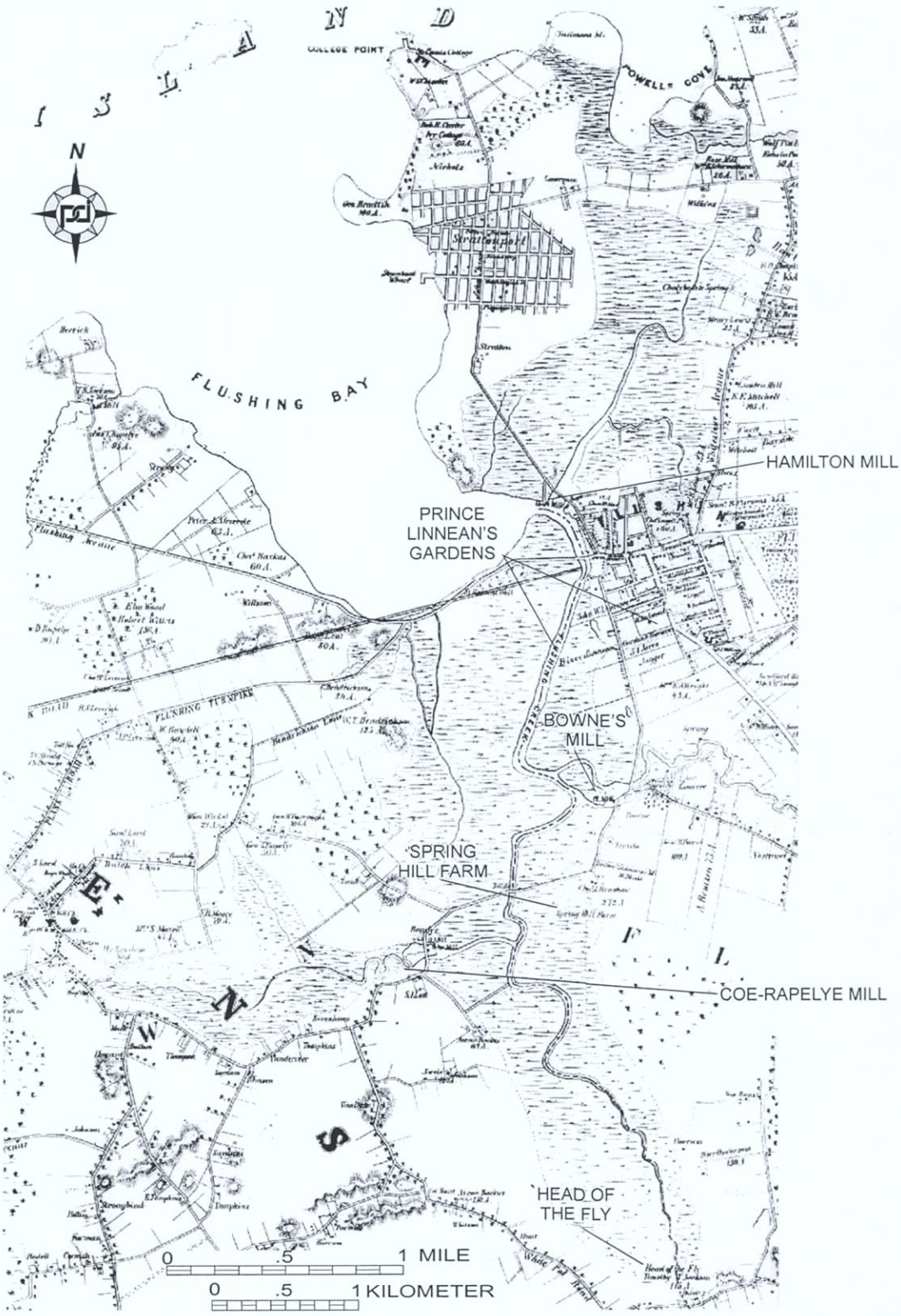

Figure 17. Flushing Meadows, ca. 1852; compare with Figure 1 to note extensive land modifications. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Dripps 1852).*

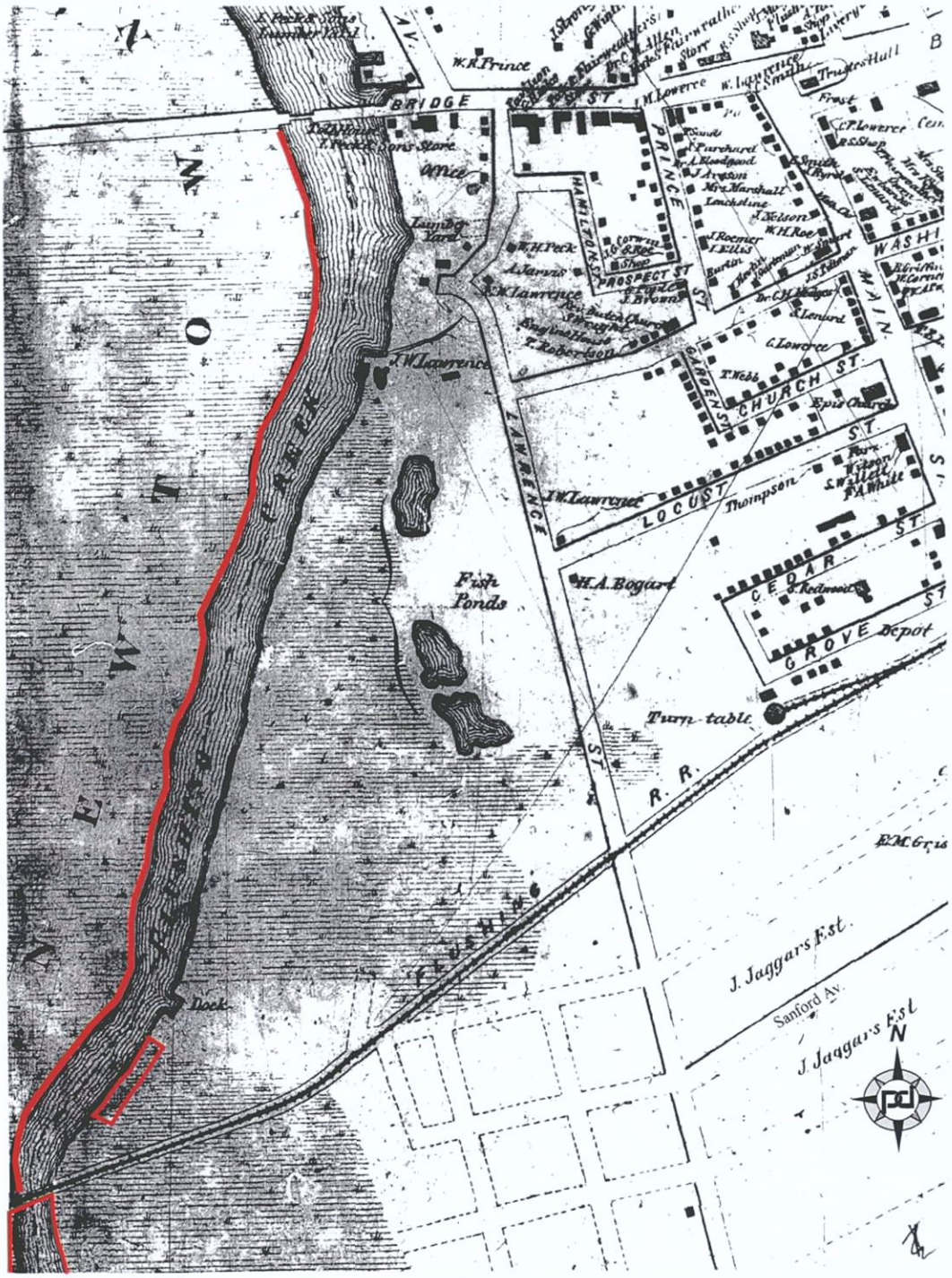

Figure 18. Flushing Creek area in 1859. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Walling 1859).*

Figure 19. View from Roosevelt Avenue Bridge with Northern Boulevard Bridge in background, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001)*.

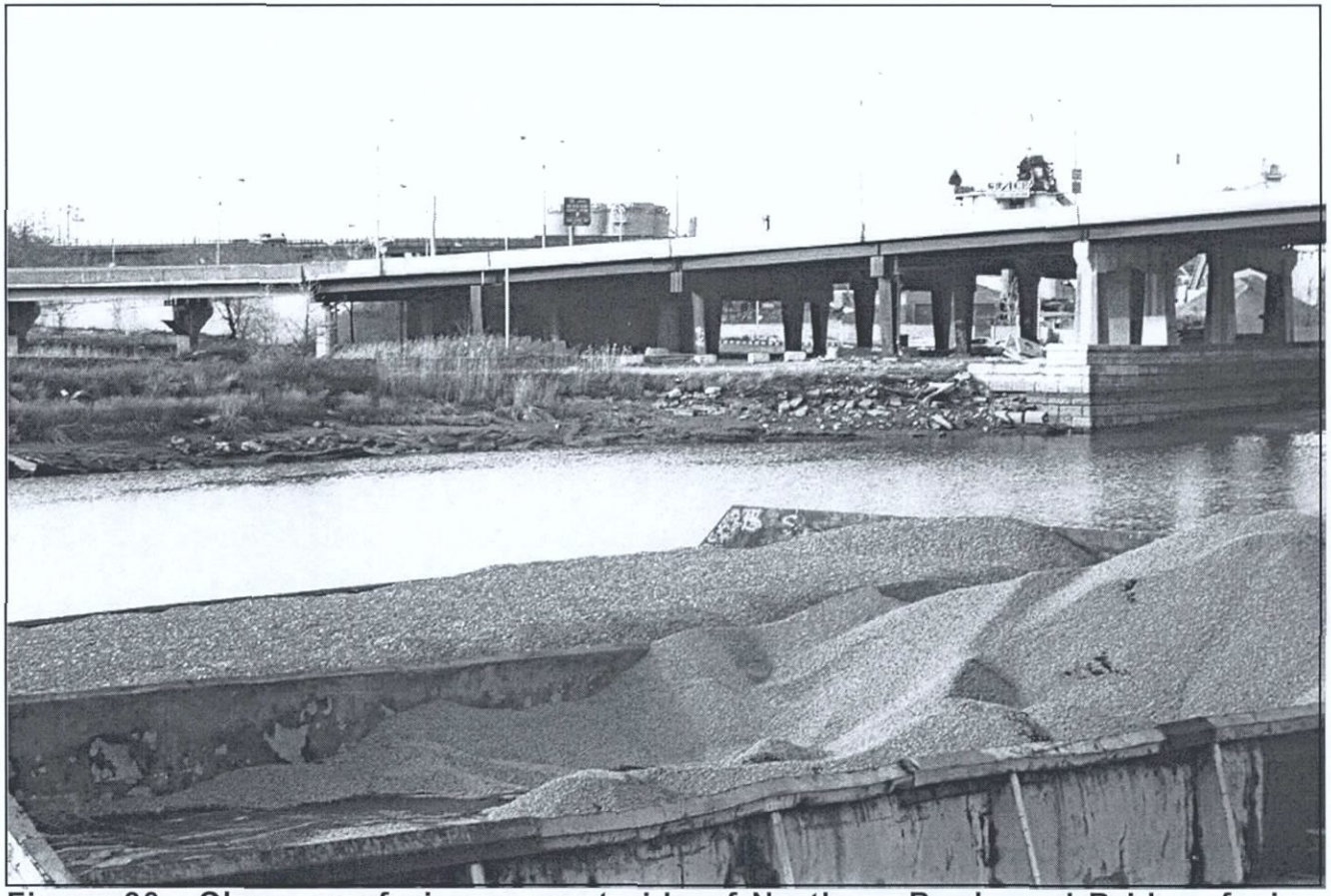

Figure 20. Close-up of pier on west side of Northern Boulevard Bridge, facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

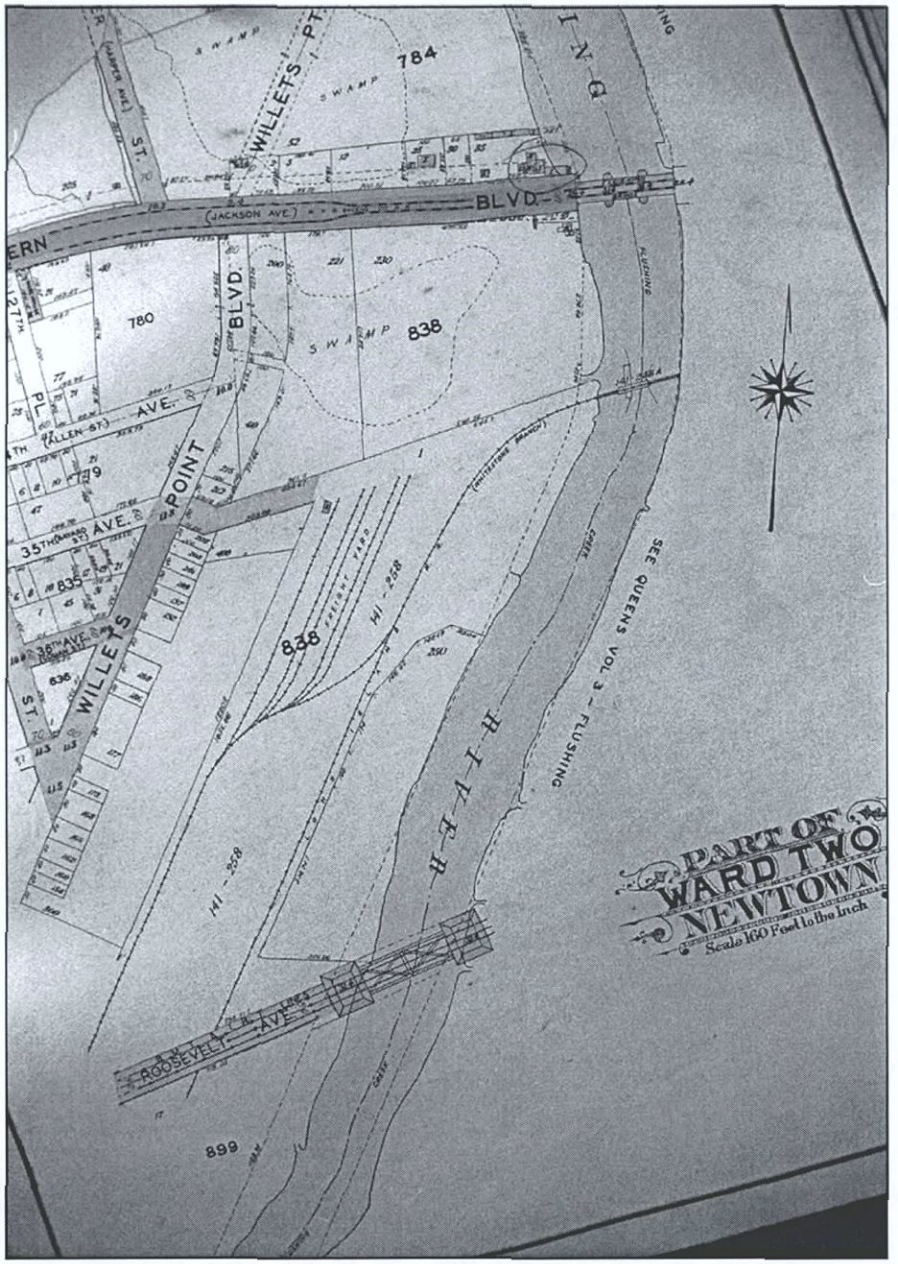

Figure 21. Flushing Creek between the Northern Boulevard and Roosevelt Avenue Bridges. APE on west side of creek. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Belcher Hyde 1927: Plate 26).*

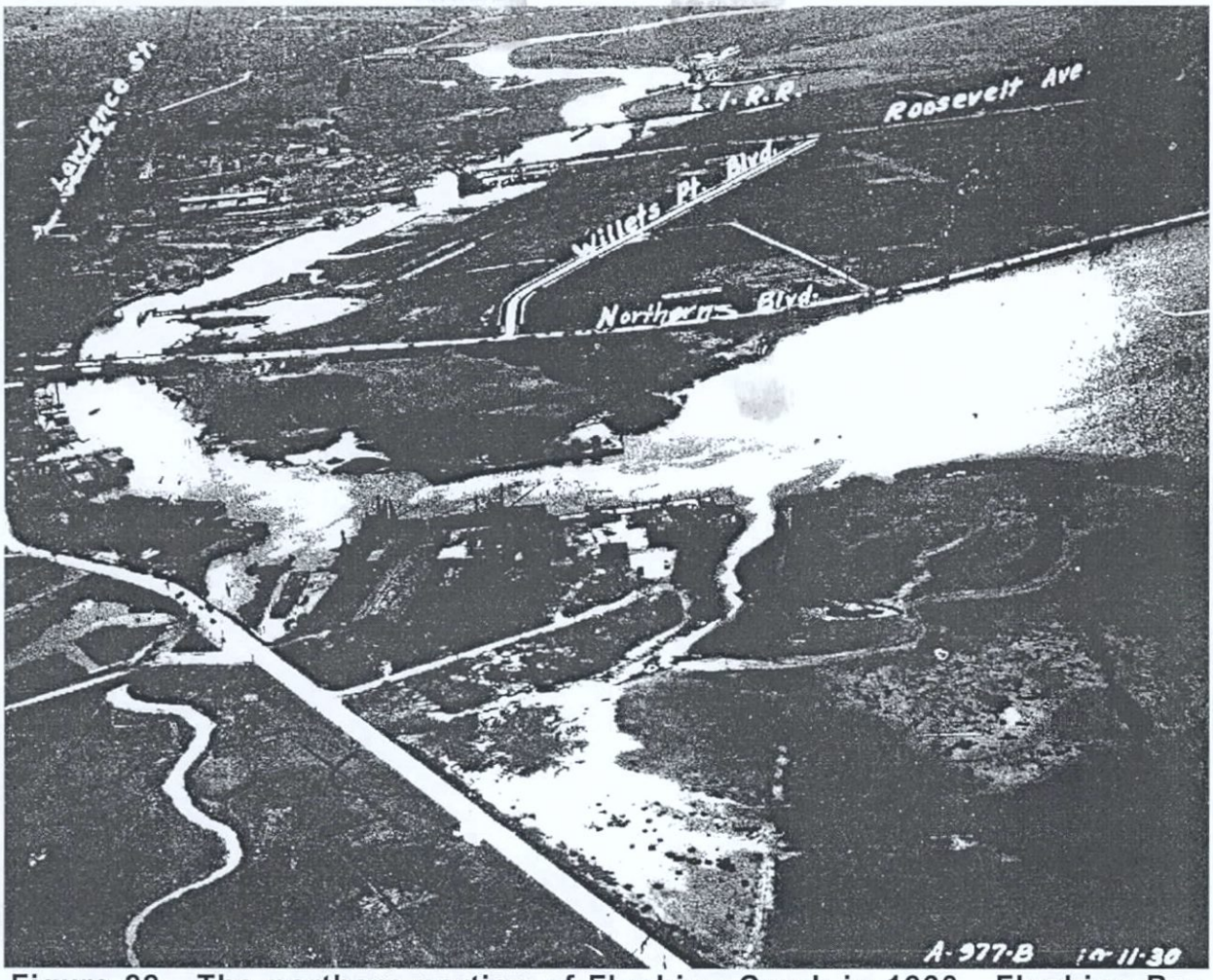

Figure 22. The northern portion of Flushing Creek in 1930. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Debevoise 1930)*.

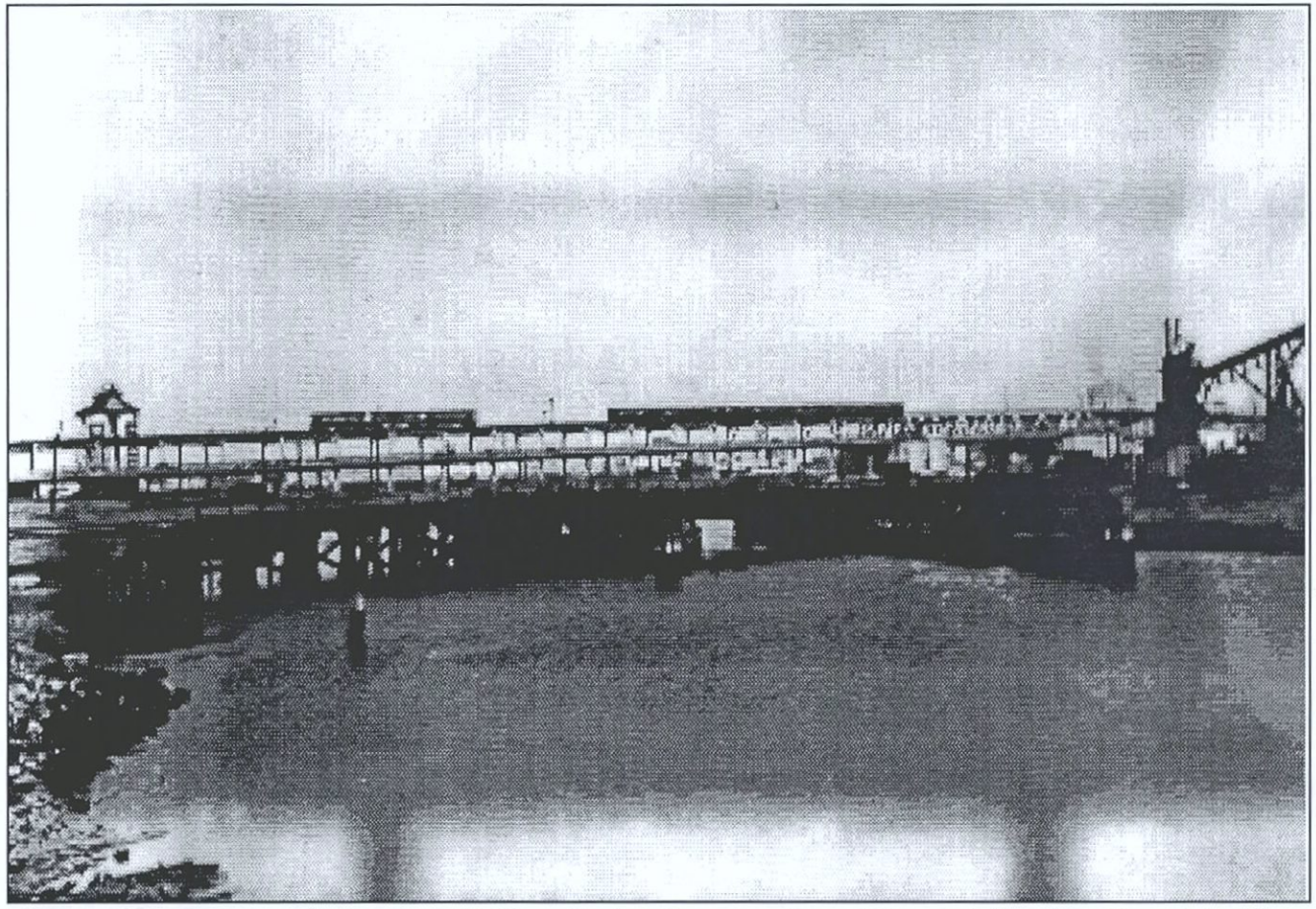

Figure 23. Roosevelt Avenue Bridge (in background) and Long Island Railroad Bridge (in foreground). Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Queens Borough Public Library 1938)*.

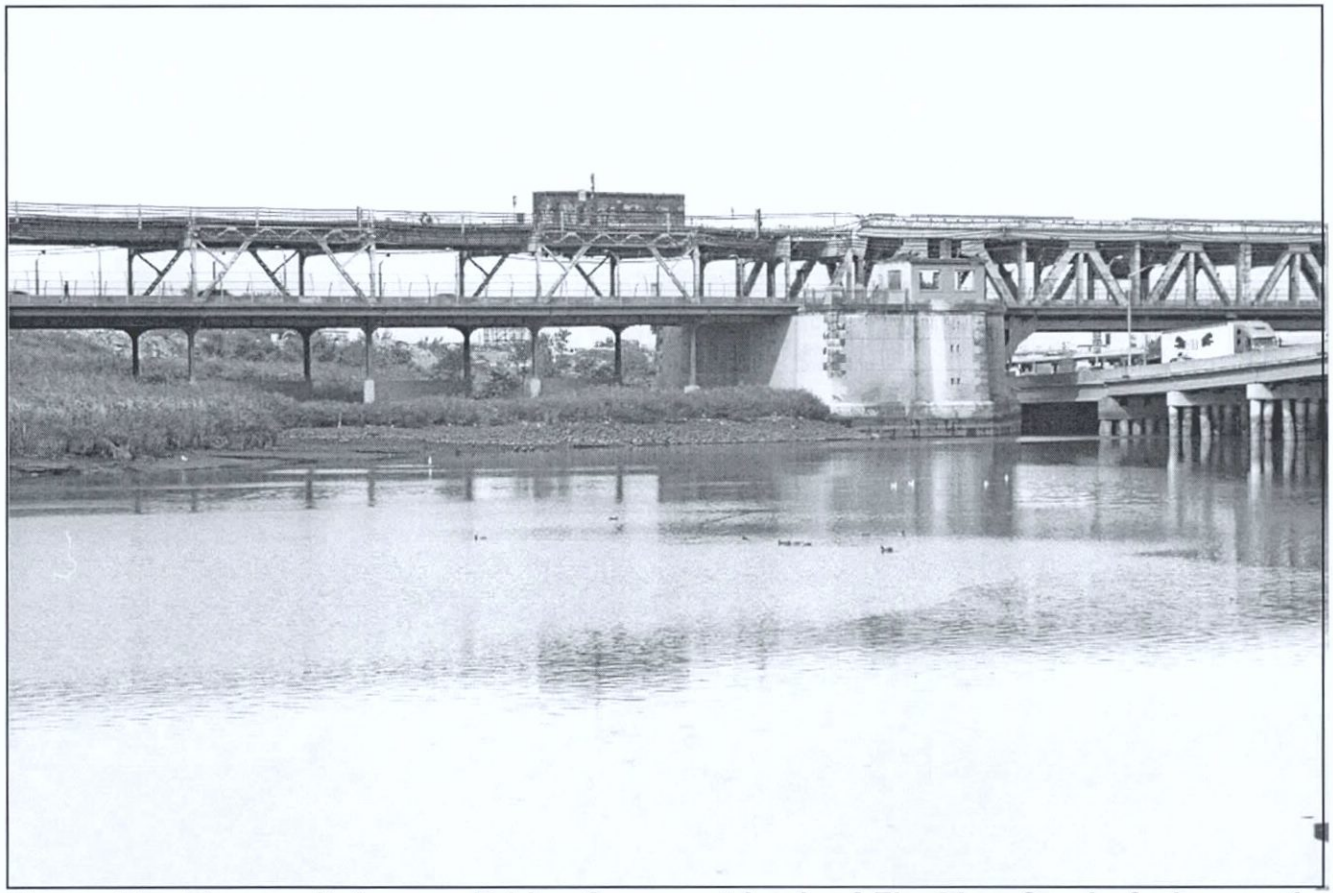

Figure 24. Roosevelt Avenue Bridge from east bank of Flushing Creek, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 25. Phragmites, pilings and old pier footings along west bank of Flushing Creek south of Roosevelt Avenue Bridge, facing southeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

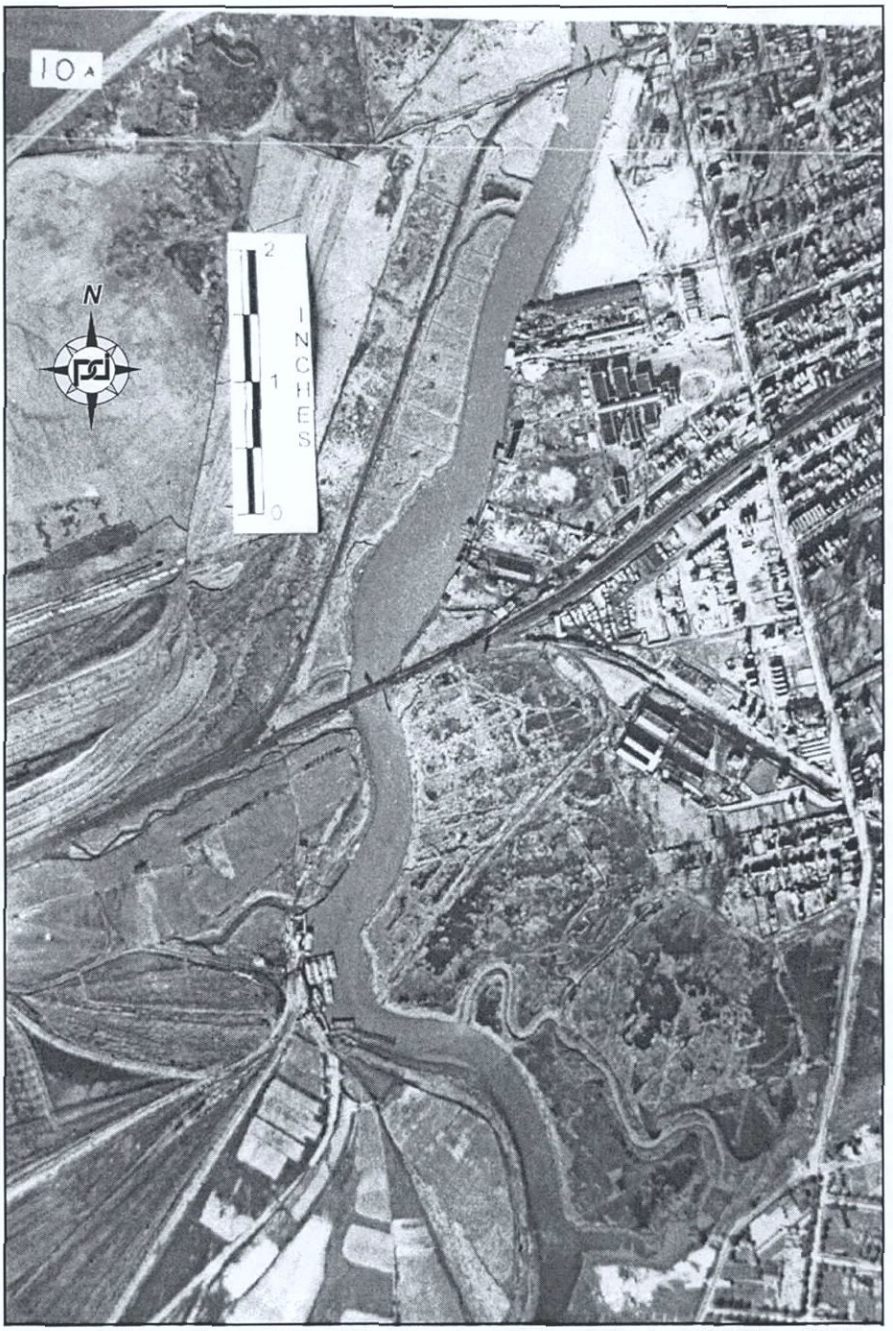

Figure 26. Flushing Creek project area in 1924. Note: Flushing & Woodside Railroad Bridge (top of photograph) and LIRR Bridge (at center of photograph). Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Fairchild: Sheet 10a)*.

Figure 27. Long Island Railroad embankment and culverts under embankment, Roosevelt Avenue Bridge in background, facing northwest from east bank of Flushing Creek. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 28. Long Island Railroad embankment bulkheading and culvert, facing east. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

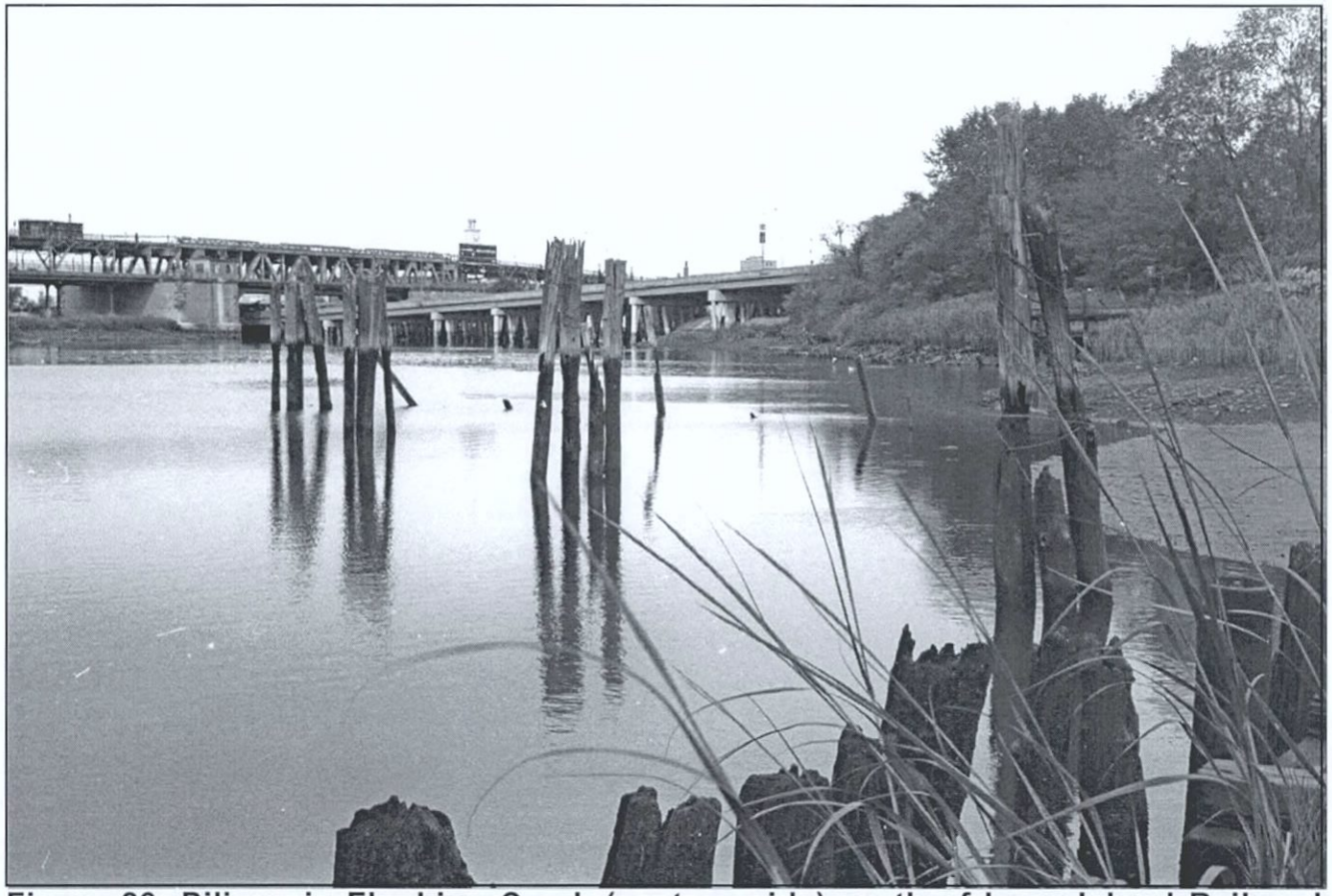

Figure 29. Pilings in Flushing Creek (eastern side) north of Long Island Railroad embankment, facing north. Note outfall at center right, Roosevelt Bridge and Van Wyck Expressway in background. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 30. Flushing Meadows project areas and the Flushing Creek bridges in 1872. Note: present Meadow Lake was created in area at lower right. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Dripps 1872)*.

