4839 R
HUNTER RESEARCH
2003

USACE
106-R

PHASE IB ARCHAEOLOGICAL SURVEY
ARTHUR KILL POWER PLANT LATERAL
STATEN ISLAND, BOROUGH OF RICHMOND
RICHMOND COUNTY, NEW YORK

Prepared for:

Natural Resource Group, Inc.
1000 IDS Center
80 South Eighth Street
Minneapolis, MN 55402

Prepared by:

Richard Hunter, Principal
William Liebeknecht, Principal Investigator

NOVEMBER 2003

751

Hunter Research, Inc. Historical Resource Consultants 120 West State Street, Trenton, NJ 08608-1185 609/695-0122 609/695-0147 Fax
e-mail address: hri@hunterresearch.com www.hunterresearch.com

PHASE IB ARCHAEOLOGICAL SURVEY
ARTHUR KILL POWER PLANT LATERAL
STATEN ISLAND, BOROUGH OF RICHMOND
RICHMOND COUNTY, NEW YORK

Prepared for:

Natural Resource Group, Inc.
1000 IDS Center
80 South Eighth Street
Minneapolis, MN 55402

Prepared by:

Richard Hunter, Principal
William Liebeknecht, Principal Investigator

NOVEMBER 2003

MANAGEMENT SUMMARY

This report describes the results of a Phase 1B archaeological survey performed for the proposed lateral gas pipeline that is to be constructed along an alignment extending south along the west side of Staten Island and feeding into the existing Arthur Kill Power Plant in the Borough of Richmond, Richmond County, New York City, New York. This survey was a direct outgrowth of an earlier Phase 1A level study of the project corridor carried out by Hunter Research in 2000-01.

Work tasks consisted of: site-specific archival research; geomorphological analysis; systematic archaeological testing along those non-wetland portions of the pipeline alignment where open trenching and staging operations are proposed; analysis of research and fieldwork data; and report preparation. Also included in the work scope was Phase 1A level study of a proposed temporary workspace at the northern end of the alignment. The subsurface investigations involved the excavation of a total of 197 shovel tests (several of which were extended to a depth of six feet using a manual bucket auger), five excavation units and five geomorphological tests.

The potential for encountering evidence of three previously documented prehistoric sites and five potential historical archaeological sites, all deemed to lie close to the project alignment, were specifically considered during the course of this work. No significant archaeological remains associated with these or any hitherto undiscovered archaeological sites were found. No further prehistoric or historical archaeological study is considered necessary in connection with the project as currently proposed.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF PLATES AND TABLES

ACKNOWLEDGMENTS

This study was undertaken by Hunter Research, Inc. for the Natural Resource Group, Inc. (NRG). Jon Berkin, Pat Robblee and Bart Jensen of NRG have all maintained a close interest in the progress of this work and on numerous occasions supplied critical background information and project-related materials. We also gratefully acknowledge the logistical assistance we received in the field from Timothy Foxen of NRG Energy, Inc. and *Allan Fillippi of the Arthur Kill Power Plant.*

We wish to acknowledge the assistance of Enviroscan, Inc., and specifically Dr. Timothy Bechtel, in completing the geomorphological work component of this study. We also received valuable assistance from Michael Tomkins of Tomkins Historical Research and from the staffs of the Staten Island Institute for Arts and Sciences *in St. George and the Staten Island Historical Society in Richmondtown* in gathering research data for this study.

Background and historical research for this study was undertaken by Michael Tomkins and James Cox under the direction of Richard Hunter and Damon Tvaryanas. Phase 1A level cultural resource inspection of the northern end of the project alignment and proposed temporary workspace was carried out by William Liebeknecht and the late Susanne Eidson. Phase 1B archaeological fieldwork was completed by James Cox, Jack McShane, Ariadne Moore and Sarita Morse under the overall direction of William Liebeknecht and the day-to-day supervision of Benjamin Harris. Report graphics were prepared by Frank Dunsmore and Michael Murphy under the direction of James Lee. The report was written by Richard Hunter and William Liebeknecht, with editorial and report production assistance from James Lee.

Richard W. Hunter, Ph.D., R.P.A.
William Liebeknecht, M.A.
Principal Investigators

Chapter 1

INTRODUCTION

A. PROJECT BACKGROUND AND SCOPE OF WORK

This report describes a Phase IB archaeological survey performed in connection with a proposed lateral gas pipeline that is to be constructed along an alignment extending south along the west side of Staten Island and feeding into the existing Arthur Kill Power Plant in the Borough of Richmond, Richmond County, New York City, New York (Figures 1.1 and 1.2). This survey was conducted by the Trenton, New Jersey-based archaeological consulting firm of Hunter Research, Inc., under contract to the Natural Resource Group, Inc. of Minneapolis, acting on behalf of Arthur Kill Power LLC (Arthur Kill), a wholly owned subsidiary of NRG Energy Inc. Enviroscan, Inc. of Lancaster, Pennsylvania, working as a subconsultant to Hunter Research, provided specialist geoarchaeological consulting services for this project (Appendix A).

The proposed gas pipeline alignment is depicted on Figure 1.3, and a description of the pipeline route—from north to south—is presented below.

The project will begin at Duke Energy Corporation's existing 30-inch diameter pipeline, approximately one mile south of Goethals Bridge. Arthur Kill will construct a meter station at this point. The meter station will consist of a prefabricated concrete building that will measure 12 feet wide, 52 feet long and 10 feet high. From this point, the pipeline proceeds for approximately 0.2 miles southeast across open land along an alignment adjacent to the Williams Transco Gas Pipeline to a point immediately north of the Staten Island Rapid Transit Railroad (Travis Spur).

The pipeline route then crosses under the Travis Spur and proceeds for approximately 0.8 miles south adjacent to the east side of the Travis Spur under tidal waterbodies and wetlands. To avoid impacts on the tidal waterbodies and wetlands, Arthur Kill will install the pipeline along this segment using the horizontal directional drill (HDD) construction technique, a trenchless method that avoids surface disturbance.

After the HDD crossing of Saw Mill Creek, the pipeline route crosses to the west side of the Travis Spur and proceeds south for approximately 0.8 miles. From this point, Arthur Kill will HDD under Meredith Avenue, the Travis Spur, and Neck Creek.

After completing the HDD installation under Neck Creek, the pipeline route proceeds for 0.3 miles south adjacent to the west side of the Travis Spur across primarily open land at which point it turns and proceeds for 0.1 miles southwest and terminates at the proposed gas regulation and conditioning facility located at the Arthur Kill Power Plant. The gas regulation building will measure 12 feet wide by 60 feet long by 10 feet high; the housing for the gas-fired heaters will measure 12 feet wide by 50 feet long by 10 feet high.

The archaeological survey document presented here supplements and re-uses portions of an earlier Phase IA cultural resource survey report produced by Hunter Research in early 2001. The work undertaken as part of the Phase IB archaeological survey generally follows the recommendations included in the earlier Phase IA report. The Phase IA survey noted some potential for prehistoric and historical archaeological resources being encountered within the immediate vicinity of the project corridor and consequently recommended that a Phase IB archaeological survey with

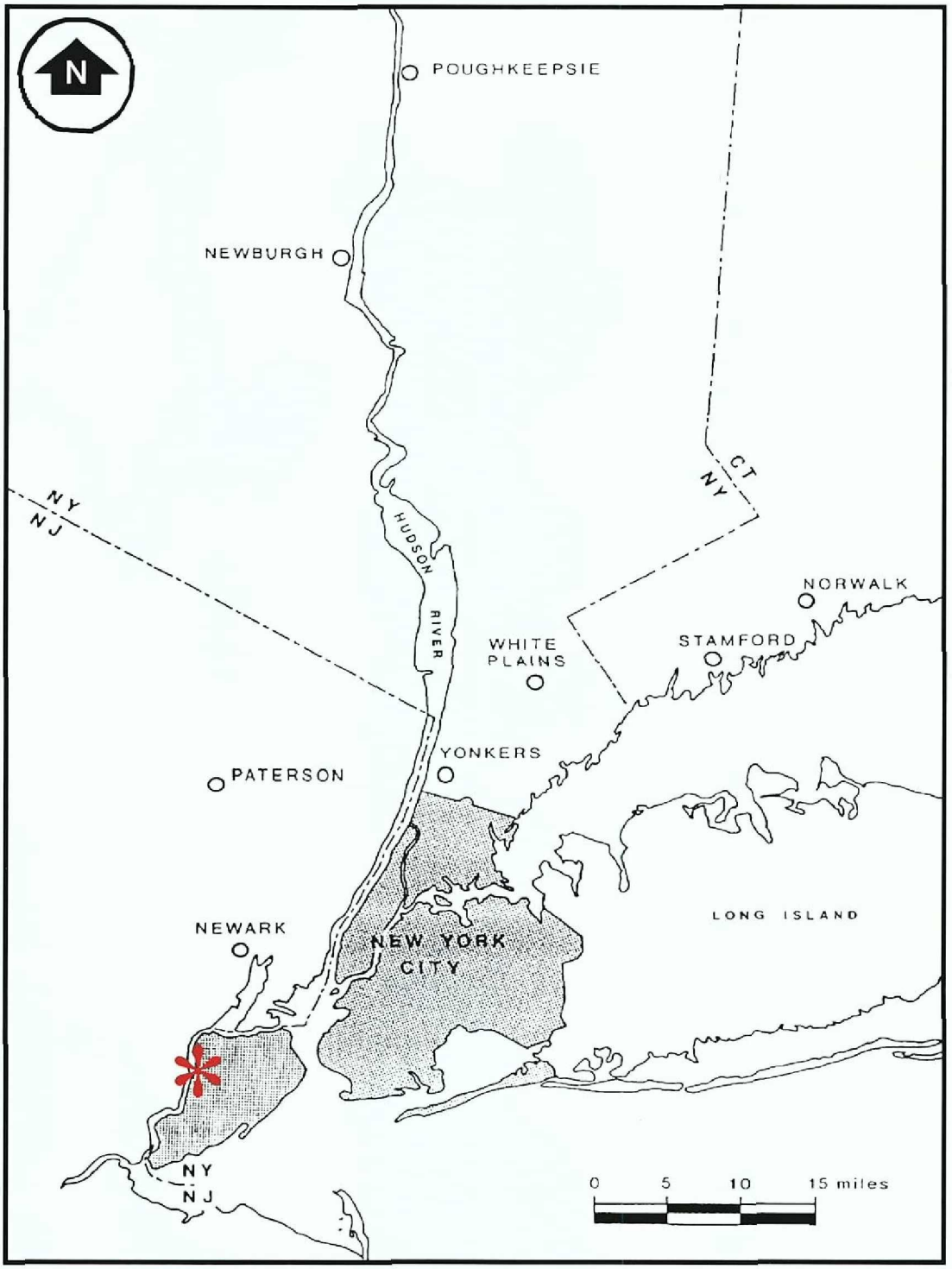


Figure 1.1. Location of Project Area (starred).

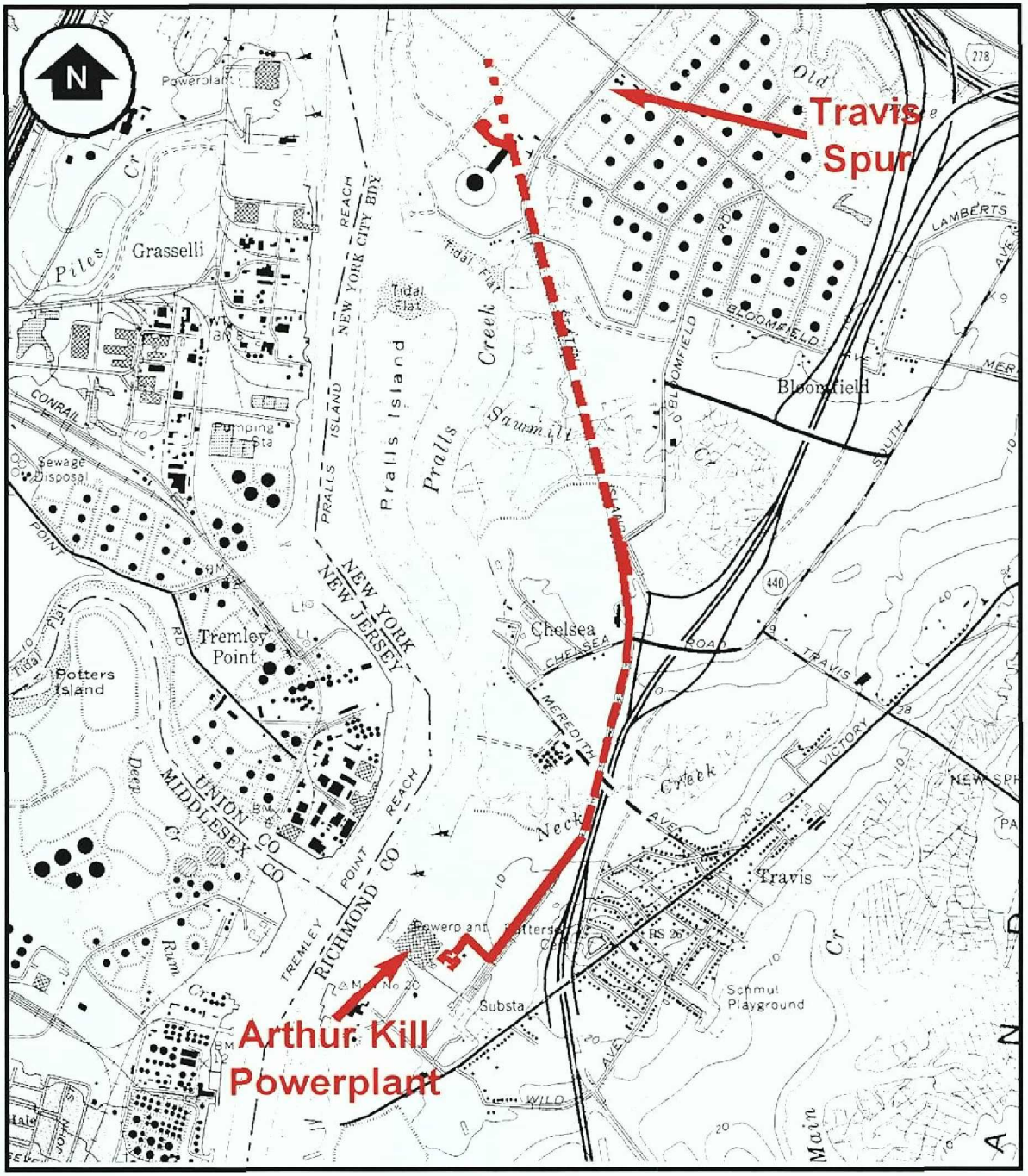


Figure 1.2. Detailed Location of Project Corridor (Indicated in Red). Source: USGS Arthur Kill NY NJ Quadrangle, (1966 [Photorevised 1981]). Scale 1 inch: 2000 feet. Project corridor shaded

subsurface testing be conducted in archaeologically sensitive areas where project-related ground disturbance was envisaged (Hunter Research, Inc. 2001).

The purpose of this Phase IB archaeological survey was threefold: 1). to identify any previously documented prehistoric or historic resources within those segments of the project corridor where open trenching, staging of horizontal directional drilling (HDD) equipment, temporary work areas and other project-related ground disturbance were proposed; 2). to provide a preliminary evaluation of the historical significance of any archaeological resources that were identified; and 3). to make recommendations, as appropriate, concerning the need for further archaeological study in connection with the proposed project actions.

Survey tasks in this instance have consisted of: limited additional historical background research, focusing on historic properties close to those sections of the project corridor where ground disturbance will occur; archaeological and geomorphological field testing in proposed HDD staging areas and along segments of the project alignment where open trenching is proposed; field inspection of a 4,800-foot-long temporary work area proposed at the northern end of the project alignment; and analysis and reporting of all research and field data.

These investigations have been performed as part of project-related compliance with the permitting process of the New York State Public Service Commission. These investigations were also conducted in accordance with the instructions and intents of various applicable Federal legislation and guidelines governing the evaluation of project impacts on archaeological resources, notably: Section 106 of the National Historic Preservation Act of 1966, as amended; Section 101(b)(4) of the National Environmental Policy Act of 1969; Section 1(3) and 2(b) of Executive Order 11593; the regulations and guidelines for determining cultural resource significance and eligibility for the National Register of Historic Places (36 CFR 60 and 63); the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (36 CFR 61); the regulations and guidelines specifying the methods, standards and reporting requirements for the recovery of scientific, prehistoric, historic and archaeological data (36 CFR 66); and the regulations and guidelines for the protection of historic properties as published in the Federal Register on May 18, 1999 by the Advisory Council on Historic Preservation (36 CFR 800).

Senior Hunter Research personnel who were responsible for undertaking these investigations meet the federal standards for qualified professional archaeologists as specified in 36 CFR 66.3(b)(2) and 36 CFR 61. All documentation and archaeological materials from this study will be stored at the Hunter Research offices in Trenton, New Jersey until the acceptance of the final report by the appropriate agencies. At this point, these materials and data will be dispatched to the New York State Museum or other approved repositories for permanent curation.

B. POTENTIAL ARCHAEOLOGICAL RESOURCES, PREVIOUS RESEARCH AND PRINCIPAL SOURCES OF INFORMATION

The key study relevant to this survey is the Phase IA cultural resource survey performed by Hunter Research for the project corridor in 2000-2001. The report on this earlier survey presented and reviewed the critical historical and archaeological literature pertaining to the project, identifying a total of five prehistoric resources and 21 historical archaeological resources that potentially lay within or close to the project corridor (Hunter Research, Inc. 2001).

Taking into account the more precisely defined course of the finally selected project alignment and the fact that portions of the pipeline are to be installed through

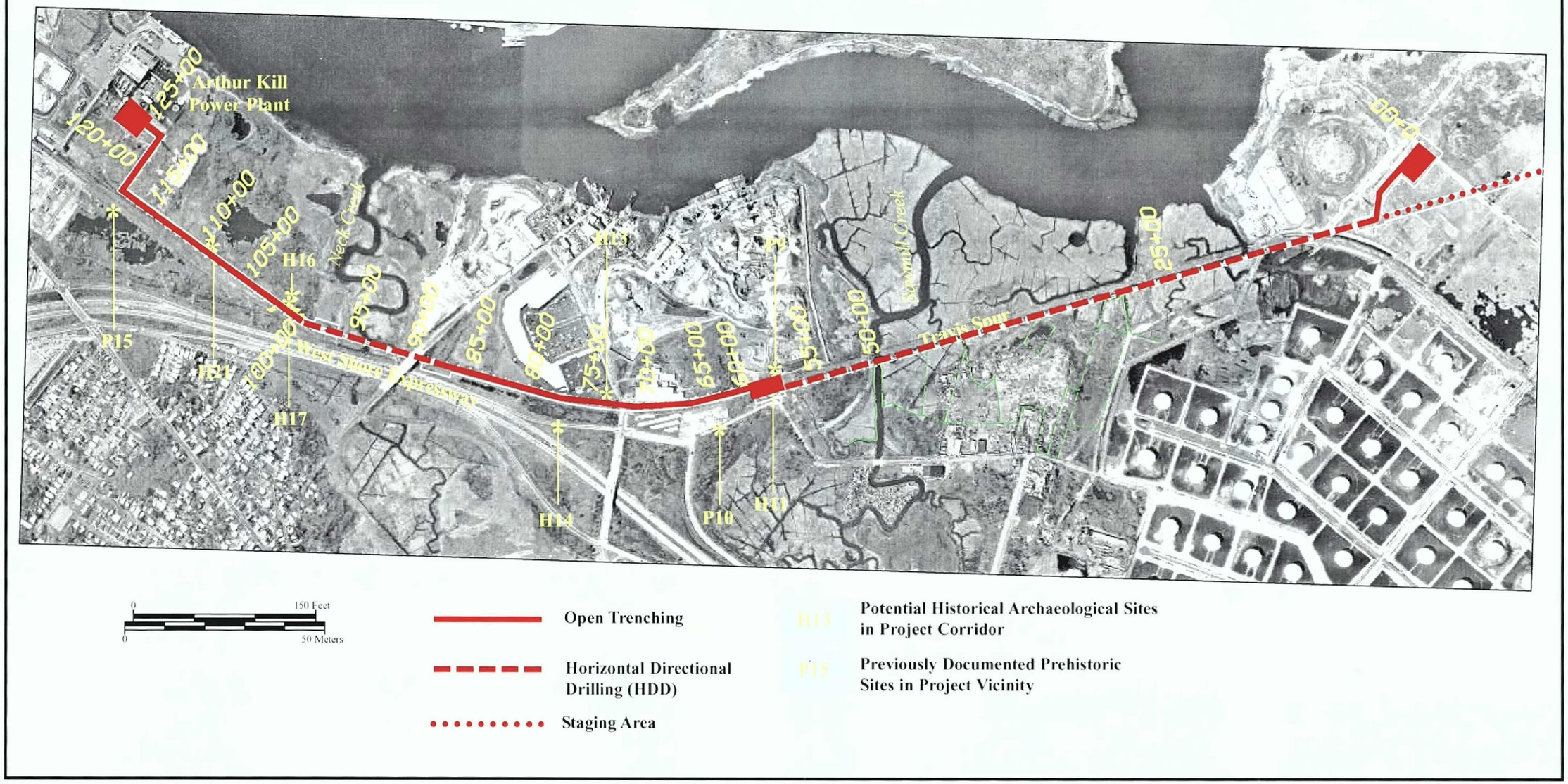


Figure 1.3. Map Showing Project Alignment.

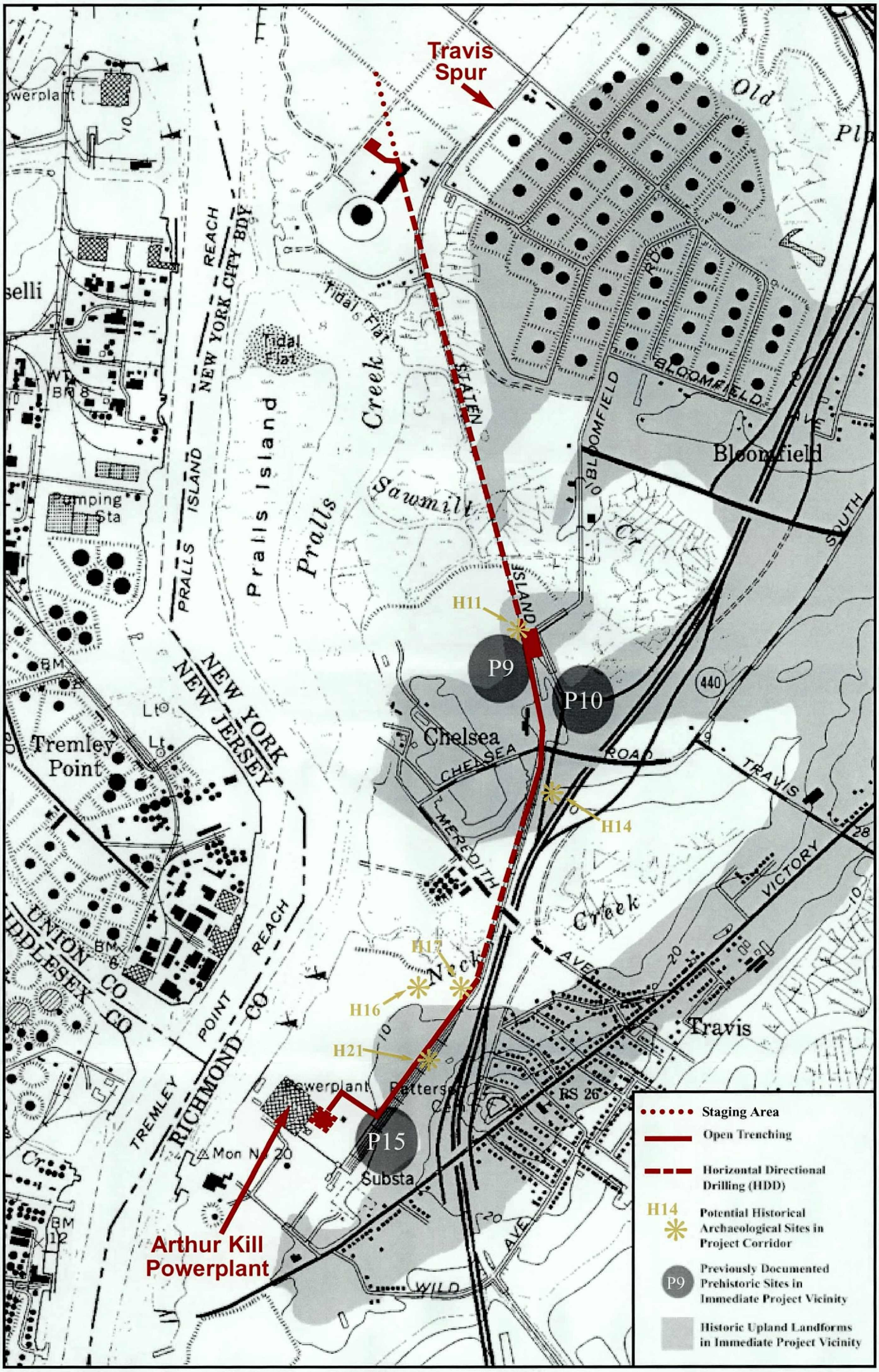


Figure 1.4. Map Showing Locations of Potential Prehistoric and Historical Archaeological Resources in Immediate Vicinity of Project Alignment (see Table 1.1 for Site Detail).

horizontal directional drilling, the number of potential archaeological resources lying within or close to areas of project impact was greatly reduced. As a result the current survey has been concerned with a total of three prehistoric resources and five historical archaeological resources. Details of these resources are summarized in Table 1.1; their locations in relation to the project alignment are shown in Figure 1.4.

No other cultural resource studies have been conducted in the immediate project vicinity other than the earlier Phase IA cultural resource survey and the various other studies referenced in Chapter 1B of the report on this survey. The principal sources of information are likewise referenced in the earlier report. The additional historical research conducted for the Phase IB survey was conducted at the Richmond County Courthouse, the Staten Island Historical Society, the Staten Island Institute of Arts and Sciences, the Staten Island Institute of Arts and Sciences, the New-York Historical Society and the New York Public Library.

Table 1.1. Summary of Potential Prehistoric and Historical Archaeological Resources in the Vicinity of the Project Alignment (See Figure 1.3 for Resource Locations).

Resource #	Resource Name/Identification #	Resource Type	Note/References
P9	NYSM 8501	Prehistoric archaeological site; camp	1904 site files (Set A) (Staten Island)
P10	Chelsea Burying Ground; NYSM 746 and 4627; NYOPRHP A085-01-0135; Boesch 71	Prehistoric archaeological site; Late Archaic/Early Woodland village/camp with burials	1898 site files (Staten Island); Skinner (1909); Salwen updated site inventory form in 1967 – lodges, graves, grooved axes; no pottery was reported. Additional artifacts excavated by Skinner in 1909
P15	Long Neck South Site; NYSM 4596; Boesch 39	Prehistoric archaeological site; camp	1904 site files (Set A) (Staten Island); Skinner (1909); Parker (1922) – scattered lodges and some shell recovered
H11	Cary Site	House	Site of pre-1830s house
H14	Van Pelt Site	House	Site of pre-1830s house (possibly 18th-century or earlier); site possibly destroyed by road/rail construction
H16	Williams Site	House and outbuildings	Site of pre-1853 house and other buildings
H17	Cannon Site 1	House and outbuildings	Site of late 19th-century house and other buildings (maybe same site as H16)
H21	Cannon Site 3	House	Site of 18th/19th-century house

Chapter 2

GEOGRAPHICAL SETTING

The project corridor is located within the Atlantic Coastal Plain on the western side of Staten Island within an area of tidal marshland and several low terrace-like landforms that finger westward toward the Arthur Kill from the main spine of the island (Figure 1.2). Elevations along the corridor range between sea level and approximately 15 feet above sea level. Two main tributary drainages of the Arthur Kill cross the project corridor: Sawmill Creek, which rises near the hamlet of Bloomfield, flows west beneath Bloomfield Road and enters the Kill opposite Pralls Island; and Neck Creek, which meanders generally westward through the marshland between the communities of Chelsea and Travis, entering the Kill roughly a mile to the south of Sawmill Creek opposite the mouth of the Rahway River. At the northern end of the corridor, the much-altered drainage of what was historically known as Balls Creek enters the Kill at the northern end of Pralls Island.

The bulk of Staten Island is formed primarily from the terminal moraine of the final Pleistocene glaciation. The project corridor lies in the general vicinity of this terminal moraine, to the west and south of a band of surficial glacial till and possibly stratified drift. The glacial deposits consist largely of unconsolidated sands and gravels overlying earlier Cretaceous sand, silt, and clay of the Coastal Plain. However, along the east side of the Arthur Kill in the vicinity of the project corridor, the fundamental underlying geological formations are almost entirely masked by recent coastal landforms and tidal marsh and by late 19th- and 20th-century land use (United States Geological Survey 1901; Schuberth 1971; Isachsen 1980).

Chapter 3

PALEOENVIRONMENT AND PREHISTORIC BACKGROUND

The Pleistocene Epoch witnessed a series of cold periods and associated "ice ages," the most recent of which terminated approximately 14,000 to 12,000 years ago. One of the most dramatic effects of these ice ages was the lowering of ocean levels worldwide as sea water was frozen and trapped in glaciers and continental ice sheets. Milliman and Emery (1968) have argued on the basis of some 80 radiocarbon samples taken along the Atlantic continental shelf that sea levels 30,000 to 35,000 years ago were close to those at present. Sea levels dropped subsequently as much as 130 meters during the final glaciation circa 16,000 years ago. Along the Atlantic coast, ocean beaches lay at the edge of the modern continental shelf, perhaps 100 kilometers east of the modern New Jersey and Long Island coastline (Figure 3.1). Belknap and J.C. Kraft (1977) have questioned the maximum depth of sea level drop but agree with this basic pattern of sea level and geomorphic change.

Overall climatic patterns have changed on a regional and continental basis during the Holocene Epoch, which began at the end of the Pleistocene. Sea levels have continued to rise as a result of the release of water from melting ice sheets. As the sea level rose, it began to transgress, or cover, the land mass of the Coastal Plain (the modern Atlantic continental shelf) to the west. The Holocene marine transgression, or sea level rise, began roughly 14,000 years ago and proceeded rapidly until circa 7000 years ago (Milliman and Emery 1968; J.C. Kraft et al. 1983).

The implications of such dynamic changes for any paleoenvironmental reconstruction of the physical appearance of the western side of Staten Island are profound. Climatic changes resulted in a succession of vegetation types moving northward, while the coastline and associated marine and eustatic environments were approaching from the east. As temperatures warmed and the climate alternated between dry and moister periods during the Holocene, open grassy environments were replaced by boreal evergreen forests and then by deciduous forests (Table 3.1). As the coastline steadily approached, the local environment shifted from inland riverine forest to salt tidal marsh with upland slopes alongside the tidal estuary. A paleoenvironmental reconstruction must therefore consider both the generally northward-moving vegetational patterns arising from the regional climatic shifts and the westward moving coastal geomorphological changes associated with coastal environments.

Another important factor in reconstructing the paleoenvironment of Staten Island is the landform created as a result of the deposition of the terminal moraine at the maximum extent of the Wisconsinan glaciation. This moraine exists as a sinuous and occasionally discontinuous ridge that winds across northern New Jersey, through the center of Staten Island and along the spine of Long Island (Figure 3.1) (Thompson 1977:19-23). Following the recession of the ice sheet, this topographic feature stood out in the landscape and remains even today an important influence on settlement and land use. Morainal landforms were much frequented by Native Americans as their elevated terrain provided valuable viewsheds and often fringed resource-rich marshland.

The occupancy of prehistoric humans within these dynamic and mobile post-glacial environments is the primary focus of this chapter. Human occupation of the Upper Delaware River Valley in the Middle Atlantic Region had begun by 11,000 to 10,500 years B.P. within a boreal forest composed primarily of pine

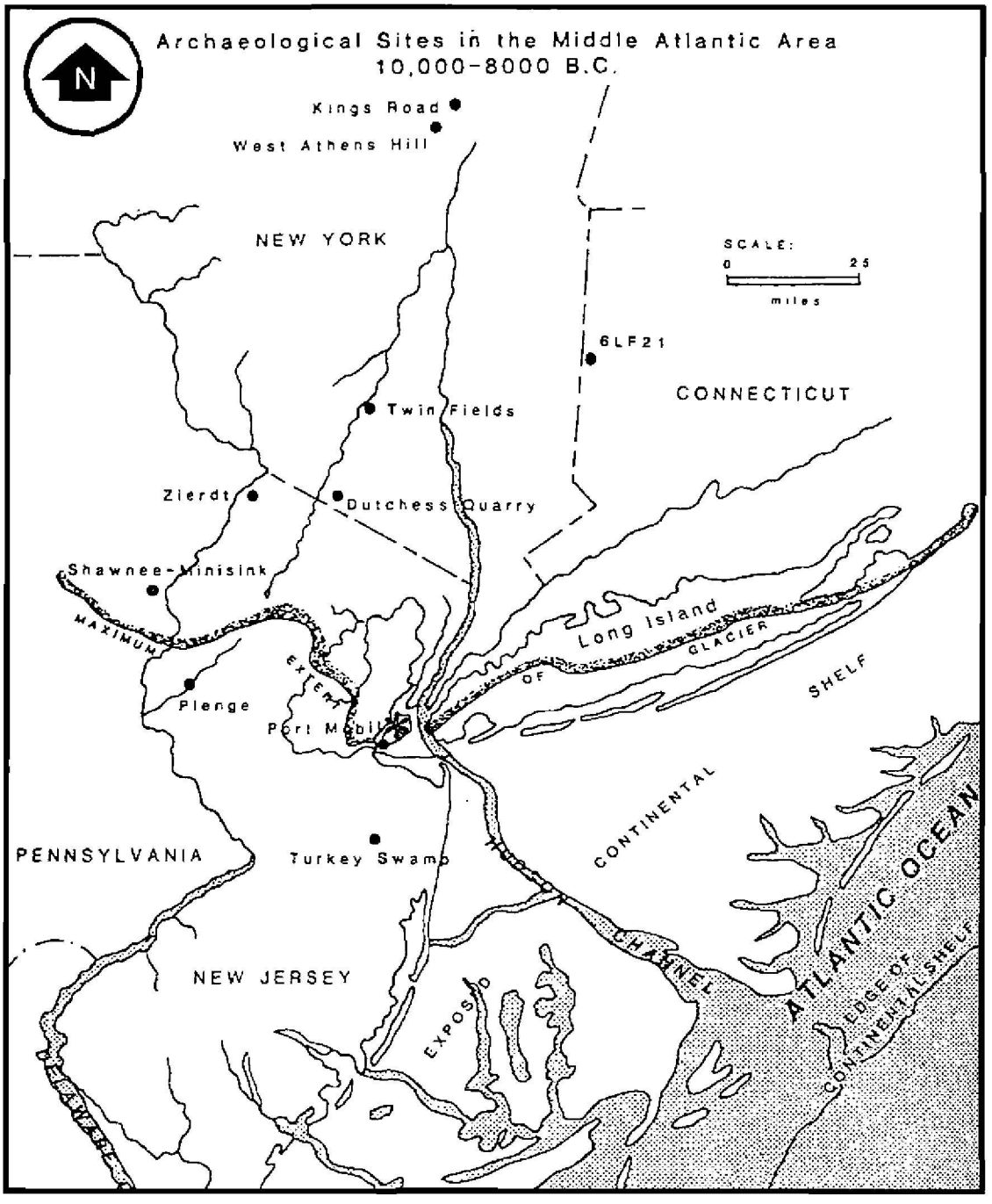


Figure 3.1. Archaeological Sites in Middle Atlantic Region, circa 12000-10000 B.P. (Kraft 1986: Figure 10). Coastline Reconstruction Based upon Edwards and Emery (1977).

Table 3.1. Temporal Correlation: Paleoenvironmental and Cultural Data.

Years B.P.	Climate	Vegetation	Culture
15,000			
–		open tundra,	
–	cool and wet Post-glacial	spruce park-land	Paleo-Indian
–	cool and wet (warmer)	spruce and fir forests	
–	Pre-Boreal		
	10,680	pine and birch	
10,000	warmer, drier Boreal	pine and oak	Early Archaic
–	9,211		
–			Archaic
–	warm (near modern) Atlantic	oak, hemlock	
5,000	4,610		Late Archaic- Early Woodland
–	warmest, driest	oak, hickory	
–	Sub-Boreal		Early-Middle Woodland
–			
–	cooler, moister Sub-Atlantic	oak, chestnut	Late Woodland
Present			

Source: Dent 1979; Custer 1989; Stewart 1990

and birch that shifted, as temperatures warmed, to pine and oak (Dent 1991; Stewart 1990, 1991). Similar vegetation cover extended throughout much of the region, although the presence of favorable microenvironments arising due to topography, solar exposure, and surface water (ponds, lakes, and rivers) exerted a considerable influence on prehistoric subsistence and adaptations.

Evidence of Paleo-Indian occupation on the Coastal Plain of New Jersey, generally in the form of isolated fluted point sites (H.C. Kraft 1977a; Cavallo 1981; Custer et al. 1983), reflects the presence of early human groups in the region. The point distribution is affected by the bias of non-systematic surface collection activity, but nevertheless provides some indication of the nature of Paleo-Indian adaptations. It is argued that these points and associated finds are indicative of hunting and game processing activities (Bonfiglio and Cresson 1978). Similar tool assemblages from the late Paleo-Indian site of Turkey Swamp near the boundary between the Inner and Outer Coastal Plains are interpreted as reflecting the same activities (Cavallo 1981).

As indicated in the earlier discussion of transgressing sea levels, Staten Island was not a coastal location at the time of Paleo-Indian occupancy. Edwards and Merrill provide a hypothetical reconstruction of the land area of the Middle Atlantic coast circa 10,000 to 12,000 years ago, which serves to illustrate potentially attractive locations for human habitation currently offshore and the eastern positions of environments currently along the New Jersey/Long Island coast (Figure 3.1). Thus, evidence of Paleo-Indian occupation along the western side of Staten Island would not relate directly to coastal environments, but rather to the exploitation of inland forest/riverine habitats (Edwards and Merrill 1977).

Evidence for Paleo-Indian occupation on Staten Island is manifested in isolated fluted point finds in the central and southern portions of the island and by two sites along the Arthur Kill – the Port Mobil site and the Charlestown Beach site, both located roughly four miles to the southwest of the southern end of the project corridor (Figure 3.2). No Paleo-Indian sites or find spots are located within a one-mile radius of the corridor. The Port Mobil site was identified within a tank farm located 1,000 feet from the Arthur Kill. Now in an area that is heavily disturbed, the site was originally situated on high sandy ground along an eroding slope at an elevation between 20 and 40 feet above present-day sea level. The Port Mobil site has yielded eight fluted points, end and side scrapers, and unifacial tools (H.C. Kraft 1977b; Eisenberg 1978; Ritchie 1980; Pagano 1985). By contrast, the Charlestown Beach site was detected eroding from a peat layer at the edge of the Arthur Kill. This site has never been fully described, but a site form was prepared by Professor Bert Salwen in 1967. The site has yielded at least 10 Paleo-Indian fluted points to collectors, including examples of Clovis and Cumberland types. Numerous phases of prehistoric occupation are indicated, including the more recent Early and Middle Woodland periods (Pagano 1985).

Paleo-Indian occupants would have co-inhabited the region with a rich fauna. The mammoth, oriented to more open habitats, may have occupied the region prior to the arrival of humans, but the forest mastodon was a contemporary of early Paleo-Indians. Deer and possibly caribou also would have been common inhabitants in the early Holocene forests. The proximity of a riverine habitat would have supported aquatic resources, both animal and plant in nature.

Many scholars in the Middle Atlantic region (e.g., Gardner 1974; Custer 1989, 1994) have combined the Early Archaic period with the Paleo-Indian period and viewed the two as a broad Late Pleistocene-Early Holocene adaptational continuum. Regardless of

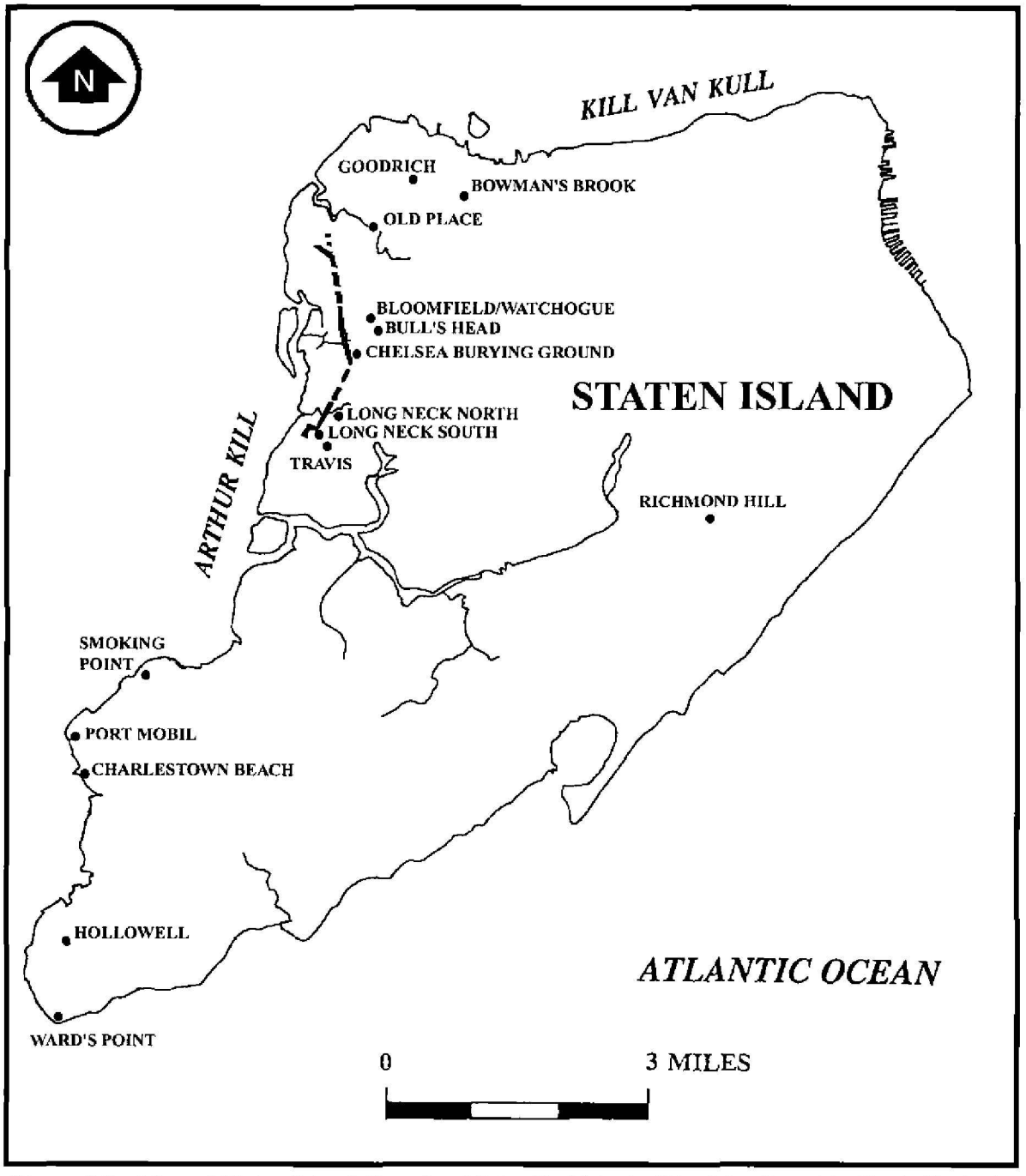


Figure 3.2. Map of Staten Island Showing Major Prehistoric Sites Mentioned in Text. Project corridor indicated in Red.

whether one favors a sharp or gradual transition, four stratified and dated Archaic sites have been found in southern Staten Island and excavated by avocational archaeologists. These are the Old Place site, the Hollowell site, the Ward's Point site, and the Richmond Hill site. One of these sites, the Old Place site (Prehistoric Resource #2), is located within one mile of the northern end of the project corridor, while another Early Archaic resource, the unstratified Goodrich site, lies just outside the one-mile radius.

The Old Place site (Prehistoric Resource #2 [site numbers refer to internal project numbering sequence and can be found on Figure 3.4]) is located roughly 4,000 feet from the main channel of the Arthur Kill at the eastern end of the Goethals Bridge approach, approximately one mile north of the north end of the project corridor (Figures 3.2 to 3.4; Table 3.2). This location lies just off the terminal moraine that represents the southernmost maximum extent of the Wisconsinan ice advance. The excavators recognized the site as a series of three or four cultural layers within a tan-colored sand near the swamp edge. The deepest layer contained Stanly, LeCroy, and Kirk points and hearth charcoal dating 7260 +/- 140 years B.P. Ritchie and Funk (1971:49) consider this date to be appropriate for the Stanly points but too recent for the earlier forms. The other Early Archaic site located close to the project corridor, the Goodrich site, is a multi-component site reportedly dating from the Early Archaic through the Late Archaic periods. No definite site limits have been determined for this site, and the New York State Museum site file information remains largely silent on the site's stratigraphy and artifact yield.

The Hollowell site is located well to the south of the project corridor at the base of a low sand rise near Ward's Point (Figure 3.2). This multi-component site contained three prehistoric strata: a Late Woodland stratum; a Late Archaic/Early Woodland stratum with Vinette I ceramics and a Vosburg point; and a layer of brown mottled sand that yielded 24 points including Kanawha, Stanly, and Eva types (Middle Archaic). A charcoal sample from the brown sand was dated to 3110 +/- 90 years B.P., a reading that seems more likely to be derived from intrusive charcoal originating in the overlying Late Archaic/Early Woodland occupation (Ritchie and Funk 1971).

The nearby Ward's Point site is located on a low sand knoll at the southern tip of Staten Island (Figure 3.2) and produced a stratigraphic sequence similar to that observed at the Hollowell site. An Early/Middle Archaic stratum was overlaid by early Middle Woodland and Transitional layers and a Late Woodland shell midden. The base cultural layer comprised a mottled reddish-brown sand that contained Kirk (Early Archaic), Kanawha, and LeCroy (Middle Archaic) points, as well as two hearths from which charcoal yielded radiocarbon dates of 7260 +/- 125 and 8250 +/- 140 years B.P. (Ritchie and Funk 1971).

In the interior of Staten Island, at the Richmond Hill site (Figure 3.2), a modern humus and a stratum with undatable cultural material sealed a layer of reddish-brown gravelly sand and clay that yielded Kirk-type, Palmer, Hardaway (Early Archaic), and LeCroy (Middle Archaic) points. Most of the cultural materials in this layer were associated with a hearth that yielded a radiocarbon date of 9360 +/- 120 years B.P., the earliest radiometric date yet recorded for human occupation within the current limits of New York City (Ritchie and Funk 1971).

Hypothetical reconstructions of the Middle Atlantic coast between 6,000 and 8,000 years ago suggest that estuarine areas were approaching their current coastline locations, but that the Arthur Kill location remained an inland one (Edwards and Emery 1977:Figure 7; see also J.C. Kraft 1977:Figure 24). Tidal salt marshes may have emerged in advance of the transgressing shoreline of New Jersey and Long Island by 5,000 years ago, and the shoreline achieved

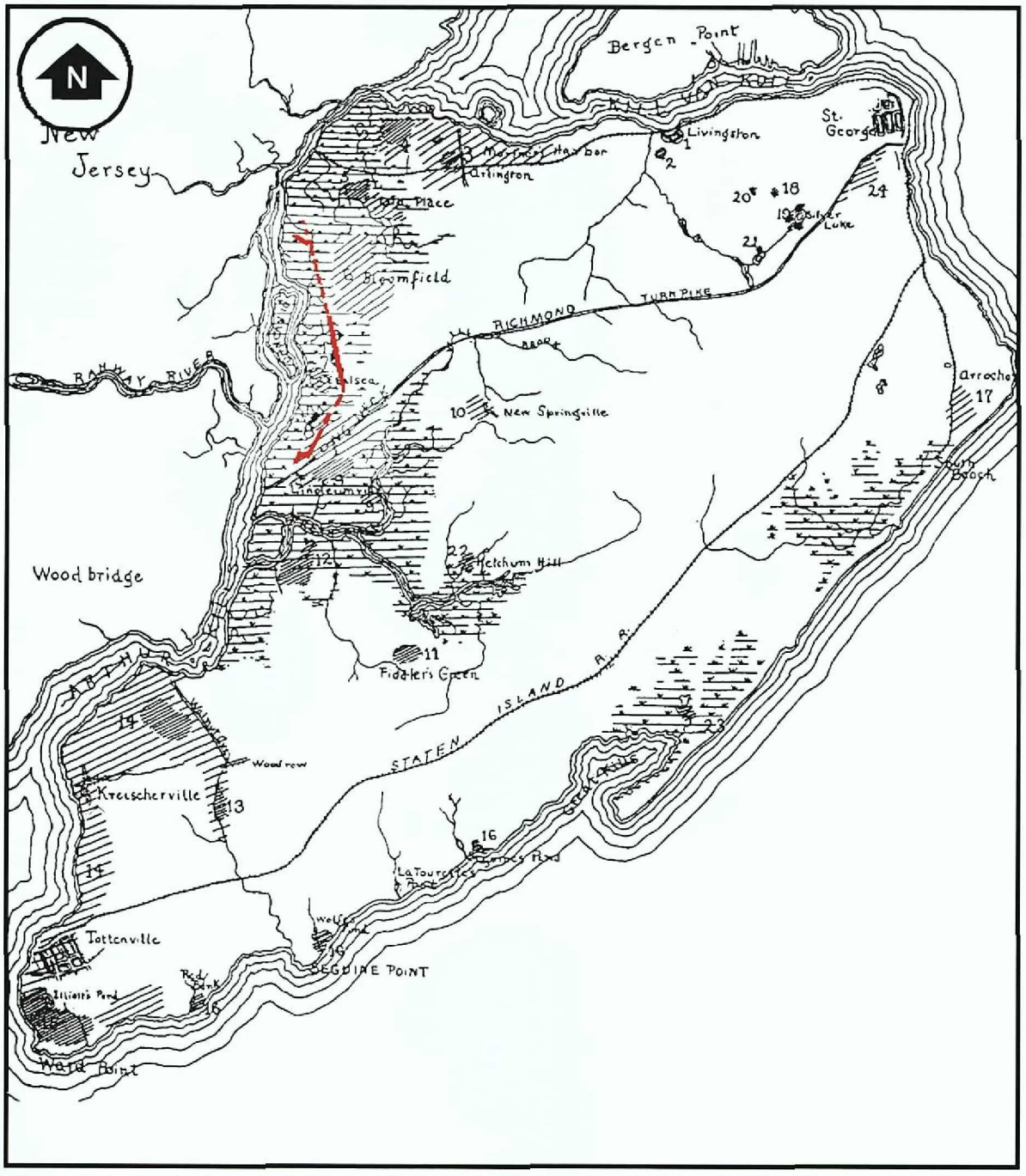


Figure 3.3. Archaeological Map of Staten Island Showing Prehistoric Sites Documented by Alanson B. Skinner (1909). Project corridor indicated in red.

its current location approximately 3000 years B.P. (J.C. Kraft 1977:Figure 27). Climatic conditions were warm and somewhat moister than in the preceding Boreal phase (Table 3.1), with oak and hemlock as dominant vegetation species (Deevey 1952; Dent 1979), but perhaps with pine persisting in coastal areas.

This time period coincides with the emergence of another archaeologically defined human adaptational phase, the Middle Archaic. Material culture changes during the Middle Archaic include the appearance of ground stone tools in addition to flaked stone artifacts. There is also a shift in the dominant raw materials utilized for tools—away from cryptocrystalline rocks to rhyolite, argillite, and other rock types—which may be suggestive of increasing mobility in the landscape and also possibly of changes in social organization. Archaic sites in the southern portion of the Middle Atlantic have been attributed to macro-band and micro-band base camps in areas of "maximum habitat overlap" as defined by Custer (1989, 1994). Such areas typically include interior freshwater swamps and bay/basin loci. Coastal tidal salt marshes and estuarine environments also would have been food resource-rich habitats available for exploitation.

Native American occupation sites producing cultural materials datable to the Middle Archaic are considered to be rare on Staten Island (Pagano 1985). The four stratified sites discussed above had Early Archaic side-notched points (Hardaway) as well as stemmed (Stanly) points, two broadly diagnostic forms that span as much as 2,000 years of occupation in the southeastern United States (Ritchie and Funk 1971). Possible explanations for this mixture of points may be found in geomorphological changes affecting soil accumulation rates across Staten Island or in micro-stratigraphic changes that were not recognized during the excavations.

