

4460M

HP 1997

W. Houston to W. 12 St

EXISTING CONDITIONS REPORT

ARCHAEOLOGICAL RESOURCES

HUDSON RIVER PARK PROJECT

WEST HOUSTON STREET TO

LITTLE WEST 12TH STREET

MANHATTAN, NEW YORK

411

HISTORICAL
PERSPECTIVES INC.



P.O. Box 3037 • Westport, Connecticut 06880-9998

EXISTING CONDITIONS REPORT
ARCHAEOLOGICAL RESOURCES
HUDSON RIVER PARK PROJECT
WEST HOUSTON STREET TO LITTLE WEST 12TH STREET
MANHATTAN, NEW YORK

DRAFT

Prepared For:

Allee King Rosen and Fleming, Inc.
117 East 29th Street
New York, New York 10016

Prepared By:

Historical Perspectives, Inc.
P.O. Box 3037
Westport, Connecticut 06880

Authors:

Cece Saunders Kirkorian, S.O.P.A.
Betsy Kearns, S.O.P.A.
Faline Schneiderman-Fox, S.O.P.A.

December 12, 1994;
Revised March 6, 1997

TABLE OF CONTENTS

I.	INTRODUCTION.....	I-1
II.	THEORETICAL OVERVIEW.....	II-1
III.	RESEARCH METHODS.....	III-1
IV.	PROJECT AREA CONDITIONS.....	IV-1
	A. Environmental Conditions.....	IV-1
	B. Current Conditions.....	IV-2
V.	PREHISTORIC RESEARCH.....	V-1
	A. Prehistoric Background.....	V-1
	B. Known Sites in the Vicinity.....	V-9
	C. Shoreline Reconstruction.....	V-10
	D. Prehistoric Sensitivity.....	V-10
VI.	HISTORICAL RESEARCH.....	VI-1
	A. Historical Background.....	VI-1
	B. Known Sites in the Vicinity.....	VI-7
	C. Historical Land Use.....	VI-8
	D. Historical Sensitivity.....	VI-9
VII.	EVALUATION OF SITE PROPERTY TYPES.....	VII-1
VIII.	SUBSURFACE DISTURBANCE.....	VIII-1
IX.	SUMMATION OF POTENTIALLY SENSITIVE AREAS.....	IX-1
X.	BIBLIOGRAPHY.....	X-1

FIGURES

PHOTOGRAPHS

FIGURES

1. U.S.G.S. Topographic Map
2. Project Site Boundaries
3. 17th Century Native American
Trails and Place Names
4. Prehistoric Sites Identified by
Historic Conservation and Interpretation
5. 1879 Bromley Atlas of the City of New York

I. INTRODUCTION

The potential creation and development of a recreational waterfront park, spanning from Battery Place to 59th Street, has been undertaken by the Hudson River Park Conservancy (HRPC), a subsidiary of the New York State Urban Development Corporation (NYSUDC). The planning and engineering process of the proposed development, to include 60 acres of parkland, 330 acres of water, four and a half miles of esplanade, and 13 recreational piers, has necessitated preparing an Environmental Impact Statement (EIS) including the identification of potentially sensitive archaeological and historical resources within the project site (Figures 1, 2). This cultural resource assessment is designed to determine what, if any, potential archaeological resources have been deposited within the project site, and to identify the effects of prior demolition, excavation, or a change in historic context to any such resources. This report includes an identification of probable archaeological sites, a discussion of research potential, a preliminary assessment of integrity for those sites with research potential, and a final inventory of sites which may be potentially significant based on criteria for nomination to the National Register of Historic Places. A discussion of project impacts and recommendations can only be put forth after a final construction plan is designated.

The proposed Hudson River Park project site spans from Battery Place north to West 59th Street and includes all land west of the course of Route 9A, west to the United States Pierhead Line (Figure 1).^{*} Because the project site extends into the Hudson River, piers, docks, wharves, bulkheads, and all other features extending into the water are included in this study. This report is concerned with the section between West Houston and Little West 12th Streets, including the north half of Pier 40 and Piers 42, 45, 46, 49, 51, and 52. The project site bounds are as follows: the southern boundary is West Houston Street and the northern boundary is Little West 12th Street, or the northern rim of the Gansevoort peninsula excluding Pier 53. The west is bounded by the U.S. Pierhead Line, while the east is bounded by the western boundary of walkway/bikeway directly adjacent to the newly designed Route 9A (Figure 2).

Report Design

The following cultural resource assessment was designed to identify potential archaeological and historical features and to assess potential sensitivity. Much of the research was previously compiled for other nearby projects and is reviewed in this report. The report is laid out as follows:

* Piers 76, 78, 88, 90, 92, and 94 are not within HRPC's jurisdiction.

- Chapter II: A Theoretical Overview was compiled to present and address current research issues in similar urban areas. Categories of potential site property types were developed.
- Chapter III: A summary of Research Methods was prepared detailing the specific research plans and goals of the assessment.
- Chapter IV: A brief overview of the Project Site Conditions was compiled based on a walkover survey and recent conditions reports.
- Chapter V: A summary of Prehistoric Research was compiled, including the Prehistoric Background, Site Survivability, Shoreline Reconstruction, and Prehistoric Sensitivity.
- Chapter VI: A summary of Historical Research was compiled, including the Historical Background, Known Sites in the Vicinity, Historical Land Use, and Historical Sensitivity.
- Chapter VII: An Evaluation of each Property Type was compiled for sites identified in chapters four and five, based on potential significance, archaeological visibility, and feasibility of retrieval.
- Chapter VIII: The Disturbance Record was compiled from a number of sources including boring logs at the NYC Topographic Bureau, previous hazardous materials reports, the walkover survey, and existing utilities.
- Chapter IX: A Summary chapter synthesizes the findings of this report.

Summary of Research

Prehistorically, the project site was mostly land beneath water, since the Manhattan shoreline was located east of its current location. After deglaciation about 15,000 years ago, water levels were periodically lowered, exposing land along the shore. The Hudson River was narrowed, and areas submerged at the time of European settlement were exposed for habitation by flora and fauna. These drowned shorelines were probably once utilized by Native

Americans for resource procurement and processing, and possibly habitation. The estuarial environment and nearby uplands would have provided abundant resources needed to sustain prehistoric populations, making these now submerged landforms once attractive for prehistoric use.

A shoreline reconstruction was compiled by Historic Conservation and Interpretation, Inc. (HCI) in 1983 for the Westway project. It included a cartographic reconstruction of the drowned shoreline, based on topographic and environmental data, which identified areas having the potential to possess Native American remains. Only one potentially sensitive area was identified by HCI, outboard of the bulkhead wall, between West Houston and Little West 12th Streets.

Historically, development and landfilling were slower along the Hudson River's shoreline than on the East River since the Hudson was deep and difficult to fill, and the East River accommodated the needs of early shippers. However, as new technologies were introduced, the Hudson River's use increased. Filling episodes pushed the shoreline west, from its original course along Greenwich Street, to its present location. The process of landfilling was slow, and often garbage, sunken ships, and shoreline features associated with shipping and seaport activity became part of the fill. Archaeological deposits from these activities have been encountered in lower Manhattan and may exist in the project site. However, the early twentieth century Chelsea/Gansevoort Pier Plan entailed removing all landfill west of West Street between West 11th and Gansevoort Streets. Any archaeological remains predating this episode and deposited in the route of Marginal Street, between these two cross streets, have been physically removed.

The following archaeological study addresses the potential prehistoric and historical archaeological sensitivity of the project site between West Houston and Little West 12th Streets. The analysis has provided a synopsis of potentially sensitive areas, together with a record of the subsequent disturbance to these areas. A final list of potential cultural resources was compiled to present those features considered to be archaeologically sensitive and previously undisturbed.

II. THEORETICAL OVERVIEW

This existing conditions report identifies the loci of potentially important cultural resources in the Hudson River Park project site. Based on documentary research, four categories of site property types have been identified from the entire study area between Battery Place and West 59th Street: Prehistoric Sites; Piers, Pier Sheds, and Wharves; Landfill; and Other. While this category list is not meant to be exhaustive or representative of all possible property types, it simply submits that these were the property types encountered within the project site boundaries during this study. A fifth category of site property type - bulkhead walls and inboard relieving platforms - has been the subject of extensive research and is not included in this report.¹ The project site between Battery Place and West 59th Street was subdivided into seven distinct geographic neighborhoods - and therefore seven separate project sites. Each of the identified property types is not necessarily found in each neighborhood.

This Theoretical Overview presents a discussion of the characteristics that would make a resource significant in each property type by providing the circumstances necessary to make a determination of significance. Significance must be assessed, for each site, within a contextual framework. Chapters V and VI provide both a prehistoric and historical contextual overview. Chapter VII of this report will, among other things, evaluate each identified resource within this context, and provide an appraisal of potential significance.

Documenting the existing conditions of the project site has entailed meeting the requirements of the State Environmental Quality Review (SEQR), the City Environmental Quality Review (CEQR), and the Department of the Interior, National Park Service (NPS). Regulations of both SEQR and CEQR echo those of the NPS in their assessment of a property's eligibility for placement on the National Register of Historic Places. The goals of the Hudson River Park project are to identify archaeological resources that are eligible for nomination to the National Register of Historic Places or else meet SEQR or CEQR criteria for sensitivity. The NPS has established the following associative criteria for the evaluation of significance as it relates to a determination of

¹A NYSOPRHP Building-Structure Inventory Form has been prepared about the bulkhead walls and inboard relieving platforms by Raber Associates and Allee King Rosen & Fleming, Inc. as part of the planning for this Hudson River Park project. The "blueform" was submitted to SHPO in March 1997 for a determination of eligibility. Therefore, the bulkhead walls and inboard relieving platforms will not be discussed as potential archaeological resources.

eligibility for inclusion on the National Register of Historic Places (36 CFR 60.4):

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, association, and:

- a. that are associated with events that have made a significant contribution to the broad patterns of our history; or
- b. that are associated with the lives of persons significant in our past; or
- c. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- d. that have yielded, or may be likely to yield, information important in prehistory or history (United States Department of the Interior 1976:xv).

Archaeological resources present in the Hudson River Park project site are most likely potentially eligible for the National Register under associative criteria a., c., and/or d.

Upon determining importance based on the above four associative values, assessment of integrity is necessary. In order to nominate a site to the National Register, the site must also have retained its integrity defined by its original and current location, setting, design, materials, workmanship, feeling, and association. To retain integrity, a property must possess at least one, and more typically several, of these components.

In addition to echoing the NPS guidelines, the current SEQR regulations address properties unique to the State of New York, while CEQR regulations regarding cultural resources specifically concern properties unique to the history, culture, and aesthetics that define the City of New York. CEQR addresses the relevance of properties either designated as landmarks by the New York City Landmarks Preservation Commission (NYCLPC), or calendared for consideration by that commission. Cultural resources, either archaeological or historic, include buildings, structures, objects, sites, and districts. The New York City Landmarks Law established and authorized the NYCLPC to designate and regulate important cultural resources, with importance determined by a resource's

ability to illuminate an aspect of the City's cultural, social, economic, political, and/or architectural history.

To assess importance and integrity, archaeologists have to look at what we know about a particular time and place in history and try to understand what forces created a particular situation. In order to accomplish this, historic contexts must be established. As defined by the National Park Service, "historic contexts provide a framework for the identification, evaluation, designation, and treatment of cultural resources associated with particular themes, areas, and time periods. Historic context-based planning permits recognition of individual properties as parts of larger systems. Historic contexts also help managers and others evaluate properties within their proper levels of significance. As such, they provide both a systematized basis for comparison and a comprehensive frame of reference. In so doing, historic contexts provide cultural resource managers with a guide for rational decision-making" (Grumet 1990:18). Potential significance can only be assessed within a locally and regionally developed historical context.

Research issues that urban archaeologists, historians and anthropologists are currently focusing on include the following: 1) the process of urbanization, 2) settlement patterns and their change over time, 3) socioeconomic status or class, 4) ethnicity, 5) trade and commerce, 6) consumer choice, and 7) analysis comparing urban areas (e.g., Dickens 1982; Salwen 1982). The potential sensitive archaeological resources must be evaluated with regard to these research issues. If a resource can yield information related to one of these research topics, further arguments for significance can be made.

Prehistoric Sites

The preservation of in situ prehistoric sites in the urban landscape is virtually unheard of. Historical development has typically disturbed or destroyed earlier, shallowly deposited, prehistoric sites. This is particularly true in Manhattan where development has been occurring for over three hundred years, and where the once-pristine terrain has been virtually obliterated. Recently, however, prehistoric archaeological sites have been found in the highly developed borough of Manhattan proving that this remains a possibility. "In 1980 during the excavation of Stone Street, as part of the Stadt Huys block, aboriginal pottery and lithics were found in the lowest levels of the excavation" (Baugher-Perlin et al. 1982:12). In the later Broad Street field investigation led by Joel Grossman, an in situ Contact period feature was found in direct association with the Dutch West India storehouse (Karen Robinson, personal communication to Cece Kirkorian, June 27, 1989). In addition to these in situ prehistoric finds, secondary deposits of prehistoric materials have also been recovered at numerous sites in Manhattan.

Both professional and amateur archaeologists have been active in Manhattan since the late nineteenth century. However, before the 1930s field techniques, recordation, and analysis were not comparable to the more scientific procedures used today. Recovery and analysis techniques are continually being refined. The data from these early excavations are generally ambiguous, lacking the ability to be assigned to a particular temporal period (Baughner-Perlin et al. 1982:5). According to Alanson Skinner's prolific research at the turn of this century, in southern Manhattan there had been Indian settlements at the Collect Pond along the east end of Canal Street, on Corlear's Hook at the East River, and at the village of "Sappokanican," situated on the Hudson River just south of 14th Street and just east of the project site. He concluded that the only Indian remains left on Manhattan were probably located at the extreme northwestern end of the island, far from the project site (Skinner 1926:51). He does note, however, that the preponderance of findings from northern Manhattan reflects both lower Manhattan's earlier development, and northern Manhattan's relatively late occupation by Native Americans.

Our knowledge of prehistoric life in Manhattan remains limited, however, because so few sites have been investigated by professionally trained archaeologists. Therefore, prehistoric sites associated with the Hudson River Park project site, that are determined to be both potentially sensitive and accessible for excavation, may be significant because of the need for data to address some of the gaps in our knowledge of prehistoric life.

Wharves and Piers

The significance of wharves and piers as resources needs to be understood in terms of the overall development of Manhattan's west side waterfront from the eighteenth century to the present because New York City's rise to commercial dominance has been closely tied to waterfront development (Henn et al. 1985:1). Because of topography and social factors, much of the west side remained underdeveloped until the nineteenth century. Prior to this, the East River proved adequate for most early shippers. Wharves and piers, dating before 1800, are only likely to have been constructed near the very southern tip of the west side of Manhattan because this was the only highly developed area of the city at that time. As time passed, however, the expanding city required more land and better docking facilities, resulting in the general spread of development to the west side of Manhattan. New landfilling techniques and ship designs prompted developers to take advantage of the deeper and faster flowing Hudson River.

Creating a contextual framework, drawing on other urban waterfront projects, is necessary to assess the significance of the potential waterfront resources in the Hudson River Park project site. In looking over the previous research from comparable

settings, it becomes clear that almost all potential waterfront resources, for similar contexts and time periods as those associated with the Hudson River Park project, have been encountered. It appears that little could be gained from investigating this resource archaeologically, unless it can be demonstrated that these past projects have left significant unanswered questions which new data could address.

During the last ten to twenty years waterfront development has been a primary research topic for archaeological projects undertaken in Manhattan, mainly along the East River. Excavations undertaken at Crueger's Wharf exposed the remains of a wharf constructed of solid logs notched at the corners (Berger 1989:V-10). Construction of this wharf dated to 1739/1740. Two cobb wharves, dating to the mid-eighteenth century, were uncovered during excavation of the Telco Block in 1981. At 175 Water Street, another east side site, archaeologists documented the presence of several eighteenth century wharves that were solid raft-like structures (Berger 1989:V-11). Another cobb wharf was discovered at the Barclays Bank site (Berger 1989:V-12). A late eighteenth century cobb wharf was discovered at the Baches Wharf site (Berger 1989:V-12). At the Assay site, still another east side site, archaeologists discovered the remains of three cobb wharfs dating to the 1780s. To date, the only west side excavation that has revealed the presence of wharves is Site 1 of the Washington Street Urban Renewal Area (Berger 1989:V-11). At this site, archaeologists discovered a late eighteenth, early nineteenth century cobb wharf.

The archaeologists analyzing data recovered at the Assay site compared the construction methods of wharves built at sites located throughout the east coast of the United States, including those sites located in New York City described above (Berger 1989:V-8-14). Many similar sites were reviewed for comparative purposes, and include sites in Portsmouth, New Hampshire; Salem and Boston, Massachusetts; New London, Connecticut; and Alexandria, Virginia. These sites dated to the seventeenth through nineteenth centuries (Ibid.).