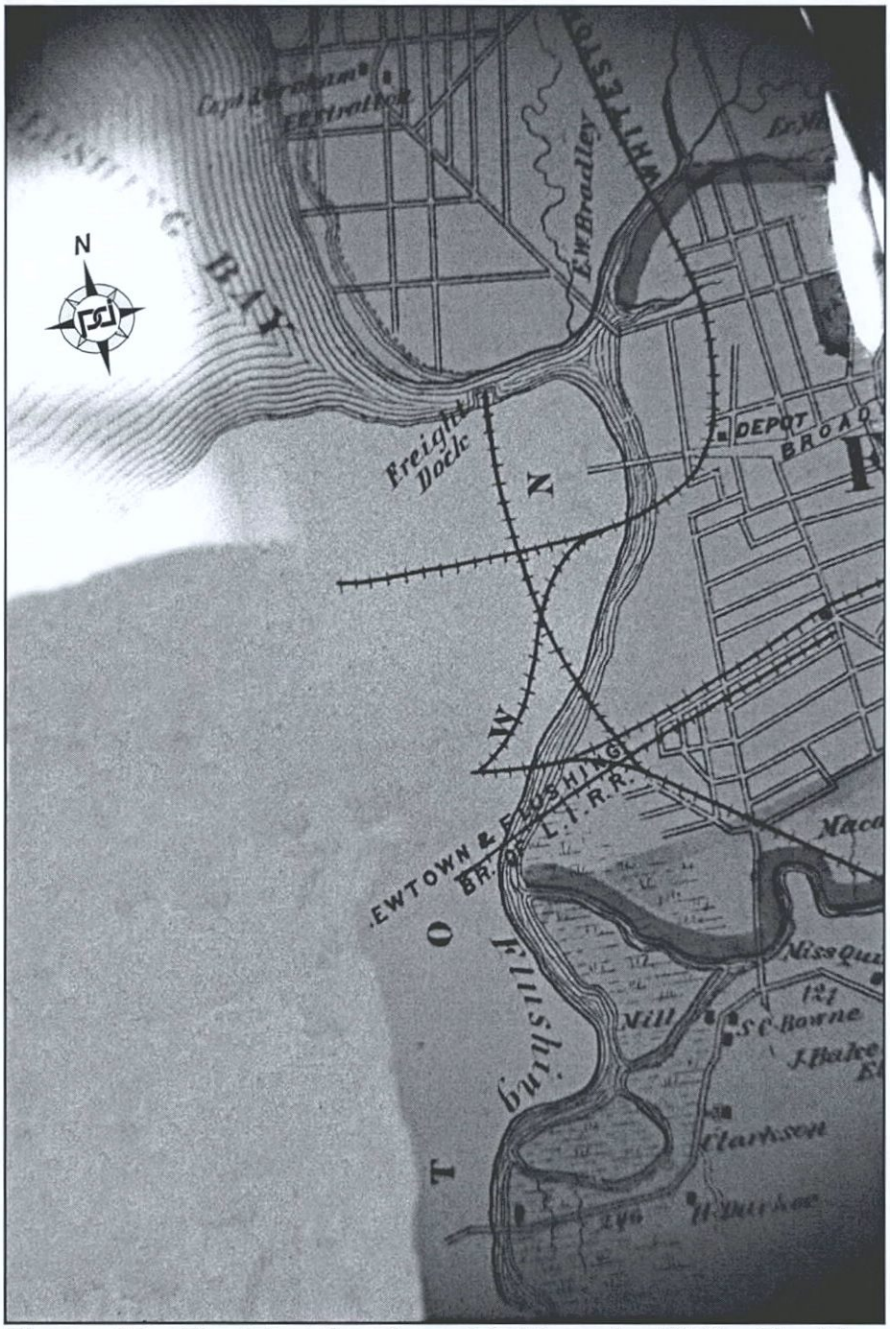

Figure 31. Flushing Creek and bridges in 1873. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Beers 1873).*

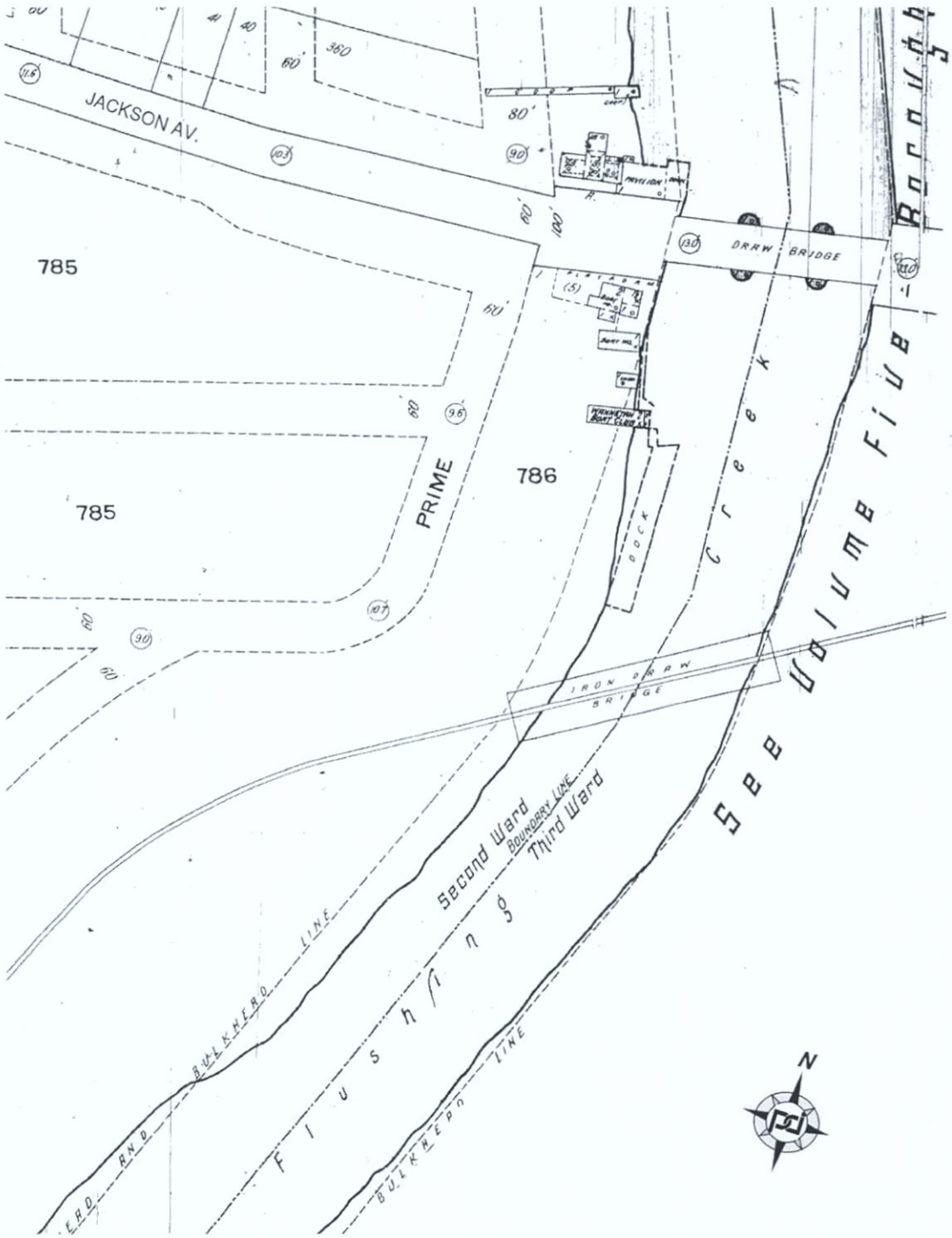

Figure 32. The APE along the west bank in 1914. Note: Flushing Bridge (at Jackson Avenue) and Flushing & Woodside Railroad Bridge. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn Map Co. 1914: 19:118).*

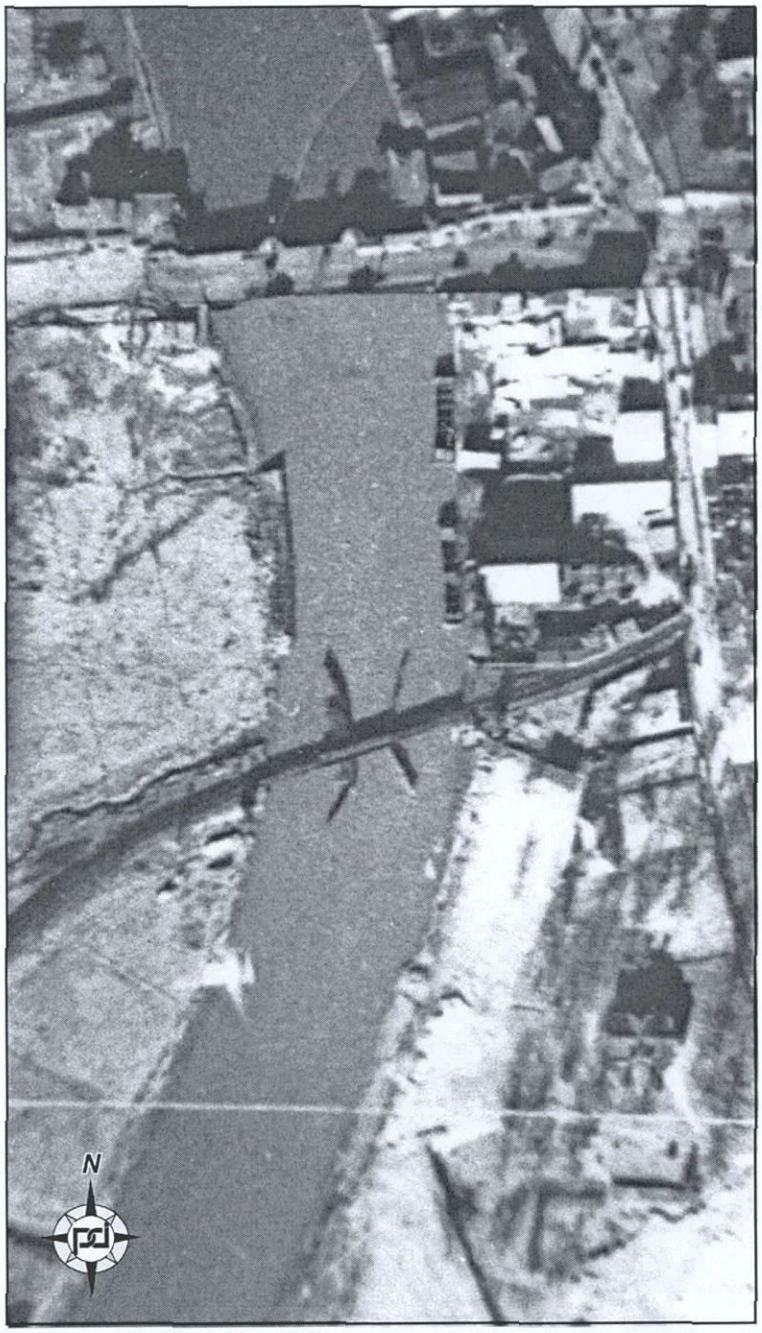

Figure 33. Detail of Flushing & Woodside Railroad Bridge (at center) and Flushing Bridge (Northern Boulevard Bridge) at top in 1924. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Fairchild 1924:Sheet 10a).*

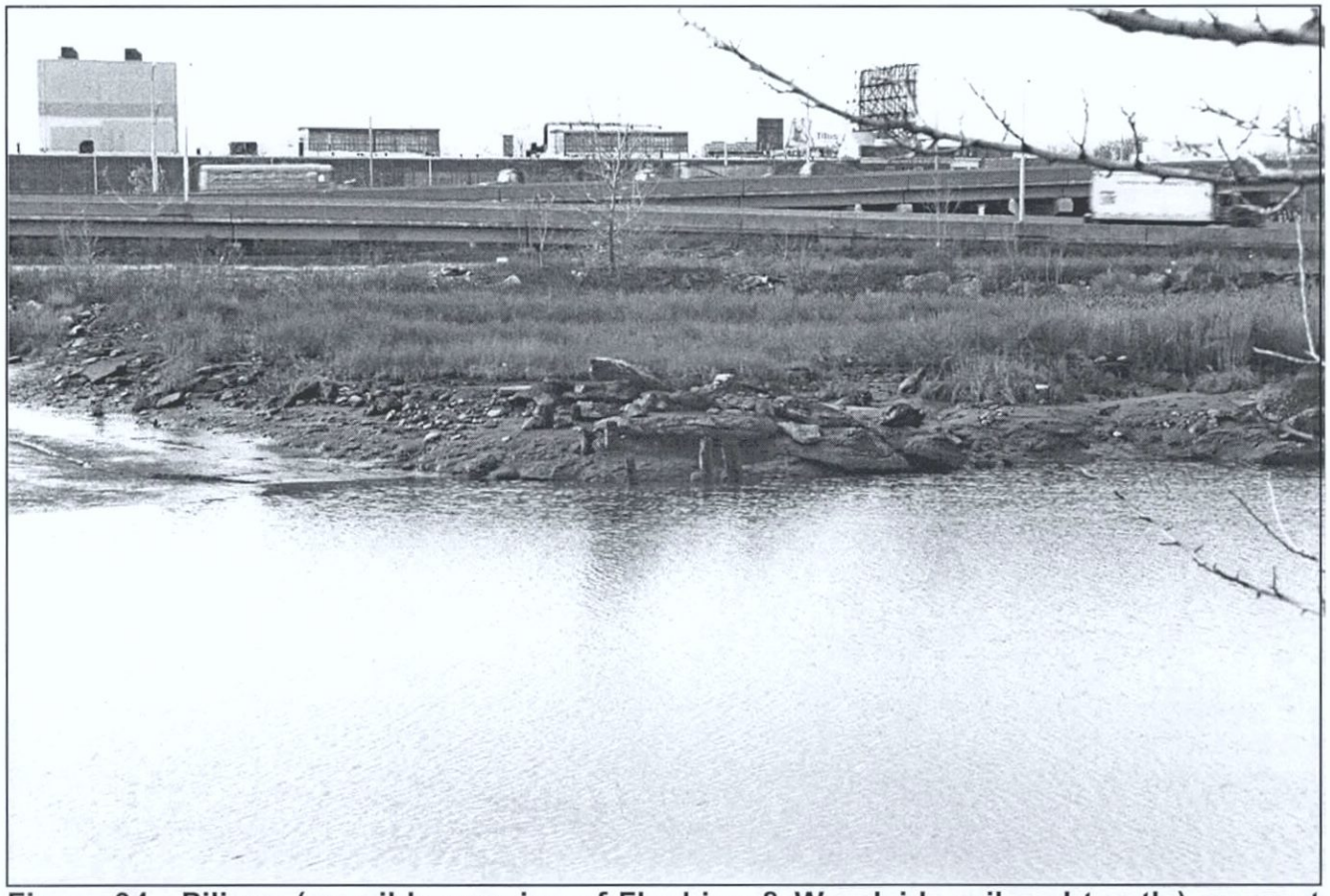

Figure 34. Pilings (possible remains of Flushing & Woodside railroad trestle) on west bank of Flushing Creek south of Northern Boulevard Bridge. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

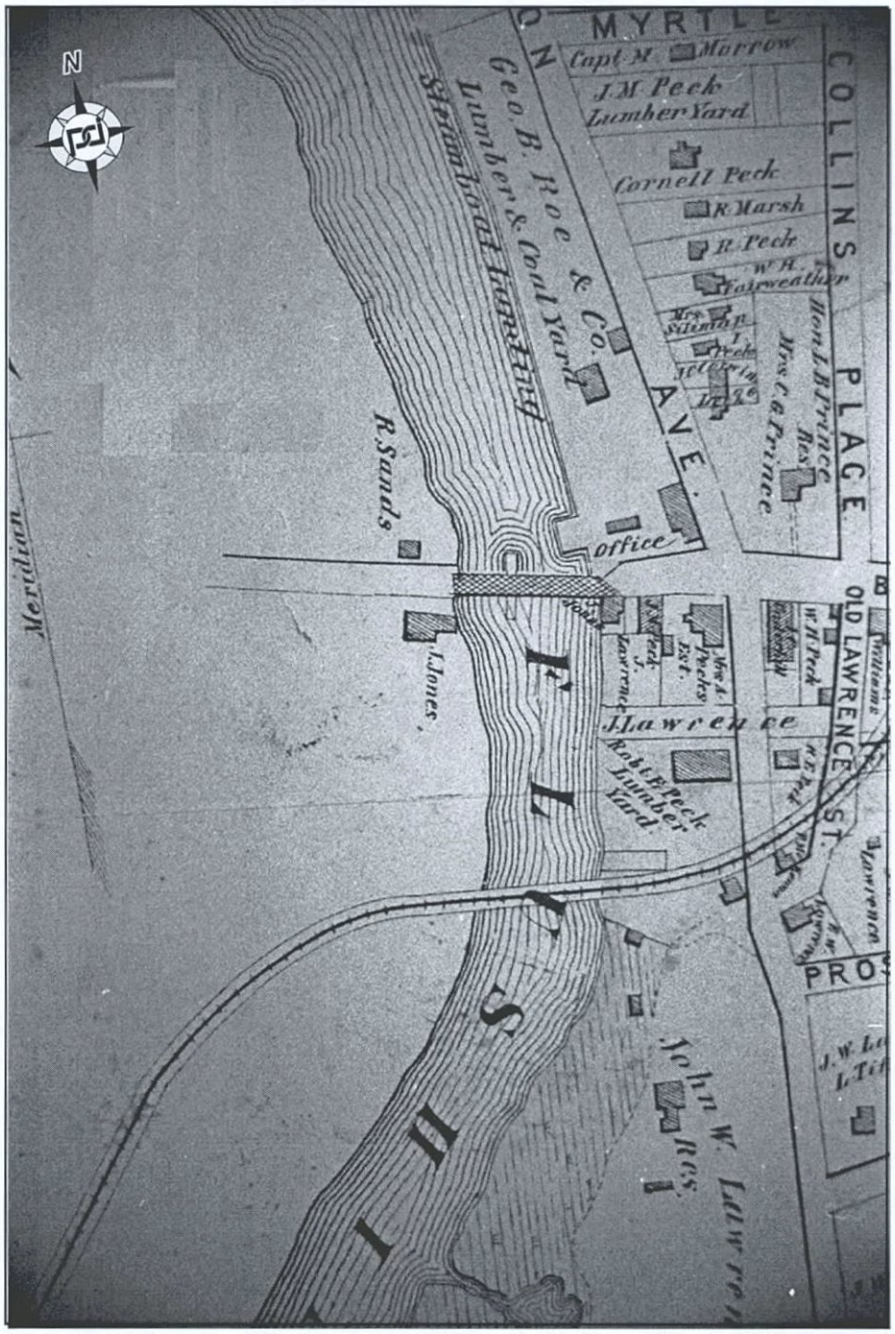

Figure 35. Two structures adjacent to Broadway (Flushing) Bridge on west bank of Flushing Creek, 1873. Note: the Jones structure may have been within the project area. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Beers 1873).*

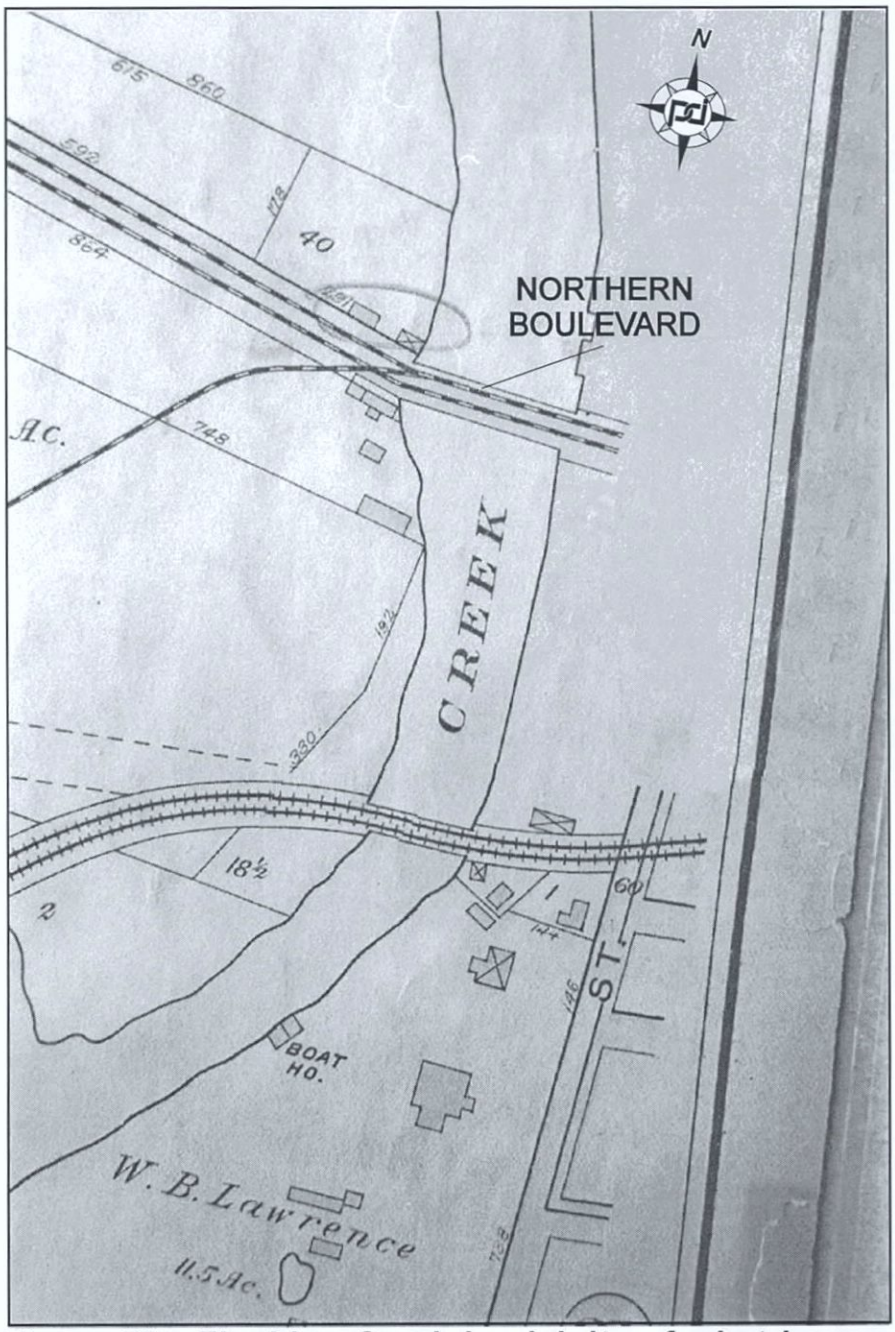

Figure 36. Flushing Creek in vicinity of what is now Northern Boulevard in 1909. APE along west bank of creek, south of Northern Boulevard. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bromley 1909 Plate 16).*

Figure 37. West Bank of Flushing Creek south of Northern Boulevard Bridge, facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

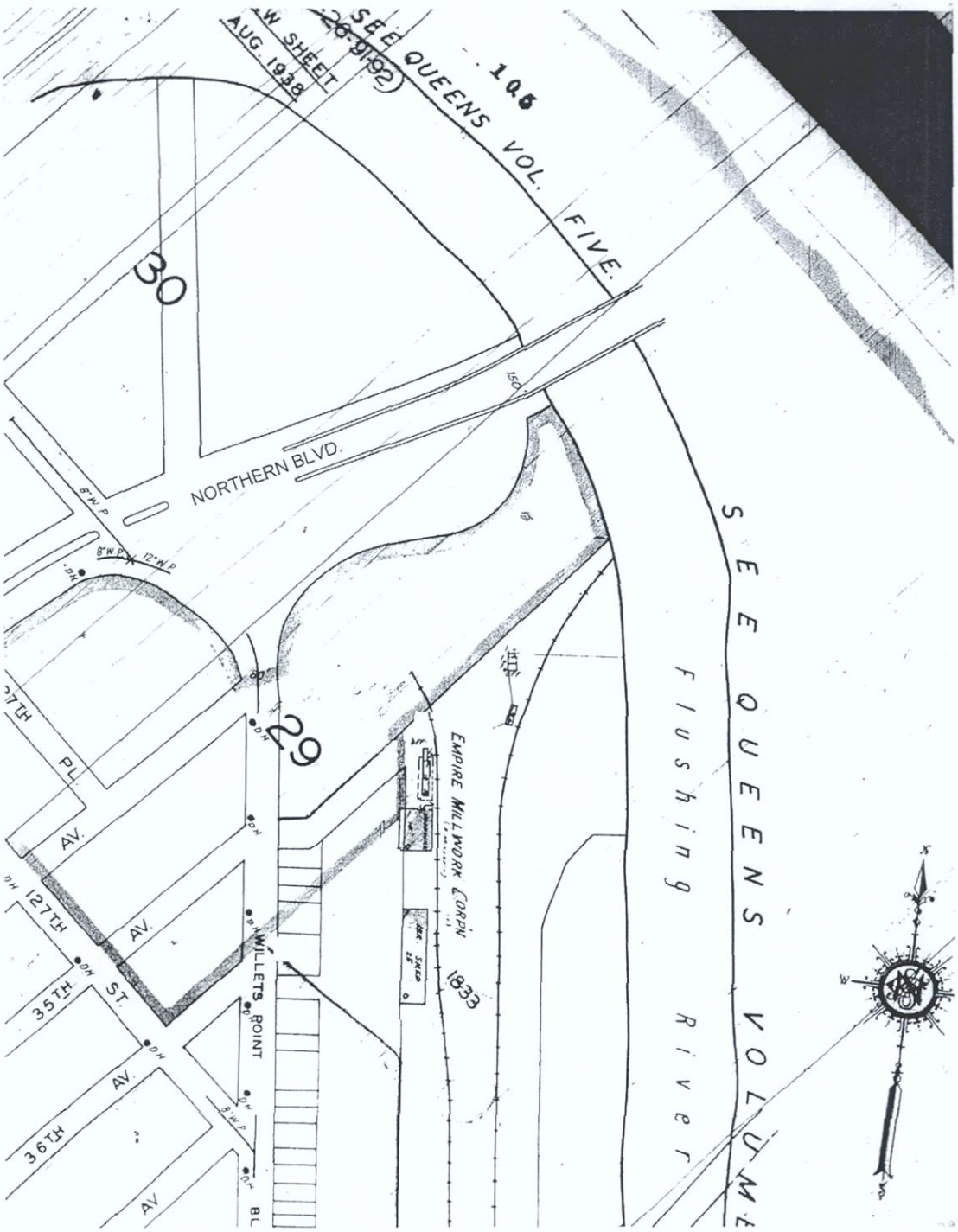

Figure 38. APE along west bank of Flushing River (Creek) south of Northern Boulevard in 1951. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn 1951, Vol 19:23).*

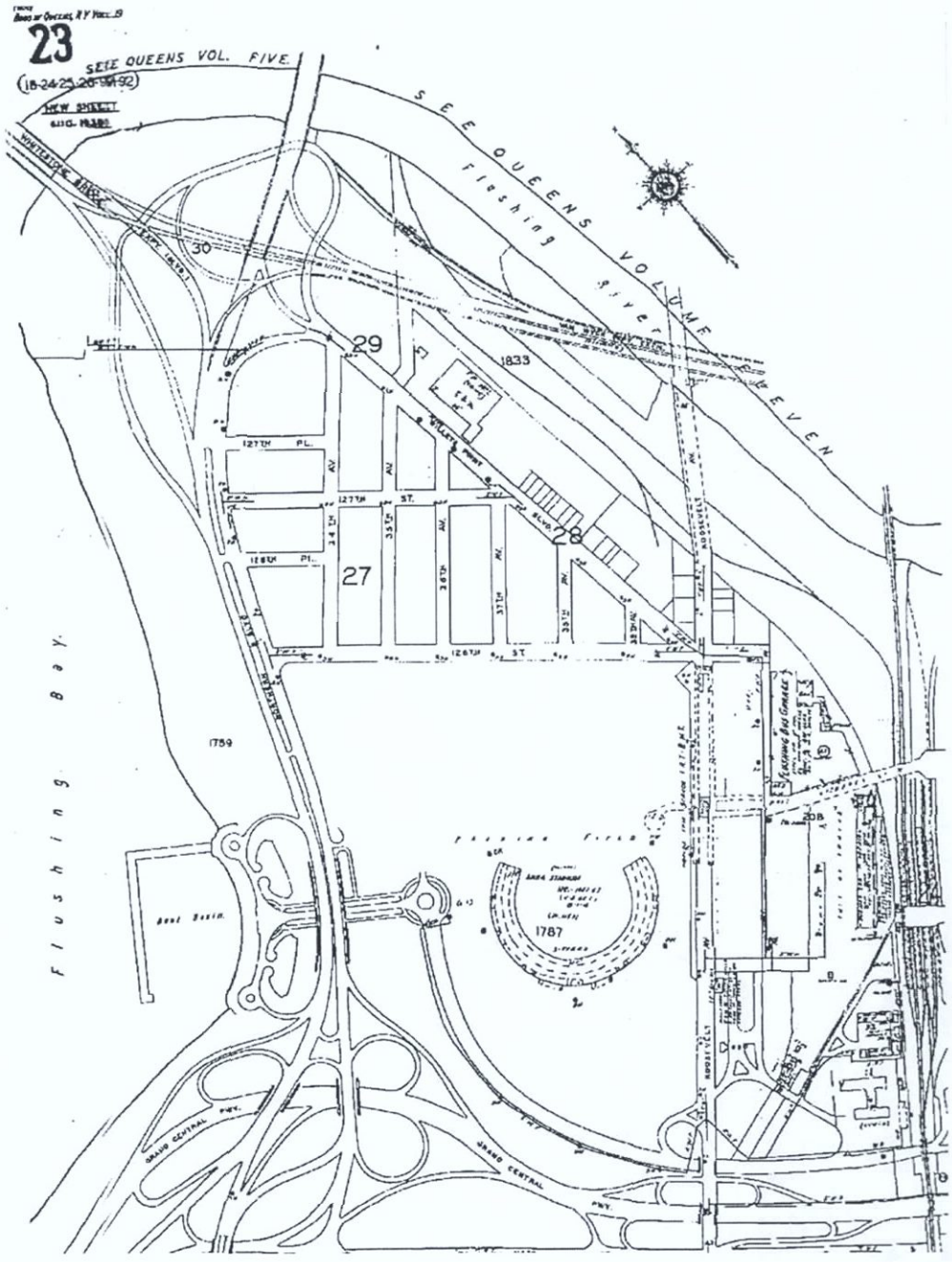

Figure 39. APE along west bank of Flushing Creek (River) south of Northern Boulevard. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn 1981 Vol. 19:23).*

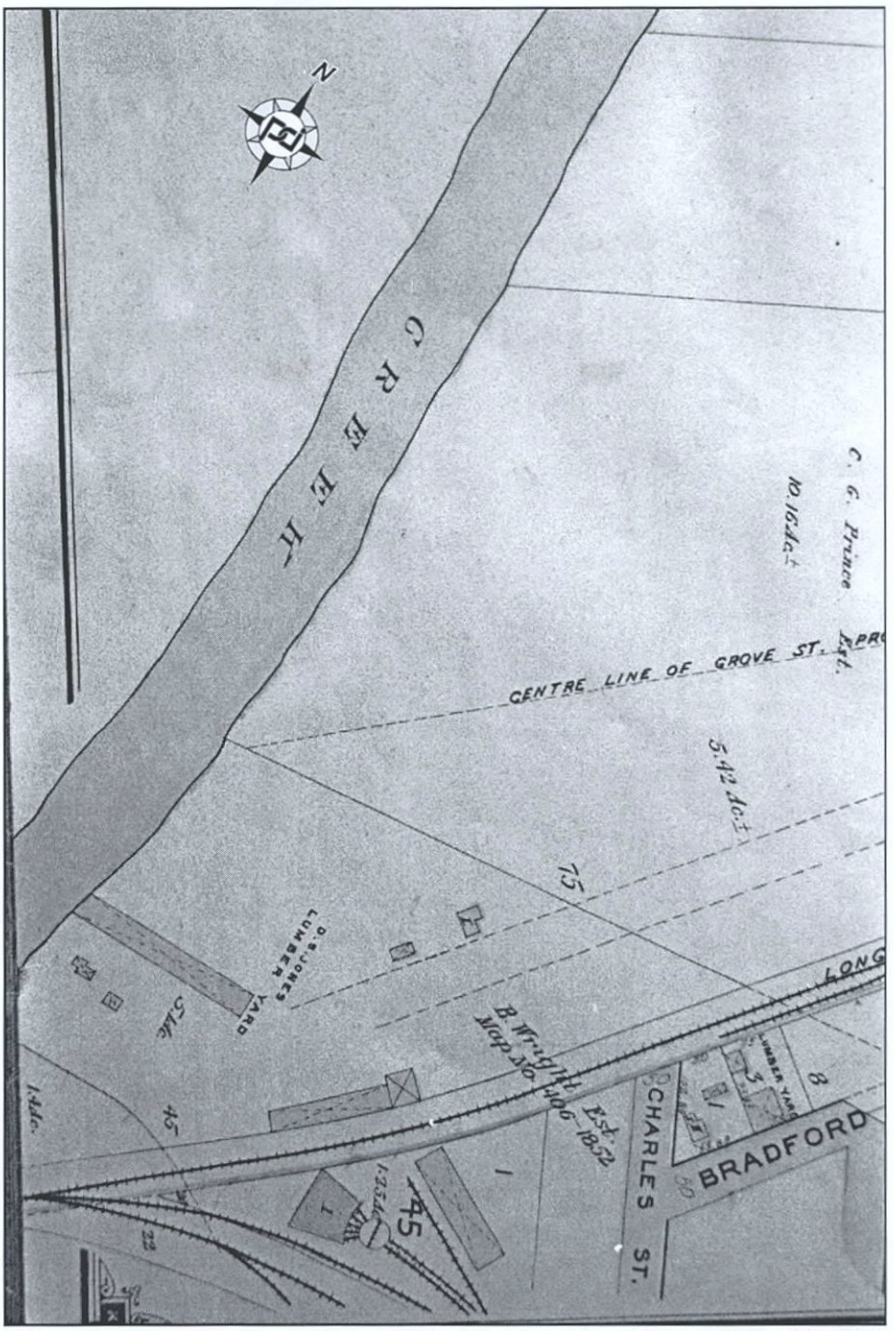

Figure 40. East bank of Flushing Creek north of LIRR crossing. APE in vicinity to Jones Lumberyard. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Ullitz 1904)*.