Climatic changes commencing about 4600 years B.P. produced the warmest and driest conditions of the current post-glacial period, with oak and hickory becoming dominant tree species. These climatic changes appear to roughly coincide with the emergence of the archaeologically-defined Late Archaic phase. This phase is characterized by diagnostic lithic forms and an increase in the number of base camps. Late Archaic occupations have been documented on or near the Arthur Kill. One Late Archaic site, the Chelsea Burying Ground (Prehistoric Resource #10), has been identified within the project corridor. Two other sites with clearly identifiable Late Archaic components have also been identified within a one-mile radius of the corridor: the above-noted Old Place site (Prehistoric Resource #2) and the Bloomfield/Watchogue site (Prehistoric Resource #7) (Figure 3.4; Table 3.2).

The Chelsea Burying Ground site is located just north of Chelsea Road, at the southern end of Bloomfield Road, on the south side of Sawmill Creek between the abandoned spur of the Baltimore & Ohio Railroad and U.S. Route 440. This site, which is first mentioned in the old site files from 1898, is reported to been the locus of a village and has produced evidence of burials dating from the Late Archaic through the Early Woodland periods. Excavated by Alanson Skinner in 1909, it was reported to contain lodges, graves, and grooved axes. No pottery was reported recovered. The multi-component, stratified Old Place site, previously noted, contained numerous Late Archaic artifacts including projectile points of Bare Island, Poplar Island, and Snook Kill type. The Bloomfield/Watchogue site is another multi-component site with a date range spanning from the Late Archaic through the Late Woodland periods. This site is alleged to have been a camp where traces of occupation were found sitting atop dunes and sand hills. Alanson Skinner (1909) and Arthur C. Parker (1922) are among those who have reported on this site, where a substantial volume of artifacts has been recovered,

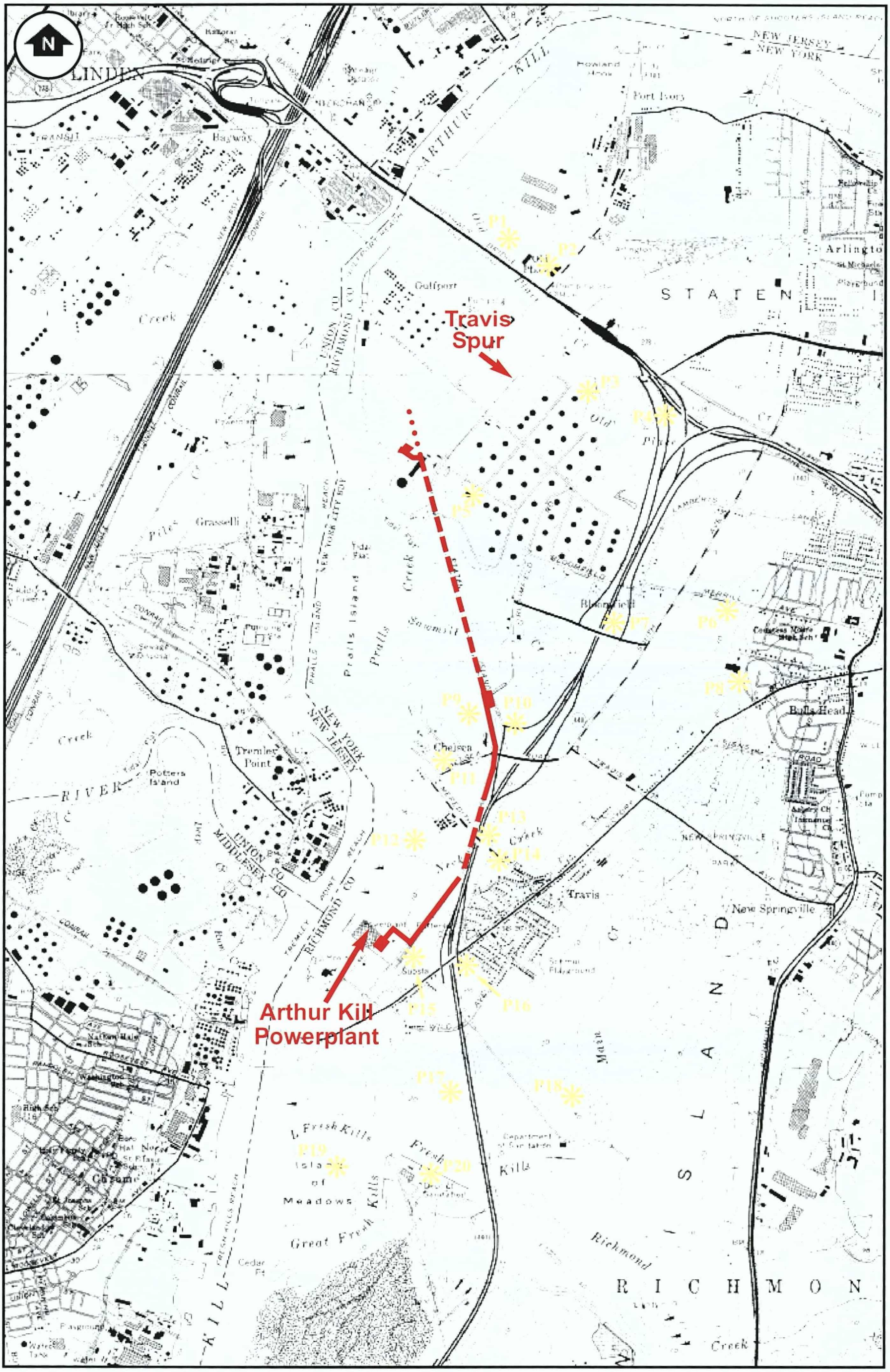


Figure 3.4. Locations of Previously Documented Prehistoric Sites in Project Vicinity (see Table 3.2 for site detail). Project corridor indicated in red.

Table 3.2. Previously-Documented Prehistoric Sites within One Mile of the Arthur Kill Project Corridor.

Prehistoric Resource #	Other Site Identification #s	Site Name	Cultural Affiliation	Type of Site	Notes
P1	NYSM* 4595		Contact Period	village, middens, burials	1904 site files (Set A) (Staten Island); Skinner (1909); Parker (1922)—large village with shell pits and hearths; early historic Iroquoian-like pottery; brass projectile points, gun flints, lead bullets, pewter trade ring, and trade pipes all recovered from surface; graves with relics, graves opened by Parker were found to be European; village on Tuinessen's Old Place Neck; some pits near the extreme point; burials were located on the property of Reverend James Kinney.
P2	NYSM 7215 NYOPRHP† A085-01-0134	Old Place	multi-component Early Archaic through Late Woodland		1895 site files (Elizabeth); Anderson updated site inventory form 1963; Ritchie (1980)—finds include Stanly/Neville, Bare Island, Poplar Island, Snook Kill projectile points; steatite sherds and Vinette I ceramics; eight areas contained Middle Woodland and Late Woodland artifacts.
P3	NYSM 8504			traces of occupation	1904 site files (Set A) (Staten Island); Parker (1922).
P4	NYSM 7216			traces of occupation	1904 site files (Set A) (Staten Island); Parker (1922).
P5	NYSM 8503 Boesch 96		Prehistoric	camp	1898 and 1904 site files (Set A) (Staten Island) - traces of occupation.
P6	NYSM 7324		Terminal Archaic		1904 site files (Set A) (Staten Island); Anderson letter in site file dated 1963; Salwen updated site inventory form in 1967—mentioned with NYSM #739 data "Bloomfield section;" Perkiomen projectile points were recovered under swampland.
P7	NYSM 4596 Boesch 41	Bloomfield/ Watchogue	Late Archaic to Late Woodland, Historic	camps and traces of occupation	Skinner (1909); Parker (1922)—abundant artifacts found on dunes and sand hills, including grooved axes, Iroquoian pottery, pipes, projectile points, steatite beads, incised clay bead, atlatl weight.
P8	NYSM 4597 Boesch 42	Bull's Head Site "Burying Ground"	Early Woodland	burials	Parker (1922)—graves reported; several grooved axes recovered at angle of Watchogue Road near the junction of Union Avenue.
P9	NYSM 8501			camp	1904 site files (Set A) (Staten Island).
P10	NYSM 746 and 4627 NYOPRHP AO85-01-0135 Boesch 71	Chelsea Burying Ground	Late Archaic-Early Woodland	village, burials	1898 site files (Staten Island); Skinner (1909); Salwen updated site inventory form in 1967—lodges, graves, grooved axes; no pottery was reported. Additional artifacts excavated by Skinner in 1909.
P11	NYSM 4627 and 9634 NYOPRHP AO85-01-000625 and AO85-01-0002634 Boesch 70		Prehistoric	camps	1904 site files (Set A) (Staten Island); Skinner (1909); Parker (1922).
P12	NYSM 8502			traces of occupation	1904 site files (Set A) (Staten Island).
P13	NYSM 8323				Relics from dune at Chelsea and Travisville.
P14 P15	NYSM 4598 Boesch 39, Boesch 80	Long Neck North Site and Long Neck South Site (Linoleumville)		possible camps, hamlets, and middens	1904 site files (Set A) (Staten Island); Skinner (1909); Parker (1922)—scattered lodges and some shell recovered; Parker mapped two camps.
P16	Boesch 38	Travis Site	Early Archaic to Contact		Located on Long Neck in the vicinity of Glen and Cannon Avenues and the Arthur Kill; reputedly one of the largest sites on Staten Island; collected for over 50 years; site is partly located on the former Richmond County Airport site.
P17	NYSM 4599 Boesch 72		Prehistoric	hamlets, middens (traces), shell middens	1904 site files (Set A) (Staten Island); Skinner (1909); Parker (1922)—scattered lodges and a shell heap with pits; a small shell heap excavated (only shell found); fish drying heap; on the south side of Long Neck (relics scattered all over the end of the neck); excavations on the south side in Price's meadow found indentions (?) of a site; no shell.
P18	NYSM 4626 Boesch 73	"Unnamed Site"	Prehistoric	small camp	Parker (1922).
P19	NYSM 4602		Early Prehistoric	village, shell heap	Skinner (1909); Parker (1922)—small village with a small shell heap, arrowheads; location not mapped by Parker.
P20	NYSM 4625 Boesch 27	Lake Island Area		camps, middens, villages	Skinner (1909); Salwen updated site inventory form in 1967—name and location are from Salwen (citing Skinner 1909); site may be near to or same as Parker #12 (NYSM 4602).

* NYSM: New York State Museum
† NYOPRHP: New York State Office of Parks, Recreation and Historic Preservation

including grooved axes, atlatl weights, projectile points, Iroquoian pottery, pipes, steatite beads, and an incised clay bead.

The appearance of cache pits and ceramic storage vessels, a key characteristic of the successive Transitional and Early/Middle Woodland periods, indicates a greater degree of sedentism among Native Americans in the Middle Atlantic region. Custer (1989) has argued for an adaptational continuum spanning the Late Archaic through the Middle Woodland periods, which he labels Woodland I in the southern coastal Middle Atlantic. Evidence for long-distance trade and exchange is manifested in the presence of Adena cultural materials from the Ohio River Valley at habitation and mortuary sites dating from around 2500 to 2000 years B.P. Increasing exploitation of estuarine resources in coastal areas is noted during the period of Adena influence.

Evidence of Early/Middle Woodland occupation has been found within a one-mile radius of the project corridor at the Old Place site, the Bloomfield/Watchogue site, the Chelsea Burying Ground site, all referenced above, and at the Bull's Head site (also locally known as the "Burying Ground") (Figure 3.4; Table 3.2). The Bull's Head site (Prehistoric Resource #8) is located near the junction of Watchogue Road and Union Avenue, and its existence was reported by Arthur C. Parker in 1922 and then later by Edward Lenik in the early 1980s (Archaeological Research Consultants, Inc. 1982). Parker reportedly recovered several grooved axes. Lenik, however, reported no cultural materials being recovered from the site at the time of his investigations. No distinctive Transitional sites have been documented within a one-mile radius of the project corridor.

Warm and dry climatic conditions began to yield to a cooler, moister, more modern climate with oak and chestnut vegetation about 2000 years B.P., which is roughly coincident in some areas of the Middle Atlantic with the waning of Adena influence. By 1000 years B.P. the trade and exchange network influence had disappeared, and the archaeologically defined Late Woodland period, or Woodland II phase, emerges. Increasing evidence of sedentism is manifested in the expanded use of storage facilities and more permanent house structures. Increased gathering of shellfish and the harvesting of plants reflect an intensification of food procurement evidently related to population growth. The emergence of agricultural production is also related to this sedentary settlement pattern, which was maintained until European contact. Material culture of this period is distinguished by several distinctive ceramic forms and small triangular projectile points, the latter evidently indicative of bow-and-arrow technology (Custer 1989).

Late Woodland occupation has been documented at numerous sites on Staten Island, including many of those already mentioned (e.g., the Hollowell site, the Ward's Point site, the Bloomfield/Watchogue site, and the Old Place site (Figures 3.2 to 3.4; Table 3.2). One additional important site deserves mention. This is the Bowman's Brook site, also referred to as the Milliken site, which is located near the northwest corner of the island. This site was occupied throughout the Woodland period and is the type site for two well-known ceramic decorative styles. The site was initially recorded in the site files of 1904 (Set A), later supplemented with information produced by Alanson Skinner (1909) and then again by Bert Salwen in 1967.

In summary, all previously documented prehistoric sites lying within a one-mile radius of the project corridor are itemized in Table 3.2 and mapped in Figure 3.4. Four of these sites lie within or very close to the project corridor: the Chelsea Burying Ground site (Prehistoric Resource #10), the Long Neck North site (Prehistoric Resource #15), the Long Neck South site (Prehistoric Resource #14), and an unnamed site (Prehistoric Resource #5). The Long Neck North and

Long Neck South sites share the same New York State Museum (NYSM) site number and are distinguished by the numbers assigned by Eugene Boesch in his recent *Archaeological Evaluation and Sensitivity Assessment of Staten Island* (Boesch 1994). Prehistoric Resource #15 was first recorded in 1904 and was described as having "traces of occupation," while Prehistoric Resource #14 was initially recorded by Parker in 1922 and was reported to comprise two camp sites that contained lodges and some shell (possibly middens). The unnamed site (Prehistoric Resource #5) was first recorded in the New York State ASI files of 1898 and then recorded again in 1904 by an unknown source. This site was reported to have yielded "Indian implements" and to have "traces of occupation." Its exact location is unknown, but based on its placement on the site maps prepared by Boesch (1994), it potentially lies within or close to the project corridor.

Worthy of additional note is the Travis site (Prehistoric Resource #16), which is reported to be one of the largest prehistoric sites on Staten Island. This site is located in the area bounded by Glen Avenue, Cannon Avenue, and the Arthur Kill on what was reported to be the site of the former Richmond County Airport (Boesch 1994). From this description it may well be that the Long Neck North and South sites (Prehistoric Resource #s 14 and 15) form parts of this larger Travis site. This multi-component site, which has yielded artifacts reportedly spanning the Early Archaic through the Contact periods, has been collected for over 50 years (Boesch 1994).

Chapter 4

HISTORICAL BACKGROUND

A. HISTORICAL OVERVIEW

1. Early Exploration and Dutch Settlement

The first Europeans to sight the narrow strait between Staten Island and Long Island were most likely sailor-explorers in the employ of the French. In 1524, Giovanni Verrazano, a Florentine navigator in a French vessel, is believed to have anchored briefly off the Narrows on the Long Island side of the Lower Bay. His stay was cut short, however, when he was forced out to sea again by violent storms. The Narrows were not actually entered by Europeans for another 85 years until Henry Hudson, in 1609, searching for a westerly route to Asia on behalf of the Dutch East India Company, discovered the Upper Bay and explored the lower section of what later came to be known as the Hudson Valley. Hudson, in fact, was responsible for naming Staten Island, giving it the appellation "Island Staatan Eylandt" (Island of the States) in honor of the States-General, the governing body of the Netherlands. It is a reasonable assumption that the Native Americans who occupied Staten Island and other areas around the Upper and Lower Bays at the time saw Hudson and the many other explorers who came in his wake as a threat. In response to the newcomers, the native peoples are believed to have established signaling stations on Todt Hill in northeastern Staten Island (and at various other prominent positions) to warn neighboring groups each time European vessels entered the Upper Bay (U.S. Army Center of Military History 1963:1).

By the late 1620s and early 1630s, the recently incorporated Dutch West India Company was busy imposing the patroonship system in the new colony of New Netherland as a means of stimulating settlement. Under this system, three unsuccessful attempts were made at establishing permanent settlements on Staten Island. The first attempt was headed by David Peterse De Vries of Hoorne. The De Vries settlement is believed to have been located at present-day Tompkinsville. De Vries kept a journal, the Korte Historical, which included detailed notes about his colonization efforts on Staten Island. He wrote that on "The 13th [of August 1636], I requested Wouter Van Twilliger to register Staten Island for me, as I wished to return and plant a colony upon it, which he consented to do." Two years later, De Vries left Holland, and arriving in the New World in late December of 1638 or early January of 1639, he reported: "so I brought the ship that same evening before Staten Island, which belonged to me, where I intended to settle my people. I sent my people to Staten Island to begin to plant a colony there and build." On February 10, he was forced to lease his plantation "as no people had been sent [to] me from Holland, as was promised in the contract which I made with Frederick De Vries, director of the West India Company." The settlement was short-lived, for in 1641, it was attacked and destroyed by Indians (Anderson and Sainz 1965:83; Black 1983:9-10).

The second and third attempts to settle Staten Island were both headed by Cornelius Melyn. Shortly after the Indian assault on the first settlement, De Vries was asked by the governor of New Netherland, William Kieft, whether he would permit Melyn "... to go upon the point of Staten Island, where the maize-land lay, saying he wished to let him plant it, and that he would place soldiers there, who would make a signal by displaying a flag, to make known at the fort [at New Amsterdam] whenever ships were in the bay ..." Apparently De Vries agreed and Melyn was granted

all of Staten Island, excepting a portion of land that had been previously settled by De Vries. Another Indian raid or the general state of tension between the Dutch and the Indians led to the abandonment of Cornelius Melyn's settlement in 1643 (Anderson and Sainz 1965:83; Black 1983:10). According to Charles Leng and William Davis's *History of Staten Island and its People*, if Melyn truly did establish a settlement at the point of Staten Island where the maize lands lay, and where a signal to the fort on New Netherland would be useful, this location would most likely have been in the vicinity of Fort Wadsworth, located at the eastern end of the island (Black 1983:10; Leng and Davis 1930-1933).

In 1650, acting under a contract with Baron Hendrick Van der Capellen, Melyn resolved to restock his ruined colony and "if possible, restore the same." According to his later testimony, 16 "handsome farms" were started. This new settlement lasted five years before it too was attacked and burned by Indians. A traveler in October 1655 wrote, "on the 21st we sailed to the North River, from Staten Island, by the watering place, and saw that all the houses there, and about Melyn's house, were burned by the Indians." This account appears to place Melyn's second settlement in the present-day Tompkinsville area, near the same location as the original De Vries plantation. Shortly after this third abortive attempt at permanently implanting a settlement, the Dutch system of patroonship was abandoned (Black 1983:12).

Despite the ongoing hostilities between the local Native American inhabitants and the incoming Europeans, and the failure of the three organized settlement implants, a few Dutch settlers did succeed in remaining on Staten Island during the 1640s and 1650s. In the mid-1650s a small garrison was stationed on the island to give protection to these inhabitants. However, the number of settlers was so small and widely dispersed, that by 1656, Governor Peter Stuyvesant was urging his council to remove the garrison and relocate the settlers across the Narrows at New Utrecht. It remains unclear whether these recommendations were acted upon (Black 1983:12-13).

Finally, in the early 1660s, the first truly permanent Dutch-American settlement was established on Staten Island. This comprised the small community known as Oude Dorp ("Old Town") and was located approximately one mile southwest of the Verrazano-Narrows Bridge, in the area presently known as Arrochar. The settlement took the form of a loose cluster of farms, somewhat ineffectively protected by a blockhouse manned by a detachment of soldiers supplied by the Dutch West India Company. This hamlet was still in existence in 1664 when the English take-over of New Netherland occurred (Anderson and Sainz 1965:84; Black 1983:14).

2. Late 17th Century to the Revolutionary War

In 1664, when Anglo-Dutch commercial and colonial rivalry was at a high pitch in Asia, Africa, and America, King Charles II of England bestowed a grant of all the territory lying between the Connecticut and Delaware Rivers (i.e., including virtually all of the province of New Netherland) upon his brother, the Duke of York. In August of the same year, the Duke of York dispatched four frigates, manned with 450 men, to New York harbor to claim his property. In September, Governor Stuyvesant of New Netherland surrendered the province to the English commander, Colonel Richard Nicolls, who assumed the position of new governor. Nicolls proceeded to parcel out land grants both to the original settlers and to the soldiers who served under him. Staten Island was subdivided in this manner, and Oude Dorp was placed within the newly created town of Dover.

The first settlement in the vicinity of the project corridor apparently occurred in 1675 when Arendt Jansen Prall (circa 1647-1725) was granted a parcel of land at

Long Neck by Governor Andros (Prall 1990:11). Prall, a Huguenot, had formerly resided in Kingston, New York. A map of Staten Island showing colonial land patents (Figure 4.1) indicates that the project corridor extends through three early land holdings. Each of these tracts was focused on the western end of a separate spit of land extending into the vast marshes bordering the east side of the Arthur Kill. The earliest and northernmost of these lots was taken up in 1680 by John West. This tract included most of the projecting arm of fast land labeled by the map as "Daniel's Neck." On the western edge of Daniel's Neck, separating the neck from the marshes, stood a long sand hill known as the "Big Hummock" or "Beulah Land" (Morris 1898:352). Immediately to the south of Daniel's Neck and separated from it by the water course today known as Sawmill Creek, was a 120-acre tract of land patented in 1685 to Jonissa Cronsoon. To the south of Cronsoon's tract, and separated from it by Cannon's Creek (present-day Chelsea Creek [also known as Neck Creek]), was the property of John Garrett DeMuff. Apparently, this parcel of land, containing 142 acres of fast land on the spit known as Long Neck, was never formally patented.

By 1697, Richard Merrill (variously spelled Merrell, Merrel, or Merril) "of Richmond County, planter" had acquired the rights to a property at a "place called Daniels Neck" containing 160 acres of land and 15 acres of meadow. This tract was clearly the same as that for which John West had received a patent 17 years earlier. In 1697, Merrill petitioned Benjamin Fletcher, the Royal Governor of the Province of New York, to grant him the rights to an adjacent "vacant & unappropriated" property that straddled a creek immediately to the south of the tract already in his hands. Merrill stated that he "at his own proper Cost and Charge would erect a Millne for the benifite and accommodation of the Inhabitants of the said County who are constrained for want of one in the said County to goe unto the adjacent Colonys for the Grist of their corn" (McMillen 1949:21).

During the American Revolution, Staten Island was heavily garrisoned by the British and redoubts were built at several locations. A map entitled *A Map of Staten Island During the Revolution* (Figure 4.2), a compilation of several Revolutionary War maps, shows two buildings within the current project corridor. At the northern end of the corridor, on the southwest side of Daniel's Neck, this map shows the mill constructed by Richard Merrill and labels it "Merrils Mill." Although originally set up as a gristmill, the mill had by this time been fitted out as a sawmill, and it is from this facility that present-day Sawmill Creek takes its name. In 1770, Thomas Merrill bequeathed the mill to his son, Richard, and described it as:

> One certain messuage and tract of land situate and being in this country Patented by John West, Known by the name of Daniel's Neck, that is to say, that part of the house wherein my son now lives together with a certain piece of tract of land beginning at the westernmost Walnut Tree from thence in a westerly course to the center of the entry between the old and new house, from thence to the South East part of the meadow dam, from thence along the southern side of sd. Dam to the Broad Creek, thence along Broad Creek to the saw Mill Race to the Saw Mill, from thence, including the saw mill to the place of beginning (McMillen 1949:21).

In 1785, Richard Merrill advertised an apparently rebuilt incarnation of the mill for rent,

> To be let, a very excellent new Saw Mill, with house and lot and five acres of salt meadow, situated on Staten Island between the new Blazing Star and Elizabeth-town Point; it is a fine stand for business, as there is plenty of timber near the mill .... (McMillen 1949:21).

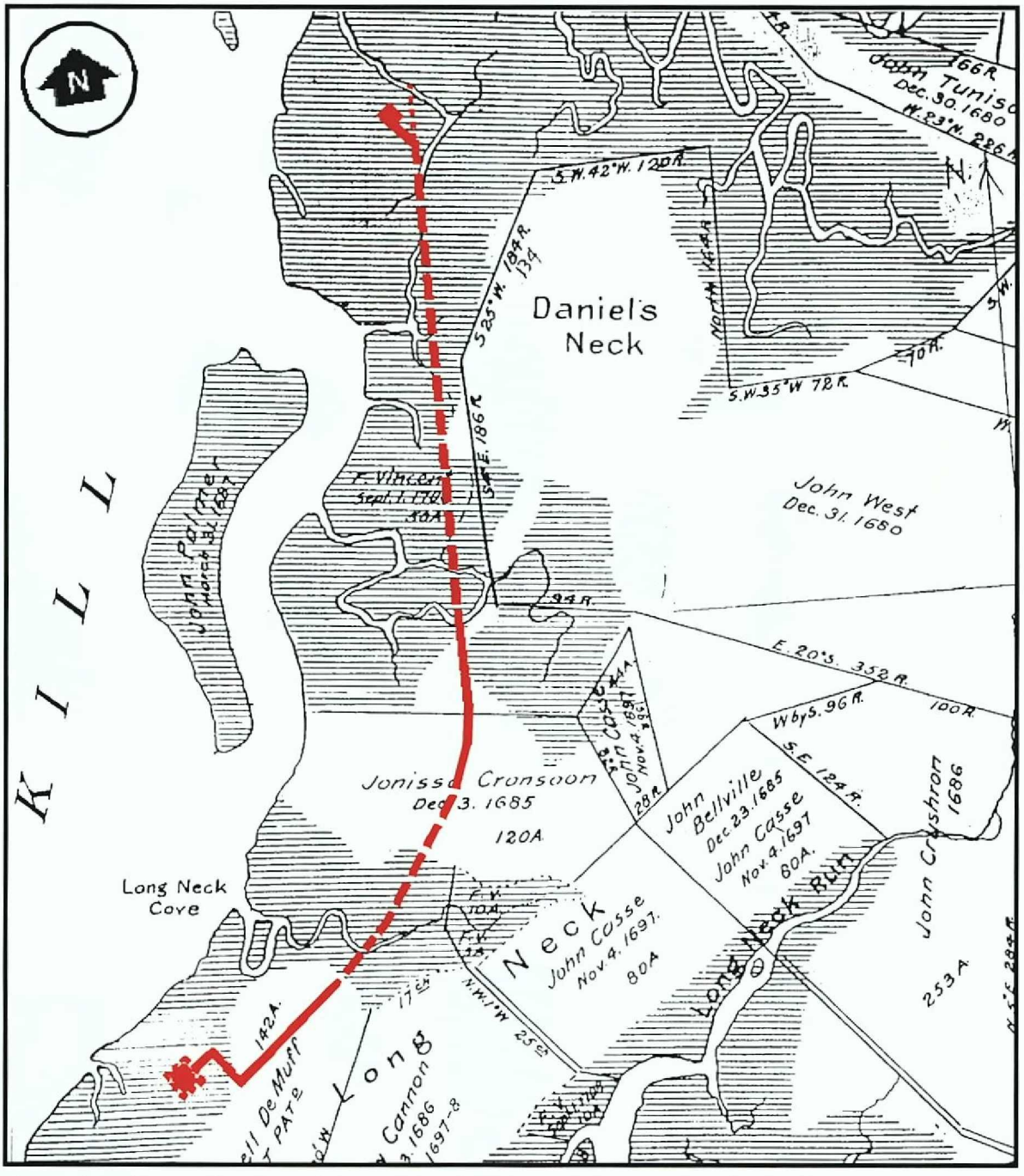


Figure 4.1. Skene, F. *Map of Staten Island, Richmond County, New York., Showing the Colonial Land Patents 1688-1712.* 1907. Scale 1 inch: 1500 feet. Project corridor indicated in red.

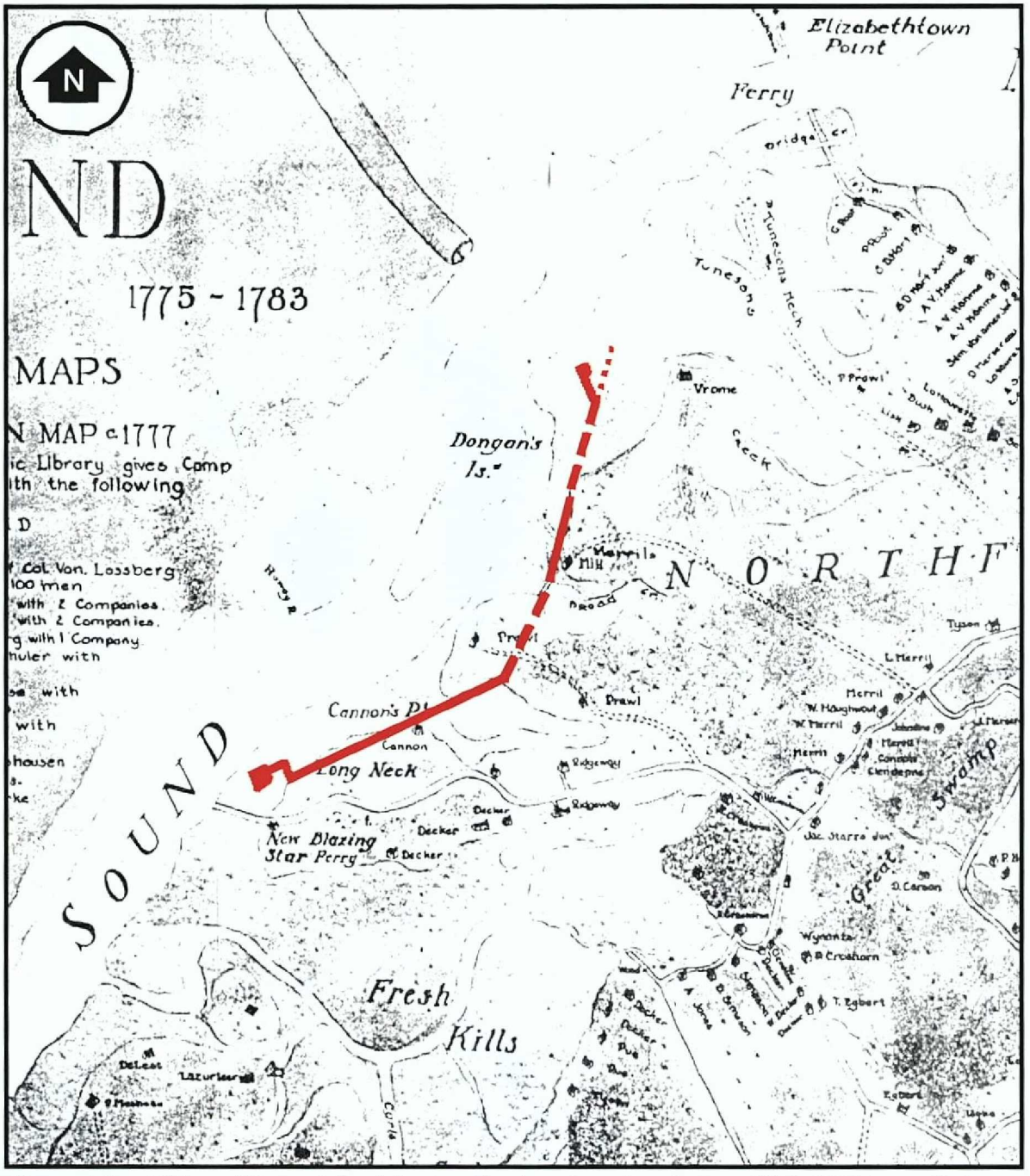


Figure 4.2. *A Map of Staten Island During the American Revolution, 1775-1783* (compiled from the Taylor & Skinner map of 1781 [original in the British Museum]; Plan No. 31 du Camp Anglo-Hessois dans Staten Island de 1780 à 1783 [original in the French War Office]; and the Hessian map, circa 1777 [copy in New York Public Library]). Scale 1.5 inches: 1 mile. Project corridor indicated in red.

The above-referenced map (Figure 4.2) shows the sawmill to have stood on the north side of present-day Sawmill Creek. An account of the mill written in 1933, placed the mill dam approximately 200 feet to the west of Bloomfield Road and stated that it had been removed in the 1860s "so the oystermen could float or freshen their oysters on the shallow mud flats while the tide flowed over them." The site of the dam, it was said, could be identified at low tide by a line of stones. The nearby foundation of a house, said to have been the frame residence of John Merrill and the same house as that mentioned in the will of 1770, was partially excavated in 1933 (McMillen1949:21). Although McMillen, in his article the "Mills of Staten Island," stated that this edifice was a tide mill, Leng and Davis' *Staten Island and Its People, A History, 1609-1929*, includes the mill not in its list of Staten Island tide mills, but instead with the list of overshot mills. The date of the mill's eventual demise is unknown, but it does not appear to be shown on any of the 19th-century maps of Staten Island. Later, the small group of houses located in the former vicinity of the mill, near the crossing of Bloomfield Road over Sawmill Creek, was known as "Sailor's Hill" (Leng and Davis 1930-1933:611; McMillen1949:21; Garnice 1972).

The second Revolutionary War-era building shown in Figure 4.2 as being situated within the project corridor was located on the northern edge of "Cannon's Pt." and is labeled simply as "Cannons." Another early settler of the lands in the vicinity of the project area was Andrew Cannon who settled on 161 acres on Long Neck in the mid-1680s (Morris 1898:365). Andrew Cannon's homestead tract is shown by Figure 4.1 as lying immediately to the east of the project corridor. Although the house shown on Figure 4.2 was presumably occupied by a descendant of Andrew Cannon, it appears to lie outside the boundaries of Andrew Cannon's tract of 1686 and instead is situated on the lands first taken up by John Garrett DeMuff.

Figure 4.2 also shows a single house, labeled "Prawl," just to the west of the project area in the vicinity of modern day Chelsea.

Thus, land use in the project vicinity during the colonial and Revolutionary War periods may be characterized as agriculturally-based and centered on a handful of plantations whose primary homes and farm fields situated on the promontories of fast land that extended into the tidal marshes ranged along the east side of the Arthur Kill. Three separate farmstead properties may be distinguished—the West (later Merrill) tract on Daniel's Neck; the Cronsoon/Prall property that stretched west to the bank of the Kill, where the Prall family built a house and landing in what is today Chelsea; and the DeMuff/Cannon lands at the western end of Long Neck. At least one of these early farmstead nuclei (marked as "Cannons" on Figure 4.2) may lie within the project corridor. In addition to the farms, one early mill site was established in the project vicinity by the Merrill family at the Bloomfield Road crossing of Sawmill Creek.

Transportation in and around this section of Staten Island in the late 17th and 18th centuries was dominated by the Arthur Kill, a key navigable waterway linking Perth Amboy and the Lower Raritan with New York Bay, which provided access to landings and tributaries on both the west side of Staten Island and the New Jersey shoreline opposite. Movement overland was based on an incipient road network that was governed by the lay of the fast land in the marshes. The main routes were the predecessors of today's Victory Boulevard (also formerly the Richmond Turnpike [chartered in 1815]), Chelsea Road, Cannon Avenue, and Bloomfield Road, which between them linked together the main farmsteads, dwellings, and landings.

3. Late 18th and 19th Centuries

In 1788 Staten Island was divided into the four townships of Westfield, Southfield, Northfield, and Castleton. The project corridor was contained within Northfield Township. In 1839, the columnist "Cosair," writing in the Richmond County Mirror, described the people living on this part of the island as "constituting one of the most peculiar classes of independent yeomanry to be found in the United States. Their farms are of small extent but are highly cultivated with a prodigality of fruit trees, and their neat white cottages ... are held by the descendants of the original owners to this day." Despite the apparent prosperity of Staten Island and Northfield Township in particular, there was still the need for the establishment of a county poor house. A poor house was established as early as 1803, but it was soon found to be an unwelcome expense in the minds of the island's tax payers. In 1829, the house and grounds were sold to raise the funds to purchase a farm (instead of a house), so that the county's poor would at least provide some return on the taxes levied by the county. In 1830, a farm of 100 acres was purchased in Northfield Township and, in 1839, approximately 14 acres of tidal marsh lying within the project corridor were purchased to supplement the land holdings. This land adjoined the southern side of Sawmill Creek west of modern day Bloomfield Road (Morris 1898:646-647).

A U.S. Coast Survey map surveyed in 1835-1836 shows that at least three and perhaps as many as five buildings were located within the bounds of the project corridor at this time (Figure 4.3). All but one of the buildings were located along the forerunner of Chelsea Road, which is depicted onthe map as extending from the Richmond Turnpike westward to a wharf and building on the edge of the Arthur Kill (the location of the Prall house and landing). Within the project corridor is one building situated approximately 1,200 feet to the north of Chelsea Road; another building is shown within the corridor approximately 400 feet to the south of the road. This second structure is located approximately equidistant between two other buildings situated on the south side of the road. All three of these latter buildings may in fact have been situated within the project corridor depending on the real world accuracy of the Coast Survey mapping and the overlay of the project corridor limits. Further to the south, another building is shown by this map to have stood within the project corridor boundaries. This building stood at what was then the western terminus of modern day Cannon Avenue and may perhaps correspond to the structure marked "Cannons" on Figure 4.2.

The map of Staten Island or Richmond County surveyed by James Butler in 1853 shows considerable growth within the project vicinity (Figure 4.4). North of Sawmill Creek the map shows buildings belonging to "A. Vroom," "C. Merrill," and "Mrs. Merrill." The nucleus of a small settlement labeled "Chelsea" had begun to form, centered on the wharf and hotel to the west of the project area. Chelsea had been known earlier as "Pralltown" (after the family that occupied most of the houses in this area). It was also sometimes referred to as "Peanutville," reportedly because the landing at Chelsea became an important way point on the ferry trip between certain points in New Jersey and New York, and the residents of Chelsea took to selling peanuts to the ferry's patrons (Leng and Davis 1930-1933:339; Garnice 1972). The Butler map also shows several buildings along Chelsea Road situated within or close to the project corridor. These include: to the north of Chelsea Road and just west of the sharp angle in today's Bloomfield Road, a building labeled "W.F. Carey;" north of Chelsea Road on the eastern edge of the project area, a building labeled "W. Stoothoff;" and immediately to the south of Chelsea Road, one building labeled "F. Simonson" and another marked "J. Van Pelt." Further south, on Cannon's Point, the Butler map shows several other buildings within or very close to the project corridor including: two buildings labeled with the name "Williams;" another

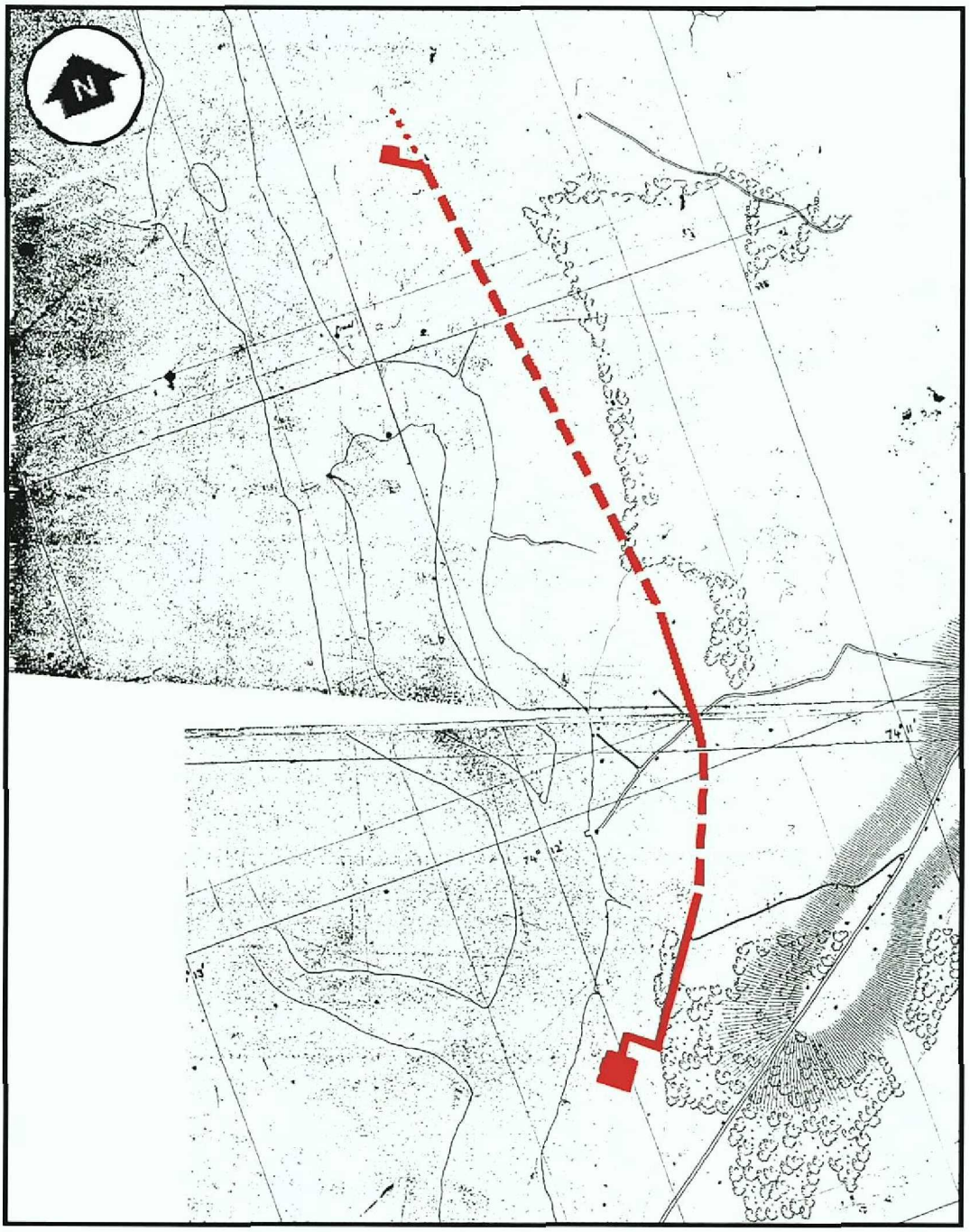


Figure 4.3. U.S. Coast Survey. *Staten Island, New York*. 1835-1836. Scale 1 inch: 2000 feet. Project corridor indicated in red.

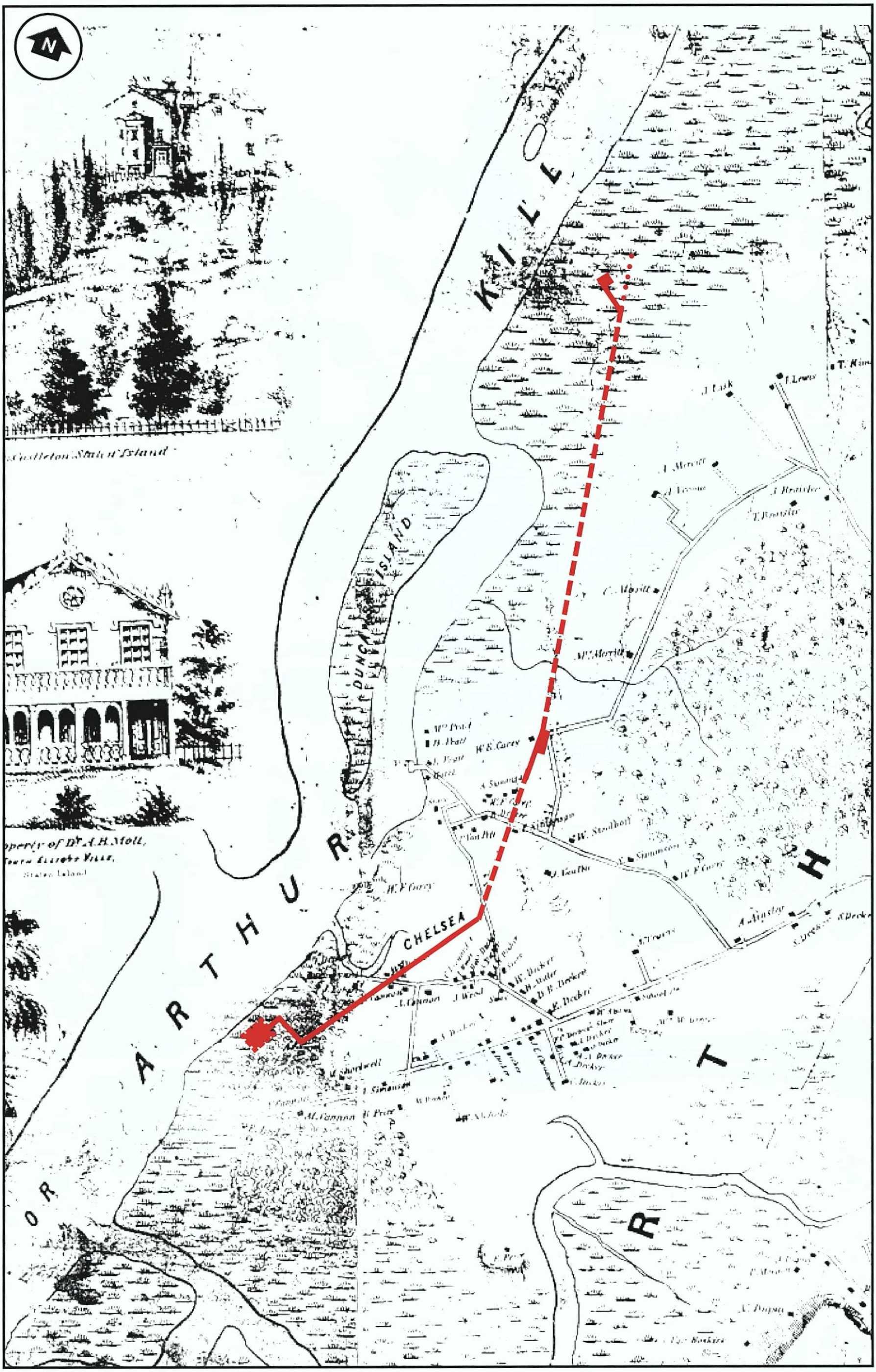


Figure 4.4. Butler, J. *Map of Staten Island or Richmond County, New York*. 1853. Scale 1 inch: 1300 feet. Project corridor indicated in red.

building on the opposite side of the road labeled "D. Cannon;" and further to the west, a fourth building labeled "J. Egbert." To the west of the Egbert property, at the mouth of present day Cannon's Creek, the map notes on the south side of the marsh a facility known as "D. Decker's Shipyard."

The Beers Atlas of Staten Island of 1874 shows that there was relatively little change in the cultural landscape of the project corridor during the third quarter of the 19th century (Figures 4.5a-b). This map is the first, however, to begin to applying place names to all of the various small settlements that had by this time developed along the western margins of Staten Island. At the northern end of the project corridor on the southwestern side of Daniel's Neck, the name "Bloomfield" was applied to a cluster of residences developing on Chelsea (later Bloomfield) Road and Merrill Road (later Decker or Bloomfield Avenue). This little community was earlier known as Merrill Town and later as Watch Oak (or Watchogue), before becoming known as Bloomfield, an appellation that persists to this day (Morris 1898:410). A somewhat larger and more nucleated settlement had also formed to the east of the project corridor centered on the intersections of Cannon Avenue and the Richmond Turnpike. Named Travisville, the subsequent growth of this hamlet into a village was closely tied to the fortunes of the American Linoleum Company, which around this time owned properties on the south side of the Richmond Turnpike some distance to the south of the project corridor.

Specifically within the project corridor, the Beers atlas shows only a single building, labeled "Mrs. S. Slate," standing within the project area to the north of Sawmill Creek. The "A. Vroom" building, shown on the Butler map of 1853 (see Figure 4.3), is not depicted by the Beers map of 1874. This appears to have been a cartographic omission rather than an accurate reflection of conditions on the ground, as several buildings labeled "A. Vroom," including one in approximately the same location, appear in this vicinity on later maps (see below, Figures 4.6 and 4.7). To the south of the creek, the map shows a building, labeled "Old School" on the east side of modern day Bloomfield Road (labeled Chelsea Road by this map), just to the east of the project corridor. To the west of the point at which the Beers map shows "Chelsea Road" becoming "Watch Oak Road," two buildings are depicted under the ownership of W.F. Cary, where the Butler map had shown only one. At the intersection of present-day Chelsea Road with the project corridor, the Beers map of 1874 depicts the same three buildings as the Butler map of 1853. The ownership of two of the buildings appears to have changed in the intervening years. The building furthest to the south and east, labeled by the Butler map of 1853 as "J. Van Pelt," is shown by the Beers map of 1874 to have been in the tenure of W.F. Cary (along with a considerable amount of the surrounding marsh land). The building labeled "W. Stoothoff" on the Butler map of 1853 is labeled "Morris and Essex" on the Beers map of 1874. "Morris and Essex" refers to the Morris and Essex Railroad of New Jersey.

The Beers map of 1874 shows numerous buildings lying within the limits of the southern end of the project corridor. On the north side of present-day Cannon Avenue are shown three small buildings labeled "Geo. Shepard" and a single building labeled "M. Cannon." The latter building may correlate with the easternmost of the two buildings labeled "Williams" on the earlier Butler map. On the south side of the road, the map shows several buildings including, most notably, two large structures not shown on the earlier map and labeled as "A. Isaacsen Reserving House." The westernmost of these buildings is depicted by the map as being of substantial size and possessing a complex footprint that is essentially T-shaped in plan. The easternmost of the two buildings is shown as having a simple rectangular footprint. Immediately to the west of the "Reserving House," the Beers map of 1874 shows two buildings labeled "Mrs. Egbert" in approx-

imately the same location where the earlier Butler map had shown a single building labeled, "J. Egbert." On the south side of the road, along the eastern edge of the project area, the map shows a single large building labeled "D. Cannon's Est."

A slightly later Beers map, dated 1887 (Figure 4.6), again shows only minimal change occurring within the cultural landscape of the project corridor in the later 1870s and 1880s. This map shows that Travisville had acquired the official post office designation of "Linoleumville" in honor of the role the American Linoleum Manufacturing Company was playing in the development of the local economy. One change evident in this map is that the property on the south side of Chelsea Road, shown by the Butler map of 1853 as being in J. Van Pelt ownership (Figure 4.4), and then by the Beers map of 1874 as being owned by "W.F. Cary" (Figure 4.5b), had by 1887 reverted to "J. Van Pelt." The building labeled on the Beers map of 1874 as "Morris and Essex" (near the intersection of Watch Oak Road and Chelsea Road) is not shown by the map of 1887. The most notable changes during this period took place along Cannon Avenue. The Beers map of 1887 does not show the "Reserving House" shown on the earlier Beers map of 1874, suggesting that it was no longer in existence by the later date. The property on which the "Reserving House" had formerly been located is shown by the Beers map of 1887 to have then been in the possession of "E. Decker." To the east of Decker's property, the map shows the addition of a single building labeled "P. Cannon."

4. 20th Century

The Robinson map of 1898 reflects a continued growth and gradual filling of empty lots in the small communities surrounding the project corridor at the turn of the century (Figure 4.7). Growth was especially notable in and around the northern end of the project corridor along Bloomfield Road. All of the houses situated along the west side of Bloomfield Road, previously labeled on earlier maps as being in the possession of "A. Vroom," are shown by this map to have been in the tenure of the Merrill family. The map shows a large building with an L-shaped footprint and a small outbuilding on a lot immediately to the south of "Water Street." The buildings are labeled as then being in the tenure of Isaiah M. Merrill. The large building may be the same structure as that labeled "A. Vroom" in approximately this location on the Beers map of 1887 (Figure 4.6). Water Street is shown as a formally opened roadway on the map of 1898, extending from the west side of Bloomfield Road down to a small unnamed creek emptying into the Arthur Kill. This represents a change from the short lane portrayed with dotted lines on the map of 1887. To the south of Isaiah M. Merrill's property, the map depicts four buildings located at the western end of a long drive extending from the western shoulder of Bloomfield Road. These buildings are situated in approximately the same location as one of the buildings labeled "A. Vroom" on the map of 1887 (Figure 4.6). The two westernmost of these buildings, possibly a house and carriage house/stable, are labeled by the map as "Victoria Merrill." Just to the east stood another pair of buildings, also possibly a house and carriage house/stable, labeled "Mary Merrill."