Berger's analysis concluded that there were distinctive construction techniques, such as the type of fill, used at different wharves. They discovered that there was "no discernible decrease in the diversity of wharf construction" during the late eighteenth and early nineteenth centuries (Berger 1989:V-19). The major techniques used in wharf construction appear to have been fairly evenly distributed over a two hundred year period. Other wharf characteristics, including the type of fill, the fill treatment of timbers, and fasteners, were also evenly distributed during this time period.

Only the joinery techniques used in construction appeared to show variation in relation to the date of construction. Berger

suggests that this variation might be related to the size of the wharves and the lack of excavation information, rather than to real differences in construction techniques (Berger 1989:V-24). With few exceptions, the geographic location of the wharf did not have a positive correlation with the type of construction technique employed (Berger 1989:V-24). Only Massachusetts craftsmen appear to have used unique techniques. Instead, "site specific circumstances clearly play an important role in the types of wharves built" (Berger 1989:V-24). Site specific factors might include local water conditions, such as the current and tides, type of river bottom conditions, and the financial situations of the individuals financing wharf construction. Other researchers have come to similar conclusions (Norman 1987:104-105; Henn et al. 1985:12).

The mid-nineteenth century introduction of the steam driven pile driver forever transformed waterfront construction (Henn et al. 1985:12). Open piling piers replaced cobb wharves in lower Manhattan. As Weber notes, "The historic creation of land through wharf construction and other engineering techniques led, in most cases, to the preservation of archaeological sites" (1988:1). If so, the open piling piers, as archaeological sites, may be preserved. Documenting the change to steam driven piles may be possible through study of intact resources.

The Assay site analysis, referred to above, has lead archaeologists to recommend that wharves "should not be used to address non-site specific research issues, given the factors which determine the configuration of the structures" (Berger 1989:V-24). It was suggested that further research should perhaps be focused on documenting the joinery techniques employed in wharf construction since this particular feature may prove more sensitive to the craftsmanship of a structure than other variables. Joinery represents one of the major engineering components of a wharf, and typically varies with the original planned use of the wharf (Berger 1989:V-25).

Piers and wharves which may be located in the Hudson River Park project site should be assessed with these two issues in mind, that is, the type of joinery techniques employed and the effects of adopting steam driven piles. Previous archaeological studies on the wharves and piers of Manhattan have focused primarily on resources dating to the eighteenth and very early nineteenth centuries. The mid-nineteenth century transition to the pile driven wharves has not been documented up to this point, leaving a real gap in our knowledge of the history of wharf construction. Study of potentially intact Hudson River Park project resources may allow us to learn a great deal about this transition period of wharf construction.

Landfill

The significance of potential cultural resources located within the Hudson River Park project site must be examined in light of their historical circumstances and relevant current research issues. There is little question that this project site may contain resources that might include information germane to the landfilling process and the development of Manhattan's waterfront. Although previous archaeological projects have produced much information about these research topics relating to Manhattan history, there remain gaps in our knowledge. Much of this past research has concentrated on documenting the east side of the city, along the shore of the East River, since both the earliest and the more recent development has occurred on this side. There remains much to be learned about the development of the west side of Manhattan, the location of this project. The question becomes whether these resources in the Hudson River Park project area will allow archaeologists to take a significant step toward filling these gaps in our knowledge.

For about the past ten years archaeologists have focused on research documenting changes in urban landfill and the growth and development of the urban waterfront. These two issues have important implications for our understanding of the process of urbanization. The majority of the research on these types of sites has been conducted within the boundaries of New York City, with Manhattan receiving most of the attention because of the intensive development currently occurring on the island. At the same time, archaeologists from up and down the East Coast, particularly in Baltimore, Philadelphia, Alexandria, Virginia and Wilmington, Delaware have examined portions of the extant eighteenth and nineteenth century landfill and waterfront areas in their respective cities.

Beyond increasing our knowledge of Manhattan's development, archaeologists must also be interested in the possibility that information from these archaeological resources might cast light on the process of urbanization in general. This might be done through comparison of data from sites located in different cities and associated with different time periods. The process of land reclamation began in the eighteenth century and continues today. Numerous archaeological projects within Manhattan have documented land reclamation along both the shores of the East and Hudson Rivers (Huey 1984, Berger 1987a, Henn et al. 1985, Sapin 1985, Rockman et al. 1985, Berger 1989, Geismar 1983, and Geismar 1987b).

Although records of the Common Council documented landfilling episodes, many earlier archaeological projects were designed to develop a clear description of the technology employed in the landfilling process since the documentary sources did not clearly address this. Sapin (1985:171) reports that the "observed alignments of the wharves and bulkheads as well as the stratigraphy

and ceramic content of the different landfill episodes supplemented the landfilling scenario developed using solely documentary sources." Because so much work has already been done towards documenting the general filling process in Manhattan, by other professional archaeologists, research issues appear to have been adequately addressed. More so, the various archaeological sites researched all demonstrated similar characteristics in terms of the technical aspects of land creation and the types of fills used in the process.

Unless a filling deposition can be tied to a specific episode by a group or individual, such as a manufacturer discarding waste materials from the production process, landfill in and of itself has little to contribute to the historical record. If specifically documented resources are in situ, precise information can be gathered regarding a manufacturing process or an individual's lifeways. If deposition is simply the collection of trash from an undesignated area, together with materials excavated elsewhere and debris from a variety of sources, then the landfill lacks associative value.

The contents of landfill may not contribute to our knowledge of early historical lifeways and neighborhood development. However, retaining devices designed to create fast land varied technologically and may be considered potentially sensitive. Just as with wharf technology, retaining device technology changed through time as new materials and methods were adopted, and thus joinery techniques may vary. These types of features are rarely documented cartographically, thus, areas within the Hudson River Park project area which experienced filling may be sensitive for the remains of retaining devices.

Other

The fourth and final category of site property type has been identified as "Other." Evaluation of significance for resources that fall into this category will have to be made on an individual basis.

III. RESEARCH METHODS

Background research was conducted to establish a prehistoric and historical framework for the interpretation of potential resources. Areas of prehistoric and historical sensitivity were identified through archival and cartographic research, following those criteria put forth in both the current SEQR and CEQR handbooks, and by the Department of the Interior, National Park Service (NPS). The previously completed Cultural Resource report prepared for the Westway project in 1983 by Historic Conservation and Interpretation, Inc. (Rutsch et al. 1983), was applicable to the Hudson River Park project site as it addressed potential cultural resource sensitivity for the Hudson River shoreline between Battery Place and West 44th Street. Similarly, Appendix C, or the Cultural Resources section of the Final Environmental Impact Statement, prepared for the Route 9A Reconstruction Project also identified resources pertinent to this project site (Allee King Rosen and Fleming, Inc., et al. 1994).

Previous Reports

The 1983 prehistoric sensitivity assessment for Westway included reconstructing the prehistoric shoreline both inboard of the bulkhead wall, beneath West Street and Marginal Street, and outboard of the bulkhead wall, beneath the Hudson River, from Battery Place north to West 44th Street (Rutsch et al 1983). Sensitivity was based on prehistoric topography, and the likelihood that Native Americans once found specific topographic features attractive for subsistence and settlement. The final analysis, based on current theoretical and methodological issues, sufficiently assessed archaeological sensitivity for the current project site south of West 44th Street. Prehistoric sensitivity both inboard and outboard of the bulkhead wall for the area between West 44th and West 59th Streets was later addressed in a similar fashion in the Route 9A Reconstruction Project report (Allee King Rosen and Fleming, Inc., et al. 1994). This report also proved sufficient for assessing prehistoric archaeological sensitivity for the current project site north of West 44th Street.

The 1983 Westway report by HCI provided details of historical development at specific interchange areas only, while the 1990 Route 9A Cultural Resource Assessment provided an in-depth level of research throughout the inboard study corridor from Battery Park north to West 59th Street. These, and other reports completed for project sites on the Hudson River shoreline, have helped to create a detailed cartographic reconstruction of historical development in the current Hudson River Park project site corridor. Episodes of filling, construction, and disturbance have also been traced for the entire length of the corridor.

Several phases of research were performed for previous reports to determine the past uses of the site, the disturbance to the site, and the significance of deposits that may remain. Research included documentary research, cartographic analysis, and site files review. The scope of each of these tasks, designed to meet SEQR criteria and the Secretary of the Interior's Guidelines for Archaeology and Historic Preservation, Federal Register, Vol. 48, No. 190, is presented below.

Documentary Research

For previous Hudson River shorefront reports, a literature search was conducted of available ethnographic and historic accounts, and reports and data pertinent to the historical and prehistoric archaeological record. Archaeological reports for the surrounding area were reviewed. In addition, permit applications from various state, city and federal agencies were examined. Where available, photographic, print and clipping files were also reviewed. The following libraries and agencies were contacted and researched in New York City and Albany.

- American Museum of Natural History
- Holland Society Library
- Municipal Art Society Library
- Museum of the City of New York-Reference Collection
- New York City Landmarks Preservation Commission
- New York City Municipal Reference Library
- New York City Municipal Archives
- New York City Society of Mechanics and Tradesmen Library
- New York Historical Society Library
- New York Public Library
- New York State Library-Manuscripts and Special Collections
- New York State Museum
- New York State Office of Parks, Recreation and Historic Preservation (SHPO)
- Port Authority of New York and New Jersey
- Regional Plan Association Library
- Society of Engineers Library
- South Street Seaport Library
- U.S. Army Corps of Engineers

The Hudson River Park project culled pertinent information from these sources applicable to the current project site.

Cartographic Analysis

Historical maps and atlases were obtained and examined to establish the presence of standing structures and features on the Hudson River shoreline throughout documented history, and to establish the prehistoric topographic and environmental conditions. Numerous maps and atlas were reviewed at five-to-ten year intervals, since buildings of shorter duration were probably not substantial enough to have retained integrity and thus would not greatly contribute to the archaeological record. In addition, these temporary structures usually lacked permanent subterranean foundations and therefore did not cause substantial disturbance to other cultural resources.

For other west side Manhattan cultural resource assessments, in addition to the above repositories, the United States Army Corps of Engineers provided maps of their projects to reconstruct shoreline disturbance. At the Borough President's Office, the Topographic Bureau provided historical and geological maps. These previously collected data bases were reviewed for pertinent information for the Hudson River Park project site.

Property Research

Land ownership histories were compiled for the previous Route 9A reconstruction project proved relevant to the Hudson River Park project site. These were obtained by reviewing land transaction records at the New York City Department of Finance, Index Division, while individual lot development was traced by obtaining Block and Lot files and microfiche from the New York City Buildings Department. This level of research was limited to reviewing ownership records, and did not include deed research.

Site Files Review

The NYCLPC was contacted for information on archaeological sites previously identified in the project area and vicinity. In addition, the NYCLPC provided a predictive model of prehistoric site location for the project area. Archaeological site files were also reviewed at the New York State Museum and the State Office of Parks, Recreation and Historic Preservation.

Field Visit

A walkover survey was conducted on October 5, 1994 of the entire project area between Battery Park and West 59th Streets to

establish "ground truth." Photographs were taken along the route and from the Hudson River facing the project site. Specific features were noted and photographed, and recent construction episodes were recorded.

IV. PROJECT AREA CONDITIONS

A. Environmental Conditions

The prehistory and history of Manhattan was in part shaped by the topography, ecology, and economic conditions that prevailed at various times. Understanding the city's geologic history aids in understanding the land-use history. During the Pleistocene period, ice advanced in North America four times. In the last 50,000 years, the Wisconsinian period, ice was 1,000 feet thick over Manhattan. Gravel and boulders deposited at the ice sheet's melting margin formed Long Island about 15,000 years ago (Kieran 1982:26). During the last 10,000 years, glacial till and outwash were covered by the fluvial deposits of the Hudson River. Sea levels have gradually risen as glaciers retreated, and the velocity of the Hudson River has decreased (Vollmer Associates 1989:6). Estuary formation in the Hudson began between 11,000 to 12,000 years ago. Between 8,000 and 10,000 thousand years ago, the river experienced a reduction in salinity, which then increased between 7,000 and 8,000 years ago when the estuary obtained its maximum extent (Rutsch et al. 1983:25). The Hudson River is known for freezing in the winter, with ice floating down river during spring thaws (Luke 1953:10).

The project site between West Houston and Little West Twelfth Streets along the Hudson River is part of the embayed section of the Coastal Plain which extends along the Atlantic Coast and ranges from 100 to 200 miles wide. The Manhattan prong, which includes southwestern Connecticut, Westchester County, and New York City, is a small eastern projection of the New England uplands, characterized by 360 million year old highly metamorphosed bedrock (Schuberth 1968:11). The Manhattan ridge generally rises in elevation towards the north, and sinks towards the south. South of 30th Street, the bedrock dips down several feet beneath the earth's surface, and south of Washington Park it plunges down below 100 feet, forming a subterranean valley.

The prevalent gneissoid formation is known as Hudson River metamorphosed rock. The city is characterized by a group of gneissoid islands, separated from each other by depressions which are slightly elevated above tide and filled with drift and alluvium. The area consists of drift with underlying crystalline rocks including stratified gneiss, mica schist, hornblendic gneiss and hornblende schist with some feldspar and quartz (Gratacap 1909:27).

Historical development has altered many of the natural topographic features that once characterized Manhattan (Gratacap 1909:5). Between West Houston and Little West Twelfth Streets, the land now supporting West Street and Marginal Street was submerged through at least the early nineteenth century. Prior to that time the Hudson River shoreline meandered between what are now Greenwich

and West Streets, between one and two blocks to the east of the project site. The shoreline was characterized by bluffs with beaches below them (Stokes Vol. 3 1909:157).

Soil within Manhattan is mostly glacial till, clay, sand, gravel, mud, and assorted debris (Kieran 1982:24). Within the project area, the soils include landfill, silty clay, clayey silt and fine sand, silty coarse to fine sand, and glacial till (Vollmer Associates 1989:7). The groundwater level fluctuates with tidal variations in the river (Ibid.:9).

B. Current Conditions

For this section of the project site, between West Houston Street and Little West 12th Street, the boundaries include all land west of the newly proposed bicycle/walkway for Route 9A out to the bulkhead wall, and extends outboard to the U.S. Pierhead Line to include piers and the Hudson River. Included in this is the north half of Pier 40, and all of Piers 42, 45, 46, 49, 51, and 52. Also protruding into the river is a two-block wide parcel of landfill between Horatio and Little West 12th Streets known as the Gansevoort peninsula. The peninsula is occupied by a large New York City Department of Sanitation (DOS) facility with administrative offices, employee locker rooms, and parking. It is also used as a municipal recycling facility.

Of the extant piers, Pier 40 is a vast, square, multi-story structure used for parking and storage. Pier 42 at Morton Street is virtually unused, except for a few unauthorized squatters. Pier 45 is in good condition and is used for public recreation. Pier 46 is vacant and in poor condition, while all that remains of Pier 49 are wooden pilings. Pier 51 is also a derelict wooden pier, and Pier 52 is virtually non-existent and has become part of the Gansevoort peninsula.

The elevated West Side Highway, once supported on piers and looming over West Street has been removed from this section of the project site, and an at-grade roadway exists in its place. A Temporary Public Safety Zone now exists just east of the bulkhead wall. Project site photographs show the current conditions along the shoreline between West Houston Street and Little West Twelfth Street (Photographs A-G). Nearby Greenwich Village is a vibrant residential community although the immediate strip adjacent to Marginal Street is generally non-residential, characterized by small shops and businesses, and market complexes. Gansevoort Street is home to one of the largest meat processing facilities in the city.

At Gansevoort Street a Department of Sanitation facility is situated on the Gansevoort peninsula, a landfill promontory extending west into the Hudson River and incorporating what was Pier 52 into the peninsula. On the north side of the landfill,

between Gansevoort and Bloomfield Streets, is a concrete platform on timber piles extending outboard of an old crib which retains fill created when the destructor plant here was in operation (Mueser Rutledge 1989:9).

A PATH tube runs beneath the project site at Morton Street. Construction for the tube began in 1874 and was finished in 1905. The tunnel is lined with either brick or brick and concrete. Two recently renovated ventilation structures for the PATH tubes are in a landscaped rectangle within the Hudson River Park project site just north of Pier 40.

V. PREHISTORIC RESEARCH

A. Prehistoric Background

Archaeologists interpret prehistoric finds within both a locally derived and regionally based contextual framework. Established models for prehistoric cultural chronologies are based on previously investigated archaeological sites. Prehistoric settlement and subsistence trends have been established for the lower Hudson Valley and coastal New York areas, providing a framework for understanding prehistoric land and resource utilization that can represent stages in Manhattan's prehistory, and therefore, the Hudson River Park project area's prehistory. Based on long term archaeological research, the following chronological description outlines the prehistory of the region. As research in the area continues, data bases increase and theoretical issues become more refined, further enhancing this regional chronology.