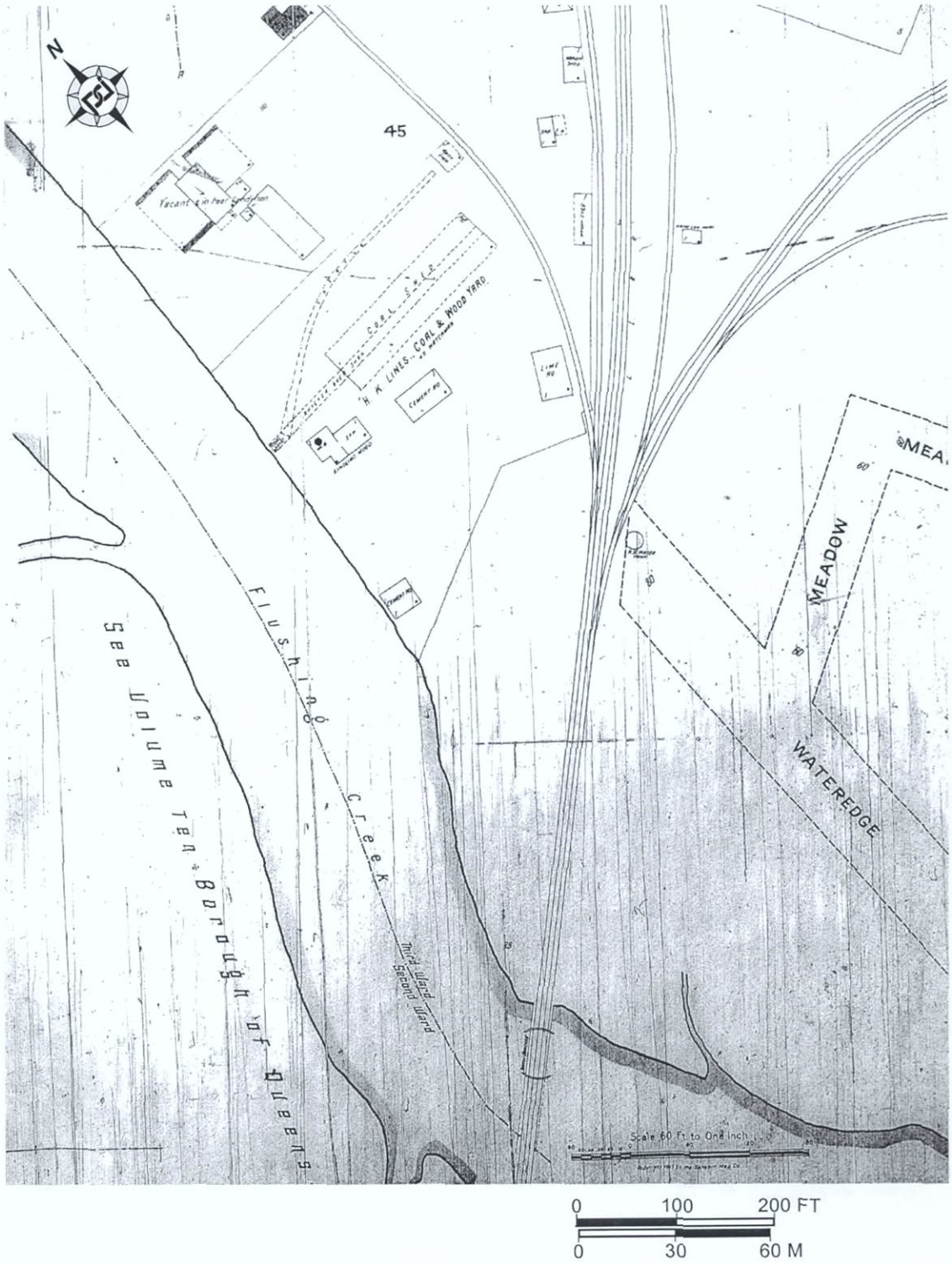

Figure 41. East bank of Flushing Creek north of LIRR crossing. APE in vicinity of H.K. Lines Coal & Wood Yard in 1917. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn 1917 Vol 11:15).*

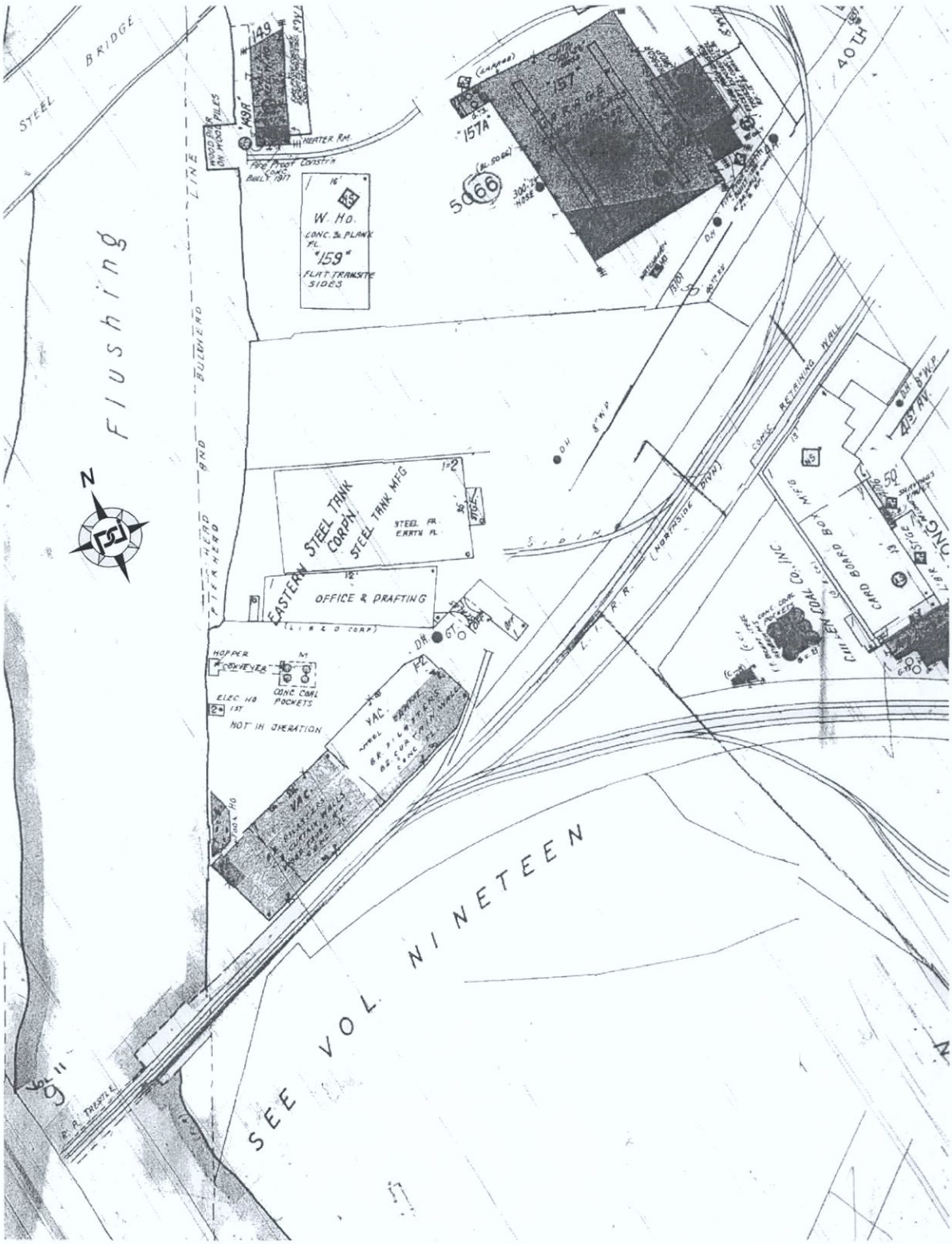

Figure 42. East bank of Flushing Creek (River) in vicinity of Roosevelt Avenue in 1951. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn Map Co. 1951:11:9).*

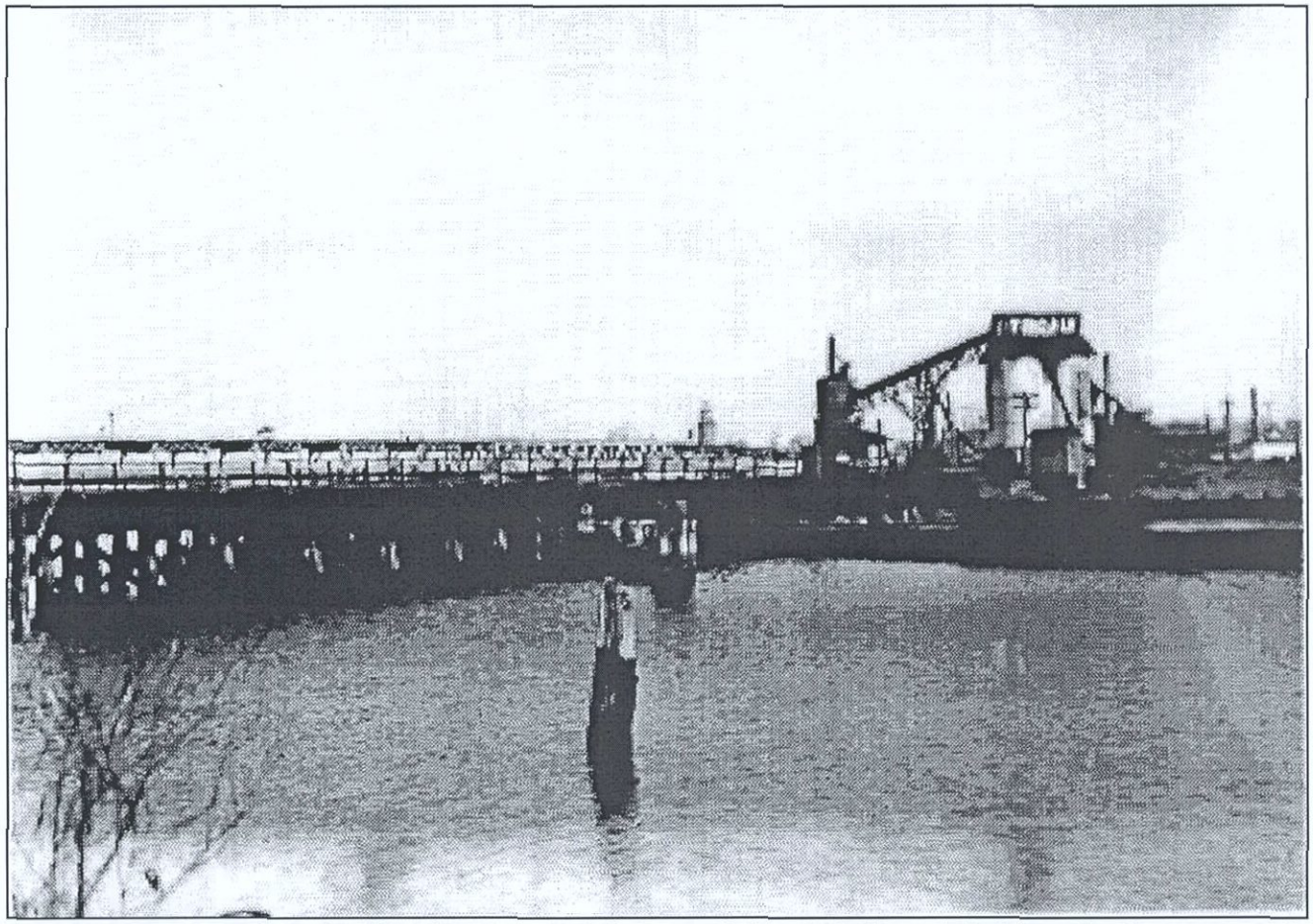

Figure 43. Loading facility (center right) Long Island Railroad Bridge (in foreground), and Roosevelt Avenue Bridge (in background) in 1938. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Queens Borough Public Library 1938)*.

Figure 44. NYSDEC outfall, east bank of Flushing Creek north of LIRR embankment, facing northeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

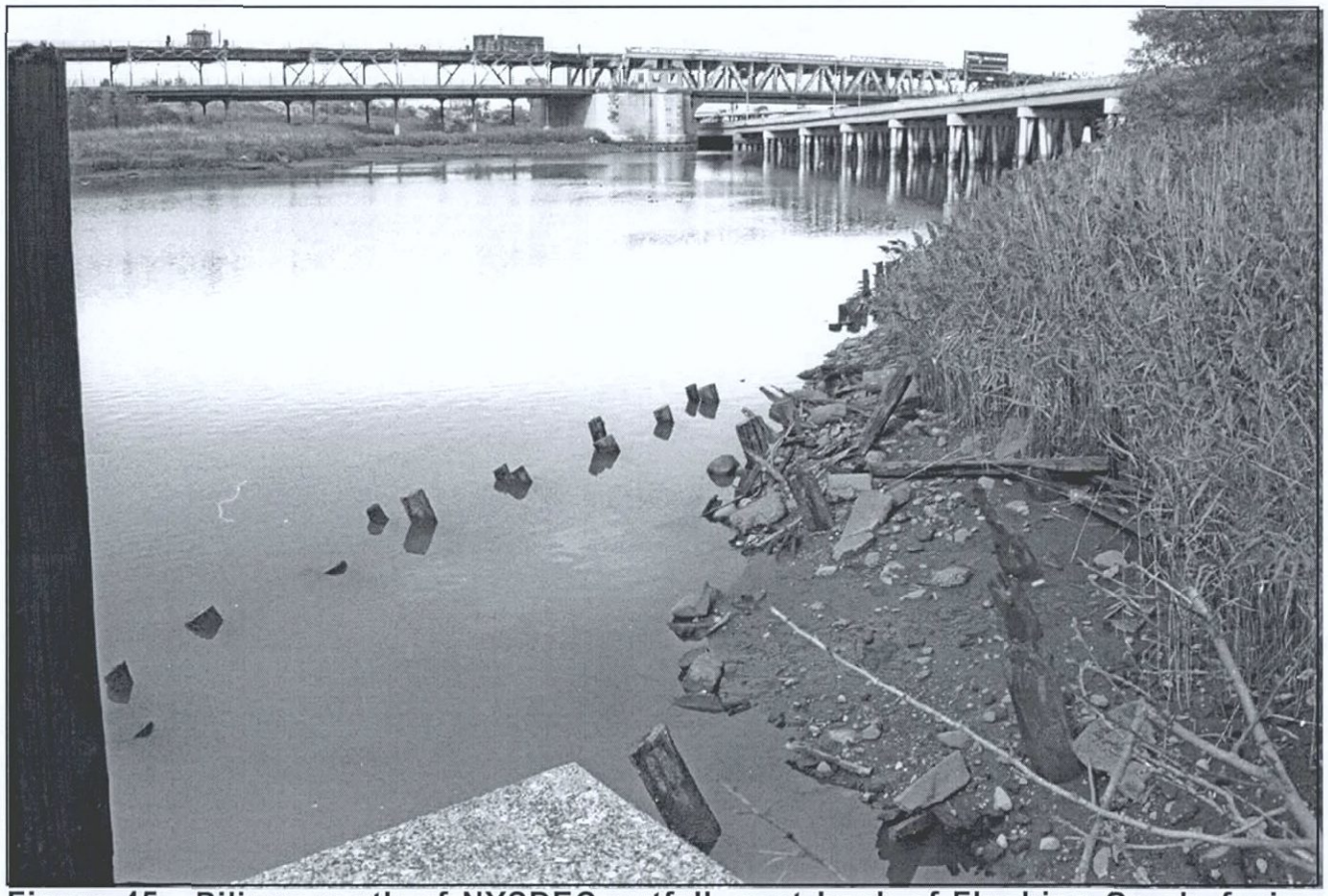

Figure 45. Pilings north of NYSDEC outfall, east bank of Flushing Creek, facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 46. Porpoise Bridge and outfall (*at center right*), facing south from LIRR embankment. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 47. Construction of tide gate and dam. Note elevation above marsh in background. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Flushing Meadow Improvement, 1937h:45)*.

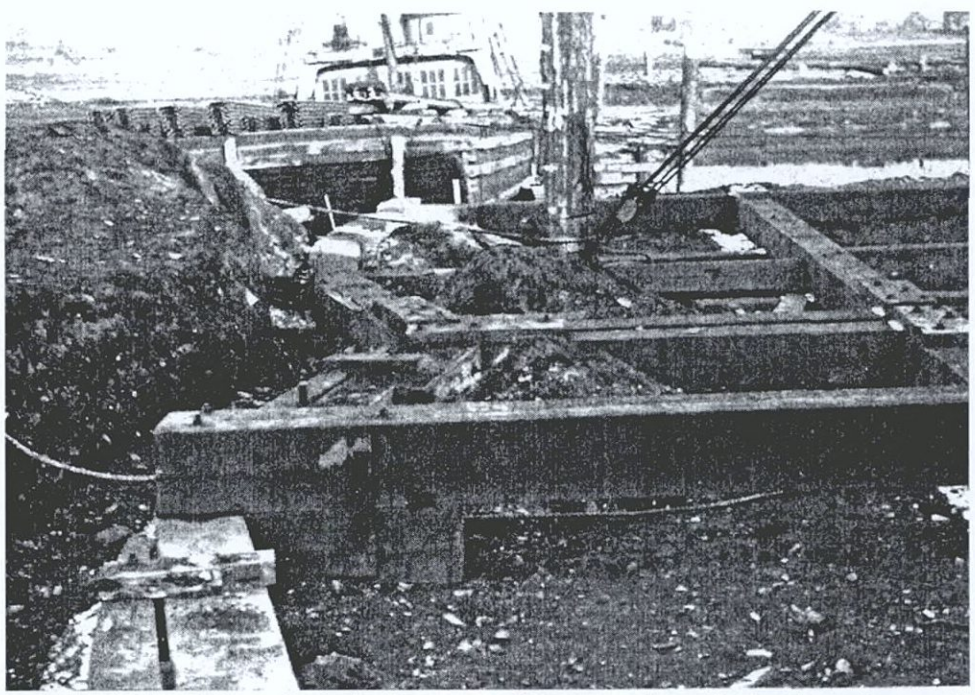

Figure 48. Flushing Creek Dam under construction showing cribbing. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Flushing Meadow Improvement 1937c:7)*.

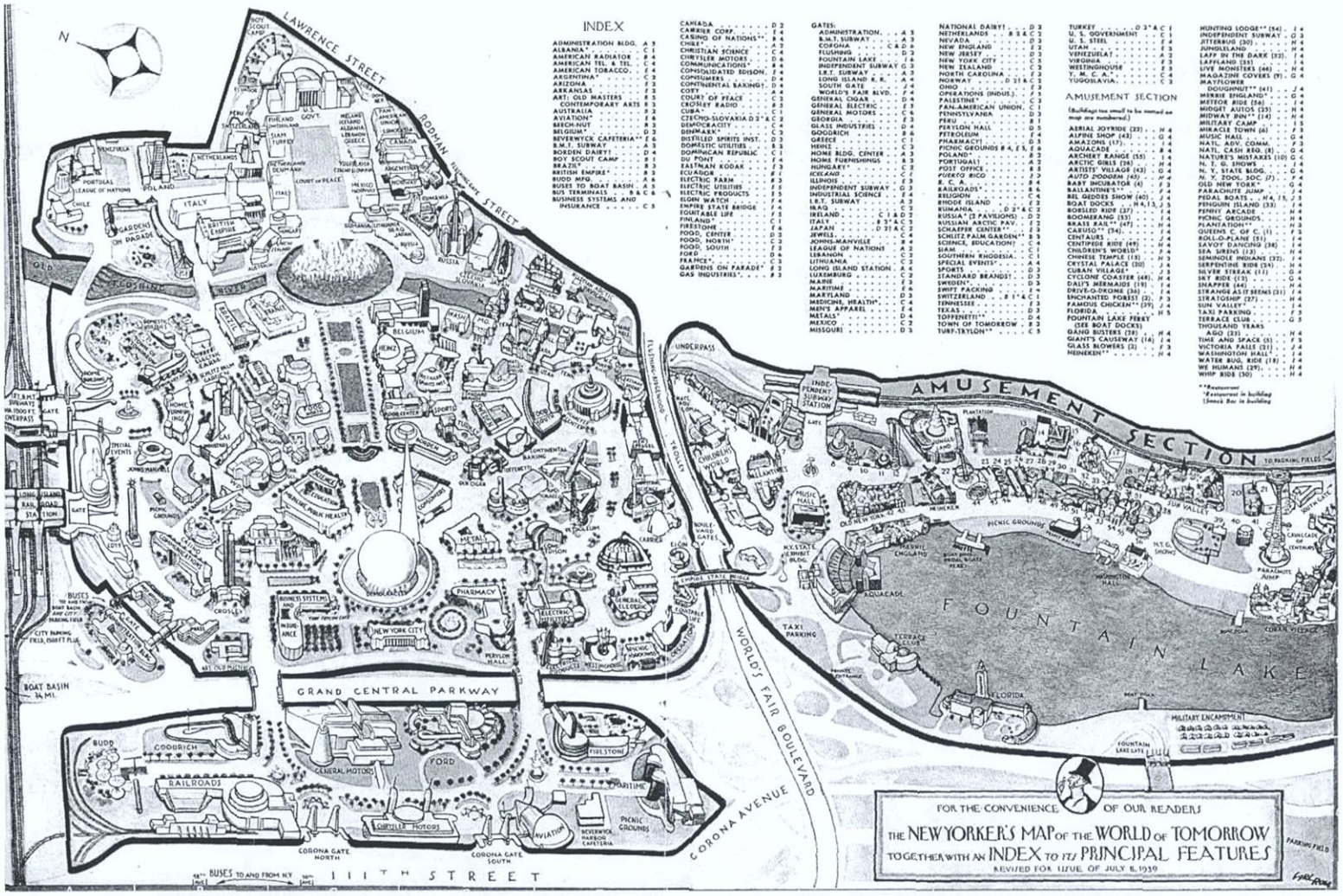

Figure 49. 1939 World's Fair Map. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(New Yorker 1939)*.

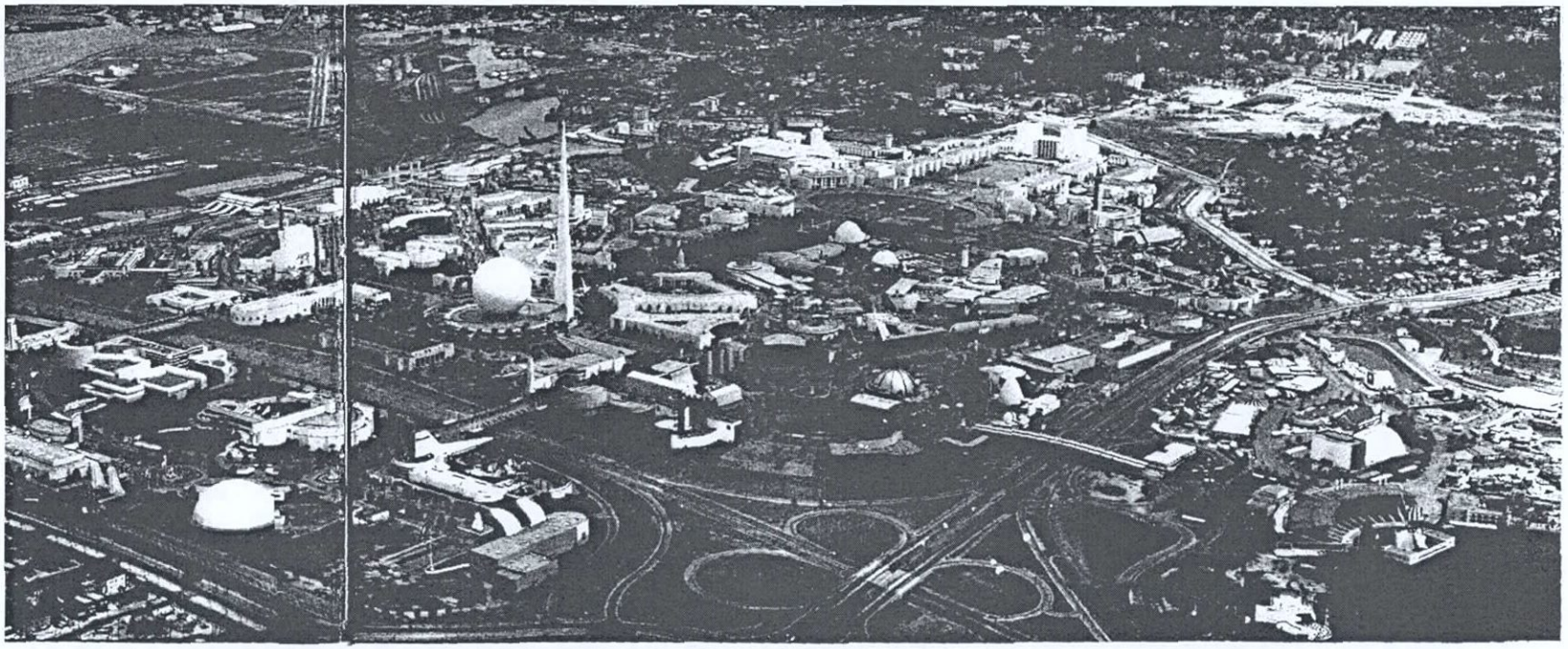

Figure 50. Aerial photograph of 1939 World's Fair. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Clarke & Rapuano et al. 1960)*.

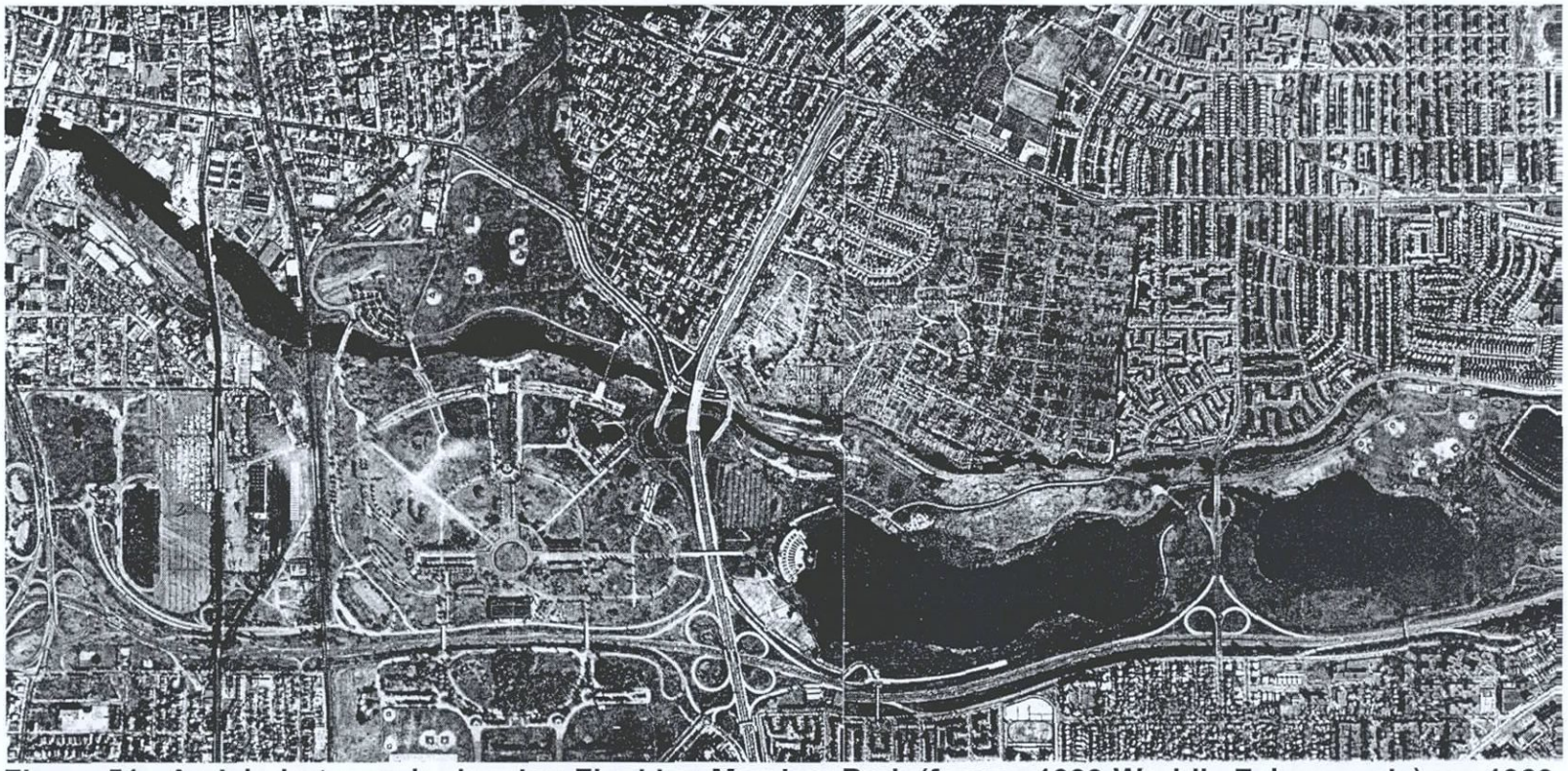

Figure 51. Aerial photograph showing Flushing Meadow Park (former 1939 World's Fairgrounds) ca. 1960. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Clarke & Rapuano et al. 1960).*

Figure 52. Culverts carrying Flushing Creek beneath Flushing Meadow Park, facing north from southern end of daylighting project area. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 53. Culverts entering south side of Flushing Meadow Park, facing southeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 54. Bridge over Flushing Creek immediately north of Long Island Expressway Park, facing south from southern end of Daylighting project area *(Pickman 2002).*

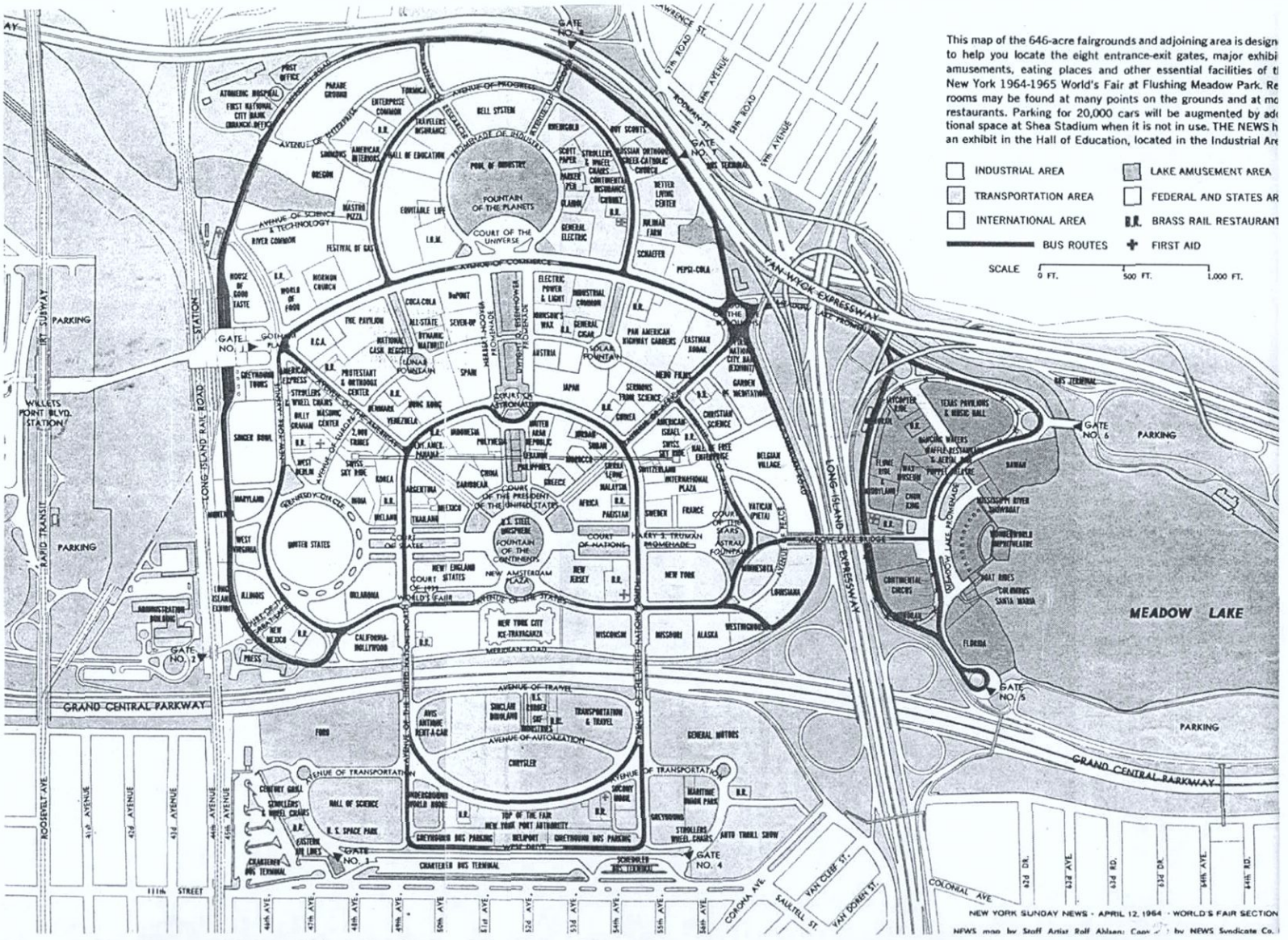

Figure 55. Map of 1964 World's Fair. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Ahlsen 1964).*

Figure 56. Aerial photograph showing Flushing Meadow Park layout, Roosevelt Avenue (left) to the Long Island Expressway interchange (right). Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Aerographics 1998).*

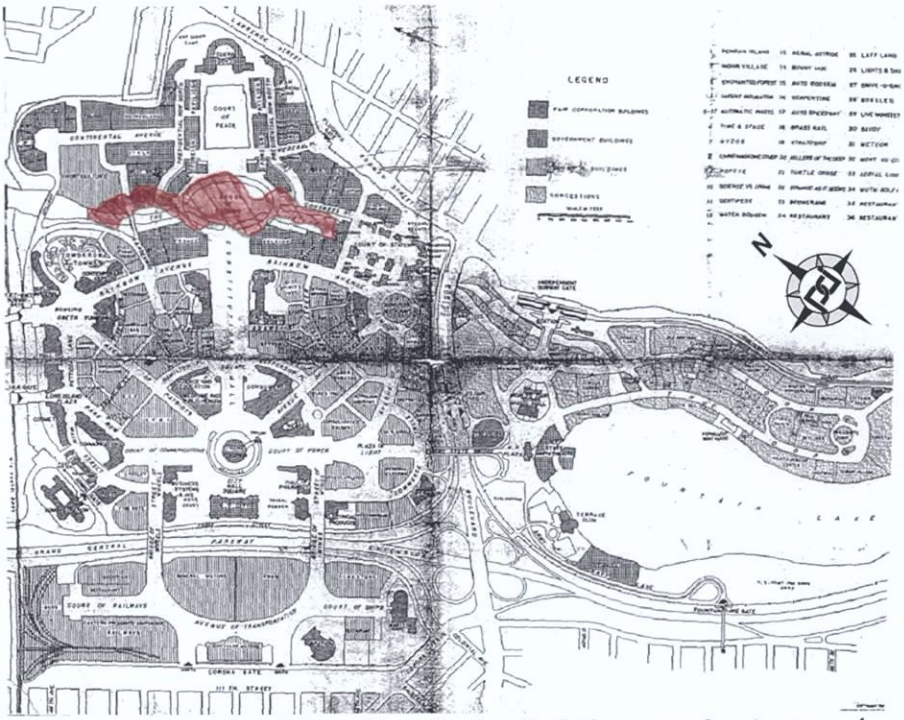

Figure 57a. Flushing Creek daylighting project area (see Figure 3c) shown (shaded area) on 1939 World's Fair Map. Flushing Bay Ecosystem Restoration Project, Queens County, New York.

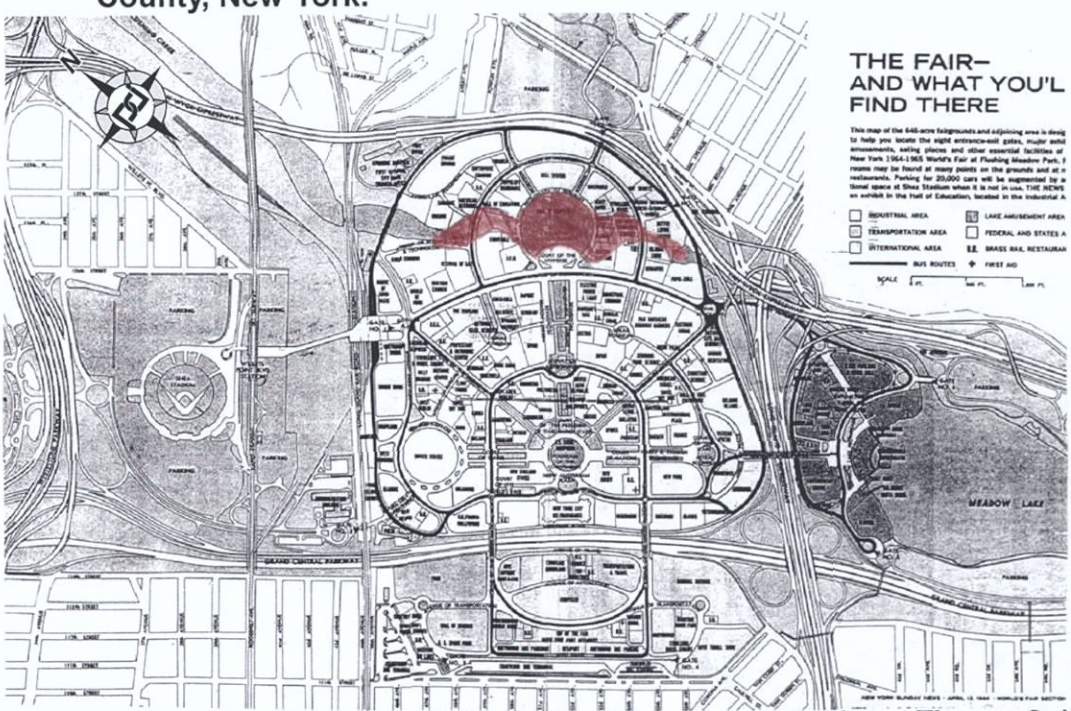

Figure 57b. Flushing Creek daylighting project area (see Figure 3c) shown (shaded area) on 1964 World's Fair Map (Figure 55). Flushing Bay Ecosystem Restoration Project, Queens County, New York.