Just to the south of the intersection of the lane leading to Mary and Victoria Merrill's buildings stood another building owned by the Merrill family. This relatively large building displayed an L-shaped footprint and fronted the west side of Bloomfield Road. The map shows the building to have been owned by "M.T. Merrill." No buildings are shown in the locations where the map of 1887 had depicted buildings labeled as "Mrs Slate" and "Old School." However, the map does show a new building just to the south of the M.T. Merrill building near which the words "C.D. Merrill" and "School No.23" appear. It is likely that the name "C.D. Merrill" may have been associated only with

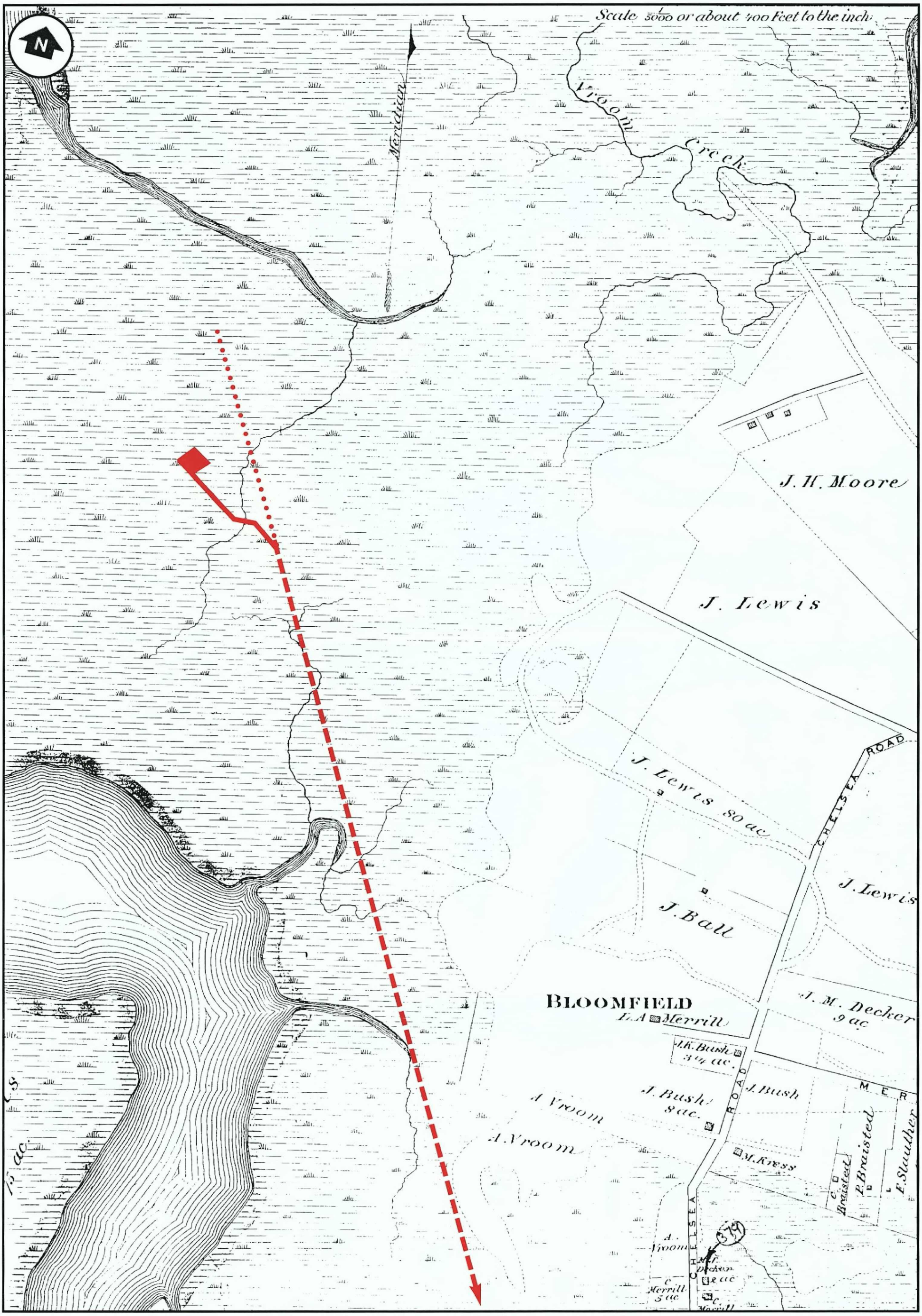


Figure 4.5a. Beers, J.B. Part of Northfield. *Atlas of Staten Island, New York*. 1874. Scale 1 inch: 500 feet. Northern section of project corridor indicated in red.

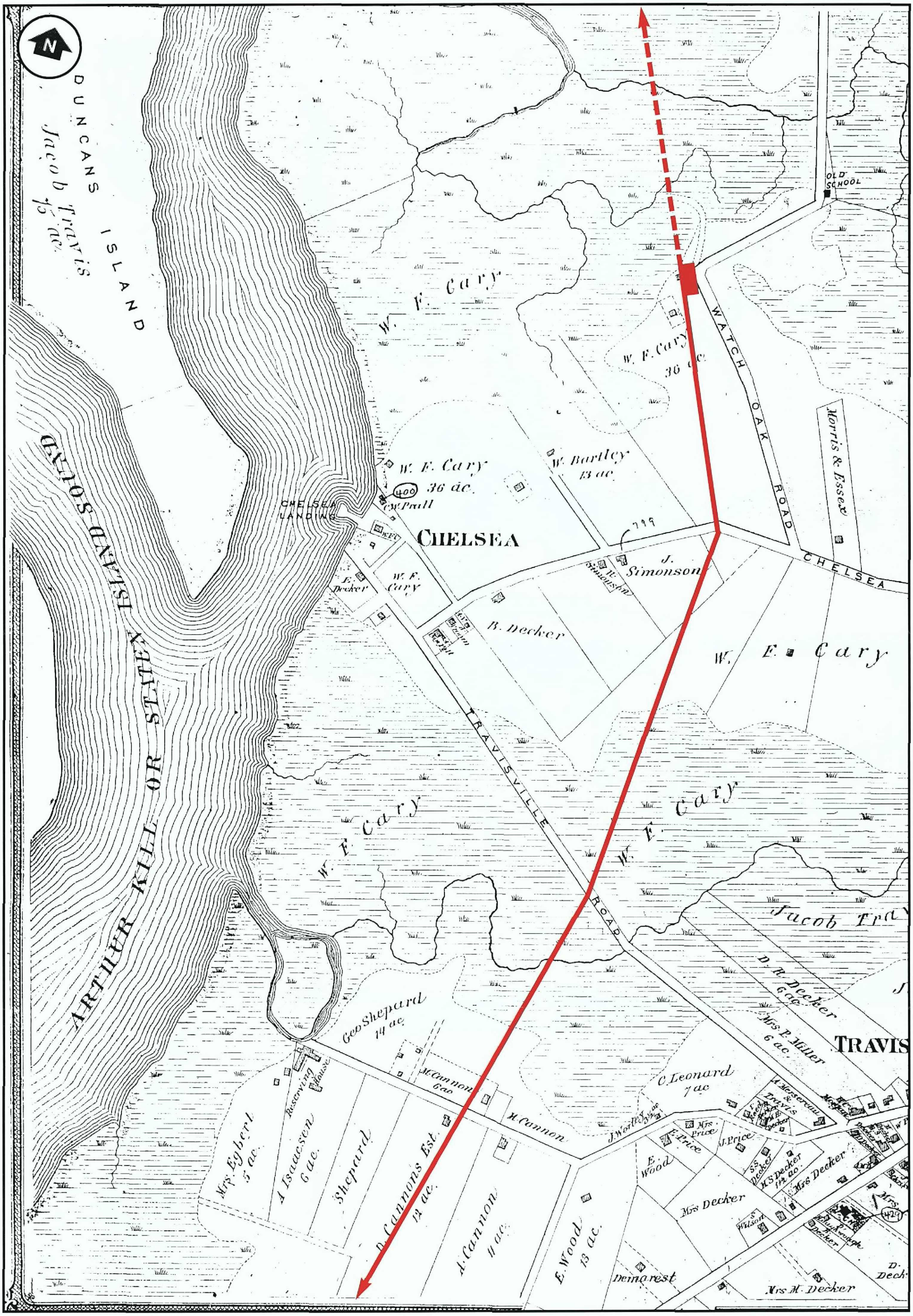


Figure 4.5b. Beers, J.B. Part of Northfield. *Atlas of Staten Island, New York*. 1874. Scale 1 inch: 500 feet. Southern section of project corridor indicated in red.

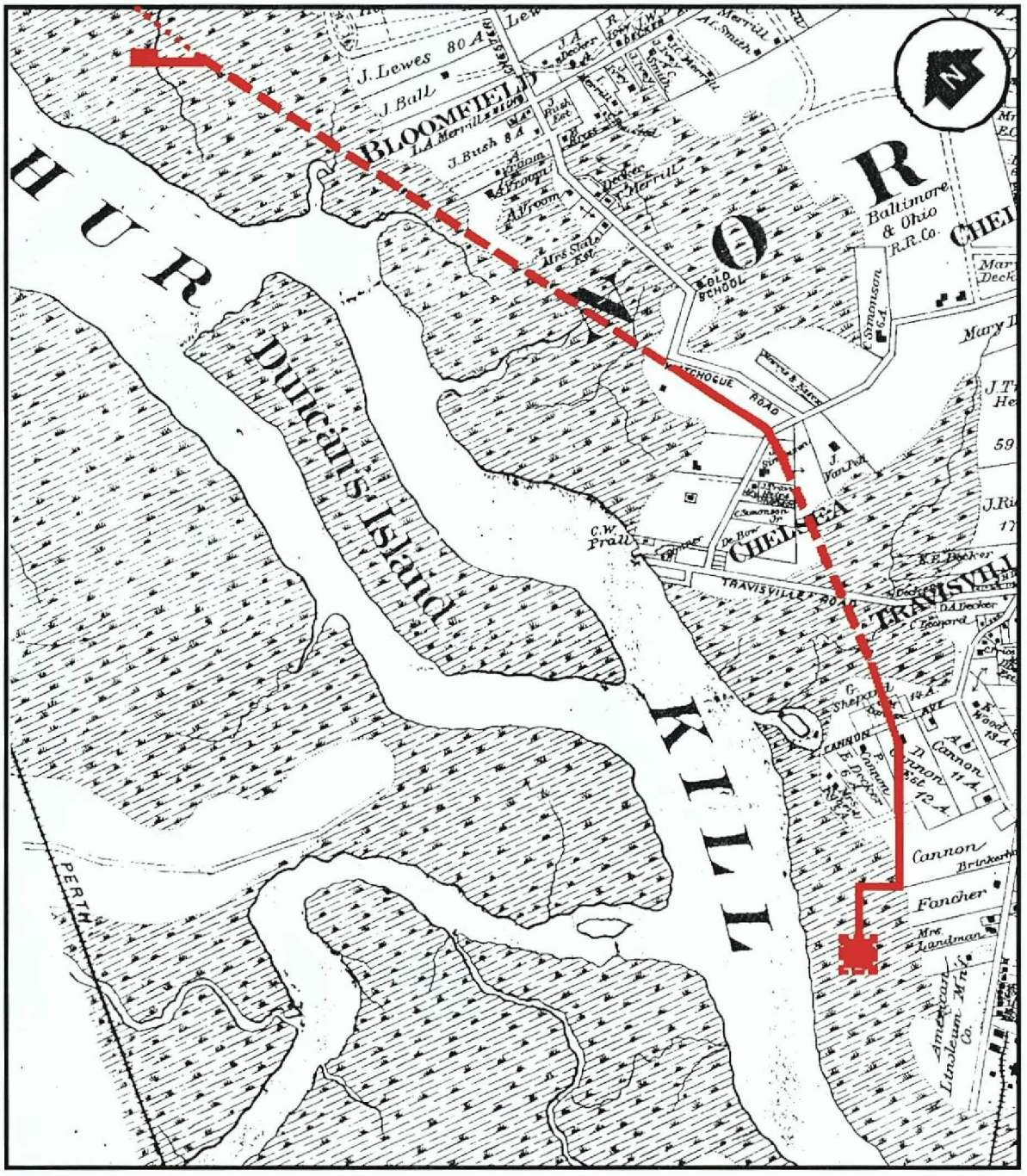


Figure 4.6. Beers, J.B. Middle Section of Richmond County, Staten Island. *Atlas of Staten Island, New York*. 1887. Scale 1 inch: 1500 feet. Project corridor indicated in red.

the property immediately to the north of that occupied by the school and not with the school property itself but as a "C. Merrill"is shown as the owner of the land on which the school was later erected by the Beers map of 1874 (Figure 4.5a), the intent of the label can not be known for certain without further research.

Near the intersection of Watchogue (Watch Oak) Road and Chelsea Road, the map shows both the "John Simonson" house (in the same spot as the F. Simonson house on the Butler map of 1853 [Figure 4.4]) and the building that the Beers map of 1887 had labeled as "J. Van Pelt." The J. Van Pelt building is shown by the newer map as then being in the possession of the "Aaron Van Pelt Est." An early 20th-century photograph of the John Simonson house (Plate 4.1) shows it to have been a two-story, three-bay, clapboard-sheathed frame residence with a single-story rear protuberance probably housing a kitchen. Outside the project corridor limits on the waterfront of Chelsea, the map makes note of the establishment of the "Mathisons & Co. Refiners of Antimony," an important new local industrial concern. Further to the south, at Chelsea, the map is the first to show "the Liberty Ditch" a new channel cut circa 1860 to straighten the course of Chelsea Creek at its mouth. Concerning the built landscape south of Cannon Avenue, for the most part this maps shows buildings in the same locations as the Beers map of 1887 (Figure 4.6), but it does not depict the house shown on the earlier map as being the property of "D. Cannon."

Almost a decade later, the Robinson map of 1907 (Figure 4.8) shows a few further changes in property ownership, but on the whole depicts a landscape very similar to that shown on the same company's map of 1898 (Figure 4.7). The lot shown by the map of 1898 as being owned by Victoria Merrill was, in 1907, owned by "C.M. Merrill," and only one, instead of two, buildings are depicted. The neighboring house formerly owned by "Mary Merril" is labeled C.G. Merrill by this map. The building labeled "School No. 23" on the earlier map is shown as "Public School No. 23" on the map of 1907. The house shown by the map of 1898 to have been in the possession of the "Aaron Van Pelt Est." is shown in 1907 as being owned by "J.A.W. & G.B. Decker." It also shows that the former Egbert property at the mouth of Chelsea Creek was by this later date in the possession of "J. B. Pearson." This map (like Figures 4.5 to 4.7) shows two buildings standing on this property.

The Bromley and Bromley map of 1917 (Figures 4.9a-b) shows buildings in all of the same locations as the Robinson map of a decade earlier, but it also shows additional outbuildings on the property of "J.A.W.& G. B. Decker" and, to the south of Cannon Avenue shows a series of five additional buildings, labeled "C.D.B. Cannon," on the lot where Figures 4.4 to 4.6 show a building associated with "D. Cannon." The Robinson map of 1907, however, had shown no building at this location. The map of 1917 also shows an additional outbuilding on the "P.L.Cannon" property and only one building, where formerly there were two, on the "J.B. Pearson" property. Perhaps most notably, the Bromley and Bromley map records what can only be described as explosive growth in the area surrounding "Linoleumville" in the decade between 1907 and 1917.

From the 1920s through the final quarter of the 20th century, Staten Island witnessed robust suburban growth, while in the post-World War II era the area in and around the project corridor has also become increasingly industrialized. Much of the industrial growth around the northern end of the corridor has centered on the petrochemical industry, the single biggest development being the construction of a massive Gulf Oil Corporation tank farm that now covers the larger part of the area bounded by the Arthur Kill, Sawmill Creek, U.S. Route 440, and the Goethals Bridge approaches and Route I-78. Several smaller industrial concerns have also located in the central portion of the project corridor over the past half cen-

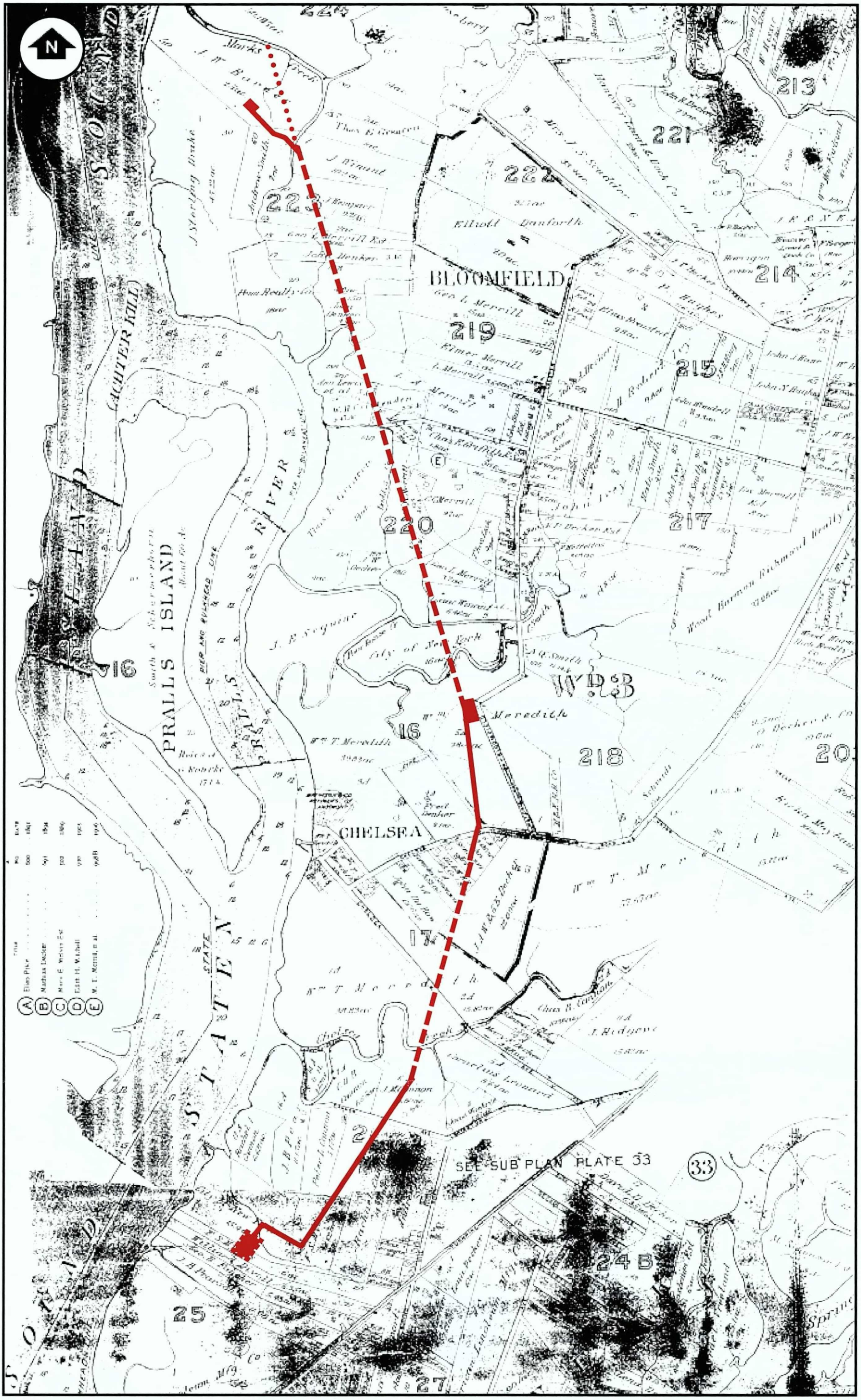


Figure 4.8. Robinson, E. *Ward 3 (Plates 33 and 34). Atlas of the Borough of Richmond, City of New York.* 1907. Scale 1 inch: 900 feet. Project corridor indicated in red.

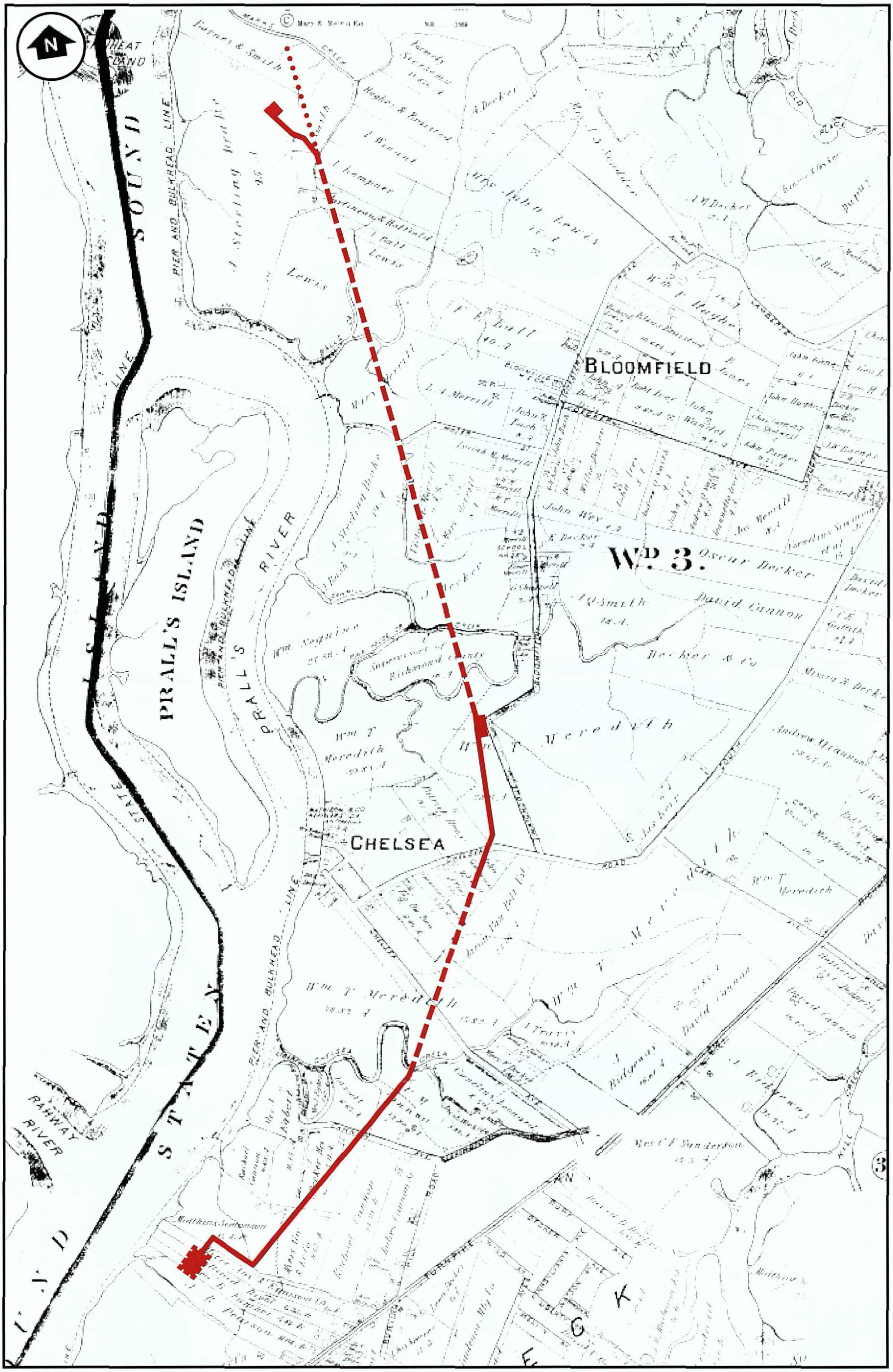


Figure 4.7. Robinson, E. *Ward 3 (Plates 33 and 34). Atlas of the Borough of Richmond, City of New York, Second and Revised Edition.* 1898. Scale 1 inch: 900 feet. Project corridor indicated in red.

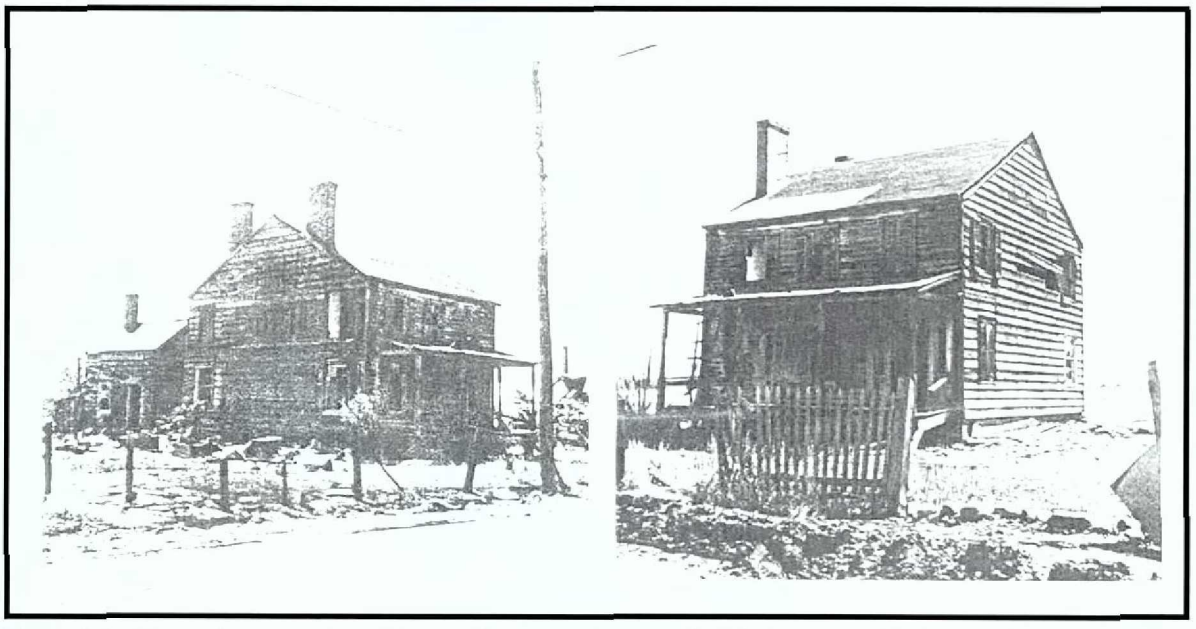


Plate 4.1. Two photographs of the J. Simonson House, South Avenue, Chelsea, taken on April 8, 1971 by R.C. Fingado (Historic Photograph Archive of the Staten Island Historical Society).

tury. By the 1980s, Chelsea, for example, was home to the May Ship Repair Company, the Adco Electric Co., the Superior Confection Company, Francesco's Auto Wreckers, and the Teleport Communications Company.

Towards the southern end of the project corridor the key to later 20th-century development was the construction of the Arthur Kill Power Plant that was originally serviced by a rail spur of the Baltimore & Ohio Railroad, known as the Travis Spur or Travis Branch. This spur line, extending south from an existing line previously constructed to provide rail service to the Gulf Oil Corporation tank farm, forms the backbone of the project corridor and extends through nearly its entire length. The spur was opened in 1959 and for several decades coal-filled hoppers made their way to the six-track Travis yard at Consolidated Edison's Arthur Kill power generating plant. These coal shipments arrived daily from Pennsylvania, West Virginia and Maryland, sufficient to supply a facility that in the late 1960s was burning 200 to 400 tons of coal an hour. The line is currently no longer in use. A single Staten Island Rapid Transit motor #353 sits abandoned in the Travis yard (www.railroad.net June 11, 2003; www.nyrail.org June 11, 2003).

Most of Staten Island's late 20th-century growth has been spurred one way or another by the expansion of the regional highway network, specifically by the construction of the General George W. Goethals Bridge, the Staten Island Expressway, and, most importantly, the West Shore Expressway. This stimulus to development continues to this day and has most recently resulted in the creation of the West Shore Plaza shopping mall just east of the village of Chelsea in the triangle of land bounded by the West Shore Expressway, Chelsea Road, and Meredith Avenue.

B. DETAILED HISTORY OF PROPERTIES IN THE IMMEDIATE PROJECT VICINITY

This section of the "historical background" chapter provides detailed historical information for each of the five historic properties lying close to the project alignment where it was considered possible that related historical archaeological resources might be encountered. Two of these properties – the Cary Site [H11] and the Van Pelt Site [H14] – are situated on the neck of land that projects westward to the Arthur Kill between Sawmill Creek and Neck Creek, and lie on the eastern outskirts of the small riverside community of Chelsea. The three remaining properties – the Williams Site [H16], the Cannon Site 1 [H17] and the Cannon Site 3 [H21] - all lie on the south side of Neck Creek, west of the Travis Spur. All three properties form part of a broad and complicated pattern of Cannon family ownership in the area that traces back into the late 17th century. None of the five historic properties studied presently contains standing historic buildings.

1. Cary Site [H11]

The property containing the Cary Site was formerly that of Benjamin Prall, Sr., who is believed to have been in ownership of much of the land containing the former community of Chelsea toward the close of the 18th century (Table 4.1). Prall's property appears to have been bounded on the west by Pralls Creek (also referred to as Pralls River) and on the north by the southernmost segment of Sawmill Creek. The property extended in an easterly direction across present-day Bloomfield Avenue and in a southerly direction perhaps as far south as Neck (Chelsea) Creek. It is likely that Benjamin Prall inherited this property from another member of the Prall family without undergoing a formal transfer through a deed. Benjamin Prall

Table 4.1. Sequence of Ownership - Cary Site [H11].

Date of Ownership	Name	Source
-1796	Benjamin Prall and his wife, Sarah	See Richmond Co. Probate File 5 1
1796-1807	Benjamin Prall, Barnt Prall, Peter Prall, John Prall, David Prall and Mary Prall (Heirs of Benjamin Prall)	Richmond Co. Probate File 5 1
1807-1822	Peter Prall, Jr.	See Richmond Co. Deed U 177
1822-1832	Heirs of Peter Prall, Jr.	Richmond Co. Probate File 261
1832-1836	Arthur Prall	Richmond Co. Deed U 177
1836-1884	William F. Cary	Richmond Co. Deed Y 444
1884-1886	George T. Bonner and William T. Meredith	Richmond Co. Deed 154 118
1886-1908	William T. Meredith	Richmond Co. Deed 171 216
1908-	W. T. Meredith Estate	Richmond Co. Deed 352 99

appears to have been in control of this property by 1783 (Richmond County Probate File 5 1; Richmond County Deed F 489).

Benjamin Prall died in 1796. His last will and testament, drafted in 1783, ordered his property to be divided among his six children, Benjamin Prall, Jr., Barnt Prall, Peter Prall, John Prall, David Prall and Mary Prall (Richmond County Probate File 51). Sometime between 1796 and 1807, Prall's property was indeed divided into several lots (at least six), with the property containing the Cary Site being set off to Peter Prall (see Richmond County Deed U 177). In 1807, Sarah Prall, widow of Benjamin Prall, Sr., quitclaimed her interest in her husband's property to her above listed children (Richmond County Deed F 489).

Peter Prall (also known as Peter Prall, Jr.) owned the property containing the Cary Site until his death, which occurred in 1822 (Richmond County Probate File 261). In 1815, seven years prior to his death, Peter Prall, Jr. drafted his last will and testament. The will indicates that he was at the time a resident of Southfield, Richmond County. The will devised property that was in the possession of his wife, Elizabeth Prall, to her, while the remainder was to pass to his son, Abraham Prall. The will lists the following as his children: Sarah Cozine, Elizabeth Marthing, Anna Prall, Susannah Prall, Mary Prall, Benjamin Prall, Arthur Prall, Abraham Prall and Catherine Prall (Richmond County Probate File 261).

In 1832, the children of Peter Prall, Jr. (minus Arthur Prall) sold "All that certain dwelling house and lot of upland and meadow ..." containing 30.1 acres to their brother Arthur Prall (Richmond County Deed U 177). The metes and bounds of this property show that it contained the Cary Site, the majority of which was situated on the west side of present-day Bloomfield Road, extending south from Sawmill Creek to Chelsea Road. On the Bromley and Bromley map of 1917 (Figure 4.9b), this property is labeled as "28.07 ac." belonging to "Wm T. Meredith." The deed of conveyance also included another 30.1-acre tract ("lot of land and meadow") located to the east of the tract containing the Cary Site and lying on the east side of Bloomfield Road. This tract had been formerly set off to Benjamin Prall, Jr. sometime between 1796 and 1807 (Richmond County Deed U 177).

Thus, by 1832, a dwelling had been constructed on the property containing the Cary Site. Most likely this house was constructed either by Peter Prall, Jr. sometime between 1796 and 1822, or by his son, Arthur Prall, sometime between 1822 and 1832, immediately following his father's death and prior to his formally gaining title to the property from his siblings.

Arthur Prall owned the property until 1836, when he sold it to William F. Cary, a merchant of New York (Richmond County Deed Y 444), who during the 1830s appears to have been trying to buy up all of the land at Chelsea. By 1839, he had nearly succeeded in doing so and, in 1841, he patented the right to erect a new dock on Staten Island Sound (Map of Property of William Ferdinand Cary at Chelsea 1839; Richmond County Deed 8 113).

William F. Cary owned the property containing the Carey Site until his death, which occurred sometime around 1884. In that year, all of his remaining Chelsea holdings, including the property containing the Carey Site, were sold to George T. Bonner and William T. Meredith (Richmond County Deed 154 118). The deed of conveyance indicates that at the time of his death, Cary was a resident of Boston.

Bonner sold his share of the former Cary property to Meredith in 1886 (Richmond County Deed 171 216). In 1908, William T. Meredith transferred title to the property to the W.T. Meredith Estate, a corporation established under the laws of New York. Based on the historic map evidence (Figures 4.6 and 4.7), the build-

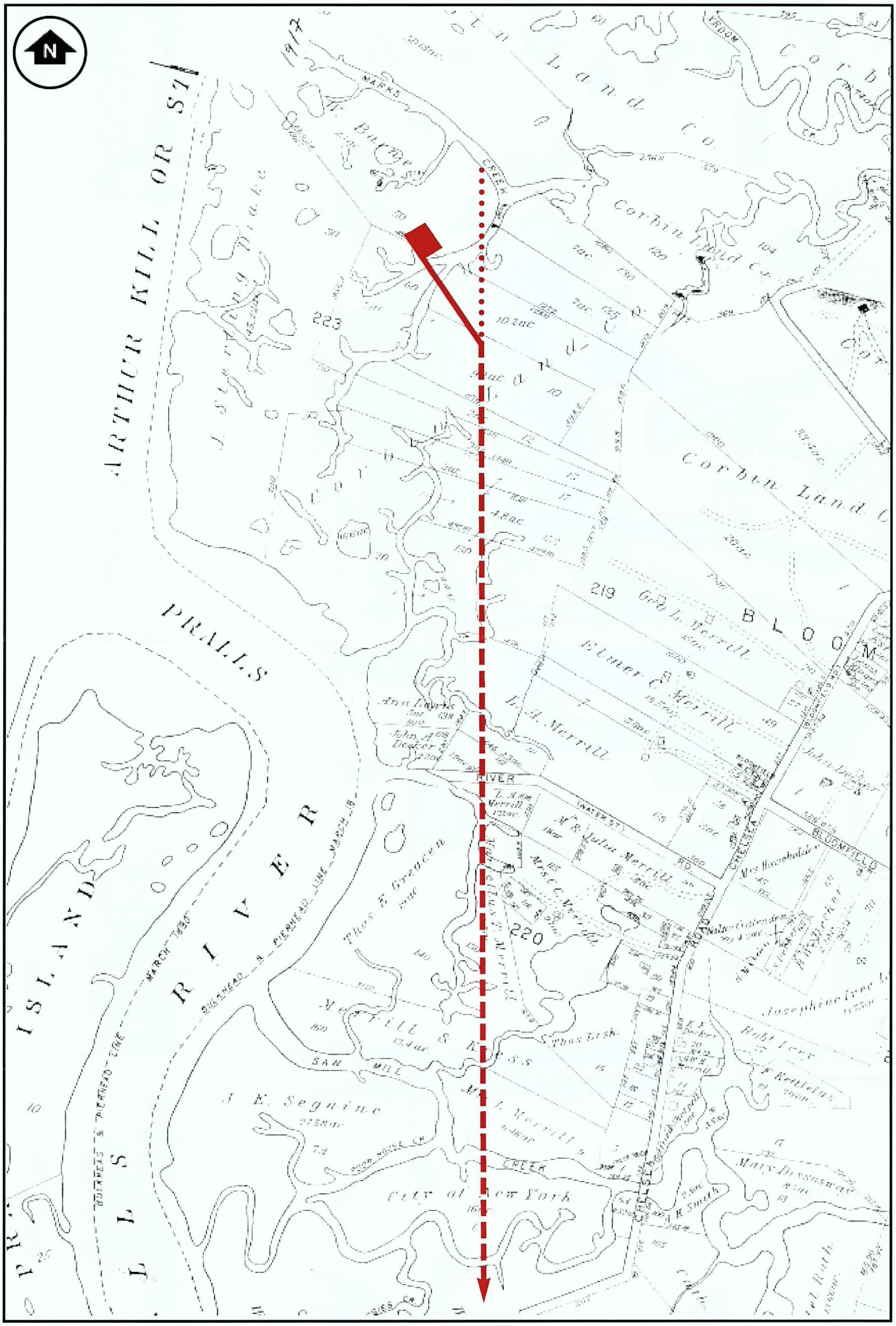


Figure 4.9a. Bromley, G.W. and W.S. Part of Ward 3, Borough of Richmond (Volume I, Plates 42 and 43). *Atlas of the City of New York, Borough of Richmond, Staten Island*. 1917. Scale 1 inch: 500 feet. Northern section of project corridor indicated in red.

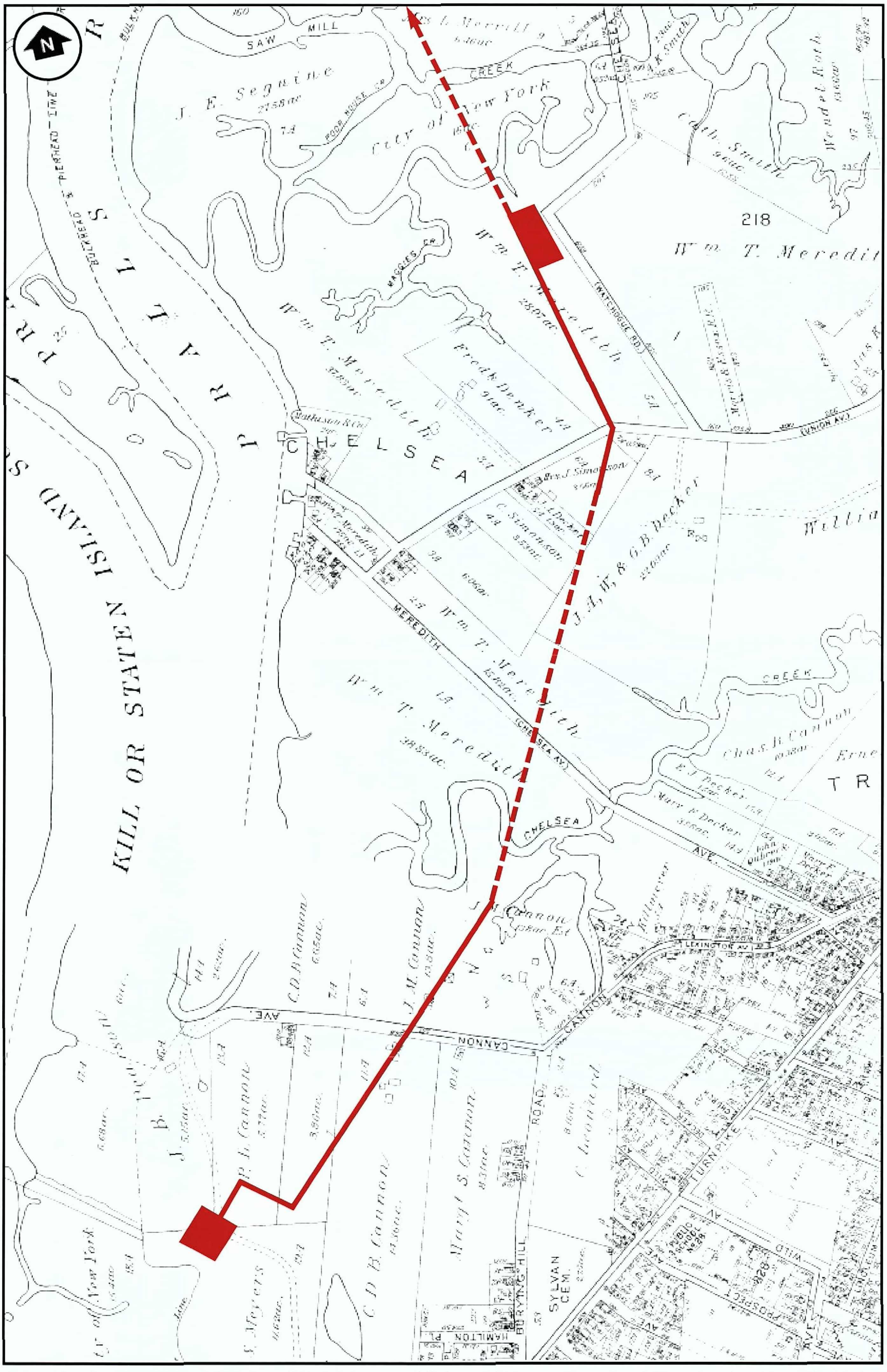


Figure 4.9b. Bromley, G.W. and W.S. Part of Ward 3, Borough of Richmond (Volume I, Plates 41 and 42). *Atlas of the City of New York, Borough of Richmond, Staten Island*. 1917. Scale 1 inch: 500 feet. Southern section of project corridor indicated in red.

ings representing the Cary Site appear to have been demolished while under the ownership of Meredith by the turn of the 20th century.

2. Van Pelt Site [H14]

The property containing the Van Pelt Site belonged to Abraham Prall in the early 19th century (Table 4.2). Upon his death, Abraham's property passed to Ichabod Prall and his wife, Hannah, of New York City. In 1821 Ichabod and Hannah sold the property to Aaron Van Pelt. At the time of sale the property was described as containing a salt marsh, a small creek and sharing a northern and western boundary with the lands of the heirs of Benjamin Prall (Richmond County Deed Liber I 217). Prior to the Van Pelt ownership, it is unlikely that a residence was in existence on this property.

The property remained in the Van Pelt family until the heirs of Aaron Van Pelt, namely Elsie Van Pelt, Jacob Van Pelt, Elizabeth A. Van Pelt, Caroline Van Pelt and Frank L. Van Pelt, sold it in 1900 to John A. Decker, Jr., William E. Decker and George B. Decker. Apparently neither Aaron Van Pelt nor his wife, Sarah, left a will and thus the deed includes important genealogical and property information:

> "Jacob Van Pelt being duly sworn, says that his father Aaron Van Pelt died in the County of Richmond, on or about the year 1834 leaving him surviving his widow Sarah Van Pelt who died during the year 1870, his son Jacob Van Pelt the affiant sons John Van Pelt and William Van Pelt and Daughter Elizabeth Merrell who died in the County of Richmond, during the year 1892 without issue" (Richmond County Deed 279 179).

The house built on the property, which is first depicted on the U.S. Coast Survey map produced in 1835-36 (Figure 4.3), was linked to various owners over the course of the 19th century. It is first attributed to "J. Van Pelt," probably Jacob Van Pelt, on the Butler map of 1853 (Figure 4.4). Though still under the ownership of Aaron Van Pelt, as set forth in the original deed with Ichabod Prall, the building is attributed to "W.F. Cary" on the Beers map of 1874 (Figure 4.5b), perhaps because Cary owned much of the surrounding property. "J. Van Pelt" is again depicted as the owner on the Beers map of 1887 (Figure 4.6). The building and property are identified "Aaron Van Pelt Est." on the Robinson map of 1898 (Figure 4.7). Finally the building and property came under the tenure of "J.A., W. & G.B. Decker" as seen on the Robinson map of 1907 (Figure 4.8) and later the Bromley and Bromley map of 1917 (Figure 4.9b).

3. Williams Site [H16]

In the late 17th and early 18th centuries the general vicinity of the Williams Site was in the hands of John Garrett DeMuff, but probably soon after came under the control of the Cannon family (Figures 4.1 and 4.2). Immediately prior to 1840, the specific property containing the Williams Site was owned by Joseph Egbert (Table 4.3). On May 23, 1840, Egbert sold this property, described as "All that certain dwelling house and lot of ground ... containing four acres, three rods and seventeen perches..." to Richard R. Decker (Richmond County Deed 8 515).

Richard Decker owned the property containing the Williams Site until his death, which occurred in 1847. The property then passed to his wife, Elizabeth Decker (Richmond County Probate File 544). The property remained under the ownership of Elizabeth Decker for the next 20 years, during which time she married John Hancock. In 1867, Elizabeth Hancock (née Decker) and her son, Freeman D. Decker, sold

Table 4.2. Ownership of the Property Containing HI4 Van Pelt Site.

Date of Ownership	Name	Source
-1821	Abraham Prall	See Richmond Co. Deed I 217
-1821	Ichabod and Hannah Prall	Richmond Co. Deed I 217
1821-1900	Aaron Van Pelt and his heirs	Richmond Co. Deed 279 179
1900-	John A. Decker, Jr., William E. Decker and George B. Decker	Richmond Co. Deed 279 179

Table 4.3. Sequence of Ownership - Williams Site [H16].

Date of Ownership	Name	Source
-1840	Joseph Egbert	See Richmond Co. Deed 8 515
1840-1847	Richard R. Decker and his wife Elizabeth	Richmond Co. Deed 8 5 15
1847-1867	Elizabeth Decker (widow of Richard R. Decker)	See Richmond Co. Deed 69 237
1867-	Victor Melese	Richmond Co. Deed 69 237
-1868	Emile B. Morel	See Richmond Co. Deed 76 15 1
1868-	George Sheppard	Richmond Co. Deed 76 15 1

the property containing the Williams Site to Victor Melese (Richmond County Deed 69 237). Sometime within the next two years the property was acquired by Emile B. Morel, who in 1868 sold the property to George Sheppard (Richmond County Deed 76 151).

The Butler map of 1853 (Figure 4.4) depicts two buildings with the single label "Williams" in the vicinity of what is termed in this report the Williams Site. The title research for the property immediately to the east suggests that it had already been improved by the late 1840s by John M. Cannon (see below). It is speculated that the only the westernmost of the two "Williams" buildings falls within the boundaries of the William Site property. The other building was possibly erected by John M. Cannon around 1847. The title research indicates that this latter property remained within Cannon ownership throughout the 19th century. The Williams Site property on the other hand was in the ownership of the Decker family at the time of the map publication, suggesting that the Williams family may have been leasing the property from Richard R. Decker's widow, Elizabeth Decker. Perhaps Elizabeth Decker had remarried by 1853 and moved in with her new husband, John Hancock, who may have owned property elsewhere. In summary, at least one building appears to have been in existence at the Williams Site by 1840, and by the 1850s this seems to have been serving as a tenant dwelling.

4. Cannon Properties [H17 and H21]

The properties termed here the Cannon Site 1 [H17] and the Cannon Site 3 [H21] both appear to derive from the subdivision of the homestead property of Andrew Cannon, Sr. in 1847. This latter property traces its Cannon family origins to the late 17th and early 18th centuries, although it is unclear if this particular homestead location dates back to the early settlement period. The homestead lot does, however, appear to fall within the bounds of a property attributed to an Andrew Cannon which is shown on the Skene map of 1907 showing colonial land patents for the period 1688-1712 (Figure 4.1). This Andrew Cannon is likely the same individual who is listed within a deed from 1703 (Richmond County Deed B 462). Later 18th-century Cannon family land ownership in this same area of Staten Island is also depicted on the Taylor and Skinner Map of 1781 (Figure 4.2).

The 19th-century Andrew Cannon, Sr. acquired his homestead property sometime prior to 1847 (see Richmond County Deed 8 515). In that year, he conveyed his 'Homestead Lot" (containing 13 acres and including Cannon Site 3 [H21]) and a 14-acre parcel on the north side of Cannon Avenue to his sons, Andrew Cannon, Jr. and John Marsh Cannon (Richmond County Deed 19 142) (Table 4.4). Seven days later, he sold another 14-acre parcel of upland and woodland, lying west of the homestead lot (containing the Cannon Site 1 [H17]) to his son, David Cannon (Richmond County Deed 25 593) (Table 4.5). Following these transfers, it appears that Andrew Cannon, Sr. remained on the homestead lot with Andrew, Jr., this property lying south of Cannon Avenue and mostly east of the project alignment, while both John Marsh Cannon and David Cannon constructed their own dwellings on the newly subdivided parcels. John Marsh Cannon established his home on the north side of Cannon Avenue. David Cannon set up his residence on the south side of the same road immediately to the west of the homestead lot. The construction of both of these latter dwellings probably occurred in the late 1840s.

The disposition of the above three properties is most easily understood on the Beers map of 1874 (Figure 4.5b). To the south of Cannon Avenue, Andrew Cannon Sr.'s homestead lot (Cannon Site 3 [H21]) is labeled "A. Cannon 11 ac." To the west of the homestead lot, David Cannon's property (Cannon Site 1

Table 4.4. Sequence of Ownership - Cannon Site 3 [HZ1].

Date of Ownership	Name	Source
-1847	Andrew Cannon, Sr.	See Richmond Co. Deed 19 142
1847	Andrew Cannon, Jr. and John Marsh Cannon	Richmond Co. Deed 19 142
1847-c 1917	Andrew Cannon, Jr.	Robinson 1907; Bromley and Bromley 1917
		Bromley and Bromley 1917
c 1917-	Margaret S. Cannon	Bromley and Bromley 1917

Table 4.5. Sequence of Ownership - Cannon Site 1 [H17].

Date of Ownership	Name(s)	Source
-1847	Andrew Cannon, Sr.	See Richmond Co. Deed 25 593
1847-	David Cannon	Richmond Co. Deed 25 593
-1901	Rachel M. Cannon	See Richmond Co. Probate File 3202
1901-	Heirs of Rachel Cannon	Richmond Co. Probate File 3202
-1924	Charles D.B. Cannon	See Richmond Co. Deed 586 301
1924-1931	Hyman Barron and his wife Sadie Barron	Richmond Co. Deed 586 301
1931-	Minnie Baron	Richmond Co. Deed 73 1 298

[H17]) is labeled 'D. Cannon Est. 12 ac." Finally, on the opposite (northern) side of the road, the John M. Cannon Site is labeled "M Cannon 6 ac."

The mid-19th-century homestead property of Andrew Cannon, Sr. (Cannon Site 3 [H21]), which soon after passed into the hands of Andrew Cannon, Jr., is depicted on the full sequence of late 19th- and early 20th-century maps (Figures 4.4, 4.5b, 4.6-4.8 and 4.9b). Andrew Cannon, Jr. held the property into the early 20th century, when it passed into the hands of Margaret S. Cannon (Table 4.4). In the 1920s, the property was subsumed into a large residential subdivision instituted by the Baron family (see below).

Sometime between 1853 and 1874, David Cannon died intestate, leaving his property (Cannon Site 1 [H17]) to his widow, Rachel M. Cannon. She retained ownership until her own death in 1901 (Richmond County Probate File 3202). Sometime between 1901 and 1917, Rachel M. Cannon's son, Charles D.B. Cannon evidently acquired full title to the property (see Richmond County Deed 586 381) (Figure 4.9b). In 1924, Charles D.B. Cannon sold the property to Hyman Baron and his wife, Sadie Baron (Richmond County Deed 586 381). The deed of conveyance indicates that at the time of the sale, Cannon was residing at 268 Cannon Avenue, which was presumably the then street address of the Cannon Site 1. Sometime between 1924 and 1926, the Barons are believed to have demolished the buildings that made up Cannon Site 1 to make way for the Baron Manor - Addition No. 2 development. A map drafted in 1926 for this development shows that this property was part of a larger development plan which also included the property containing the former Andrew Cannon, Sr. homestead lot (Richmond County Map No. 1592). This development represented part of the mid-20th-century westward expansion of the community of Travis, a process that was subsequently halted and constrained in the 1950s by the construction of Consolidated Edison power generating plant and its rail link known as the Travis Spur, and more recently by the construction of the West Shore Expressway.

The John Marsh Cannon property on the north side of Cannon Avenue was initially jointly owned by John Marsh Cannon and his brother, Andrew Cannon, Jr. In 1866, Andrew Cannon, Jr. and his wife, Permeia Ann Cannon, sold their interest in the property to John Marsh Cannon (Richmond County Deed 94 404). John Marsh Cannon is believed to have lived here for the rest of the 19th century before moving to Port Richmond in the early years of the 20th century (see Richmond County Deed 308 20). In 1905, John Marsh Cannon sold the 14-acre property to Laura Anderson, who in 1921 sold it to Marcella Florence Nally (Richmond County Deeds 308 20 and 535 142). In 1955, Nally sold the western portion of the property to Consolidated Edison Company of New York, Inc. to make way for the construction of this corporation's power plant facility (Richmond County Deed 1034 405).