Archaeologists have concluded that Native Americans established themselves in the Northeast after the last glacial episode, the Wisconsin. Between 18,000 and 16,000 years ago, the last episode of the Pleistocene in the Northeast, ice reached its maximum advance and then receded north. Glacial gravels and erratics were left along the melting margin. Striations can be seen on Manhattan's bedrock outcrops marking the path of receding glaciers. By 13,000 years ago, ice had retreated north enough so that the lower Hudson Valley and surrounding area were open for the re-establishment of flora and fauna. As ice melted, glacial lakes formed, eventually filling with sediments and becoming swamps. Current studies indicate that the exact date Native Americans first occupied the Northeast was around 12,000 years ago, although there is increasing evidence to suggest an earlier date. Until this evidence becomes substantiated, the accepted date remains c. 12,000 years Before Present (B.P.).

PaleoIndian Period (12,000-9,500 B.P.)

The prehistoric environment of post-glacial New York was far different than it is today. Between 14,000 and 12,000 years ago the Northeast was characterized by a spruce dominated open woodland, and by 10,000 years ago the region was predominately defined by pine (Gaudreau 1988:240). Pollen samples show that the southeastern New York region had a mixed coniferous-hardwood forest following deglaciation (Salwen 1975:43). This post-glacial environment supported mega-fauna hunted by PaleoIndians including mammoth, giant ground sloth, horse, and giant beaver. The PaleoIndian period represents the earliest documented human

occupation in the Northeast, dating approximately between 12,000 to 9,500 B.P.

Few sites have actually been found dating to this period, perhaps because Native Americans first settled on the exposed continental shelf, now submerged. The immense quantity of water retained in ice sheets and glaciers drastically lowered the sea level, extending the Atlantic coastline twenty to thirty miles south and east of what it currently is (Ibid.). The exposed continental shelf, now submerged beneath the ocean, would have possessed the resources necessary to support the emergent PaleoIndian population (Edwards and Emory 1977:19).

A typical artifacts assemblage from PaleoIndian sites in the Hudson River Valley and throughout the Northeast include diagnostic Clovis-type fluted projectile points (points) and processing tools such as scrapers, graters, and drills suggesting animal processing. Stone tools were made from cherts native to eastern New York, and jasper from Pennsylvania and New Jersey. To some archaeologists, lithics recovered far from their sources suggest well-defined or extensive travel or trade networks in operation at that time. Other research in the Northeast has lead to the postulation that small bands of hunters nomadically roamed large territories, relying predominantly on post-pleistocene megafauna. Alternative hypotheses based on research in the mid-Hudson valley suggest that PaleoIndians inhabiting the area used a wide variety of resources and had a restricted territory in which they operated (Eisenberg 1978:139). Further research continues to assist in developing and refining models of regional and local subsistence and settlement.

Despite the years of research, there are still many questions left unanswered regarding the culture and settlement and subsistence systems of PaleoIndians. Sites found tend to be situated in one of three specific geographic locales: on lowland waterside camps near coniferous swamps and near larger rivers; on upland bluffs in areas where deciduous trees dominated; and on ridge tops also dominated by deciduous trees (Eisenberg 1978:138). Throughout the Northeast it has been more common to locate isolated spot finds of diagnostic artifacts than habitation sites. The lack of recovered habitation sites may be due to post-glacial changes in topography or subsequent development where habitation sites once existed (Saxon 1973:252). The rising sea levels and resultant changes in water courses have probably inundated numerous encampments. However, since the Hudson River is a fjord (a narrow inlet of the sea bordered by steep cliffs), it is possible that early occupation sites may be preserved along the naturally elevated post-glacial shoreline (Snow 1980:180). Currently, no habitation sites have been identified on Manhattan Island.

Several miles southwest of the Hudson River Park project site, on nearby Staten Island, a PaleoIndian habitation site was found at Port Mobil (Ritchie 1980:xvii). The site was situated on high ground, sloping down to the Arthur Kill, about 1000 feet away. Although the site was substantially disturbed, several fluted points were recovered together with tools made of eastern Pennsylvania tan and yellow jasper, and eastern New York Normanskill flint. Not far from Port Mobil, on the tidal beach of the Arthur Kill, six fluted points were also found made of jasper and local and exotic flints (Ibid.). This represents the only PaleoIndian component recovered within the metropolitan New York area. Spot finds further north have occurred along the Hudson River and its tributaries (Funk 1976:205).

Archaic Period (9,500-3,000 B.P.)

The Archaic period lasted for about 6,500 years. Unique point types and tool kits have caused this period to be further subdivided into the Early, Middle, Late, and Terminal periods. Throughout the Early Archaic (9,500-7,000 B.P.) fluctuations in the climate occurred, giving way to a gradual warming trend and allowing new resources to become established. Although sea levels were rising, New York Harbor, contiguous to the project area, was still considerably smaller than it is today (Salwen 1975:49). As a result of environmental changes, it appears that the primary dependence on big game gave way to a hunting, fishing, and gathering economy, relying upon a diversity of resources. The more reliable resource base may have encouraged population growth.

Diagnostic projectile point types of this period are predominantly bifurcate-based points found on major drainages. Sites in the coastal New York area have been found on tidal inlets, coves, and bays, and on fresh water ponds (Ritchie 1980:143). Few inland sites of the Early Archaic period have been recovered and excavated in northern New York and New England. However, on nearby Staten Island four sites were found with an Early Archaic component (Salwen 1975:50). Salwen ascribes the earlier and more prolific population of the southeastern New York area to the early establishment of hardwood forests in this region (Ibid.). Although resources may have been abundant in more northern regions, climatic fluctuations and extremes would have prohibited the establishment of a reliable resource base. The locally established hardwood forests may have attracted people to the southern New England and New York area (Dincauze and Mulholland 1977:450).

Subsequently, Middle Archaic cultures populated the region from about 7,000 to 5,500 years ago, as the climate continued to warm allowing assorted flora and fauna to grow. Dincauze and

Mulholland (1977) suggest that in this period seasonal population movements, based on the exploitation of specialized resources, became well established and may have led to the creation of territories. Tool kits expanded in response to diverse resources, with artifacts including Neville and Stark projectile points. Middle Archaic shell middens, situated to the north along the Hudson River, show a growing reliance on shellfish. At Croton Point and Montrose Point, archaeological sites on the Hudson River in Westchester County north of the Hudson River Park project area, shell middens yielded dates of between 5,600 to 5,800 B.P. (Brennan 1974:85).

Late Archaic cultures radiated across the Northeast from approximately 5,500 to 4,000 B.P. with continued climatic warming providing a resource-rich environment. Diagnostic projectile point types of this period include small stemmed points such as Lamokas and Taconics, as well as Squibnocket and Brewerton Points. The lower Hudson Valley has evidence for increased habitation, with numerous shell middens along it dating to this period (Brennan 1974:87). Site types of this period include rockshelters, open woodland camps, and high bluffs along the Hudson, identified north of the project site. Archaic points found in metropolitan New York were commonly made from locally available quartz (Suggs 1966:42). The switch to local, versus exotic, lithics could mean decreased seasonal migration or a reduction in trade with neighboring groups.

Settlement and subsistence patterns in operation may have been a centrally based wandering pattern focused on the use of seasonal resources. A high degree of cultural complexity is suggested by the wide range of site types and the great diversity in site locations. More Late Archaic sites have been found than sites of either of the two previous periods. This may be because of either an increase in the population brought on by the more stable environment, or a bias in site visibility. By the Late Archaic period, sea levels were much as they are today, and sites of this period would have less of a chance of being inundated. In another interpretation, archaeologists in the Northeast have postulated that small stemmed quartz points attributed to this period actually represent an underlying cultural tradition, persistent through later periods (McBride 1984:133). Therefore, sites attributed to this period based on projectile point typologies may actually have been misinterpreted.

During the Terminal Archaic period (4,000-3,000 B.P.), three cultural traditions persisted in the Northeast. These include the Laurentian tradition represented by the Vergennes phase and the Vosberg complex; the small stemmed tradition represented by the Sylvan Lake complex; and the Susquehanna tradition represented by the Snook Kill and Orient phases (Funk 1976:250). Although New

York State Archaeologist Bob Funk defines these three separate traditions as persisting in the Hudson River Valley, Snow reassesses the distribution of Terminal Archaic points and suggests that the Susquehanna tradition dominated the first half of the period and was comprised of Snook Kill, Perkiomen and Susquehanna Broad points, while the latter half of the period was dominated by the Orient complex characterized by the Orient Fishtail point (Snow 1980:237). The precise sequence of Terminal Archaic traditions, complexes, and phases is a continuing source of debate.

These three cultural traditions, based on unique projectile point types, may represent distinct settlement patterns centered on the use of specific resource niches. According to Funk and Ritchie, authors of Aboriginal Settlement Patterns in the Northeast, sites of the Snook Kill Tradition, predominant in the southern sub-area, tend to be located on high, sandy river terraces (1973:342). Orient phase habitation and burial sites have been recovered from eastern Long Island (Ibid.:344). Whether these three distinct traditions, Laurentian, Small Stemmed and Susquehanna, represent the migration of new people into the area, or the spread of new technological ideas, has yet to be answered. Each of these tool traditions predominantly used locally available raw materials, with the small stemmed point tradition relying heavily upon quartz.

Local Terminal Archaic groups added a new type of artifact to their tools kit. Bowls and other utilitarian and decorative items were fashioned from ground and polished steatite, or soapstone. The majority of sites found in the surrounding region were located on the banks of the Hudson River and its major tributaries. This may be because of the high visibility along major river drainages rather than the actual lack of sites in remote settings. Continued research from interior areas has more recently begun to find sites of this period. Orient points recovered in the Hudson Valley have been radiocarbon-dated to approximately 4,000 to 2,800 B.P.

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

The Woodland period continued in the Northeast from approximately 3,000 to 500 years ago. Like the Archaic period, the Woodland is further divided into three sub-categories: the Early, Middle and Late periods. The first of these, the Early Woodland period, lasted from about 3,000 to 1,700 years ago and manifests itself by the Middlesex Phase in eastern New York. Crude, undecorated ceramic vessels, called Vinette 1 pottery, were tempered with steatite. Simple pottery designs of this type have been found at sites on major waterways and tributaries. Early Woodland, Middlesex Phase sites are commonly uncovered at sand and

gravel mining operations near fresh water as these sites tend to be located on well drained knolls adjacent to water (Ritchie 1980:201).

The climate gradually cooled during this period, perhaps reducing resource availability. Settlement systems changed with the need to exploit alternative resources. Coastal resources, providing year round availability, were sought while upland hunting and gathering supplemented coastal resources. Fish runs in rivers provided a stable and reliable resource. Fish weirs were used in the Hudson and smaller tributary rivers to catch large quantities of anadromous fish to feed the growing population (Brumbach 1986:35).

The Middle Woodland period lasted from ca. 1,700 to 1,000 B.P. This period is marked by regional changes in ceramic and projectile point styles. Stone tool assemblages include Jack's Reef Corner Notched and Pentagonal points, and Fox Creek points. More exotic lithics were used, perhaps suggesting a growth in trade networks. By this time, subsistence and settlement seems to have been characterized by semi-permanent settlements with task-specific locations used for the purpose of exploiting target resources. Ritchie and Funk identify several settlement types for Middle Woodland cultures including repeatedly occupied small and semi-permanent large camps, small temporary camps, workshops, cemeteries and burial mounds (1973:349).

Shell middens found on the seacoast and shores of the Hudson River suggest an increase in the reliance on aquatic resources. During this period, maize horticulture was introduced from the west and horticultural practices were slowly adapted. The nature and extent of prehistoric maize cultivation has been debated among archaeologists working in the Northeast. Research on Long Island has led to the hypothesis that before European contact, maize was not cultivated on the sandy, nutrient-poor soils of the island. Nonetheless, with the benefits of trading with Europeans, Native Americans on Long Island settled more permanently along the sandy coast where shells were available for wampum manufacturing, an integral part of the mercantile exchange. Concurrent with this was the need for a reliable and storable food source. It is theorized that maize horticulture was incorporated to provide food, and a commodity for trade, required to support villages (Ceci 1979:72). Other archaeologists throughout the Northeast are now questioning the distribution and adoption of non-indigenous, that is, introduced, horticultural systems.

Again, artifacts encountered changed with the addition of ornamental pendants and pins, and the bow and arrow. Ceramics changed technologically as walls were thinned and overall shape was

rounded. Some interpretations suggest that the shift to a rounded bottom corresponds to the adoption of maize and results from the desire to cook food longer (Braun 1980:100). Surface decorations included netmarking and ornamentation of the collars and bodies, reflecting the cultural affiliation of the producer. Overall, the material remains in the region are limited in number, compared to those found further to the northwest in the Great Lakes region of New York (Funk 1976:298). This bias may be due to sampling and preservation rather than the actual lack of sites.

Within the Late Woodland period, the Windsor cultural tradition was defined with its components found in the Long Island Sound area and in the Hudson and Connecticut River drainages. In the lower Hudson Valley and on western Long Island, the tradition is represented by the Windsor North Beach and Clearview phases (Snow 1978:63). The Fox Creek Phase of the Middle Woodland period may have been centered in the New York coastal region, and in the eastern New York drainages (Ritchie and Funk 1973:356). Artifact types of this period include the Levanna triangular projectile point and Cayadutta Incised pottery. General trends of the period show a move towards semi-permanent villages.

By the Late Woodland period, 1,200 to 500 years ago, the climate was much as it is now. Settlement patterns suggest the use of diverse topographic settings including coastal and island sites, inland sites on major drainages, and campsites located near swamps and along streams as well as inland rockshelter sites. There is evidence of an increase in site size and number in addition to abundance and frequency of artifacts. The annual subsistence round may have included seasonal movements among riverine, coastal and inland wintering sites. Increased use of horticulture may have affected seasonal movements, with spring and summer spent planting crops. While maize, beans, and squash were procurable, these did not comprise the entire subsistence base. Hunting and gathering were continued. A semi-permanent settlement pattern may have led to competition and defense of productive land, contributing to territoriality (Mulholland 1988:163).

The Windsor tradition was replaced by the East River cultural tradition by about 600 B.P., while the Bowmans Brook and later Clasons Point phases are local manifestations of the ceramics associated with this period (Snow 1978:63). The Bowmans Brook culture may have entered New York from New Jersey through Staten Island, where many artifacts of this phase have been found (Ritchie 1980:269). Sites have been found on tidal streams or coves, with large village sites containing between fifty to one hundred storage pit features (Ibid.). There appears to be more shellfish use at these sites. Ritchie notes that sites of the Clasons Point culture tend to be found on the second rise of ground

above high-water level, on tidal inlets, and have many of the characteristics of Bowmans Brook Phase sites (Ibid.:271).

Contact Period (500-300 B.P.)

The initial interactions between Native Americans and Europeans typifies the Contact period, dating from 500 to 300 B.P. At the beginning of this period, Native American settlement patterns were essentially the same as those of the Late Woodland period. Stream side camp sites were occupied in the spring and fall to take advantage of bountiful fish runs. Upland and inland task specific sites were also occupied for short periods for hunting, trapping, and lithic procurement. Semi-permanent villages, with oval and round bark and mat covered houses, were located near planting fields. Large pits were used for storing dried meat, fish, and corn, and to bury unwanted trash. Planting fields were commonly burned at the end of the season to encourage new growth and, as a result, fauna. Horticultural villages were commonly moved to a new site after ten or twenty years when soil fertility, firewood, and nearby game resources were reduced (Salwen 1975:57).

Initial interactions between Native Americans and Europeans transpired when early explorers traded with the native population. As non-indigenous materials were introduced into the native material culture, tool assemblages and settlement and subsistence patterns changed drastically. Traditional stone, bone, and wood tools were replaced by European goods made of copper and iron. Shell beads and wampum were produced, and furs were collected by Native Americans as a medium of exchange. Europeans were happy to procure furs from Native Americans, resulting in many trading posts being established along the Hudson River. Although early historical accounts discuss the presence of Native American stockaded villages or forts in the Hudson Valley and coastal New York, archaeological data does not confirm their presence until the middle of the seventeenth century (Ritchie and Funk 1973:368).

In the seventeenth century, metropolitan New York was populated by Native Americans speaking a Munsee dialect of the Eastern Algonquian language (Goddard 1978b:73). Northern Manhattan was primarily occupied by a group identified by colonists as the Wiechquesgeck (Grumet 1981:60). At that time, Native Americans called the Hudson River "Mahicanituk," which translated to "the great waters or seas, which are constantly in motion" (Ibid.:22). Manhattan itself was called "Minna-atn," which meant "Island of Hills" (Bolton 1934:47).