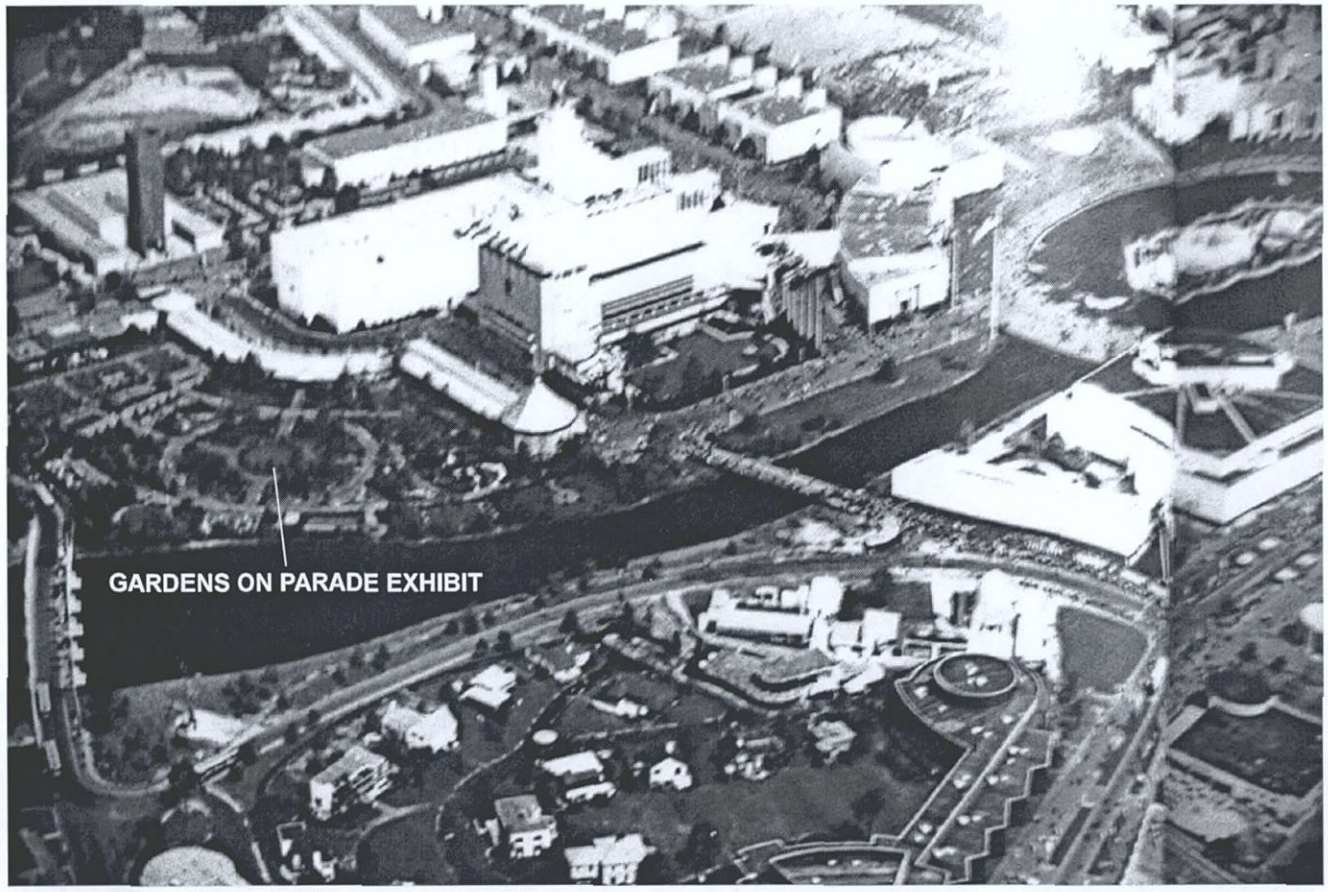

Figure 58. ***Aerial view of 1939 World's Fair Gardens on Parade exhibit at center left, British Pavilion at center, facing east. Flushing Bay Ecosystem Restoration Project, Queens County, New York*** *(Wurts 1977).*

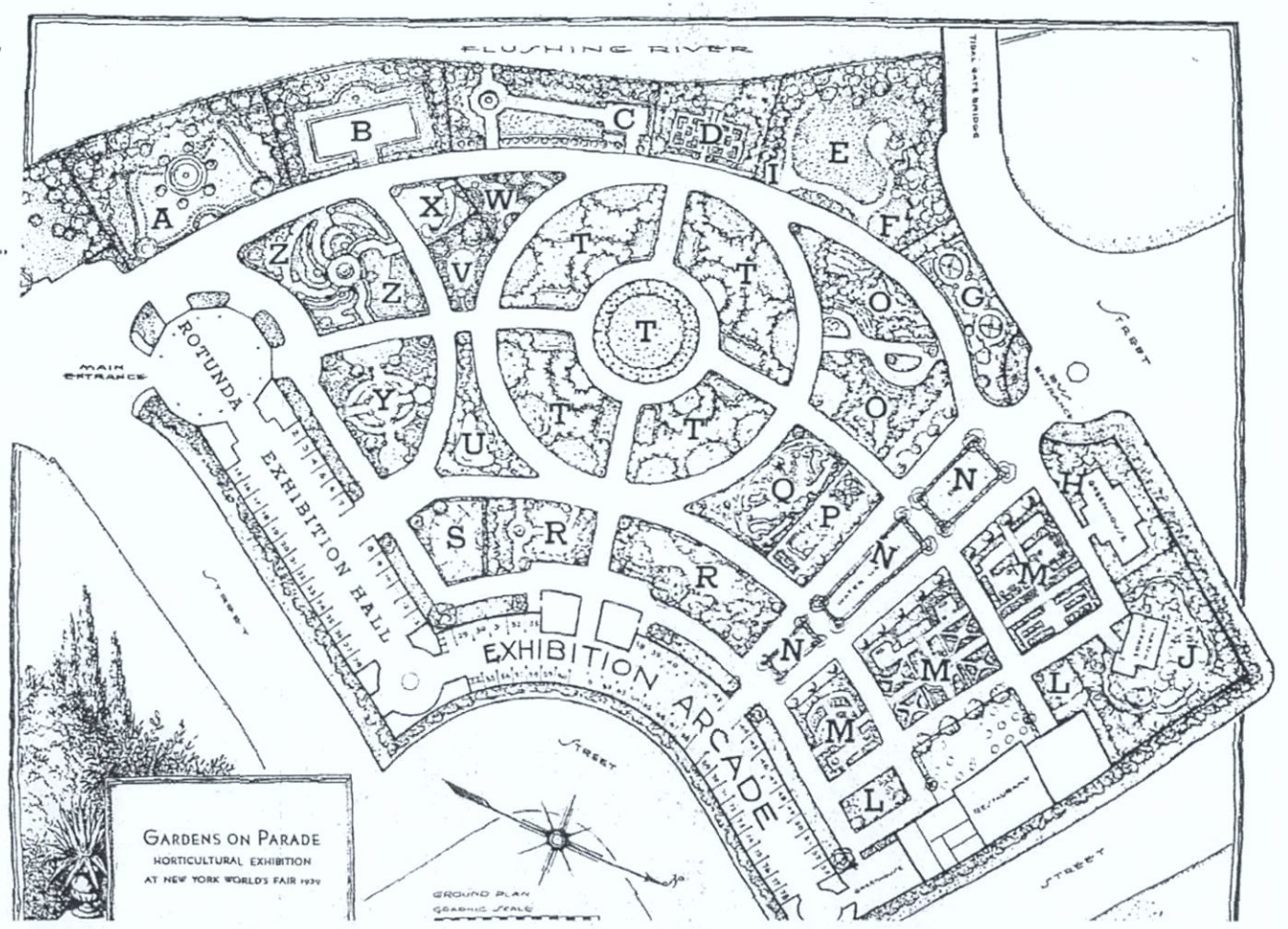

Figure 59. Plan of Gardens on Parade exhibit. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Hortus Inc. 1939).*

Figure 60. Aerial view of 1939 Worlds Fair showing Lagoon of Nations, facing east. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Wurts 1977).*

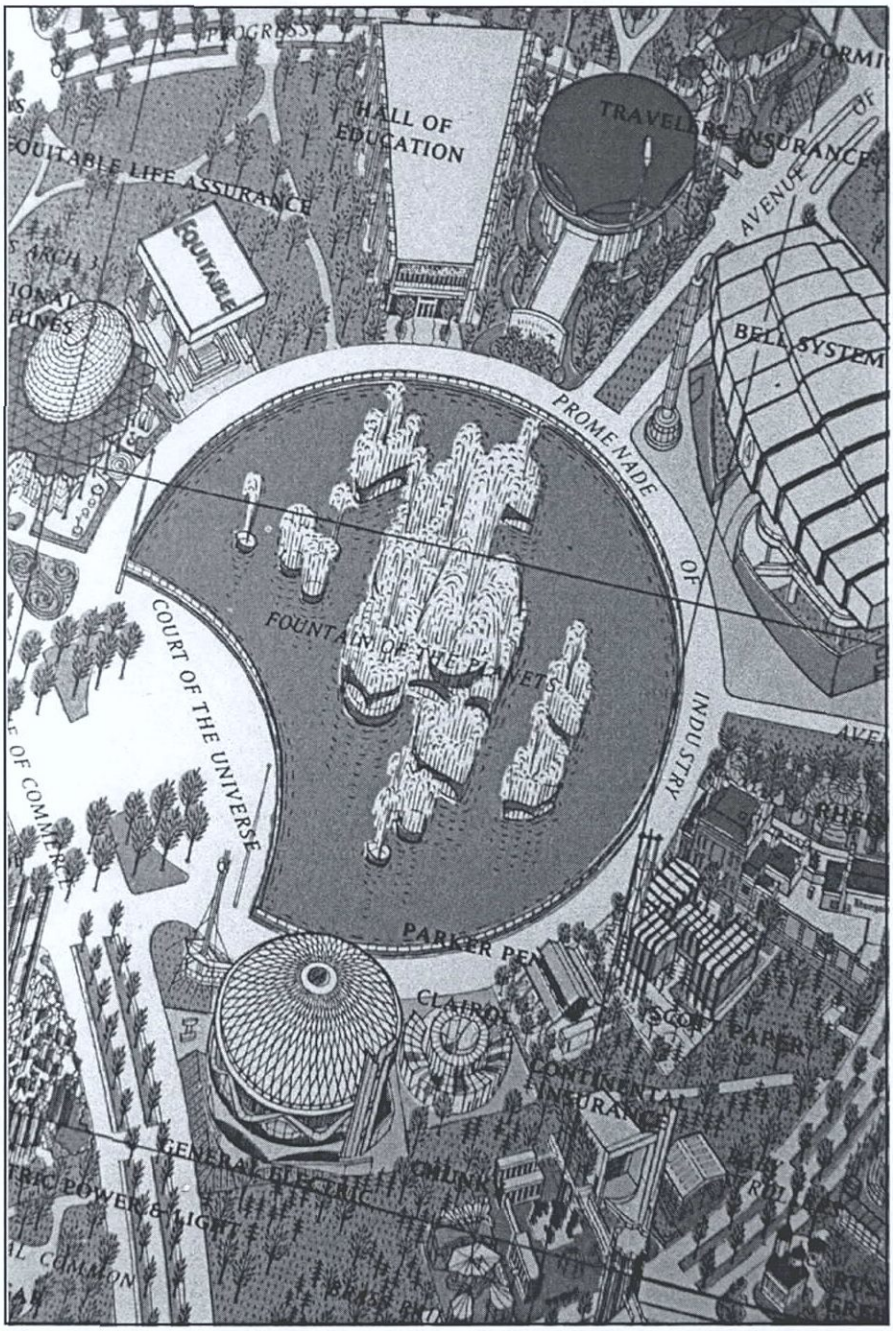

Figure 61. Detail of Fountain of the Planets and vicinity at the 1964 World's Fair. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bollman 1964).*

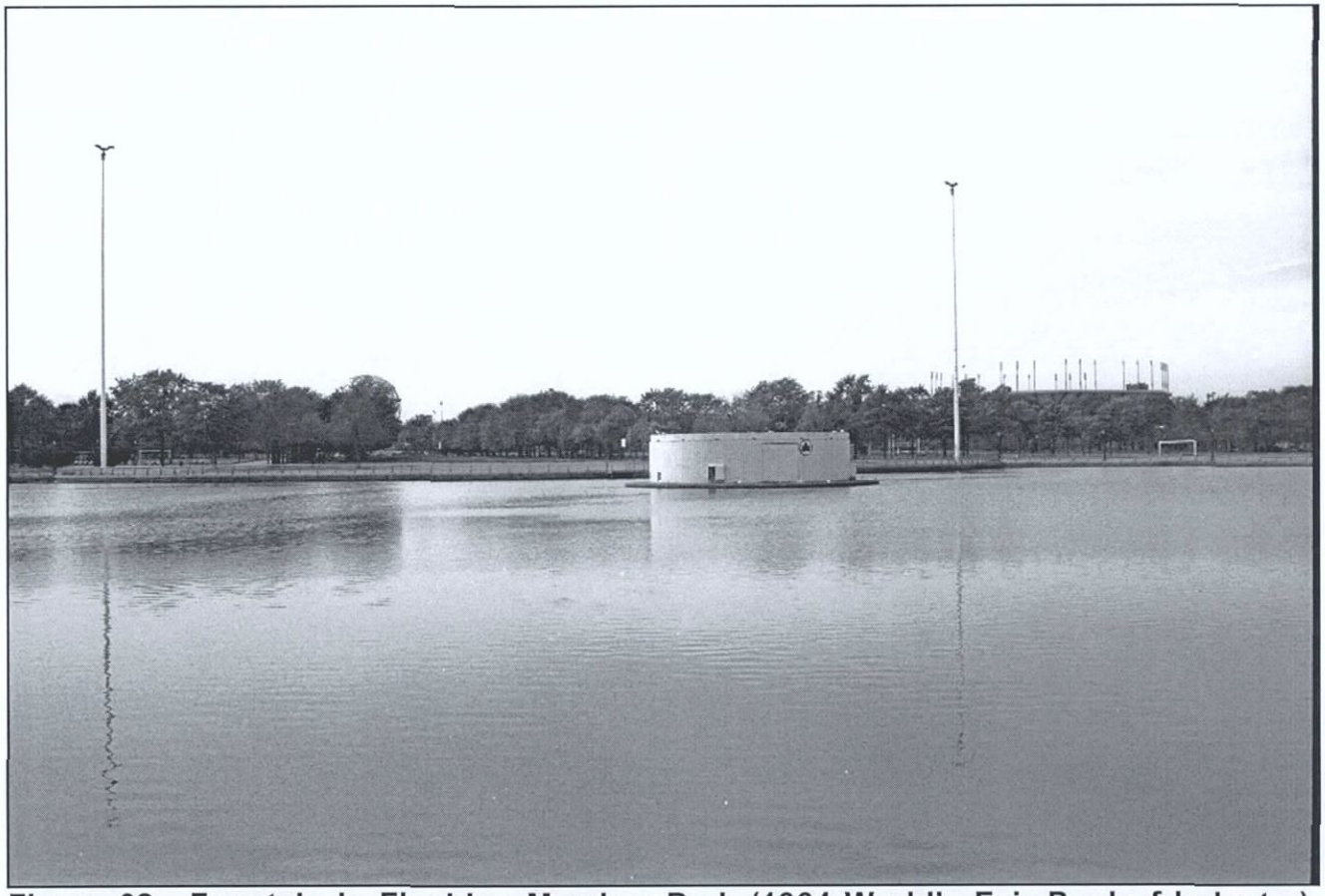

Figure 62. Fountain in Flushing Meadow Park (1964 World's Fair Pool of Industry), facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 63. General Electric Pavilion, 1964 World's Fair. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bletter 1989)*.

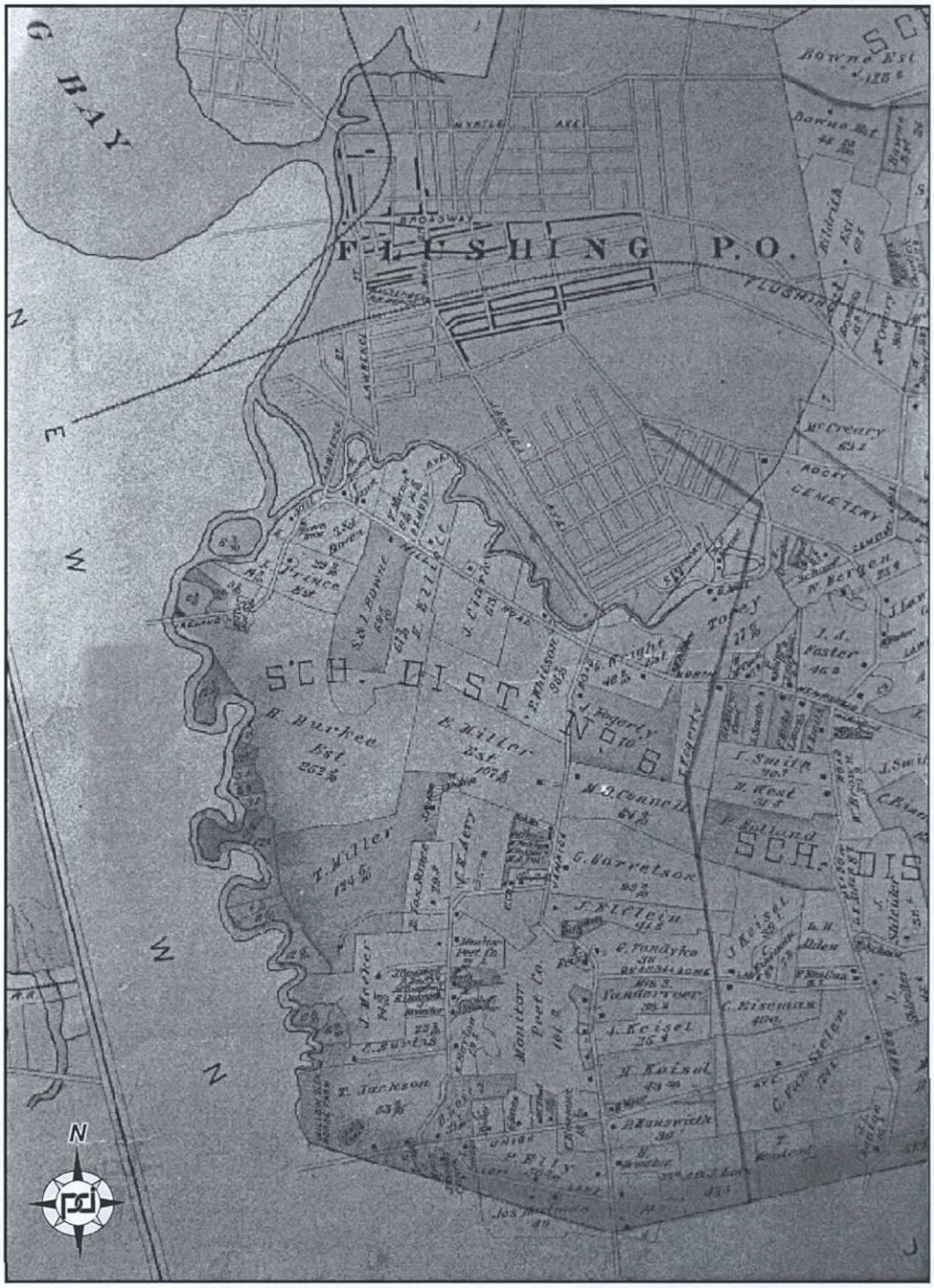

Figure 64. East side of Flushing Creek in 1891. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Wolverton 1891:Plate 29).*

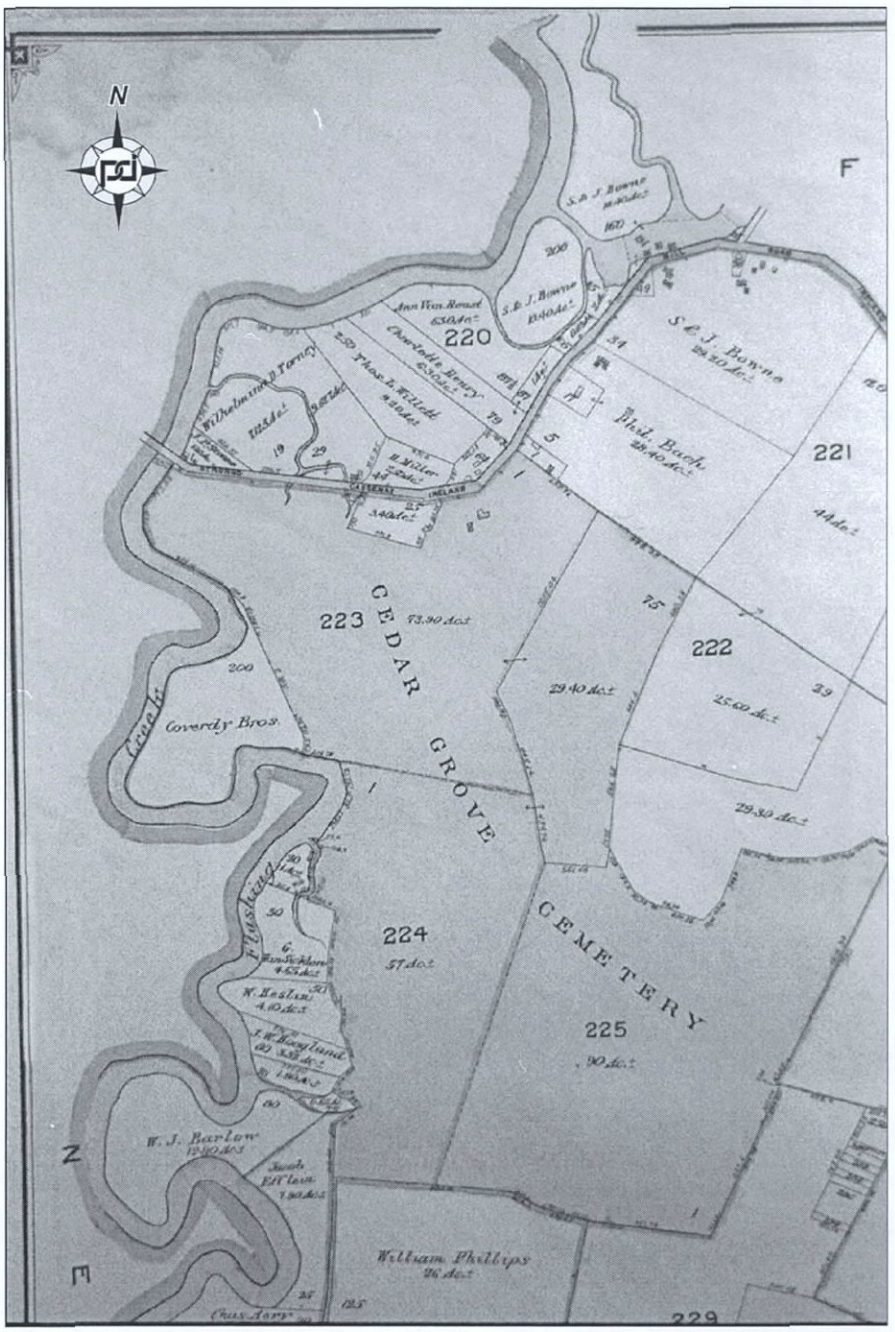

Figure 65. Flushing Creek in 1904. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Hyde 1904: Plate19).*

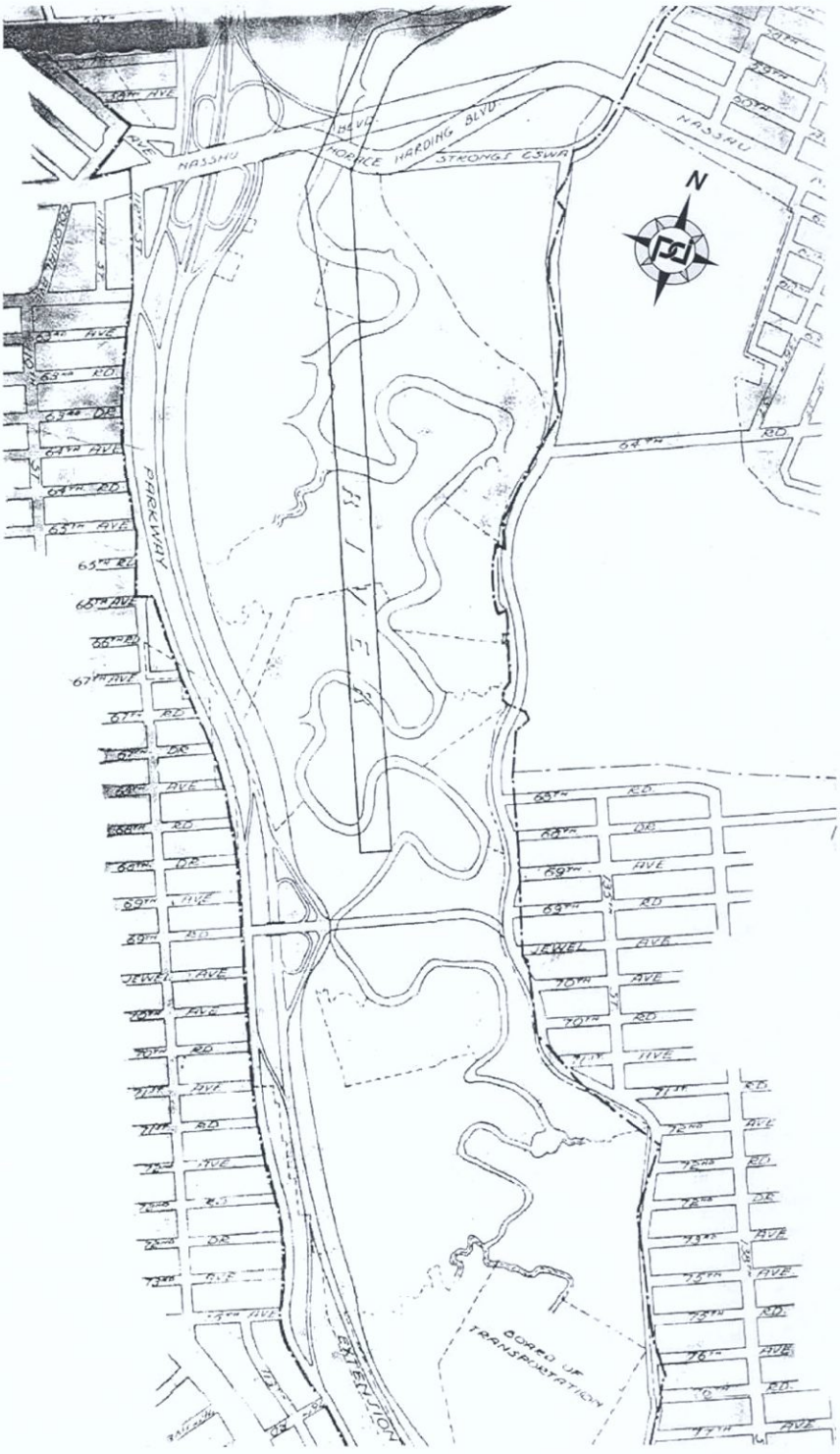

Figure 66. Park land around Flushing Creek (River) in 1935. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(New York City Department of Parks 1935)*.

Figure 67. Construction of Meadow Lake Outlet. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(World's Fair 1939/40 Corporation 1937b).*

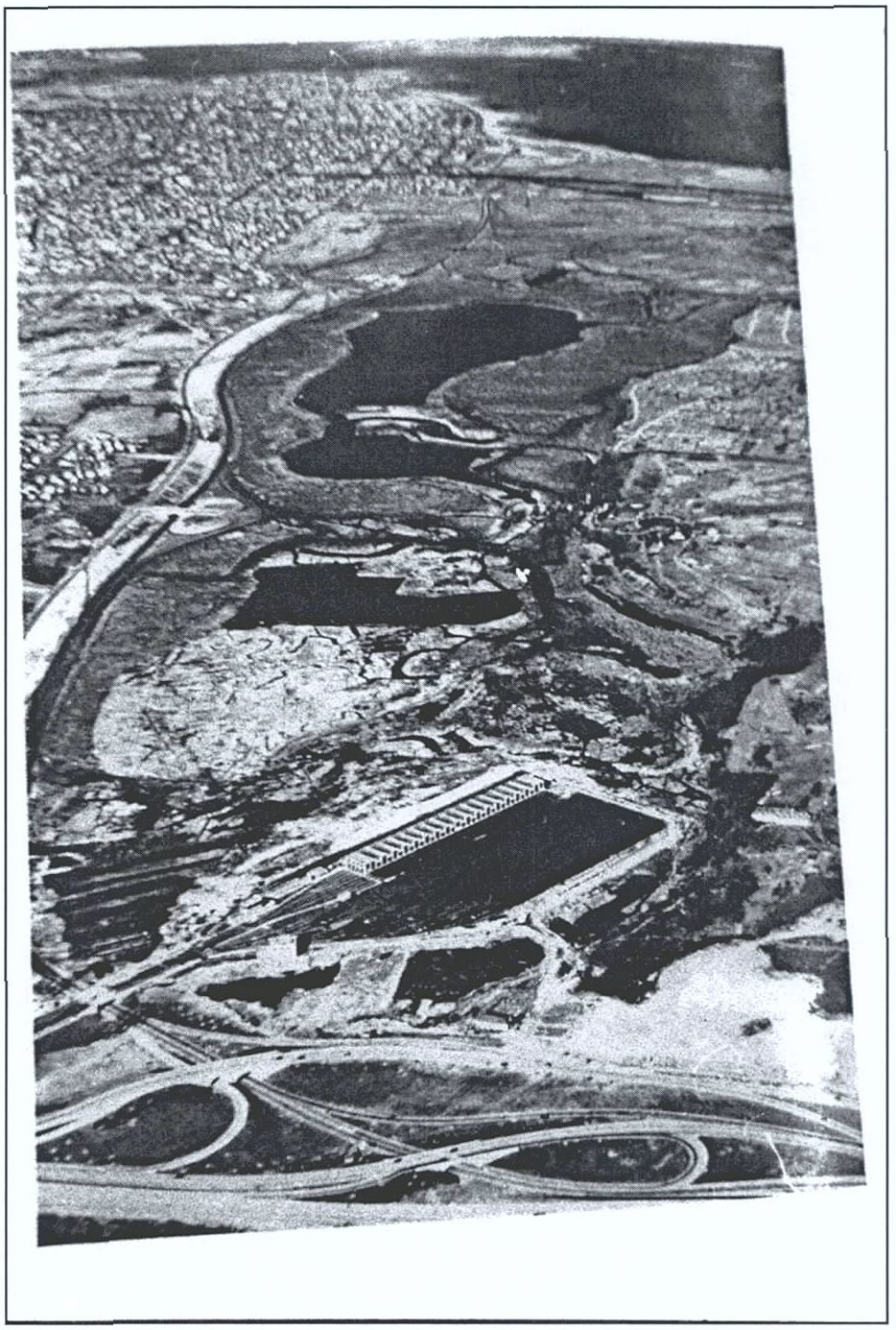

Figure 68. Aerial Photograph showing construction of Meadow and Willow Lakes. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(FMI 1937b).*

Figure 69. Aerial photograph showing southern portion of Flushing Meadows. Note Horse Brook at upper left. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Fairchild 1924: Sheet 14a).*

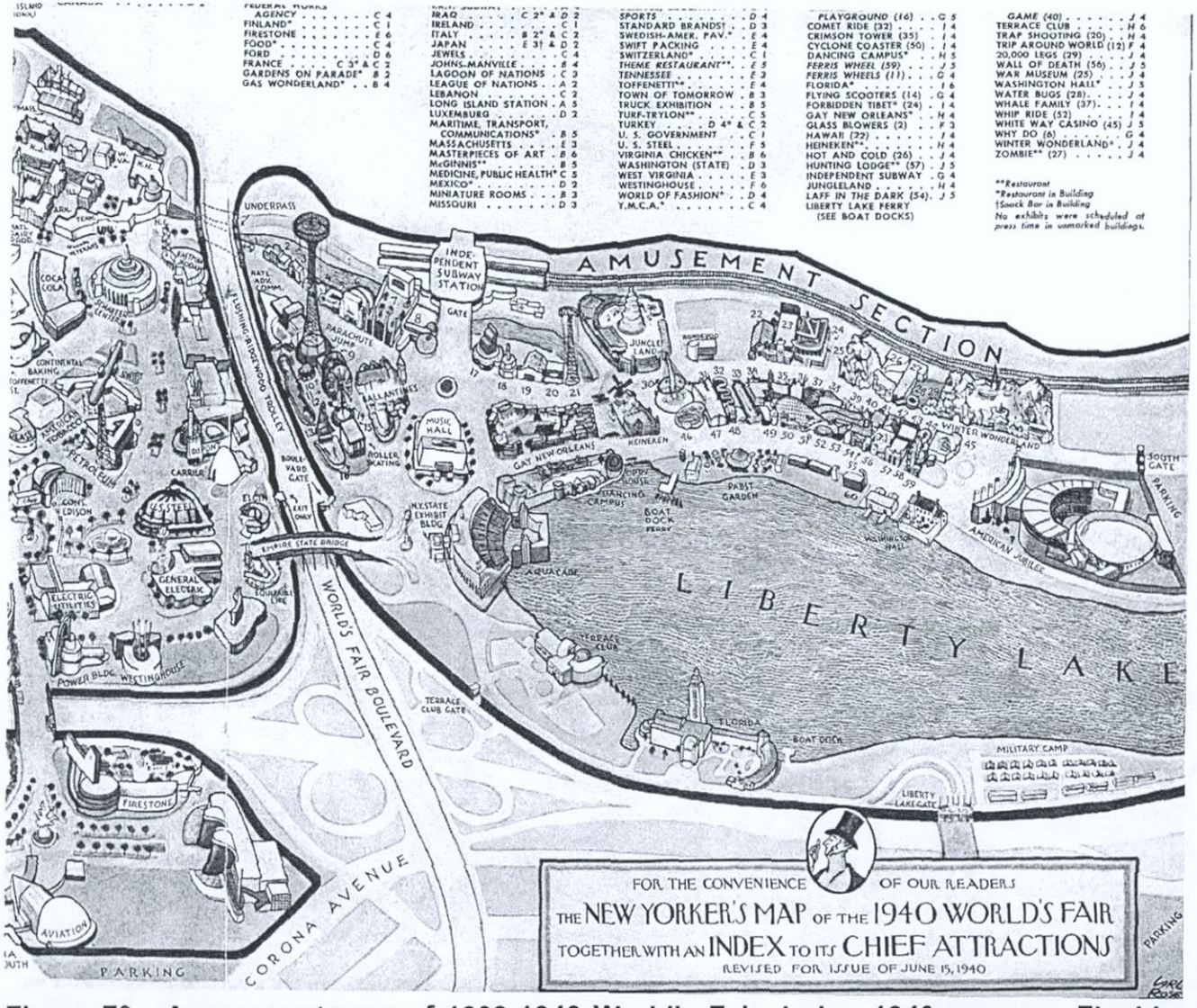

Figure 70. Amusement area of 1939-1940 World's Fair during 1940 season. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(New Yorker 1940)*.