Chapter 5

ARCHAEOLOGICAL FIELD INVESTIGATIONS

In October of 2001 a Principal Investigator (Liebeknecht) and Senior Archaeologist (Eidson) conducted a one-day pedestrian survey of the proposed temporary workspace for the horizontal directional drilling (HDD) operations at the northern end of the project alignment (Figure 5.1). In May and June of 2003 a team of between four and six field archaeologists under the supervision of a Principal Investigator (Liebeknecht) and Senior Archaeologist (Harris) conducted shovel testing within the upland portions of the 60-foot wide, 2.3 mile long project corridor where open trenching is proposed (Figures 5.1, 5.2a-c and 5.3a-c). The latter activity involved excavation of 197 15- to 18-inch-diameter shovel test pits to a depth of three feet, or until sterile subsoil was encountered. Selected shovel tests where it was felt there might be some potential for more deeply buried soil horizons were excavated down to a depth of six feet with a manual bucket auger. Areas where shovel testing produced cultural materials, or where deposits of potential interest were encountered, were further examined through three- or five-foot square excavation units. Five excavation units in total were excavated.

Limited geomorphological testing and analysis were carried out in conjunction with the archaeological testing. The project geomorphologist excavated five geomorphological tests along the open trench segment to the north of Neck Creek and examined several of the shovel tests and all of the excavation units dug by Hunter Research. The results of the geomorphological studies are reported in Appendix A. Both archaeological and geomorphological testing procedures were subject to permitting requirements of the New York State Department of Environmental Conservation, (NYSDEC) the details of which are included in Appendix B.

All excavated soils were screened through ¼-inch-mesh screen and all tests were backfilled upon completion. Stratigraphic data, including information on soil types, depths and Munsell colors, were recorded on pre-printed shovel test and excavation unit log sheets. These data are summarized in Appendix C. Artifacts were bagged and labeled according to provenience and are summarized in Appendix D. Modern artifacts and non-diagnostic materials (such as coal, common along a railroad alignment) were noted in the shovel test and excavation unit logs and discarded in the field.

Testing was restricted to those segments of the project alignment where open trenching was proposed and to the proposed HDD staging and temporary workspace areas. Within these segments, some areas were considered to have moderate to high prehistoric and historical archaeological potential based on the background research and initial field evaluation carried out as part of the earlier Phase 1A cultural resource survey (Hunter Research, Inc. 1999). Thus, areas in the vicinity of documented prehistoric and historic sites were considered to have a moderate to high degree of archaeological potential. Portions of the project alignment where HDD is proposed were not tested. No testing was undertaken in areas of obvious historic or modern disturbance, such as along the railroad cut and fill areas, and along the course of existing buried utility lines. Limited geomorphological tests were conducted in the disturbed areas to confirm and examine the character of the buried landform (See Appendix A). In an effort to ensure the area was thoroughly tested, archaeological shovel testing was shifted slightly to the east side of the railroad tracks away from areas of obvious disturbance to check for potential manifestations of previously recorded sites adjacent to the

project corridor. Testing was also not permitted in tidal wetlands, (See Appendix B- Special Condition Number 8), which in any event were deemed to be of poor quality and low archaeological potential. The wetland locations were delineated prior to the commencement of the archaeological survey. A copy of the wetland delineation report was provided to Hunter Research, Inc. (Natural Resource Group, Inc. 2003).

Fieldwork, for the most part, proceeded from north to south and tests were excavated at 25-foot intervals along baselines and in larger areas over a grid. In some cases on-site adjustments to the earlier archaeological sensitivity assessment were made by the Principal Investigator, which resulted in the excavation of some additional tests and the elimination of others. Throughout, particular attention was paid to the identification of buried cultural horizons and to the potential survival of these horizons below the normal shovel test depth (*circa* three feet). All of the shovel tests and excavation units were continued into sterile subsoil, which typically comprised well-developed clayey strata, glacial gravels, or deep wetland deposits.

A. FIELD INSPECTION OF PROPOSED TEMPORARY WORKSPACE FOR HDD OPERATIONS AT THE NORTHERN END OF THE PROJECT ALIGNMENT (FIGURE 5.1)

A Phase 1A-level archaeological inspection was conducted at the site of the proposed temporary workspace for HDD operations at the northern end of the project alignment. A single traverse was walked along the approximate centerline of the 2,650-foot-long temporary workspace. This area of low-lying land is densely covered by phragmites, briars and a variety of wetland species (Plate 5.1). The southernmost portion consists of filled land, while to the north are freshwater wetlands that may originally have been tidal. Relict hedgerows observed in this area (and ditches and field boundaries shown on historic maps and aerial photographs) indicate that the land has been drained in the past and presumably at one time supported farming. Most likely, agricultural activity would have consisted of livestock grazing and the cultivation of salt hay. In prehistoric times (in the Archaic period or earlier), when the Atlantic shoreline lay considerably further east and sea level was lower than at present, this area may also have been able to support Native American occupation, although geomorphological analysis performed a short distance to the south along the project alignment suggests that this is not likely.

Unfortunately, the dense vegetation and saturated wetland soils greatly reduced ground visibility and constrained examination of the ground surface in this northern section of the project alignment. No physical remains of historic buildings were observed and no prehistoric or historic cultural materials were recovered from the ground surface. There is no record of previously documented prehistoric or historic sites in this immediate area in the site files of either the New York State Museum or the New York State Office of Parks, Recreation and Historic Preservation.

B. ARCHAEOLOGICAL INVESTIGATION OF THE PROPOSED HDD STAGING AREA AND OPEN TRENCHING SEGMENT NORTH OF NECK CREEK (STATION 58+85 TO STATION 95+00 [FIGURES 5.2A-C])

This segment of the project alignment is characterized by a mixture of dense shrubs (mainly buttonbush and swamp laurel), scattered trees (birch, marsh elder, sweet gum, groundsel, maple and poplar) and a variety of wetland grasses and forbs (Plates 5.2 and 5.3). The area also contains numerous piles of construction debris, car tires, and household garbage. Running immediately adjacent to the west of the proposed HDD staging area is the bed of the Travis Spur (a

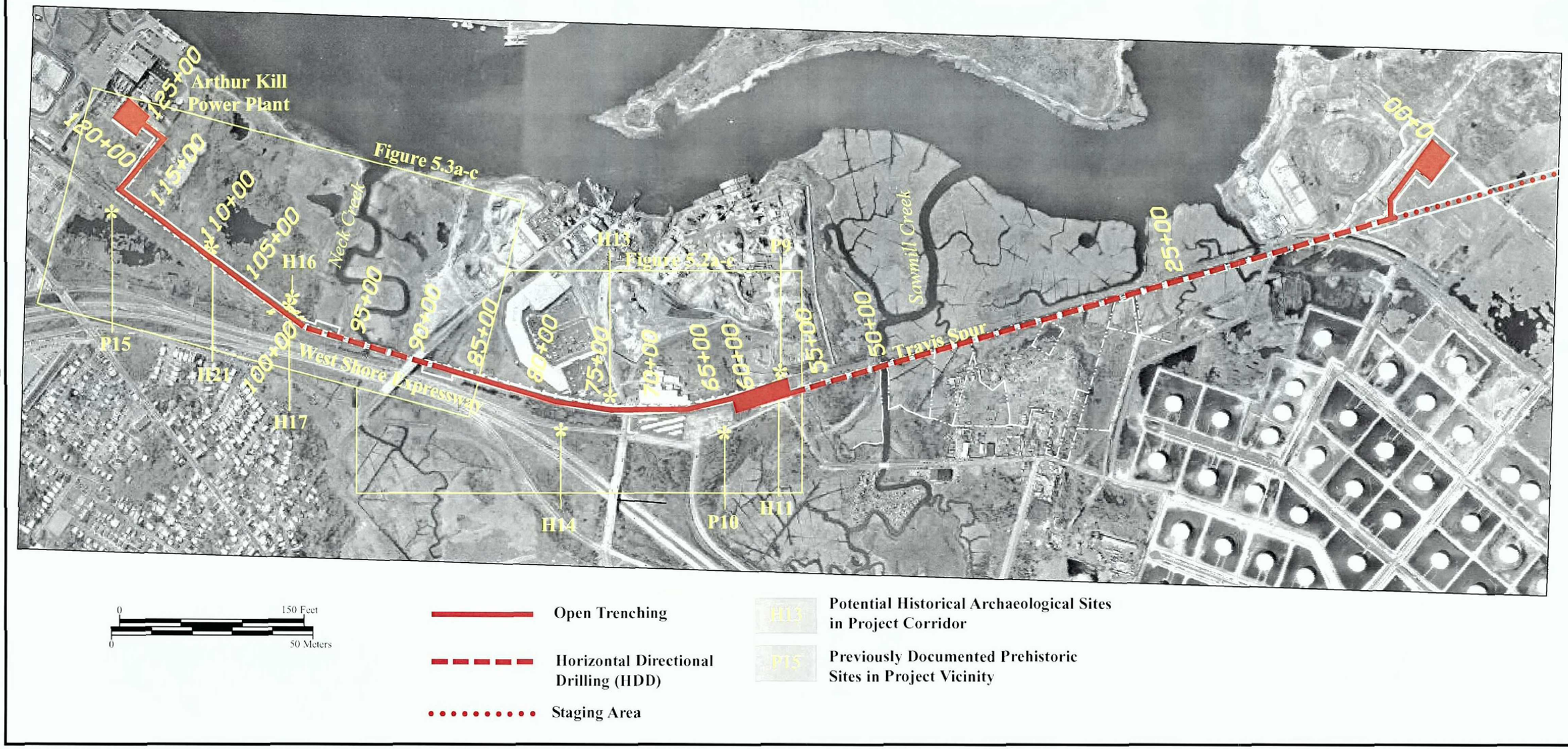


Figure 5.1. Map Showing Project Corridor and Areas of Phase IB Archaeological Survey.

Figure 5.2a. Detailed Maps Showing Archaeological Testing North of Neck Creek (Northern Segment).

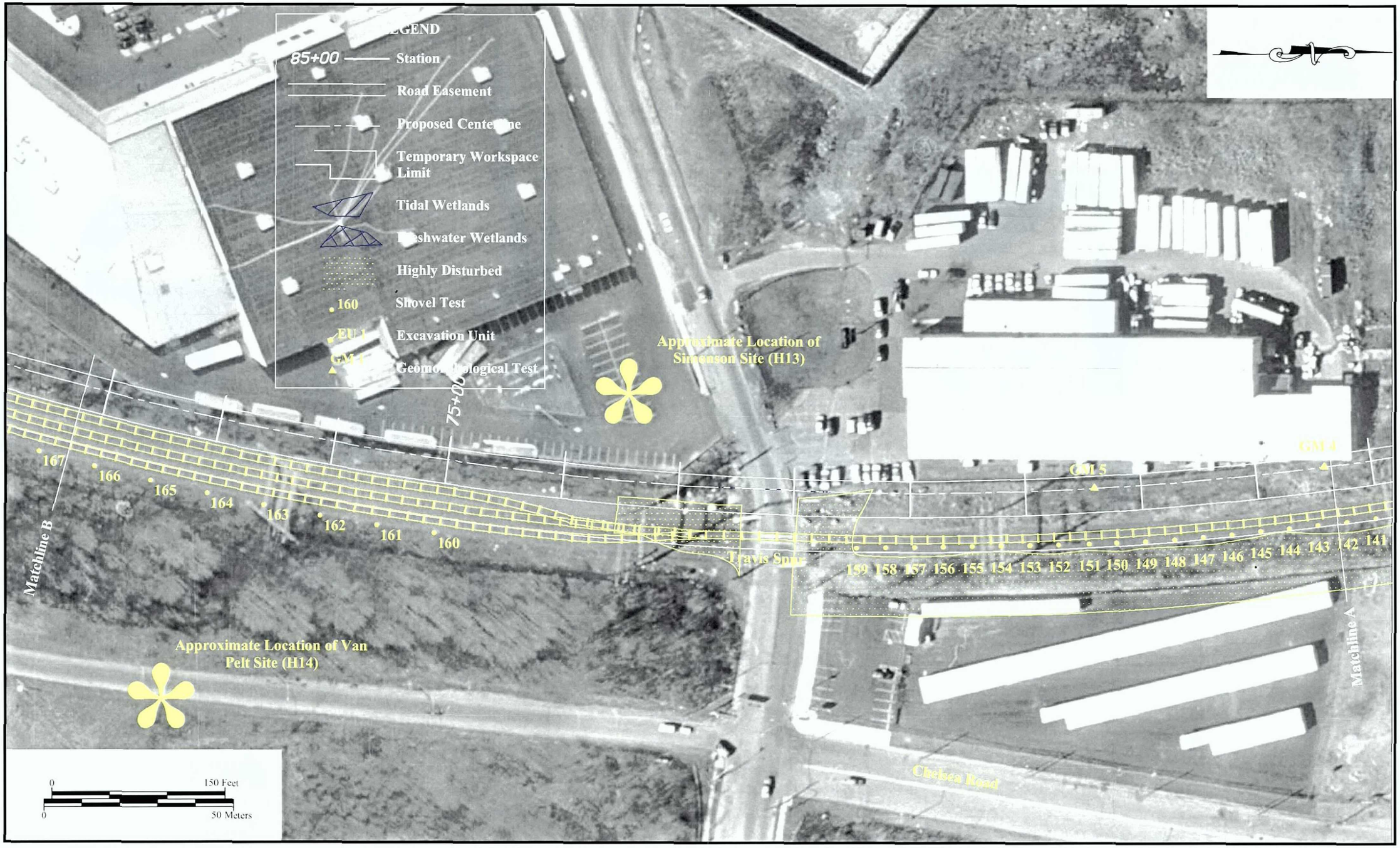


Figure 5.2b. Detailed Maps Showing Northern Archaeological Testing Segment (Central Segment).

Figure 5.2c. Detailed Maps Showing Northern Archaeological Testing Segment (Southern Segment).

Figure 5.3a. Detailed Maps Showing Archaeological Testing South of Neck Creek (Northern Segment).

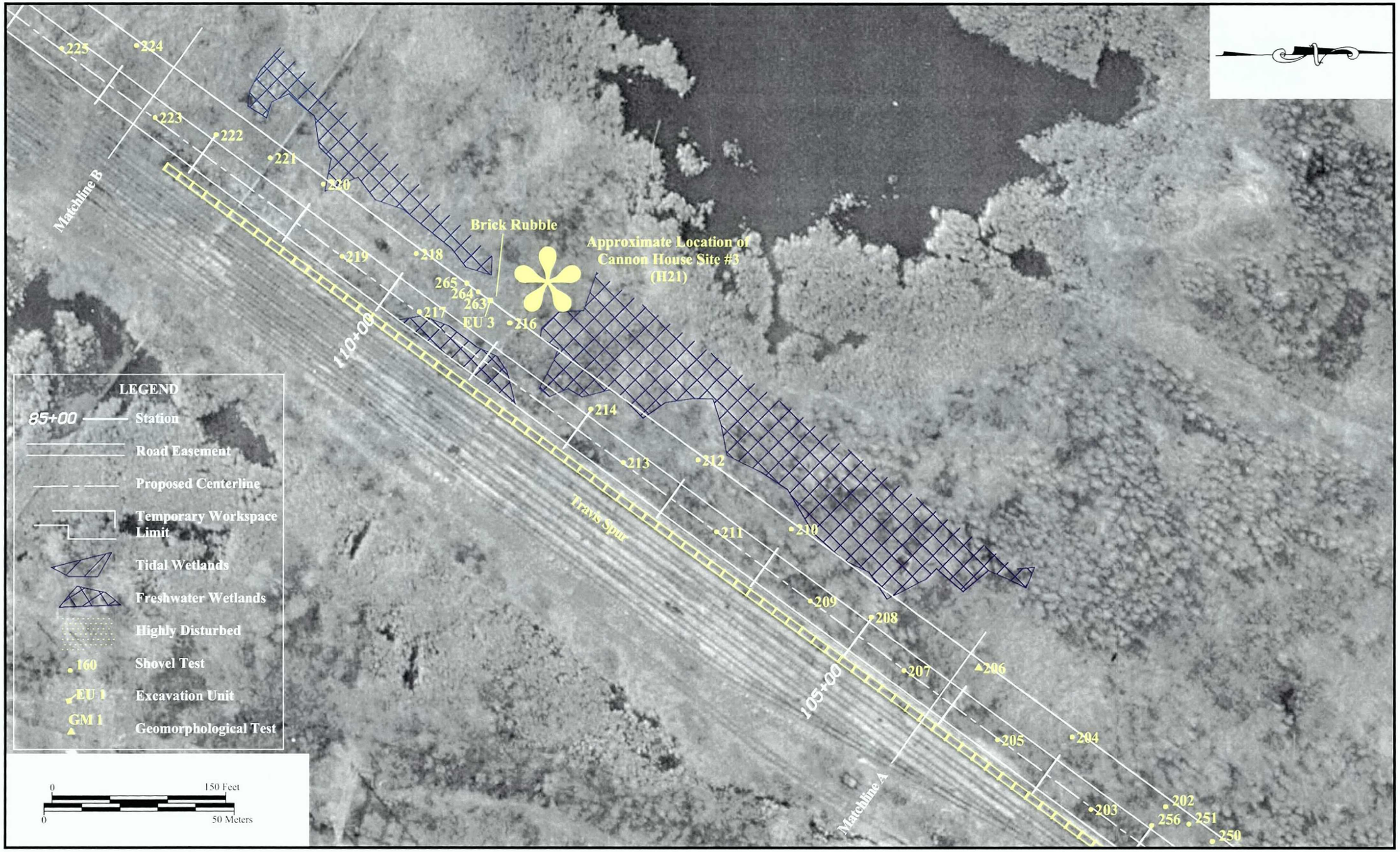


Figure 5.3b. Detailed Maps Showing Southern Archaeological Testing Segment (Central Segment).

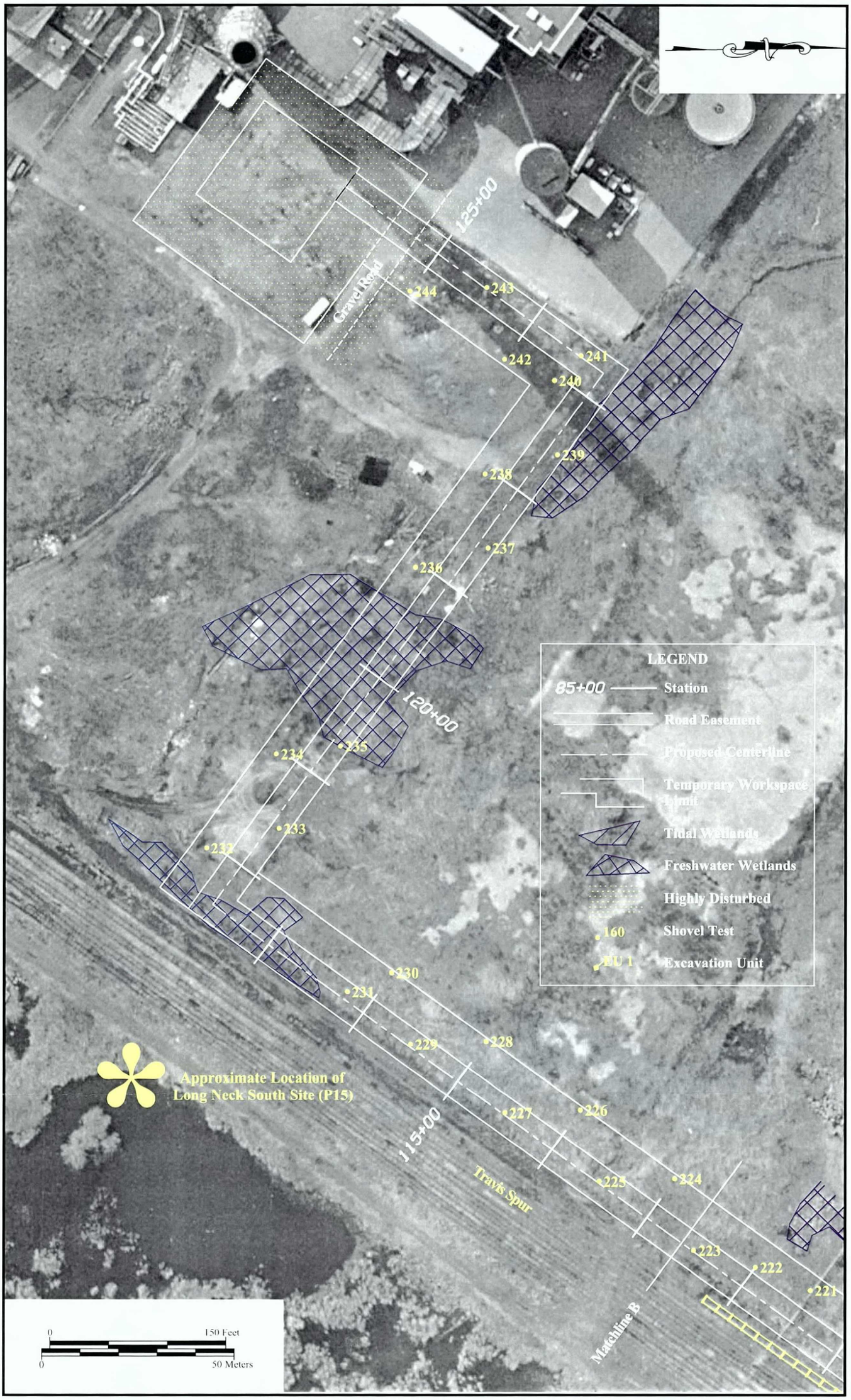


Figure 5.3c. Detailed Maps Showing Southern Archaeological Testing Segment (Southern Segment).

Plate 5.1. General view looking west showing location of proposed temporary work-space for horizontal directional drilling operations at the northern end of the project alignment (Photographer: William Liebeknecht, October 2001) [HRI Neg.# 01044/D1:08].

Plate 5.2. View looking east showing location of proposed staging area for horizontal directional drilling at Station 59+00 (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:07].

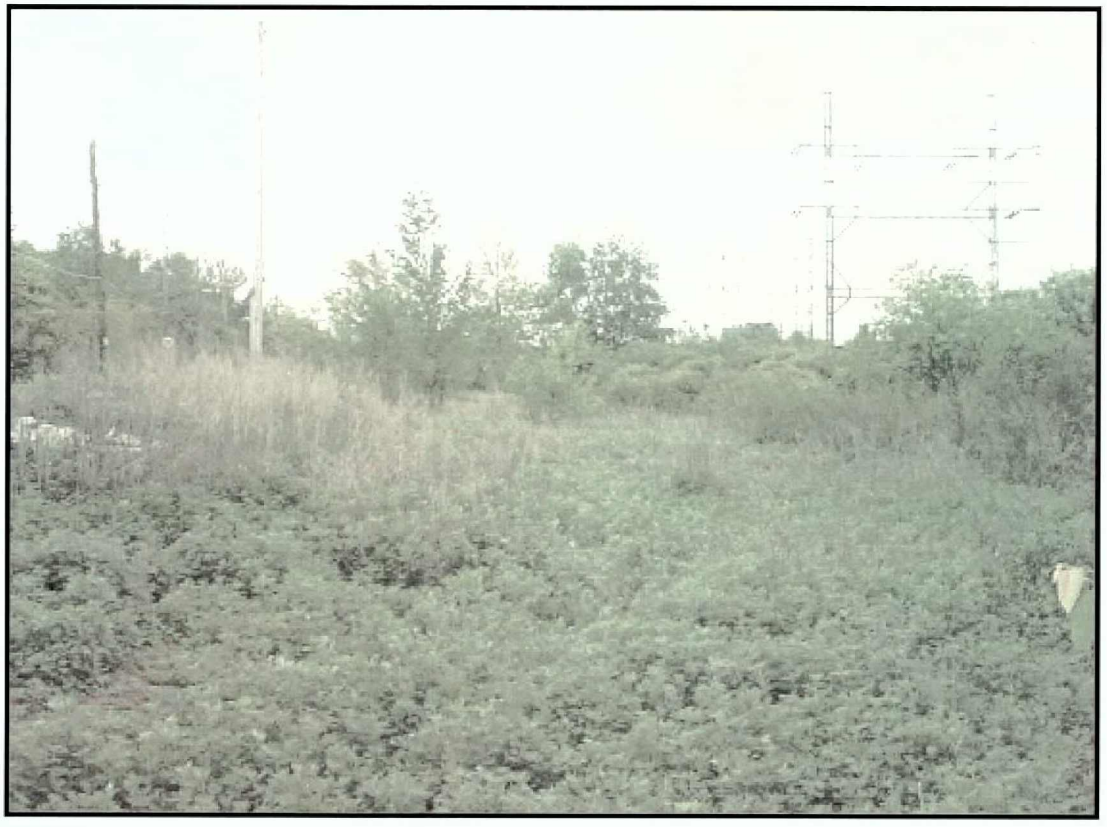


Plate 5.3. View looking south showing location of proposed staging area for horizontal directional drilling at Station 60+00 (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:09].

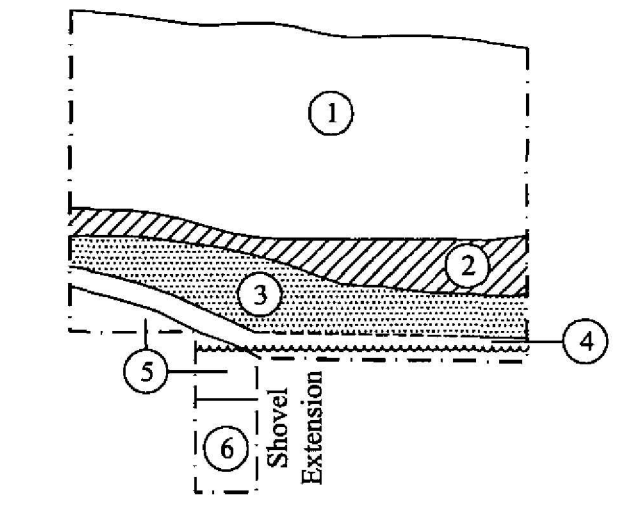
component of the Staten Island Rapid Transit), a railroad embankment composed of massive amounts of dense fill material capped by trap rock. The proposed pipeline alignment will pass beneath the railroad bed at Station 60+00 and then follow the western edge of the rail spur. Also on the west side of the tracks is a buried high-voltage electrical cable, whose general course is indicated by a series of red warning marker poles. Because of the existence of this buried cable, no testing was possible along the western side of the railroad; instead testing was undertaken along the opposite (eastern) side of the railroad, adjacent to the toe of the embankment slope to ensure no manifestations of previously recorded sites lie within close proximity to the project corridor. A total of 131 shovel tests (ST #s 1-62 and 100-168), five geomorphological tests (GM #s 1-5 [see Appendix A]) and two excavation units (EU #s 1 and 2) were excavated in the proposed HDD staging area and open trenching segment north of Neck (Chelsea) Creek. Consistent with Special Condition 8 of the NYSDEC permit, no testing was conducted within tidal wetland portions along this segment of the pipeline route.

Within the proposed HDD staging area, 55 shovel tests (ST #s 1-55) were initially excavated using a 25-foot grid spacing (Figure 5.2a). In general, stratigraphy consisted of a modern sandy loam fill, ranging from 0.2 feet to1.9 feet in depth, which overlay aeolian sands and silts (B horizon), ranging in thickness from one to two feet. Beneath the B horizon, some tests encountered dense silt and clay deposits related to glacial Lake Hackensack (Appendices A and C). With just one exception (noted below), all artifacts recovered from this area were found to date from the early 20th century to the present. Most if not all of this material appears to consist of secondary refuse dumped on vacant land.

Three supplementary shovel tests (ST #s 56-58) were excavated to the southeast of Shovel Test 18 to investigate a slight depression, which it was thought might represent the remains of a domestic structure. The results were uninformative; no cultural materials were recovered and soil profiles mirrored those observed in tests in the surrounding area.

Shovel Test 5 encountered a dark silty soil layer thought to be a possible buried A horizon. A supplementary shovel test (ST # 62) located ten feet to the east of Shovel Test 5 encountered the same buried horizon. Excavation Unit 1, a five-foot square test unit, was placed between Shovel Tests 5 and 62. Examination of the profile by the project geomorphologist resulted in the interpretation of this buried dark, silty layer as sediment formed within glacial Lake Hackensack during the Late Pleistocene/Early Holocene period. This deposit is now sealed by 2.2 feet of fill related to the construction of the adjacent railroad line (Figure 5.4; Plate 5.4).

Shovel Test 48 produced a prehistoric quartzite hammerstone of indeterminate age from Context 2, a dark medium sandy clay B horizon. Three supplementary shovel tests (ST #s 59-61) were spaced 12.5 feet north, south and east of this initial test (the area 12.5 feet west of ST # 48 was inundated with water). No additional prehistoric artifacts were encountered. Excavation Unit 2, a three-foot-square test unit, was also placed five feet east of Shovel Test 48 in order to better understand the soils in this area (Plate 5.5). The upper two feet of soils in this unit proved to consist of sandy loam marsh deposits (A horizon) of recent deposition. Beneath this material was a three-foot-thick sandy clay B horizon that is interpreted as a periglacial aeolian deposit. Beneath the B horizon was a clayey sand C horizon whose full depth could not be established owing to rising water levels in the unit (Figure 5.5). No additional cultural materials were recovered from this excavation unit. The hammerstone appears to be an isolated find possibly deriving originally from the nearby Chelsea Burying Ground Site [P10].



Context	Description [Interpretation]	Munsell
1	Mottled compact silty loam [fill]	7.5YR 4/2 7.5YR 4/6 7.5YR 4/3
2	Medium sand [B horizon]	5YR 5/6
3	Wet clay [Lake Hackensack clay bed]	7.5YR 5/1
4	Silty loam	10YR 2/1
5	Silty sandy loam	10YR 4/3
6	Silty sandy clay	10YR 5/1

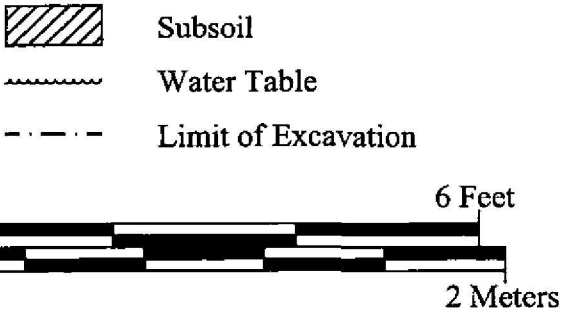


Figure 5.4. Excavation Unit 1, North Profile.

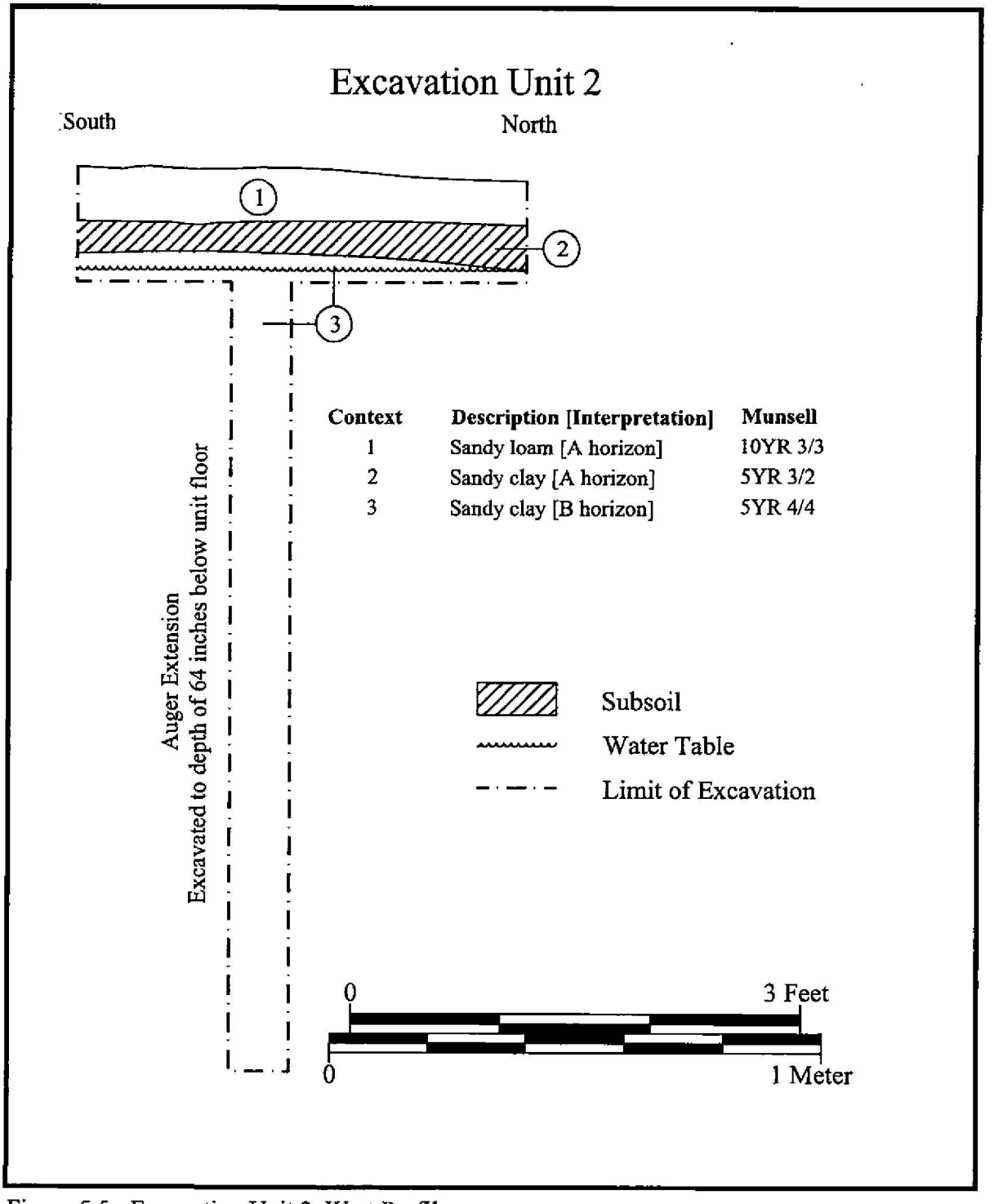


Figure 5.5. Excavation Unit 2, West Profile.

Plate 5.4. View looking west showing Enviroscan geomorphologist Tim Bechtel examining the west profile of Excavation Unit 1 at the location of the proposed staging area for horizontal directional drilling at Station 59+85 (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:34].

Plate 5.5. View looking west showing the west profile of Excavation Unit 2 at the location of the proposed staging area for horizontal directional drilling at Station 61+12; note the perched water table in this area (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:42].

Plate 5.6. View looking southeast showing a section of the project alignment at Station 64+00 where open trenching is proposed; Hunter Research field crew members are surveying in shovel test locations (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:12].

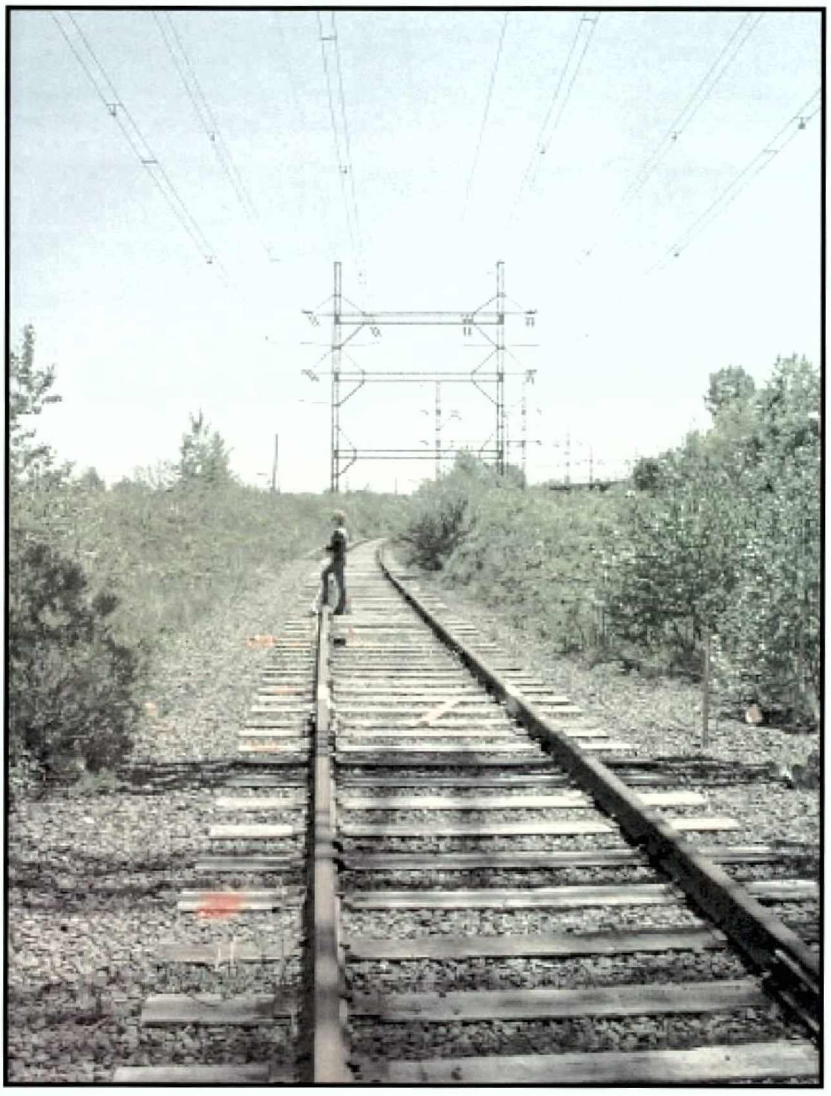


Plate 5.7. View looking south showing a section of the project alignment at Station 66+00 where open trenching is proposed; note the high-voltage overhead power lines and the location of buried power lines indicated by the orange pole to the right of the railroad tracks (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:13].

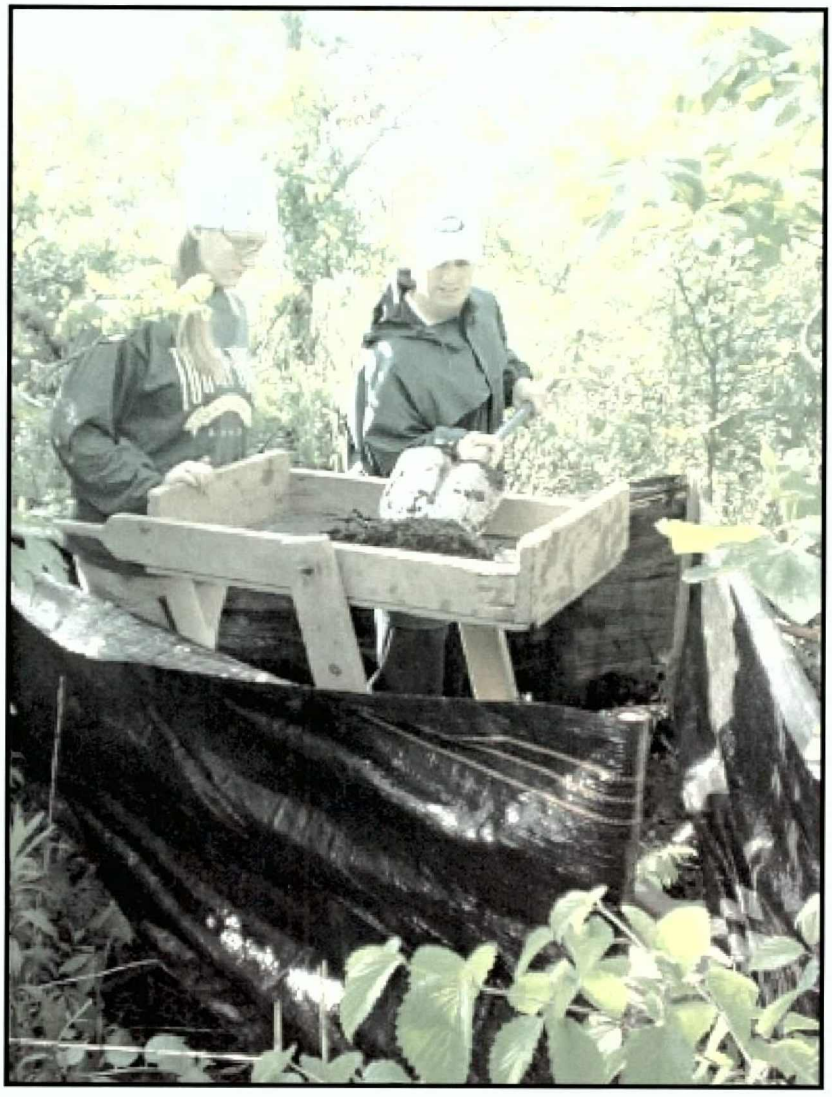


Plate 5.8. View looking east showing Hunter Research field crew members excavating Shovel Test 158 at Station 71+25 in a location where open trenching is proposed; the test location is enclosed by a temporary silt fence to minimize environmental damage (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:26].

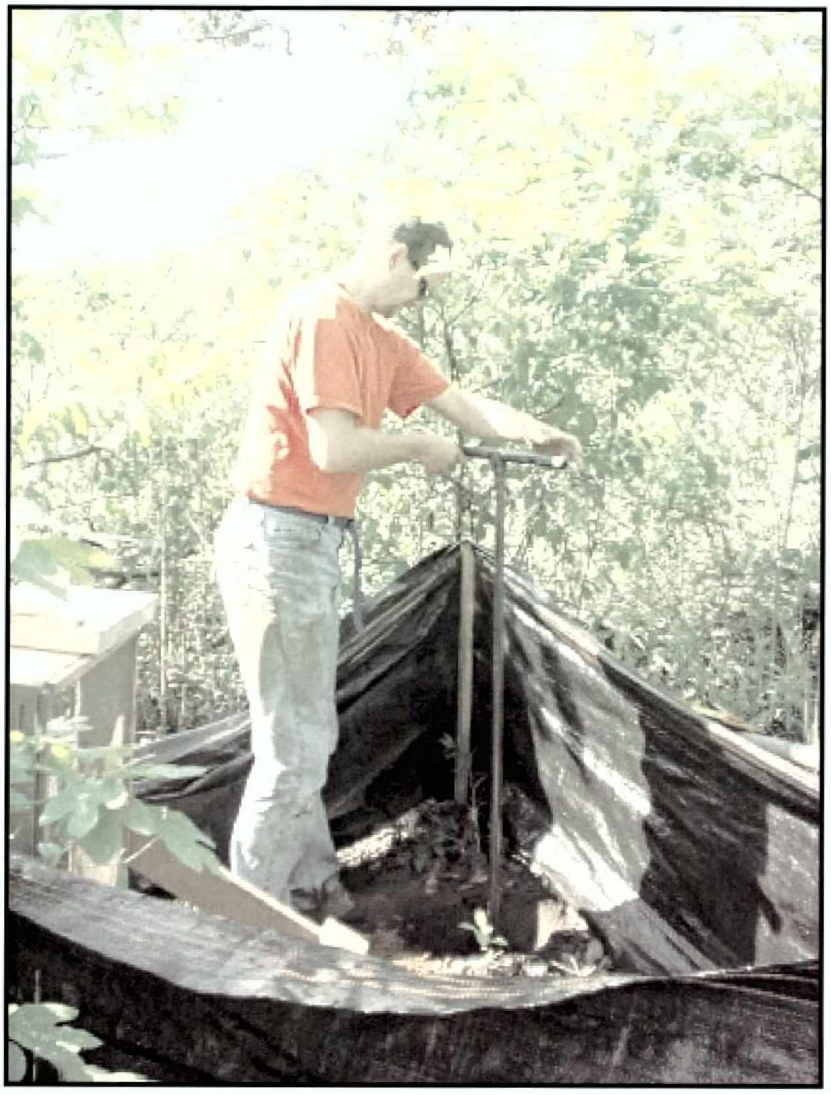


Plate 5.9. View looking south showing Enviroscan geomorphologist Tim Bechtel examining a soil core from Geomorphological Test 2 at Station 63+40 in a location where open trenching is proposed; the test location is enclosed by a temporary silt fence to minimize environmental damage (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:30].

Plate 5.10. View looking south from South Avenue at Station 72+80 along a section of the project alignment where open trenching is proposed; note the high-voltage overhead power lines and the second set of railroad tracks in this section of the alignment (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:15].

Plate 5.11. View looking south from Station 79+00 toward the Meredith Avenue over-pass along a section of the project alignment where open trenching is proposed; the phragmites grasses at left are growing in a water-filled ditch (Photographer: William Liebeknecht, June 2003) [HRI Neg.# 03029/D1:17].

Plate 5.12. View looking east from Station 81+00 showing typical wetlands vegetation along a section of the project alignment where open trenching is proposed; the phragmites grasses in the center of the view are growing in a water-filled ditch (Photographer: William Liebeknecht, June 2003) [HRI Neg.# 03029/D1:16].

Shovel tests excavated along the proposed open trench segment north of Neck Creek between Stations 60+50 and 66+25 were laid out along the east side of the railroad at 25-foot intervals along two parallel north-south lines spaced 20 feet apart (ST #s 100-138). Adequate investigation of this area was particularly critical due to the possible presence of burials associated with the Chelsea Burying Ground in this location. The tests along these two lines were "staggered" to provide fuller coverage (Figure 5.2a; Plates 5.6-5.9). The remaining shovel tests laid out along this proposed open trench segment between Stations 66+25 and 95+00 were limited to a single transect due to development and wetlands with standing water (ST #s 139-168) (Figures 5.2a-c; Plates 5.10-5.12). Tests along this latter section of the alignment exhibited as much as three feet of modern (post-1960) fill overlying aeolian sands and silts (B horizon) which ranged in thickness from one to two feet. Beneath the B horizon, some tests encountered dense silt and clay deposits related to glacial Lake Hackensack (Appendices A and C). In this series of tests, two prehistoric jasper waste flakes were recovered from historic fill layers - one from Shovel Test 122, the other from Shovel Test 143.

C. ARCHAEOLOGICAL INVESTIGATION OF THE PROPOSED OPEN TRENCHING SEGMENT SOUTH OF NECK CREEK (STATION 95+00 TO STATION 125+00 [FIGURES 5.3A-C])

This segment of the project alignment is characterized by a mixture of dense shrubs (mainly buttonbush), and trees (birch, marsh elder, maple and poplar) with a variety of wetland grasses and forbs (including poison ivy) (Plates 5.13 and 5.14). Running adjacent and parallel to the southeast side of the project alignment is the railroad embankment of the Travis Spur, which immediately south of Neck Creek expands to multiple tracks that all terminate at the Arthur Kill Power Plant. As is the case on the north side of Neck Creek, the embankment and rail bed are composed of massive amounts of dense fill capped by trap rock. The buried high-voltage electrical cable continues to run alongside the northwestern edge of the rail spur, its course again indicated by red warning markers. A total of 66 shovel tests (ST #s 200-265) and three excavation units (EU #s 3-5) were excavated in the proposed open trench segment south of Neck (Chelsea) Creek. Shovel tests excavated within this segment between Stations 100+10 and 118+00 were laid out at 100-foot intervals along two parallel north-south lines spaced 40 feet apart (ST #s 200-231). The tests along these two lines were "staggered" to provide fuller coverage (Figure 5.3a-c). At Station 118+00 the project alignment turns 90 degrees and heads to the northwest for 500 feet (examined with a similar testing pattern [ST #s 232-244]), before resuming a southwesterly course and terminating at the site of a proposed 100-foot-square gas regulation and conditioning facility (Plate 5.15). Tests along this section of the alignment exhibited as much as three feet of modern fill overlying periglacial aeolian sands and silts (B and C horizons) that ranged in thickness from one to three feet. Beneath the B horizon, some tests encountered dense silt and clay deposits related to glacial Lake Hackensack (Appendices A and C).

Three supplementary shovel tests (ST #s 263-265) were excavated between Shovel Tests 216 and 218 to investigate a scatter of bricks observed on the surface. It was thought that these might be the remnants of a structure of potential interest. Brick fragments were noted and discarded from the uppermost two soil contexts. Shovel Test 265 also yielded two light aqua bottle fragments from the top of Context 2. A five-foot-square excavation unit (EU # 3) was placed over ST # 263, which had produced the most brick fragments (Figure 5.6; Plate 5.16). Additional bricks were observed, along with fragments of recent wire-reinforced safety glass, in Contexts 1 and 2, suggesting that the assemblage was demolition debris, most like-

ly dumped on the site illegally. Several of the bricks were embossed with the word "BROCKWAY" and a few others were embossed with "BJA & Co". The excavation unit was terminated in the sterile B horizon without yielding any further cultural material of note.

An additional 17 shovel tests (ST #s 245-262) were excavated in the vicinity of Shovel Tests 200 and 204 based on the opinion of the project geomorphologist who requested investigation of a possible buried A horizon. The results were inconclusive, as no cultural materials were recovered. Two three-foot-square excavation units (EU #s 4 and 5) were placed immediately northeast of ST # 262 to examine the soils in this area in greater detail.

Excavation Unit 4 exhibited a sequence of five layers of historic fill, 2.15 feet in total thickness and overlying a thin sandy loam B horizon (Context 6). The latter in turn overlay glacial till and sediments (Figure 5.7; Plate 5.17). A mixture of historic materials, mostly dating to the late 19th and early 20th centuries, was recovered from Context 4 (a compact sandy loam). Also among the items recovered were two (mended) buff-bodied earthenware ceramic sherds, which typically date to the late 17th or 18th centuries. Six sherds from a single ironstone china vessel (*circa* 1840–1920) were recovered from Context 5 (sandy loam). A single isolated argillite waste flake was recovered from the B horizon (Context 6).

A second excavation unit (EU # 5) was opened adjacent to Excavation Unit 4 to further explore the area for potential historic and prehistoric resources (Figure 5.8; Plate 5.18). The stratigraphy was the same as that noted in Excavation Unit 4, but the sum total of cultural materials found consisted of a single sherd of historic porcelain recovered from a fill layer, Context 3.