The arrival of Governor Willem Kieft in 1638, who maintained a hard-line policy with the local Indians, resulted in large scale conflicts between Native Americans and European settlers. His policies resulted in the deaths of about 1,000 Native Americans between 1640 and 1645 (Washburn 1978:98). In 1655 Native Americans attacked the growing city of New Amsterdam, and the ensuing Esopus Wars, named so for the involvement of the Esopus Indians of the mid-Hudson Valley, lasted until 1664. As a result, Algonquian bands in the lower Hudson Valley lost their independence and fell under Dutch control (Ibid.).

Plagues, intertribal stress, and the pursuits of Europeans to obtain land rights resulted in the subsequent breakdown of native sociopolitical organization during the seventeenth century. The plagues of 1616-1620, inadvertently introduced by Europeans, depopulated many groups with total losses in southern New England and New York estimated at between 70-90 percent of the original population (Snow 1980:34). Moreover, the conflicts engendered by rapid colonial expansion, war, and epidemics, caused many Native American groups either to leave the area or take up habitation in established communities, i.e. reservations (Brasser 1978:85).

The foregoing cultural chronologies are based, in part, on prehistoric sites found in the metropolitan New York area, although none were ever found within the project site. On Staten Island, numerous prehistoric sites have been reported, ranging from the PaleoIndian through Woodland periods. The Tottenville site, a burial site on the southern portion of the island, was found on a bluff overlooking the shoreline and may represent a wampum manufacturing station (Jacobson 1980:5). In total, over one hundred prehistoric sites have been reported from Staten Island, although significantly fewer have been scientifically studied. It is thought that cultural groups inhabiting Staten Island were probably affiliated with groups in New Jersey and the mid Atlantic region. Staten Island may have demarcated the boundary of New York and New Jersey groups (Ritchie 1980:145). If this is the case, then the role of Manhattan Island may have been similar. With the proximity of New Jersey cultural groups, as well as the Long Island Sound groups, cultural traits of Manhattan Indians would undoubtedly reflect these associations.

Because of the lack of sites actually recovered on Manhattan, the accepted settlement system established for the coastal New York area has been based primarily on the large and highly visible shell midden sites found along the coast of Long Island Sound. Yet more recent archaeological research indicates a variety of occupation sites other than villages associated with shell middens. An intensive survey of Shelter Island in the Long Island Sound, many

miles east of the project site, has yielded a number of small short term lithic workshops and food processing stations, previously unseen and excluded from settlement pattern studies (Lightfoot et al. 1985:59). Further research and unbiased testing strategies in upland areas have also shown that many sites exist in these locales. While its true that the coast of Manhattan was undoubtedly attractive for Native American habitation and resource procurement, smaller sites located inland may have been used as well but would be situated east of the project site.

B. Known Sites in the Vicinity

At the time of European contact, the only known Native American habitation site in the vicinity of the project site was Sapohanikan Point in what is now Greenwich Village (Figure 3). Bolton reports that Sapohanikan was probably a landing place for canoes arriving from and departing to New Jersey (Bolton 1934:53). However, Skinner states that Sapohanikan was an Indian village probably located near the block bounded by Gansevoort, Little West 12th, West, and Washington Streets - directly east but outside of the project site - and that there was an Indian settlement there as late as 1661 (Skinner 1961:52). He also notes that the name may have been applied to the general vicinity. Skinner also reported Site 9, a village site on the Collect Pond near Canal Street many blocks south and east of the project site, which possessed a large deposit of shells (Ibid.:630). No sites were actually within the project site boundaries.

C. Shoreline Reconstruction

At the time Europeans first set foot on Manhattan, the project site was land under water. Consequent landfilling pushed the shoreline further west and Marginal Street was created, burying prehistoric landforms. In some cases, archaeological sites may also have been buried. In 1983 a subsurface soil and fill profile of West and Marginal Street was created by Historic Conservation and Interpretation (HCI) during the original archaeological survey for the proposed Westway project. Based on soil borings, paleoecologists and prehistorians reconstructed the post-glacial shoreline between Battery Place and West 44th Street (Rutsch et al. 1983:17). Much of the proposed Westway project was outboard of the current shoreline. As a result, HCI's work was concerned with both the outboard and inboard shoreline following deglaciation.

The research conducted by HCI concluded that although West and Marginal Streets were submerged beneath the Hudson River before European settlement, they were once exposed. According to Rutsch,

borings taken in Marginal Street south of Charles Street showed a stratum of organic gray silt up to 90 feet thick overlying various sand strata. In Marginal Street, above the sand and silt were layers of historical period landfill (Rutsch et al. 1983:43). The silt stratum was created by river silt deposited after original inundation, while the underlying sand was glacial outwash deposited as glaciers retreated north (Ibid.).

The research concluded that prior to European settlement, what is now Marginal Street was submerged beneath the Hudson River, and that "the area north of approximately Gansevoort Street was inundated by rising sea level at least as early as 13,000 B.P." (Rutsch et al. 1983:20). The topography of the uppermost level of the glacial gravel surface deposited prior to inundation was generally lower in the northern section of Rutsch's project site and higher in the southern section (Ibid.:19). There were clear indications of the presence of a deep canyon in this area prior to inundation.

D. Prehistoric Sensitivity

As discussed in the Prehistoric Background section above, archaeologists typically encounter sites on well drained elevated soils near fresh water resources. However, environments with a broad spectrum of resources were favorable for prehistoric habitation. Coastal and riverine areas could provide a mix of aquatic, estuarial, and terrestrial resources. In particular, the confluences of streams and/or rivers were considered choice sites for habitation and have a high potential to yield prehistoric archaeological resources. Coves and inlets would have provided protection from strong winds coming down the Hudson Valley. Settlement studies on islands in the southern New England area show that settlement patterns are often affected by strong prevalent winds, such as those experienced in the lower Hudson Valley (Little 1985:26).

Several years ago, various agencies attempted to create a model of potential prehistoric site locations in the metropolitan New York area. In an attempt to provide a planning tool, the NYCLPC created a model identifying potentially sensitive areas where prehistoric archaeological remains may be found in Manhattan. No sensitive areas within this section of the linear project parcel were identified. However, the model is based on the potential to recover sites from land that was exposed and suitable for habitation at the time of European settlement. The model does not attempt to determine the potential sensitivity of submerged shorelines, once exposed for prehistoric habitation. However, as

discussed above, this particular task was attempted by HCI for the project parcel during the original 1983 Westway study.

For the proposed Westway project, HCI performed a monumental task and created a detailed shoreline reconstruction for the New York State Department of Transportation (see Rutsch et al. 1983). Analysis of borings, taken both inboard and offshore, and early maps and atlases, showed that at the time of European Contact West and Marginal Streets were submerged beneath the Hudson River. Woodland and Contact period sites would be situated further east of the project site on land that was exposed and available for use during those periods. However, when water tables were lowered prehistorically, during the Paleo through Terminal Archaic periods, the submerged shoreline was exposed and the Hudson River's boundary rested further west than it is today. These historically submerged, but prehistorically exposed, areas may have once been used for resource procurement or settlement.

The following is a synopsis of conclusions reached for the paleoenvironmental study performed by Richard R. Pardi and Dennis Weiss of Queens College and City College (for a full description of research conducted, see Rutsch et al. 1983: Appendix 2). Radiocarbon and chemical samples from cores were used to establish the prehistoric development of the shoreline. A topographic map was then constructed depicting the locations and elevations of shoreline features as they changed through time. These locations were then compared to the known settlement patterns prevalent at each specific point in time. Specific areas were then identified as being potentially sensitive for prehistoric habitation based on topography and site characteristics which may have affected settlement patterns, as described above. These identified areas are currently deeply buried beneath river silts outboard of the bulkhead wall.

Inboard of the Bulkhead Wall

No sites were identified between West Houston Street and Little West 12th Street inboard of the bulkhead wall. Although numerous inboard areas were identified in lower Manhattan by HCI as having the potential to possess prehistoric archaeological remains, no areas were identified from Marginal Street north of Vestry Street. The research conducted by HCI indicated that the prehistoric shoreline within the project site north of Vestry Street was inundated by 13,000 year ago. Inundation predates known Native American sites in the Northeast (Rutsch et al. 1983:20). Therefore, Rutsch concludes, there is no sensitivity for prehistoric resources to have once existed beneath landfill for this section of the project site.

Outboard of the Bulkhead Wall

Rutsch concluded that north of Canal Street there were few topographic features that would have been conducive for prehistoric settlement. However, one potential site was identified outboard between West Houston Street and Little West 12th Street (1983:65). Rutsch's Area 11 was identified west of Clarkson Street outboard of the bulkhead wall (Figure 4). Peat was found in borings taken from this loci, suggesting the southern extent of a submerged lake's shoreline. The loci is now 80 feet below sea level, and is situated beneath the Hudson River (Ibid.).

The one site identified outboard of the bulkhead wall, that is on the surface submerged beneath the waters of the Hudson River, requires more complex analysis. Rutsch discusses the possibility that "deposits of river-borne silt or sand will protect fragile sites lying off sea coasts" and suggests that this may be the case for identified off-shore sites (Ibid.:401). He further remarks that the feasibility of recovering such sites is another issue and requires additional discussion, a topic addressed in Chapter VII, Evaluation of Site Property Types, in this report.

VI. HISTORICAL RESEARCH

A. Historical Background

When Giovanni de Verrazano first sailed into New York harbor in 1524, the project site was land under water. The shoreline on the banks of the pristine Hudson River, named for Henry Hudson who first sailed up it in 1609, were further east than they are today. Early trading and exploring ventures by Europeans were such that traders sustained few interactions with Native Americans, conducting transactions on ships to avoid entering unexplored territory. As trading ventures increased in frequency and the new territory was explored, European settlements were slowly established. By 1613 a trade house was built on the southern tip of Manhattan by the New Netherlands Company, a sponsor of many voyages to the new world in search of trade goods (Wilson 1902:395). Shacks were also built to house the few traders who chose to settle on the island. The rapidly expanding fur trade up and down the Hudson River proved enticing for European entrepreneurs and thus the small village at Manhattan's southern tip grew.

In 1623 the Dutch West India Company was granted rights to all lands within Manhattan by the Dutch States General (Hoag 1905:32). Subsequently in 1626 Peter Minuit, the Director General, purchased Manhattan Island from the local Indians for what amounted to less than 25 dollars (Jones 1978:10). By 1664 the English had obtained possession of the island, and King Charles II regranted the land to the Duke of York. Once land rights were granted, the growing community on Manhattan built a gristmill near Battery Place and Greenwich Street (Rutsch et al. 1983:334). Ensuing land disputes provoked the Dutch to build a wall at what is now Wall Street in 1653 to demarcate the northern boundary of the city and keep out undesirables (Works Progress Administration 1939:58). In 1699 the British removed the stockade and the city slowly expanded northward.

In 1686 the Dongon Charter was decreed by Lieutenant Governor Thomas Dongon, granting a charter to the Mayor Alderman of New York City, and the City of New York became officially established. Land ownership, out to the low water mark, was transferred from the Crown to the City of New York (Hoag 1905:32). At that time, Marginal Street was still submerged land and the shoreline along the Hudson River was situated east of its current location, between what are now Greenwich and Washington Streets.

The earliest travelers found the East River a better and safer harbor as the high bluffs and jagged edges of the Hudson River thwarted docking. However, the Hudson River did prove vital in

linking northern territories to the growing village on Manhattan. The depth of the Hudson, the lack of protected coves needed to provide shelter from strong northerly winds, and the propensity for winter ice floes left the Hudson shorefront virtually unused (Buttenwieser 1987:27). As a result, early landfilling was not avidly pursued on the banks of the Hudson River for lack of economic interest (Buttenwieser 1987:32). One of the earliest landfilling episodes documented on the Hudson shorefront took place between 1699 and 1701 when several entrepreneurs filled and built docks on the three blocks between Cedar and Cortlandt Streets and Greenwich Street and Washington Street (Ibid.:32).

Inland, just east of the project site, the fertile upland proved more valuable. By 1663 Governor Van Twiller was cultivating a large tobacco plantation north of Spring Street adjacent to the Hudson River. His farm, titled "Bossen Bouwerie," which translates to "Farm in the Woods" (Works Progress Administration 1929:125), was the site of his home located at the foot of Charlton Street. In the 1740s Sir Peter Warren purchased 300 acres of land, together with several houses, at the site of what is now Greenwich Village. His land along the shorefront was described as "a bluff along the river with a fine beach below" (Stokes Vol. 3 1909:157). The parcel between Fulton and Christopher Streets, extending from the Hudson River east to Broadway, later became part of the Queen's Farm, granted by Queen Ann to Trinity Church in 1705 (Works Progress Administration 1939:79). In 1794 William Rhinelander, a shipbuilder, obtained a 99 year lease for a large part of this parcel and, in 1797, the Common Council granted him rights to fill and develop water-lots on the Hudson River contiguous to his property. The Rhinelanders proceeded to lease much of their land to commercial interests at a substantial profit. The few wealthy landowners who controlled the use of the waterfront at that time did not follow Rhinelander's example.

In 1730 the Montgomery Charter was established, extending land ownership privileges an additional two blocks beyond the low water mark into the Hudson River, prompting these landowners to reassess their actions. The charter included a provision for creating three streets - Greenwich, Washington and West - parallel to the river (Hoag 1905:32). Following the Revolutionary War another attempt was made to urge the construction of the street along the Hudson River originally provided for in the 1730 charter. In 1795 the Common Council again passed an ordinance creating West Street, a 70 foot wide outer street, demarcating the western boundary of the city. The proposed creation of West Street was intended to compel landowners to pursue landfilling where they were granted water rights. By the early nineteenth century, several docks and piers had been built on the Hudson River shorefront between West Houston and Little West 12th Streets. In 1804 the Common Council increased

the distance from Washington to West Street from 160 feet to 200 feet, lengthening the developed blocks between them by 40 feet (Rutsch et al. 1983:153).

International conflicts preceding the War of 1812 resulted in the construction of Fort Gansevoort on the block bounded by Gansevoort, Little West 12th, Washington, and West Streets, just east of the project site boundaries. Otherwise known as the "White Fort," because of its whitewashed sandstone, Fort Gansevoort was built in preparation for British invasion during the War of 1812. The fort was named for General Gansevoort, an officer in George Washington's army who died in 1812. The oblong enclosed stone battery encompassed "magazines, arsenal, extensive barracks, and furnaces for heating cannon balls" (Bloom 1949). The fort stood on a promontory jutting out into the river. At that time the Hudson River shoreline north of Christopher Street was "generally irregular and unimproved, except for the fort and Townsend's Dock at West 12th Street" (Vollmer Associates 1987:13).

By the early nineteenth century chaotic street placements spawned the creation of a city plan to provide for the systematic laying out of streets and avenues throughout Manhattan. The resultant Commissioner's Plan of 1811 imposed a grid system over the city, disregarding natural topographic features which may have impeded road construction. Street regulations called for extensive grading and filling, removing massive rocks and boulders, and tearing down existing houses located in the path of proposed roadways. Although the plan was laid down on paper, many of the roads were not actually created until decades later. West Street remained incomplete in many places at that time, and Marginal Street had not yet been created (1811 Commissioners of New York State; 1927-30 Ewen).

The frustrations experienced by the City in their attempts to actually create West Street caused the Common Council to pass yet another ordinance in 1825, demanding the creation of West Street and filling of water lots. Land reclamation and filling along the Hudson River waterfront was pursued by either allowing unstructured harbor silts and river accretion to build up, or by placing fill in engineered retaining devices (Geismar 1983:672). In lower Manhattan, ships were sometimes deliberately sunk as cribbing to help stabilize fill (Berger 1983:9). After wharves and piers were built, derelict ships were sunk adjacent to them, and together these features contributed to and operated to retain fill. In one such case, part of the burnt seventeenth century Dutch ship "Tiger" was sunk and subsequently encountered during subway excavation at the corner of Dey and Greenwich Streets in 1916 (Solecki 1974:109). During the later excavation of the adjacent World Trade Center,

archaeologists unsuccessfully searched for the remainder of the ship.

Wooden cofferdams, wharves, and bulkheads were built as fill retaining devices, framed with hewn logs, filled with loose stone, and covered with earth (Geismar 1983:30). Timber grillage was commonly used as cribbing, a practice first employed in Europe. Colonists continued to use this method, as both the Dutch and English had previously, aided by the ample supply of wood in the region. To retain fill, quays were first built by driving a row of wooden piles into the river with diagonal braces bolted to the inside, forming the face work. Earth and fill was then placed in the vacant area behind the piles, and was then planked over to form a roadway level with adjacent streets (Ibid.:31). Wooden jetties were similarly built. Once the economic value of clean fill generated from building excavations was realized, this was no longer used as fill. Instead, wharves and piers were frequently used as dumping boards, where garbage was collected and pushed overboard into scows or directly into the river. Between West Houston and Little West 12th Streets, there were dumping boards at Christopher Street in 1827 and Gansevoort Street in 1844 (Buttenwieser 1987:42). Rubbish, ballast, and street trash pushed the shoreline further west.