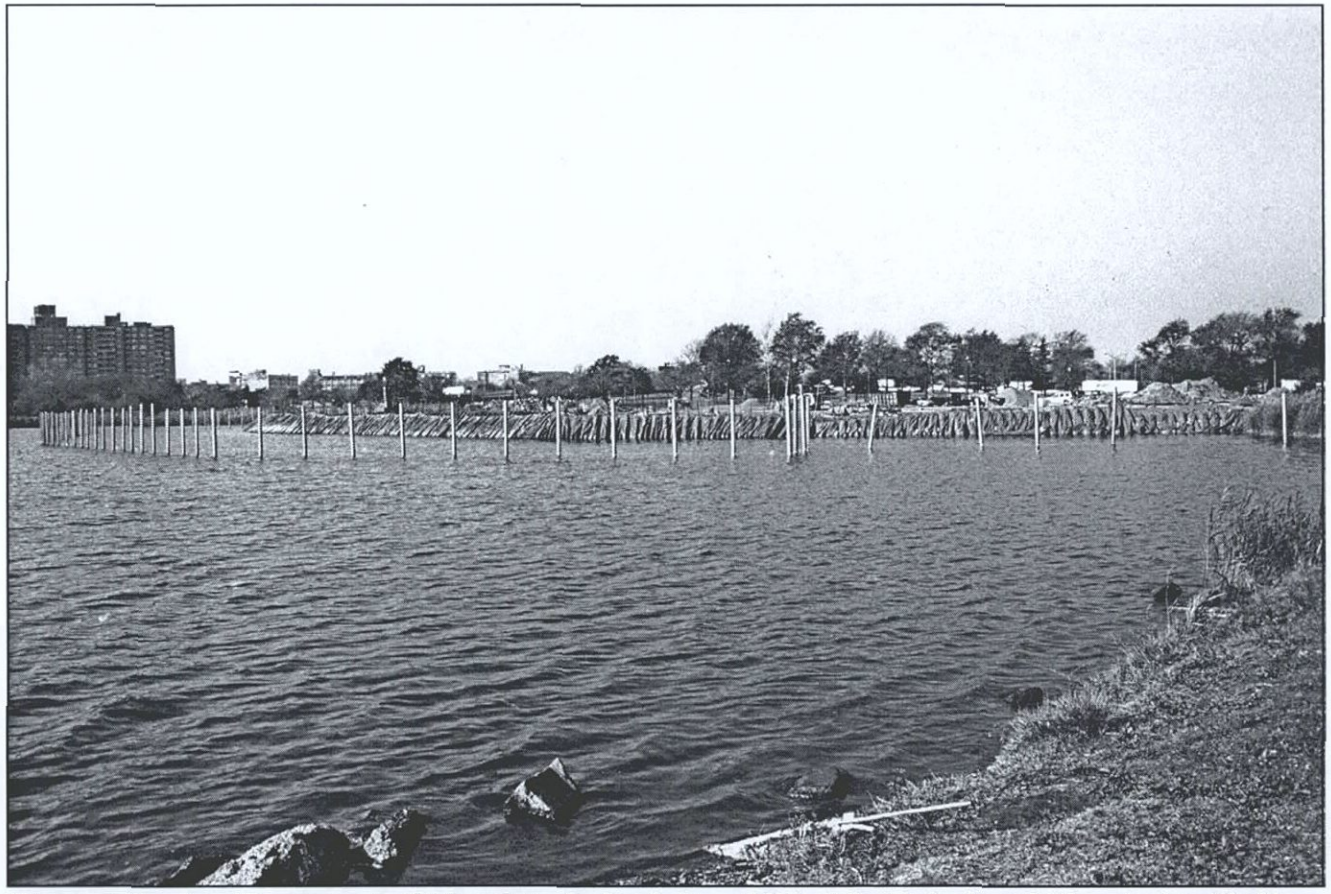

Figure 71. Northern end of Meadow Lake (site of World's Fair Amphitheater) with New Pavilion under construction, facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

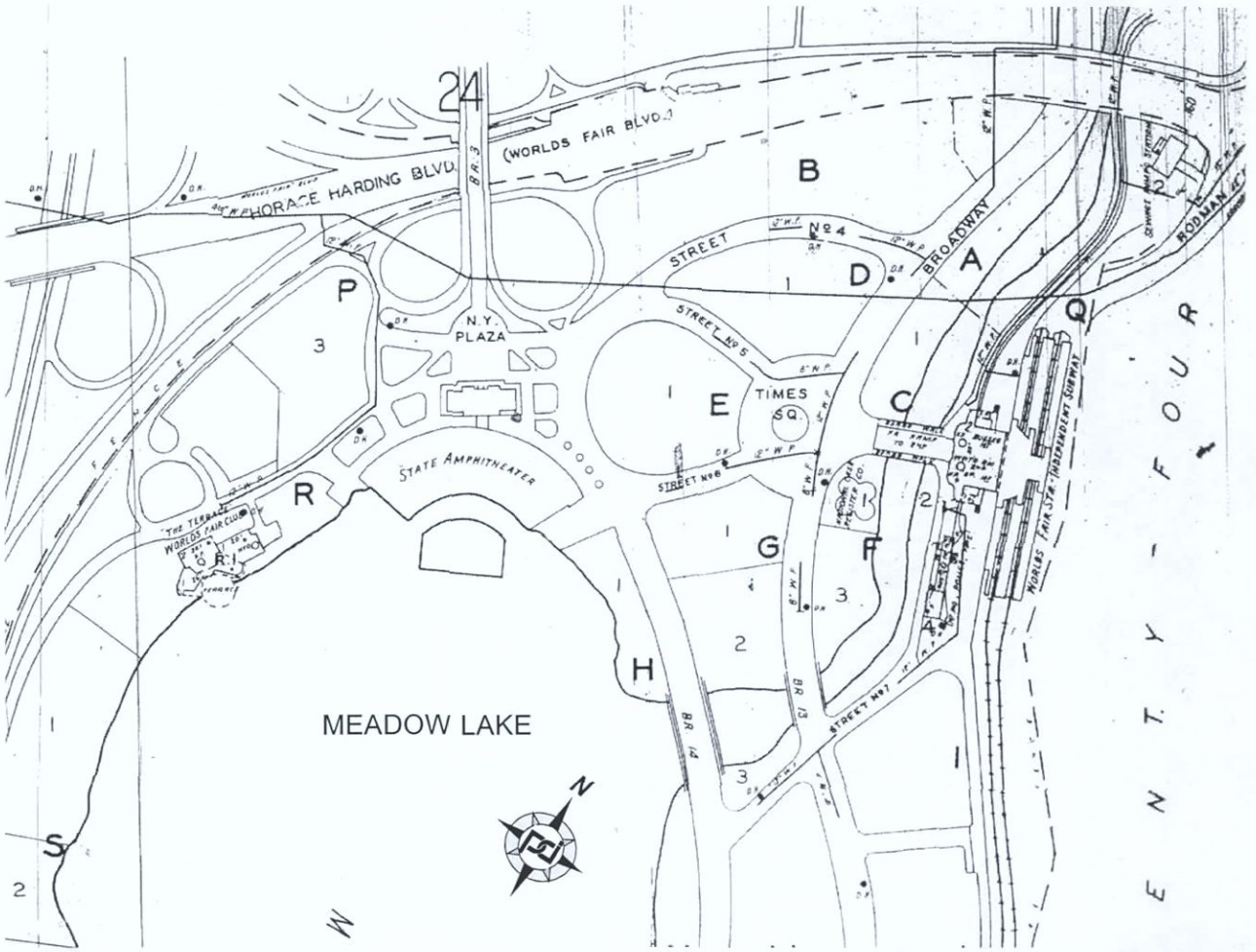

Figure 72. Northern end of Meadow Lake in 1951. Note bridges over creek at right. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn 1951 Vol. 19:25)*.

Figure 73. Bridge over Meadow Lake outlet stream, facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001)*.

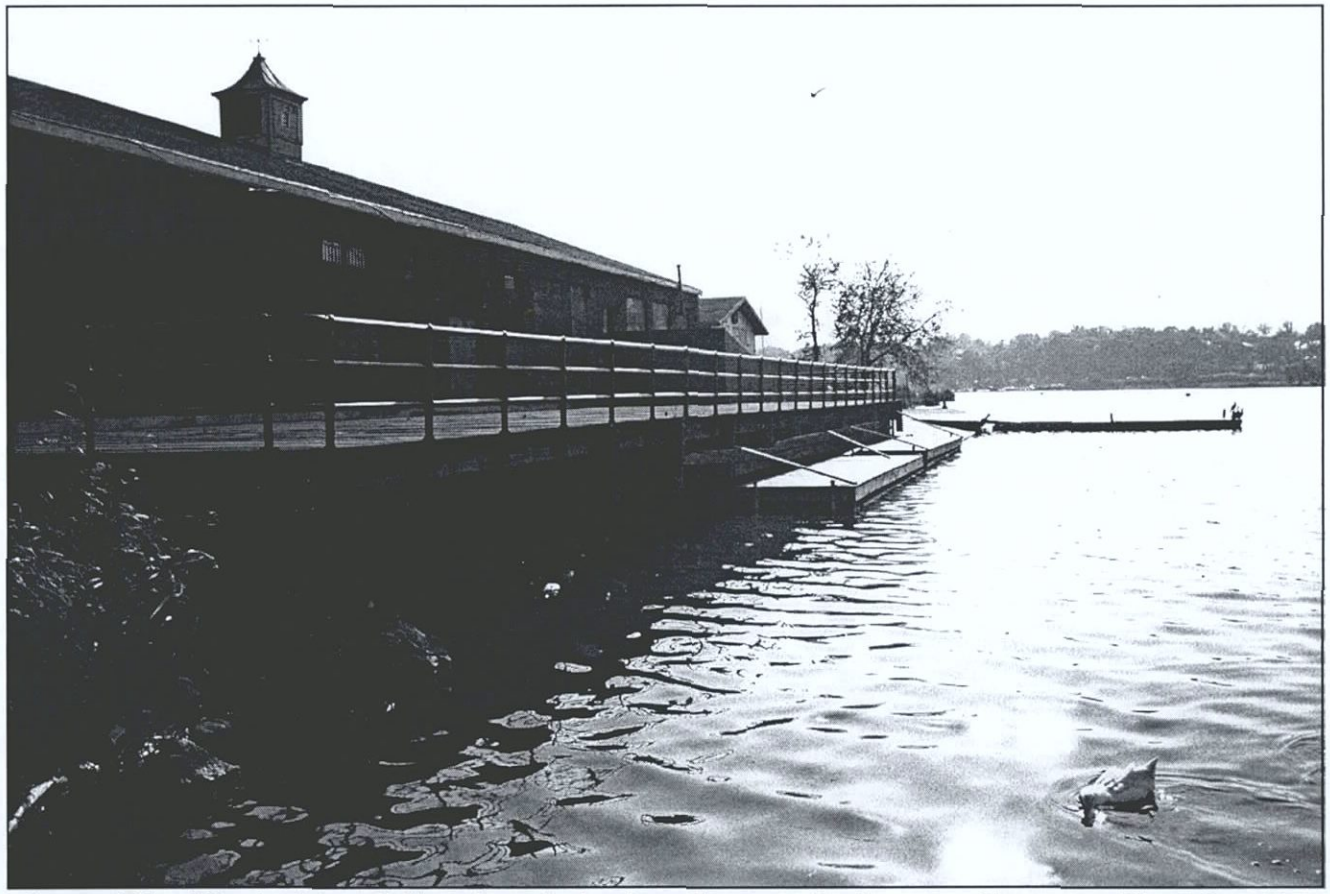

Figure 74. West side of Meadow Lake boathouse, facing southwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

Figure 75. Remains of wooden wharf at the northwestern end of Willow Lake, facing northeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

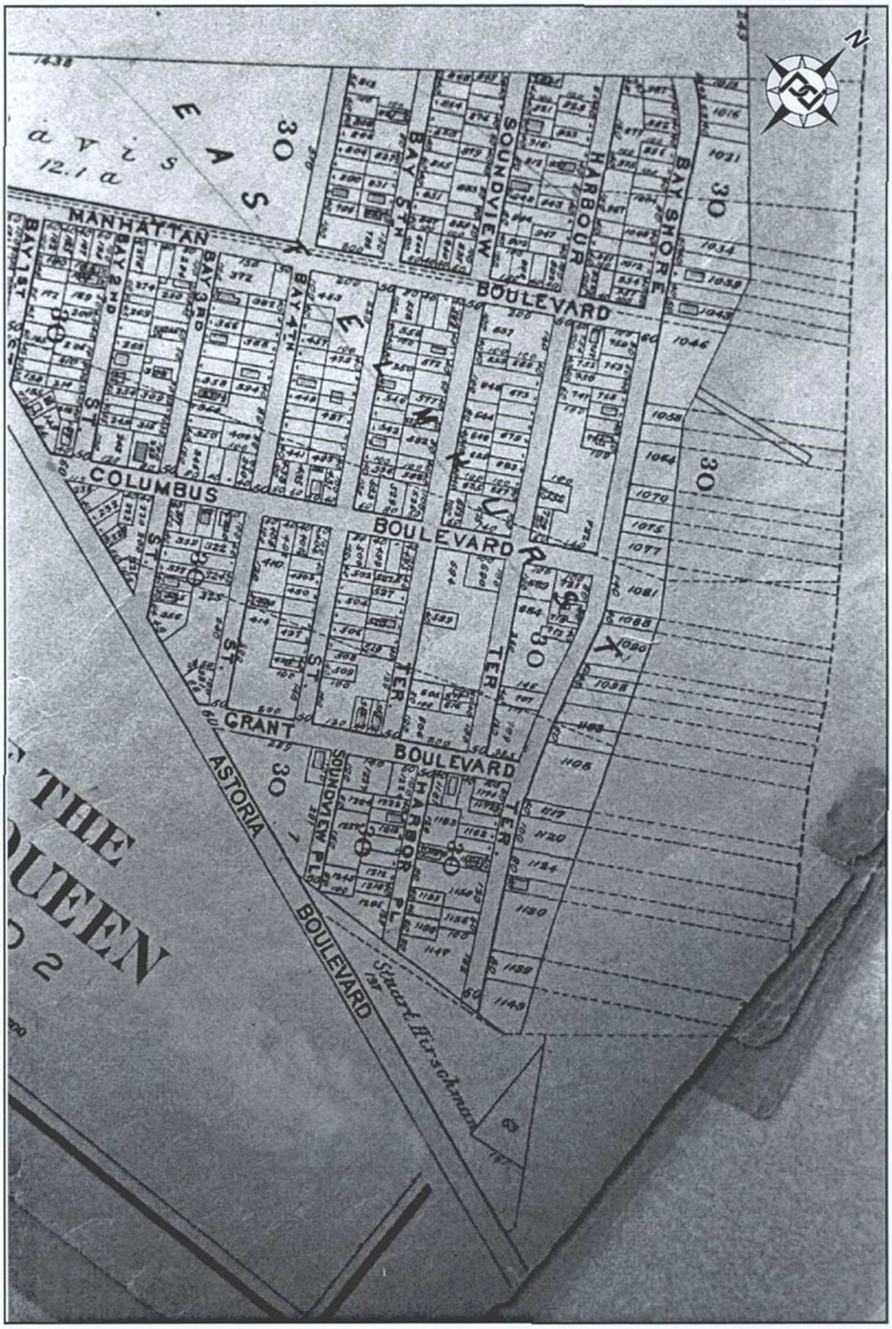

Figure 76. Portion of west shore of Flushing Bay. Note Manhattan Boulevard is the present 27th Avenue and Bay Shore Terrace is now *Ditmars* Boulevard. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bromley 1909)*.

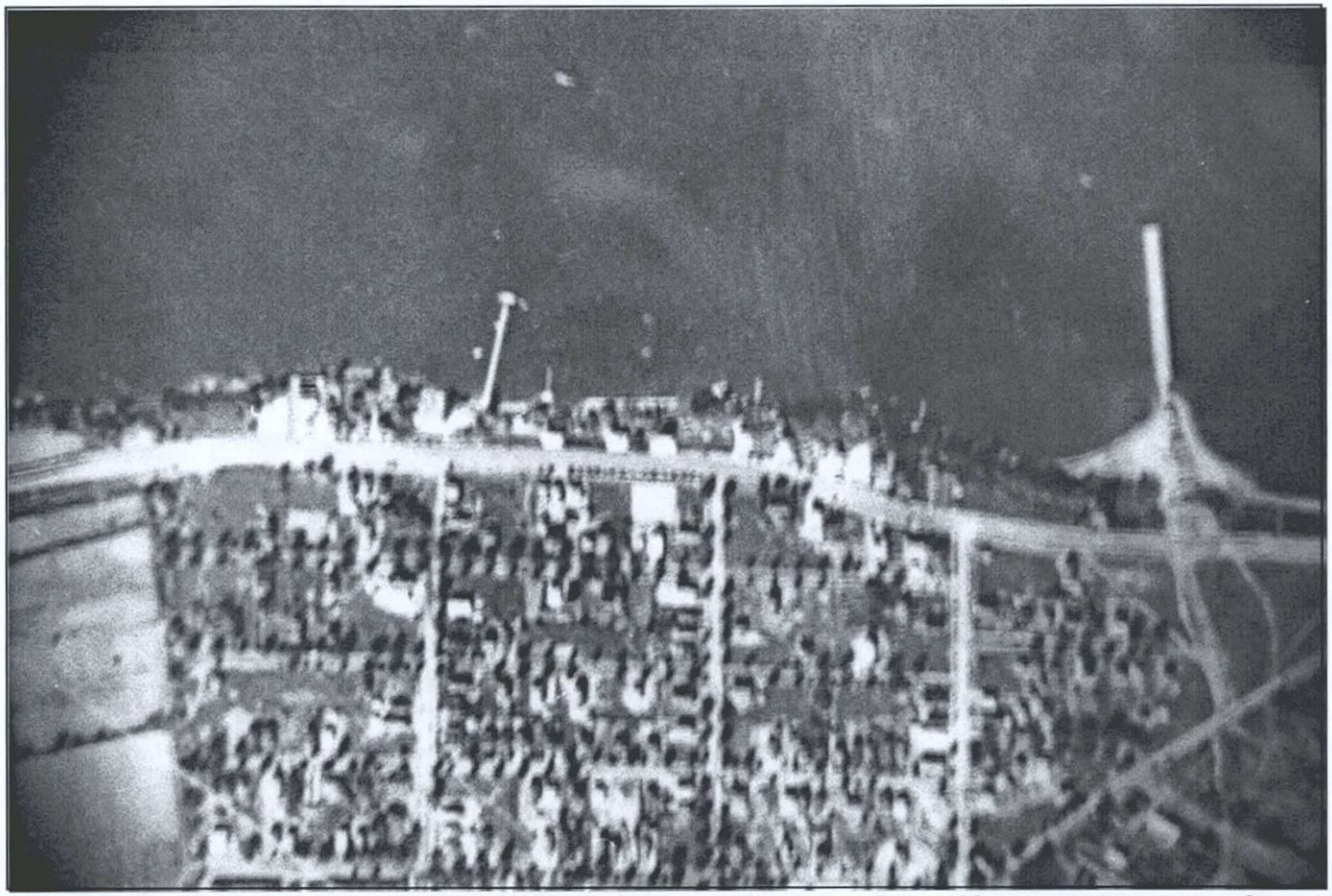

Figure 77. Aerial Photograph of West Shore of Flushing Bay. Note: street near pier at left is the present 27th Avenue. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Fairchild 1924: Sheet 10a)*

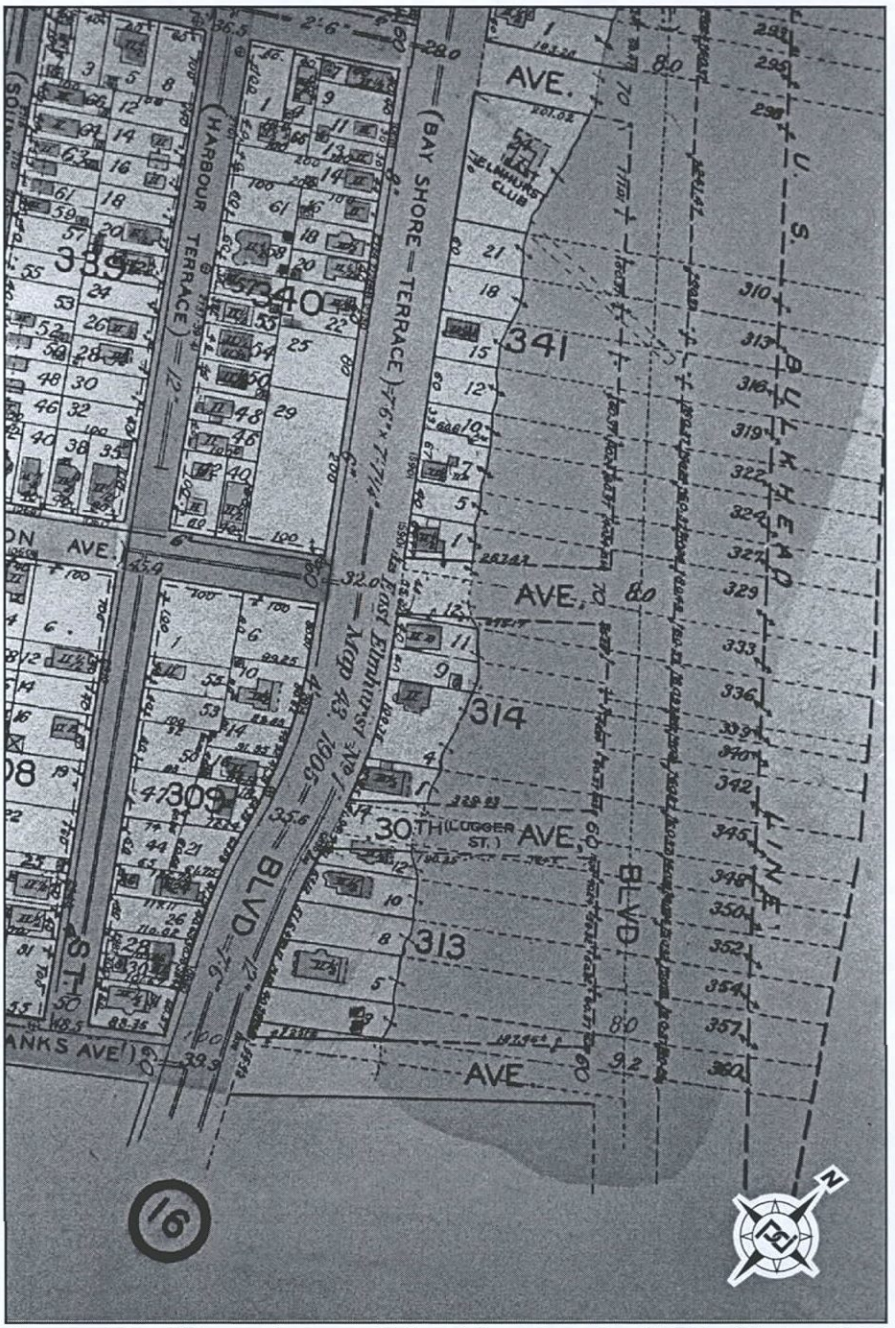

Figure 78. West shore of Flushing Bay in 1927. Note: 27th Avenue is street at top. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Belcher Hyde 1927: Plate 10)*.

Figure 79. Stone wall and steel bulkhead in western portion of LaGuardia Airport South Shore, facing west. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001)*.

Figure 80. Possible remains of flushing bay dike (left center), southern end of LaGuardia Airport Dike (in center background), facing west. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2001).*

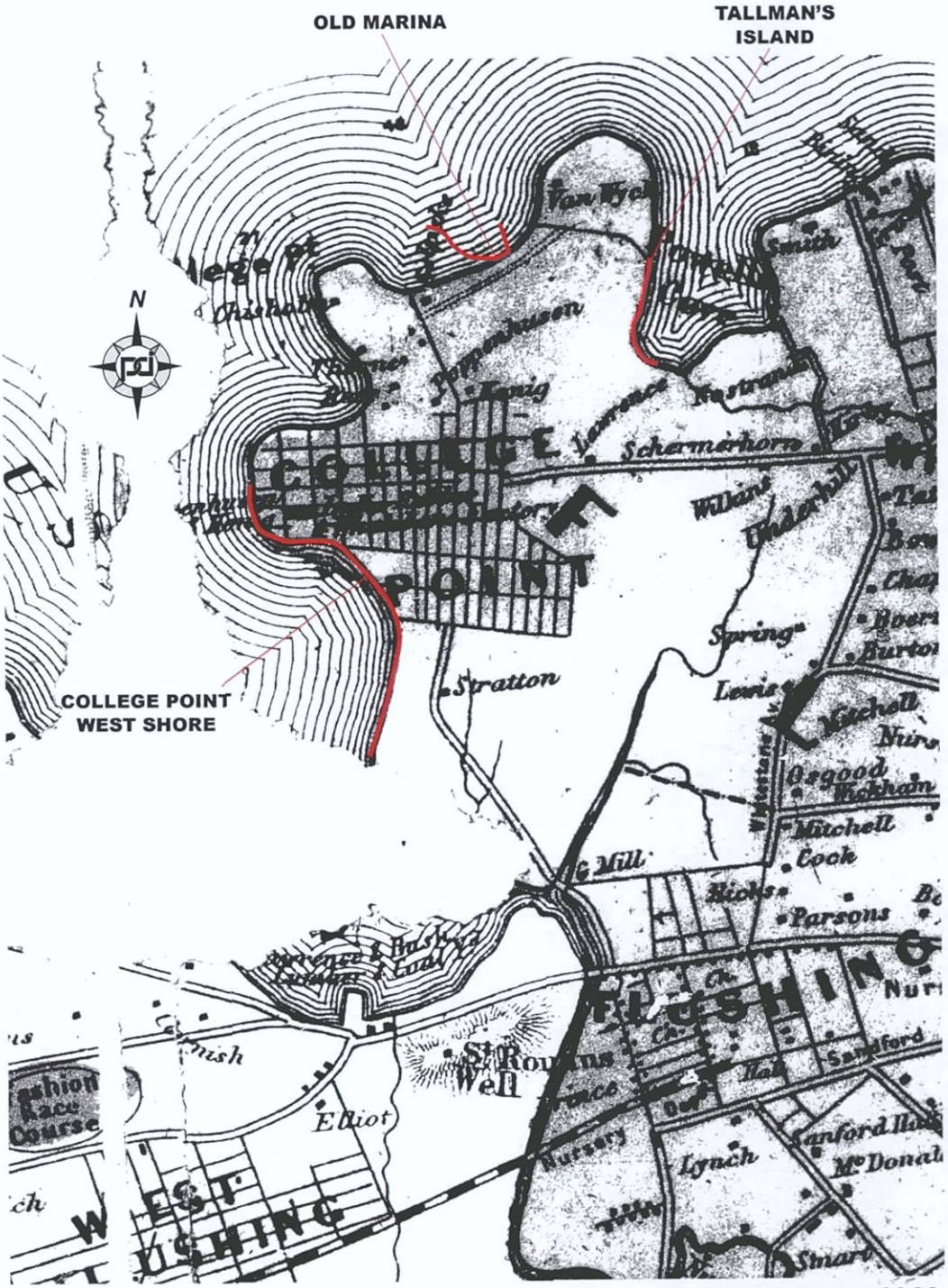

Figure 81. Portions of the APE in College Point as shown in 1860. Flushing Bay Ecosystem Restoration Project, Queens County, New

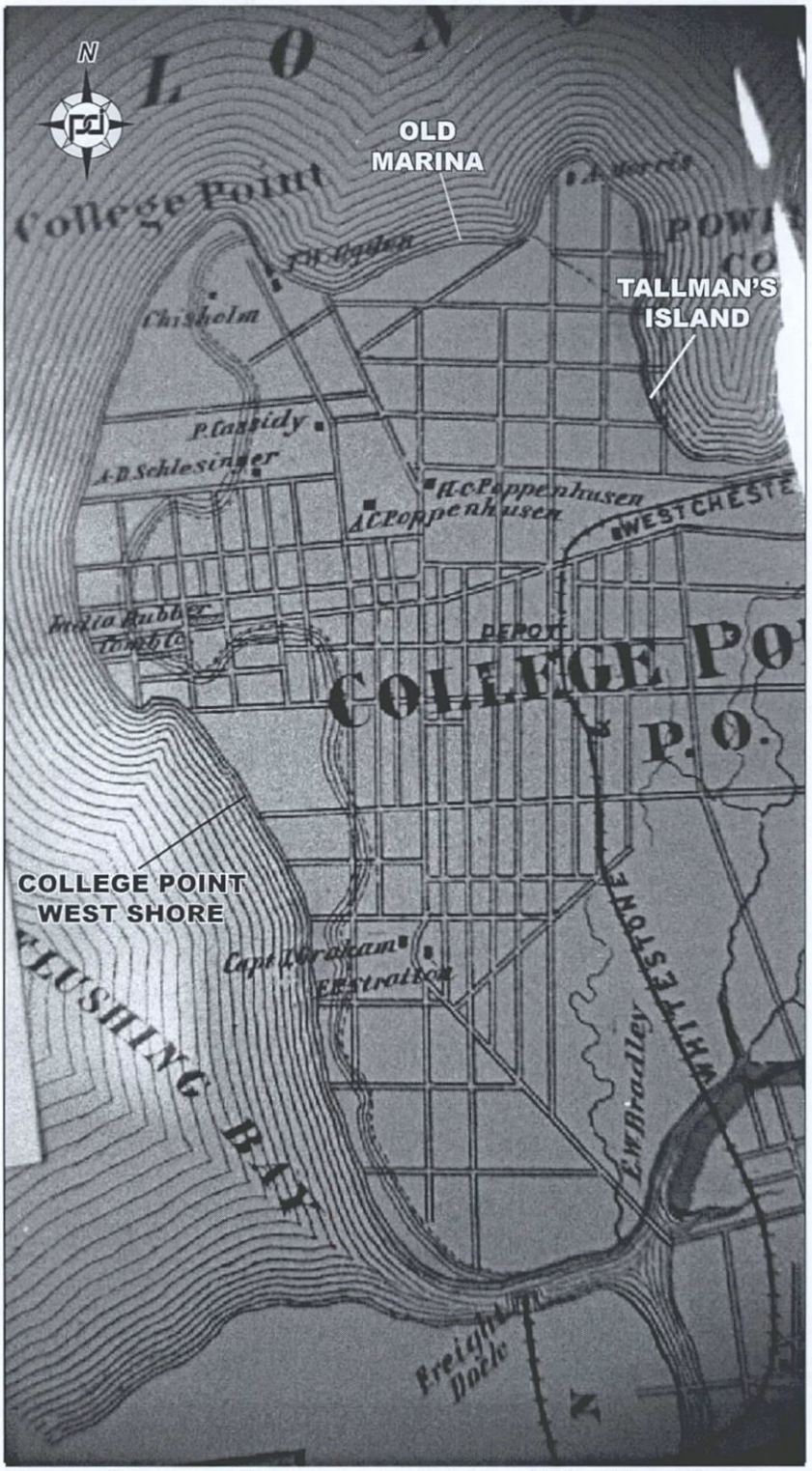

Figure 82. The APE as shown in 1873. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Beers 1873).*

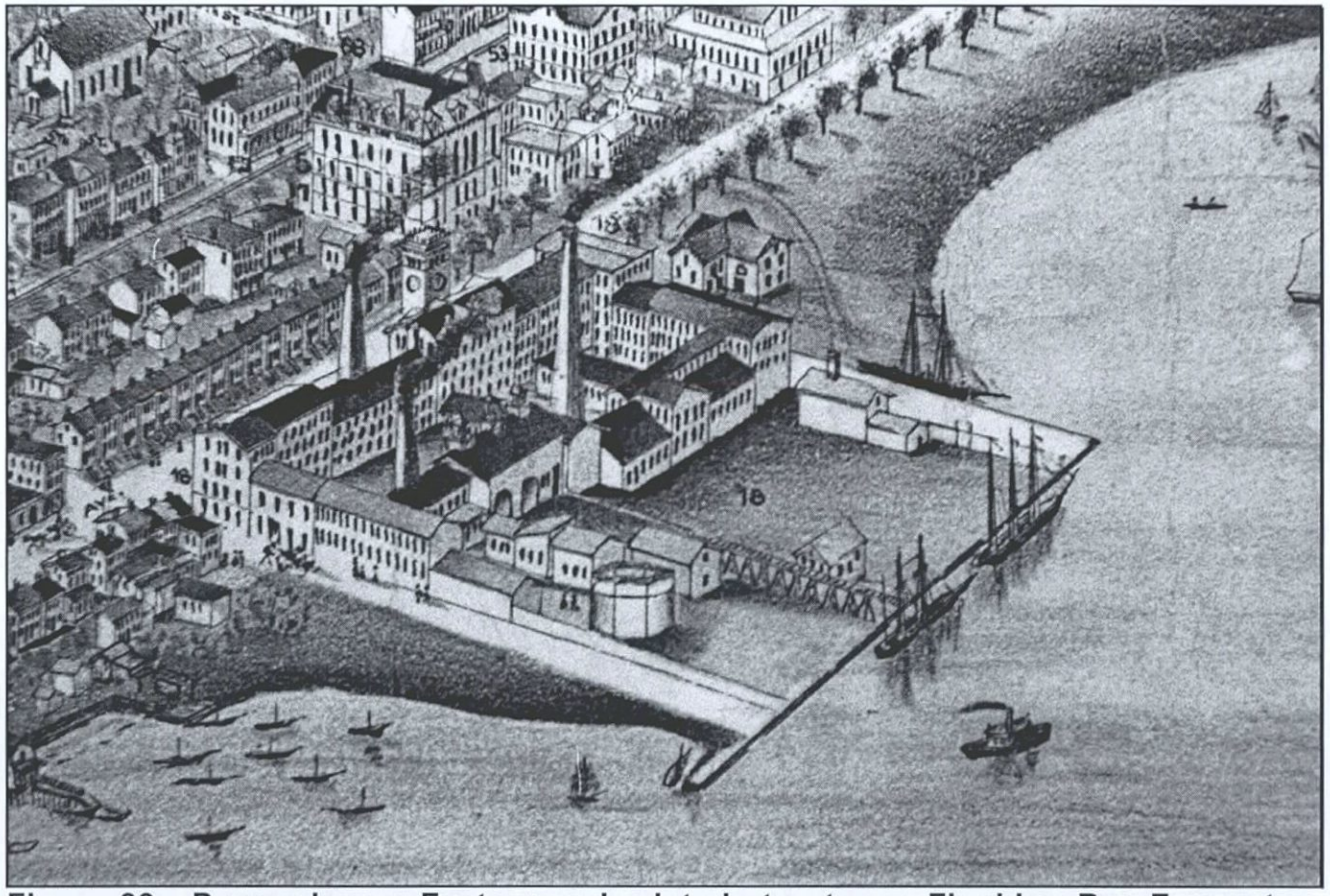

Figure 83. Poppenhusen Factory and related structures. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bailey 1896).*

Figure 84. Western end of College Point. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bailey 1896)*.