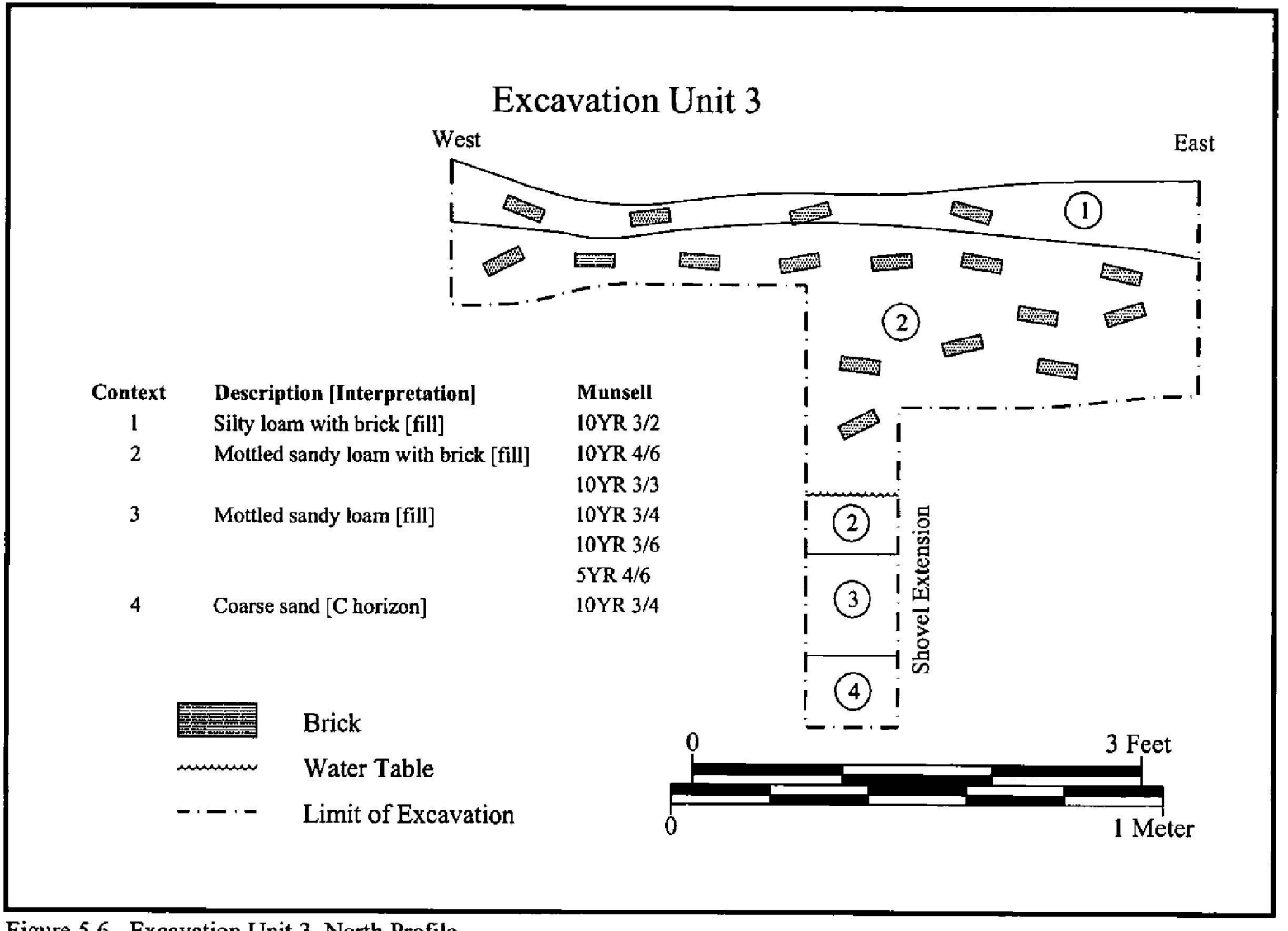
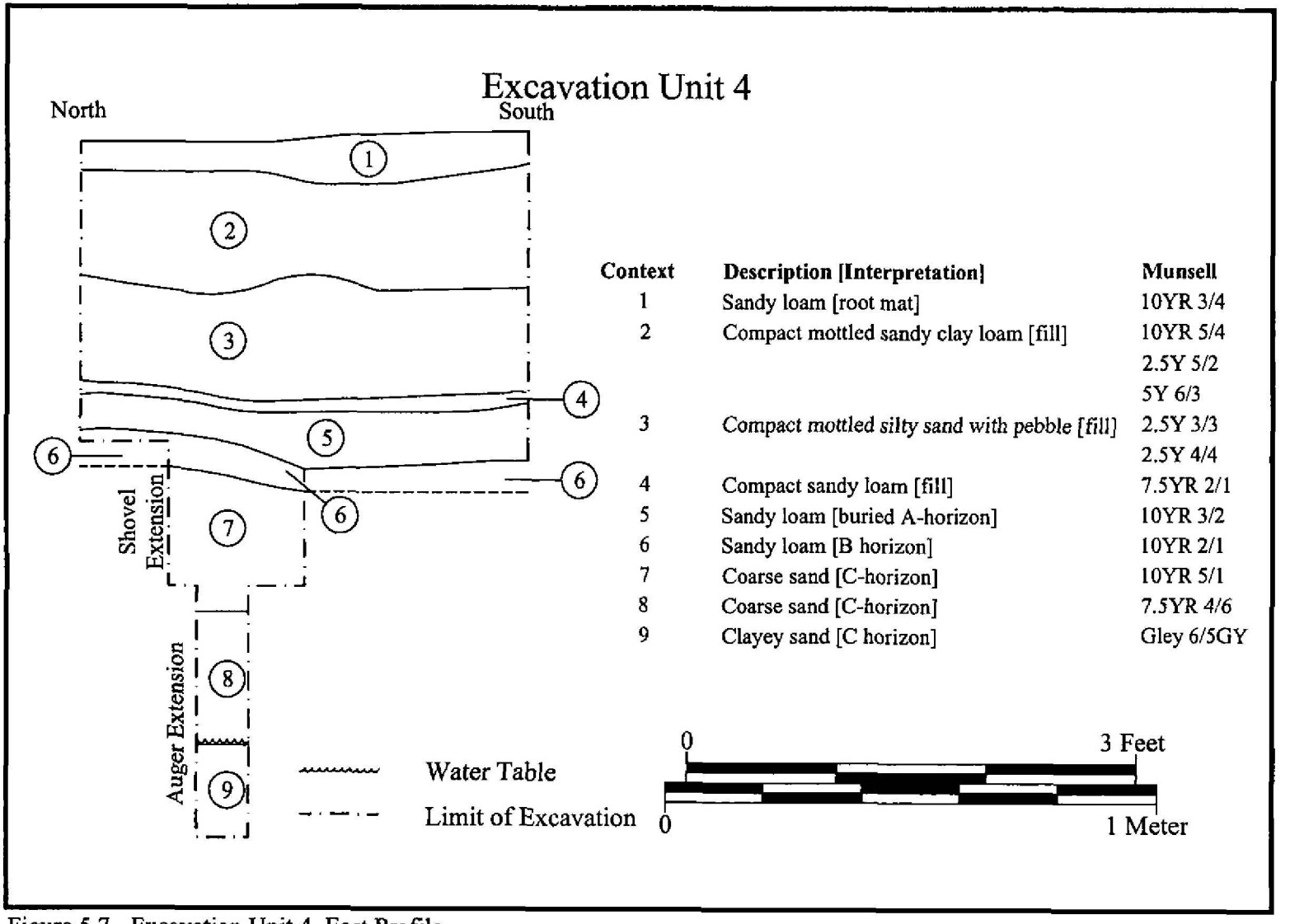


Figure 5.6. Excavation Unit 3, North Profile.



Context	Description [Interpretation]	Munsell
1	Sandy loam [root mat]	10YR 3/4
2	Compact mottled sandy clay loam [fill]	10YR 5/4 2.5Y 5/2 5Y 6/3
3	*Compact mottled silty sand with pebble [fill]*	2.5Y 3/3 2.5Y 4/4
4	Compact sandy loam [fill]	7.5YR 2/1
5	Sandy loam [buried A-horizon]	10YR 3/2
6	Sandy loam [B horizon]	10YR 2/1
7	Coarse sand [C-horizon]	10YR 5/1
8	Coarse sand [C-horizon]	7.5YR 4/6
9	Clayey sand [C horizon]	Gley 6/5GY

Figure 5.7. Excavation Unit 4, East Profile.

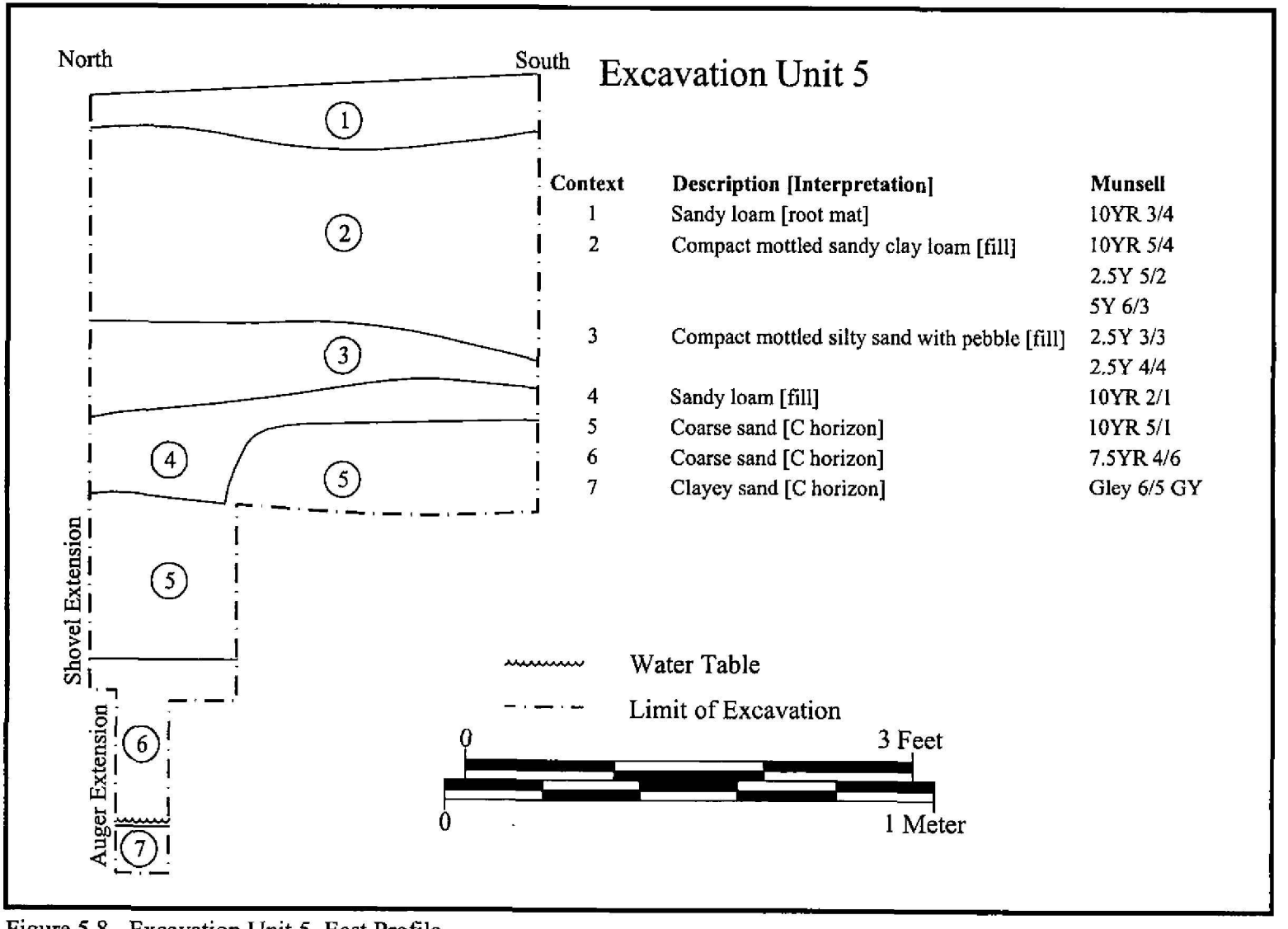


Figure 5.8. Excavation Unit 5, East Profile.

Plate 5.13. View looking northeast at Station 105+00 showing birch-dominated woodlands along a section of the project alignment where open trenching is proposed (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:49].

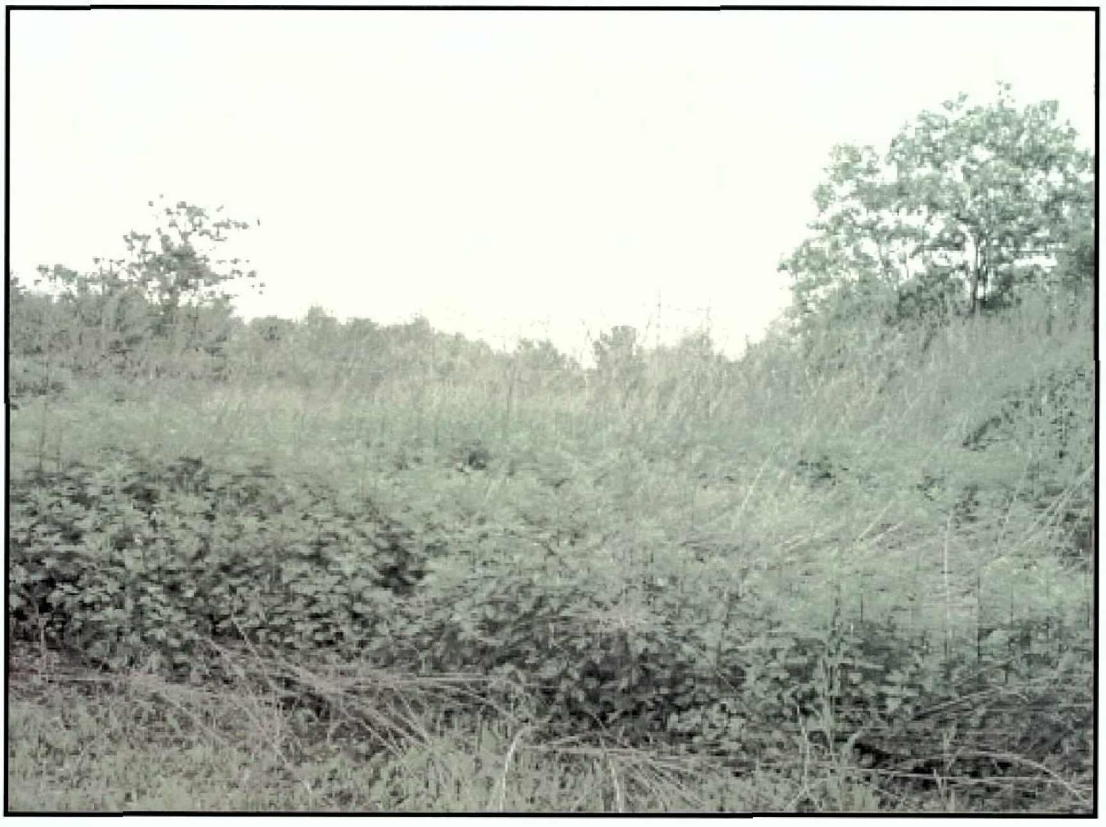


Plate 5.14. View looking northeast at Station 113+00 showing low-lying vegetation along a section of the project alignment where open trenching is proposed (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:48].

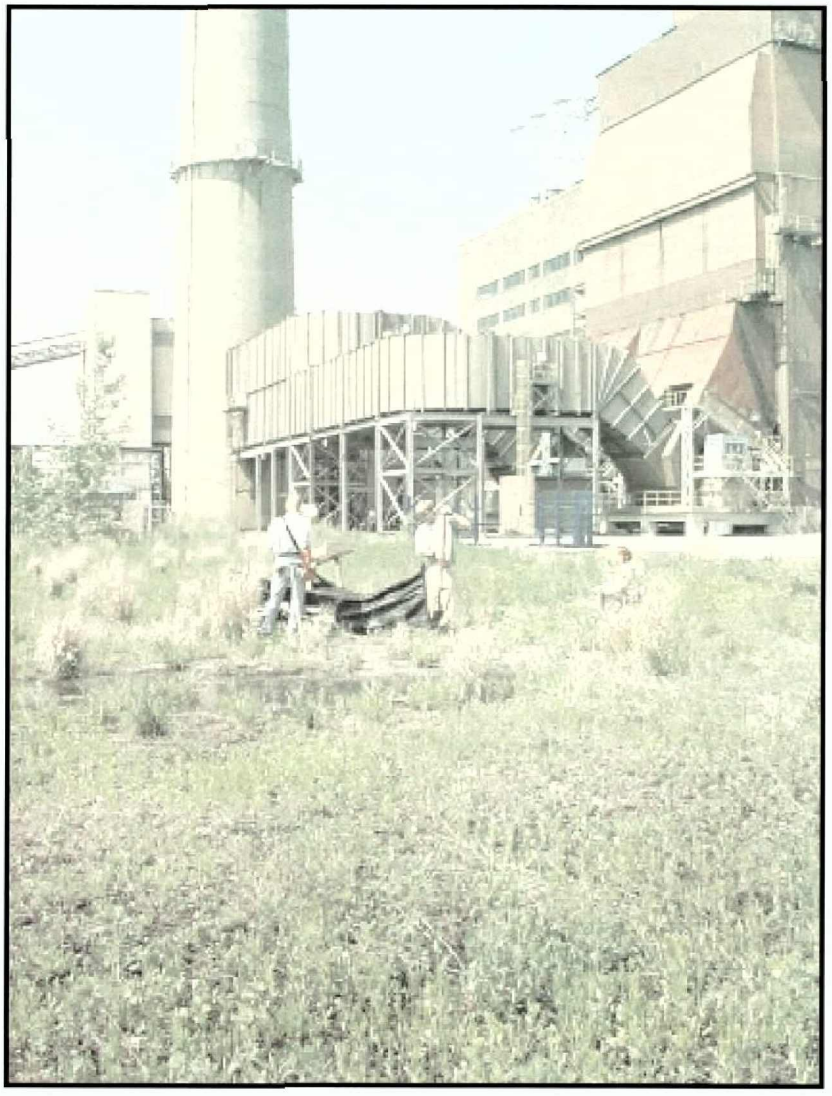


Plate 5.15. View looking southwest at Station 125+00 showing Hunter Research field crew members excavating Shovel Test 244 at the southern end of the project alignment where open trenching is proposed; the Arthur Kill Power Plant is in the background (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:46].

Plate 5.16. View looking north showing the north profile of Excavation Unit 3 at Station 109+25 in a section of the project alignment where open trenching is proposed (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:54].

Plate 5.17. View looking south showing the south profile of Excavation Unit 4 at Station 101+00 in a section of the project alignment where open trenching is proposed (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:56].

Plate 5.18. View looking east showing the east profile of Excavation Unit 5 at Station 101+00 in a section of the project alignment where open trenching is proposed (Photographer: Ben Harris, June 2003) [HRI Neg.# 03029/D1:57].

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

The combined effort of the earlier Phase 1A cultural resource studies (as reported in Hunter Research, Inc. 2001) and the current Phase 1B archaeological survey reported on here have entailed extensive background and archival research into both local prehistory and history, thorough pedestrian survey of all accessible segments of the project alignment and systematic archaeological testing along those non-wetland portions of the alignment where open trenching and staging operations are proposed. The subsurface investigations involved the excavation of a total of 197 shovel tests (several of which were extended to a depth of six feet using a manual bucket auger), five excavation units and five geomorphological tests.

A. PREHISTORIC RESOURCES

Several previously documented prehistoric sites have been noted in the project vicinity, the most notable of which are located on the two westward-projecting upland promontories referred to as Chelsea Neck and Long Neck (see above, Figure 1.4). On the former neck, which extends between Sawmill Creek and Neck Creek, Prehistoric Site NYSM 8501 [P9] and the Chelsea Burying Ground (also referred to as Prehistoric Sites NYSM 746 and 4627 [P10]) are reportedly respectively located west and east of the Travis Spur. On Long Neck, the Long Neck South Site (also referred to as Prehistoric Site NYSM 4598 [P15]) was approximately located between the Arthur Kill Power Plant and the West Shore Expressway in the general vicinity of the Travis Spur.

Archaeological and geomorphological testing on Chelsea Neck were concentrated at the site of the proposed HDD staging area and along the east side of the railroad extending south to Neck Creek. The presence of a buried high-voltage cable along the west side of the railroad tracks precluded extensive shovel testing of this area. However, several geomorphological cores were successfully excavated along the pipeline centerline. These cores indicated that the area to the west of the railroad tracks had been disturbed by both the construction of the railroad and the installation of the buried high-voltage cable. The cores revealed that the surface soil horizons were composed exclusively of fill.

The HDD staging area lies just northwest of the supposed location of the Chelsea Burying Ground. No intact prehistoric archaeological deposits were found in this group of tests and it may be stated with confidence that the HDD staging does not encroach upon any part of the Chelsea Burying Ground. A single prehistoric artifact, a quartzite hammerstone, was recovered from a disturbed context within one shovel test, but there is no way of knowing whether or not this specimen originally derived from the Chelsea Burying Ground. Intensified testing in the area surrounding this find spot produced no other prehistoric cultural materials.

Shovel testing along the east side of the Travis Spur, extending south to Neck Creek, also found no evidence of intact prehistoric archaeological deposits and no indication that the project alignment passes through either of the two previously documented prehistoric sites on Chelsea Neck. Two jasper flakes recovered from disturbed contexts in widely separated shovel tests represent the only prehistoric cultural materials recovered from this series of excavations.

On Long Neck, to the south of Neck Creek, all testing was conducted on the northwest side of the Travis Spur. No intact prehistoric archaeological deposits were encountered in any of the shovel tests, although a single argillite flake was recovered from the B horizon in Excavation Unit 4. This isolated artifact is not judged to be significant or evidence of the survival of the Long Neck Prehistoric Site within the project corridor (no other prehistoric cultural materials were found in either Excavation Units 4 or 5). For the most part, soils in this area are extensively disturbed, largely as a result of the construction of the railroad and Arthur Kill power plant. The Long Neck Prehistoric Site, which is believed to lie south and east of the project alignment, may have been wholly or partially obliterated by the construction of the rail yard and substation to the east of the Power Plant.

In summary, archaeological and geomorphological survey found no evidence of intact prehistoric archaeological resources and only a very small quantity of prehistoric artifacts, all recovered from disturbed contexts. None of the previously documented prehistoric sites extend into the project corridor, which has been extensively disturbed in places as a result of 20th-century land use (chiefly the Travis Spur, utilities installation, industrial development and road construction). Geomorphological study shows that the depth of cultural stratigraphy along the project alignment is shallow and that there is no potential for deep-buried prehistoric deposits. No further prehistoric archaeological study is considered necessary in connection with the gas pipeline project as currently proposed.

B. HISTORICAL ARCHAEOLOGICAL RESOURCES

The Phase 1A cultural resource study identified five potential historical archaeological sites in or close to the project alignment, all of them domestic sites presumably supporting a house, outbuildings and associated yards and gardens. Archival research and archaeological testing thus concentrated on the potential for data relating to these five sites, two of which were located on Chelsea Neck, the remaining three on the south side of Neck Creek along the long vanished Cannon Avenue.

The two historic sites on Chelsea Neck – the Cary Site [H11] and the Van Pelt Site [H14] – are both situated on land that traces back to Prall family ownership in the 18th century. Both sites appear to have been first built upon in the early 19th century as the Prall holdings began to be broken up and sold off. No structural remains or historic cultural materials relating to these two sites were found. Only 20th-century artifacts were recovered and these appear to be the result of secondary deposition. It is thought that the Cary Site was most likely destroyed through construction of the Travis Spur, while the Van Pelt Site probably lies east of the project alignment and may have been obliterated by the construction of the West Shore Expressway.

The three historic sites lying south of Neck Creek – the Williams Site [H16], the Cannon Site 1 [H17] and the Cannon Site 3 [H21] – are all situated on land that traces back to Cannon family ownership in the 18th century. The Williams Site appears to have both passed out of Cannon ownership and been first developed in the mid-19th century. The late 19th-century property containing the Cannon Site 3 is believed to coincide with an early Cannon homestead that dates back into the 18th century, although it remains unclear if it is the family's original Staten Island homestead. The Cannon Site 1 represents a mid-19th-century subdivision of the earlier Cannon Site 3 homestead. All three sites were accessed via historic Cannon Avenue, a route that is depicted on 19th-century maps, but is no longer in existence. Archaeological testing found no structural remains or intact deposits relating to the occupation of any of these three sites, nor any trace of Cannon Avenue. A very small quantity of early his-

toric ceramics was recovered from Excavation Unit 4, which may reflect field scatter from the Cannon Site 3. Soils are extensively disturbed throughout this area as a result of rail, road and utilities construction and it is likely that all or part of the Cannon Sites 1 and 3 have been destroyed. The Williams Site, lying slightly further to the west, stands a slightly stronger chance of survival.

In summary, no intact historical archaeological resources were found within the project corridor. No further historical archaeological study is considered necessary in connection with the gas pipeline project as currently proposed.

REFERENCES

Anderson, A. J., and D. R. Sainz
1965 Excavation at Oude Dorp. *The New Bulletin* 14(9):81-96.

Archaeological Research Consultants, Inc.
1982 Cultural Resource Sensitivity Study, Sharrott Estates Archaeological Project, Sandy Ground National Register District. On file, #10, New York State Office of Parks, Recreation and Historic Preservation, Waterford, New York.

Beers, J. B.
1874 Part of Northfield. In *Atlas of Staten Island, New York.* On file, Staten Island Institute of Arts and Sciences, Staten Island, New York.

1887 Middle Section of Richmond County. In *Atlas of Staten Island, New York.* On file, Staten Island Institute of Arts and Sciences, Staten Island, New York.

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

Black, F. R.
1983 *A History of Fort Wadsworth, New York Harbor.* Division of Cultural Resources, National Regional Office, National Park Service, United States Department of the Interior, Boston, Massachusetts.

Boesch, E. J.
1994 Archaeological Evaluation and Sensitivity Assessment of Staten Island. On file, Landmarks Preservation Commission, New York, New York.

Bonfiglio, A., and J. H. Cresson
1978 Aboriginal Cultural Adaptation and Exploitation of Periglacial Features in Southern New Jersey. Paper presented at the 1978 Middle Atlantic Archaeological Conference, Rehoboth Beach, Delaware.

Bromley, G. W., and W. S. Bromley
1917 *Atlas of the City of New York, Borough of Richmond, Staten Island.* Vol. I. G.W. Bromley & Co., Philadelphia, Pennsylvania.

Butler, J.
1853 *Map of Staten Island or Richmond County, New York.* On file, Staten Island Institute of Arts and Sciences, Staten Island, New York.

Cavallo, J. A.
1981 Turkey Swamp: A Late Paleo-Indian Site in New Jersey's Coastal Plain. *Archaeology of Eastern North America* 9:1-17.

Custer, J. F.
1989 *Prehistoric Cultures of the Delmarva Peninsula: An Archaeological Study*. University of Delaware Press, Newark, Delaware.

1994 Current Archaeological Research in the Middle Atlantic Region of the Eastern United States. *Journal of Archaeological Research* 2(4):329-360.

Custer, J. F., J. A. Cavallo, and R. M. Stewart
1983 Paleo-Indian Adaptations on the Coastal Plain of Delaware and New Jersey. *North American Archaeologist* 4:263-276.

Deevey, E. S., Jr.
1952 Radiocarbon Dating. *Scientific American* 52:24-28.

Dent, R. J.
1979 Ecological and Sociocultural Reconstruction in the Upper Delaware Valley. Ph.D. Dissertation. The American University, University Microfilms, Ann Arbor, Michigan.

1991 Archaeology in the Upper Delaware Valley: The Earliest Populations. In *The People of Minisink: Papers from the 1989 Delaware Water Gap Symposium*, edited by David G. Orr, and Douglas V. Campana. pp. 117-140. Mid-Atlantic Region of the National Park Service, United States Department of the Interior, Philadelphia, Pennsylvania.

Edwards, R. L., and K. O. Emery
1977 Man on the Continental Shelf. In *Amerinds and Their Paleoenvironments in Northeastern North America*, edited by W. S. Newman, and B. Salwen. pp. 353-359. Annals of the New York Academy of Sciences, New York, New York.

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

Eisenberg, L.
1978 Paleo-Indian Settlement Patterns in the Hudson and Delaware River Drainages. In *Occasional Publications in Northeastern Archaeology 4*. Franklin Pierce College, New Hampshire.

Gardner, W. M.
1974 The Flint Run Paleo-Indian Complex: A Preliminary Report, 1971-73 Seasons. Occasional Publication No. 1. Department of Anthropology, Catholic University, Washington, D.C.

Garnice, V.
1972 Local Names of Staten Island - Past and Present. *Staten Island Historian* 31(12, October-December).

Hunter Research, Inc.
2001 Phase IA Cultural Resource Survey Arthur Kill Power Plant Lateral Staten Island, Borough of Richmond Richmond County, New York. Prepared for: Natural Resource Group, Inc., Minneapolis, Minnesota.

Isachsen, Y. W.
1980 Continental Collisions and Ancient Volcanoes: The Geology of Southeastern New York. New York State Geological Survey, Educational Leaflet 24, Albany, New York.

Kraft, H. C.
1977a The Paleo-Indian Sites at Port Mobil, Staten Island. *Researches and Transactions of the New York State Archaeological Association* 17(1):1-19*Current Perspectives in Northeastern Archaeology, Essays in Honor of William A. Ritche*, edited by R. Funk, and C. F. Hayes, III.

1977b Paleoindians in New Jersey. In *Amerinds and Their Paleo-Environments in Northeastern North America*, edited by W. S. Newman, and B. Salwen. pp. 264-281. Annals of the New York Academy of Sciences, New York, New York.

Kraft, J. C.
1977 Late Quaternary Paleogeographic Changes in the Coastal Environments of Delaware, Middle Atlantic Bight, Related to Archaeological Settings. In *Amerinds and Their Paleoenvironments in Northeastern North America*, edited by W. Newman, and B. Salwen. pp. 35-69. Annals of the New York Academy of Sciences, New York, New York.

Kraft, J. C., D. Belknap, and I. Kayan
1983 Potentials of Discovery of Human Occupation Sites on the Continental Shelves and Nearshore Coastal Zone. In *Quaternary Coastlines and Marine Archaeology: Towards the Prehistory of Land Bridges and Continental Shelves*, edited by P. Masters, and N. Flemming. pp. 87-120. Academic Press, London, England.

Leng, C. W., and W. T. Davis
1930-1933 *Staten Island and Its People: A History, 1609-1929.* Lewis Historical Publishing Company, New York, New York.

A Map of Staten Island during the Revolution
1775-1783 On file, Staten Island Institute of Arts and Sciences, Staten Island, New York.

McMillen, L.
1949 Old Mills of Staten Island. *The Staten Island Historian* 10(3, July-September):1, 21.

Milliman, J. D., and K. O. Emery
1968 Sea Levels During the Past 35,000 Years. *Science* 162:1121-1123.

Morris, I. K.
1898 *Morris's Memorial History of Staten Island, New York.* Vol. I. Memorial Publishing Company, New York, New York.

New York State Museum
New York State Museum Site Maps and Files. On file, New York State Museum, Albany, New York.

Natural Resource Group, Inc.
2003 Arthur Kill Power Plant Lateral. Wetland Delineation Report. Prepared by Natural Resource Group, Inc. for NRG Energy, Inc.

Pagano, D. N.
1985 Urban Archaeological Resources and the Law: A Study of the City of New York. Unpublished Masters thesis, Department of Anthropology, New York University, New York, New York.

Prall, R. D.
1990 The Pralls of Staten Island. *Staten Island Historian* 8(1, Summer-Fall):11-15.

Richmond County Deeds
On file, Richmond County Courthouse, Staten Island, New York.

Richmond County Probate Files
On file, Richmond County Courthouse, Staten Island, New York.

Ritchie, W. A.
1980 [1965] *The Archaeology of New York State.* Harbor Hill Books, Harrison, New York.

Ritchie, W. A., and R. E. Funk
1971 Evidence for Early Archaic Occupations on Staten Island. *Pennsylvania Archaeologist* 41(3):45-60.

Robinson, E.
1907 Ward 3. In *Atlas of the Borough of Richmond, City of New York, Second and Revised Edition.* Map. On file, Staten Island Institute of Arts and Sciences, Staten Island, New York.

Schuberth, C. J.
1971 *New York Walk Book.* Doubleday/Natural History Press, New York.

Skene, F.
1907 *Map of Staten Island, Richmond County, New York, Showing the Colonial Land Patents 1688-1712.* On file, Staten Island Institute of Arts and Sciences, State Island, New York.

Skinner, A. B.
1909 The Lenape Indians of Staten Island. *American Museum of Natural History, Anthropological Papers* 3(1):3-62.

Staten Island Railroad
2003 Http://www.nyrail.org.

Staten Island Rail Link
2002-2003 Http://www.railroad.net [June 11, 2003].

Stewart, R. M.
1990 Archaeology, Sedimentary Sequences, and Environmental Change in the Delaware River Basin. On file, Bureau for Historic Preservation, Pennsylvania Historical and Museum Commission, Harrisburg, Pennsylvania.

1991 Archaeology and Environment in the Upper Delaware Valley. In *The People of Minisink: Papers from the 1989 Delaware Water Gap Symposium*, edited by D. G. Orr, and D. V. Campana. pp. 79-107. Mid-Atlantic Region of the National Park Service, United States Department of the Interior, Philadelphia, Pennsylvania.

Thompson, J. H. (editor)
1977 *Geography of New York State*. Syracuse University Press, Syracuse, New York.

United States Army Center of Military History (Comptroller Section)
1963 *History of Fort Wadsworth: Tricentenary, 1663-1963*. United States Army Military History Institute.

United States Coast Survey
1835-1836 *Staten Island, New York.* On file, National Archives, Record Group 23, Sheet No. 9, Washington D.C.

United States Geological Survey
1901 Surficial Geology Sheet, New Jersey- New York- Staten Island Quadrangle. Map.

Appendix A

GEOARCHAEOLOGY STUDY (ENVIROSCAN, INC.)

ENVIROSCAN, INC.

Final Report
Geoarchaeological Study
Arthur Kill
Staten Island, NY
Enviroscan Reference Number 080125

Prepared For: Hunter Research, Inc.
Prepared By: Enviroscan, Inc.
June 23, 2003

[illegible] • Lancaster, Pennsylvania 17603 • [illegible]

ENVIROSCAN, INC.

June 23, 2003

Mr. William B. Liebeknecht
Hunter Research, Inc.
120 West State Street
Trenton, NJ 08608

RE: Geoarchaeological Study
Arthur Kill
Staten Island, NY
Enviroscan Reference Number 080125

Dear Mr. Liebeknecht:

Pursuant to our proposal, dated August 22, 2001, Enviroscan, Inc. has completed a geoarchaeological study of the above-referenced site. The analysis was based on inspection/documentation (on May 27 through 29, 2003) of the soil profiles in 23 test units (shovel test pits, hand auger borings and meter-square excavations), and on review of published geologic, soils, and topographic reports. Enviroscan's interpretation of the geology and geomorphology of the site based on these data is described below.

This site spans consists of a proposed pipeline route approximately 2.5 miles in length along the Arthur Kill (northwestern) shore of Staten Island, New York (See Figure 1). The site crosses primarily low-lying meadows, fresh and saltwater wetlands, and a few wooded uplands.

The site lies within the Coastal Plain physiographic province, and has been mapped by numerous authors (see references) as lying on made land or artificial fill of varying thicknesses and compositions. Bedrock reportedly lies at great depth (tens to hundreds of feet). Beneath the fill, the unconsolidated materials above bedrock reportedly consist primarily of materials deposited during and immediately after the last (Wisconsinan – circa 12,000 to 14,000 years ago) glacial advance.

851 Columbia Avenue • Lancaster, Pennsylvania 17603 • 717/396-5922 • Fax 717/396-8746 • e-mail@enviroscan.com • www.enviroscan.com

As the Wisconsinan glaciers flowed generally south and eastward, they carried within and beneath them a wide variety of earth materials scoured from higher latitudes. The materials deposited beneath the glacier consisted of unsorted gravels, silt, sand, and clay that were highly compacted by the weight of the overlying ice, forming dense, hard till. At the margin of the furthest southward advance, the Wisconsinan glaciers deposited a ridge of unsorted boulders and outwash (sand and gravel) that form the terminal moraine that crosses Staten Island from southwest to northeast, and comprise Long Island. As the glaciers retreated by melting, a global rise in sea level flooded former stream and glacial valleys creating periglacial lakes. At this time (Late Pleistocene – circa 12,000 years ago) Staten Island north of the terminal moraine lay beneath periglacial Lake Hackensack which occupied the current Arthur Kill drainage area. On the lake bottom, fine silts and clays were deposited. As the glaciers retreated to northern latitudes, strong winds blowing across the semi-arid tundra deposited aeolian silt and sand. Over the thousands of years of Holocene history, the climate became warmer and wetter, and tidal marshes developed on the lowlands along rivers. In the project area, in historic times, these natural glacial and periglacial (Pleistocene), and post-glacial (Holocene) deposits were capped by fill. In summary, the generalized stratigraphy of the project area should consist of the following:

Material	Age
Fill	Historic to Recent
Organic Silty Marsh Deposits	Holocene
Aeolian Sand and Silt Deposits	Late Pleistocene/Early Holocene
Lake Hackensack Silt and Clay Deposits	Late Pleistocene/Early Holocene
Glacial Till	Pleistocene
Bedrock	Mesozoic

The surficial soils on the site have been mapped by the Natural Resources Conservation Service and the New York City Soil and Water Conservation District. The mapping is incomplete, unpublished, and considered preliminary or draft. However, Enviroscan has obtained a draft copy of the soils mapping, and it is depicted on Figure 1. The project area spans many mapped soil units – descriptions of which are attached as an expanded legend to Figure 1. In summary, all of the mapped soils consist of fill materials of varying thickness and composition, overlying either native marsh (organic) deposits, periglacial aeolian sands or Lake Hackensack sediments, or glacial till, with any of these locally absent.

The stratigraphy of the site was observed and recorded by Enviroscan in 23 test units excavated by the client and/or hand-augered by Enviroscan. Hand-augering was performed in most locations to allow extension of the soil testing to depths below the generally shallow water table. The test units generally sampled three general areas depicted on Figure 1: the horizontal directional drilling (HDD) area, and the northern and southern open trench areas.

The soil profiles recorded by Enviroscan are presented in Appendix A. The surficial materials in all test units were confirmed to be fill or Holocene marsh deposits. Pleistocene periglacial or glacial sediments underlie the Holocene fill and marsh deposits at generally shallow depths (i.e. on average 1 to 2 feet – see Table 1). The top of these Pleistocene sediments represents the maximum depth at which human occupation levels should be expected. Since the Holocene marsh deposits represent the only prehistoric horizon in which human occupation levels should be expected, the stratigraphic window into the prehistoric (i.e. the stratum between historic to recent fill and glacial materials) is very narrow to absent. In fact, only units GM1, Eu2, ST160, ST164, and ST168 displayed any significant, recognizable thickness of possible prehistoric Holocene sediments. Buried A horizons were observed in units ST200 and ST204, but they were developed in material that appeared to be historic fill.

Based on the published mapping by others, and site investigation by Enviroscan, the potential for deeply buried prehistoric soils or former occupation levels is extremely low. The maximum expected depths of buried intact cultural features or occupation levels are limited by the occurrence of inferred periglacial and glacial (Pleistocene) sediments. These depths are listed for each test unit in the attached Table 1.

As always, we have enjoyed and appreciated the opportunity to work with you. If you have any questions, please do not hesitate to contact me.

Sincerely,
Enviroscan, Inc.

Timothy D. Bechtel, Ph.D., P.G.
Principal

Technical Review by:
Enviroscan, Inc.

Felicia K. Bechtel, M.Sc., P.G.
President

enc.: Figure 1: Soils Map
Soils Map Expanded Legend
Table 1
Appendix A: Soil Profile Descriptions (24 sheets)
References

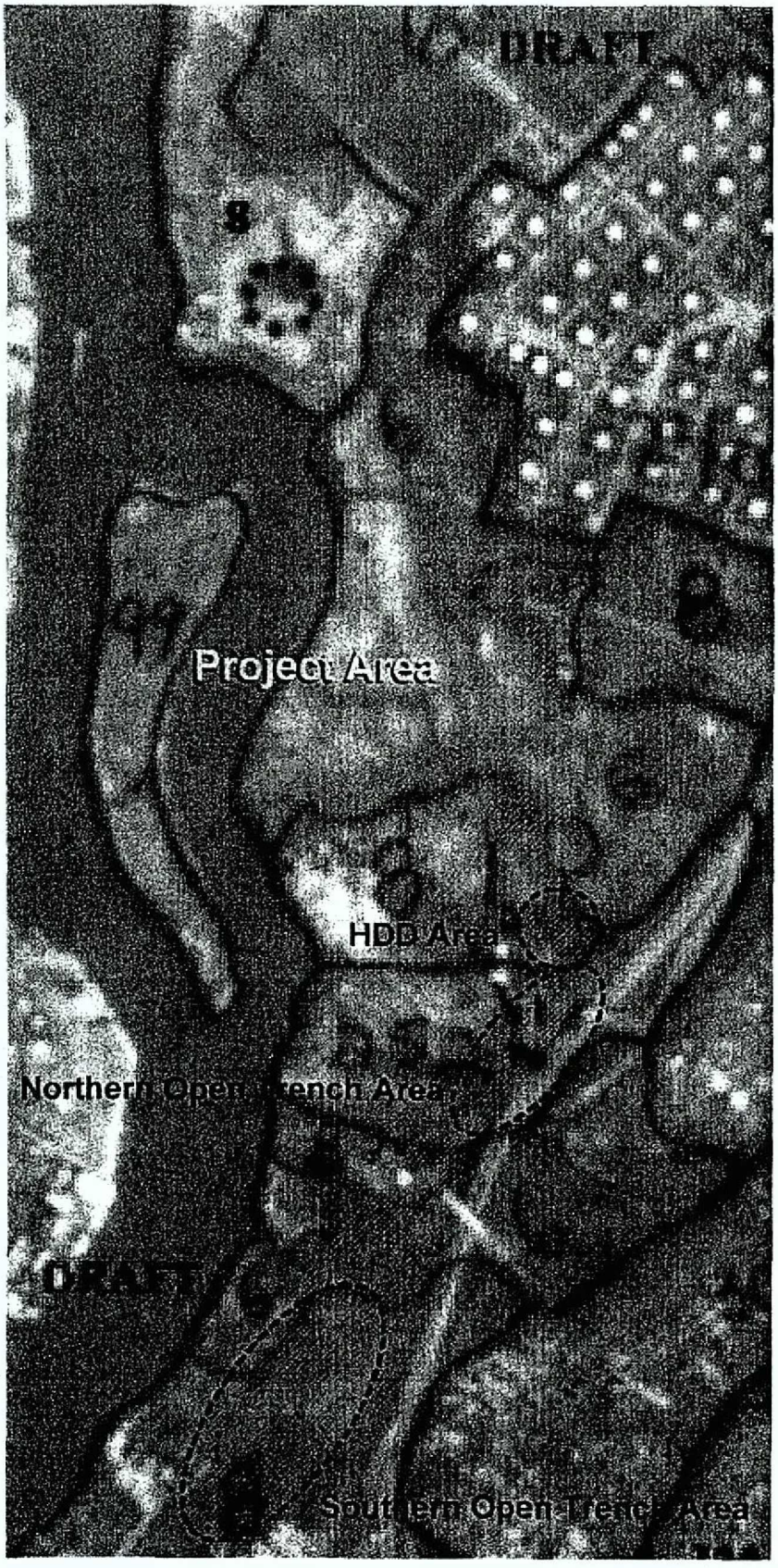


Figure 1

Soils Map

Arthur Kill
Staten Island, NY

Enviroscan, Inc.
Project No. 080125
Rev. 06/18/2003

ENVIROSCAN, INC.

Notes:

Soils mapping provided as a draft by the NYC Soil Survey (personal communication).

Approximate project area sketched by Enviroscan based on mapping provided by Hunter Research.

Symbol	Map Unit Name
6	Ipswich-Pawcatuck-Matunuck mucky peat
8	Laguardia-Ebbetts-P&B complex, 0 to 8 percent slopes
101	P&B-Laguardia-Ebbetts complex, 0 to 8 percent slopes, wet substratum
238	Windsor-Deerfield, 0 to 8 percent slopes
240	Windsor-Verazano-P&B, 0 to 8 percent slopes
252	Laguardia-Centralpark-P&B complex, 0 to 8 percent slopes, till substratum
304	P&B-Windsor-Verazano, 0 to 8 percent slopes

See SOILS MAP EXPANDED LEGEND for unit descriptions

0 1000 2000

N
W E
S

SOILS MAP EXPANDED LEGEND

Symbol	Map Unit Name
6	Ipswich-Pawcatuck-Matunuck mucky peat
8	Laguardia-Ebbetts-P&B complex, 0 to 8 percent slopes
101	P&B-Laguardia-Ebbetts complex, 0 to 8 percent slopes, wet substratum
238	Windsor-Deerfield, 0 to 8 percent slopes
240	Windsor-Verazano-P&B, 0 to 8 percent slopes
252	Laguardia-Centralpark-P&B complex, 0 to 8 percent slopes, till substratum
304	P&B-Windsor-Verazano, 0 to 8 percent slopes

Conventional and Special Symbols Legend:

v	Bedrock outcrop
.....	Steeper slopes than established in map unit range
<	Ash (coal or fly)
W	Wetspot

Soil Unit Descriptions

The Deerfield consists of very deep-to-bedrock, well-drained soils formed in glaciofluvial deposits of sand derived mainly from granite, gneiss, and quartzite. Solum thickness ranges from 15 to 40 inches. Gravel ranges from 0 to 15 percent in the solum and 0 to 20 percent in the substratum. Iron depletions with chroma of two or less are between depths of 15 to 40 inches from the mineral soil surface. Hydrologic Group B.

The Centralpark series consists of very deep-to-bedrock, well-drained soils where more than 40 inches of loamy fill, with an average of greater than 35 percent rock fragments, have been piled on a natural surface that may or may not have had its topsoil layer removed before being covered. This soil series does not have a fragipan or dense till within the top six feet, but the subsoil may have been compacted by heavy machinery as it was being deposited. Rock fragments are derived mainly from sedimentary and metamorphic rocks. This soil is relatively clean of human-made artifacts. Hydrologic Group B.

The Ebbets series is pending final approval; therefore, it is not on the Official Series Description (OSD) website. The Ebbets series consists of very deep-to-bedrock, well-drained soil where less than 40 inches of loamy fill has been intermingled and mixed with demolished construction debris and placed on a natural surface or water. The particle size control section consists of 10-34% coarse fragments by volume. Hydrologic Group B.

The Ipswich series consists of very deep-to-bedrock, very poorly-drained soils formed in thick organic deposits greater than 51 inches in depth. The soil is inundated by saltwater at high tide. Hydrologic Group D.

SOIL PROFILE DESCRIPTION

Profile #:	GM1 (Hand Auger Boring)	**Date:**	5/27/2003
Location:	Station 61+51	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	060125
Topographic Setting:	Northwestern shore of Staten Island, marshy area east of railroad bed		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	1	1	O_1	5YR3/1	?	humus	brick, coal, glass, rounded pebbles	coarse, subangular, blocky	sticky, slightly plastic, soft	modern marsh deposit
1	1.8	0.8	B	5YR4/3	?	clayey silt	rounded pebbles	medium, subangular, blocky	sticky, plastic, soft	modern to historic marsh deposits
1.8	2	0.2	C_1	2.5YR4/4	?	clay	none	massive	sticky, plastic, slightly hard	post-glacial Lake Hackensack sediments
2	2.5	0.5	O_2	5YR3/1	?	silty peat	none	massive	sticky, plastic, soft	post-glacial Lake Hackensack sediments
2.5	>6.5	>4	C_2	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater at 0 feet

Base of Test Unit at 6.5 feet

SOIL PROFILE DESCRIPTION

Profile #:	GM2 (Hand Auger Boring)	**Date:**	5/27/2003
Location:	Station 63+40	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area east of railroad bed		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	1	1	A	5YR3/1	?	loam	brick, slag, glass	fine, subangular, blocky	nonsticky, slightly plastic, soft	fill
1	2	1	B	5YR3/2	?	sandy clay	rounded pebbles	granular	nonsticky, plastic, soft	fill
2	>6	>4	C	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, slightly hard	periglacial aeolian deposit

Groundwater at 3 feet

Base of Test Unit at 6 feet

The Laguardia series consists of very deep-to-bedrock, well-drained soil where more than 40 inches of loamy fill has been intermingled and mixed with demolished construction debris and placed on a natural surface or water. This soil is well-drained and does not have a layer that is impermeable to water or restricts root penetration within the top six feet, but the subsoil may have been compacted by heavy machinery as it was deposited. Coarse fragments average 35 to 75 percent by volume. Hydrologic Group B.

The Matunuck series consists of very deep-to-bedrock, very poorly-drained soils formed in thick sandy sediments and have a thin organic surface layer ranging from 8 to 16 inches. The soil is inundated by saltwater at high tide. Hydrologic Group D.

The Pawcatuck series consists of very deep-to-bedrock, very poorly-drained soils formed in sandy sediments and have an organic surface layer ranging from 16 to 51 inches. The soil is inundated by saltwater at high tide. Hydrologic Group D.

The Verazano series consists of very deep-to-bedrock, well-drained soils where less than 40 inches of loamy fill has been piled on sandy sediments that may or may not have had its top soil removed before being covered. This soil has a contrasting particle size family class (12 to 36 inches). The subsoil in the loamy material may have been compacted by heavy machinery as it was being deposited. Rock fragments range from 0 to 20 percent. This soil is relatively clean of human made artifacts. Hydrologic Group B.

The Windsor series consists of very deep-to-bedrock, excessively-drained soils formed in glacial outwash deposits of poorly-graded sands and loamy sands derived mainly from crystalline rocks. Thickness of the solum ranges from 10 to 36 inches. Rock fragments, dominantly fine gravel, range from 0 to 10 percent by volume in the solum and from 0 to 15 percent in the substratum. Hue yellower than 7.5YR in the B horizon. Hydrologic Group A.

The Pavement and Buildings unit consists of areas covered by 85 percent or more of pavement and buildings; may be so intermingled with other soil series that it is not practical to map them separately (P&B complex). Hydrologic Group: Impervious material.