The rapidly growing west side supported many successful business ventures. The Gansevoort Market was one such commercial venture, built on landfill at the site of the previous ca. 1812 Fort Gansevoort. The market, built in 1884 east of the project site, was "designed to accommodate farm wagons and consisted of ten parallel streets, each 33 feet wide, separated by 6-foot walks" (Rutsch et al. 1983:381). In 1889 the new West Washington Market was constructed across from the original Gansevoort Market, on what is now the Gansevoort peninsula. The West Washington Market had ten red-brick buildings housing live poultry markets serving the Kosher community. Since the poultry needed heat, each stall of the market was equipped with a furnace "so that each roof adds more than a dozen chimneys to its picturesque architecture" (Works Progress Administration 1939:72).

When the Chelsea-Gansevoort Piers - discussed below - were built at the turn of the twentieth century, the location of both markets stood in the way of traffic on West Street (Ibid.:302). This remained the case until the West Side Highway was constructed over the markets in the 1930s. A new Gansevoort Market and Meat Center was built on the site of the previous Gansevoort Market in 1949. When workers drove piles for the new Gansevoort Market, remnants of Fort Gansevoort, dating to 1812, were encountered (Bloom 1949). While the new Gansevoort Market and Meat Center is extant just east of the project site, the West Washington Market

was demolished in 1950 and was replaced by a City incinerator. The incinerator, located on the Gansevoort peninsula, is now occupied by the Department of Sanitation. The earlier markets both contributed to the bustling nature of the waterfront.

In 1847 waterfront commerce was further amplified when the Hudson River Railroad was organized and a track was laid from Chambers to West 30th Street (Rutsch et al. 1983:258). The railroad serving the waterfront helped to spur industrial and commercial growth. In the 1870s the Hudson River Railroad merged with the New York Central and added a new passenger and freight terminal at St. Johns Park near Canal and Hudson Streets to accommodate ferry users (Buttenwieser 1987:75). By 1851 a railroad station was opened at West 30th Street and Eleventh Avenue, and by 1852 the Eight Avenue Railroad opened a second line between Chambers and West 51st Streets (Works Progress Administration 1939:146). The Ninth Avenue elevated train ran north to West 30th Street, "destroying the charm and property values of Chelsea's most sedate avenue, but making possible additional profits for successful speculators engaged in building tenements" (Works Progress Administration 1939:147). Elevated railways were complete throughout Manhattan by 1875, expediting local travel to the growing shorefront (McCabe 1882:239).

The relatively slow pace of development which characterized the eighteenth century was succeeded by rapid expansion on the Hudson River shorefront in the nineteenth century. By the middle of the nineteenth century, new technologies fostered interest in the relatively unused Hudson River waterfront. The invention of the steamboat in 1807, the production of larger vessels by local shipbuilders, the opening of the Erie Canal in 1825, and the demand for coal in New York City generated more shipping through the port of New York and a demand for deeper berths (Buttenwieser 1987:39). To accommodate these growing industries, new piers were built off of West Street into the Hudson River.

By 1839, narrow wooden finger piers projected from every street end between Vesey and King streets, but this northern area was less developed (Buttenwieser 1987:39). The shorefront was predominantly controlled by private individuals and businesses, contributing to deplorable waterfront conditions (Hoag 1905:36). Haphazard waterfront "improvements" hardly improved conditions at all. Instead, irregularly shaped, privately owned piers were in a continual state of disrepair and the solid base construction of piers prohibited the flow of sewage, draining from the shores out to sea, creating disease-ridden waters (New York Pier and Warehouse Co. 1869:58). Conveying merchandise to and from the Hudson River waterfront was also impeded by the tremendous volume of freight and pedestrian traffic. The miserable waterfront conditions

desperately called for corrective measures, and numerous public agencies were established to deal with these issues.

One of the agencies created to address waterfront conditions was the Department of Docks, established in 1870. The department was granted rights and land for the construction of wharves, bulkheads, docks, piers, basins, and slips. They then instituted the McClellan Plan which resulted in the construction of a solid block and granite bulkhead wall, around the southern half of Manhattan between West 61st and East 51st Streets, over the course of the next sixty years. The wall was to be placed outside of the previously existing bulkhead to allow 250 feet for the width of West and Marginal Streets (Buttenwieser 1987:73). Unfortunately, similar problems were encountered in creating these outer streets, and by the 1890s both West and Marginal Streets were still blocked with many intrusions (Rutsch et al. 1983:297). As late as 1910 "numerous encroachments into the right-of-way still existed, especially south of Cortlandt Street where some old bulkheads maintained the 70 foot width of West Street" (Ibid.:270). The plan enabled the available pier area to double on the Hudson River shorefront. Piers were built to accommodate many steam ship lines and ferry houses for the New Jersey Central and Pennsylvania Railroads (McCabe 1882:360).

Waterfront commerce was further boosted in the late nineteenth and early twentieth centuries with increased competition between transatlantic steamship companies fighting for space at the few long piers that could accommodate their ships (Buttenwieser 1987:83). Each year longer steamships were built and New York City's waterfront facilities could not keep up with the demand for space. As a result, in 1880 the Chelsea-Gansevoort Plan was proposed by Chief Engineer George Greene. The plan detailed the construction of piers long enough to accommodate the newly built steamships. Previously, piers between West 11th and West 23rd Streets were "intentionally undeveloped, as decades of filling had caused the land here to nestle against the state pierhead line" (Ibid.:84). Landfilling had pushed the shoreline a block west of its current route, permitting a Thirteenth Avenue to exist between these two cross streets. The proposal called for adding 21 piers between West 11th and 23rd Streets, 80 feet wide and up to 530 feet long. Since the U.S. Pierhead line remained unmoved, the plan necessitated removing shoreline fill and extending the piers inland east of the 1880 shoreline.

The section between West 12th and Gansevoort Streets was partially filled with the remains of prominent family estates. George Greene...recommended that all of the filling that had taken place at Chelsea-Gansevoort since the 1830s be undone. To construct new piers that met the

requirements of contemporary steamships, part of all of the buildings on twenty-three city blocks would be razed and the blocks themselves excavated and turned back into deep water. The Chelsea-Gansevoort improvement involved removing old foundations, dredging the river bottom with a traditional clam-shell bucket or a newer pneumatic pump, removing the mud by scow or pumping it directly onto the shore, and building new piers and bulkheads (Buttenwieser 1987:86,92).

Due to funding problems and legal difficulties, the Chelsea-Gansevoort Plan was not actually implemented until years later. In 1890 the War Department set new western limits on the pierhead line between West 11th and West 14th Streets, the Gansevoort section, and the original proposal was modified to include six 728 foot piers between these streets. Work began on the Gansevoort, or southern, section in 1894, and was complete in 1902 when six piers were opened to the Cunard, White Star, and Leyland lines for their passenger ships (Buttenwieser 1987:94). Also in 1902, work began on the more northerly Chelsea section of the project between West 14th and West 23rd Streets. In 1897 the planned pier lengths were increased to 800 feet, with the increase in length accomplished by removing an additional quarter-block of land to the east. In 1903 the Chelsea Improvement Plan was altered again to accommodate 1000 foot piers (Ibid.:96).

Construction of the piers required shortening city blocks to the east. Everything west of what is now West Street, including what is now Marginal Street, was excavated and dredged to a depth of about 40 feet below mean low water (Department of Docks 1908:244). A bulkhead wall was constructed and fill was placed behind the bulkhead wall to create a new Marginal Street. The piers themselves were constructed of timber piles and concrete decks, 2-stories tall with steel clad in corrugated iron (Rutsch et al. 1983:309).

The famed architectural team of Warren and Wetmore, designers of Grand Central Station, were hired by the city to design pier sheds for the Chelsea Improvement Plan. They designed a row of concrete and pink granite buildings faced with scored stucco which spanned the shorefront. "The two-story, unified facade was designed with triangular pediments that hung over the entryways at the ends of east-west streets. In these, and over the first floor windows, heroic cement sculptures were set celebrating the history of trade" (Buttenwieser 1987:99). Sheds were constructed on the decks of the timber piers (Department of Docks 1908:244). The project was completed in 1910. Sometime between 1950 and the 1980s a platform was built west of the bulkhead line between West 17th and West 22nd Streets.

The Chelsea-Gansevoort plan left West Street edged with busy docks which were the "main highway for the city's incoming and outgoing supplies" (Works Progress Administration 1939:58). South of 23rd Street, the Hudson River was walled by an "almost unbroken line of bulkhead sheds and dock structures" (Ibid.:69), blocking any view of the river itself from pedestrians or nearby residents. Cross streets were packed with traffic heading for ferries. Subsequently, more plans were enacted to help alleviate traffic congestion in the 1920s and 1930s, and thus the West Side Highway (Highway) was constructed. By 1947 the elevated structure continued as far south as Rector Street, supported on piles driven to bedrock (Vollmer Associates 1989:10). The Highway has since been demolished and an at-grade roadway was built to replace it (Ibid.).

B. Known Sites in the Vicinity

While there are many historical structures and features throughout the area, site file searches at the New York State Museum, New York State Office of Parks, Recreation, and Historic Preservation, and the New York City Landmarks Preservation Commission revealed no inventoried archaeological sites within the Hudson River Park project site.

C. Historical Land Use

Previous archaeological assessments, reviewed for this project, scrutinized an extensive collection of maps and atlases in order to identify potentially sensitive archaeological features. Such potential archaeological features may also exist within the current project site (see Map and Atlas Section in the Bibliography of this report). Specifically Rutsch's 1983 Westway report, the 1990 Route 9A Reconstruction report, and several smaller site-specific studies for tangential sites each entailed extensive cartographic research. Rather than repeat this effort unnecessarily, a synopsis of previous research and findings is presented.

Maps and atlases were generally reviewed at approximately five-to-ten year intervals, while in some cases several maps were used dating to the same period to verify accuracy. This interval of map dates proved sufficient to identify potentially sensitive areas and accurately track landfiling episodes. Buildings or features present for less than five to ten years rarely were constructed in such a manner as to leave a vertical or horizontal footprint on the landscape and disturbance by these transient

structures tended to be minimal, therefore reviewing maps at shorter intervals seemed unproductive.

The actual route of Marginal Street between West Houston Street and Little West 12th Street was deliberately planned, with construction commencing as landfilling permitted. The project site was never subjected to lotting or residential development, always having been used as a road. Therefore, research of land transaction records was inappropriate and not undertaken.

Cartographic research revealed inconsistencies with some of the early maps. Maps compiled prior to the beginning of the nineteenth century depicted development of the city core at the southern end of the island, providing a rich resource base for this section of the project site. However, the 1819-20 Randel map, considered one of the more accurate sources for topography at that time, did not exist for the area south of West 12th Street. Also, the 1859 Viele Map of the City of New York, showing the original topography of Manhattan Island, accurately shows the shoreline east of the project area and thus was not consulted for this section.

Documenting development in the 1860s also posed a problem since few maps were found dating to this period. During the Civil War, New York's cartographers were redirected; and maps and atlases were not produced in the abundance that they were in the 1850s (Alice Hudson, Director of the Map Division, New York Public Library, personal communication to Faline Schneiderman-Fox, April 1989). The only detailed map found dating to this period, Dripps 1868 Plan of New York City, showed West Street as a continuous road along the shoreline of the river, uninterrupted by intrusions. It seems that Dripps simply depicted the road as it was planned 'for convenience.'

D. Historical Sensitivity

Specific areas sensitive for potentially significant historical remains exist between West Houston Street and Little West 12th Street. Several buildings, which could be considered potentially sensitive, actually stood in the route of Marginal Street. Resources were identified from cartographic sources, while additional information was gathered at the City's Buildings Department and Block and Lot Division, and from secondary sources. To help clarify the positions of identified resources in the following discussion, resources are described in relation to the nearest east-west running cross street. Going from south to north the following resources have been identified.

Piers and Wharves

Numerous eighteenth and nineteenth century piers traversed the route of Marginal Street within the project site boundaries between West Houston and Little West 12th Streets. However, since Marginal Street was deeply excavated, dredged, and refilled between West 11th Street and Gansevoort Street with the Chelsea/Gansevoort Pier Plan in the early twentieth century, no resources predating this event could have survived between these two cross streets. Going from south to north, the following piers and wharves were identified south of West 11th Street which may have become part of the landfill and survived beneath the Marginal Street surface. The terms "Old" and "New" are used in the following descriptions in an attempt to differentiate piers which were constantly being replaced and renumbered historically, from their predecessors and successors.

Extinct Piers

At the foot of West Houston Street, Old Pier 47 was built between 1846 and 1852 and stood through ca. 1879 (Burr 1846; Dripps 1852; Bromley 1879; Figure 5). The pier may have become part of the Marginal Street landfill by 1879. Old Pier 48 was built at the foot of Clarkson Street between 1826 and 1827 (Prior Dunning 1826; Ewen 1827). The pier extended 250 feet into the river and was T-shaped (Rutsch et al. 1983:130). The pier may have become part of the Marginal Street landfill by 1879 (Bromley 1879; Figure 5). Old Pier 49 was built at the foot of Leroy Street between 1852 and 1854 (Dripps 1852; Bacon 1856), and may have also become part of the Marginal Street landfill by 1879 (Bromley 1879; Figure 5).

Pier 50 was built at the foot of Morton Street by 1852 (Dripps 1852), and may have become part of the landfill by 1879 (Bromley 1879; Figure 5). At the foot of Barrow Street a pier was built by 1854, but was removed by 1856 (Dripps 1854; Bacon 1856). Subsequently, a landing for the Hoboken Ferry was built halfway between Barrow and Christopher Streets between 1854 and 1856 (Dripps 1854; Bacon 1856). The landing was also used by the Delaware, Lackawanna, and Western Railroad, and may have become part of the landfill by 1879 (Bromley 1879; Figure 5). The layout of the landing consisted of a five-part plan with two piers on the wings and a two-story ferry house in the center (Rutsch et al. 1983:292).

Just north of Christopher Street, Old Pier 50 was built by 1827 (Ewen 1827), and may have become part of the landfill also by 1879 (Bromley 1879; Figure 5). Just north of West 10th Street, Old Pier 51 was operated by the City of New York and was once called the Old State Prison Dock. The dock, built between 1826 and 1827

(Prior Dunning 1826; Ewen 1827), may have become part of the Marginal Street landfill by 1913 (Hyde 1913). At the foot of Perry Street, Old Pier 53 was built between 1846 and 1852 (Burr 1846; Dripps 1852). The pier may have become part of the landfill by 1902 (Bromley 1902).

Extant Piers

By 1902 almost every street end marked the site of a pier extending off of Marginal Street out to the U.S. Pierhead line. The Gansevoort section of the Chelsea/Gansevoort Pier Plan was complete and new piers extended from the shoreline between West 11th and Gansevoort Streets. These timber-framed finger piers were removed, replaced, or upgraded throughout the twentieth century. Little evidence remains of these structures except, perhaps, an occasional line of timber piles adjacent to the shoreline. In addition to the piers described above which were all removed or incorporated, in part, into the Marginal Street landfill, there are several extant piers extending west into the river from the current bulkheaded shoreline.

Extant Pier 40 spans several blocks between King Street and Leroy Street, but only the northern half between West Houston and Leroy Street falls into this section of the project site (Photograph A). The pier and multistory pier structure were built between 1955 and 1967 (Bromley 1955; Bromley 1967). In 1967 the Holland American Line maintained docking facilities here, with the roof of the structure used for automobile parking. The extant structure maintains an open interior courtyard.

Heading north, extant Pier 42 at the foot of Morton Street was probably built between 1879 and 1885 (Bromley 1879; Robinson 1885; See Figure 5; Photographs A, C). The pier was used by the Compagnie Generale Transatlantique in 1885 and 1902 (Robinson 1885; Bromley 1902), and by the Norwegian American Line from at least 1934 through 1967 (Bromley 1934; Bromley 1955; Bromley 1967). The cartographic record does not clarify whether the extant structure is the original ca. 1885 pier or a more recent replacement.

Extant Pier 45 is located at the foot of West 10th Street and was built between 1902 and 1934 (Bromley 1902; Bromley 1934; Photograph D). In 1934 the pier was used by the Italian Line, but by 1955 it was occupied by the Grace Line (Bromley 1955). Pier 46 was also built between 1902 and 1934 at the foot of Charles Street (Bromley 1902; Bromley 1934; Photograph A). In 1934 the pier was used by the Savannah Line and in 1955 it was used by the Ocean Steam Ship Company (Bromley 1955).

Extant Pier 49 was built at the turn of the twentieth century as part of the Chelsea/Gansevoort Pier Plan. All that remains are timber piles protruding from the river. Pier 51 at Jane Street was also built as part of the early twentieth century Chelsea/Gansevoort Pier Plan and is currently in bad condition (Photograph E). Similarly, Pier 53 was built at the same time and has since been almost entirely removed, with the few remaining timbers having been incorporated into the Gansevoort peninsula (Photograph F).