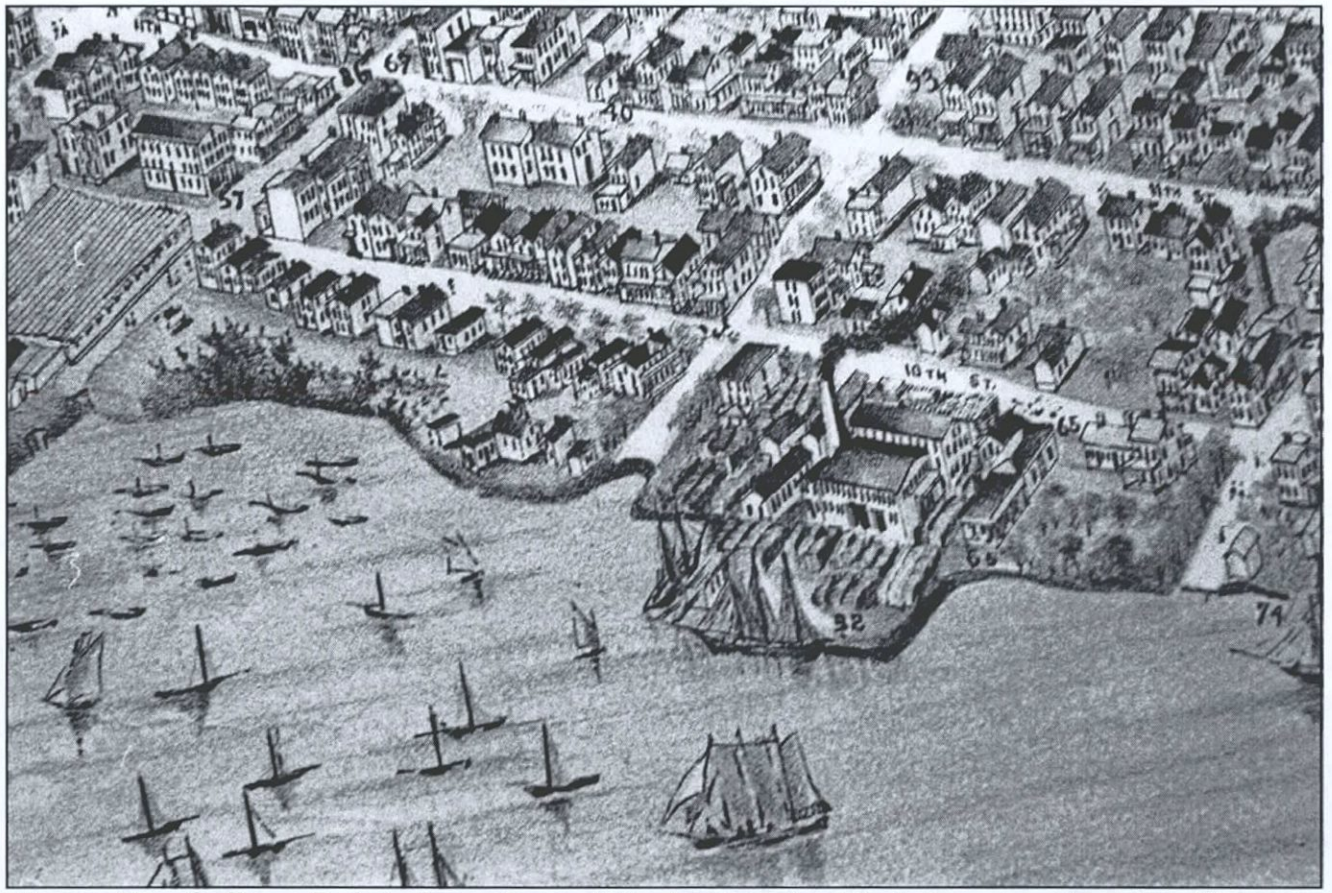

Figure 85. College Point shore from 18th Avenue to 22nd Avenue, showing Kraemer Brothers Yard (#32 on map). Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bailey 1896)*.

Figure 86. College Point shore north of 22nd Avenue to south of 23rd Avenue showing Ilch Yard (#74 on map). Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bailey 1896).*

Figure 87. Southern portion of Flushing Bay and western shoreline of College Point. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Coast and Geodetic Survey 1969)*

Figure 88. The western shore of College Point and eastern Flushing Bay in 1924. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Fairchild 1924: Sheet 10a)*.

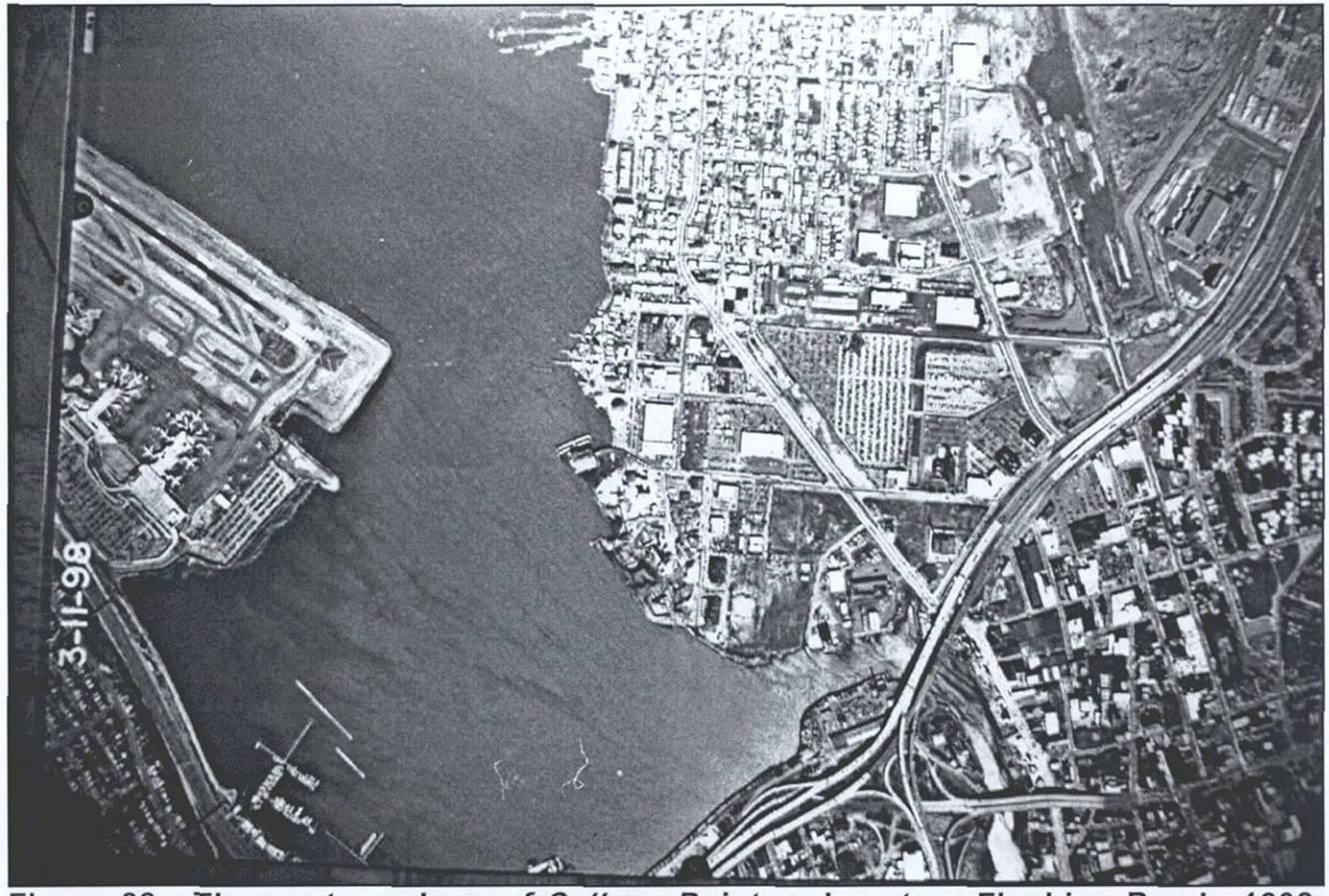

Figure 89. The western shore of College Point and eastern Flushing Bay in 1998. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Aerographics 1998).*

Figure 90. Old Marina and Tallman's Island project areas in 1891. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Wolverton 1891:Plate 22).*

Figure 91. Old Marina and Tallman's Island project areas in 1912. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Borough of Queens Topographic Bureau 1912).*

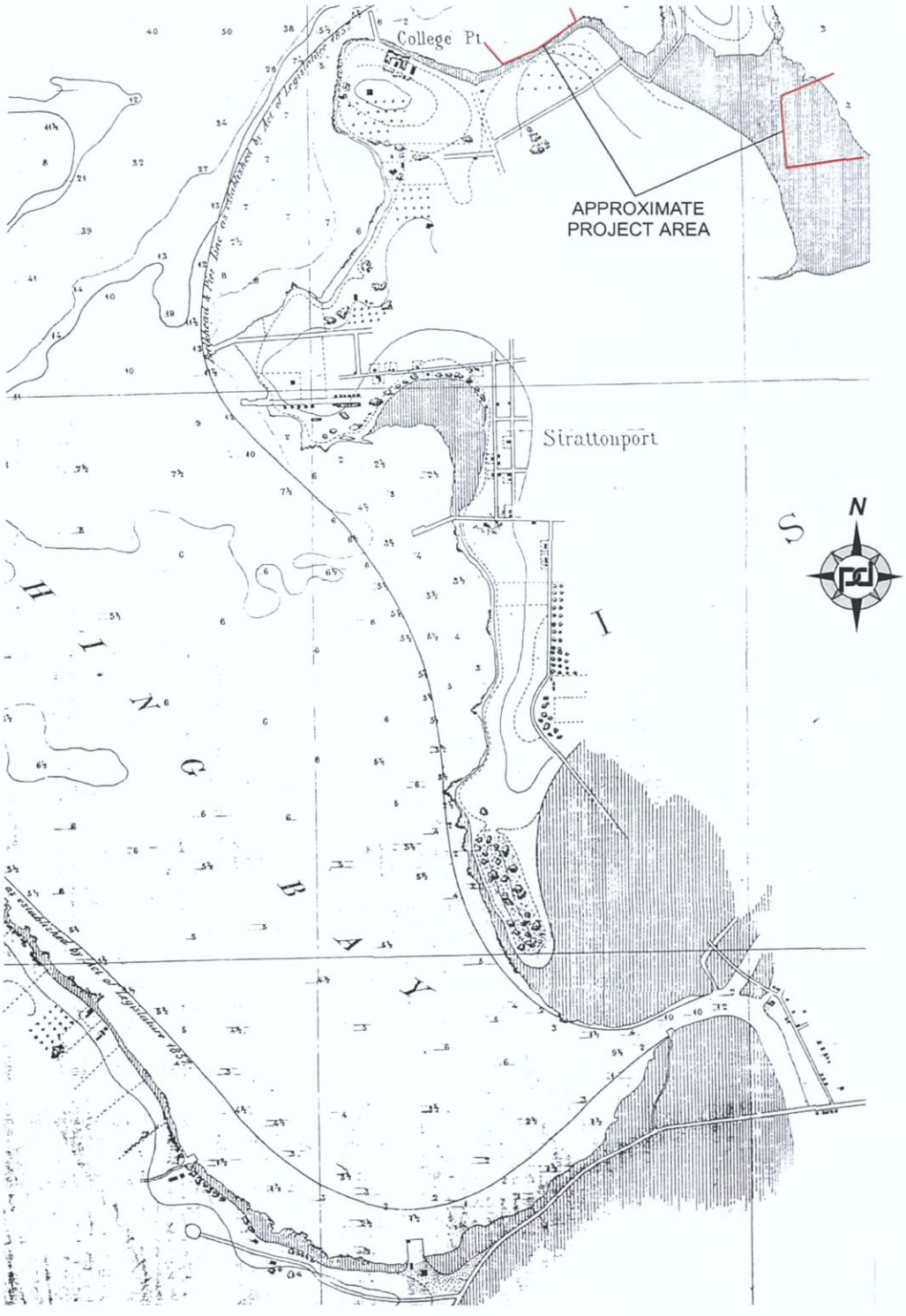

Figure 92. College Point and eastern Flushing Bay. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Army Engineers 1874).*

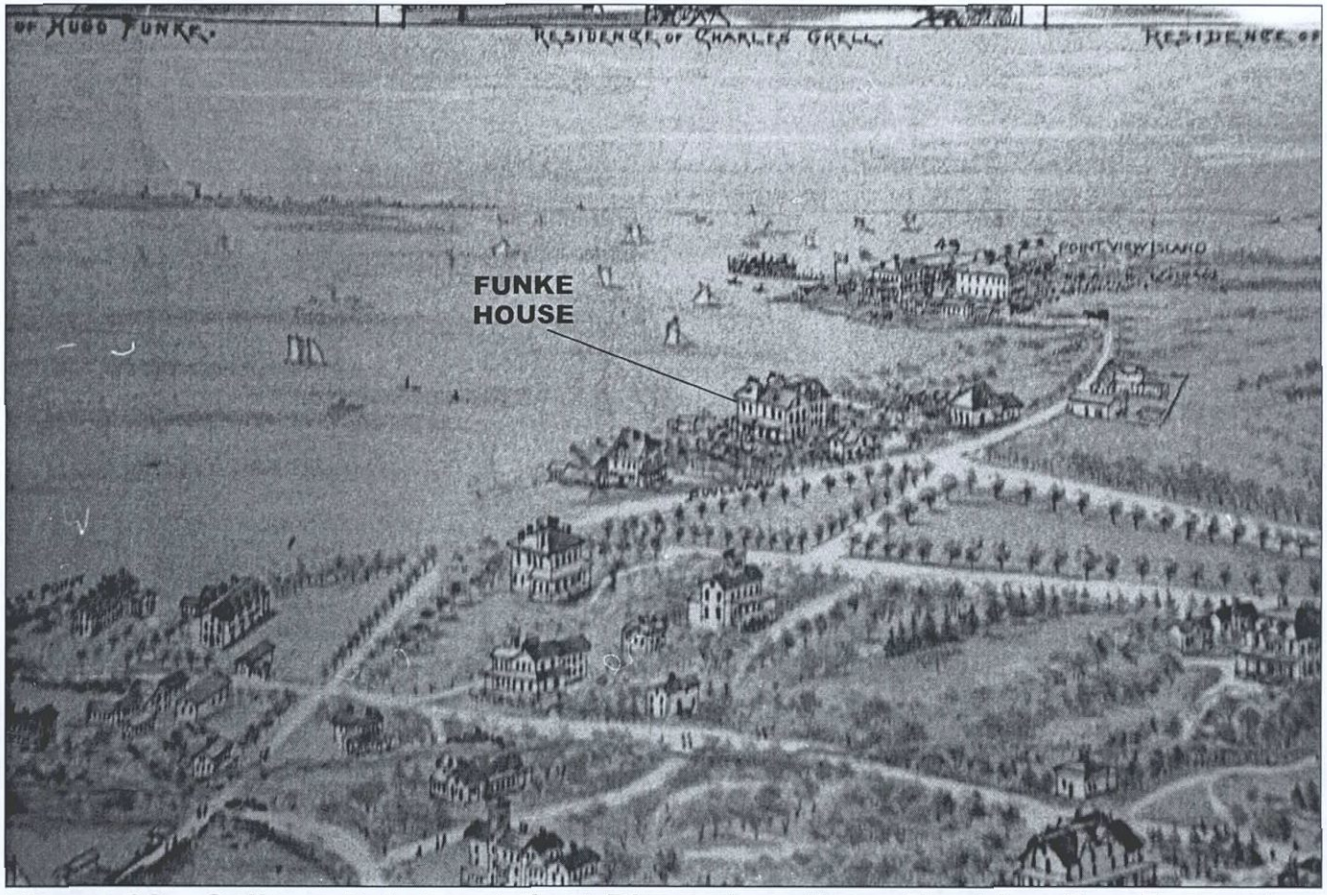

Figure 93. College Point and East River shoreline. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bailey 1896).*

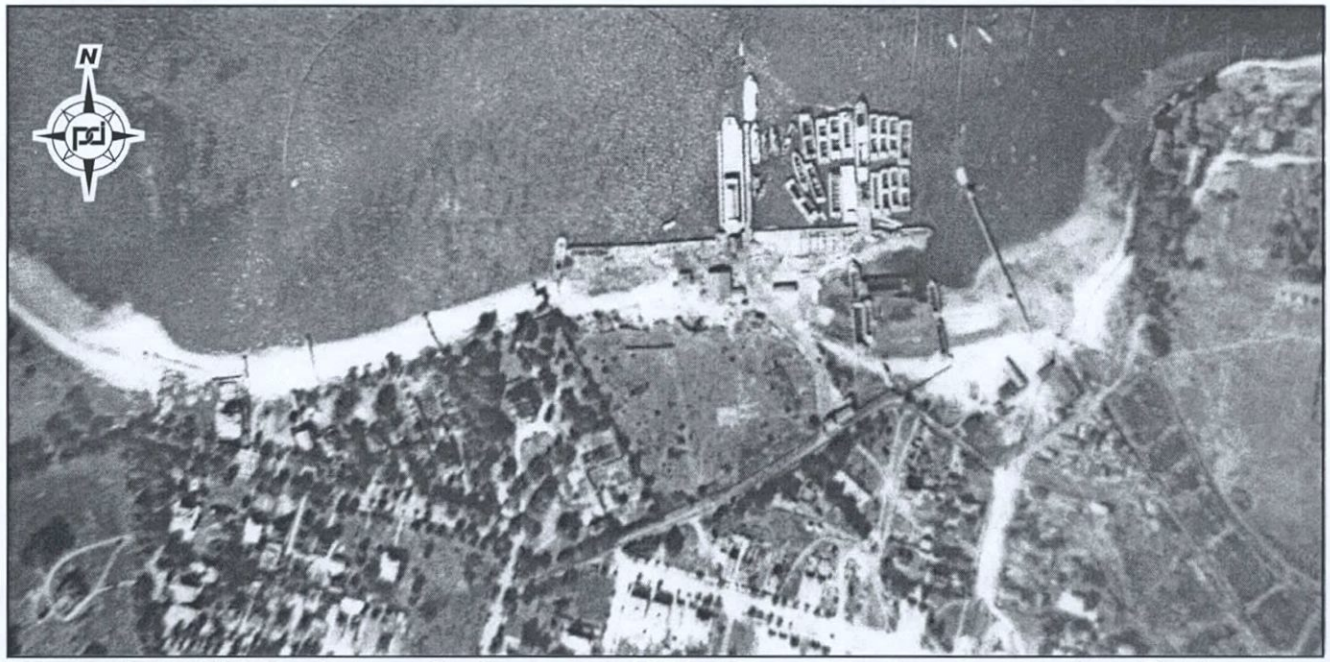

Figure 94. Old Marina project area in 1924. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Fairchild 1924)*.

Figure 95. Old Marina project in 1996. Feature labels A-K added. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(New York City Oasis)*.

Figure 96. Shipyard Feature K (remains of wharf bulkheading at left) and Feature D (at right) from Figure 95, facing west. Note embankment at top left. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

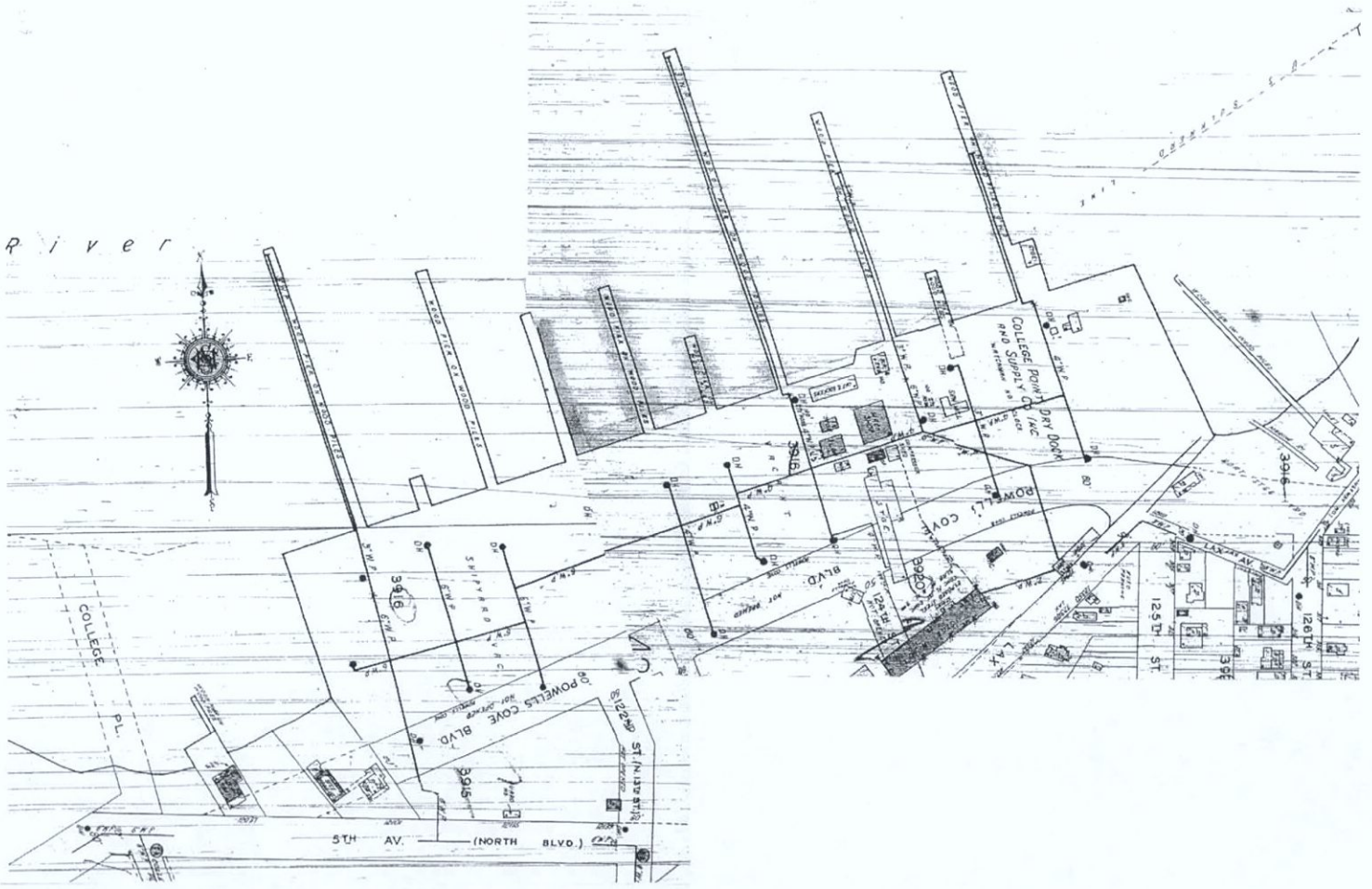

Figure 97. Old Marina project area in 1951. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn Company 1951:5.41-42)*.

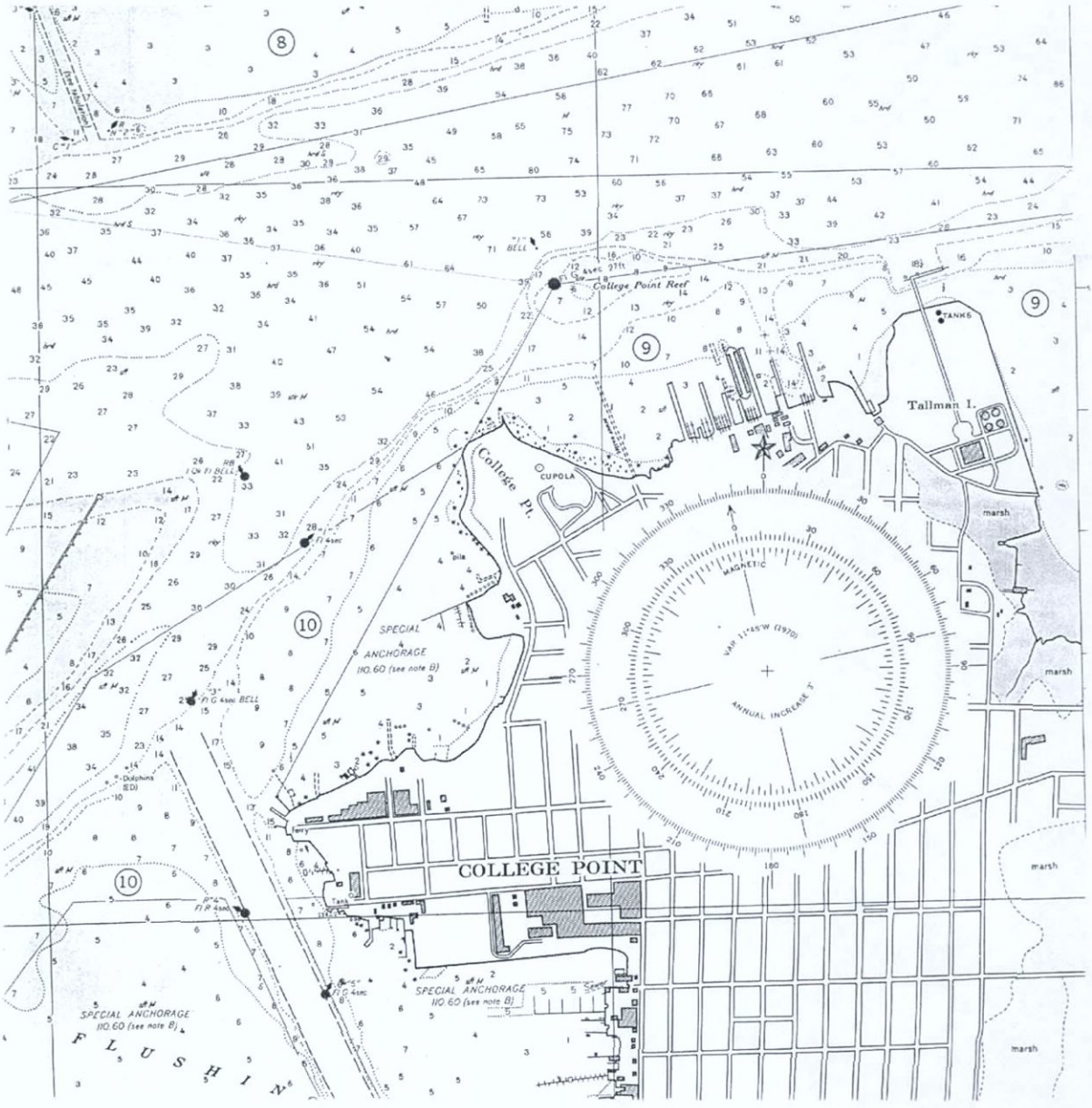

Figure 98. Old Marina and Tallman's Island project area in 1969. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Coast and Geodetic Survey 1969).*

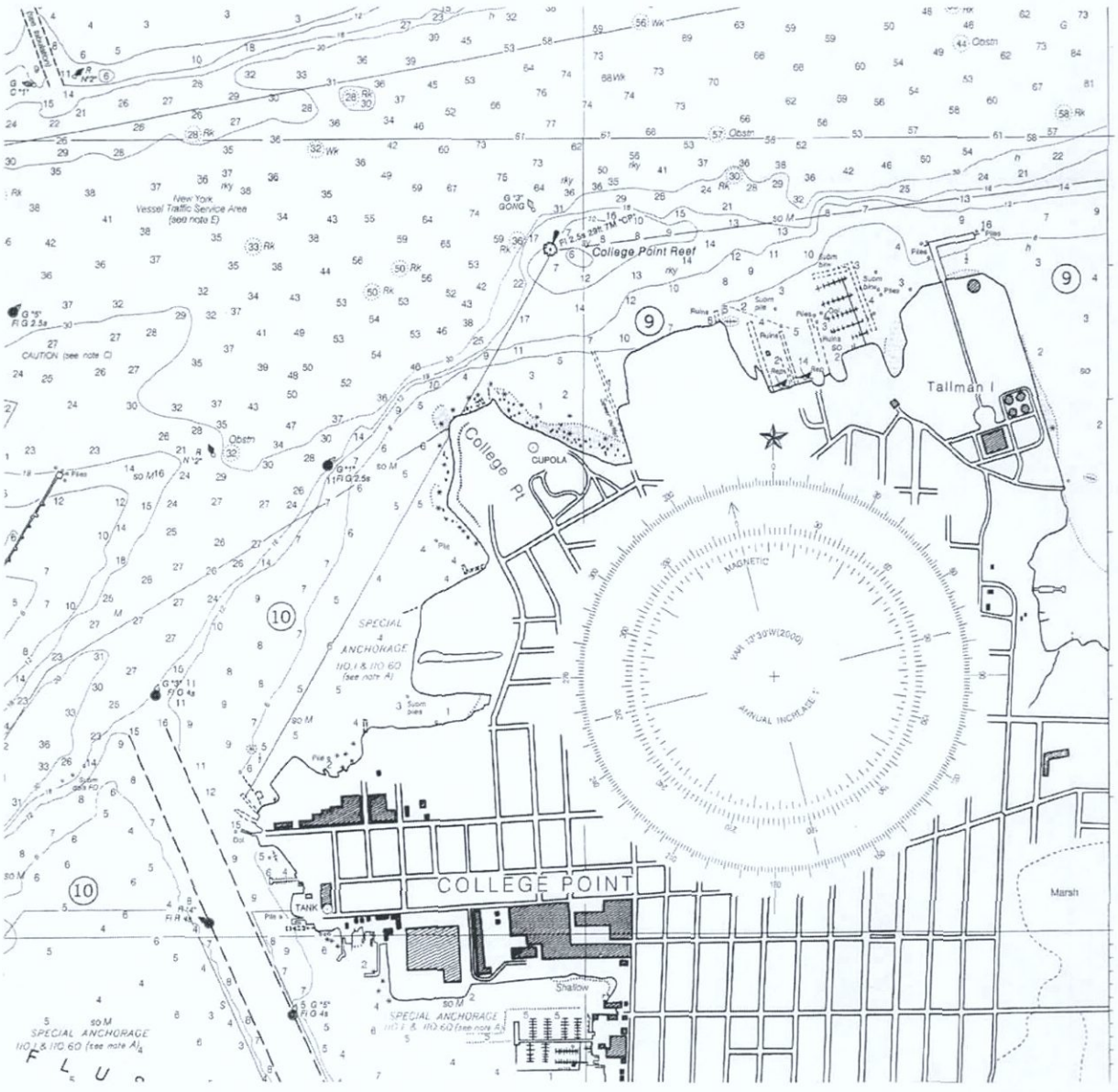

Figure 99. Old Marina and Tallman's Island project area in 2000. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(NOAA 2000).*

Figure 100. Overview of shipyard remains, eastern portion, facing northeast. Feature D in left foreground. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 101. Overview of shipyard remains, western portion, facing northwest. Feature D in foreground. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 102. Shipyard Feature A (center), facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 103. Shipyard Feature B (center), and portion of Feature A (at right); portion of Feature C (in foreground), facing northeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 104. Shipyard Feature C (foreground and left), Feature B (at center right), and Feature C1 (in background), facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 105. Shipyard Feature K, remains of wharf cribbing and bulkheading, facing west. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 106. Shipyard Feature E1 (at right), Feature F (center background), and Feature E1 (left foreground), facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 107. Shipyard Feature G, facing northwest. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 108. Shipyard Feature G1 (foreground), portion of Feature G (at right), and Features H and H1 (in background), facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 109. Shipyard Feature H1 (foreground), and portion of Feature H (left background), facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 110. Shipyard Feature H, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

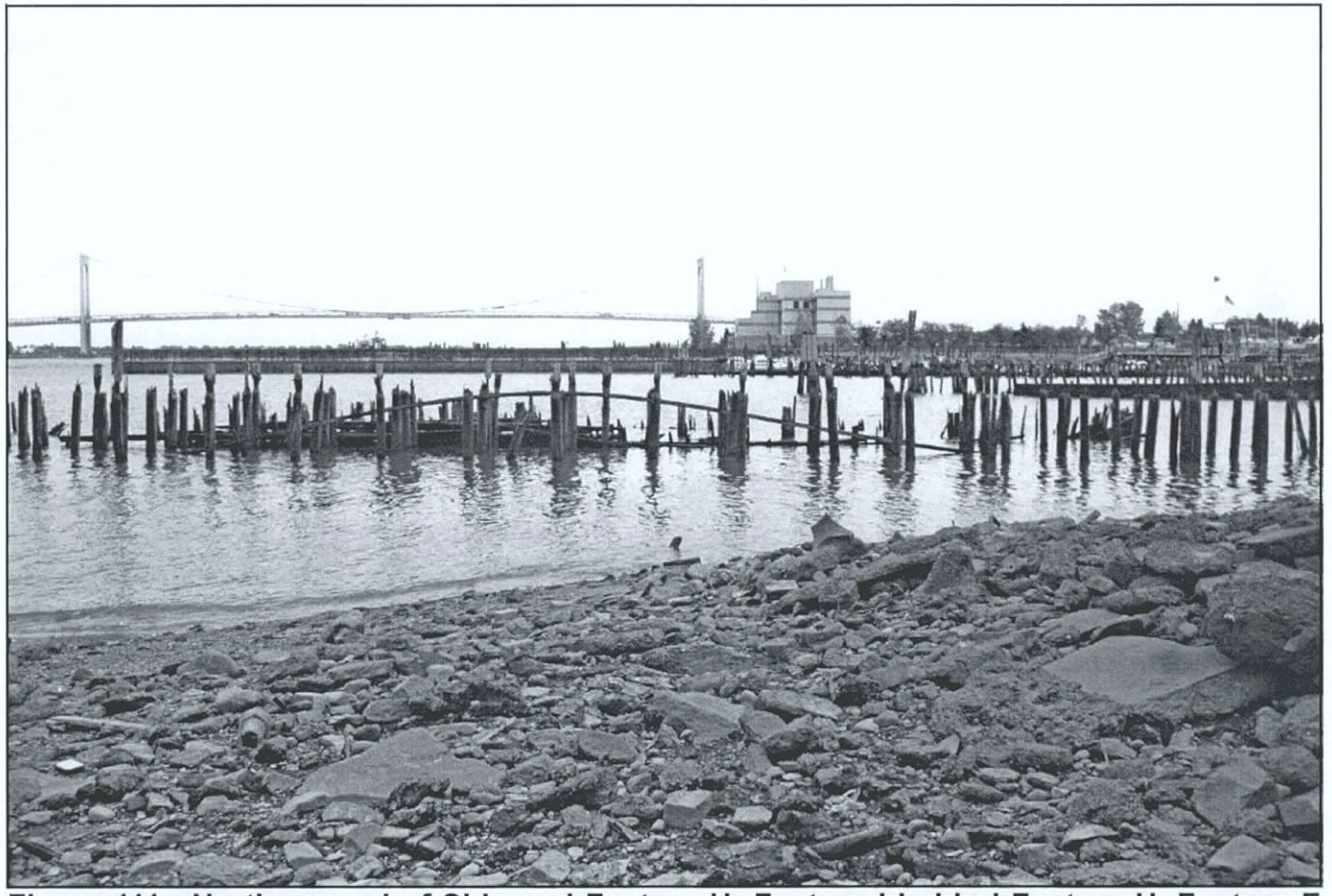

Figure 111. Northern end of Shipyard Feature H; Feature I behind Feature H, Feature F in background at right, facing east. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 112. Feature J, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 113. Gravestones and other debris on beach, southern portion of Old Marina project area, facing southeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

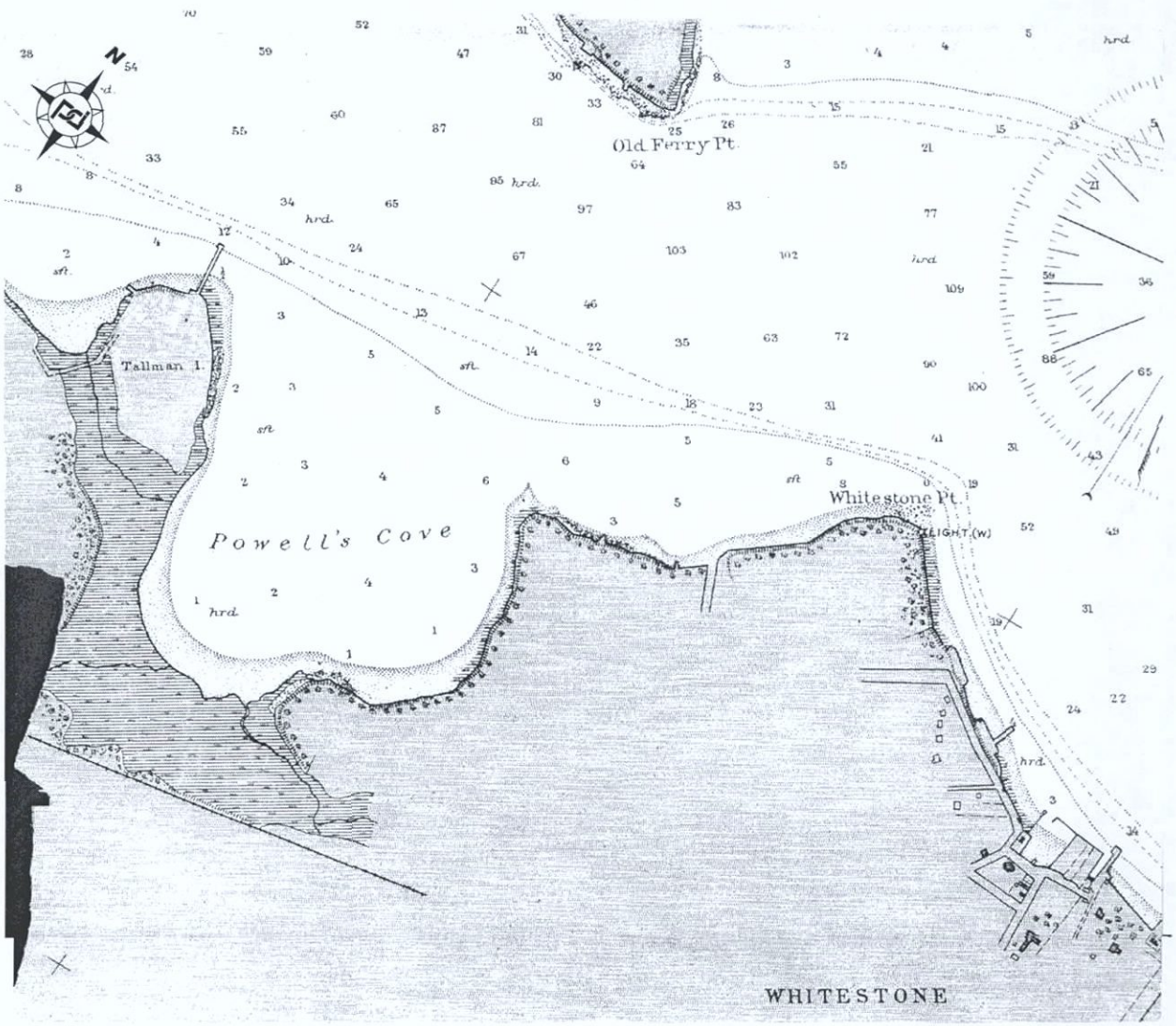

Figure 114. Tallman's Island/Powell's Cove area in 1896. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Coast and Geodetic Survey 1896)*.