Table 1

Test Unit	Maximum Expected Depth of Potential Occupation Levels (feet)	Criterion for Selecting This Depth
EU1	2.2	Post-Glacial Lake Hackensack sediments
EU2	2	Periglacial aeolian sediments
GM1	1.8	Post-Glacial Lake Hackensack sediments
GM2	2	Periglacial aeolian sediments
GM3	2	Post-Glacial Lake Hackensack sediments
GM4	>2.5	Refusal
GM5	>2.5	Refusal
ST160	1.1	Periglacial aeolian sediments
ST164	0.8	Periglacial aeolian sediments
ST168	2.7	Periglacial aeolian sediments
ST200	2.6	Periglacial aeolian sediments
ST202	2.1	Periglacial aeolian sediments
ST204	0.7	Periglacial aeolian sediments
ST206	1.8	Periglacial aeolian sediments
ST208	0.2	Periglacial aeolian sediments
ST212	0.2	Periglacial aeolian sediments
ST220	>0.5	Refusal
ST224	>1.4	Refusal
ST228	2.7	Glacial till
ST234	3.1	Glacial till
ST236	0.9	Glacial till
ST240	>1.8	Refusal
ST244	>0.3	Refusal

Appendix A

Soil Profile Descriptions (24 sheets)

1051 Columbia Avenue • Lancaster, Pennsylvania 17603 • 717/396 8922 • fax 717/396 8746 • email@enviroscan.com • www.enviroscan.com

SOIL PROFILE DESCRIPTION

Profile #:	GM4 (Hand Auger Boring)	**Date:**	5/27/2003
Location:	Station 67+40	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area east of railroad bed		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.5	0.5	A	5YR3/1	?	gravelly loam	brick, slag, glass	coarse, subangular, blocky	nonsticky, slightly plastic, soft	fill
0.5	>2.5	>2	B	5YR3/2	?	silty clay	rounded pebbles	medium, subangular, blocky	sticky, plastic, soft	fill

Groundwater at 0.2 feet

Base of Test Unit at 2.5 feet (refusal in three locations)

SOIL PROFILE DESCRIPTION

Profile #:	GM5 (Hand Auger Boring)	**Date:**	5/27/2003
Location:	Station 69+40	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080125
Topographic Setting:	*Northwestern shore of Staten Island, marshy area east of railroad bed*		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	1	1	A	5YR3/1	?	gravelly loam	brick, slag, glass	coarse, subangular, blocky	nonsticky, slightly plastic, soft	fill
1	>2.5	>1.5	B	5YR3/2	?	silty clay	rounded pebbles	medium, subangular, blocky	*sticky, plastic,* soft	fill

Groundwater at 0.2 feet

Base of Test Unit at 2.6 feet (refusal in three locations)

SOIL PROFILE DESCRIPTION

Profile #:	EU1 (meter square excavation)	**Date:**	5/27/2003
Location:	West of Shovel Test 5	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Horizontal Directional Drilling (HDD) Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, east of railroad bed on finger of upland between marshy areas		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	1.5	1.5	A	5YR3/1	gradual wavy	gravelly loam	brick, slag, glass	fine, subangular, blocky	nonsticky, slightly plastic, slightly hard	fill
1.5	2.2	0.7	B	5YR3/2	abrupt wavy	gravelly loam	brick, slag, glass, pebbles	fine, subangular, blocky	nonsticky, slightly plastic, slightly hard	fill
2.2	3.1	0.9	C_1	5YR4/6	clear wavy	clayey sand	none	granular	sticky, plastic, slightly hard	post-glacial Lake Hackensack sediments
4.5	5	0.6	C_2	5YR4/1	abrupt wavy	clay	minor plant matter	massive	sticky, plastic, slightly hard	post-glacial Lake Hackensack sediments (varved)
5	5.5	0.5	O	5YR3/1	gradual wavy	silty peat	none	massive	sticky, plastic, soft	post-glacial Lake Hackensack sediments
5.5	>6.5	>1	C_3	10YR3/2	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial *aeolian deposit*

Groundwater at 4.7 feet

Base of Test Unit at 6 feet

SOIL PROFILE DESCRIPTION

Profile #:	GM3 (Hand Auger Boring)	**Date:**	5/27/2003
Location:	Station 65+40	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area east of railroad bed		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	1.5	1.5	A	5YR3/1	?	gravelly loam	brick, slag, glass	coarse, subangular, blocky	nonsticky, slightly plastic, soft	fill
1.5	2	0.5	B	5YR3/2	?	silty clay	rounded pebbles	medium, subangular, blocky	sticky, plastic, soft	fill
2	4.5	2.5	C_1	10YR5/4	?	clay	minor plant matter	massive	sticky, plastic, slightly hard	post-glacial Lake Hackensack sediments
4.5	5	0.5	C_2	alternating dark and light reddish brown	?	clay	none	massive	sticky, plastic, slightly hard	post-glacial Lake Hackensack sediments (varved)
5	5.5	0.5	O	5YR3/1	?	silty peat	none	massive	sticky, plastic, soft	post-glacial Lake Hackensack sediments
5.5	>6.5	>1	C_3	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	*periglacial aeolian deposit*

Groundwater at 0 feet

Base of Test Unit at 6.5 feet

SOIL PROFILE DESCRIPTION

Profile #:	EU2 (meter square excavation)	**Date:**	5/27/2003
Location:	East of Shovel Test 48	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080126
Topographic Setting:	Northwestern shore of Staten Island, marshy area east of railroad bed		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	2	2	A	5YR3/1	gradual wavy	sandy loam	rounded pebbles	fine, subangular, blocky	nonsticky, slightly plastic, soft	*modern to historic marsh deposits*
2	5	3	B	5YR3/2	diffuse irregular	clayey sand	rounded pebbles, two large angular cobbles	granular	nonsticky, slightly plastic, soft	periglacial aeolian deposit
5	>5.5	>4	C	5YR4/4	?	clayey sand	none	massive	nonsticky, slightly plastic, slightly hard	periglacial aeolian deposit

Groundwater at 1 foot

Base of Test Unit at 5.5 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST160 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 81+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area between railroad tracks and canal		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.4	0.4	A	5YR3/1	clear wavy	sandy clay loam	glass	fine, subangular, blocky	sticky, plastic, soft	fill
0.4	1.1	0.7	B	5YR3/2	gradual wavy	silty clay	none	medium, subangular, blocky	sticky, plastic, soft	fill or marsh deposit
1.1	2.2	1.1	C_1	10YR5/4 (increasing orange with depth)	clear wavy	clayey sand	none	massive	nonsticky, slightly plastic, slightly hard	periglacial aeolian deposit
2.2	>4.7	>2.5	C_2	2.5YR4/4	?	gravelly clay	rounded and angular pebbles	massive	nonsticky, slightly plastic, extremely hard	till

Groundwater at 0.5 feet

Base of Test Unit at 4.7 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST164 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 83+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area between railroad tracks and canal		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.3	0.3	A	5YR3/1	clear wavy	sandy clay loam	none	fine, subangular, blocky	sticky, plastic, soft	fill
0.3	0.8	0.5	B	5YR3/2	gradual wavy	sandy clay	none	medium, subangular, blocky	sticky, plastic, soft	fill or marsh deposit
0.8	3.1	2.3	C_1	10YR5/4 (increasing orange with depth)	clear wavy	clayey sand	none	massive	nonsticky, slightly plastic, slightly hard	periglacial aeolian deposit
3.1	>3.8	>0.7	C_2	2.5YR4/4	?	gravelly clay	rounded and angular pebbles	massive	nonsticky, slightly plastic, extremely hard	till

Groundwater at 2.3 feet

Base of Test Unit at 3.8 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST168 (Shovel Test Pit)	**Date:**	6/28/2003
Location:	Station 85+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Northern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area between railroad tracks and canal		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.3	0.3	A	5YR3/1	clear wavy	sandy clay loam	none	fine, subangular, blocky	sticky, plastic, soft	fill
0.3	0.9	0.6	B_1	5YR3/2	diffuse wavy	sandy clay	none	medium, subangular, blocky	sticky, plastic, soft	fill or marsh deposit
0.9	2.7		B_2	5YR3/1	clear wavy	sandy clay	none	medium, subangular, blocky	sticky, plastic, soft	fill or marsh deposit
2.7	5.3	2.6	C_1	10YR5/4 (increasing orange with depth)	clear wavy	clayey sand	none	massive	nonsticky, slightly plastic, slightly hard	periglacial aeolian deposit
5.3	>5.5	>0.2	C_2	2.5YR4/4	?	gravelly clay	rounded and angular pebbles	massive	nonsticky, slightly plastic, extremely hard	till

Groundwater at 3.8 feet

Base of Test Unit at 5.5 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST200 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 101+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant, on hummocky upland near stone foundation (?) remnants		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.2	0.2	A_{11}	5YR3/1	clear	silty loam	pebbles	fine, platey	nonsticky, slightly plastic, soft	fill
0.2	0.5	0.3	B_{11}	5YR4/3	gradual	sandy loam	none	fine, subangular, blocky	slightly sticky, plastic, soft	fill
0.5	1.8	1.3	C_{11}	2.5Y5/4	abrupt	gravelly sand	pebbles	granular	nonsticky, nonplastic, hard	fill
1.8	2.6	0.8	A_{21}	5YR3/1	gradual	silty loam	coal, ash	medium, subangular, blocky	nonsticky, nonplastic, soft	fill
2.6	3.8	1.2	B_{21}	5YR3/3	diffuse	clayey sand	none	fine subangular, blocky	slightly sticky, plastic, soft	periglacial aeolian deposit
3.8	4.7	0.9	C_{21}	5YR4/6	gradual	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit
4.7	5.2	0.5	C_{22}	10YR4/4	gradual	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit
5.2	>6	>0.8	C_{23}	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater Not Encountered

Base of Test Unit at 6 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST202 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 102+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.2	0.2	A	5YR3/1	clear	silty loam	brick, coal, pebbles	fine, platey	nonsticky, slightly plastic, soft	fill
0.2	1.4	1.2	B_1	5YR4/1	abrupt	clayey loam	coal	fine, subangular, blocky	slightly sticky, plastic, hard	fill
1.4	2.1	>0	B_2	5YR3/2	diffuse	sandy loam	coal	fine, subangular, blocky	slightly sticky, slightly plastic, soft	fill
2.1	>2.3	>0.2	C	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater Not Encountered

Base of Test Unit at 2.3 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST204 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 103+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.3	0.3	A_{11}	5YR3/1	clear wavy	loam	glass, coal, ash	fine, platey	nonsticky, slightly plastic, soft	fill
0.3	0.5	0.2	B_{11}	5YR3/3	clear wavy	silty clay loam	glass, coal, ash	fine, subangular, blocky	slightly sticky, slightly plastic, soft	fill
0.5	0.7	0.2	A_{21}	2.5YR2.5/1	abrupt flat	silty sand	coal, ash	fine subangular, blocky	nonsticky, nonplastic, soft	fill
0.7	1.3	0.6	B_{21}	5YR4/2	diffuse irregular	sand	none	fine subangular, blocky	slightly sticky, slightly plastic, soft	periglacial aeolian deposit
1.3	>1.5	>0.2	C	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater at 2.8 feet

Base of Test Unit at 1.5 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST206 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 104+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	*Interpretation*
0	0.2	0.2	A	5YR3/1	clear wavy	loam	glass, coal, ash	fine, platey	nonsticky, slightly plastic, soft	fill
0.2	1.8	1.6	B	5YR3/3	clear wavy	silty clay loam	glass, coal, ash	fine, subangular, blocky	slightly sticky, slightly plastic, soft	fill
1.8	>1.8	>1	C	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater at 0.9 feet

Base of Test Unit at 1.8 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST208 (Shovel Test Pit)	**Date:**	5/29/2003
Location:	Station 105+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill – Southern Open Trench Area	**Project #:**	060125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.2	0.2	A	5YR3/1	clear flat	sandy loam	none	fine, platey	nonsticky, slightly plastic, soft	fill
0.2	0.7	0.5	B	5YR3/4	diffuse irregular	clayey sand	none	fine, subangular, blocky	nonsticky, slightly plastic, soft	periglacial aeolian deposit
0.7	>3.8	>3.1	C	5YR5/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater at 1.8 feet

Base of Test Unit at 3.8 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST212 (Shovel Test Pit)	**Date:**	5/29/2003
Location:	Station 107+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.2	0.2	A	5YR3/1	clear flat	sandy loam	none	fine, platey	nonsticky, slightly plastic, soft	fill
0.2	0.9	0.7	B	5YR3/4	diffuse irregular	clayey sand	none	fine, subangular, blocky	nonsticky, slightly plastic, soft	periglacial aeolian deposit
0.9	1.6	0.7	C_1	5YR5/6	clear flat	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit
1.6	2.1	0.5	C_2	2.5YR3/3 with dark striping	clear flat	clay	none	massive	nonsticky, slightly plastic, hard	periglacial lacustrine deposit (varved)
2.1	>4.2	>2.1	C_3	5YR5/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater at 1 foot

Base of Test Unit at 4.2 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST216 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 109+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	060125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.3	0.3	A	variable, very dark	diffuse	silty loam	brick, slag, glass, pebbles	fine, subangular, blocky	slightly sticky, slightly plastic, soft	fill
0.3	0.7	0.4	B	variable, brown	clear	clayey loam	brick, slag, glass, pebbles	fine, subangular, blocky	slightly sticky, plastic, soft	fill
0.7	1.1	>0	C_1	variable, red-brown	clear	gravelly sand	brick, slag, glass, pebbles, timber	massive	nonsticky, slightly plastic, hard	fill
1.1	>3.6	>2.5	C_2	5YR4/6	?	clayey sand	none	massive	nonsticky, slightly plastic, hard	periglacial aeolian deposit

Groundwater at 0.8 feet

Base of Test Unit at 3.6 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST220 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 111+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.2	0.2	A	variable, very dark	diffuse	gravel	brick, slag, glass, pebbles	granular	nonsticky, slightly plastic, soft	fill
0.2	0.5	0.3	B	variable, brown	clear	silty gravel	brick, slag, glass, pebbles	fine, subangular, blocky	slightly sticky, slightly plastic, soft	fill
0.5	>.5	>0	C	variable, red-brown	?	sandy gravel	brick, slag, glass, pebbles	massive	nonsticky, nonplastic, extremely hard	fill

Groundwater at 0.2 feet

Base of Test Unit at 0.5 feet (shovel and auger refusal at three locations)

SOIL PROFILE DESCRIPTION

Profile #:	ST224 (Shovel Test Pit)	**Date:**	5/29/2003
Location:	Station 113+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080126
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	>1.4	>1.4	A	5YR3/1	?	gravelly sand	coal, timber, ash	very fine, subangular, blocky	slightly sticky, slightly plastic, soft	fill

Groundwater Not Encountered

Base of Test Unit at 1.4 feet (refusal in three locations)

SOIL PROFILE DESCRIPTION

Profile #:	ST228 (Shovel Test Pit)	**Date:**	5/29/2003
Location:	Station 115+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, marshy area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	1.1	1.1	A	5YR2.5/1	clear flat	loam	aluminum can	fine, platey	nonsticky, slightly plastic, extremely soft	fill
1.1	2.7	1.6	B	5YR4/1	abrupt	sandy loam	plastic, pebbles	fine, subangular, blocky	nonsticky, slightly plastic, soft	fill
2.7	>3	>0.3	C	10R4/4	?	sandy clay	none	massive	nonsticky, slightly plastic, extremely hard	till

Groundwater at 2.5 feet
Base of Test Unit at 3 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST234 (Shovel Test Pit)	**Date:**	5/29/2003
Location:	Station 119+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, wooded area west of railroad bed, north of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.1	0.1	A	5YR2.5/1	clear flat	sandy loam	plastic, pebbles	fine, platey	nonsticky, nonplastic, soft	fill
0.1	2.8	2.7	B	5YR4/1	clear flat	gravelly clay	plastic, brick	coarse, blocky	sticky, plastic, slightly hard	fill
2.8	3.1	>0.3	C_1	5YR1/1	abrupt	gravel	coal	granular	nonsticky, nonplastic, hard	fill
3.1	>3.2	>0.1	C_2	10R4/4	?	sandy clay	none	massive	nonsticky, slightly plastic, extremely hard	till

Groundwater at 1.6 feet
Base of Test Unit at 3.2 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST236 (Shovel Test Pit)	**Date:**	5/29/2003
Location:	Station 121+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, meadow west of railroad bed, east of plant		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.3	0.3	A	10YR2/2	clear wavy	gravelly loam	mica, coal	fine, platey	nonsticky, slightly plastic, soft	fill
0.3	0.9	0.6	B	10YR3/3	abrupt irregular	gravelly clay loam	mica, coal, brick	medium, subangular, blocky	nonsticky, slightly plastic, soft	fill
0.9	>1.2	>0.3	C	5YR4/4	?	sandy clay	none	massive	nonsticky, slightly plastic, extremely hard	till

Groundwater at 1.1 feet

Base of Test Unit at 1.2 feet

SOIL PROFILE DESCRIPTION

Profile #:	ST240 (Shovel Test Pit)	**Date:**	5/29/2003
Location:	Station 123+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, meadow west of railroad bed, immediately adjacent to plant parking lot		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.2	0.2	A	10YR2/2	clear wavy	gravelly loam	crushed stone, brick	fine, platey	nonsticky, slightly plastic, soft	fill
0.2	1.1	0.9	B	10YR3/3	abrupt irregular	gravelly sand	ceramic, brick	medium, subangular, blocky	nonsticky, nonplastic, slightly hard	fill
1.1	>1.8	>0.7	C	10YR3/4	?	gravelly sand	coal	massive	nonsticky, nonplastic, extremely hard	fill

Groundwater at 1.4 feet

Base of Test Unit at 1.8 feet (refusal at three locations)

SOIL PROFILE DESCRIPTION

Profile #:	ST244 (Shovel Test Pit)	**Date:**	5/28/2003
Location:	Station 125+00	**Geologist:**	Timothy D. Bechtel, Ph.D., P.G.
Site:	Arthur Kill - Southern Open Trench Area	**Project #:**	080125
Topographic Setting:	Northwestern shore of Staten Island, meadow west of railroad bed, immediately adjacent to plant parking lot		

Depth Interval (feet)		Thickness (feet)	Horizon	Color	Boundary	Matrix	Clasts	Structure	Consistency	Interpretation
0	0.1	0.1	A	10YR2/2	clear wavy	gravelly loam	crushed stone, brick	fine, platey	nonsticky, slightly plastic, soft	fill
0.1	>.3	>.2	B	10YR3/3	?	gravelly sand	ceramic, brick	medium, subangular, blocky	nonsticky, nonplastic, extremely hard	fill

Groundwater at .3 feet

Base of Test Unit at .3 feet (refusal at three locations)

References

Benimoff, Alan, ed., 1994, The Geology of Staten Island, New York: .Geological Association of New Jersey Annual Meeting, 11th, Somerset, NJ, 14-15 October 1994, Field Guide and Proceedings, 296 p.

Cadwell, D. H., 1989, Surficial geology map of New York, Lower Hudson sheet: New York State Museum Map and Chart Series 40, scale 1:250,000.

Fisher, D. W., Isachsen, I. W., and Rickard, L. V., editors and compilers, 1970, Geological map of New York: New York State Museum and Science Service Map and Chart Series Number 15, scale 1/250,000.

Lyttle, P. T., and Epstein, J. B., 1987, Geologic map of the Newark 1ø by 2ø quadrangle, New Jersey, Pennsylvania, and New York: United States Geological Survey Miscellaneous Investigations Series Maps, Map I-1715 (2 sheets; scale 1:250,000).

Merguerian, Charles; and Sanders, J. E., 1991, Trip 19, Geology of Staten Island and vicinity, 29 September 1991 (revision of 1989 Trip 04, 15 April 1989): New York Academy of Sciences Section of Geological Sciences Trips on the Rocks Guidebook, 78 p.

Muller, E. H., 1964, Quaternary geology of New York, p. 99-112 in Wright, H. E., and Frey, D. G., eds., The Quaternary of the United States: Princeton, NJ, Princeton University Press, 922 p.

Sanders, J. E., 1974, Geomorphology of the Hudson Estuary, p. 5-38 in Roels, Oswald, ed., Hudson River Colloquium: New York Academy of Sciences Annals, v. 250, 185 p.

Sanders, J. E.; and Merguerian, Charles, 1994, Glacial geology of the New York City region, p. 93-200 in Benimoff, Alan, ed., The Geology of Staten Island, New York: Geological Association of New Jersey Annual Meeting, 11th, Somerset, NJ, 14-15 October 1994, Field Guide and Proceedings, 296 p.

Schuberth, C. J., 1968, The geology of New York City and environs: Garden City, NY, Natural History Press, 304 p.

Appendix B

PERMITS

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 2 Office
47-40 21st Street, Long Island City, NY 11101
Tel: (718) 482-4997 Fax: (718) 482-4975

Erin M. Crotty
Commissioner

July 19, 2002

Bart Jensen
Natural Resource Group, Inc.
900 Second Avenue South
Minneapolis, MN 55402

Re: NYSDEC Permit No. 2-6403-00014/00031
NRG Energy, Inc., Arthur Kill Pipeline
Archaeological Field Surveys
ECL Article 24 – Freshwater Wetlands
ECL Article 25 – Tidal Wetlands
NOTICE OF PERMIT ISSUANCE

Dear Mr. Jensen:

Enclosed is your client's permit for the project cited above. Please ask your client to read all conditions carefully. Please also provide complete copies of this permit to all contractors, agents and employees performing any part of the permitted activities.

If you have questions on compliance with permit conditions, please call Steve Zahn of DEC Marine Resources at (718) 482-6464 or Joseph Pane of DEC Fish & Wildlife at (7180 482-4922; on administrative and environmental review matters involving this permit, please call me at the number above.

Very truly yours,

John F. Cryan
Regional Permit Administrator

cc: S. Zahn, DEC Region 2 Marine Resources
J. Pane, DEC Region 2 Fish & Wildlife
DEC Region 2 Division of Law Enforcement

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DEC PERMIT NUMBER:	EFFECTIVE DATE:
2-6403-00014/00031	July 19, 2002
FACILITY/PROGRAM NUMBER(S):	**EXPIRATION DATE(S):**
2-6403-00014	31 December 2002

PERMIT

Under the Environmental Conservation Law (ECL)

TYPE OF PERMIT X New ☐ Renewal ☐ Modification X Permit to Construct ☐ Permit to Operate

- ☐ Article 15, Title 5: Protection of Waters
- ☐ Article 15, Title 15: Water Supply
- ☐ Article 15, Title 15: Water Transport
- ☐ Article 15, Title 15: Long Island Wells
- ☐ 6 NYCRR 608: Water Quality Certification
- ☐ Article 17, Titles 7, 8: SPDES
- ☐ Article 19: Air Pollution Control
- X Article 24: Freshwater Wetlands
- X Article 25: Tidal Wetlands
- ☐ Article 27, Title 7; 6 NYCRR 360: Solid Waste Management
- ☐ Article 27, Title 9; 6 NYCRR 373: Hazardous Waste Management
- ☐ Article 34: Coastal Erosion Management
- ☐ Article 36; 6 NYCRR 502: Floodplain Management Variance

PERMIT ISSUED TO:	TELEPHONE NUMBER:
Timothy W. Foxen NRG Energy, Inc.	(612) 373 - 5304
ADDRESS OF PERMITTEE: 901 Marquette Avenue, Suite 2300 Minneapolis, MN 55402	
CONTACT PERSON FOR PERMITTED WORK: Bart Jensen, Natural Resource Group, Inc. 900 Second Avenue South, Suite 1800, Minneapolis, MN 55402	**TELEPHONE NUMBER:** (612) 359 - 5688
PROJECT/FACILITY NAME: Archaeological field surveys for NRG Arthur Kill Pipeline	
PROJECT/FACILITY ADDRESS: 100 foot wide corridor within high sensitivity areas along the south segment of the proposed pipeline, south of Neck Creek and within the 200 to 300 foot horizontal directional drill staging area located in the middle of the pipeline route.	

COUNTY:	TOWN:	WATER BODY:	NYTM COORDINATES:
Richmond	New York City	Various Tidal and Freshwater Wetlands	N/A

DESCRIPTION OF AUTHORIZED ACTIVITY:

Conduct archaeological field surveys.

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, the General Conditions specified (see page 2) and any Special Conditions included as part of this permit.

REGIONAL PERMIT ADMINISTRATOR:	ADDRESS:	
John F. Cryan	NYS DEC Region 2 Office, 47-40 21st Street Long Island City, NY 11101 PHONE: (718) 482-4997	
AUTHORIZED SIGNATURE: John F. Cryan	DATE: July 19, 2002	Page 1 of 4

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification

The permittee expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, agents, and assigns for all claims, suits, actions, damages, and costs of every name and description, arising out of or resulting from the permittee's undertaking of activities or operation and maintenance of the facility or facilities authorized by the permit in compliance or non-compliance with the terms and conditions of the permit.

Item B: Permittee to Require its Contractors to Comply with Permit

The permittee shall require its independent contractors, employees, agents and assigns comply with this permit, including all special conditions, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits

The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights

This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

GENERAL CONDITIONS

General Condition 1: Facility Inspection by the Department

The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71-0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when written or verbal notification is provided by the Department at least 24 hours prior to such inspection.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

General Condition 2: Relationship of this Permit to Other Department Orders and Determinations

Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

General Condition 3: Applications for Permit Renewals or Modifications

The permittee must submit a separate written application to the Department for renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing.

The permittee must submit a renewal application at least:

a) 180 days before expiration of permits for State Pollutant Discharge Elimination System (SPDES), Hazardous Waste Management Facilities (HWMF), major Air Pollution Control (APC) and Solid Waste Management Facilities (SWMF); and

b) 30 days before expiration of all other permit types.

Submission of applications for permit renewal or modification are to be submitted to:

NYSDEC Regional Permit Administrator, Region 2
47-40 21st Street, Long Island City, New York 11101 Telephone: (718) 482-4997

General Condition 4: Permit Modifications, Suspensions and Revocations by the Department

The Department reserves the right to modify, suspend or revoke this permit when:

a) the scope of the permitted activity is exceeded or a violation of any condition of the permit or provisions of the ECL and pertinent regulations is found;

b) the permit was obtained by misrepresentation or failure to disclose relevant facts;

c) new material information is discovered; or

d) environmental conditions, relevant technology, or applicable law or regulation have materially changed since the permit was issued.

ADDITIONAL GENERAL CONDITIONS FOR ARTICLES 16 (TITLE 5), 24, 25, 34 AND 6NYCRR PART 608

1. If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

2. The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

3. Granting of this permit does not relieve the applicant of the responsibility of obtaining any other permission, consent or approval from the U.S. Army Corps of Engineers, U.S. Coast Guard, New York State Office of General Services or local government which may be required.

4. All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

5. There shall be no unreasonable interference with navigation by the work herein authorized.

6. If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

SPECIAL CONDITIONS

1. ALL WORK AND ACTIVITIES AUTHORIZED BY THIS PERMIT SHALL COMPLY WITH ALL OF THE APPLICABLE PROVISIONS OF ECL ARTICLE 24 (FRESHWATER WETLANDS), 25 (TIDAL WETLANDS), AND THE REGULATIONS IMPLEMENTING AND GOVERNED BY THESE STATUTES, AT 6 NYCRR PARTS 661 AND 663, UNLESS OTHERWISE SPECIFIED HEREIN.

2. ALL ACTIVITIES AUTHORIZED BY THIS PERMIT SHALL BE IN STRICT CONFORMANCE WITH THE FOLLOWING:

   A. PERMIT APPLICATION 2-6403-00014/00031 AND SUPPORTING INFORMATION, DATED 9/20/02, RECEIVED BY NYSDEC ON 9/21/02.

   B. LETTER FROM JON BERKIN OF NATURAL RESOURCE GROUP, INC. , DATED 6/7/02, RECEIVED BY NYSDEC ON 6/10/02.

3. PRIOR TO COMMENCEMENT OF THE PERMITTED ACTIVITY, PERMITTEE, HIS CONTRACTORS AND OTHER APPROPRIATE PARTIES MUST MEET ON-SITE TO REVIEW THE PERMIT CONDITIONS AND WORK SCHEDULE. AT THAT TIME, THE PERMITTEE SHALL PROVIDE NYSDEC REGIONAL PERMIT ADMINISTRATOR WITH THE FOLLOWING ITEMS:

   A. IDENTIFY (NAME, ADDRESS, PHONE NUMBER, PRIMARY CONTACT PERSON) THE VARIOUS PARTICIPANTS IN THE TESTING PROJECT.

   B. IDENTIFY THE METHOD OF HANDLING\TREATMENT OF SOILS. IF TRANSLOCATION OF SOILS IS PROPOSED IDENTIFY THE ESTIMATED DEPTH OF CUT, HOLDING AREA AND TRANSLOCATION METHOD. IF EXCAVATION\REPLACEMENT OF SOILS AT POINT OF CONTACT IS PROPOSED IDENTIFY EQUIPMENT AND METHOD WHICH WILL BE UTILIZED.

   C. IDENTIFICATION OF ALL STORAGE AND STAGING AREAS FOR THE PROJECT.

   D. IDENTIFY TYPE AND LOCATION OF EQUIPMENT TO BE UTILIZED FOR TESTING.

SPECIAL CONDITIONS

4. AT THE CONCLUSION OF TESTING, PERMITTEE MUST PROVIDE NYSDEC REGIONAL PERMIT ADMINISTRATOR WITH A WRITTEN REPORT OF THE ACTIVITIES UNDER TAKEN PURSUANT TO THIS PERMIT. THE REPORT MUST INCLUDE THE FOLLOWING: THE NUMBER OF SHOVEL EXCAVATIONS, THE NUMBER OF TRENCH EXCAVATIONS, THE DATE OF COMMENCEMENT\ COMPLETION OF WORK, STATUS OF RESTORATION WORK, SUMMARY OF REMEDIAL ACTIONS\DIRECTIVES ISSUED, SUMMARY OF TEST RESULTS, ETC.

5. EQUIPMENT ACCESS MUST BE VIA EXISTING PAVEMENT OR PROPOSED ACCESS CORRIDORS PROVIDED TO THE DEPARTMENT AT THE PRE-TESTING SITE MEETING. AT THE CONCLUSION OF TESTING A BARRIER, FENCE OR OTHER STRUCTURE SHALL BE PLACED TO PREVENT FUTURE UNAUTHORIZED ACCESS.

6. OPERATING VEHICLES, STAGING EQUIPMENT, AND STORAGE OF EXCAVATED MATERIALS IN REGULATED TIDAL WETLANDS IS PROHIBITED.

7. THE CUTTING OF TREES IS PROHIBITED.

8. EXCAVATION OF ANY KIND IS PROHIBITED IN REGULATED TIDAL WETLANDS.

9. ALL SEDIMENTS ARE TO BE RETAINED ON THE CONSTRUCTION SITE; NO DEPOSITION OF SEDIMENT IS TO OCCUR IN WETLANDS OR OTHER AREAS TO BE LEFT IN A NATURAL CONDITION. THIS RETENTION IS TO BE ACCOMPLISHED BY PLACING HAY BALES, FILTER FABRIC OR OTHER BARRIERS TO EROSION AROUND THE TESTING SITE AND AREAS TO BE LEFT IN A NATURAL CONDITION. EROSION CONTROL MEASURES ARE TO BE IN PLACE BEFORE ANY TESTING ACTIVITY BEGINS AND ARE TO BE MAINTAINED UNTIL COMPLETION OF WORK.

10. STAKED HAYBALES AND SILT FENCING MUST BE DEPLOYED IN THE UPLANDS DOWNGRADIENT OF ANY BORING OR EXCAVATION AREA TO PREVENT LOSS OF EXCAVATED MATERIALS OR SOILS TO THE ADJACENT WETLAND AREAS.

11. AREAS OF BARE SOIL, IN TEST LOCATIONS AND ON THE ACCESS PATHWAYS, ARE TO MULCHED WITH HAY AND SEEDED AT THE CONCLUSION OF THE TESTS.

12. ALL AREAS IN WHICH BARE SOIL IS EXPOSED ARE TO BE SEEDED WITH A FAST GROWING WILDFLOWER OR WETLAND MIX. AT A MINIMUM, THE FOLLOWING SPECIES SHALL BE INCLUDED IN THE SEED MIX *PANICUM SP., ANDROPOGON SP., CAREX SP., ASCLEPIAS SP., ASTER SP.* SEEDINGS ARE TO BE REPEATED AS NEEDED TO ESTABLISH A THICK GROUND COVER. WHEN WINTER WEATHER PREVENTS GROWTH OF GRASS, SUCH AREAS ARE TO BE COVERED WITH MULCH AND SEEDED AS SOON AS ALLOWED BY GROWING CONDITIONS. AREAS OF BARE SOIL ARE NOT TO PERSIST FOR MORE THAN SIX WEEKS.

13. NO FILLING OR GRADE ALTERATIONS ARE AUTHORIZED UNDER THIS APPROVAL.

14. ALL TEST AND ACCESS AREAS ARE TO MATCH SMOOTHLY THE ELEVATION AND CONTOURS OF THE ADJACENT UNDISTURBED LAND.

15. ALL WORK IS TO BE ACCOMPLISHED SO AS TO MINIMIZE ADVERSE IMPACTS TO FRESHWATER WETLANDS, WILDLIFE, WATER QUALITY, AND NATURAL RESOURCES.

16. AT THE CONCLUSION OF TESTING, AUTHORIZED BY THIS PERMIT, THE PERMITTEE, HIS CONTRACTORS AND OTHER APPROPRIATE PARTIES MUST MEET ON-SITE TO INSPECT RESTORATION AND CLOSURE OF THE WORK AREA APPROVED UNDER THIS PERMIT. ALL WORK AREAS MUST BE RESTORED TO DEPARTMENT SATISFACTION.

17. A COPY OF THIS LETTER OF PERMISSION, INCLUDING ALL MAPS AND DRAWINGS MENTIONED IN THE CONDITIONS, IS TO BE AVAILABLE ON THE PROJECT SITE AT ALL TIMES.

18. AT LEAST FIVE (5) DAYS PRIOR TO START OF WORK, PERMITTEE SHALL COMPLETE AND SUBMIT THE ATTACHED "NOTICE OF INTENT TO COMMENCE WORK" FORM TO NYSDEC MARINE RESOURCES 47-40 21ST STREET, L.I.C., N.Y. 11101 (ATTENTION: STEPHEN ZAHN)

SPECIAL NOTE: IN ACCORDANCE WITH TITLE 19, PART 600.4 (C) OF THE NEW YORK CODE OF RULES AND REGULATIONS, THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION HEREBY CERTIFIES THAT THE ACTION DESCRIBED AND APPROVED IN THIS PERMIT, IF LOCATED WITHIN THE COASTAL AREA OF THE STATE OF NEW YORK, IS CONSISTENT TO THE MAXIMUM EXTENT PRACTICABLE WITH THE POLICIES AND PURPOSES OF THE NEW YORK CITY WATERFRONT REVITALIZATION PROGRAM

NOTICE OF INTENT TO COMMENCE WORK

Date: _____

NYSDEC Marine Resources
Attn. George Stadnik
N.Y.S.D.E.C Region 2 Office
47-40 21st Street
Long Island City, N.Y. 11101

Re: NYSDEC Permit No. 2-6403-00014/00031
NRG Energy Inc. - Arthur Kill Pipeline
Archaeological Field Surveys
Staten Island, New York

Dear Mr. Stadnik:

In accordance with Special Condition 18 of the referenced permit, I hereby serve notice to commence work on _____, 200____.

This is also to certify that, having read this entire permit, I am fully aware of and understand the general and special conditions therein, and agree to comply with all such conditions further understand that prior to undertaking any modification to the subject work, I must seek and receive written approval of the NYSDEC Regional Permit Administrator.

_____
Signature of Permittee

_____
Name of Permittee (please print)

Richard L. Hunter, PRESIDENT
Signature of Contractor

HUNTER RESEARCH, INC.
Name of Contractor (please print)

120 WEST STATE STREET
Street Address of Contractor

TRENTON NJ 08608
City, State, & Zip Code of Contractor

609-695-0122
Telephone Number of Contractor

WARNING

The permittee and his contractor (if any) are required to follow all permit conditions. Violations of the permit may lead to legal action, including the imposition of substantial monetary fines and corrective work.

cc: Environmental Permits

New York City
Economic Development
Corporation

Seth O. Kaye
Executive Vice President

January 22, 2003

Tim Foxen
Director of Natural Gas Supply
NRG Energy, Inc.
901 Marquette Ave
Suite 2300
Minneapolis, MN 55410

Re: Arthur Kill Power Pipeline Project – Staten Island
Survey and Test License

Dear Mr. Foxen:

Attached please find an executed original of the survey and test license required for the wetland and archeological work. Please feel free to call me with questions at 212-312-3780. Thank you.

Sincerely,

Alice Cheng
Vice President, Transportation

Cc: Marc Dworkin, NRG
Betty Woo/City Law Department
Jack Powers/NYCEDC
Patricia Arenas/NYCEDC

SURVEY AND TESTING LICENSE
The City of New York

Licensor and Licensee agree as follow:

I. Definitions:

A. Administrator: New York City Economic Development Corporation ("EDC"), designated by the City (defined below) to administer and manage this Survey and Testing License (this "License") pursuant to the amended and restated Maritime Contract between the City and EDC dated as of June 30, 2002 (as amended and restated from time to time), or such successor administrator as Licensor (defined below) may designate ("Administrator"). Some or all of Administrator's functions hereunder may, in EDC's sole discretion, be performed by Apple Industrial Development Corp. ("Apple"), a not-for-profit corporation that is an affiliate of and manages properties on behalf of EDC. EDC and Apple have their offices at 110 William Street, New York, New York 10038. Notices and correspondence sent to EDC should be addressed to the attention of: Senior Vice President for Property Management.

B. Licensor: The City of New York ("City"), in its proprietary capacity as owner of the Property (defined below) and not in its governmental capacity, acting through its Administrator.

C. Licensee: NRG Energy, Inc., having an office at Arthur Kill Generating Station, 4401 Victory Blvd., Staten Island, New York 10314.

D. Property: That certain property being in the County of Richmond, Borough of Staten Island, City and State of New York, consisting of those Tax Blocks and Lots as set forth in Exhibit A (collectively, the "Property").

II. Period; Charge for Period: The fee for this License for the required period, which period shall commence as of ~~November~~ Dec. 2002 ("Effective Date") and not extend beyond nine (9) months from the Effective Date (the "Term"), is three hundred and fifty dollars ($350). This sum is payable on the Effective Date by means of a certified check, accepted subject to collection, payable to Administrator, and along with this License shall represent the agreement between Licensee and Licensor.

THIS IS A SHORT-TERM NON-EXCLUSIVE REVOCABLE LICENSE, TERMINABLE AT WILL AT LICENSOR'S OPTION. LICENSEE AGREES TO PROMPTLY VACATE THE PROPERTY UPON TWENTY-FOUR (24) HOURS WRITTEN NOTICE OF TERMINATION FROM LICENSOR. NO OWNERSHIP, LEASEHOLD OR OTHER PROPERTY INTEREST SHALL VEST IN LICENSEE BY VIRTUE OF THIS LICENSE. *THIS LICENSE IS NOT ASSIGNABLE.*

III. Use:

A. This License will grant access only for the following purposes (collectively, the "Work"):

1. the surveying of the Property for wetland delineations, consisting solely of walking on the Property and identifying wetland boundaries, and at no time will the ground surface be breached, nor will any form of digging, excavation, or any other activity requiring entrance into manholes and/or other subsurface structures located on the Property be required or conducted in connection with this purpose; and

2. the performance of certain soil testing relating to archaeological resource investigations on the Property, to be conducted along certain areas of or adjacent to the Staten Island Railroad right-of-way as delineated in Exhibit B hereto but not in or under any rail ballast or track areas, consisting of

a. hand excavation "shovel tests" to a depth of approximately 20 inches at 25 foot intervals,

b. soil borings using a 3 inch diameter split spoon advanced by a tripod-mounted motorized cathead to a depth of approximately 6 to 8 feet at 50 to 100 foot intervals, and

c. *if necessary, i.e. intact cultural deposits are identified during testing and there is insufficient data to assess its significance,* expanded excavation limited to the area required to assess the significance of the site using a small trackhoe as required by the Field Services Bureau of the New York Office of Parks, Recreation and Historic Preservation, provided that Licensee promptly notifies Administrator prior to any such excavation.

B. Immediately upon completion of each portion of the Work set forth in paragraph (A)(2) above, the affected area shall be backfilled with the excavated material or any other material necessary so as to restore the Property to its original condition and contours, at Licensee's sole cost and expense. Notwithstanding the foregoing, in no event shall any breach or excavation of the ground surface, irregardless of the extent of any such breach or excavation, be left unattended or unfilled or uncovered so as to pose a potential hazard or dangerous condition to person or property. In the event Licensee fails or neglects to at all times monitor all areas where the ground surface has been breached by any type of digging or excavation, or backfill or cover such excavation so as not to pose a potential hazard or dangerous condition to person or property, Licensor and Administrator shall have the right to effect the restoration of the ground surface of the Property, or any part thereof, at the sole cost and expense of Licensee, which may, in the sole discretion

of Licensor or Administrator, be deducted from the Security described in Article V hereof.

C. All Work shall be performed at Licensee's sole cost and expense, in a good and workmanlike manner, by safe and lawful methods.

D. Access to the Property will be available between the hours of 8:00 a.m. and 6:00 p.m., Monday through Friday, and all Work shall be done in a manner that does not interfere with the operations of any occupants then on the Property. Administrator will inform all occupants on the Property of the need for Licensee's access and ensure such access at the times herein above set forth.

E. No work other than that expressly authorized by this License may be conducted on the Property.

IV. Approval of Work and Contractors:

A. Prior to the commencement of any Work, Licensee shall provide to Administrator for approval a work plan detailing the Work, including the scope of the soil testing and any health and safety plans.

B. Prior to the commencement of any Work, any contractor used by Licensee to conduct the Work must be approved by Administrator.

C. Any approval by Licensor, Administrator or Apple under this Article IV shall not in any way release Licensee from any of its obligations hereunder, nor shall such approval constitute an assumption by Licensor, Administrator or Apple of any responsibility whatsoever with respect to the Work.

D. Licensee shall promptly provide, or shall cause any contractor to promptly provide, Administrator with complete results of all Work when same becomes available.

V. Security Deposit:

A. Upon execution hereof, Licensee will deposit with Administrator a certified check in the sum of five thousand dollars ($5,000) (the "Security"), accepted subject to collection, which shall secure (i) the faithful performance of all obligations imposed upon Licensee hereunder and (ii) the payment of all the sums of money that may be due the City as herein provided.

B. In the event that Licensee fully and completely performs all of the obligations set forth herein and contemplated hereby, Licensor shall cause the Security or any part thereof to be returned to Licensee, without interest, within thirty (30) days after the last day of the Term. In the event that Licensee shall default in the performance of any such obligation or the making of any such payment, Licensor

may apply the Security or any portion thereof to the satisfaction of such obligation of Licensee. Licensee's liability for such default shall in no event be limited to the amount of the Security, and Licensee shall be and remain liable for any deficiency remaining after the application of the Security. Nothing contained in this License shall preclude Licensor from exercising any remedy that Licensor may have at law or in equity against Licensee.

VI. Insurance:

A. Licensee shall submit to Administrator a copy of an insurance certificate(s) demonstrating that adequate liability coverage in the amounts listed below is in effect during the Term. Licensee shall obtain and maintain or cause to be obtained and maintained the following insurance:

1. A Commercial General Liability insurance policy, issued by a company duly authorized to do business in the State of New York, for not less than $1,000,000 per occurrence combined single limit for death, personal or bodily injury and property damage, and shall include coverage for contractual liability (designating all indemnity provisions of any agreements related to the Work or any aspect thereof), and shall cover independent contractors and shall contain an endorsement that underground operations are covered and shall state that the "XCU Exclusions" have been deleted. The liability policy must specifically state that it is being issued in accordance with this License effective as of the Effective Date between Licensor and Licensee;

2. Comprehensive Automobile Liability Insurance, for all vehicles that are used in connection with this License, whether owned or not owned, with $1,000,000 per occurrence combined single limit for death, personal or bodily injury and property damage; and

3. Workers' Compensation in such amounts as may be legally required and Employers Liability Insurance with a limit of $500,000 per occurrence.

B. All policies of insurance required by this Article VI shall contain the terms and conditions of policies and endorsements generally available from insurance companies at rates as set forth in paragraph "C" below for such risks and a written waiver of the right of subrogation with respect to all of the named insureds and additional insureds, including Licensor, Administrator and Apple. Should other or additional types of insurance or clauses thereafter become available, Licensee agrees to furnish such new policies on demand of Licensor. Licensee further agrees to execute and deliver any additional instruments and to do or cause to be done all acts and things that may be requested by Licensor properly and fully to insure Licensor and Administrator against all damage and loss as herein provided for and to effectuate and carry out the intents and purposes of this License.

C. Policies providing for applicable insurance shall be issued only by insurance companies that are licensed or authorized to do business in the State of New York and that have a rating in the latest edition of "Bests Key Rating Guide" of "A:VII" or better, or another comparable rating reasonably acceptable to Administrator and Licensor. Certificates of Insurance evidencing the issuance of all insurance required herein, and guaranteeing at least thirty (30) days prior notice to Licensor and Administrator of cancellation or non-renewal, shall be delivered to Licensor and Administrator prior to execution of this License, or, in the case of new or renewal policies replacing any polices expiring during the Term, no later than thirty (30) days before the expiration dates of such policies. At Licensor's or Administrator's request, Licensee shall submit the entire original policy.

D. The City of New York, New York City Economic Development Corporation and Apple Industrial Development Corp. shall be named as additional insureds on all required insurance policies as evidenced by such insurance certificate except for workers' compensation and employers liability coverage. Any deductibles or self-insured retentions are subject to the prior written approval of Administrator.

E. Licensee, however, shall be, continue and remain liable for any uninsured destruction, loss or damage from any cause arising from breach of any of the covenants of this License by Licensee. In the event of any such loss or damage for which Licensee becomes liable as aforesaid, Licensee shall, at its sole cost and expense, promptly repair or replace the property so lost or damaged in accordance with plans and specifications approved by Licensor and Administrator. Notwithstanding the foregoing, Licensor and Administrator, at their sole discretion, may elect to receive in cash the value of repairs or rebuilding by Licensee in lieu of performance of such repairs to or rebuilding of the Property.

VII. Indemnification: Licensee assumes all risk of, and shall be fully responsible for and reimburse fully Licensor, Administrator and Apple for any loss, cost or expense arising out of any personal or bodily injury, death, or loss or damage to any property arising out of this License or Licensee's operations hereunder or any of the acts, omissions, events, conditions, occurrences or causes described in the next sentence. Licensee shall forever defend, indemnify and hold harmless Licensor, Administrator and Apple and their respective directors, members, officials, officers, agents, representatives and employees from and against any and all liabilities, claims, demands, penalties, fines, settlements, damages, costs, expenses and judgments of whatever kind or nature, known or unknown, contingent or otherwise (a) arising from personal or bodily injury to any person or persons, including death, or any damage to property of any nature, occasioned wholly or in part by any act(s) or omission(s) of Licensee or of the employees, guests, invitees, contractors, subcontractors, representatives, officials, officers, servants or agents of Licensee, occurring on or in proximity to the Property, or arising out of or as a result of this License, including, without limitation, any personal or bodily injury, including death, or property damage related to any collapse or failure of all or any part of the Property, or (b) relating to or arising from any and all liens and encumbrances which may be filed or recorded against the Property or any public improvement lien filed against any funds of

the City or Administrator as a result of actions taken by or on behalf of Licensee, its contractors, subcontractors, agents, representatives, employees, guests or invitees, or (c) arising out of, or in any way related to the storage, transportation, disposal, release or threatened release of any Hazardous Materials (as hereinafter defined) over, under, in, on, from or affecting the Property or any persons, real property, personal property, or natural substances thereon or affected thereby in connection with Licensee's use of the Property or any work performed on the Property by or on behalf of Licensee, except that Licensee shall not be liable for any claim, demand, penalty, fine, settlement, damage, cost, expense or judgment arising from a condition existing on the Property prior to the Effective Date of this License provided, however, that Licensee shall be liable for any acts or omissions on its part that worsens any condition existing on the Property. For purposes of this License, "Hazardous Materials" means (i) any "hazardous waste" as defined under the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 et seq., or (ii) "hazardous substance" as defined under the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. Section 9601 et seq., or (iii) "hazardous materials" as defined under the Hazardous Materials Transportation Act, 49 U.S.C. Section 5101 et seq., or (iv) "hazardous waste" as defined under New York Environmental Conservation Law Section 27-0901 et seq., or (v) "hazardous substance" as defined under the Clean Water Act, 33 U.S.C. Section 1321 et seq., or (vi) petroleum or petroleum products, crude oil or any by-products thereof, natural gas or synthetic gas used for fuel; any asbestos, asbestos-containing material or polychlorinated biphenyl; and any additional substances or materials which from time to time are classified or considered to be hazardous or toxic or a pollutant or contaminant under the laws of the State of New York, the United States of America, or regulated under any other Requirements. For the purposes of this License, the term "Requirements" means: (i) the Zoning Resolution of The City of New York (as the same may be amended and/or replaced) and any and all applicable laws, rules, regulations, orders, ordinances, statutes, codes, executive orders, resolutions and requirements of all federal, state, and local governmental agencies and instrumentalities (currently in force and hereafter adopted) applicable to the Property or any street, road, avenue, service area, sidewalk or other area comprising a part of, or lying in front of, the Property, or any vault in or under the Property and (ii) any and all provisions and requirements of any property, casualty or other insurance policy required to be carried by Licensee under this License. The provisions of this Article VII shall survive the termination of this License.

VIII. Noise Control: Licensee shall comply with Section 24-201 *et seq.* of the Administrative Code of The City of New York (the "Noise Control Code"). Licensee shall not operate, construct or cause to be operated, conducted or constructed on the Property devices and/or activities which would cause a violation of the Noise Control Code. Any such devices and activities shall incorporate advances in the art of noise control developed for the kind and level of noise emitted or produced by such devices or activities in accordance with the regulations issued by the New York City Department of Environmental Protection, or its successor.

IX. Applicable Laws: Licensee agrees to comply, at its own expense, with all applicable legal requirements in conducting the Work and in its operations on the Property. This

License does not grant authority for the performance of any construction work or any other operation or use which may require any permit or approval from any public or private party. If required, Licensee must obtain any such authorization, permit or approval at its sole cost and expense. Such compliance includes, but is not limited to, any required review, permit or approval by the City and/or any other applicable governmental entity.

X. Utilities: Licensee shall determine or cause to be determined whether there are any utilities located where it desires to do the Work. Licensee shall be liable for damage, if any, done to any such utilities. This License shall not be construed in any manner as a representation by Licensor or Administrator as to the part of the Property where the Work may be done without damaging such utilities.

XI. Access: Licensee shall at all times permit inspection of the Property by Licensor's agents, employees, consultants and representatives (including Administrator and its agents, employees, consultants and representatives) and shall permit inspection thereof by or on behalf of prospective future occupants.

XII. Liens Against Property; Discharge of Liens: Licensee shall not create, cause to be created or allow to exist (i) any lien, encumbrance or charge upon the Property or any part thereof, (ii) any lien, encumbrance or charge upon any assets of, or funds appropriated to, the City, Administrator or Apple, or (iii) any other matter or thing whereby the estate, rights or interest of Licensor in and to the Property or any part thereof might be impaired. If any mechanic's, laborer's, vendor's, materialman's or similar statutory lien is filed against the Property or any part thereof, or if any public improvement lien is created, or caused or suffered to be created by Licensee, then Licensee shall immediately after receipt of notice of the filing of such mechanic's, laborer's, vendor's, materialman's or similar statutory lien or public improvement lien cause it to be vacated or discharged of record by payment, deposit, bond, order of court of competent jurisdiction or otherwise. The provisions of this Article XII shall survive the termination of this License.

XIII. Accident Reports: Licensee shall notify Administrator immediately, and in any event within twenty four (24) hours, of any incidents/accidents arising out of or in connection with the Work, whether on or adjacent to the Property.

Please indicate your acceptance and agreement to the terms set forth above by having an authorized person sign this License where indicated below and returning such signed copy to New York City Economic Development Corporation, 110 William Street, New York, New York 10038, Attention: Ms. Alice Cheng.

Date: 12/12, 2002

LICENSOR:

THE CITY OF NEW YORK
By its Department of Business Services

By:
Title:

LICENSEE:

NRG ENERGY, INC.

By: MARC SHAPIRO
Title: DIRECTOR ASSET MGMT

Approved as to form by:

Acting Corporation Counsel

EXHIBIT A

The Property: in Staten Island, New York

Tax Block	Tax Lot
2758	12
2758	16
2810	7
2800	32
1801	95
1801	55
1815	70
1815	125
1815	300
1815	325
1815	75
1815	74
1825	140
1835	100
1815	235
1815	251

EXHIBIT B

Map (Separate Attachment)

NRG Energy, Inc.
901 Marquette Avenue South
Suite 2300
Minneapolis, MN 55402-3265

Telephone (612) 373-5300
Fax (612) 373-5312

April 21, 2003

Via FedEx

Mr. Steve Zahn
New York State Department of Environmental Conservation
Division of Environmental Permits, Region 2
47-40 21st Street
Long Island City, NY 11101-5407

Subject: NRG Energy, Inc. – Arthur Kill Power Plant Lateral
Permit No. 2-6403-00014/00031
Notice of Intent to Commence Work

Dear Mr. Zahn:

As required by Special Condition 18 of the above-referenced permit, NRG Energy, Inc. is providing notice of intent to begin the archaeological field surveys. A copy of the signed Notice of Intent to Commence Work is enclosed.

If you have any questions, or require additional information, please call me at (612) 373-5304 or Bart Jensen, NRG Energy's environmental consultant, at (612) 359-5686.

Sincerely,

NRG Energy, Inc.

Timothy W. Foxen

Timothy Foxen
Director, Natural Gas Supply

cc (w/enclosure): Anthony Emmerich, NYSDEC Division of Lands and Forests, Region 2
Richard Hunter, Hunter Research, Inc.
Bart Jensen, Natural Resource Group, Inc.

NOTICE OF INTENT TO COMMENCE WORK

Date: 4/21/03

NYSDEC Marine Resources
Attn. George Stadnik
N.Y.S.D.E.C Region 2 Office
47-40 21st Street
Long Island City, N.Y. 11101

Re: NYSDEC Permit No. 2-6403-00014/00031
NRG Energy Inc. - Arthur Kill Pipeline
Archaeological Field Surveys
Staten Island, New York

Dear Mr. Stadnik:

In accordance with Special Condition 18 of the referenced permit, I hereby serve notice to commence work on April 29th (or shortly thereafter), 2003.

This is also to certify that, having read this entire permit, I am fully aware of and understand the general and special conditions therein, and agree to comply with all such conditions further understand that prior to undertaking any modification to the subject work, I must seek and receive written approval of the NYSDEC Regional Permit Administrator.

Timothy W. Foxen
Signature of Permittee

Timothy W. Foxen
Name of Permittee (please print)

Richard L. Hunter, PRESIDENT
Signature of Contractor

HUNTER RESEARCH, INC.
Name of Contractor (please print)

120 WEST STATE STREET
Street Address of Contractor

TRENTON, NJ 08608
City, State, & Zip Code of Contractor

609-695-0122
Telephone Number of Contractor

WARNING

The permittee and his contractor (if any) are required to follow all permit conditions. Violations of the permit may lead to legal action, including the imposition of substantial monetary fines and corrective work.

cc: Environmental Permits

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 2
47-40 21ST Street, Long Island City, NY 11101-5407
Phone: (718) 482-4997 • FAX: (718) 482-4975
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

January 2, 2003

Timothy Foxen
NRG Energy Inc.
901 Marquette Avenue South Suite 2300
Minneapolis, MN 55402-3265

Re: NYSDEC Permit No. 2-6403-00014/00034
NRG Energy, Inc., Arthur Kill Pipeline
Archaeological Field Surveys
ECL Article 24 - Freshwater Wetlands
ECL Article 25 - Tidal Wetlands
NOTICE OF PERMIT RENEWAL

Dear Mr. Foxen:

In response to your request for permit renewal, please be advised that the expiration date of the above referenced permit is hereby extended to December 31, 2003.

All terms, specifications and conditions of the permit remain as previously written on July 19, 2002.

Technical questions concerning this matter should be directed to Joe Pane, NYSDEC Fish and Wildlife and Steve Zahn, NYSDEC Marine Resources, 718 482-6464. Administrative questions should be directed to Tamara Greco, NYSDEC Environmental Permits, 718 482-4997.

Sincerely,

John F. Cryan
Regional Permit Administrator

cc: NYSDEC Marine Resources
NYSDEC Fish and Wildlife
NYSDEC Law Enforcement

95-20-1 (3/87)—NI

New York State
Department of Environmental Conservation

NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Departmental conditions on it, contact the Regional Permit Administrator listed below. Please refer to the permit number shown when contacting the DEC.

John F. Cryan

Regional Permit Administrator

John F. Cryan
47-40 21st Street
LIC, NY 11101

Permit Number 2-6403-00014/00034

Expiration Date 12/31/03

NOTE: This notice is NOT a permit (718) 482-4997

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 2 Office
47-40 21st Street, Long Island City, NY 11101
Tel: (718) 482-4997 Fax: (718) 482-4976

Erin M. Crotty
Commissioner

July 19, 2002

Bart Jensen
Natural Resource Group, Inc.
900 Second Avenue South
Minneapolis, MN 55402

Re: NYSDEC Permit No. 2-6403-00014/00031
NRG Energy, Inc., Arthur Kill Pipeline
Archaeological Field Surveys
ECL Article 24 – Freshwater Wetlands
ECL Article 25 – Tidal Wetlands
NOTICE OF PERMIT ISSUANCE

Dear Mr. Jensen:

Enclosed is your client's permit for the project cited above. Please ask your client to read all conditions carefully. Please also provide complete copies of this permit to all contractors, agents and employees performing any part of the permitted activities.