Pier Structures

Structures identified in this category include pier sheds once present in the route of Marginal Street either constructed on docks or along the shoreline. The majority of pier sheds were built by ca. 1902 (Bromley 1902), and were removed in the last thirty years. In this section of the project site at least thirteen pier sheds were identified on the shorefront, with only one dating to ca. 1885 (Robinson 1885), and the remainder dating to the early twentieth century (Bromley 1902; Hyde 1913). Most of these were the typical steel structures built as part of the Chelsea/Gansevoort Pier Plan.

Landfill

The process of filling the shoreline and expanding the size of Manhattan began in the eighteenth century and has continued through the twentieth century. In Marginal Street the majority of landfilling took place between 1859 and 1879 (Perris 1859; Bromley 1879; Figure 5). Fill between West 11th and Gansevoort Street dates to the early twentieth century when the route was excavated and refilled. Fill beneath the Gansevoort peninsula dates to ca. 1874 (Bacon 1859; Viele 1874).

Other

Between Gansevoort and Bloomfield Streets, west of Marginal Street and in the Hudson River Park project site, ten rectangular two-story market buildings of the West Washington Market were built by 1902 (Bromley 1902). The market buildings stood until at least 1950 when they were demolished and a city incinerator was built on the site (Demolition Permit 358:1950; Block and Lot File). In 1980 two 2,000 gallon gas/fuel tanks were installed at the incinerator site (FP 360:1980; Block and Lot File). The incinerator building is now occupied by the New York City Department of Sanitation (Photograph F).

VII. EVALUATION OF SITE PROPERTY TYPES

Documentary research identified four property types within the project site boundaries between Battery Place and West 59th Street. For the West Houston to Little West 12th Street section of the project site, potential resources were identified from each of the property types which include Prehistoric Sites; Piers, Pier Sheds, and Wharves; Landfill; and Other. The following is a discussion of the potential of each of these property types to be archaeologically important, and whether each has the ability to contribute to the historical record in a meaningful way. The significance of each property type is dependent upon associative value, integrity, visibility (i.e., the inherent potential of a site to have left an interpretable archaeological record, remains, or footprint), and feasibility of recovery.

Prehistoric Sites

In Chapter Five, only one area of potential prehistoric activity was discussed. This "Prehistoric Area," previously identified by Rutsch (1983) is located outboard of the bulkhead wall west of Clarkson Street (Area 11). Area 11 was once the southern margin of a lake. The shoreline reconstruction previously compiled for the 1983 Westway project (Rutsch et al. 1983) reported that this site, if it does in fact exist, would be located about 80 feet below the current sea level. That is, below the Hudson River and deeply buried beneath layers and layers of accumulated river silt which may have served to protect it. The site's potential importance is great considering the paucity of prehistoric sites from Manhattan. Conversely, its actual recovery would be extremely difficult due to its depth.

Following the completion of the Draft Westway report in April of 1983, borings were requested outboard and south of Canal Street to further assess the potential for submerged prehistoric archaeological sites to exist. No further work was recommended for this loci, Area 11, since it was felt to have minimal potential. For the area south of Canal Street, although borings yielded no evidence of prehistoric cultural activity, archaeologists pointed out that the likelihood of recovering a site using this method of investigation is analogous to finding a needle in a haystack. More importantly, the borings helped to further determine the prehistoric topography (Letter from Phil Lord, New York State Museum, to Mary Ivey, NYSDOT, April 6, 1984). Based on the soil borings and the negative results of a sub-bottom profiling Marine Survey, SHPO offered the opinion that no significant cultural resources existed within the area flagged by Rutsch and that no additional survey was needed anywhere outboard of the bulkhead wall (Letter from Julia Stokes, NYSOPRHP, to Keith Smith, NYSDOT, April 20, 1984). Subsequently, the Advisory Council on Historic Preservation (Advisory Council) voiced concern about the

determination of no sensitivity for this area, citing the questionable effectiveness of soil borings to identify sites in such a setting (Letter from Thomas King, Director, Office of Cultural Resource Preservation, to Dennis Suszkowski, U.S. Army Corps of Engineers, July 23, 1984).

Throughout 1984, SHPO, the Advisory Council, and the U.S. Army Corp of Engineers (Army Corps) continued their discussion regarding sensitivity and recommendations for pursuing investigation of the prehistoric area outboard and south of Canal Street. By December, 1984, SHPO stated that the Section 106 process had been completed for the project. In 1985 the Army Corps granted construction permits for the project with the condition that the outboard area, sensitive for prehistoric resources, be monitored during construction. The New York City Landmarks Preservation Commission (NYCLPC) pointed out that monitoring is not feasible outboard, and the Advisory Council agreed that no monitoring would be required during construction (Letter from D.L. Klima, Advisory Council on Historic Preservation, to Mary Ivey, NYSDOT, April 25, 1985). After all of the agency reviews were complete, no further research on offshore prehistoric loci was required and sites were written off as lacking sensitivity.

The three agencies, SHPO, the Advisory Council, and NYCLPC, concluded that the feasibility of monitoring or recovering potential sites, submerged beneath the Hudson River and layers of sand and silt, is unproductive. Although this argument was made regarding sites south of Canal Street, the same conclusion can be made regarding Area 11. In addition to the tremendous impediments that would exist in attempting to investigate offshore sites, the likelihood that such sites would have withstood the years of silting and historical dredging of the Hudson River channel is minimal. Dredging the river bottom was constantly required in both the main channel of the Hudson and shorefront slips to permit free access by ships. Because of the unanimous determination of negative feasibility, and because of the likelihood that resources would have been obliterated by constant dredging, there is no further need to consider this resource.

Piers, Pier Sheds, and Wharves

Nine nineteenth century piers were identified within this segment of the project site boundary. However, an in-depth analysis of this property type for the previous Route 9A study determined that because of exposure to the elements (including borers), ship design changes, and changing business demands, piers and wharves were constantly being rebuilt. Studying a buried pier would more likely reflect the technology current at the end of use, not the technology applied when originally constructed or during subsequent reconstructions (Memo from Karen Hartgen to Dan D'Angelo, March 1992). SHPO concurred that this category would add

little to the archaeological record, and thus required no further research (Allee King Rosen and Fleming, Inc., et al. 1994:II-26). Therefore, no historical piers in this section of the project site require further discussion.

Arguments can be made against the archaeological sensitivity of extant piers as well. The original construction of early twentieth century piers tends to be well documented, especially since so many piers were built within a short period of time associated with efforts to improve waterfront conditions. Little actually remains of those piers that do still exist, since years of weathering and neglect have rendered them virtually destroyed. Since both the underlying timber piles and above platforms were exposed to the naturally destructive effects of salinity, tidal action, and inclement weather, the piers were undoubtedly rebuilt and updated throughout the twentieth century. Eventually they were virtually abandoned and left to deteriorate. Original construction techniques have been compromised by both these actions. Studying original engineering plans and descriptions of construction would be more productive towards documenting technological variations than investigating existing structures with little integrity.

The only buildings identified in this category were pier sheds that were once present along the shoreline. Buildings included headhouses, situated on the shoreline perpendicular to piers, ancillary sheds situated on the shoreline in Marginal Street, and pier sheds built on the pile supported pier decks. Undoubtedly, there would be minimal or no foundations associated with buildings once constructed on top of pier platforms. Also, there is minimal archaeological visibility of sheds because of their function as storage facilities. During a recent waterfront excavation of a nineteenth century storage facility in downtown Baltimore, only minimal artifacts were recovered (i.e. one bale seal). The scant archaeological deposits contributed no new information towards the historical record (Lisa DeLeonardio, Baltimore Center for Urban Archaeology, personal communication to Cece Kirkorian, October 22, 1994).

In a topic-intensive study of pier sheds compiled for the Route 9A study, a strong argument was made against the potential research contributions of pier sheds. According to the Final Environmental Impact Statement (FEIS), Appendix C, Cultural Resources, "The subsurface archaeological visibility of the sheds that were erected on fast land must be considered very low. Also, it is assumed that a minimum of potential is present for recovering significant archaeological data on materials temporarily housed in sheds" (Allee King Rosen and Fleming, Inc., et al. 1994:II-26). The nature of these buildings, largely functioning as offices and storage sheds for pier operators and owners, together with the lack of foundations, renders these buildings as having minimal visibility. Pier sheds lack associative value and integrity, both of which are required for a declaration of significance (New York

City Department of City Planning 1993:3F-2). SHPO concurred with the recommendation that no further consideration be required for this category. Therefore, of the pier sheds in this section of the project site, none require further discussion.

Landfill

The landfill in and of itself is not judged to be sensitive since filling episodes of this period on the west side of Manhattan have been documented and artifacts found in this secondary context lack integrity and contextual associations (New York City Department of City Planning 1993:3F-2). Numerous projects within Manhattan have documented land reclamation along both the shore of the East and Hudson Rivers. Records of the Common Council also documented landfilling as it occurred. Landfill itself could be considered worthy of subsurface archaeological investigation if the deposition is associated with a specific episode by a group or individual, such as a manufacturer discarding waste materials from the production process. Thus, if the resources are in situ, specific information can be gathered regarding a manufacturing process or an individual's lifeways. If deposition is simply the collection of trash from an undesignated area, together with materials excavated elsewhere and debris from various sources, the information that can be acquired in such a context is minimal.

Although the contents of landfill may not contribute to our knowledge of early historical lifeways and neighborhood development, the retaining devices designed to create fast land varied technologically and may be considered potentially sensitive. However, since construction techniques changed through time as new materials and methods were adopted and retaining devices were rebuilt as needed, archaeological remains would reflect the rebuilt features, not their original form. SHPO concurred with the conclusion that landfill and retaining devices would have limited research potential (Allee King Rosen and Fleming, Inc., et al. 1994:II-27).

Other

The ten market buildings that once stood between Gansevoort and Bloomfield Street, situated on the Gansevoort peninsula west of West Street, were built by c.1902 and removed in 1950 when a destructor plant was built. The site is now predominantly occupied by a City Sanitation facility, and in 1980 two 2,000 gallon gas/fuel tanks were installed on the site (FP 360:1980; Block and Lot File). The associative value of the earlier market structures is questionable given their late date, extensive documentation, and function. Integrity is also questionable due to subsequent disturbance caused by the destructor plant.

Archaeological deposits associated with market buildings from the early twentieth century would likely be limited to discarded trash from shoppers, rejected and spoiled goods, and pieces and bits of packing material. According to the NYCLPC, artifacts associated with markets would "result from day to day breakage, refuse and loss: they would not represent residential use patterns, but would tend towards a broad spectrum of manufactured and dietary products" (Baugher-Perlin et al. 1982:47). The information that could be ascertained through such data would more likely be culled from readily available documents. Earlier markets, dating to the eighteenth and early nineteenth centuries, may have the potential to contribute to the archaeological record as they "represent an orb of intense activity that may be highly visible archaeologically" (Ibid.:40). The case for twentieth century markets is different. Documentary research would be more likely to provide insights into market practices, consumerism, and dietary patterns.

For the Route 9A contextual study on Meat Markets, arguments were made that markets would probably lack substantial remnants of produce since industry recycling promoted the reuse of left-over and discarded waste (Hartgen Archaeological Associates 1991:10). Specific laws were enacted to ensure that offal was properly discarded (NYCLPC 1983:45). In addition, archaeological deposits from these market buildings have undoubtedly experienced tremendous disturbance with the subsequent construction of the destructor plant. The site has been further compromised by the installation of two subsurface fuel tanks. SHPO concluded that the category of markets required no further archaeological consideration citing the lack of archaeological visibility (Allee King Rosen and Fleming, Inc., 1994:II-22).

VIII. SUBSURFACE DISTURBANCE

Each potentially sensitive resource was evaluated as to the degree of prior disturbance it had undergone. Disturbance was assessed both horizontally, for lengths and widths of impact, and vertically, for depths of impact. Simplified, the location of each resource was compared, vertically and horizontally, to maps of subsurface utility lines, maps of buried tanks, and information from block and lot folders to determine the extent of prior impacts. Subsequently, three levels of disturbance were devised and assigned to each resource.

- | | |
|-----------------------|--|
| Very disturbed - | Most of the site appears to have been disturbed. |
| Partially Disturbed - | Part of the site appears to have been disturbed. |
| Undisturbed - | None of the site appears to have been disturbed. |

Historical Resources

The only historical property type identified through research and determined to have associative value was the bulkhead wall and inboard relieving platform. The accompanying NYSOPRHP Building-Structure Inventory Form prepared by Raber Associates and Allee King Rosen & Fleming, Inc. and submitted to SHPO in March 1997 addresses this resource's potential for eligibility for National Register status.

IX. SUMMATION OF POTENTIALLY SENSITIVE AREAS

The following property types were utilized for classifying potentially sensitive archaeological remains:

- 1) Prehistoric Remains
- 2) Historical Remains
 - a) Piers and wharves
 - b) Landfill
 - c) Bulkhead Wall and Inboard Relieving Platforms
 - d) Other

For this section of the project site, located between West Houston and Little West 12th Street, identified resources fell into the property type categories of Prehistoric Remains, and each of the property types of Historical Remains. Prehistoric Sites were identified, through previous research, outboard of the bulkhead wall but were subsequently dismissed as lacking visibility. Outboard sites are felt to lack the potential to yield archaeologically important information since recovery is unfeasible and integrity is questionable.

The historical period sites which were initially identified as potentially sensitive proved, upon more in-depth analysis, to have little potential to contribute to the archaeological record, and thus do not require any further consideration as concurred by SHPO. The bulkhead wall and inboard relieving platforms are given further consideration in the accompanying NYSOPRHP Building-Structure Inventory Form.

BIBLIOGRAPHY

Allee King Rosen and Fleming, Hartgen Archeological Associates and Historical Perspectives Inc.

1989 Draft Contaminated Materials Assessment, Route 9A Reconstruction Project. Prepared for New York State Department of Transportation, Federal Highway Administration, and U.S. Department of Transportation

1994 Final Environmental Impact Statement, Appendix C, Cultural Resources. Prepared for New York State Department of Transportation, Federal Highway Administration, and U.S. Department of Transportation

Barlow, Elizabeth

1971 The Forests and Wetlands of New York City. Little Brown and Co., Boston.

Battery Park City Authority

1981 Battery Park City Final Environmental Impact Statement. Battery Park City Authority, New York.

Baugher-Perlin, Sherene, M. Janowitz, M. Kodack and K. Morgan

1982 "Towards an Archaeological Predictive Model for Manhattan: A Pilot Study." Ms. on file with the New York City Landmarks Preservation Commission.

Berger, Louis and Associates

1983 Barclays Bank Site, 100 Water Street, New York, New York. The Cultural Resource Group of Louis Berger, Inc.

1987a Archaeological Investigation of Site 1 of the Washington Street Urban Renewal Area, New York City. Prepared by Louis Berger and Associates for Shearson Lehman/American Express through the New York City Public Development Corporation, New York.

1987b Druggists, Craftsmen and Merchants of Pearl and Water Streets, New York: The Barclays Bank Site. The Cultural Resource Group of Louis Berger, Inc.

1989 Archaeological and Historical Investigations at the Assay Site Block 35, New York, New York. Prepared by Louis Berger and Associates for HRO International, Ltd., New York.

- Bloom, Daniel H.
 1949 "Forgotten Fort Found on Site of City Market." In the New York Herald Tribune, April 17, 1949.
- Bolton, Reginald P.
 1934 Indian Life of Long Ago in the City of New York. Boltons Books, New York.
- Brasser, Ted J.
 1978 "Early Indian-European Contacts." In Northeast, edited by Bruce G. Trigger, pp. 78-88. Handbook of North American Indians, Vol. 15, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D. C.
- Braun, David P.
 1980 "On the Appropriateness of the Woodland Concept in Northeastern Archaeology." In Proceedings of the Conference on Northeastern Archaeology, Research Report 19, edited by James Moore, University of Massachusetts, Amherst. pp. 93-108.
- Brennan, Louis A.
 1974 "The Lower Hudson: A Decade of Shell Middens." Archaeology of Eastern North America 2(1):81-93.
- Brumbach, Hetty Jo
 1986 "Anadromous Fish and Fishing: A Synthesis of Data From the Hudson River Drainage." Man in the Northeast, 32:35-66.
- Buttenwieser, Ann L.
 1987 Manhattan Water Bound. New York University Press, New York.
- Ceci, Lynn
 1979 "Maize Cultivation in Coastal New York." North American Archaeologist 1(1):45-74.
- De Voe, Thomas F.
 1867 The Market Assistant. Riverside Press, New York.
 1873 Report Upon the Present Condition of the Public Markets of the City and County of New York. Evening Post Steam Presses, New York.
- Dickens, Roy S., Jr.
 1982 Preface. In Archaeology of Urban America: The Search for Pattern and Process, edited by R. S. Dickens, Jr., pp. XIV-XX. Academic Press, New York.