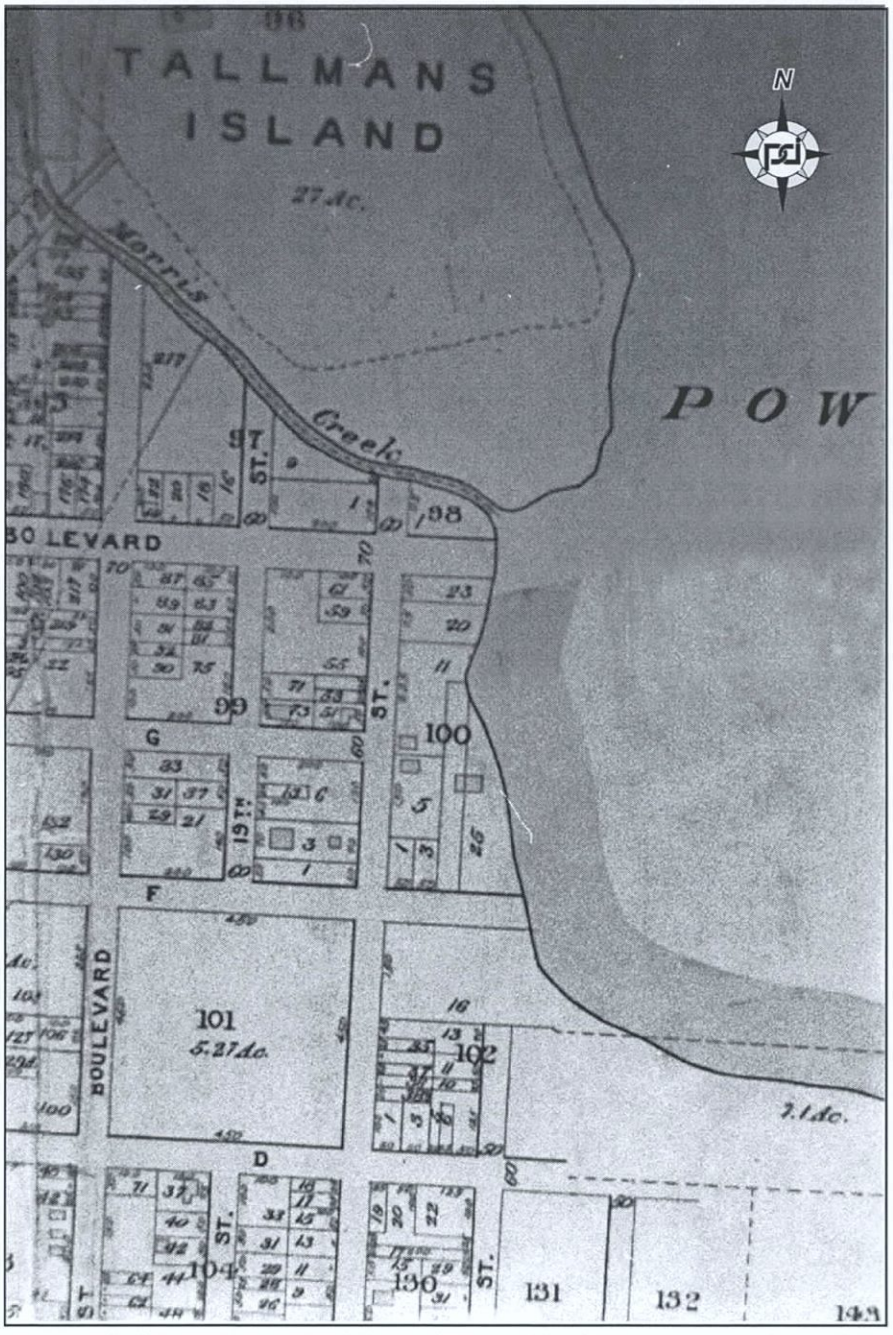

Figure 115. Tallman's Island/Powell's Cove project area in 1909. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Bromley 1909:Plate 23)*.

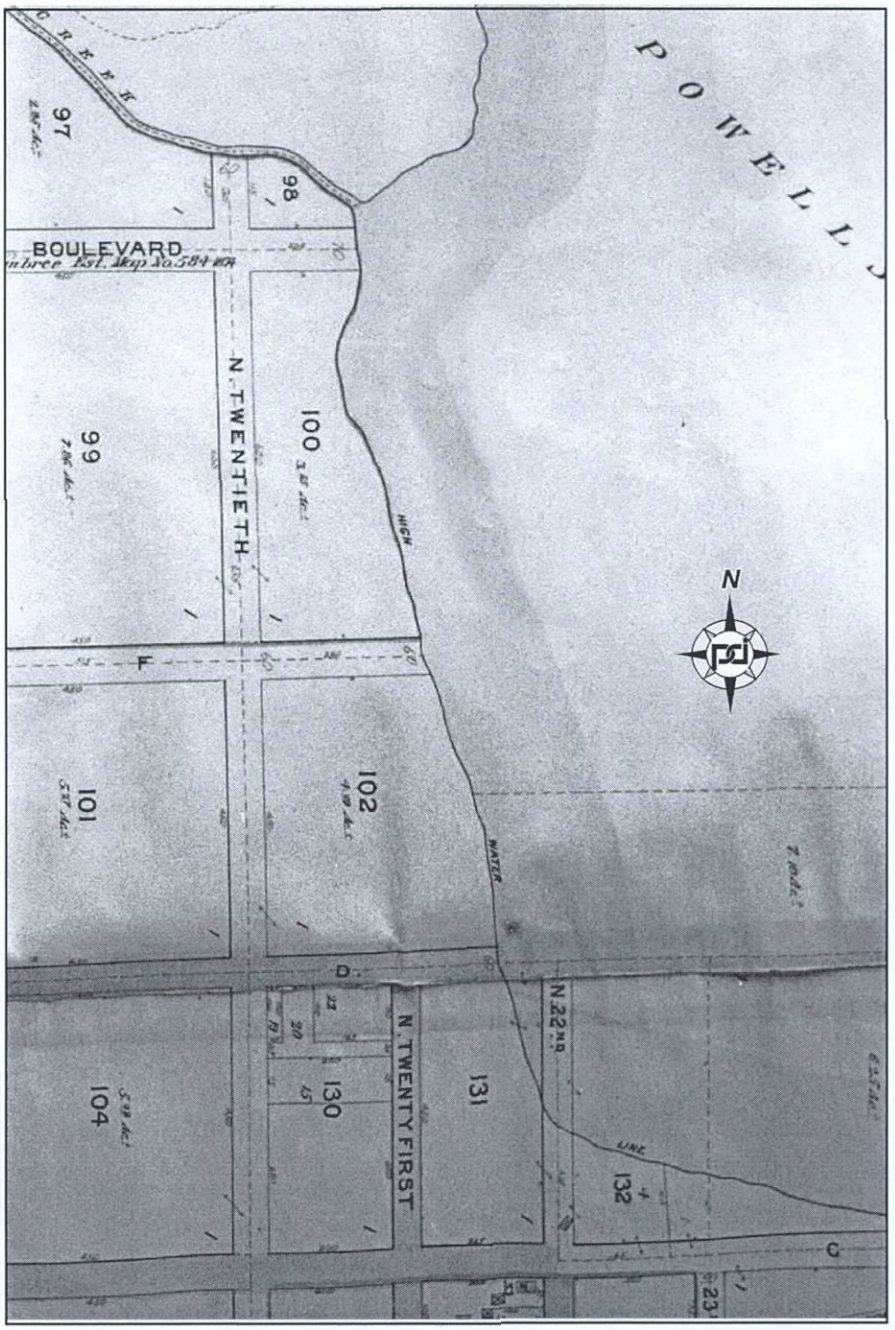

Figure 116. Powell's Cove project area. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Belcher Hyde 1904: Plate 2).*

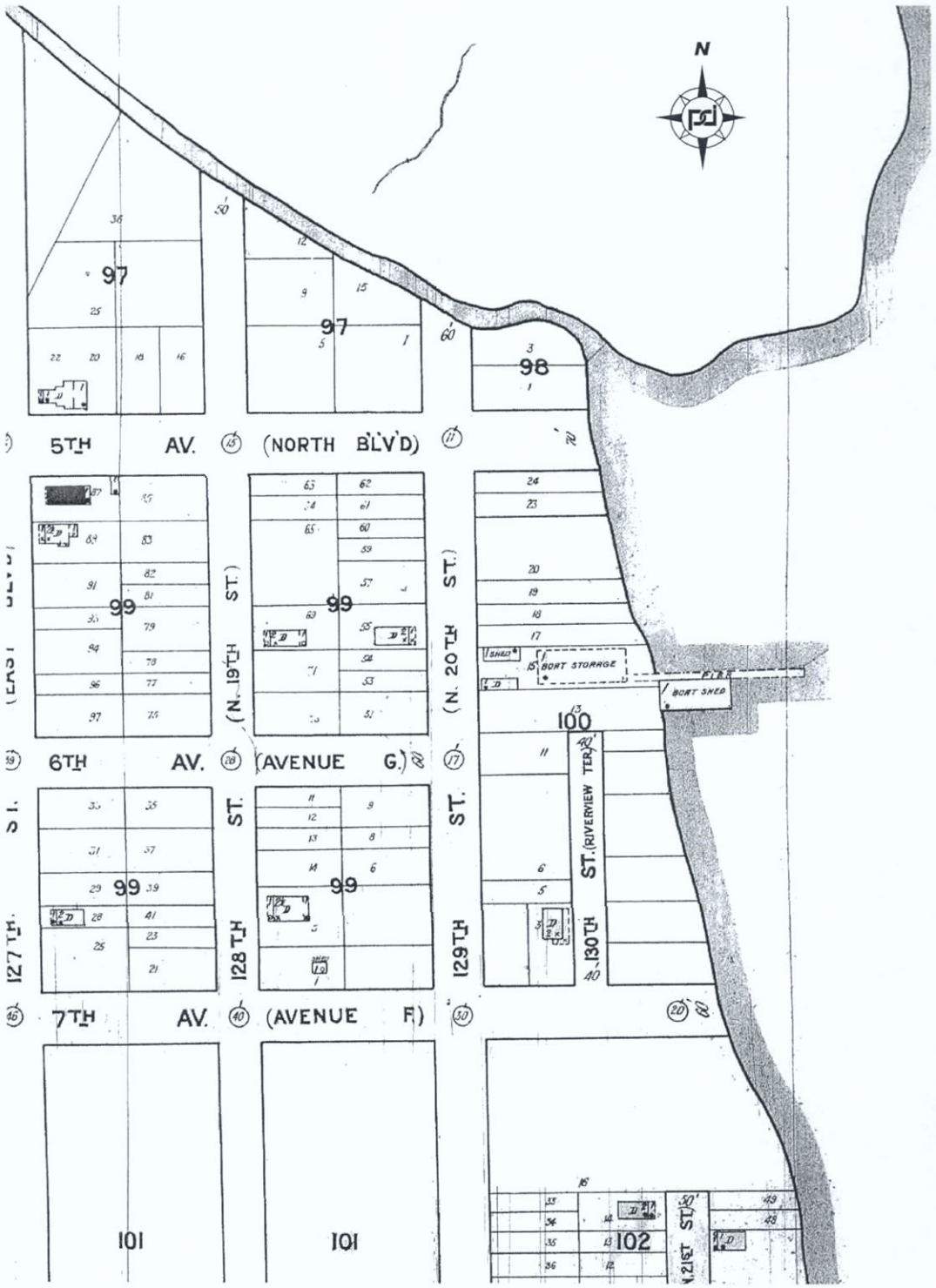

Figure 117. Tallman's Island/Powell's Cove project area in 1916. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Sanborn Map Company 1916:5:13).*

Figure 118. Tallman's Island/Powell's Cove project area in 1924. Note bulkheading on breakwater construction at center. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Fairchild 1924: Sheet 7C).*

Figure 119. Remains of pier along west shoreline Powell's Cove at line of 6th Avenue, facing east. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 120. Remains of bulkheading (in foreground at left) along west shoreline of Powell's Cove, facing north. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

Figure 121. Ariel Tennis and Rowing Club Pier along west shoreline of Powell's Cove, facing southeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

Figure 122. Remains of pier along west shoreline of Powell's Cove, facing northeast. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002).*

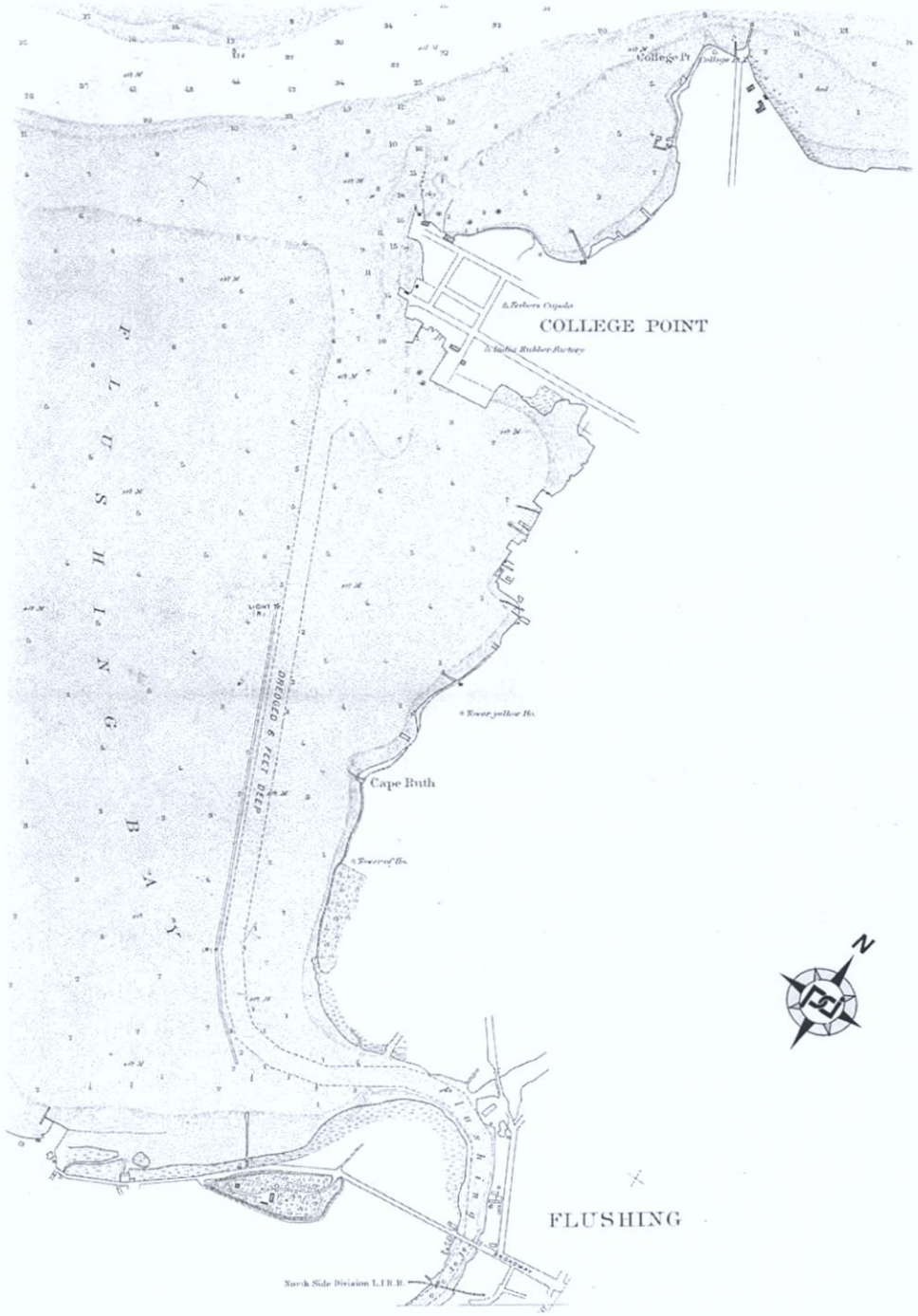

Figure 123. Channel in eastern Flushing Bay. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Coast and Geodetic Survey 1909)*.

Figure 124. Flushing Bay in 1878. Note possible dike near east shore of bay. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Coast Survey 1878).*

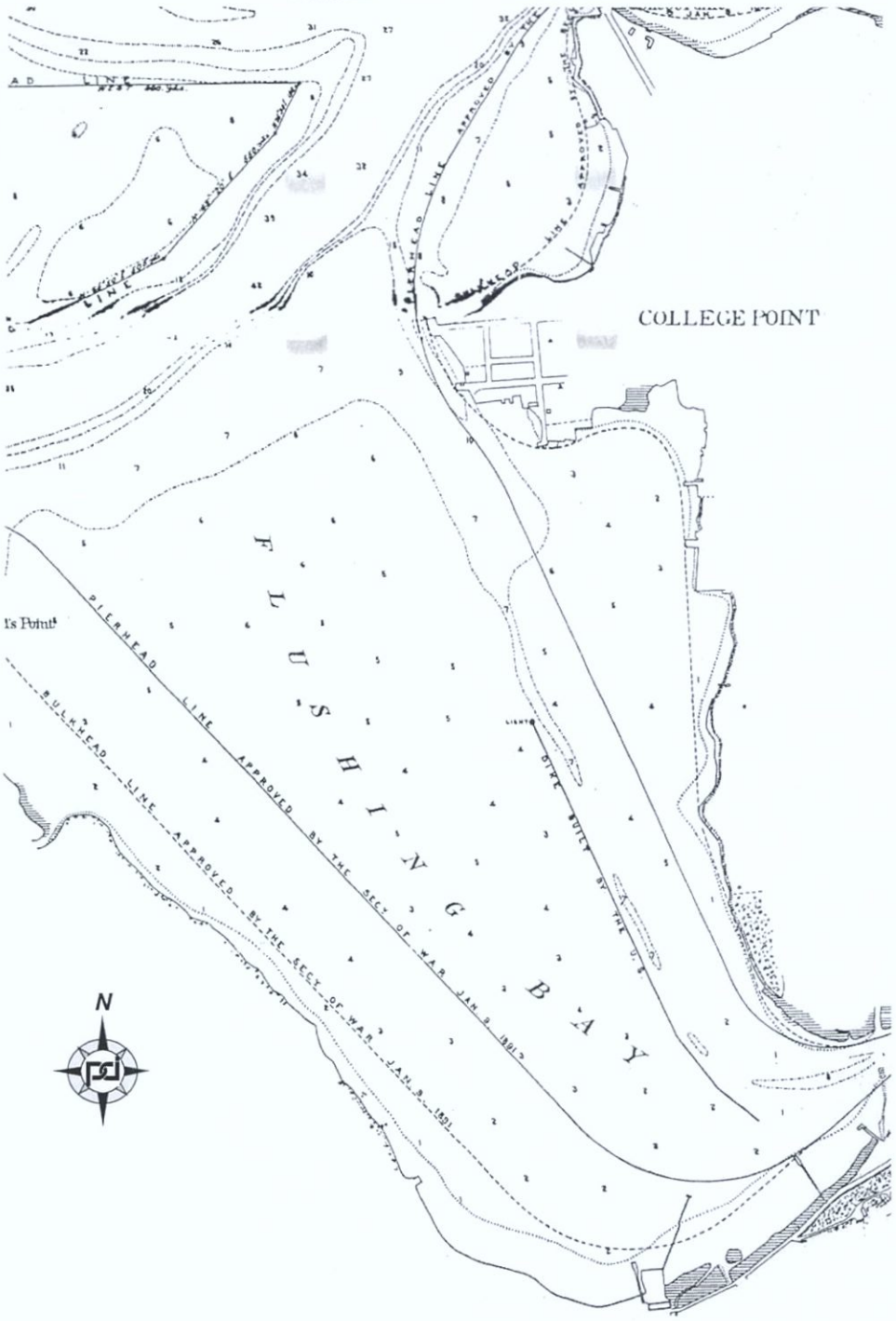

Figure 125. Eastern portion of Flushing Bay and dike. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Army Engineers 1893).*

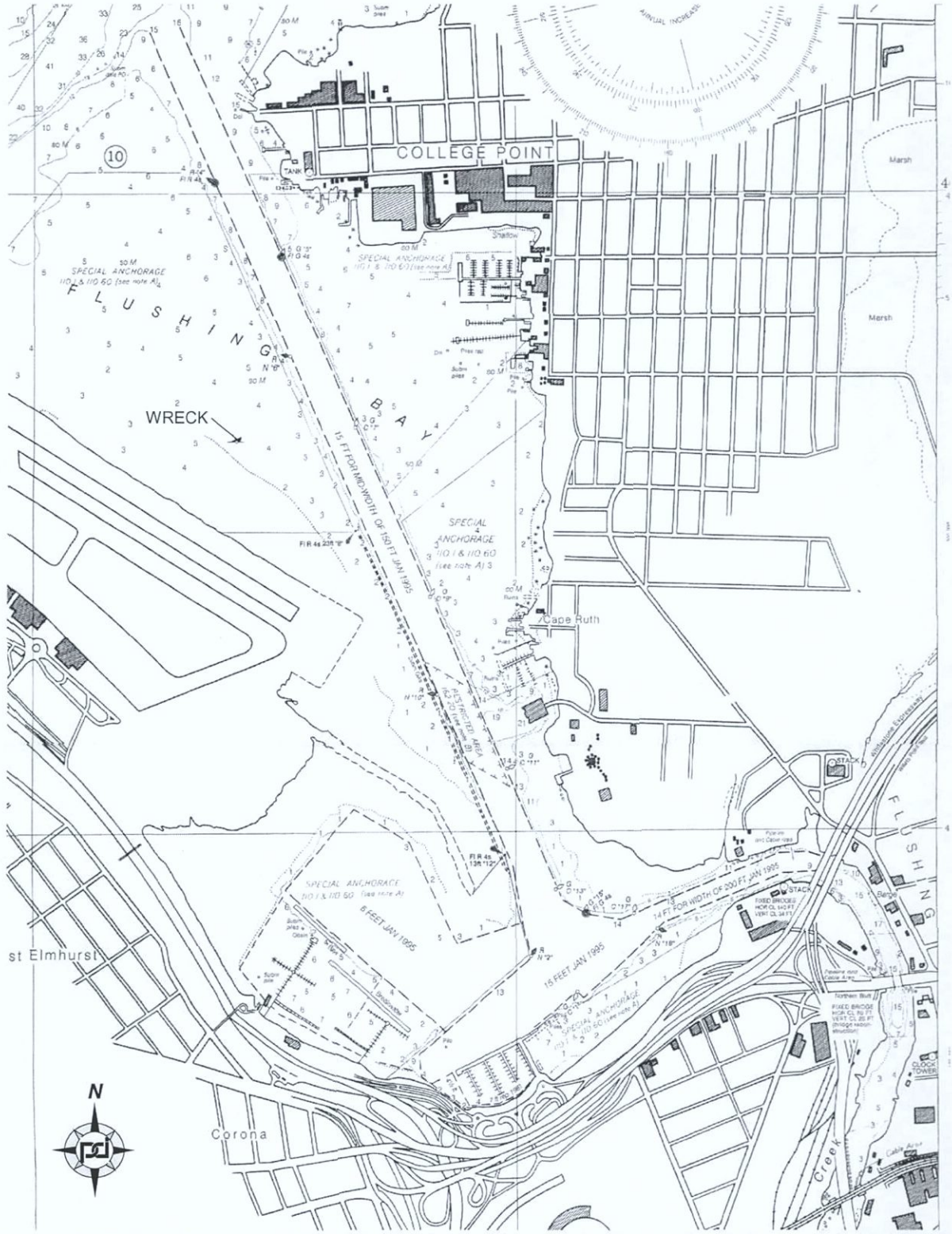

Figure 126. Southern portion of Flushing Bay and channel. Note wreck between channel and LaGuardia runway. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(NOAA 2000)*.

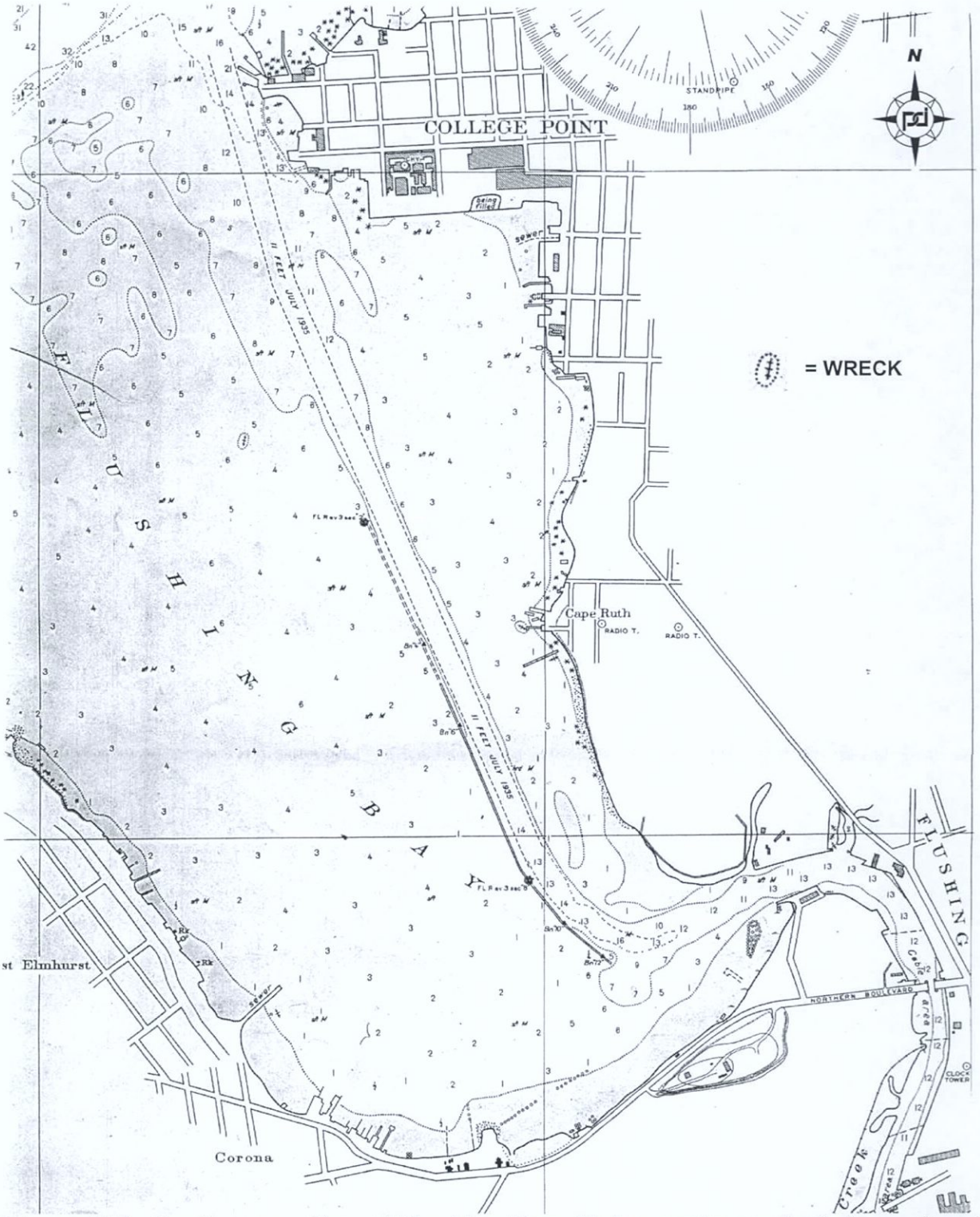

Figure 127. Southern portion of Flushing Bay. Note wrecks west of channel and west of Cape Ruth. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(U.S. Coast and Geodetic Survey 1937).*

Figure 128. Wreck in Flushing Bay (at center) with LaGuardia Airport in background, facing west. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(Pickman 2002)*.

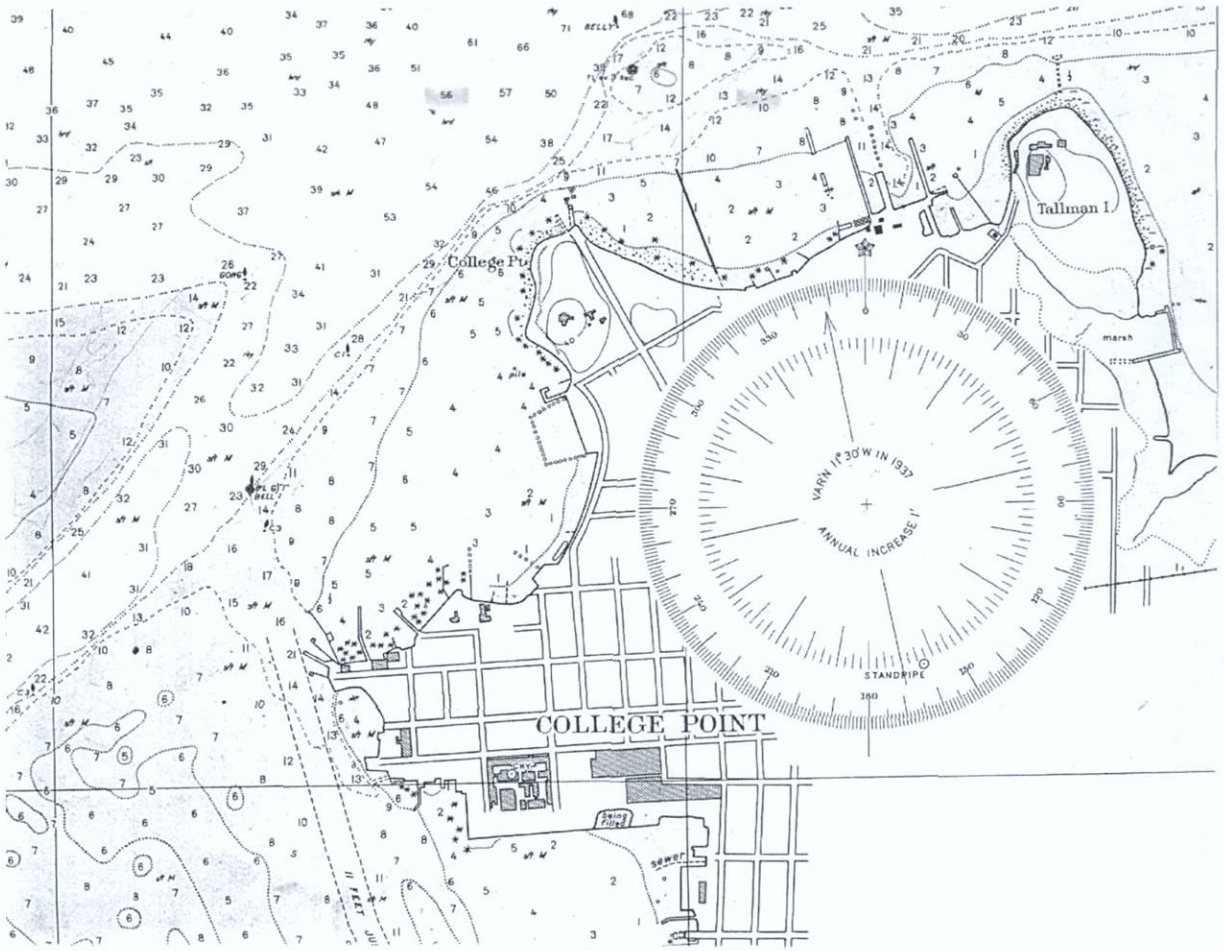

Figure 129. College Point East River shoreline. Note wrecks southeast of Tallman's Island and near pier at center. Flushing Bay Ecosystem Restoration Project, Queens County, New York *(US Coast and Geodetic Survey 1937).*

4.0 Conclusions and Recommendations

This Phase IA cultural resources investigation was conducted to determine the sensitivity and presence or absence of cultural resources for eleven locations within the Flushing Bay watershed, Queens County, New York. Three of these areas—College Point West Shoreline, Meadow Lake, and Flushing Bay Navigational Channel—have been excluded from the current proposed project design as of April 2002 (USACE 2002a). The analysis has been included in case development of these areas is reconsidered. The eight project areas as currently proposed are Upper and Lower Flushing Creek, Willow Lake, Flushing Creek in Flushing Meadows-Corona Park, Inner Flushing Bay, LaGuardia Airport Dike, North College Point/Old Marina Site, and Tallman's Island/Powell's Cove. A number of ecosystem restoration activities are planned which will impact known and possibly undocumented resources.