If you have questions on compliance with permit conditions, please call Steve Zahn of DEC Marine Resources at (718) 482-6464 or Joseph Pane of DEC Fish & Wildlife at (7180 482-4922; on administrative and environmental review matters involving this permit, please call me at the number above.

Very truly yours,

John F. Cryan
Regional Permit Administrator

cc: S. Zahn, DEC Region 2 Marine Resources
J. Pane, DEC Region 2 Fish & Wildlife
DEC Region 2 Division of Law Enforcement

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DEC PERMIT NUMBER:		EFFECTIVE DATE:
2-6403-00014/00031		July 19, 2002
FACILITY/PROGRAM NUMBER(S):	PERMIT	EXPIRATION DATE(S):
2-6403-00014	Under the Environmental Conservation Law (ECL)	31 December 2002

TYPE OF PERMIT X New ☐ Renewal ☐ Modification X Permit to Construct ☐ Permit to Operate

- ☐ *Article 15, Title 5: Protection of Waters*
- ☐ Article 15, Title 15: Water Supply
- ☐ Article 15, Title 15: Water Transport
- ☐ Article 15, Title 15: Long Island Wells
- ☐ 6 NYCRR 608: Water Quality Certification
- ☐ Article 17, Titles 7, 8: SPDES
- ☐ Article 19: Air Pollution Control
- X Article 24: Freshwater Wetlands
- X Article 25: Tidal Wetlands
- ☐ Article 27, Title 7; 6 NYCRR 360: Solid Waste Management
- ☐ Article 27, Title 9; 6 NYCRR 373: Hazardous Waste Management
- ☐ Article 34: Coastal Erosion Management
- ☐ Article 36; 6 NYCRR 502: Floodplain Management Variance

PERMIT ISSUED TO:	TELEPHONE NUMBER:
Timothy W. Foxen NRG Energy, Inc.	(612) 373 - 5304
ADDRESS OF PERMITTEE: 901 Marquette Avenue, Suite 2300 Minneapolis, MN 55402	
CONTACT PERSON FOR PERMITTED WORK: Bart Jensen, Natural Resource Group, Inc. 900 Second Avenue South, Suite 1800, Minneapolis, MN 55402	TELEPHONE NUMBER: (612) 359 - 5686
PROJECT/FACILITY NAME: Archaeological field surveys for NRG Arthur Kill Pipeline	
PROJECT/FACILITY ADDRESS: 100 foot wide corridor within high sensitivity areas along the south segment of the proposed pipeline, south of Neck Creek and within the 200 to 300 foot horizontal directional drill staging area located in the middle of the pipeline route.	

COUNTY:	TOWN:	WATER BODY:	NYTM COORDINATES:
Richmond	New York City	Various Tidal and Freshwater Wetlands	N/A

DESCRIPTION OF AUTHORIZED ACTIVITY:

Conduct archaeological field surveys.

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, the General Conditions specified (see page 2) and any Special Conditions included as part of this permit.

REGIONAL PERMIT ADMINISTRATOR:	ADDRESS:	
John F. Cryan	NYS DEC Region 2 Office, 47-40 21st Street Long Island City, NY 11101 PHONE: (718) 482-4997	
AUTHORIZED SIGNATURE: John F. Cryan	DATE: July 19, 2002	Page 1 of 4

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification

The permittee expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, agents, and assigns for all claims, suits, actions, damages, and costs of every name and description, arising out of or resulting from the permittee's undertaking of activities or operation and maintenance of the facility or facilities authorized by the permit in compliance or non-compliance with the terms and conditions of the permit.

Item B: Permittee to Require its Contractors to Comply with Permit

The permittee shall require its independent contractors, employees, agents and assigns comply with this permit, including all special conditions, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits

The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights

This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

GENERAL CONDITIONS

General Condition 1: Facility Inspection by the Department

The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71-0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when written or verbal notification is provided by the Department at least 24 hours prior to such inspection.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

General Condition 2: Relationship of this Permit to Other Department Orders and Determinations

Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

General Condition 3: Applications for Permit Renewals or Modifications

The permittee must submit a separate written application to the Department for renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing.

The permittee must submit a renewal application at least:

a) 180 days before expiration of permits for State Pollutant Discharge Elimination System (SPDES), Hazardous Waste Management Facilities (HWMF), major Air Pollution Control (APC) and Solid Waste Management Facilities (SWMF); and

b) 30 days before expiration of all other permit types.

Submission of applications for permit renewal or modification are to be submitted to:

NYSDEC Regional Permit Administrator, Region 2
47-40 21st Street, Long Island City, New York 11101 Telephone: (718) 482-4997

General Condition 4: Permit Modifications, Suspensions and Revocations by the Department

The Department reserves the right to modify, suspend or revoke this permit when:

a) the scope of the permitted activity is exceeded or a violation of any condition of the permit or provisions of the ECL and pertinent regulations is found;

b) the permit was obtained by misrepresentation or failure to disclose relevant facts;

c) new material information is discovered; or

d) environmental conditions, relevant technology, or applicable law or regulation have materially changed since the permit was issued.

ADDITIONAL GENERAL CONDITIONS FOR ARTICLES 15 (TITLE 5), 24, 25, 34 AND 6NYCRR PART 608

1. If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

2. The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

3. Granting of this permit does not relieve the applicant of the responsibility of obtaining any other permission, consent or approval from the U.S. Army Corps of Engineers, U.S. Coast Guard, New York State Office of General Services or local government which may be required.

4. All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

5. There shall be no unreasonable interference with navigation by the work herein authorized.

6. If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

SPECIAL CONDITIONS

1. ALL WORK AND ACTIVITIES AUTHORIZED BY THIS PERMIT SHALL COMPLY WITH ALL OF THE APPLICABLE PROVISIONS OF ECL ARTICLE 24 (FRESHWATER WETLANDS), 25 (TIDAL WETLANDS), AND THE REGULATIONS IMPLEMENTING AND GOVERNED BY THESE STATUTES, AT 6 NYCRR PARTS 661 AND 663, UNLESS OTHERWISE SPECIFIED HEREIN.

2. ALL ACTIVITIES AUTHORIZED BY THIS PERMIT SHALL BE IN STRICT CONFORMANCE WITH THE FOLLOWING:

   A. PERMIT APPLICATION 2-6403-00014/00031 AND SUPPORTING INFORMATION, DATED 9/20/02, RECEIVED BY NYSDEC ON 9/21/02.

   B. LETTER FROM JON BERKIN OF NATURAL RESOURCE GROUP, INC. , DATED 6/7/02, RECEIVED BY NYSDEC ON 6/10/02.

3. PRIOR TO COMMENCEMENT OF THE PERMITTED ACTIVITY, PERMITTEE, HIS CONTRACTORS AND OTHER APPROPRIATE PARTIES MUST MEET ON-SITE TO REVIEW THE PERMIT CONDITIONS AND WORK SCHEDULE. AT THAT TIME, THE PERMITTEE SHALL PROVIDE NYSDEC REGIONAL PERMIT ADMINISTRATOR WITH THE FOLLOWING ITEMS:

   A. IDENTIFY (NAME, ADDRESS, PHONE NUMBER, PRIMARY CONTACT PERSON) THE VARIOUS PARTICIPANTS IN THE TESTING PROJECT.

   B. IDENTIFY THE METHOD OF HANDLING\TREATMENT OF SOILS. IF TRANSLOCATION OF SOILS IS PROPOSED IDENTIFY THE ESTIMATED DEPTH OF CUT, HOLDING AREA AND TRANSLOCATION METHOD. IF EXCAVATION\REPLACEMENT OF SOILS AT POINT OF CONTACT IS PROPOSED IDENTIFY EQUIPMENT AND METHOD WHICH WILL BE UTILIZED.

   C. IDENTIFICATION OF ALL STORAGE AND STAGING AREAS FOR THE PROJECT.

   D. IDENTIFY TYPE AND LOCATION OF EQUIPMENT TO BE UTILIZED FOR TESTING.

SPECIAL CONDITIONS

4. AT THE CONCLUSION OF TESTING, PERMITTEE MUST PROVIDE NYSDEC REGIONAL PERMIT ADMINISTRATOR WITH A WRITTEN REPORT OF THE ACTIVITIES UNDER TAKEN PURSUANT TO THIS PERMIT. THE REPORT MUST INCLUDE THE FOLLOWING: THE NUMBER OF SHOVEL EXCAVATIONS, THE NUMBER OF TRENCH EXCAVATIONS, THE DATE OF COMMENCEMENT\ COMPLETION OF WORK, STATUS OF RESTORATION WORK, SUMMARY OF REMEDIAL ACTIONS\DIRECTIVES ISSUED, SUMMARY OF TEST RESULTS, ETC.

5. EQUIPMENT ACCESS MUST BE VIA EXISTING PAVEMENT OR PROPOSED ACCESS CORRIDORS PROVIDED TO THE DEPARTMENT AT THE PRE-TESTING SITE MEETING. AT THE CONCLUSION OF TESTING A BARRIER, FENCE OR OTHER STRUCTURE SHALL BE PLACED TO PREVENT FUTURE UNAUTHORIZED ACCESS.

6. OPERATING VEHICLES, STAGING EQUIPMENT, AND STORAGE OF EXCAVATED MATERIALS IN REGULATED TIDAL WETLANDS IS PROHIBITED.

7. THE CUTTING OF TREES IS PROHIBITED.

8. EXCAVATION OF ANY KIND IS PROHIBITED IN REGULATED TIDAL WETLANDS.

9. ALL SEDIMENTS ARE TO BE RETAINED ON THE CONSTRUCTION SITE; NO DEPOSITION OF SEDIMENT IS TO OCCUR IN WETLANDS OR OTHER AREAS TO BE LEFT IN A NATURAL CONDITION. THIS RETENTION IS TO BE ACCOMPLISHED BY PLACING HAY BALES, FILTER FABRIC OR OTHER BARRIERS TO EROSION AROUND THE TESTING SITE AND AREAS TO BE LEFT IN A NATURAL CONDITION. EROSION CONTROL MEASURES ARE TO BE IN PLACE BEFORE ANY TESTING ACTIVITY BEGINS AND ARE TO BE MAINTAINED UNTIL COMPLETION OF WORK.

10. STAKED HAYBALES AND SILT FENCING MUST BE DEPLOYED IN THE UPLANDS DOWNGRADIENT OF ANY BORING OR EXCAVATION AREA TO PREVENT LOSS OF EXCAVATED MATERIALS OR SOILS TO THE ADJACENT WETLAND AREAS.

11. AREAS OF BARE SOIL, IN TEST LOCATIONS AND ON THE ACCESS PATHWAYS, ARE TO MULCHED WITH HAY AND SEEDED AT THE CONCLUSION OF THE TESTS.

12. ALL AREAS IN WHICH BARE SOIL IS EXPOSED ARE TO BE SEEDED WITH A FAST GROWING WILDFLOWER OR WETLAND MIX. AT A MINIMUM, THE FOLLOWING SPECIES SHALL BE INCLUDED IN THE SEED MIX: *PANICUM SP., ANDROPOGON SP., CAREX SP., ASCLEPIAS SP., ASTER SP.* SEEDINGS ARE TO BE REPEATED AS NEEDED TO ESTABLISH A THICK GROUND COVER. WHEN WINTER WEATHER PREVENTS GROWTH OF GRASS, SUCH AREAS ARE TO BE COVERED WITH MULCH AND SEEDED AS SOON AS ALLOWED BY GROWING CONDITIONS. AREAS OF BARE SOIL ARE NOT TO PERSIST FOR MORE THAN SIX WEEKS.

13. NO FILLING OR GRADE ALTERATIONS ARE AUTHORIZED UNDER THIS APPROVAL.

14. ALL TEST AND ACCESS AREAS ARE TO MATCH SMOOTHLY THE ELEVATION AND CONTOURS OF THE ADJACENT UNDISTURBED LAND.

15. ALL WORK IS TO BE ACCOMPLISHED SO AS TO MINIMIZE ADVERSE IMPACTS TO FRESHWATER WETLANDS, WILDLIFE, WATER QUALITY, AND NATURAL RESOURCES.

16. AT THE CONCLUSION OF TESTING, AUTHORIZED BY THIS PERMIT, THE PERMITTEE, HIS CONTRACTORS AND OTHER APPROPRIATE PARTIES MUST MEET ON-SITE TO INSPECT RESTORATION AND CLOSURE OF THE WORK AREA APPROVED UNDER THIS PERMIT. ALL WORK AREAS MUST BE RESTORED TO DEPARTMENT SATISFACTION.

17. A COPY OF THIS LETTER OF PERMISSION, INCLUDING ALL MAPS AND DRAWINGS MENTIONED IN THE CONDITIONS, IS TO BE AVAILABLE ON THE PROJECT SITE AT ALL TIMES.

18. AT LEAST FIVE (5) DAYS PRIOR TO START OF WORK, PERMITTEE SHALL COMPLETE AND SUBMIT THE ATTACHED "NOTICE OF INTENT TO COMMENCE WORK" FORM TO NYSDEC MARINE RESOURCES 47-40 21ST STREET, L.I.C., N.Y. 11101 (ATTENTION: STEPHEN ZAHN)

SPECIAL NOTE: IN ACCORDANCE WITH TITLE 19, PART 600.4 (C) OF THE NEW YORK CODE OF RULES AND REGULATIONS, THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION HEREBY CERTIFIES THAT THE ACTION DESCRIBED AND APPROVED IN THIS PERMIT, IF LOCATED WITHIN THE COASTAL AREA OF THE STATE OF NEW YORK, IS CONSISTENT TO THE MAXIMUM EXTENT PRACTICABLE WITH THE POLICIES AND PURPOSES OF THE NEW YORK CITY WATERFRONT REVITALIZATION PROGRAM

NOTICE OF INTENT TO COMMENCE WORK

Date: _____

NYSDEC Marine Resources
Attn. George Stadnik
N.Y.S.D.E.C Region 2 Office
47-40 21st Street
Long Island City, N.Y. 11101

Re: NYSDEC Permit No. 2-6403-00014/00031
NRG Energy Inc. - Arthur Kill Pipeline
Archaeological Field Surveys
Staten Island, New York

Dear Mr. Stadnik:

In accordance with Special Condition 18 of the referenced permit, I hereby serve notice to commence work on _____, 200____.

This is also to certify that, having read this entire permit, I am fully aware of and understand the general and special conditions therein, and agree to comply with all such conditions further understand that prior to undertaking any modification to the subject work, I must seek and receive written approval of the NYSDEC Regional Permit Administrator.

_____
Signature of Permittee

_____
Name of Permittee (please print)

_____
Signature of Contractor

_____
Name of Contractor (please print)

_____
Street Address of Contractor

_____
City, State, & Zip Code of Contractor

_____
Telephone Number of Contractor

WARNING

The permittee and his contractor (if any) are required to follow all permit conditions. Violations of the permit may lead to legal action, including the imposition of substantial monetary fines and corrective work.

cc: Environmental Permits

NRG Energy, Inc.
901 Marquette Avenue South
Suite 2300
Minneapolis, MN 55402-3265

Telephone (612) 373-5300
Fax (612) 373-5312

April 21, 2003

Mr. Anthony Emmerich
New York State Department of Environmental Conservation
Division of Lands and Forests, Region 2
47-40 21st Street
Long Island City, NY 11101-5407

Via FedEx

Subject: NRG Energy, Inc. – Arthur Kill Power Plant Lateral
Temporary Revocable Permit No. 767
Notice of Intent to Commence Work

Dear Mr. Emmerich:

As required by Condition 2 of the above-referenced permit, NRG Energy, Inc. (NRG Energy) is providing notice of intent to begin the archaeological field surveys. NRG Energy plans on beginning the archaeological field surveys no earlier than April 29, 2003.

If you have any questions, or require additional information, please call me at (612) 373-5304 or Bart Jensen, NRG Energy's environmental consultant, at (612) 359-5686.

Sincerely,

NRG Energy, Inc.

Timothy Foxen
Director, Natural Gas Supply

cc: Steve Zahn, NYSDEC Region 2
Richard Hunter, Hunter Research, Inc.
Bart Jensen, Natural Resource Group, Inc.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

#767 renewal

New York State Department of Environmental Conservation

81-20-3(7/86)

TEMPORARY REVOCABLE PERMIT FOR THE
USE OF STATE LANDS
(see reverse side for standard terms and conditions)

Name: Tim Fozen, NRG Energy, Inc.

Address: 901 Marquette Avenue, Suite 2300

Minneapolis, Minnesota

Telephone Number: (612) 373-5304 Zip Code: 55402

State Land Location: County: Richmond Town: Bloomfield/Chelsea

Land Designation: Travis/Sawmill Creek

Patent, Tract, Lot, Etc.: Block 1801, Lot 125

The Department of Environmental Conservation hereby grants permission to the above named permittee to use these State lands described above and shown on the attached map for the purposes stated on the attached application and as amended below subject to the standard terms and conditions listed on the reverse side of this form and to the following special terms and conditions. (Use additional sheet if necessary).

Complete archaeological and field surveys as described in Temporary Revocable Permit #767, dated August 12, 2002, subject to special conditions of that permit and to conditions of NYSDEC wetlands prmit #2-6403-00014/00034

Unless otherwise suspended or revoked, this permit shall expire on 12/31/03

APPROVAL

Regional Director: [signature] for Thomas Kunkel Date: 4/8/03

Central Office: not required Date:
(if required)

NOTICE OF EXPIRATION OF TEMPORARY REVOCABLE PERMIT

This is to inform you that this permit expired on ______________

and that all conditions of such permit have been satisfactorily met.

______________ Date ______________ Regional Director

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STANDARD TERMS AND CONDITIONS

1. This permit shall at all times be subject to the approval of the Regional Land Manager and may be suspended or revoked at any time with due cause.

2. The permittee shall notify the Regional Land Manager at least 48 hours prior to commencing use and upon completion of use.

3. The activities authorized under this permit shall not interfere with normal administration of the area by the Department.

4. No damage will be done to State Land, State facilities or boundary or survey markers.

5. The permittee is responsible for any inadvertant or deliberate damage caused by the exercise of this permit and will be held responsible for restoration, rehabilitation or repair at the permittee's expense.

6. No trees or other vegetation shall be cut, disturbed or removed unless specifically authorized by the Regional Land Manager.

7. The State land covered by this permit shall be kept free of litter and debris and be left in a condition satisfactory to the Regional Land Manager at the expiration of the permit or on completion of activities authorized by the permit.

Special Conditions:

1. **This permit is issued for survey work only and does not constitute permission by the Department to construct the proposed gas pipeline across state lands.**

2. The permittee shall provide the Department with two copies of any survey reports including archaeological and environmental surveys including site forms, maps, photographs, GIS files and reports, pertaining to finds or lack thereof on state lands.

3. All scientific collections, field notes and other records resulting from this survey are the property of the State of New York. The permittee agrees to make and fund appropriate curation/disposition arrangements with the NYS Museum, in consultation with the Department.

4. All holes excavated during the wetlands survey shall be filled in as the survey progresses. Surface restoration after survey completion is subject to the approval of the Regional Forester.

Additional conditions relating to Archaeological survey:

1. The permittee shall coordinate the scheduling of archaeological survey work with the Regional Forester.

2. Permission is granted for standard archaeological survey and surface inspection directed toward the identification of archaeological sites within the proposed project area. Archaeological investigations beyond the Stage 1 level will require additional permitting including but not limited to a permit issued by the Department and the New York State Museum pursuant to Section 233 of Education Law. The Department shall be included in the consultation relating to any additional site evaluation (Stage 2) or data recovery/impact mitigation (State 3) undertaken pursuant to Section 106 of the National Historic Preservation Act or Section 14.09 of the New York State Historic Preservation Act.

3. All test pits shall be filled in as the survey progresses. Surface restoration after survey completion is subject to the approval of the Regional Forester.

4. All archaeological work shall be completed in accordance with the standards established by the New York Archaeological Council, for field work reporting and curation.

5. Copies of all correspondence including but not limited to correspondence with the New York State Office of Parks, Recreation and Historic Preservation, are to be provided to:

Charles R. Vandrei
Agency Historic Preservation Officer
Bureau of Public Lands
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-4255

NRG Energy, Inc.
901 Marquette Avenue South
Suite 2300
Minneapolis, MN 55402-3265

Telephone (612) 373-5300
Fax (612) 373-5312

May 13, 2003

Mr. John Cryan
New York State Department of Environmental Conservation
47-40 21st Street
Long Island City, NY 11101-5407

Via FedEx

Subject: Arthur Kill Pipeline Project
NYSDEC Permit No. 2-6403-00014/00034

Dear Mr. Cryan:

I am writing this letter to inform you that in accordance with Special Condition 3 of the above referenced permit, a representative of NRG Energy, Inc. (NRG Energy) met on-site with its archaeological consultant, Hunter Research Inc. (Hunter), prior to the commencement of the fieldwork to review the permit conditions and work schedule.

Following is the information required by subparts A-D of Special Condition 3.

A. *Identify (Name, Address, Phone Number, Primary Contact Person) the Various Participants in the Testing Project.*

William Liebeknecht
Hunter Research, Inc.
Historical Resource Consultants
120 West State Street
Trenton, NJ 08608-1185
(609) 695-0122

Allan Fillippi
NRG Energy, Inc.
Arthur Kill Generating Station
4401 Victory Boulevard
Staten Island, NY 10314
(718) 390-2734

B. *Identify the method of handling\treatment of soils. If translocation of soils is proposed, identify the estimated depth of cut, holding area and translocation method. If excavation\replacement of soils at point of contact is proposed, identify equipment and method to be utilized.*

As outlined in the letter dated June 7, 2002 from Jon Berkin of Natural Resource Group, Inc. to Mr. Harold Dickey of the New York State Department of Environmental Conservation, NRG Energy will conduct Phase 1B archaeological fieldwork within the high sensitivity areas contained within the southern open trench and HDD staging area portions of the project. The testing methods to be utilized in the investigation consist of soil boring, the excavation of shovel tests, and the possible excavation of larger areas either by hand or utilizing a small trackhoe.

Soil borings will be excavated using a 3 inch split spoon, tripod with motorized cathead. This work will include geomorphological analysis of the borings. The majority of the soil removed during the boring process will be returned to its original location following its removal. Small amounts of soil from the boring may be retained for more detailed analysis.

Shovel test units will be excavated to locate and identify archeological materials and sites. Shovel tests will consist of square units measuring approximately 40x40 centimeters. Interval spacing between individual units will be standardized at 25 feet. All manually excavated soil will be passed through one-quarter-inch mesh hardware cloth to ensure uniform recovery of artifacts. Shovel tests will be excavated to sterile deposits or to the extent of practical excavation, whichever is shallower. Each shovel test will be backfilled immediately after it is recorded to restore contours and every attempt will be made to segregate topsoil from subsoils. Backfilling of holes will be completed so that topsoil is replaced at ground surface to maintain the existing stratigraphy.

Larger areas may be excavated by hand to further investigate any suspected deposits of cultural material. These hand excavated units will measure five square feet in area, and will be excavated to a maximum depth of six feet below surface. All manually excavated soil will be passed through one-quarter-inch mesh hardware cloth to ensure uniform recovery of artifacts. Every attempt will be made to segregate topsoil from subsoils during excavation. Backfilling of the excavated areas will be completed so that topsoil is replaced at ground surface to maintain the existing stratigraphy.

If intact cultural deposits are identified during testing and there is insufficient data to assess the significance of the site, Hunter will mobilize a small track hoe or use hand shovels to expand the excavation areas. The trenches will be excavated to sterile (non-artifact bearing) deposits. However, the areas excavated will not exceed a maximum of six feet in depth. In concert with deep testing, geomorphological and pedological analysis of soils and stratigraphy will be conducted in order to evaluate the antiquity, depositional characteristics, and integrity of buried archeological strata. Geomorphological studies will serve to augment the archeological data and place them within their appropriate depositional contexts. Every attempt will be made to segregate topsoil from subsoils during backhoe excavation. Backfilling of the excavated areas will be completed so that topsoil is replaced at ground surface to maintain the existing stratigraphy.

C. *Identification of all storage and staging areas for the project.*

No storage or staging areas are anticipated for the Phase IB archaeological investigation. If equipment storage or staging is required, sufficient space is available at the Arthur Kill Power Plant for this purpose.

D. *Identify the type and location of equipment to be utilized for testing.*

Shovel tests and hand excavations will be performed with shovels, trowels, and screens with ¼ inch mesh.

Coring will be performed with a 3 inch split spoon, tripod with motorized cathead.

Backhoe excavation, if necessary, will be performed with a small, rubber-tired or tracked backhoe.

In addition, NRG Energy is providing information on access as required by Special Condition 5. Access to the project site will be from the following existing paved roads: Victory Boulevard; South Avenue; and Bloomfield Road.

If you have any questions, or, require additional information, please call me at (612) 373-5304 or Bart Jensen, NRG Energy's environmental consultant, at (612) 359-5686.

Sincerely,

NRG ENERGY, INC.

Timothy W. Foxen

Timothy Foxen
Director, Natural Gas Supply

cc: Bart Jensen, Natural Resource Group, Inc.
Jon Berkin, Natural Resource Group, Inc.
Allan Filippi, Arthur Kill Generating Station
William Liebeknecht, Hunter Research, Inc.

bcc: Marc Dworkin, NRG Energy, Inc.
Richard Hunter, Hunter Research, Inc.
Craig Indyke, Read and Laniado
Dick Avazian, Natural Field Services Corporation

Appendix C

SUMMARY OF SUBSURFACE TESTING

APPENDIX C

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	1	1	0 - 0.6ft	sand loam	7.5YR 3/4	--
		2	0.6 - 1.3ft	sand	7.5YR 5/8	Historic Building Materials Historic Furnishings Historic Glass Vessels
		3	1.3 - 3ft	mottled sand.	7.5YR 5/8, 7.5YR 4/6	--
Shovel Test	2	1	0 - 0.5ft	sand loam	7.5YR 3/4	--
		2	0.5 - 2.1ft	sand	7.5*R 5/8	--
		3	2.1 - 3.1ft	mottled sand.	7.5YR 5/8, 7.5YR 4/6	--
Shovel Test	3	1	0 - 0.4ft	sand loam	7.5YR 3/4	--
		2	0.4 - 1.5ft	sand	7.5YR 5/8	--
		3	1.5 - 3.8ft	mottled sand	7.5YR 5/8, 7.5YR 4/6	--
Shovel Test	4	1	0 - 1ft	silty loam	10YR 2/2	--
		2	1 - 2ft	sand	7.5YR 5/8	--
		3	2 - 3ft	mottled sand.	7.5YR 5/8, 7.5YR 4/6	--
		4	3 - 5ft	sandy clay	10YR 5/2	--
Shovel Test	5	1	0 - 0.5ft	silty loam with gravel	10YR 2/2	Historic Ceramic Vessels
		2	0.5 - 0.8ft	sand	7.5YR 5/8	--
		3	0.8 - 3.1ft	mottled sand	7.5YR 5/8, 7.5YR 4/6	--
		4	3.1 - 3.5ft	mottled silty clay	7.5YR 2.5/1, 7.5YR 2.5/3	--
		5	3.5 - 4.4ft	sandy silt	7.5YR 2.5/1	--
		6	4.4 - 4.9ft	silty sand	7.5YR 2.5/2	--
		7	4.9 - 5.5ft	mottled clay	7.5YR 5/8, 7.5YR 4/6	--
		8	5.5 - 5.7ft	sandy clay	10YR 4/1	--
Shovel Test	6	1	0 - 1.9ft	loamy sand	10YR 3/2	--
		2	1.9 - 3ft	sand	7.5YR 5/8	--
		3	3 - 4.4ft	sand.	7.5YR 4/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	7	1	0 - 1.7ft	silty sand	10YR 3/2	--
		2	1.7 - 3.8ft	sand	7.5YR 5/8	Historic Ceramic Vessels
Shovel Test	8	1	0 - 0.2ft	silty sand	10YR 5/6	--
		2	0.2 - 0.8ft	silty sand.	10YR 3/2	--
		3	0.8 - 2.2ft	sand	7.5YR 5/8	--
		4	2.2 - 3.9ft	sand.	7.5YR 4/4	--
Shovel Test	9	1	0 - 0.2ft	silty loam with gravel	10YR 3/1	--
		2	0.2 - 0.9ft	silty loam.	10YR 3/2	--
		3	0.9 - 2ft	sand	7.5YR 5/8	--
		4	2 - 5ft	sand.	7.5YR 4/4	--
Shovel Test	10	1	0 - 0.7ft	silty sand with gravel	10YR 3/1	--
		2	0.7 - 1.4ft	sand	7.5YR 5/8	--
		3	1.4 - 3.5ft	sand.	7.5YR 4/4	--
		4	3.5 - 4.9ft	sand	7.5YR 5/6	--
Shovel Test	11	1	0 - 0.6ft	gravel	--	--
Shovel Test	12	1	0 - 1ft	sand loam	10YR 3/2	--
		2	1 - 4.7ft	sand	7.5YR 5/8	--
Shovel Test	13	1	0 - 1.9ft	sand loam	10YR 3/2	--
		2	1.9 - 3ft	sand	7.5YR 5/8	--
Shovel Test	14	1	0 - 0.6ft	sand loam	10YR 3/2	--
		2	0.6 - 2.8ft	sand	7.5YR 5/8	--
		3	2.8 - 4ft	sand.	7.5YR 4/4	--
Shovel Test	15	1	0 - 0.8ft	sand loam	10YR 3/2	--
		2	0.8 - 2.4ft	sand	7.5YR 5/8	--
		3	2.4 - 6ft	sand.	7.5YR 4/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	16	1	0 - 0.9ft	sand loam	10YR 2/2	--
		2	0.9 - 2ft	sand	7.5YR 5/8	--
		3	2 - 5.2ft	mottled sand.	7.5YR 5/8, 7.5YR 4/6	--
Shovel Test	17	1	0 - 1.2ft	sand loam	10YR 2/2	Historic Ceramic Vessels
		2	1.2 - 4.3ft	sand	7.5YR 5/8	--
Shovel Test	18	1	0 - 0.4ft	sand loam	7.5YR 3/4	--
		2	0.4 - 1.4ft	sand	7.5YR 5/8	--
		3	1.4 - 3.6ft	mottled sand.	7.5YR 5/8, 7.5YR 4/6	--
Shovel Test	19	1	0 - 0.8ft	silty loam with gravel	10YR 3/2	--
		2	0.8 - 3.8ft	medium sand	7.5YR 4/4	--
Shovel Test	20	1	0 - 0.7ft	silty loam with gravel	10YR 3/2	--
		2	0.7 - 2.6ft	compact medium sand	7.5YR 5/4	--
		3	2.6 - 5.4ft	medium sand.	7.5YR 4/4	--
Shovel Test	21	1	0 - 0.9ft	sand loam	10YR 2/2	--
		2	0.9 - 2.2ft	sand	7.5YR 5/8	--
		3	2.2 - 5.1ft	sand.	7.5YR 4/6	--
Shovel Test	22	1	0 - 0.9ft	sand loam	10YR 2/2	--
		1 B	-		--	Historic Building Materials
Shovel Test	23	1	0 - 0.3ft	sand loam	10YR 2/2	--
		2	0.3 - 2.2ft	medium sand	7.5YR 5/8	--
Shovel Test	24	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 4.9ft	medium sand	7.5YR 5/8	--
Shovel Test	25	1	0 - 1.3ft	silty sand with gravel	10YR 3/4	--
		2	1.3 - 2.8ft	medium sand	7.5YR 5/8	--
		3	2.8 - 6.3ft	medium sand.	7.5YR 4/6	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	26	1	0 - 0.7ft	sand loam	10YR 3/3	--
		2	0.7 - 4.7ft	medium sand	7.5YR 5/8	--
Shovel Test	27	1	0 - 0.7ft	sand loam	10YR 3/3	--
		2	0.7 - 2ft	medium sand	7.5YR 5/8	--
		3	2 - 5ft	medium sand.	7.5YR 4/4	--
Shovel Test	28	1	0 - 0.3ft	sand loam	10YR 3/3	--
		2	0.3 - 0.8ft	medium sand	7.5YR 5/8	--
		3	0.8 - 4.4ft	medium sand.	7.5YR 4/4	--
Shovel Test	29	1	0 - 0.7ft	sand loam	10YR 3/3	--
		2	0.7 - 5.2ft	medium sand	7.5YR 5/8	--
Shovel Test	30	1	0 - 1.1ft	sand loam with gravel	10YR 3/3	--
		2	1.1 - 2ft	medium sand	7.5YR 5/8	--
		3	2 - 3.9ft	medium sand.	7.5YR 4/3	--
		4	3.9 - 4.9ft	medium sand	7.5YR 5/6	--
Shovel Test	31	1	0 - 0.3ft	sand loam	10YR 3/3	--
		2	0.3 - 1.9ft	medium sand	7.5YR 5/8	--
		3	1.9 - 5.2ft	medium sand.	7.5YR 3/4	--
Shovel Test	32	1	0 - 0.7ft	sand loam	10YR 3/3	--
		2	0.7 - 2ft	medium sand	7.5YR 5/8	--
		3	2 - 4.5ft	medium sand.	7.5YR 3/4	--
Shovel Test	33	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 1.4ft	medium sand	7.5YR 5/8	--
		3	1.4 - 4.2ft	medium sand.	7.5YR 3/4	--
Shovel Test	34	1	0 - 0.6ft	sand loam	10YR 3/3	--
		2	0.6 - 3.1ft	medium sand	7.5YR 5/8	--
		3	3.1 - 5.1ft	medium sand.	7.5YR 3/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	35	1	0 - 0.5ft	sand loam with gravel	10YR 3/3	--
		2	0.5 - 1ft	medium sand	7.5YR 5/8	--
Shovel Test	36	1	0 - 0.5ft	sand loam	10YR 3/3	Historic Building Materials
		2	0.5 - 2ft	medium sand	7.5YR 5/8	--
		3	2 - 5.8ft	medium sand.	7.5YR 4/4	--
Shovel Test	37	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 2.6ft	medium sand	7.5YR 5/8	--
		3	2.6 - 3.4ft	medium sand.	7.5YR 4/4	--
Shovel Test	38	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 2.1ft	medium sand	7.5YR 5/8	--
		3	2.1 - 4.3ft	medium sand.	7.5YR 4/4	--
Shovel Test	39	1	0 - 0.6ft	sand loam	10YR 3/3	--
		2	0.6 - 1.7ft	medium sand	7.5YR 5/8	--
		3	1.7 - 4.2ft	medium sand.	7.5YR 4/4	--
Shovel Test	40	1	0 - 0.6ft	sand loam	10YR 3/3	--
		2	0.6 - 1.2ft	medium sand	7.5YR 5/8	--
		3	1.2 - 1.4ft	silty loam	10YR 2/1	--
		4	1.4 - 2.3ft	sandy clay	10YR 3/2	--
		5	2.3 - 4.5ft	medium sand	10YR 4/6	--
Shovel Test	41	1	0 - 0.3ft	sand loam	10YR 3/3	--
		2	0.3 - 1.4ft	medium sand	7.5YR 5/8	--
		3	1.4 - 4.3ft	medium sand.	7.5YR 4/4	--
Shovel Test	42	1	0 - 0.3ft	sand loam	10YR 3/3	--
		2	0.2 - 1.7ft	medium sand	7.5YR 4/6	--
		3	1.7 - 4ft	medium sand.	7.5YR 4/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	43	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 1.7ft	medium sand	7.5YR 5/8	--
		3	1.7 - 4.6ft	medium sand.	7.5YR 4/4	--
Shovel Test	44	1	0 - 0.3ft	sand loam	10YR 3/3	--
		2	0.3 - 0.9ft	medium sand	7.5YR 5/8	--
		3	0.9 - 1.2ft	silt	10YR 2/1	--
		4	1.2 - 2.8ft	medium sand	10YR 3/2	--
		5	2.8 - 4ft	medium sand.	10YR 4/6	--
Shovel Test	45	1	0 - 0.6ft	sand loam	10YR 2/2	--
		2	0.6 - 1ft	medium sand	7.5YR 5/8	--
		3	1 - 1.2ft	silt	10YR 2/1	--
		4	1.2 - 2ft	sandy clay	10YR 3/2	--
		5	2 - 2.5ft	medium sand	10YR 4/6	--
		6	2.5 - 4.5ft	medium sand.	10YR 4/2	--
Shovel Test	46	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 1.3ft	medium sand	7.5YR 4/4	--
		3	1.3 - 3.4ft	medium sand.	7.5YR 5/8	--
Shovel Test	47	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 0.9ft	medium sand	7.5YR 4/4	--
		3	0.9 - 2.8ft	medium sand.	7.5YR 5/8	--
Shovel Test	48	1	0 - 0.6ft	sand loam	10YR 3/3	--
		2	0.6 - 1.3ft	medium sand	10YR 4/4	Prehistoric Cobble-based Lithics
		3	1.3 - 2.9ft	medium sand.	7.5YR 4/4	--
		4	2.9 - 4.3ft	medium sand	7.5YR 5/8	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	49	1	0 - 0.3ft	sand loam	10YR 2/2	--
		2	0.3 - 0.5ft	mottled sand loam, loam	7.5YR 4/6, 10YR 3/2	--
		3	0.5 - 0.6ft	sandy silt	10YR 2/1	--
		4	0.6 - 0.8ft	sandy clay	7.5YR 4/3	--
		5	0.8 - 1.1ft	mottled silty sand	10YR 2/1, 10YR 3/3	--
		6	1.1 - 1.9ft	mottled medium sand	7.5YR 4/4, 10YR 4/4	--
		7	1.9 - 3.1ft	sand	10YR 5/6	--
		8	3.1 - 4.2ft	sandy clay	10YR 4/2	--
		9	4.2 - 5ft	medium sand	10YR 5/2	--
Shovel Test	50	1	0 - 0.2ft	sand loam	10YR 2/2	--
		2	0.2 - 0.4ft	medium sand	10YR 3/3	Historic Ceramic Vessels
		3	0.4 - 0.9ft	medium sand.	7.5YR 4/6	--
		4	0.9 - 1.1ft	sandy clay	7.5YR 4/3	--
		5	1.1 - 1.2ft	silt	10YR 2/1	--
		6	1.2 - 1.6ft	mottled sand	10YR 3/3, 10YR 4/6	--
		7	1.6 - 1.9ft	silty sand	10YR 3/1	--
		8	1.9 - 4ft	sandy clay	10YR 4/2	--
		9	4 - 5ft	medium sand	10YR 5/2	--
Shovel Test	51	1	0 - 0.8ft	sand loam	10YR 3/3	--
		2	0.8 - 2.1ft	medium sand	7.5YR 4/4	--
		3	2.1 - 3.9ft	medium sand.	7.5YR 5/8	--
Shovel Test	52	1	0 - 0.6ft	sand loam	10YR 3/3	--
		2	0.6 - 1.7ft	medium sand	7.5YR 4/4	--
		3	1.7 - 3.3ft	medium sand.	7.5YR 5/8	--
Shovel Test	53	1	0 - 0.6ft	sand loam	10YR 3/3	--
		2	0.6 - 1.2ft	medium sand	10YR 4/4	--
		3	1.2 - 2.9ft	mottled sandy clay	10YR 5/4, 7.5YR 5/8	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	54	1	0 - 0.7ft	clay loam	10YR 2/1	--
		2	0.7 - 1.3ft	mottled clay loam	10YR 4/2, 10YR 3/2	--
		3	1.3 - 1.8ft	mottled sandy clay	10YR 5/4, 7.5YR 5/8	--
Shovel Test	55	1	0 - 0.2ft	sand loam	10YR 3/3	--
		2	0.2 - 1.2ft	sand loam.	10YR 3/4	--
		3	1.3 - 1.7ft	medium sand	5YR 4/8	--
		4	1.7 - 1.9ft	sandy clay loam	10YR 2/1	--
		5	1.9 - 3.9ft	sandy clay	10YR 4/2	--
Shovel Test	56	1	0 - 0.5ft	sand loam	10YR 2/2	--
		2	0.5 - 1.4ft	sand	10YR 4/6	--
		3	1.4 - 2.5ft	medium sand	7.5YR 7/8	--
Shovel Test	57	1	0 - 0.8ft	sand loam	7.5YR 3/2	--
		2	0.8 - 2.3ft	medium sand	10YR 4/6	--
		3	2.3 - 3.2ft	medium sand.	7.5YR 7/8	--
Shovel Test	58	1	0 - 0.8ft	sand loam	10YR 2/2	--
		2	0.8 - 1.4ft	sand	10YR 4/6	--
		3	1.4 - 2.6ft	medium sand	7.5YR 7/8	--
Shovel Test	59	1	0 - 0.6ft	sand loam	10YR 3/3	--
		2	0.6 - 2.2ft	medium sand	7.5YR 4/4	--
		3	2.2 - 3.5ft	medium sand.	7.5YR 5/8	--
Shovel Test	60	1	0 - 0.3ft	sand loam	10YR 3/3	--
		2	0.3 - 1.6ft	medium sand	7.5YR 4/4	--
		3	1.6 - 3.2ft	medium sand.	7.5YR 5/8	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	61	1	0 - 0.4ft	sand loam	10YR 3/3	--
		2	0.4 - 0.9ft	mottled sand loam	10YR 4/4, 10YR 3/4	--
		3	0.9 - 1.5ft	medium sand	10YR 4/4	--
		4	1.5 - 3.9ft	medium sand.	7.5YR 4/4	--
		5	3.9 - 4.8ft	medium sand	7.5YR 5/8	--
Shovel Test	62	1	0 - 0.5ft	silty loam	10YR 2/2	--
		2	0.5 - 1.4ft	sand	7.5YR 5/8	--
		3	1.4 - 1.7ft	mottled silty clay	7.5YR 2.5/1, 7.5YR 2.5/3	--
		4	1.7 - 2ft	sandy silt	7.5YR 2.5/1	--
		5	2 - 2.2ft	silty sand	7.5YR 2.5/2	--
		6	2.2 - 2.6ft	mottled clay	7.5YR 5/8, 7.5YR 4/6	--
Shovel Test	100	1	0 - 0.3ft	sand loam	10YR 3/2	--
		2	0.3 - 0.7ft	silty sand	10YR 3/3	Historic Ceramic Vessels
		3	0.7 - 1.1ft	silty sand.	7.5YR 3/1	Historic Building Materials
						Historic Glass Vessels
		4	1.1 - 1.3ft	silty sand	10YR 3/3	--
		5	1.3 - 1.5ft	clay loam	7.5YR 3/3	--
		6	1.5 - 1.7ft	silty loam	5YR 2.5/1	--
		7	1.7 - 5ft	sandy clay	10YR 3/2	--
Shovel Test	101	1	0 - 0.3ft	sand loam	10YR 3/2	--
		2	0.3 - 0.7ft	sandy clay	10YR 4/3	--
		3	0.7 - 0.9ft	silty loam	5YR 2.5/1	--
		4	0.9 - 1.5ft	sandy clay	10YR 4/1	--
		5	1.5 - 3ft	sandy clay.	10YR 6/6	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	102	1	0 - 0.4ft	sand loam	10YR 3/2	--
		2	0.4 - 0.8ft	silty sand	10YR 3/3	--
		3	0.8 - 1.1ft	medium sand	7.5YR 4/6	Historic Ceramic Vessels
		4	1.1 - 1.2ft	sand loam	7.5YR 4/1	--
		5	1.2 - 1.3ft	silty loam	5YR 2.5/1	--
		6	1.3 - 2.2ft	sand loam	7.5YR 4/1	--
		7	2.2 - 3.8ft	sandy clay	10YR 6/6	--
Shovel Test	103	1	0 - 0.3ft	sandy silt	7.5YR 2.5/1	--
		2	0.3 - 0.9ft	sand loam	10YR 4/4	--
		3	0.9 - 1.8ft	sandy silt	10YR 3/2	--
		4	1.8 - 3.5ft	sandy clay	10YR 4/4	--
Shovel Test	104	1	0 - 0.3ft	sand loam	10YR 3/2	--
		2	0.3 - 0.5ft	silty sand	10YR 3/3	--
		3	0.5 - 0.9ft	medium sand	7.5YR 4/6	--
		4	0.9 - 1.1ft	sand loam	7.5YR 4/1	--
		5	1.1 - 1.3ft	silty sand	5YR 2.5/1	--
		6	1.3 - 1.8ft	sand loam	7.5YR 4/1	--
		7	1.8 - 3ft	sand	10YR 5/6	--
		8	3 - 4ft	sand.	7.5YR 4/6	--
Shovel Test	105	1	0 - 0.4ft	sand loam	10YR 3/2	Historic Ceramic Vessels
		2	0.4 - 0.8ft	silty sand	10YR 3/3	--
		3	0.8 - 1.5ft	sandy clay	10YR 3/4	--
		4	1.5 - 1.9ft	sandy clay.	10YR 4/6	Historic Building Materials Historic Glass Vessels
		5	1.9 - 2.5ft	mottled sandy clay	10YR 4/4, 10YR 3/3	--
		6	2.5 - 3.3ft	sand	10YR 3/3	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	106	1	0 - 0.4ft	sand loam	10YR 3/2	--
		2	0.4 - 2.5ft	medium sand	7.5YR 4/6	--
		3	2.5 - 3.5ft	medium sand.	7.5YR 5/4	--
Shovel Test	107	1	0 - 0.4ft	silty loam	10YR 3/2	--
		2	0.4 - 2.2ft	sand loam	7.5YR 4/6	--
		3	2.2 - 3.3ft	sand	7.5YR 5/4	--
Shovel Test	108	1	0 - 0.9ft	silty sand	10YR 3/3	Historic Building Materials Historic Ceramic Vessels Historic Energy Historic Glass Vessels Historic Manufacturing
		2	0.9 - 2.6ft	medium sand	7.5YR 4/6	--
		3	2.6 - 3.3ft	wet sand	7.5YR 5/4	--
Shovel Test	109	1	0 - 0.4ft	silty sand	10YR 3/3	--
		2	0.4 - 2ft	medium sand	7.5YR 4/6	--
		3	2 - 2.5ft	sand.	7.5YR 5/4	--
Shovel Test	110	1	0 - 0.7ft	silty sand	10YR 3/3	--
		2	0.7 - 1.4ft	mottled medium sand	7.5YR 4/6, 10YR 4/4	--
		3	1.4 - 2.6ft	medium sand	7.5YR 4/6	--
		4	2.6 - 3.6ft	sand	7.5YR 5/4	--
Shovel Test	111	1	0 - 0.3ft	coarse sand	5YR 4/6	--
		2	0.3 - 0.6ft	silty loam	7.5YR 3/1	--
		3	0.6 - 2.3ft	coarse sand	5YR 4/6	--
		4	2.3 - 3ft	wet coarse sand	5YR 4/6.	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	112	1	0 - 0.3ft	silty loam	10YR 2/1	--
		2	0.3 - 0.7ft	silty loam.	10YR 3/6	Historic Ceramic Vessels Historic Glass Vessels
		3	0.7 - 1.8ft	compact silty loam	10YR 2/1	--
		4	1.8 - 4.8ft	medium sand	10YR 4/6	--
Shovel Test	113	1	0 - 0.4ft	coarse sand	5YR 4/6	--
		2	0.4 - 0.8ft	silty loam	7.5YR 3/1	--
		3	0.8 - 2.5ft	sand loam	10YR 4/6	--
		4	2.5 - 2.9ft	wet sand loam	10YR 4/6.	--
		5	2.9 - 5.2ft	wet sandy clay	10YR 4/6	--
Shovel Test	114	1	0 - 0.7ft	silty sand	10YR 3/2	Historic Building Materials
		2	0.7 - 3ft	sand loam	10YR 3/3	--
		3	3 - 5.5ft	medium sand	7.5YR 5/8	--
Shovel Test	115	1	0 - 1ft	coarse sand	10YR 3/2	--
		2	1 - 2.2ft	silty loam	10YR 3/4	--
		3	2.2 - 3.4ft	sand loam	10YR 5/6	--
		4	3.4 - 5.1ft	wet sand loam.	10YR 5/6.	--
Shovel Test	116	1	0 - 0.6ft	silty sand	10YR 3/2	--
		2	0.6 - 1.4ft	sand loam	10YR 3/3	--
		3	1.4 - 3.6ft	medium sand	7.5YR 5/8	--
		4	3.6 - 4ft	medium sand.	10YR 5/6	--
Shovel Test	117	1	0 - 0.2ft	silty loam	10YR 3/4	--
		2	0.2 - 1.2ft	sand loam	10YR 3/3	--
		3	1.2 - 2.2ft	coarse sand	10YR 5/6	--
		4	2.2 - 3.1ft	wet coarse sand.	10YR 5/6.	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	118	1	0 - 0.7ft	silty sand	10YR 3/2	--
		2	0.7 - 1.6ft	sand loam	10YR 3/3	--
		3	1.6 - 4ft	medium sand	7.5YR 5/8	--
Shovel Test	119	1	0 - 0.7ft	silty sand	10YR 3/2	--
		2	0.7 - 1.4ft	mottled silty sand.	5YR 4/4, 5YR 4/1	--
		3	1.4 - 2ft	medium sand	10YR 3/3	--
		4	2 - 2.5ft	sand loam	10YR 2/1	--
		5	2.5 - 2.8ft	medium sand	10YR 3/3	--
		6	2.8 - 5.2ft	wet medium sand.	10YR 3/3.	--
Shovel Test	120	1	0 - 0.5ft	silty sand	10YR 3/2	--
		2	0.5 - 2ft	compact silty sand	5YR 4/4	--
		3	2 - 3.3ft	sand loam	10YR 2/1	--
		4	3.3 - 5.4ft	medium sand	10YR 3/3	--
		5	5.4 - 6ft	wet medium sand	10YR 3/3.	--
Shovel Test	121	1	0 - 0.8ft	silty sand	10YR 3/2	--
		2	0.8 - 1.6ft	compact silty sand	5YR 4/4	Historic Ceramic Vessels
		3	1.6 - 2.6ft	sand loam	10YR 2/1	--
		4	2.6 - 3.3ft	mottled silty loam	10YR 4/4, 10YR 3/2	--
		5	3.3 - 3.9ft	mottled silty clay	10YR 3/3, 10YR 4/4	--
		6	3.9 - 5.6ft	wet sand	10YR 5/6	--
Shovel Test	122	1	0 - 0.5ft	sandy clay	10YR 3/2	--
		2	0.5 - 0.8ft	sandy clay loam	7.5YR 3/4	--
		3	0.8 - 1ft	sand loam	7.5YR 4/4	--
		4	1 - 1.4ft	silty sand	10YR 3/1	--
		5	1.4 - 1.9ft	medium sand loam	7.5YR 4/3	--
		6	1.9 - 2.5ft	sandy clay	10YR 4/2	Prehistoric Lithics
		7	2.5 - 3ft	silty sand	10YR 4/3	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	123	1	0 - 0.4ft	silty sand with gravel	10YR 3/2	--
		2	0.4 - 1.3ft	compact silty loamy sand	7.5YR 4/4	--
		3	1.3 - 3.9ft	mottled silty clay	10YR 4/4, 10YR 3/2	--
		4	3.9 - 4.2ft	sand loam	10YR 2/1	--
		5	4.2 - 5.2ft	wet sand	10YR 5/6	--
Shovel Test	124	1	0 - 0.6ft	sandy clay	10YR 3/3	--
		2	0.6 - 3ft	sandy clay loam	7.5YR 4/3	--
Shovel Test	125	1	0 - 0.2ft	silty sand with gravel	10YR 3/2	--
		2	0.2 - 1.6ft	compact silty loamy sand	7.5YR 4/4	Historic Building Materials Historic Ceramic Vessels Historic Fauna Historic Glass Vessels
Shovel Test	126	1	0 - 0.6ft	sandy clay	10YR 4/2	--
		2	0.6 - 0.8ft	silty clay	5YR 4/3	--
		3	0.8 - 1.1ft	sand loam	10YR 2/1	--
		4	1.1 - 1.6ft	medium sand	7.5YR 4/6	--
		5	1.6 - 1.9ft	mottled sandy clay	10YR 4/1, 10YR 6/2	--
		6	1.9 - 2.1ft	medium sand	10YR 5/6	--
		7	2.1 - 2.4ft	medium silty sand	10YR 5/4	--
		8	2.4 - 2.7ft	mottled silty clay	5YR 4/3, 10YR 4/1, 10YR 5/6	--
		9	2.7 - 3.4ft	clay	2.5Y 4/1	--
		10	3.4 - 3.5ft	mottled silty clayey sand	2.5Y 4/1, 2.5Y 4/4	--
		11	3.5 - 4.3ft	sand loam	10YR 2/1	--
		12	4.3 - 6.4ft	medium sand	2.5Y 4/3	--
		13	6.4 - 6.5ft	medium sand.	10YR 4/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	127	1	0 - 2.3ft	silty sand	10YR 3/2	Historic Building Materials Historic Ceramic Vessels Historic Energy Historic Glass Vessels
Shovel Test	128	1	0 - 1.3ft	sand loam	10YR 3/2	--
		2	1.3 - 2.9ft	mottled sandy clay	10YR 4/6, 7.5YR 3/4	--
Shovel Test	129	1	0 - 2.7ft	silty loam with gravel	10YR 3/2	--
		2	2.7 - 3.4ft	clay	10YR 4/1	--
		3	3.4 - 3.6ft	silty loam	10YR 2/1	--
		4	3.6 - 4ft	silty sand	10YR 3/1	--
		5	4 - 4.5ft	medium sand	10YR 4/1	--
Shovel Test	130	1	0 - 0.5ft	silty loam	5YR 3/2	--
		2	0.5 - 1.3ft	silty sand loam	5YR 2.5/1	--
		3	1.3 - 3ft	clay	10YR 4/1	--
		4	3 - 3.4ft	silty loam	10YR 2/1	--
		5	3.4 - 4.7ft	medium sand	10YR 4/1	--
Shovel Test	131	1	0 - 2ft	silty loam with asphalt	10YR 3/3	Historic Ceramic Vessels
Shovel Test	132	1	0 - 0.5ft	silty loam	10YR 3/2	--
		2	0.5 - 1.1ft	coarse sand	10YR 4/4	--
		3	1.1 - 1.4ft	sandy clay	2.5Y 4/4	--
		4	1.4 - 1.9ft	coarse sand	5YR 5/8	--
		5	1.9 - 2.9ft	clay	10YR 4/1	--
		6	2.9 - 3.7ft	mottled silty loam	5YR 4/1, 5YR 4/3	--
		7	3.7 - 4ft	silty loam	10YR 2/1	--
Shovel Test	133	1	0 - 0.8ft	silty loam with asphalt	10YR 3/2	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	134	1	0 - 0.7ft	sand loam	10YR 2/2	--
		2	0.7 - 1.5ft	medium sand	10YR 4/4	--
		3	1.5 - 1.7ft	medium sand.	10YR 3/6	--
		4	1.7 - 2ft	clay	10YR 3/1	--
		5	2 - 3.8ft	medium sand	10YR 4/6	--
Shovel Test	135	1	0 - 2.5ft	silty loam with asphalt	10YR 3/3	--
Shovel Test	136	1	0 - 0.5ft	sand loam	10YR 2/2	--
		2	0.5 - 1.1ft	sand loam.	10YR 3/2	--
		3	1.1 - 1.5ft	mottled silty sand	10YR 5/6, 10YR 6/1	--
		4	1.5 - 2.1ft	clay	7.5YR 5/1	--
		5	2.1 - 2.7ft	medium sand	10YR 5/6	--
Shovel Test	137	1	0 - 1.4ft	silty sandy clay	10YR 3/2	--
Shovel Test	138	1	0 - 0.8ft	silty loam	10YR 2/2	--
		2	0.8 - 3.2ft	mottled sand	10YR 5/6, 10YR 6/1	--
Shovel Test	140	1	0 - 0.5ft	sand loam	10YR 2/2	--
		2	0.5 - 1.8ft	mottled sand	10YR 5/6, 10YR 6/1	--
		3	1.8 - 2.5ft	silty clay	10YR 5/1	--
		4	2.5 - 3.2ft	mottled sand	10YR 5/6, 10YR 6/1	--
Shovel Test	141	1	0 - 0.5ft	silty loam	7.5YR 3/1	--
		2	0.5 - 2.3ft	coarse sand with gravel	10YR 4/3	--
Shovel Test	142	1	0 - 0.6ft	silty clay with gravel	10YR 2/2	--
		2	0.6 - 1ft	silty sandy clay with gravel	10YR 2/1	--
		3	1 - 2ft	medium sand with gravel	10YR 2/1.	--
		4	2 - 2.4ft	wet sand.	5YR 3/2	--
Shovel Test	143	1	0 - 0.6ft	silty loam	7.5YR 3/1	--
		2	0.6 - 1.2ft	coarse sand with gravel	10YR 4/3	Prehistoric Lithics