- Dincauze, Dena and Michael Mulholland
 1977 "Early and Middle Archaic Site Distributions and Habitats in Southern New England." In Amerinds and Their Paleo-environments in Northeastern North America. Annals of New York Academy of Sciences 288:439-456.
- Edwards, Robert L. and K. O. Emery
 1977 "Man on the Continental Shelf." (As reprinted in The Coastal Archaeology Reader, Vol. V, of Readings in Long Island Archaeology and Ethnohistory. Suffolk County Archaeological Association, 1982.) pp. 12-21.
- Eisenberg, Leonard
 1978 "Paleo-Indian Settlement Patterns in the Hudson- Delaware River Drainages." Occasional Publications in Northeastern Anthropology, No. 4.
- Funk, Robert E.
 1976 Recent Contributions to Hudson Valley Prehistory. New York State Museum Memoir 22. The State Education Department, Albany, New York.
- Funk, Robert E. and William A. Ritchie
 1973 Aboriginal Settlement Patterns in the Northeast. New York State Museum Memoir 20. The State Education Department, Albany, New York.
- Gaudreau, Denise C.
 1988 "The Distribution of Late Quaternary Forest Regions in the Northeast: Pollen Data, Physiography and the Prehistoric Record." In Holocene Human Ecology in Northeastern North America, George P. Nichols, ed. Plenum Press, New York. pp. 215-256.
- Geismar, Joan
 1983 The Archaeological Investigation of the 175 Water Street Block, New York City. Soil Systems Division of Professional Services Industries, Inc.
- 1987a Stage 1A Archaeological Evaluation of the Exchange Project Site, 10 Battery Place, New York City. Prepared for EEA, Inc., New York.
- 1987b "Landfill and Health, A Municipal Concern or, Telling It Like It Was." Northeast Historical Archaeology 16:49-57.
- Gilder, Rodman
 1936 The Battery. Houghton Mifflin Company, Boston.

- Goddard, Ives
1978a "Delaware." In Northeast, edited by Bruce G. Trigger, pp. 213-239. Handbook of North American Indians, Vol. 15, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.
- 1978b "Eastern Algonquian Languages." In Northeast, edited by Bruce G. Trigger, pp. 70-77. Handbook of North American Indians, Vol. 15, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D. C.
- Gratacap, Louis P.
1909 Geology of the City of New York. Henry Holt & Co., New York.
- Grumet, Robert Steven
1981 Native American Place Names in New York City. Museum of the City of New York, New York.
- 1990 Historic Contact: Indians and Colonists in Northeastern North America, 1497-1783. National Historic Landmark Theme Study, United States Department of the Interior, National Park Service.
- Hartgen Archaeological Associates and Historical Perspectives, Inc.
1991 Draft Contextual Study: Meat Market, Route 9A Reconstruction Project. Prepared for New York State Department of Transportation, Federal Highway Administration, and the City of New York.
- 1992 Contextual Study: Wharves and Piers, Route 9A Reconstruction Project. Prepared for New York State Department of Transportation, Federal Highway Administration, and the City of New York.
- Henn, Roselle, Diana Wall, Laurie Boros, Valerie DeCarlo and Jed Levin
1985 "Preindustrial Waterfront Technology in Lower Manhattan." Paper presented at the Annual Meeting of the Society for Industrial Archaeology, Newark, Delaware.
- Hoag, S.W., Jr.
1905 Dock Department and New York Docks. The Municipal Engineers of the City of New York, New York.
- Huey, Paul R.
1984 "Old Slip and Cruger's Wharf at New York: An Archaeological Perspective of the Colonial American Waterfront." Historical Archaeology 18(1):15-37.

- Jacobson, Jerome
1980 Burial Ridge: Archaeology at New York City's Largest Prehistoric Cemetery. The Staten Island Institute of Arts and Sciences, New York.
- Jones, Pamela
1978 Under the City Streets. Holt, Rinehart and Winston, New York.
- Kieran, John
1982 A Natural History of New York City. Second edition. Fordham University Press, New York.
- Kirkorian, Cece and Evelyn Tidlow
1984 Phase One Archaeological Impact Report for Sites 1A, 1B, 5B and 5C, Washington Street Urban Renewal Area, New York City, New York. Prepared for Allee King Rosen and Fleming, Inc., New York.
- Konvitz, Josef W.
1989 "William J. Wilgus and Engineering Projects to Improve the Port of New York, 1900-1930." Technology and Culture 30:398-425.
- Lightfoot, Kent, Robert Kalin, Owen Lindauer and Linda Wicks
1985 "Coastal New York Settlement Patterns: A Perspective From Shelter Island." Man in the Northeast 30:59-82.
- Little, Elizabeth A.
1985 "Prevailing Winds and Site Aspects: Testable Hypothesis About the Seasonality of Prehistoric Shell Middens at Nantucket, Massachusetts." Man in the Northeast 29:15-27.
- Luke, Myron H.
1953 The Port of New York 1800-1810. New York University Press, New York.
- McBride, Kevin A.
1984 Prehistory of the Lower Connecticut River Valley. Unpublished Ph.D. dissertation, University of Connecticut, Storrs, Connecticut.
- McCabe, James D.
1982 New York By Sunlight and Gaslight. Douglass Brothers Publishers, Philadelphia.

Mueser Rutledge Consulting Engineers

- 1990 Evaluation of COE Jurisdiction, Route 9A Reconstruction Project, New York, New York. Prepared by Mueser Rutledge Consulting Engineers for Vollmer Associates, Inc.
- 1989 Draft Report of the Bulkhead Condition Review Battery Park City to West 59th Street Hudson River, New York For Route 9A Reconstruction Report. Prepared by Mueser Rutledge Consulting Engineers for Vollmer Associates, Inc.
- 1988 Evaluation of the Bulkhead Battery Park City to West 46th Street Hudson River, N.Y. Prepared for Ebasco Constructors, Inc., New York.

Mulholland, Mitchell T.

- 1988 "Territoriality and Horticulture: A Perspective for Prehistoric Southern New England." In Holocene Human Ecology in Northeastern North America, George P. Nichols ed. Plenum Press, New York. pp. 137-166.

New York City Department of City Planning

- 1931 In the Matter of: The Application of the North River Bridge Company to the United States War Department on the Construction of a Bridge over the Hudson at West 57th Street. American Society of Civil Engineers, New York.
- 1993 City Environmental Quality Review, Technical Manual. Mayor's Office of Environmental Coordination, December 1993.

New York City Department of Docks

- 1881 Action of the Commissioners on the Construction of the River Wall Designed by George S. Greene, Jr. New York City Department of Docks, New York.

New York City Department of Docks and Ferries

- 1908 38th Annual Report of the Department of Docks and Ferries. New York City Department of Docks and Ferries, New York.
- 1912- Reports on West Manhattan Waterfront. Report 24.
- 1913 New York City Department of Docks and Ferries, New York.

New York Pier and Warehouse Company

- 1869 Piers and Wharves of New York. Evening Post Steam Press, New York.

- Norman, J. Gary
1986 "Eighteenth Century Wharf Construction in Baltimore." MA thesis, The College of William and Mary.
- Ritchie, William A.
1980 The Archaeology of New York State. Revised edition. Harbor Hill Books, New York.
- Rockman, Diana, Wendy Harris, and Jed Levin
1985 The Archaeological Investigation of the Telco Block, South Street Seaport Historic District, New York, New York. Advisory Council on Historic Preservation, Washington, D.C.
- Rutsch, Edward, Nan Rothschild, et al.
1983 Westside Highway Cultural Resource Survey, Archaeological Work Program: Cultural Resources Research. Prepared for New York State Department of Transportation.
- Salwen, Bert
1975 "Post-Glacial Environments and Cultural Change in the Hudson River Basin." Man in the Northeast 10:43-70.
- 1978 "Indians of Southern New England and Long Island: Early Period." In Northeast, edited by Bruce G. Trigger, pp. 160-176. Handbook of North American Indians, Vol. 15, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.
- 1982 Foreword. In Archaeology of Urban America: The Search for Pattern and Process, edited by R. S. Dickens, Jr., pp. XIII-XVII. Academic Press, New York.
- Sapin, Wendy Harris
1985 "Landfilling at the Telco Block." American Archeology 5(3):170-174.
- Saxon, Walter
1973 "The Paleo-Indian on Long Island." New York State Archaeological Association Bulletin, 57. March, 1973. (As reprinted in The Coastal Archaeology Reader, Vol. II, of Readings in Long Island Archaeology and Ethnohistory. Suffolk County Archaeological Association, 1978.) pp. 251-261.
- Schuberth, Christopher J.
1968 The Geology of New York City and Its Environs. The Natural History Press, New York.

- Skinner, Alanson
1926 "The Indians of Manhattan Island and Vicinity." The American Museum of Natural History, Guide Leaflet Series. No. 41. New York.
- 1951 The Indians of Manhattan Island and Vicinity. Ira J. Friedman, Inc., Port Washington, Long Island, New York.
- Snow, Dean
1978 "Late Prehistory of the East Coast." In Northeast, edited by Bruce G. Trigger, pp. 58-69. Handbook of North American Indians, Vol. 15, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D. C.
- 1980 The Archaeology of New England. Academic Press, New York.
- Solecki, Ralph S.
1974 "The 'Tiger,' An Early Dutch Seventeenth Century Ship, And An Abortive Salvage Attempt." Journal of Field Archaeology. Vol. 1:109-116.
- Stokes, Isaac Newton Phelps
1915- The Iconography of Manhattan Island. Volumes I-VI.
1926 Robert H. Dodd, New York.
- Suggs, Robert C.
1966 The Archaeology of New York State. Thomas Y. Crowell Company, New York.
- United States Department of the Interior
1976 National Register of Historic Places. National Park Service, United States Government Printing Office, Washington, D.C.
- Valentine, D. Thomas
1847- Manuals of the Corporation of the City of New York.
1866
- Vollmer Associates
1987 "West Side Highway Replacement Study. Technical Appendix 3, Archaeology/Landmarks/Historic Sites." Prepared for NYS Department of Transportation, NYC Department of Transportation, and NYC Department of City Planning, New York.
- 1989 Route 9A Reconstruction, Preliminary Review of Existing Data and Proposed Subsurface Investigation. Prepared for NYS Department of Transportation, Albany, New York.

Washburn, Wilcomb E.

1978 "Seventeenth-Century Indian Wars." In Northeast, edited by Bruce G. Trigger, pp. 89-100. Handbook of North American Indians, Vol. 15, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Weber, Carmen A.

1988 "Interim Report: An Exploration of Philadelphia's Early Waterfront Through the Hertz Lot Excavation." Ms. on file Philadelphia Historical Commission, Philadelphia, Pennsylvania.

Wilson, Rufus Rockwell

1902 New York: Old and New. 2 vols. J.B. Lippincott Co., Philadelphia.

Works Progress Administration

1939 The WPA Guide to New York City. Revised edition. Random House, New York.

MAPS AND ATLASES

Bacon, J.

- 1856 Barnitz Pier Map of the City of New York. Surveyed and drawn for the New York Corn Exchange, New York.

Bromley, George Washington

- 1879 Atlas of the City of New York. G.W. Bromley and Co., New York.
- 1902 Atlas of the City of New York. Volume 2, Update of 1899. G.W. Bromley and Co., Philadelphia.
- 1925 Atlas of the City of New York. Volume 2. Update of 1906. G.W. Bromley and Co., Philadelphia.
- 1934 Atlas of the City of New York. G.W. Bromley and Co., Philadelphia.
- 1955 Atlas of the City of New York. G.W. Bromley and Co., Philadelphia.
- 1967 Atlas of the City of New York. G.W. Bromley and Co., Philadelphia.

Burr, David H.

- 1846 Map of the City of New York. David H. Burr, New York.

City of New York, Department of Public Works

- 1931 Contract Plan for the Construction of Foundations for the Elevated Public Highway. Office of the President, Department of Public Works, New York.

City of New York, Environmental Protection Administration

- 1968 P.W. - 164 North River Water Pollution Control Project, South Branch Intercepting Sewer Record Drawings. Department of Water Resources, New York.

Commissioners of New York State

- 1807- Map of the City of New York and Island of Manhattan.
- 1811 William Bridges, New York.

Dripps, Matthew

- 1852 Map of the City of New York Extending Northward to 50th Street. Surveyed and Drawn by John F. Harrison, New York.

Ewen, Daniel

1827- Maps and Surveys of the City of New York. Volume 6.

1830 Daniel Ewen, New York.

Hooker, W.

1824 Plan of the City of New York. Engraved for the Strangers Guide, New York. W. Hooker, New York.

Hyde, E. Belcher

1913 Atlas of the Borough of Manhattan. Volume 2. Update of 1906. E. Belcher Hyde, Brooklyn, New York.

1930 Atlas of the City of New York. Volume 2. Update of 1906. E. Belcher Hyde, Brooklyn, New York.

1950 Atlas of the City of New York. Volume 2. Update of 1906. E. Belcher Hyde, Brooklyn, New York.

Longworth, David H.

1808 Plan of the City of New York. David Longworth, New York.

1817 Actual Map and Comparative Plan of New York. David Longworth, New York.

MacCoun, Townsend

1909 The Hudson River (Cahohatatea) at the Time of Its Discovery by Henry Hudson, 1609. Townsend MacCoun, New York.

Office of the President of the Borough of Manhattan

1940 Rock Data Map of Manhattan: Details of Borings and Excavations. Second edition. Office of the President of the Borough of Manhattan of the City of New York, New York.

Poppleton, Thomas

1817 North River Shore, Battery and 75th Street: A Map of Property on the North Side of Marketfield Street Between Broadway and Fifty-Third to Fifty-Ninth. R. Graves Co., New York.

Prior and Dunning

1826 Plan of the City of New York. Prior and Dunning, New York.

Robinson, Edward and R. H. Pidgeon

1885 Robinson's Atlas of the City of New York. E. Robinson and R. Pidgeon, New York.

Taylor, B. and J. Roberts

1797 A New and Accurate Plan of the City of New York in the
State of New York in North America. J. Roberts, New
York.

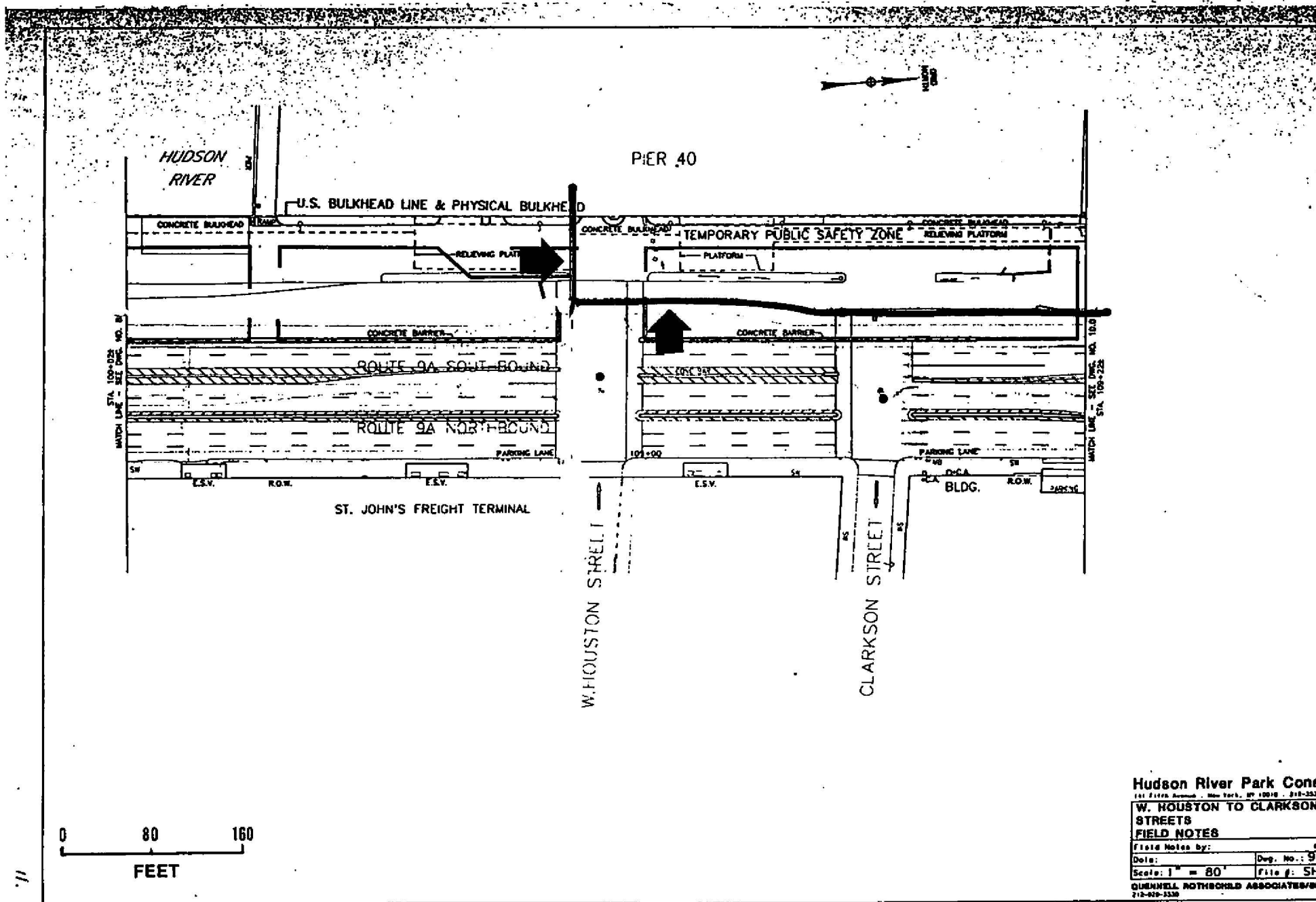


FIGURE 2: Project Site Boundaries,
West Houston Street to Little West 12th Street