Evaluation, in part, of the known resources can be undertaken following the eligibility criteria established by the United States Department of the Interior for listing of properties on the National Register of Historic Places:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. That are associated with the lives of persons significant in our past; or
>
> C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> D. That have yielded or may be likely to yield, information important in prehistory or history.

The following discussion assesses the documented cultural resources within each of the proposed FLUBERP areas according to these criteria, considers possible impacts of project activities on such resources, and presents recommendations, where appropriate, for additional cultural resources investigations. Table 4.1 contains the restoration activity, known or potential remains and recommendations for the locations currently proposed for ecosystem restoration activities.

4.1 AREAS INCLUDED IN THE FLUBERP

4.1.1 Lower Flushing Creek. The area adjacent to the banks of Flushing Creek within the FLUBERP area remained undeveloped into the twentieth century, and much of the area was never developed. Recommendations range from an easily determined National Register-eligible site to no further work for the ten documented resources in this area (see Table 4.1).

Table 4.1. Restoration Activity, Recorded Cultural Resources and Recommendations for the FLUBERP Areas

Location	Restoration Activity	Recorded Cultural Resources	Recommendations
Lower Flushing Creek	widening existing tidal marsh areas	*Prehistoric:* None, overall low sensitivity *Historic:* <u>Vehicular/Pedestrian Bridges</u> **1 Flushing Bridge** - early 1800s to present with various structures at same location; most recent post-1951 bridge may have removed; remains of previous structures **2 Roosevelt Avenue Bridge** - 1926 to present with three different types of bridges in same approximate location; extant timber pilings and stone pier footing may relate to earlier 1926 bridge <u>Railroad Bridges</u> **3 Flushing or present Long Island Railroad Bridge** - 1854 to present with reconstruction periods; extant timber pilings may relate to earlier remains **4 Flushing & Woodside Railroad Bridge and Trestle** - 1865/1869 to 1930/1950 with different configurations; trestle connected bridge to Flushing Railroad tracks, buried under embankment ca. 1880s with possibility of trestle remains under later fill; extant wood pilings may represent earlier bridge remains **5 Trestle/Trolley Line** of 1895 to 1915 - no longer in use due to in-filling of marshes **6 Newtown and Flushing Railroad Bridge** - 1871-1876; post 1876 trestle work and tracks pulled up **7 1870s Rail Spur Bridge** - probable freight line section only in operation in 1870s connecting/in between present Van Wyck Expressway crossing and a point north of current LIRR Bridge <u>Other Structures</u> **8 D.S. Jones Lumber Yard/ H.K. Lines Coal and Wood Yard/Eastern Steel Tank Corporation** with new coal loading facility - 1904 to 1951; east bank of Flushing Creek and north of LIRR **9 New York City outfall and headwall and wood pilings** present in eastern creek bank project area; later remains likely represent wooden bulkheading associated with the early 1900s industrial facilities of lumber yard **10 LIRR south to Porpoise Bridge**, during reconnaissance only a modern outfall located on west bank	1 and 2 potentially NRHP eligible -- test trenching to determine presence, location and condition of remains 3 potentially NRHP eligible -- test trenching to determine location and condition of additional remains 4 NRHP eligible -- Test trenching to determine arrangement, location and condition of remains 5 No further work 6 No further work 7 No further work 8 and 9 test trenching to determine condition and relationship of remains 10 No further work Remainder of Project Area: documentation of conditions
Inner Flushing Bay	rehabilitation and extension of marsh and shore mud flats involving grading and deposition of fill materials	*Prehistoric:* None, overall low sensitivity *Historic:* None, low sensitivity	No further work Western shoreline excluded as of April 2002

Location	Restoration Activity	Recorded Cultural Resources	Recommendations
LaGuardia Airport	removal of artificial dike at south end of airport	*Prehistoric:* None, overall low sensitivity *Historic:* None, low sensitivity *Modern:* **1 1963-1964 earthen breakwater**	No further work
Willow Lake	reordering of vegetation; construction of wildlife habitat structures and trails	*Prehistoric:* None, overall low sensitivity *Historic:* **1 parkland and playing fields** border lake between 1960 to ca. 1974 **2 remains of wood wharf** some 25 feet long along southwest shoreline noted during reconnaissance; date and function unknown; possibly used by insect control boats **3 bridge remains along south end of lake**; post-1930s to 1992, unable to examine during reconnaissance	No further work
Flushing Creek at Meadows-Corona Park	reordering of stream channel above-ground	*Prehistoric*: None, overall low sensitivity *Historic:* **1 1939/1940 World's Fair Structures**: Gardens on Parade, United Kingdom and Australia pavilions, Lagoon of Nations, 1939 channel location **2 1964/1965 World's Fair Structures:** Maestro Pizza, Equitable Life Building, Pool of Industry/Fountain of Plants with extant features; General Electric Pavilion, Clairol Pavilion, Parker Pen Pavilion, Continental Insurance Company Pavilion, Chunky Candy Pavilion, Brass Rail Restaurant, Julimar Farm Exhibit, Better Living Center	1 and 2 potentially NRHP eligible cultural landscape; additional historic preservation and historic landscape studies 1 and 2 potentially NRHP-eligible archaeological remains; Phase II evaluation study
Upper Flushing Creek	modifications of culverts and tide gates/dam at LIRR and Porpoise Bridge crossings	*Prehistoric:* None, overall low sensitivity *Historic:* **1 Long Island Railroad** - post-1951 trestle crossing replaced by an embankment, creek flows beneath through a pipe culvert; embankment construction involved fill behind wood bulkhead/cribbing; currently partially visible **2 Porpoise Bridge** - reinforced concrete bridge; 1937-present with few alternations to the original	1 No further work 2 potentially NRHP eligible; Phase II evaluation study
North College Point/Old Marina Site	restore and create marshes and tidal shoreline involving placement of structural features, grading, planting and in-filling	*Prehistoric*: None, overall low sensitivity *Historic:* **1 Shipyard facilities, 1916/1926,** College Point Dry Dock and Supply Company (1963 Sound Ship Building Corporation), ceased operation by 1986; bulkheading and in-filling along shoreline; shipyard piers, wharf, pilings possible other features still extant as are derelict barges; shipyard buildings may be beneath 1900s land fill	1 Potentially NRHP eligible; Phase II evaluation study Remainder of project area: documentation of current conditions

Location	Restoration Activity	Recorded Cultural Resources	Recommendations
Tallman's Island/ Powell's Cove	creation of wetlands between Tallman's Island and Powell's Cove Park	*Prehistoric:* possible materials associated with Powell's Cove site *Historic:* **1 Likely boat-club facilities** by 1909 along Powell's Cove shoreline; with large bulkhead and/or breakwater structure in 1920s; pier and bulkhead gone by 1943; pier and associated bulkheading remains noted during reconnaissance in general area; other remains including boathouse under late 1900s fill	Phase IB/II deep testing to determine presence of prehistoric remains 1 No further work Remainder of project area: documentation of current conditions

Flushing & Woodside Railroad Bridge and Trestle Remains. Bridge and trestle remains are associated with the development of the railroad lines built in Queens County in the latter half of the nineteenth century and are considered National Register eligible under Criteria A and/or C. During the reconnaissance, a number of pilings were noted on the west bank of Flushing Creek, near the northern end of the FLUBERP site. These pilings are at the location of a late-nineteenth/early-twentieth century drawbridge that conveyed the Flushing & Woodside Railroad tracks across Flushing Creek. From the western end of the drawbridge a trestle extended southward approximately parallel to the creek banks to join with a railroad line that occupied the path of the existing LIRR tracks. Documentary sources revealed that this trestle was buried under a ca. 1880s embankment, which, in turn may have been buried under twentieth-century fill. The visible pilings may be associated with the approaches to the drawbridge and suggest that additional pilings, as well as the later embankment, may be intact beneath the twentieth-century fill.

The available FLUBERP project map (see Figure 3c) indicates that the area where the visible pilings were noted is proposed for excavation to create a low marsh environment. The extent of excavation in the area away from the creek is not known. If remains of the former trestle are present, they would most likely be impacted in the area where the pilings were noted, and in the area extending north of the LIRR embankment where the route of the trestle more closely approaches the west bank of the creek. This area should be assessed further when more detailed project plans are available. Test trenching in these areas could determine if remains of the trestle are present.

Flushing Bridge, Roosevelt Avenue Bridge, and the LIRR Drawbridge. The Flushing, Roosevelt Avenue, and Long Island Railroad bridges are considered potentially eligible to the National Register. Features such as pilings and footings are extant and may relate to the earliest phases of operation, which along with the other rail lines played a role in the area's transportation development. The presence, condition and relationships of extant or undetected remains should be examined through additional mechanical or hand-test trenching.

***Jones* Lumber Yard and Extant Wood Pilings.** Test trenching is also recommended around the extant wood pilings that may relate to the operation of the Jones Lumber Yard in the early 1900s. The trenching would be implemented to establish a relationship and evaluate the condition and importance of the resource.

Trestle/Trolley Line, Newtown & Flushing Railroad Bridge, 1870s Railroad Spur, and Modern Outfall. Little or no likelihood of recovery of remains from the three railroad

lines, in addition to the recent nature of the last four documented resources, leads to a recommendation of no further work.

It is important that conditions in the remainder of the project area be recorded through photographs and plans before construction begins. A documentary record serves not only the present but future construction and archaeological concerns.

4.1.2 Inner Flushing Bay. The study area remained open water until filled for construction of LaGuardia Airport, which resulted in siltation adjacent to the fill area. No airport facilities extended into the proposed FLUBERP site. The Inner Flushing Bay FLUBERP site shorelines do not include any known cultural resources potentially eligible for the National Register (see Table 4.1). It is unlikely that any undetected NRHP-eligible prehistoric or historic resources are present due to the man-made shorelines. The west shore of Flushing Bay south of LaGuardia Airport was initially included in the study area but is not now being considered for full feasibility analysis. No further cultural resources studies are recommended for this site.

4.1.3 LaGuardia Airport Dike. The LaGuardia Airport Dike, slated for removal as part of proposed FLUBERP activities, was constructed in 1964 and is less than 50 years of age. It is neither a historically nor a technically significant structure, and it has already been disturbed by the removal of its upper portion. The dike is not a potentially NRHP-eligible cultural resource. No further cultural resources studies are recommended for this site (see Table 4.1).

4.1.4 Willow Lake. Willow Lake was created for the 1939-1940 New York World's Fair in Flushing Meadow Park, but unlike other sections of the fair was used for passive recreational purposes. It also had the same function during the second New York World's Fair in 1964-1965. No World's Fair buildings were located at Willow Lake (see Table 4.1). After the 1964-1965 Fair, ball fields and other recreational facilities were located there. The present landscape is the result of natural introgression into a former culturally created landscape and, unlike the other portions of Flushing Meadow Park, the present landscape was not the one created for the fairs. The wood wharf and bridge remnants are not considered eligible for listing in the National Register. While their date and function may be unknown, they likely relate to modern use of the lake and not to its historic construction-period past. No further cultural resources studies are recommended for this site.

4.1.5 Flushing Creek Daylighting and Upper Flushing Creek. These projects would affect portions of the sites of the 1939-1940 and 1964-1965 New York World's Fairs. These events were significant in the cultural history of not only New York City, but also the United States. A number of monographs have been published evaluating various cultural aspects of the fairs.

World's Fair Landscape. The preliminary analysis of cultural resources, conducted as part of the 1996 USACE reconnaissance study, noted that the New York State Amphitheater (since demolished) has been determined eligible for listing on the National and State Registers of Historic Places, and the Unisphere from the 1964-1965 World's' Fair is a designated New York City landmark. Other properties and structures from the World's Fairs may be eligible, but have not yet been formally evaluated. The analysis further stated that "an important component of potentially eligible resources is the landscape of the park, which contributes to its significance" (Dames & Moore, Inc. 1996: D-10). We concur with this assessment (see Table 4.1).

The present Flushing Meadows Park landscape is a direct result of the creation of the two World's Fairs, and in itself represents an "artifact" associated with the fairs. In the vicinity of the FLUBERP site, the existing landscape design is more directly associated with the 1964-1965 Fair, as noted in Section 3.3.2. This is reflected in the existing pattern of roadways as well as the fountain, which was constructed for the fair. The existing Flushing Meadows landscape is a cultural landscape, bearing no relationship to the "natural" salt meadow landscape that existed prior to the early decades of the twentieth century. This cultural landscape is definitely associated with "significant events in our history" [i.e., the New York World's Fairs] and thus potentially eligible for the NRHP under Criterion A. Specifically, this landscape represents the National Register category of a Designed Historic Landscape (Keller and Keller 2002).

The FLUBERP alternative that calls for the removal of the fountain and creation of marshland would completely destroy the remaining World's Fair landscape elements in the project area. The daylighting alternative that would leave the fountain intact, would also recreate an open channel such as existed for the 1939-1940 Fair. Creation of wetlands elements adjacent to the creek, however, would not be in keeping with the landscape of the fair. Re-establishment of an open channel would involve maintenance of an adjacent park landscape, and reconstruction of bridges and the park roadway system to their ca 1939 configuration. Further studies by historic preservation and historic landscape specialists should be conducted prior to FLUBERP project design.

Tide Gate and Dam. The proposed project could involve modification of the culverts under the LIRR embankment and the tide gate under the Porpoise Bridge. The latter structure was constructed prior to the 1939 World's Fair, and its construction enabled the creation of the landscape for both World's Fairs as well as the present Flushing Meadow Park. The tide gate and dam do not appear to have been substantially altered. The structures are potentially eligible for the NRHP as an element of the World's Fair/Park landscape, as well as for its key function in enabling the creation of the World's Fair and the Park.

The nature of the modifications proposed for the tide gates as part of the FLUBERP have not been specified. National Register-eligibility of the structure should be evaluated further and the specific FLUBERP construction plans evaluated for their impacts on the aspects of the dam contributing to potential NRHP eligibility.

Long Island Railroad Embankment. The present Long Island Railroad embankment and culverts are of relatively recent construction and do not represent potentially National Register-eligible constructions.

World's Fair/Flushing Meadow Park Archaeology. It is unknown if construction of the Flushing Creek daylighting project would impact any significant archaeological remains. Such resources could potentially be the remains (i.e., foundations) of buildings from the World's Fairs, fill deposits underlying these buildings, or surficial deposits associated with fair and park visitors.

The contract that each exhibitor signed with the 1964-1965 World's Fair Corporation provided that at the end of the fair all buildings would be removed to a depth of four feet below grade and that each plot would be graded and planted with new grass (Wood 1964:93). A similar provision was included in the 1939-1940 fair contracts. It is not known if foundation remains of any of the buildings from either fair exist within the park. It is also not

known whether any of the building foundations would have exceeded the depth of the post-fair demolition. Pilings underlying the foundations, which apparently were left in place, would mark the building sites. No structural remains were noted during the examination of an open cut at the site of one of the 1939 buildings.

Below the depth reached by building foundations, fill deposits of ash and refuse from the Corona dumps could remain intact. Deposits at the site of the Queens Museum indicated that the fill contained nineteenth and early twentieth century artifacts.

Demolition and grading in and adjacent to the World's Fair building sites in conjunction with fair deconstruction and subsequent landscaping would most likely have removed any surficial deposits associated with fair visitors. At sites not subject to construction after demolition of the 1939-1940 Fair buildings (e.g., the site of Gardens on Parade and British Empire Pavilions), refuse accumulations dating after demolition of the 1939 buildings would more likely be present. Artifact deposits associated with fair visitorship could be considered a significant cultural resource under National Register Criterion A and/or Criterion D, as could underlying early twentieth-century landfill deposits.

The extent and depth of disturbance should be evaluated when specific project plans become available. Test excavations utilizing backhoe trenching and/or manual excavations could determine if any such deposits are present.

4.1.6 North College Point/Old Marina. The proposed FLUBERP site was the location of a shipyard established between ca. 1916 and 1924 (see Table 4.1). Shipyard facilities included a number of piers extending into the East River. Remains of these piers were noted during the reconnaissance and are visible on recent aerial photographs. Several derelict barges, probably associated with the period of shipyard operation, also were noted at the site. Remains of the shipyard, representative of College Point's marine-oriented commercial activities, are potentially National Register eligible under Criteria C and D. Creation of tidal marsh and tidal shoreline environments by the proposed FLUBERP would most likely result in the removal of these features. A Phase II cultural resources investigation should be undertaken to evaluate the significance of these remains. The study should involve additional documentary research on the shipyard and examination of the ship and pier remains by a marine historian and/or archaeologist.

The ca. 1920s shipyard buildings would have been located south of the shoreline and their location would now be beneath a fill bank some 15 to 20 feet in height. Unless the proposed project involves substantial cutting back of the bank, no impacts to the site of these shoreward facilities are anticipated. This likelihood should be assessed once final project plans become available. In addition, documentation of current conditions in the remainder of the project area should be undertaken.

4.1.7 Powell's Cove/Tallman's Island.

Prehistoric Site. A prehistoric site was noted on high ground that extended to the vicinity of the present 7th Avenue and 130th Street, near the southwestern portion of the proposed FLUBERP site. The FLUBERP site represented a tidal marsh environment prior to twentieth-century landfilling. While the prehistoric site would not have extended into this marsh environment, it has been noted that prehistoric occupants of shoreline sites may have disposed of refuse in adjacent marshlands (see Pickman 1980). The proposed FLUBERP activities would result in excavation of landfill to recreate tidal marsh environments.

FLUBERP plans should be evaluated to determine whether excavations would penetrate beneath the existing fill to impact underlying marsh deposits. If so, archaeological borings or test trenching may be considered to evaluate the presence or absence of prehistoric material in the portion of the project site adjacent to the reported prehistoric site at 130th Street and 7th Avenue. However, the potential for actually locating prehistoric sites in this area would be very low. Any proposed examination of these areas should only be considered in locations that have not been impacted by previous dredging activity.

Twentieth-Century Pier. The Powell's Cove area remained largely undeveloped until the early twentieth century. The only development within the project area was the construction of a pier/breakwater in the early twentieth century in the vicinity of the alignment of 6th Avenue. Pilings were noted at this location during the site reconnaissance. These remains would not appear to meet any of the National Register eligibility criteria. Nevertheless, documentation of existing conditions in the remainder of the project area should be undertaken.

4.2 AREAS EXCLUDED FOR THE FLUBERP

Due to project design changes, the following areas have been excluded from FLUBERP activities. However, since the analysis had already been completed, the recommendations for cultural resources in excluded areas have been included in case these locations are reconsidered for future ecosystem restoration activities (Table 4.2).

4.2.1 College Point West Shoreline.

Prehistoric Sites. In two areas of the College Point western shoreline (in the vicinity of Graham Court and 26th Avenue and south of 31st Avenue) prehistoric sites were noted atop the bluffs that border the shoreline. It is likely that these bluff-top sites have since been removed by construction. Prehistoric artifacts have been recovered from the beach below one of these sites. The artifacts may have been deposited on the beach due to bluff erosion, although refuse deposits may have accumulated at the bluff base during the prehistoric occupation of these sites. The bluff base now represents a beach environment subject to Flushing Bay wave action. During the prehistoric occupation of the sites, when sea levels were lower than at present, the bluff base could have represented marsh-type environments and artifacts could remain within or beneath such marsh deposits. If the areas below the two bluff top prehistoric sites are reconsidered for future FLUBERP activities, archaeological borings could determine the presence of marsh deposits beneath the beach sands as well as the presence of prehistoric artifact deposits.

Nineteenth-Century and Twentieth-Century Piers. Potential environmental restoration sites in this area could include the locations of the remains of various derelict piers and associated structures (see Table 4.2), as noted in Section 3.3.4.1. It was not possible to obtain access to many of these sites. Should this area be considered for future environmental restoration activities, further evaluation of these remains should be made either after rights of entry for various properties are obtained or by means of marine reconnaissance. No further work is recommended for the possible ferry structures (number 1 in Table 4.2) or the brick building (number 3 in Table 4.2) since these resources are outside the project area and will not be affected. Moreover, documentation of the present conditions in the remainder of the project area should be undertaken.

Table 4.2 Recommendations for the Areas Excluded from the FLUBERP

Location	Prior or Reconnaissance Recorded Cultural Resources	Recommendations
College Point West Shoreline (eastern shoreline of Flushing Bay)	*Prehistoric:* **possible remains associated with the Grantville and Graham Court sites** *Historic:* 1 **various steamboat docks 1852 to later 1900s** within and adjacent to project area; remains of possible ferry boarding gangway noted during reconnaissance **2 coal yard, boat house, out-buildings and two piers by 1886**; piers noted during reconnaissance with no opportunity for examination **3 extant brick building** likely one of the industrial buildings from late 1800s to early 1900s **4 pier at site of Arrow Yacht Club by 1916**; club still present as are portions of pier and a building that may relate to original 1920s structures **5 bluff area between 25th and 28th Avenues,** former location of Graham Court prehistoric site; post-1951 site of nursing homes and apartments; possible ca 1924 pier **6 houses by 1926** between 28th and 29th Avenues; some still extant as are piers and pilings and derelict boat along shoreline **7 pier and boathouse at 29th Avenue** ca 1910s; name changes but still extant **8 small structures and a large pier by 1924** and a marina by 1969 around 30th and 31st avenues; pilings noted during reconnaissance in area of 1924 pier and later marina **9 sand and gravel and asphalt companies between 1926 and 1951** on Grantville bluff area with a loading facility; some companies still in operation and loading facility still extant along with derelict pilings	Phase IB/II deep testing to determine presence of prehistoric remains 1 No further work 3 No further work 2, 4-9 Phase IB examination Remainder of project area: Documentation of current conditions
Meadow Lake	*Prehistoric:* None, overall low sensitivity *Historic: In or Adjacent:* 1 **1939-1940 World's Fair Structures:** Amphitheater and Music Hall; Merrie England/Dancing Campus and Opry House; bridges over Meadow Lake outlet stream; Old New York/Artist's Village/Gay New Orleans exhibits; boat house and docks; Heineken's exhibit; shoreline at outlet stream was bulkheaded; extant wood pilings may represent remains of bulkheading; Meadow Lake east shore exhibits: penny arcade, Pabst Garden restaurant, Washington Hall, Cuban Village, Parachute Jump; Meadow Lake southern shoreline informal recreation area; one dock for lake maintenance activities **2 1964-1965 World's Fair Structures:** Amphitheater from prior World's Fair refurbished; adjacent docks for boating activities; Mississippi Riverboat attraction; Hawaii Exhibit complex; boathouse and docks from prior World's Fair refurbished	1 and 2 potentially NRHP-eligible cultural landscape; additional historic preservation and historic landscape studies 1 and 2 potentially NRHP-eligible archaeological remains; Phase II evaluation study
Flushing Bay Navigational Channel	*Prehistoric:* None, overall low sensitivity *Historic:* **1 Dike parallel and adjacent on west side of channel**, 4663 feet long, ca 1878; portions still extant and pilings noted during reconnaissance may relate to the dike	Deep testing for prehistoric sites 1 Potentially NRHP-eligible; Phase IB marine examination of extent and condition of the dike and for presence of possible shipwrecks

4.2.2 Meadow Lake. The same cultural resources considerations noted for the Flushing Creek Daylighting project apply to the Meadow Lake area, which served as the amusement area for both World's Fairs (see Section 3.3.2.6). Should this project be reconsidered for FLUBERP activities, impacts on the World's Fair landscape and building sites should be evaluated (see Table 4.2).

4.2.3 Flushing Bay Navigational Channel.

Flushing Bay Channel Dike. It is possible that pilings noted near the southern portion of the Flushing Bay channel could represent a portion of the nineteenth-century channel dike. Depending on the extent and condition of such remains, the dike could be considered eligible under National Register Criterion A (as a contributing factor enabling the economic development of the Flushing area) or Criterion B. If dredging is considered in the future, a Phase IB marine examination of the extent and condition of the dike, as well as a survey for possible unrecorded shipwrecks should be undertaken. While no historic-period shipwrecks in or adjacent to the channel were noted, available sources do not necessarily list all actual ship remains (see Table 4.2).

Submerged Prehistoric Sites. As discussed in Section 3.2.3 of this report, a possibility exists that submerged prehistoric sites could remain beneath the waters of Flushing Bay. The analysis suggests that if such sites are present at the location of the Flushing Bay channel they would be approximately 30 feet below mean sea level. Further assessment of the possible presence of such sites would only be considered if future dredging was to extend below this approximate depth. However, the potential for actually locating prehistoric sites in this area would be very low. Any proposed examination of these areas should only be considered in locations that have not been severely impacted by previous dredging activities.

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Appendix A
VITAE OF PROJECT PERSONNEL

ARNOLD PICKMAN
Industrial Archaeologist

EDUCATION

M.A. Archaeology, New York University, 1985
B.A. Anthropology, New York University, 1976

EXPERIENCE

Mr. Pickman is currently an independent consulting archaeologist. He has fourteen years experience in prehistoric and historic period archaeology and has conducted various field investigations throughout eastern New York and New Jersey. He is experienced at conducting cultural resource investigations on large-scale projects including landfill, utility, and highway projects, which often require design of field methodology including predictive site modeling strategies, all phases of archaeological field investigations, and report preparation.

Mr. Pickman has directed and implemented a comprehensive array of field methodologies pertinent to cultural resource investigations, including developing and implementing research designs, and directing field components for Phase I and Phase II field investigations. As principal investigator and field director he has coordinated and supervised Phase I and II field investigations.

CONSULTING PROJECTS CONDUCTED FOR U.S. ARMY CORPS OF ENGINEERS

Mr. Pickman served as co-principal investigator and industrial archaeologist for a cultural resources investigation for the Joseph G. Minish Passaic River Waterfront Park and Historic area located in the City of Newark, New Jersey. The investigation included documentary research, field measurements, and photographic recordation of cultural resources at sites of the former Newark Lime and Cement Company, the New Jersey Railroad & Transportation Company, and the Stephens and Condit Shipping Company.

He served as industrial archaeologist for the Morris Canal Right-of-Way cultural resource investigation in preparation for the construction of the Joseph G. Minish Passaic River Waterfront Park and Historic Area in Newark, New Jersey.

Mr. Pickman recently conducted a cultural resources assessment at the locations proposed T-groin installations at Rockaway Beach, Edgemere, Queens County, New York. The investigation included field inspection of 3000 feet of shoreline, documentary research, and photographic documentation of site and field conditions.

He also conducted Stage IB and Stage II archaeological investigations of prehistoric and nineteenth century industrial sites on the Ramapo River in Passaic County, New Jersey. He has prepared an annotated bibliography for Hudson River Environmental Reconstruction. Mr. Pickman conducted an archaeological survey and developed a predictive model for Greenwood Lake, Passaic County, New Jersey. He has conducted a cultural resource reconnaissance for the Beach Erosion Control Project, Rockaway Inlet to Norton's Point, Brooklyn, New York.

OTHER ARCHAEOLOGICAL CONSULTING PROJECTS

Mr. Pickman has conducted many New York-area cultural resources investigations. His responsibilities included documentary research, field reconnaissance, photographic documentation, and report writing. His projects include:

- ☐ Cultural Resources Reconnaissance of the Atlantic Coast of Long Island, Jones Inlet to Rockaway Inlet, Long Beach Island, Nassau County, New York.

- ☐ Archaeological Testing and Construction Monitoring, Shoreline Protection and other improvements, Alice Austen Park, Borough of Staten Island, City of New York, conducted for Lomma Construction and New York City Department of Parks and Recreation.

- ☐ Archaeological Documentary Study and Field Testing, Sobel Court Park, Staten Island, New York. Conducted for New York City Department of Parks and Recreation.

- ☐ Archaeological Documentary Study, South Jamaica Urban Renewal Area, Borough of Queens, New York. Conducted for New York City Department of Housing Preservation and Development.

- ☐ Numerous Stage I and II archaeological investigations of prehistoric and historic sites in the counties of Suffolk, Westchester, Staten Island, Manhattan, Brooklyn, Queens, Nassau, Dutchess, and the Bronx.

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MICHELE HELENE HAYWARD, Ph.D.
Senior Archaeologist

EDUCATION

Ph.D. Anthropology, The Pennsylvania State University, 1986
M.A. Anthropology, The Pennsylvania State University, 1975
B.A. Anthropology, Beloit College, 1972

EXPERIENCE

Dr. Hayward has more than 20 years of experience conducting archaeological investigations and cultural resource management (CRM) projects throughout the Caribbean, Mexico, Central America, and the Eastern United States. Her experience in CRM consists of both reviewing projects and reports as a representative of the Institute of Puerto Rican Culture and conducting investigations for this agency and private firms. Dr. Hayward is fluent in Spanish and has extensive experience preparing documents and conducting interviews in Spanish. She is currently a Senior Archaeologist with Panamerican Consultants, Inc. (PCI). As Principal Investigator and Field Director for all levels of archaeological investigations, her duties include reconnaissance surveys and preliminary and intensive data recovery excavations of prehistoric and historic sites; archival research; and historic and prehistoric data analysis. She has extensive experience in report preparation and proposal writing as well as designing archaeological field strategies at all levels.

REPRESENTATIVE PANAMERICAN CONSULTANTS, INC. EXPERIENCE (1992 to Present)

Dr. Hayward has served as Principal Investigator and Co-principal Investigator for more than five cultural resources investigations at the United States Military Academy at West Point, Orange County, New York. Conducted for the New York District of the U.S. Army Corps of Engineers under subcontract, these investigations included Phase I cultural resource surveys for the Cadet Library Annex, Stewart Army Subpost, Gross Olympic Center, Range Road 22 timber harvest, Bull Hill Road Extension, former Married Junior Officers' Quarters (Building 124), Hurricane Floyd timber sale areas, and Stony Lonesome Road By-Pass.

She has also served as Principal Investigator for four (4) cultural resource investigations for proposed cellular communications tower projects for URS Corporation. Project areas for these investigations include locations in the following New York State counties: Erie, Cattaraugus, Chautauqua, and Steuben. The investigations included supervising archival and documentary research, directing the systematic survey of the project areas, and report preparation.

In addition, she served as Laboratory Director for the cultural resources investigation of 10 wetland restoration areas in Central and Northern New York. Conducted for the Natural Resources Conservation Service, these investigations were conducted for sites in Broome, Jefferson, Madison, Monroe, Montgomery, Oswego, Otsego, Lewis, Oneida, and St. Lawrence counties.

Her experience in CRM consists of both reviewing projects and reports as a representative of the Institute of Puerto Rican Culture and conducting investigations for this agency and private firms.

Dr. Hayward is fluent in Spanish and has extensive experience preparing documents and conducting interviews in Spanish. In addition to her responsibilities as Senior Archaeologist with Panamerican, Dr. Hayward has co-written proposals to obtain funds from the National Park Service, administered by the Puerto Rican State Historic Preservation Office (PRSHPO), to continue research on island rock art sites. This interest was initiated while she was employed at the Institute of Puerto Rican Culture.

She has served as principal investigator and field director and laboratory director for Phase II testing of two prehistoric sites within the municipios of Dorado and Toa Baja, Puerto Rico, for the Río de la Plata flood control study for the Jacksonville District, U.S. Army Corps of Engineers (USACE). She has conducted other intensive excavations for the USACE in the Caribbean, including a data recovery project (Phase III) at the San Felipe del Morro fort in San Juan, Puerto Rico, and a Phase III investigation at the LO-9 prehistoric site in the Piñones north coast region of the Municipio of Loíza.

Dr. Hayward served as the principal investigator for the Aklis archaeological investigation (Phase III) conducted for the National Park Service at the U.S. Fish and Wildlife Refuge in St. Croix, U.S. Virgin Islands (USVI). Her duties included field testing, laboratory analysis and report writing.

Dr. Hayward has also served as Research Archaeologist and Project Review Archaeologist for the Center of Archaeological Investigations, Institute of Puerto Rican Culture, San Juan, Puerto Rico. Her duties included the initial assessment of some 600 to 800 annual permit applications for state and privately funded construction projects to determine the level of archaeological investigation; review of CRM reports for Phase I, II, and III projects; review of proposals for Phase II and III investigations; preparation of detailed scopes of work for Phase II and III studies; meetings with applicants, both private and public, to discuss the level of project effort; and principal investigator on Institute-sponsored archaeological research projects.

Dr. Hayward served as Principal Investigator and Co-Author with Mark Steinback for the development of a research design for Civil War and postbellum sites (1862-1892) at the Marine Corps Deport, Parris Island, South Carolina. Conducted for the U.S. Army Corps of Engineers, Savannah District, the project located published sources and original documents pertaining to Parris Island, presented this information in a systematic format, outlined the history of Parris Island, identified archaeologically sensitive areas, and assessed the potential for further research.

Dr. Hayward served as Principal Investigator and Field/Laboratory Director for Panamerican's data recovery investigation (Phase III) of two historic deposits at the Spanish Colonial period fort, San Felipe del Morro in San Juan, Puerto Rico. El Morro is administered by the National Park Service and the work was conducted under contract to the Jacksonville District, USACE. Six-weeks of intensive field work entailed: the excavation of a 2-meter wide trench in the central portion of Midden Area 2 located on a rock ledge at the base of the fort's wall; the excavation of half of a 5-x-4 meter block of 1-x-1 meter units in Midden Area 1 within El Morro's grounds; and the establishment of a concomitant-to-the-field-work laboratory for preliminary analysis. Various researchers undertook studies of the field and background results: Dr. Jalil Sued-Badillo (military history of El Morro), Yvonne Narganes Storde, M.A. (faunal remains), Gregory and Dorothy Walwer, M.A.s (botanical remains), Thomas Addyman, B.A. (stratigraphy at Midden Area 1), and Dr. Hayward (historic period artifacts). Dr. Hayward then served as the principal author of the final report which incorporated the results of all of the specialized studies as they related to issues or hypotheses regarding the depositional history of the middens and the nature of military life, socio-economic status and subsistence at El Morro.

Dr. Hayward served as Senior Archaeologist for a geomorphological and archaeological investigation in the Upper New York and New Jersey Harbor (Hudson Essex, and Union Counties, New Jersey and Kings, Richmond, and New York Counties, New York). Part of the New York and New Jersey Navigation Study, the project was conducted for Barry A. Vittor & Associates, Inc., under contract to the U.S. Army Corps of Engineers, New York District. The geomorphological work was subcontracted to Geoarchaeology Research Associates. An interdisciplinary approach was used to examine the potential for cultural resource preservation in buried contexts flanking ten navigation channels. Fieldwork stressed the inspection of samples and cores from 114 geotechnical borings. A working model of cultural resource sensitivity was developed that ranked the channels and various segments based on depth and extent of previous dredging, and stratigraphic sequence. It was concluded that the navigation channels had moderate to high potential for intact deposits pre-dating 6000 B.C. Sites dating after 6000 B.C. were less likely to be preserved because they were higher in elevation and more exposed to destructive long-term effects of dredging and shipping activities. Additional geomorphological and archaeological studies were recommended for the most sensitive channels for cultural resources, which were Newark Bay, Anchorage, Claremont and Port Jersey.

ARCHAEOLOGICAL LABORATORY EXPERIENCE

Dr. Hayward has served as Laboratory Director, taught laboratory methods at the graduate level, and recently served as Laboratory Director and supervisor on PCI projects, including the El Morro mitigation project (San Juan, Puerto Rico) and the Aklis prehistoric site at Sandy Point Wildlife Refuge (St. Croix, USVI).

As Laboratory Director her activities included the analysis of prehistoric material from two sites located during a Phase I survey for the Río Anton Ruiz Flood Control Study, Humacao, Puerto Rico. The project was undertaken for the Jacksonville District, USACE.