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	144	1	0 - 0.4ft	silty sand loam	10YR 2/2	--
		2	0.4 - 2ft	compact sand	10YR 4/6	--
Shovel Test	145	1	0 - 1ft	silty sand loam	10YR 2/2	--
		2	1 - 2.1ft	medium compact sand	10YR 4/6	--
Shovel Test	146	1	0 - 0.7ft	sand loam	7.5YR 3/1	--
		2	0.7 - 1.9ft	medium sand	10YR 4/3	--
		3	1.9 - 2.1ft	compact coarse sand	10YR 5/6	--
Shovel Test	147	1	0 - 0.7ft	sand loam	7.5YR 3/1	--
		2	0.7 - 1.1ft	coarse sand with gravel	10YR 5/6	--
Shovel Test	148	1	0 - 0.6ft	silty loam	10YR 2/2	--
		2	0.6 - 2ft	wet medium sand	10YR 4/6	--
Shovel Test	149	1	0 - 1ft	sand loam	7.5YR 3/1	--
		2	1 - 2.2ft	coarse sand	10YR 4/3	--
Shovel Test	150	1	0 - 1.5ft	silty loam	10YR 2/2	Historic Ceramic Vessels
Shovel Test	151	1	0 - 1.4ft	sand loam	7.5YR 3/1	--
		2	1.4 - 1.6ft	coarse sand	10YR 4/3	--
Shovel Test	152	1	0 - 2ft	silty loam with gravel	10YR 2/2	--
Shovel Test	153	1	0 - 1.1ft	sand loam	7.5YR 3/1	--
		2	1.1 - 1.3ft	medium sand	10YR 5/6	--
Shovel Test	154	1	0 - 1.5ft	silty sand loam	10YR 3/2	--
		2	1.5 - 2ft	silty sand	5YR 5/4	--
Shovel Test	155	1	0 - 0.8ft	sand loam	7.5YR 3/1	--
		2	0.8 - 2.3ft	medium sand	5YR 4/6	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	156	1	0 - 0.4ft	silty loam	10YR 3/3	Historic Building Materials Historic Ceramic Vessels Modern Unidentified
		2	0.4 - 0.9ft	sand loam	10YR 4/4	Historic Building Materials
		3	0.9 - 1.1ft	silty loam	10YR 2/1	--
		4	1.1 - 2.1ft	sand loam	10YR 4/4	--
		5	2.1 - 3.2ft	sandy clay	10YR 5/6	--
		6	3.2 - 3.7ft	sandy clay.	10YR 5/2	--
Shovel Test	157	1	0 - 0.6ft	sand loam	7.5YR 3/1	--
		2	0.6 - 2.5ft	coarse sand	10YR 5/6	--
Shovel Test	158	1	0 - 0.4ft	silty loam	10YR 3/3	--
		2	0.4 - 1.9ft	sand loam	10YR 4/4	--
		3	1.9 - 2.5ft	sand loam.	10YR 4/6	--
Shovel Test	159	1	0 - 1.5ft	silty sand	7.5YR 3/3	--
Shovel Test	160	1	0 - 0.4ft	silty loam	10YR 2/1	--
		2	0.4 - 1.1ft	mottled clay	10YR 5/1, 10YR 5/6	--
Shovel Test	161	1	0 - 0.5ft	silty loam	10YR 2/1	--
		2	0.5 - 2.4ft	clayey sand	7.5YR 3/1	--
		3	2.4 - 3.9ft	mottled sandy clay	10YR 5/6, 10YR 5/1	--
Shovel Test	162	1	0 - 0.5ft	silty loam with gravel	10YR 2/1	--
		2	0.5 - 1.8ft	clayey sand	7.5YR 3/1	--
		3	1.8 - 2.8ft	mottled clayey sand.	2.5Y 5/6, 2.5Y 5/3	--
		4	2.8 - 4.4ft	wet medium sand	10YR 4/6	--
		5	4.4 - 4.6ft	wet coarse sand.	10YR 5/4	--
		6	4.6 - 5ft	mottled clayey sand	10YR 5/3, 7.5YR 4/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	163	1	0 - 0.4ft	silty loam	10YR 3/2	--
		2	0.4 - 0.9ft	sand loam	2.5Y 6/6	--
		3	0.9 - 1.7ft	clayey sand	7.5YR 5/6	--
		4	1.7 - 2.6ft	mottled clayey sand.	5YR 4/3, 7.5YR 5/6	--
Shovel Test	164	1	0 - 0.4ft	silty loam	10YR 2/1	--
		2	0.4 - 0.8ft	sandy clay	5YR 3/2	--
Shovel Test	165	1	0 - 0.6ft	silty loam	10YR 3/2	--
		2	0.6 - 3.3ft	medium sand	10YR 4/6	--
Shovel Test	166	1	0 - 0.9ft	silty loam	10YR 3/2	Historic Ceramic Vessels Historic Glass Vessels
		2	0.9 - 2ft	clayey sand	10YR 3/6	--
		3	2 - 2.4ft	wet coarse sand	10YR 4/6	--
Shovel Test	167	1	0 - 0.4ft	silty loam	10YR 3/2	--
		2	0.4 - 1.3ft	medium sand	10YR 4/6	--
		3	1.2 - 1.8ft	silty clay	10YR 2/1	--
		4	1.8 - 3ft	wet coarse sand	10YR 4/6	--
Shovel Test	168	1	0 - 0.4ft	silty loam	10YR 2/1	--
		2	0.4 - 2.5ft	silty sandy clay	7.5YR 3/4	--
Shovel Test	200	1	0 - 0.15ft	silt	5YR 3/2	--
		2	0.15 - 0.5ft	sand loam	5YR 4/3	--
		3	0.5 - 1.8ft	sand with gravel	2.5Y 5/4	--
		4	1.8 - 3.8ft	silty loam	5YR 3/1	--
Shovel Test	201	1	0 - 0.3ft	sand loam	10YR 3/4	--
		2	0.3 - 2.8ft	mottled sandy clay with pebbles	10YR 4/1; 7.5YR 3/2; 2.5Y 7/8	--
		3	2.8 - 3.2ft	sand	7.5YR 5/6	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/interpretation	Munsell	Cultural Materials
Shovel Test	202	1	0 - 0.5ft	silty loam	5YR 3/2	--
		2	0.5 - 1.5ft	silty loam.	5YR 2/1	Historic Ceramic Vessels
		3	1.5 - 1.8ft	sandy clay	5YR 4/1	--
		4	1.8 - 3ft	medium sand	5YR 5/6	--
Shovel Test	203	1	0 - 0.4ft	sand loam	10YR 3/2	--
			0 - 1.2ft	sandy clay loam with pebbles	7.5YR 3/2	--
Shovel Test	204	1	0 - 0.7ft	silty loam	5YR 3/2	--
		2	0.7 - 0.8ft	silty loam.	5YR 2/1	--
		3	0.8 - 1.3ft	sandy clay	5YR 4/1	--
		4	1.3 - 3ft	medium sand	5YR 5/6	--
Shovel Test	205	1	0 - 0.4ft	sand loam	10YR 3/2	--
		2	0.4 - 0.7ft	medium sand	10YR 3/4	--
		3	0.7 - 3ft	medium sand w/ fill	5YR 4/6	--
Shovel Test	206	1	0 - 0.2ft	silty loam	5YR 3/2	--
		2	0.2 - 1.5ft	sandy clay	7.5YR 4/1	--
Shovel Test	207	1	0 - 0.4ft	sand loam	10YR 3/2	--
		2	0.4 - 0.7ft	medium sand	10YR 4/3	--
		3	0.7 - 2.2ft	coarse sand	7.5YR 4/6	--
Shovel Test	208	1	0 - 0.2ft	silty loam	5YR 3/2	--
		2	0.2 - 1ft	sandy clay	5YR 4/1	--
		3	1 - 2.7ft	medium sand	5YR 5/6	--
Shovel Test	209	1	0 - 0.4ft	sand loam	10YR 4/3	--
		2	0.4 - 0.6ft	coarse sand with pebbles	7.5YR 4/4	--
		3	0.6 - 1ft	coarse sand.	10YR 4/6	--
		4	1 - 2.8ft	compact medium sand	7.5YR 5/8	--
Shovel Test	210	1	0 - 0.6ft	sand loam	10YR 3/2	--
		2	0.6 - 0.9ft	coarse sand with pebbles	10YR 4/6	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	211	1	0 - 0.5ft	sand loam	10YR 3/2	--
		2	0.5 - 0.8ft	silty clay	5YR 3/4	--
		3	0.8 - 0.9ft	medium sand	10YR 4/6	--
		4	0.9 - 1.2ft	compact coarse sand. with pebbles	7.5YR 3/4	--
		5	1.2 - 3.2ft	fine sand	7.5YR 4/6	--
Shovel Test	212	1	0 - 0.6ft	silty loam	5YR 3/2	--
		2	0.6 - 1.2ft	sandy clay	5YR 4/1	--
		3	1.2 - 1.9ft	medium sand	5YR 5/6	--
Shovel Test	213	1	0 - 0.4ft	sand loam	10YR 3/4	--
		2	0.4 - 2ft	medium sand with pebbles	10YR 5/8	--
Shovel Test	214	1	0 - 0.4ft	sand loam	10YR 3/4	--
		2	0.4 - 0.9ft	medium sand with pebbles	10YR 5/8	--
		3	0.9 - 2ft	wet silty sand	10YR 3/2	--
		4	2 - 3ft	wet medium sand with pebbles	10YR 4/4	--
Shovel Test	216	1	0 - 0.1ft	silty loam	10YR 2/1	--
		2	0.1 - 0.6ft	wet sand loam	5YR 5/1	--
		3	0.6 - 1.5ft	wet medium sand	5YR 5/6	--
Shovel Test	217	1	0 - 0.6ft	silty loam	10YR 3/1	--
		2	0.6 - 1.1ft	silty loam.	7.5YR 3/3	--
		3	1.1 - 1.5ft	silty clay	10YR 2/1	--
		4	1.5 - 2.5ft	sandy clay	2.5YR 3/2	--
		5	2.5 - 3ft	silty clay	10YR 2/1	--
Shovel Test	218	1	0 - 0.7ft	silty loam	7.5YR 4/6	--
Shovel Test	219	1	0 - 0.5ft	silty loam	10YR 3/4	--
		2	0.5 - 1.1ft	silty loam. with brick	10YR 2/1	--
Shovel Test	220	1	0 - 0.6ft	sand loam	5YR 5/1	--
		2	0.6 - 1.1ft	wet sand	5YR 4/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	222	1	0 - 0.4ft	sandy clay loam	7.5YR 3/2	--
		2	0.4 - 1.6ft	medium sand with pebbles	10YR 5/8	--
		3	1.6 - 2ft	asphalt	10YR 2/1	--
Shovel Test	223	1	0 - 0.9ft	silty loam	10YR 2/1	--
		2	0.9 - 1.2ft	compact medium sand	10YR 4/6	--
Shovel Test	224	1	0 - 0.5ft	silty loam	5YR 3/1	--
		2	0.5 - 1.1ft	silty loam. with gravel	5YR 2.5/1	--
Shovel Test	225	1	0 - 0.5ft	silty loam	10YR 2/1	--
		2	0.5 - 0.9ft	medium sand	10YR 4/6	--
		3	0.9 - 1.4ft	silt with asphalt	10YR 2/1	--
Shovel Test	226	1	0 - 1.3ft	silty loam	10YR 2/1	--
Shovel Test	227	1	0 - 0.5ft	silty loam	10YR 2/1	--
		2	0.5 - 1.2ft	compact clay loam	10YR 3/2	--
Shovel Test	228	1	0 - 1ft	silty loam	10YR 2/1	--
		2	1 - 2.4ft	wet silty clay loam	10YR 3/2	--
Shovel Test	229	1	0 - 0.8ft	silty loam	10YR 3/1	--
		2	0.8 - 1ft	coal	10YR 2/1	--
		3	1 - 1.8ft	silty sand with building rubble	10YR 3/3	--
Shovel Test	230	1	0 - 0.3ft	loam with wood chips	10YR 2/1	--
Shovel Test	231	1	0 - 0.8ft	silty loam	10YR 3/1	--
		2	0.8 - 2.1ft	coal	10YR 2/1	--
Shovel Test	232	1	0 - 2.3ft	mottled clay loam	2.5Y 4/2; 10YR 4/3	--
Shovel Test	233	1	0 - 0.9ft	sand loam	10YR 3/3	--
		2	0.9 - 1.3ft	clayey sand	5YR 4/2	--
Shovel Test	234	1	0 - 2.9ft	silty clay loam	2.5Y 3/3	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	235	1	0 - 0.7ft	silty loam	10YR 3/3	--
		2	0.7 - 1.9ft	silty clay	5YR 5/1	--
Shovel Test	236	1	0 - 0.5ft	silty loam with gravel	10YR 2/2	--
		2	0.5 - 1ft	silty loam with gravels	10YR 3/3	--
		3	1 - 1.5ft	compact clayey sand with gravel	7.5YR 4/3	--
Shovel Test	237	1	0 - 0.4ft	silty loam	7.5YR 2.5/1	--
		2	0.4 - 2ft	coarse sand with gravel	5YR 4/1	--
Shovel Test	238	1	0 - 0.4ft	sand loam with gravel	10YR 3/4	--
Shovel Test	239	1	0 - 0.6ft	silty loam	7.5YR 2.5/1	--
		2	0.6 - 0.8ft	silty clay	7.5YR 3/1	--
		3	0.8 - 1.1ft	silty sand	10YR 3/3	--
		4	1.1 - 1.8ft		10YR 2/1	--
Shovel Test	240	1	0 - 0.3ft	gravel	--	--
		2	0.3 - 1.3ft	sandy clay loam with gravel	10YR 3/4	--
Shovel Test	241	1	0 - 0.3ft	silty loam	7.5YR 2.5/1	--
		2	0.3 - 0.6ft	silty loam with gravel	10YR 4/1	--
Shovel Test	242	1	0 - 0.25ft	gravel	--	--
		2	0.25 - 2.15ft	sand loam	10YR 3/4	--
Shovel Test	243	1	0 - 0.3ft	sand loam with gravel	10YR 3/4	--
Shovel Test	244	1	0 - 0.6ft	wet sand loam	10YR 3/4	--
		2	0.6 - 0.9ft	wet, silty loam	10YR 3/1	--
Shovel Test	245	1	0 - 0.4ft	sand loam	7.5YR 3/4	--
		2	0.4 - 0.8ft	compact medium sand	7.5YR 4/4	--
Shovel Test	246	1	0 - 0.8ft	sand loam	7.5YR 3/4	--
		2	0.8 - 2ft	compact medium sand	10YR 5/8	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	247	1	0 - 0.5ft	sand loam	7.5YR 3/4	--
		2	0.5 - 0.7ft	compact medium sand	7.5YR 4/4	--
Shovel Test	248	1	0 - 0.5ft	sand loam	7.5YR 3/4	--
		2	0.5 - 1.5ft	sandy clay with shale	2.5Y 3/6	--
		3	1.5 - 1.7ft	sandy clay	10YR 4/1	--
Shovel Test	249	1	0 - 0.2ft	loam	10YR 3/4	--
Shovel Test	250	1	0 - 0.2ft	silty loam	10YR 3/4	--
		2	0.2 - 1.1ft	sand loam	10YR 4/3	--
Shovel Test	251	1	0 - 0.3ft	silty loam	10YR 3/4	--
		2	0.3 - 0.6ft		10YR 3/2	--
		3	0.6 - 0.8ft	mottled silty clay	10YR 3/2; 10YR 5/8	--
		4	0.8 - 1ft	silty loam	10YR 2/1	--
		5	1 - 1.4ft	silty clay	10YR 5/2	--
		6	1.4 - 2.2ft	silty clay loam	10YR 3/4	--
Shovel Test	252	1	0 - 0.2ft	silty loam	10YR 3/4	--
		2	0.2 - 0.5ft	silty clay	10YR 5/8	--
Shovel Test	253	1	0 - 1.7ft	mottled clayey sand with pebbles	10YR 3/4; 10YR 6/8; 7.5YR 5/1	--
		2	1.7 - 1.9ft	medium sand	7.5YR 3/2	--
		3	1.9 - 2.8ft		10YR 5/8	--
Shovel Test	254	1	0 - 0.2ft	silty loam	10YR 3/3	--
		2	0.2 - 0.6ft	sand loam	10YR 4/3	--
		3	0.6 - 1.4ft	sandy clay	10YR 4/6	--
		4	1.4 - 1.7ft	clayey sand	10YR 3/2	--
		5	1.7 - 1.8ft		7.5YR 5/6	--
Shovel Test	255	1	0 - 1.6ft	sand loam	10YR 3/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	256	1	0 - 0.3ft	sand loam with pebbles	10YR 3/4	--
		2	0.3 - 1.9ft	medium sand	7.5YR 3/2	--
		3	1.9 - 2.2ft		7.5YR 5/6	--
Shovel Test	257	1	0 - 0.3ft	sand loam	10YR 2/2	--
		2	0.3 - 1.4ft	clayey sand	5YR 4/1	--
		3	1.4 - 1.6ft	mottled clayey sand	7.5YR 4/5; 7.5YR 5/6	--
Shovel Test	258	1	0 - 0.4ft	sand loam	10YR 3/4	--
		2	0.4 - 1.7ft	silty clay	10YR 5/8	--
Shovel Test	259	1	0 - 0.4ft	sand loam	10YR 3/4	--
		2	0.4 - 1.5ft	wet silty loam	10YR 2/2	--
		3	1.5 - 1.7ft	sand	7.5YR 5/6	--
Shovel Test	260	1	0 - 1.1ft	sand loam	10YR 3/4	--
Shovel Test	261	1	0 - 0.8ft	sand loam	10YR 4/2	--
		2	0.8 - 0.9ft	silty clay	10YR 2/1	--
		3	0.9 - 1.3ft	mottled clayey sand with pebbles	10YR 4/3; 2.5Y 5/4	--
Shovel Test	262	1	0 - 0.3ft	sandy clay loam	7.5YR 3/2	--
		2	0.3 - 1.5ft	mottled clayey sand with pebbles	10YR 4/3; 2.5Y 5/4	--
		3	1.5 - 2.4ft	clayey sand	7.5YR 2.5/1	--
		4	2.4 - 2.7ft	wet coarse sand	10YR 3/4	--
Shovel Test	263	1	0 - 1.1ft	silty loam	10YR 4/2	--
Shovel Test	264	1	0 - 0.6ft	silty loam	10YR 4/2	--
		2	0.6 - 2.5ft	silty sand	10YR 4/3	--
		3	2.5 - 3.3ft		10YR 4/6	--
		4	3.3 - 3.4ft	compact silty clay	5YR 4/2	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Shovel Test	265	1	0 - 0.7ft	silty loam	10YR 4/2	--
		2	0.7 - 1.7ft	sand loam	10YR 5/6	Historic Glass Vessels
		3	1.7 - 3.8ft	mottled coarse sand with pebbles	10YR 4/4; 10YR 5/6	--
		4	3.8 - 3.9ft	silty sand	10YR 2/1	--
		5	2.9 - 4.2ft	medium sand	10YR 5/6	--
Excavation Unit	1	1	-	mottled compact silty loam	10YR 4/2, 7.5YR 4/6, 7.5YR 4/3	--
		2		medium sand	5YR 5/6	--
		3		wet clay	7.5YR 5/1	--
		4		silty loam	10YR 2/1	--
		5		silty sandy clay	10YR 4/3	--
		6			10YR 5/1	--
Excavation Unit	2	1	-	sand loam	10YR 3/3	--
		2		sandy clay	5YR 3/2	--
		3		sandy clay.	5YR 4/4	--
Excavation Unit	3	1	-	silty loam	10YR 3/2	--
		2		mottled sand loam	10YR 4/6, 10YR 3/3	--
		3		mottled sand loam.	10YR 3/4, 10YR 3/6, 5YR 4/6	--
		4		coarse sand	10YR 3/4	--

APPENDIX C (Cont.)

SUMMARY OF SUBSURFACE TESTING

Unit Type	No.	Context	Depth	Soil Description/Interpretation	Munsell	Cultural Materials
Excavation Unit	4	1	-	sand loam	10YR 3/4	--
		2		compact mottled sandy clay loam	10YR 5/4, 2.5Y 5/2, 5Y 6/3	--
		3		compact mottled silty sand with pebbles	2.5Y 3/2, 2.5Y 4/4	--
		4		compact sand loam	7.5YR 2/1	Historic Building Materials
						Historic Ceramic Vessels
						Historic Clothing Related
						Historic Glass Vessels
						Historic Recreation/Activities
		5		sand loam.	10YR 3/2	Historic Ceramic Vessels
		6		sand loam	10YR 2/1	Prehistoric Lithics
		7		coarse sand	10YR 5/1	--
		8		coarse sand.	7.5YR 4/6	--
		9		clayey sand	GLEY 6/5GY	--
Excavation Unit	5	1	-	sand loam	10YR 3/4	--
		2		compact mottled sandy clay loam	10YR 5/4, 2.5Y 5/2, 5Y 6/3	--
		3		compact mottled silty sand with pebbles	2.5Y 3/3, 2.5Y 4/4	Historic Ceramic Vessels
		4		sand loam	10YR 2/1	--
		5		coarse sand	10YR 5/1	--
		6		coarse sand.	7.5YR 4/6	--
		7		clayey sand	GLEY 6/5GY	--

*** Discarded**

Appendix D

ARTIFACT INVENTORY

APPENDIX D
ARTIFACT INVENTORY

Excavation Unit 4 Context 4		**Catalog #**	**10**
2	Historic Building Materials, Coarse Earthenware, brick, fragment	Row #	1
2	Historic Ceramic Vessels, Earthenware, Buff bodied slipware, unidentified form, fragment, glazed both surfaces, cl lead, same vessel, 1670 - 1795	Row #	8
1	Historic Ceramic Vessels, Refined Earthenware, Ironstone, plate, rim, beaded and scalloped molded bands interior 1840-Present	Row #	6
1	Historic Ceramic Vessels, Refined Earthenware, Ironstone, unidentified form, rim, 1840-Present	Row #	7
6	Historic Clothing Related, Leather, shoe, fragment	Row #	4
1	Historic Clothing Related, Rubber, shoe, fragment, black, shoe/boot heel with three full thickness perforations fo attachment	Row #	5
1	Historic Glass Vessels, Glass, curved, unidentified, fragment, clear/uncolored	Row #	3
1	Historic Glass Vessels, Glass, curved, unidentified, fragment, light green	Row #	2
8	Historic Recreation/Activities, Rubber, toy, fragment, ball with textured exterior surface	Row #	9
	Total Artifacts in Context 4: 23		
Excavation Unit 4 Context 5		**Catalog #**	**11**
6	Historic Ceramic Vessels, Refined Earthenware, Ironstone, unidentified, rim and body, scalloped rim, same vessel, 1840-Present	Row #	1
	Total Artifacts in Context 5: 6		
Excavation Unit 4 Context 6		**Catalog #**	**14**
1	Prehistoric Lithics, Argillite, debitage, whole flake, grey, 21g, 60 mm class	Row #	1
	Total Artifacts in Context 6: 1		
	Total Artifacts in Excavation Unit 4 : 30		
Excavation Unit 5 Context 3		**Catalog #**	**15**
1	Historic Ceramic Vessels, Porcelain, hard paste, unidentified form, fragment, unglazed	Row #	1
	Total Artifacts in Context 3: 1		
	Total Artifacts in Excavation Unit 5 : 1		
Shovel Test 1 Context 2		**Catalog #**	**16**
1	Historic Building Materials, plaster, fragment	Row #	4
1	Historic Building Materials, Ferrous metal, nail, unidentified, fragment, corroded	Row #	5
8	Historic Building Materials, Glass, window, fragment, light aqua	Row #	1
1	Historic Furnishings, Glass, mirror, fragment, light aqua	Row #	3
1	Historic Glass Vessels, Glass, bottle, unidentified, fragment, stippled, green	Row #	2
	Total Artifacts in Context 2: 12		
	Total Artifacts in Shovel Test 1 : 12		
Shovel Test 5 Context 1		**Catalog #**	**17**
1	Historic Ceramic Vessels, Porcelain, hard paste, unidentified form, fragment	Row #	1
	Total Artifacts in Context 1: 1		
	Total Artifacts in Shovel Test 5 : 1		

APPENDIX D (Cont.)
ARTIFACT INVENTORY

Shovel Test 7 Context 2 **Catalog # 18**

1 Historic Ceramic Vessels, Refined Earthenware, Ironstone, unidentified form, fragment, transfer printed underglaz Row # 1
blue indeterminate motif, 1840-Present

Total Artifacts in Context 2: 1

Total Artifacts in Shovel Test 7 : 1

Shovel Test 17 Context 1 **Catalog # 19**

1 Historic Ceramic Vessels, Refined Earthenware, semi-porcelain, unidentified form, fragment, 1870-Present Row # 1

Total Artifacts in Context 1: 1

Total Artifacts in Shovel Test 17 : 1

Shovel Test 22 Context 1B **Catalog # 32**

1 Historic Building Materials, Ceramic, tile, fragment, glazed, white Row # 1

Total Artifacts in Context 1: 1

Total Artifacts in B Shovel Test 22 : 1

Shovel Test 36 Context 1 **Catalog # 31**

3 Historic Building Materials, Porcelain, unidentified, sanitary ware, fragment, glazed exterior, white, sherds mend. Row # 1
possible sink fragments, remnant of molded depression with full thickness round perforation 0.8" diameter

Total Artifacts in Context 1: 3

Total Artifacts in Shovel Test 36 : 3

Shovel Test 48 Context 2 **Catalog # 13**

1 Prehistoric Cobble-based Lithics, Quartzite, cobble-based tool, hammerstone, whole, grey, L 78.9mm, W 47mm, Row # 1
38mm, 202g, battered on one margin

Total Artifacts in Context 2: 1

Total Artifacts in Shovel Test 48 : 1

Shovel Test 50 Context 2 **Catalog # 6**

1 Historic Ceramic Vessels, Porcelain, hard paste, hollow ware, fragment Row # 1

Total Artifacts in Context 2: 1

Total Artifacts in Shovel Test 50 : 1

Shovel Test 100 Context 2 **Catalog # 20**

1 Historic Ceramic Vessels, Refined Earthenware, hotel china, small hollow ware, rim to base, 2.5" diameter rim, 1 Row # 1
Present

Total Artifacts in Context 2: 1

Shovel Test 100 Context 3 **Catalog # 1**

1 Historic Building Materials, Glass, window, fragment, light aqua Row # 2

1 Historic Glass Vessels, Glass, bottle, unidentified, shoulder, light aqua Row # 1

APPENDIX D (Cont.)
ARTIFACT INVENTORY

Total Artifacts in Context 3: 2

Total Artifacts in Shovel Test 100 : 3

Shovel Test 102 Context 3 **Catalog # 21**

1 Historic Ceramic Vessels, Porcelain, hard paste, unidentified form, fragment, colored glaze exterior, olive green Row # 1

Total Artifacts in Context 3: 1

Total Artifacts in Shovel Test 102 : 1

Shovel Test 105 Context 1 **Catalog # 12**

1 Historic Ceramic Vessels, Porcelain, hard paste, plate, base and foot ring, unidentifiable decoration, green, 5" di Row # 1

Total Artifacts in Context 1: 1

Shovel Test 105 Context 4 **Catalog # 33**

1 Historic Building Materials, Glass, window, fragment, light aqua Row # 2

1 Historic Glass Vessels, Glass, bottle, unidentified, body, clear/uncolored, remnant of embossed lettering "...f...the Fa..." Row # 1

Total Artifacts in Context 4: 2

Total Artifacts in Shovel Test 105 : 3

Shovel Test 108 Context 1 **Catalog # 2**

7 Historic Building Materials, Porcelain, sanitary ware, fragment, sherds mend, probable toilet rim Row # 1

1 Historic Ceramic Vessels, Refined Earthenware, Ironstone, unidentified form, fragment, 1840-Present Row # 5

1 Historic Energy, Coal ash, fragment Row # 2

1 Historic Glass Vessels, Glass, curved, unidentified, fragment, clear/uncolored Row # 4

1 Historic Manufacturing, Slag, unidentified, fragment Row # 3

Total Artifacts in Context 1: 11

Total Artifacts in Shovel Test 108 : 11

Shovel Test 112 Context 2 **Catalog # 8**

1 Historic Ceramic Vessels, Refined Earthenware, semi-porcelain, small hollow ware, whole, 2.5" diameter rim, Ht butter pat dish, 1870-Present Row # 3

1 Historic Ceramic Vessels, Refined Earthenware, Whiteware, unidentified form, fragment, 1815-Present Row # 2

1 Historic Glass Vessels, Glass, curved, unidentified, fragment, clear/uncolored Row # 1

Total Artifacts in Context 2: 3

Total Artifacts in Shovel Test 112 : 3

Shovel Test 114 Context 1 **Catalog # 22**

1 Historic Building Materials, Porcelain, unidentified, fragment, possible insulator/electrical hardware Row # 1

Total Artifacts in Context 1: 1

Total Artifacts in Shovel Test 114 : 1

APPENDIX D (Cont.)
ARTIFACT INVENTORY

Shovel Test 121 Context 2 — **Catalog # 23**

1	Historic Ceramic Vessels, Refined Earthenware, Ironstone, unidentified form, fragment, 1840-Present	Row #	1

Total Artifacts in Context 2: 1

Total Artifacts in Shovel Test 121 : 1

Shovel Test 122 Context 6 — **Catalog # 24**

1	Prehistoric Lithics, Jasper, debitage, flake fragment, tan, cortex, 1g	Row #	1

Total Artifacts in Context 6: 1

Total Artifacts in Shovel Test 122 : 1

Shovel Test 125 Context 2 — **Catalog # 25**

1	Historic Building Materials, Ceramic, sewer pipe, fragment, glazed, brown, surface missing	Row #	6
1	Historic Ceramic Vessels, Refined Earthenware, semi-porcelain, unidentified form, fragment, hand painted undergl blue floral motif, 1870-Present	Row #	8
1	Historic Ceramic Vessels, Refined Earthenware, semi-porcelain, unidentified form, fragment, surface missing, 18' Present	Row #	7
1	Historic Ceramic Vessels, Refined Earthenware, Whiteware, hollow ware, rim, transfer printed underglaze, blue landscape motif, 1815 - 1915	Row #	9
1	Historic Ceramic Vessels, Refined Earthenware, Whiteware, unidentified form, fragment, hand painted underglaze, polychrome, red, blue, green and yellow indeterminate decorative motif, 1815-Present	Row #	10
1	Historic Fauna, Shell, clam, fragment	Row #	1
1	Historic Glass Vessels, Glass, container, unidentified, fragment, external thread finish, clear/uncolored	Row #	5
2	Historic Glass Vessels, Glass, curved, unidentified, fragment, clear/uncolored	Row #	2
1	Historic Glass Vessels, Glass, curved, unidentified, fragment, olive green	Row #	4
1	Historic Glass Vessels, Glass, curved, unidentified, fragment, brown	Row #	3

Total Artifacts in Context 2: 11

Total Artifacts in Shovel Test 125 : 11

Shovel Test 127 Context 1 — **Catalog # 26**

1	Historic Building Materials, Ceramic, tile, fragment, glazed, light blue	Row #	13
1	Historic Building Materials, Ceramic, tile, fragment, glazed, tan, molded ridges and black printed letter "A" on ba surface	Row #	14
1	Historic Building Materials, Ceramic, tile, fragment, red bodied, non-porous, molded ridges on back surface with mortar/cement adhered, impressed numbers "...1 2 1..." vertically along edge of back surface	Row #	12
2	Historic Building Materials, Ceramic, tile, fragment, glazed, pink	Row #	11
1	Historic Building Materials, Ceramic, tile, fragment, glazed, white, surface missing	Row #	10
1	Historic Building Materials, Glass, window, fragment, clear/uncolored	Row #	4
1	Historic Ceramic Vessels, Refined Earthenware, Whiteware, unidentified form, fragment, 1815-Present	Row #	15
1	Historic Energy, Coal ash, fragment	Row #	1
1	Historic Glass Vessels, Glass, bottle, unidentified, fragment, olive green	Row #	6
1	Historic Glass Vessels, Glass, bottle, unidentified, fragment, stippled, green	Row #	7
1	Historic Glass Vessels, Glass, bottle, unidentified, base, stippled, brown, remnant of unidentified embossed letter number exterior surface	Row #	9
1	Historic Glass Vessels, Glass, bottle, unidentified, fragment, cobalt blue	Row #	5
1	Historic Glass Vessels, Glass, curved, unidentified, fragment, clear/uncolored	Row #	3

APPENDIX D (Cont.)
ARTIFACT INVENTORY

1 Historic Glass Vessels, Glass, curved, unidentified, fragment, clear/uncolored, lead glass — Row # 2
1 Historic Glass Vessels, Glass, curved, unidentified, fragment, brown — Row # 8

Total Artifacts in Context 1: 16

Total Artifacts in Shovel Test 127 : 16

Shovel Test 131 Context 1 — **Catalog # 4**

1 Historic Ceramic Vessels, Refined Earthenware, hotel china, unidentified form, base and foot ring, transfer printed underglaze, green indeterminate motif, 1860-Present — Row # 1

Total Artifacts in Context 1: 1

Total Artifacts in Shovel Test 131 : 1

Shovel Test 143 Context 2 — **Catalog # 27**

1 Prehistoric Lithics, Jasper, debitage, reduction fragment, tan, 1g — Row # 1

Total Artifacts in Context 2: 1

Total Artifacts in Shovel Test 143 : 1

Shovel Test 150 Context 1 — **Catalog # 7**

1 Historic Ceramic Vessels, Refined Earthenware, hotel china, cup, rim and body, transfer printed underglaze, greer 3.5" diameter, unidentified wide scroll and floral band exterior beneath rim, 1860-Present — Row # 1

Total Artifacts in Context 1: 1

Total Artifacts in Shovel Test 150 : 1

Shovel Test 156 Context 1 — **Catalog # 9**

1 Historic Building Materials, Glass, window, fragment, light aqua — Row # 2
1 Historic Ceramic Vessels, Refined Earthenware, semi-porcelain, unidentified form, fragment, 1870-Present — Row # 1
1 Modern Unidentified, Plastic, fragment, white — Row # 3

Total Artifacts in Context 1: 3

Shovel Test 156 Context 2 — **Catalog # 3**

1 Historic Building Materials, Glass, window, fragment, clear/uncolored — Row # 2
1 Historic Building Materials, Glass, window, fragment, light aqua — Row # 1

Total Artifacts in Context 2: 2

Total Artifacts in Shovel Test 156 : 5

Shovel Test 166 Context 1 — **Catalog # 28**

2 Historic Ceramic Vessels, Porcelain, hard paste, unidentified, fragment, glazed, brown, sherds mend — Row # 2
1 Historic Glass Vessels, Glass, curved, unidentified, fragment, clear/uncolored, remnant of unidentified embossed m on exterior — Row # 1

Total Artifacts in Context 1: 3

Total Artifacts in Shovel Test 166 : 3

APPENDIX D (Cont.)
ARTIFACT INVENTORY

Shovel Test 202 Context 2 **Catalog # 29**

1 Historic Ceramic Vessels, Refined Earthenware, Creamware, unidentified form, fragment, surface missing, 1762 - Row # 1

Total Artifacts in Context 2: 1

Total Artifacts in Shovel Test 202 : 1

Shovel Test 265 Context 2 **Catalog # 30**

2 Historic Glass Vessels, Glass, bottle, unidentified, base, light aqua, 2.5" diameter Row # 1

Total Artifacts in Context 2: 2

Total Artifacts in Shovel Test 265 : 2

Auger Test 1 **Catalog # 5**

1 Historic Ceramic Vessels, Coarse Earthenware, Redware, hollow ware, fragment, glazed both surfaces, clear lead Row # 1

Total Artifacts in Suface Collection: 1

Total Artifacts in Auger Test 1 : 1

Total Number of Artifacts: 118

*** Item Discarded in Laboratory**

Appendix E

RESUMES

Richard W. Hunter
PRESIDENT

Ian C. Burrow
VICE PRESIDENT

RICHARD W. HUNTER
President/Principal Archaeologist, Ph.D., RPA

EDUCATION

Ph.D., Geography, Rutgers University, New Brunswick, New Jersey, 1999
Dissertation Title: *Patterns of Mill Siting and Materials Processing: A Historical Geography of Water-Powered Industry in Central New Jersey*

M.A., Archaeological Science, University of Bradford, England, 1975

B.A., Archaeology and Geography, University of Birmingham, England, 1973

EXPERIENCE

1986-present — President/Principal Archaeologist
Hunter Research, Inc., Trenton, NJ

Founder and principal stockholder of firm providing archaeological and historical research, survey, excavation, evaluation, and report preparation services in the Northeastern United States. Specific expertise in historical and industrial archaeology (mills, iron and steel manufacture, pottery manufacture), historical geography, historic landscape analysis. Participation in:

- Project management, budgeting and scheduling
- Proposal preparation and client negotiation
- Hiring and supervision of personnel
- Supervision of research, fieldwork, analysis and report preparation

1999-present — Faculty Member, Certificate in Historic Preservation
Office of Continuing Education, Drew University, Madison, NJ

Courses: The Role of Archaeology in Preservation,
25 Years of Public Archaeology in New Jersey

1983-1986 — Vice-President/Archaeologist
Heritage Studies, Inc., Princeton, NJ

Principal in charge of archaeological projects. Responsibilities included:

- Survey, excavation, analysis, and reports
- Client solicitation, negotiation, and liaison
- Project planning, budgeting, and scheduling
- Recruitment and supervision of personnel

1981-1983 — Principal Archaeologist
Cultural Resource Group, Louis Berger & Associates, Inc., East Orange, NJ

Directed historical and industrial archaeological work on major cultural resource surveys and mitigation projects in the Mid-Atlantic region. Primary responsibility for report preparation and editing.

1979-1981 — Archaeological Consultant, Hopewell, NJ

1978-1981 — Adjunct Assistant Professor, Department of Classics and Archaeology, Douglass College, Rutgers University, NJ

1978-1979 Research Editor
Arete Publishing Company, Princeton, NJ

Prepared and edited archaeological, anthropological, and geographical encyclopedia entries (*Academic American Encyclopedia*, 1980).

1974-1977 Archaeological Field Officer
Northampton Development Corporation, Northampton, England

Supervised archaeological salvage projects executed prior to development of the medieval town of Northampton (pop. 230,000). Experience included:

- Monitoring of construction activity
- Supervision of large scale urban excavations
- Processing of stratigraphic data and artifacts
- Preparation of publication materials

1969-1970 Research Assistant
Department of Planning and Transportation, Greater London Council

SPECIAL SKILLS AND INTERESTS

- water powered mill sites
- iron and steel manufacture before the Industrial Revolution
- historic cartography
- scientific methods in archaeology
- historic research interpretation and public outreach

PUBLICATIONS

"A Coxon Waster Dump of the Mid-1860s, Sampled in Trenton, New Jersey." In: *Ceramics in America*, edited by Robert Hunter, pp. 241-244. University Press of New England [2003]

"The Richards Face: Shades of an Eighteenth-Century American Bellarmine." In: *Ceramics in America*, edited by Robert Hunter, pp. 259-261. University Press of New England [2003]

"Eighteenth-Century Stoneware Kiln of William Richards Found on the Lamberton Waterfront, Trenton, New Jersey." In: *Ceramics in America*, edited by Robert Hunter, pp. 239-243. University Press of New England [2001]

"Trenton Re-Makes: Reviving the City by the Falls of the Delaware." *Preservation Perspective* XVIII (2): 1, 3-5 [1999]

"Mitigating Effects on an Industrial Pottery." *CRM* 21(9):25-26 [1998] (with Patricia Madrigal)

From Teacups to Toilets: A Century of Industrial Pottery in Trenton, Circa 1850 to 1940, Teachers Guide sponsored by the New Jersey Department of Transportation, 1997 (with Patricia Madrigal and Wilson Creative Marketing)

"Pretty Village to Urban Place: 18th Century Trenton and Its Archaeology." *New Jersey History*, Volume 114, Numbers 3-4, 32-52 [Fall/Winter 1996] (with Ian Burrow)

Hopewell: A Historical Geography. Township of Hopewell [1991] (with Richard L. Porter)

"Contracting Archaeology? Cultural Resource Management in New Jersey, U.S.A." *The Field Archaeologist* (Journal of the Institute of Field Archaeologists) 12, 194-200 [March 1990] (with Ian Burrow)

"American Steel in the Colonial Period: Trenton's Role in a 'Neglected' Industry" In *Canal History and Technology Proceedings* IX, 83-118 [1990] (with Richard L. Porter)

"The Demise of Traditional Pottery Manufacture on Sourland Mountain, New Jersey, during the Industrial Revolution," Ch. 13 in *Domestic Potters of the Northeastern United States, 1625-1850* Studies in Historical Archaeology, Academic Press [1985]

PROFESSIONAL AFFILIATIONS

Registry of Professional Archeologists (RPA) [formerly Society of Professional Archeologists] (accredited 1979; certification in field research, collections research, theoretical or archival research)
Preservation New Jersey (Board Member, 1994 - 2003)
New Jersey State Historic Sites Review Board (Member, 1983 -1993)
Professional Archaeologists of New York City (PANYC)
Society for Historical Archaeology
Society for Industrial Archaeology
Society for Post-Medieval Archaeology
Council for Northeast Historical Archaeology
Archaeological Society of New Jersey (Life Member)
Mount Hope Historical Conservancy (Board Member, 1995 - 2000)

OTHER AFFILIATIONS

Trenton Downtown Association (Board Member, 1998 - present)
Hopewell Township Historic Preservation Commission (Member, 1998 - present)

HUNTER RESEARCH

Richard W. Hunter
PRESIDENT

Ian G. Burrow
VICE PRESIDENT

WILLIAM B. LIEBEKNECHT
Principal Investigator, M.A.

EDUCATION

M.A., Public History, Rutgers University, Camden, New Jersey, 1993

B.A., Anthropology, Beloit College, Beloit, Wisconsin, 1984

EXPERIENCE

1993-present — Principal Investigator
Hunter Research, Inc., Trenton, NJ

Technical and managerial responsibilities for survey, evaluation and mitigation of selected archaeological projects. Participation in:

- Overall site direction and day-to-day management
- Development and implementation of research, excavation and analysis strategies for prehistoric and historic archaeological sites
- Report and proposal preparation
- Hiring and supervision of personnel

1991 — Senior Archaeologist
Hunter Research, Inc., Trenton, NJ

Technical and managerial responsibilities for selected field and laboratory components of archaeological projects. Participation in:

- Survey, excavation, analysis, and reports
- Project supervision and on-site management
- Management of laboratory operations and graphics production

1988-1991 — Laboratory and Drafting Supervisor
Hunter Research, Inc., Trenton, NJ

Supervision of laboratory personnel and management of all laboratory operations. Participation in all aspects of report graphics production.

1988 (June-Aug.) — Field Supervisor
University of Delaware Center for Archaeological Research, Newark, DE

Technical and supervisory responsibilities for field crew personnel.

1985-1988 — Laboratory and Field Supervisor
Research & Archaeological Management, Inc. (RAM), Highland Park, NJ

1984-1985 — Research and Field Assistant, Historic Sites Research, Princeton, NJ

SPECIAL SKILLS AND INTERESTS

- New Jersey ceramic and glass manufacturing
- American Stoneware and Yellow ware
- Lower Delaware Valley prehistory
- British ceramics

PUBLICATIONS

"The Richards Face – Shades of an Eighteenth-Century American Bellarmine" *Ceramics in America*, forthcoming (2004), co-authored with Richard Hunter.

"A Coxon Waster Deposit of the Mid-1860s Sampled in Trenton, New Jersey." *Ceramics in America*, forthcoming (2004), co-authored with Rebecca White and Richard Hunter.

"Rebekah at the Marriott: Marriott Site Yellow Ware Waster Dump, Circa 1863-1868, Trenton, New Jersey." *Trenton Potteries, Newsletter of the Potteries of Trenton Society*, March 2002, 3:1. Co-authored with Rebecca White.

"Joseph Mayer's Arsenal Pottery Dump Part 3: Cut Sponge Decorated Ironstone China." *Trenton Potteries, Newsletter of the Potteries of Trenton Society*, December 2001, 2:3/4.

"William Richard's Sugar Processing Pottery 1760-1786." *Trenton Potteries, Newsletter of the Potteries of Trenton Society*, December 2000, 1:4.

"Joseph Mayer's Arsenal Pottery Dump Part 2: Majolica." *Trenton Potteries, Newsletter of the Potteries of Trenton Society*, August/September 2000, 1:3.

"Joseph Mayer's Arsenal Pottery Dump Part 1: Yellowware." *Trenton Potteries, Newsletter of the Potteries of Trenton Society*, April/May 2000, 1:2.

"Archaeological Data Recovery Investigations at the Derewal Prehistoric site, Hunterdon County, New Jersey." *Bulletin of the Archaeological Society of New Jersey*, 1999, No. 54, 12-43. Co-authored with Ian Burrow, Donald Thieme, and Joseph Schuldenrein.

"Ceramic Production at the Hickory Bluff Prehistoric Site [7K-C-411]." *Bulletin of the Archaeological Society of Delaware*, 1999, No. 36, New Series, 3-11.

"An Effigy Head from Cumberland County." *Bulletin of the Archaeological Society of New Jersey*, 1998, No. 53, 118-119.

"Early Sorrow Pattern." *Victorian Ceramics Group Newsletter*, November 1997, 3:1, p. 3.

"A Token Find." *Bulletin of the Archaeological Society of New Jersey*, 1995, No. 50.

"British Registry Marks." *Bulletin of the Archaeological Society of New Jersey*, 1993, No. 48, 69-70.

"Further Evidence: Clam Shell Fracturing Patterns From a Site in Monmouth County, New Jersey." The Archaeology and Ethnohistory of the Lower Hudson Valley and Neighboring Regions: Essays In Honor of Louis Brennan, 1991, *Occasional Publications in Northeastern Anthropology*, No. 11.

"The Fort Elfsborg Spoon." *Bulletin of the Archaeological Society of New Jersey*, 1986, No. 40, 45-46.

PROFESSIONAL AFFILIATIONS

Middle Atlantic Archaeological Conference
Eastern States Archaeological Federation
Archaeological Society of New Jersey, (Third Vice President 1989-91, 1998-2000; Board Member at Large 2002-present, Life Member)
Lower Delaware Valley Chapter of Archaeological Society of New Jersey
Archaeological Society of New York
Archaeological Society of Delaware
Society for Pennsylvania Archaeology
Council of Northeast Historical Archaeology
Potteries of Trenton Society, (Board Member 1998-present)
American Ceramic Circle (Inducted 2002)
Philadelphia Archaeological Forum
Society for Post-Medieval Archaeology
Preservation New Jersey
Boy Scouts of America Archaeology Badge Councilor

AWARDS

Who's Who Among Young Executives in America, 1992
Archaeological Society of New Jersey Award of Appreciation, 1990
NJ Historic Sites Council Historic Preservation Commendation for Archaeological Studies, 1989
Delaware Department of State, Certificate of Appreciation, 1999

CERTIFICATIONS

OSHA 40-hour Initial Training, Spring 1994-Present
Hazardous Materials Supervisory Training, September 1994
Sediment and Stormwater Management Certification, 1994

Appendix F

PROJECT ADMINISTRATIVE DATA

APPENDIX E

Project Administrative Data

HUNTER RESEARCH, INC.
PROJECT SUMMARY

Project Name:	Phase IB Archaeological Survey Arthur Kill Power Plant Lateral Staten Island, Borough of Richmond Richmond County, New York
Level of Survey:	I
HRI Project Reference:	03029
Date of Report:	November 2003
Client:	Natural Resource Group, Inc.
Address:	
Review Agency:	NY DEC, NYC CLPC and NY SOPRHP
Agency Reference:	
Artifacts Records Deposited:	

PROJECT CHRONOLOGY

Date of Contract Award:	4/4/2003
Notice to Proceed:	4/4/2003
Background Research:	June-July 2003
Fieldwork:	June 2003
Analysis:	October 2003
Report Written:	November 2003

PROJECT PERSONNEL

Principal Investigator(s):	Richard Hunter, Richard Hunter and William Liebeknecht
Background Researcher(s):	James Cox
Field Supervisor(s):	Benjamin Harris
Field Assistant(s):	
Analyst(s):	Rebecca White
Draftperson(s):	Frank Dunsmore and Janel Bisacquino
Report Author(s):	Richard Hunter and William Liebeknecht