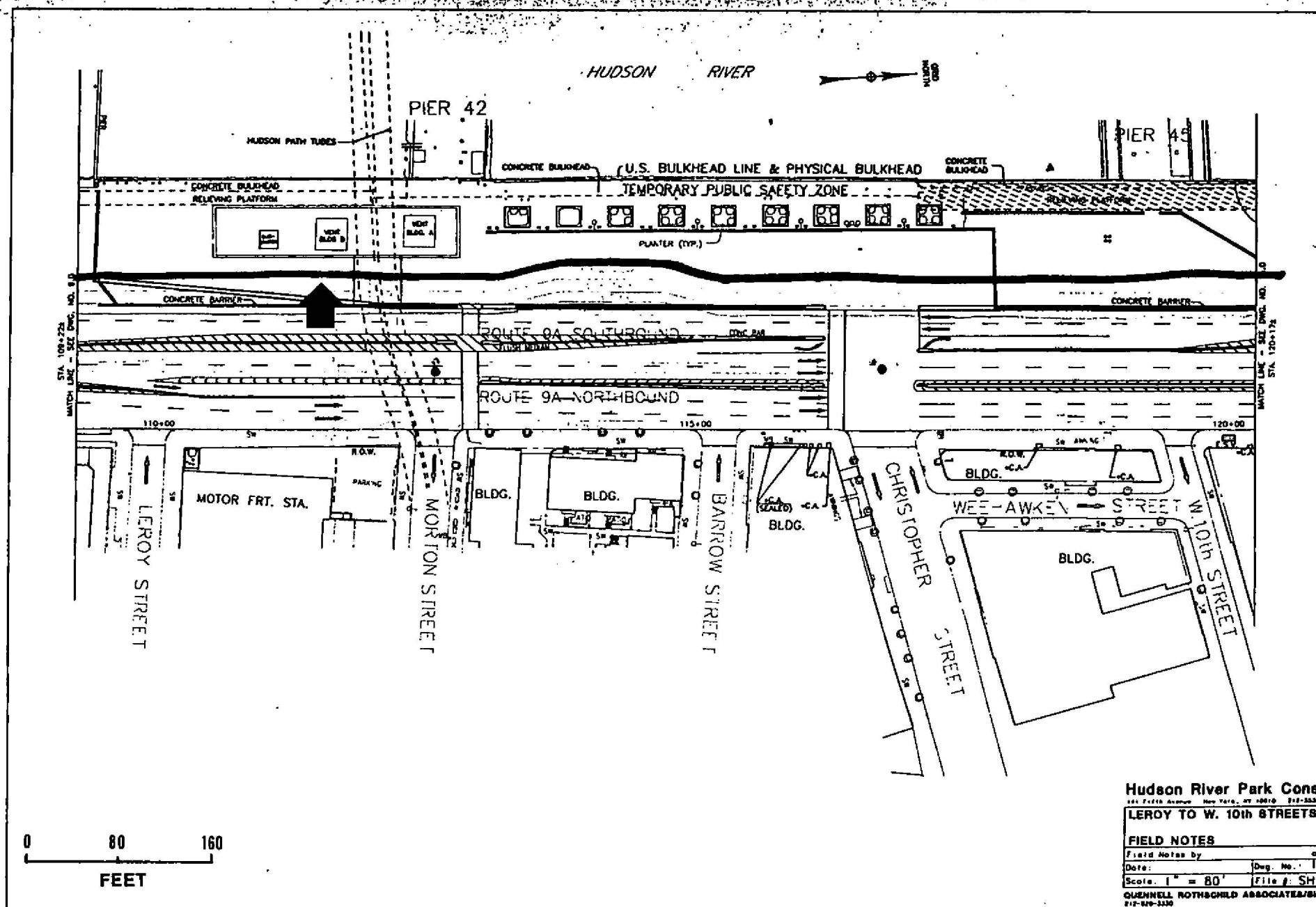


FIGURE 2: Project Site Boundaries,
 West Houston Street to Little West 12th Street

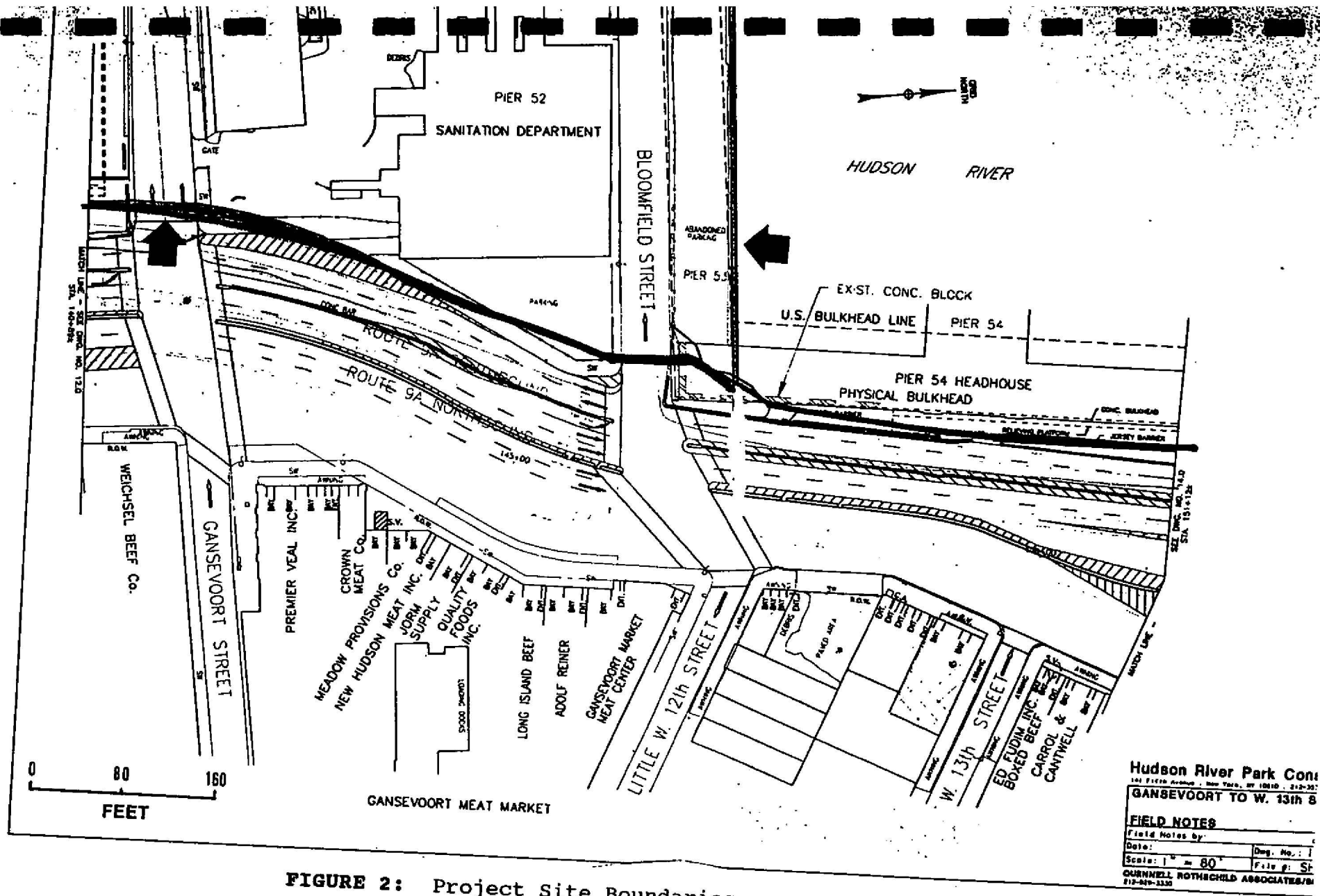


FIGURE 2: Project Site Boundaries,
West Houston Street to Little West 12th Street

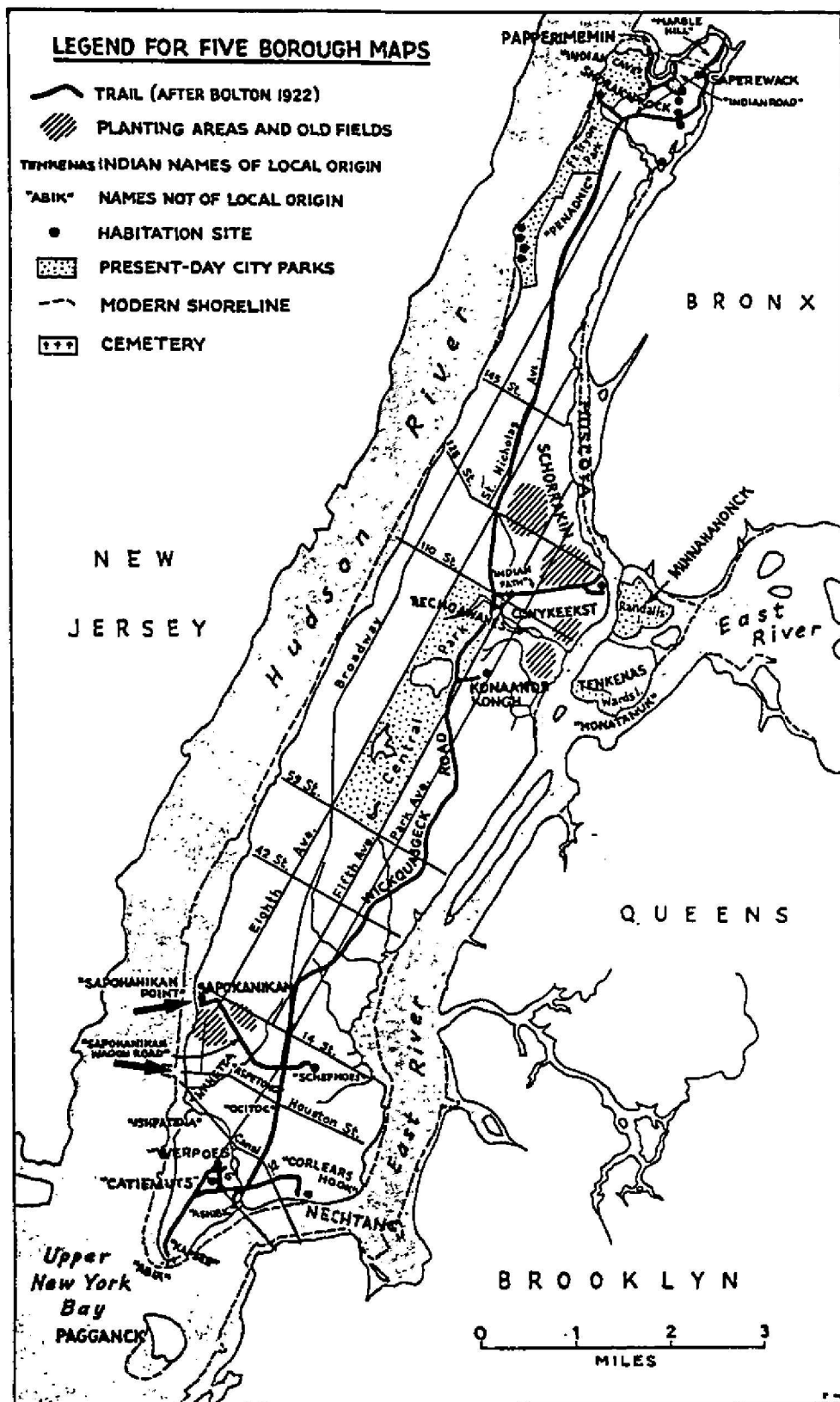
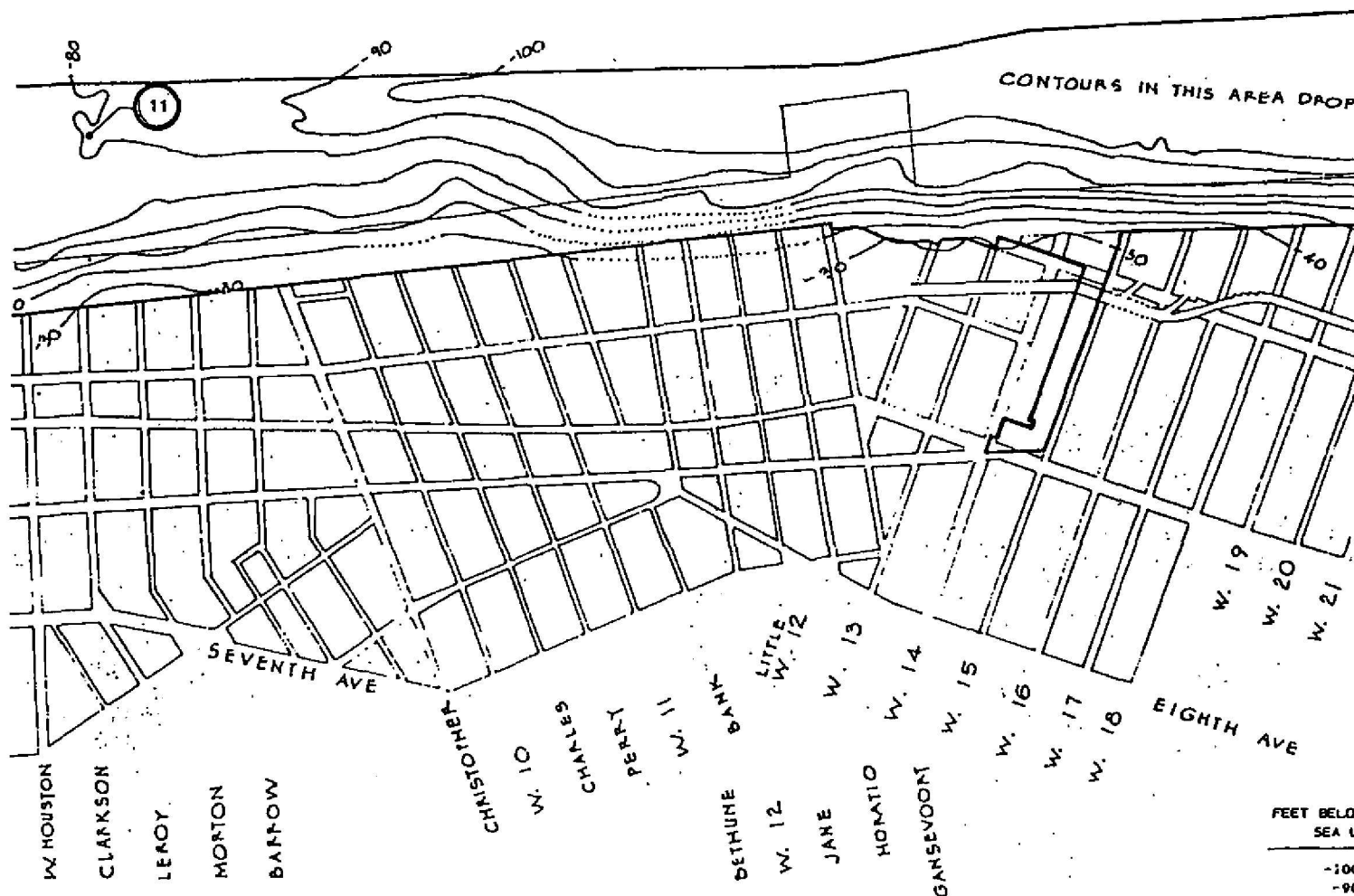
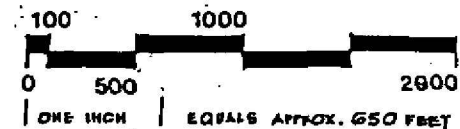


Figure 3

17th-century Native American Trails and
Place Names on Manhattan Island

Source: Grumet 1981

KEY
 ARCHEOLOGIST'S EXTRAPOLATION
 OF CONTOUR LINES
 ○ MAP REFERENCE AREAS.



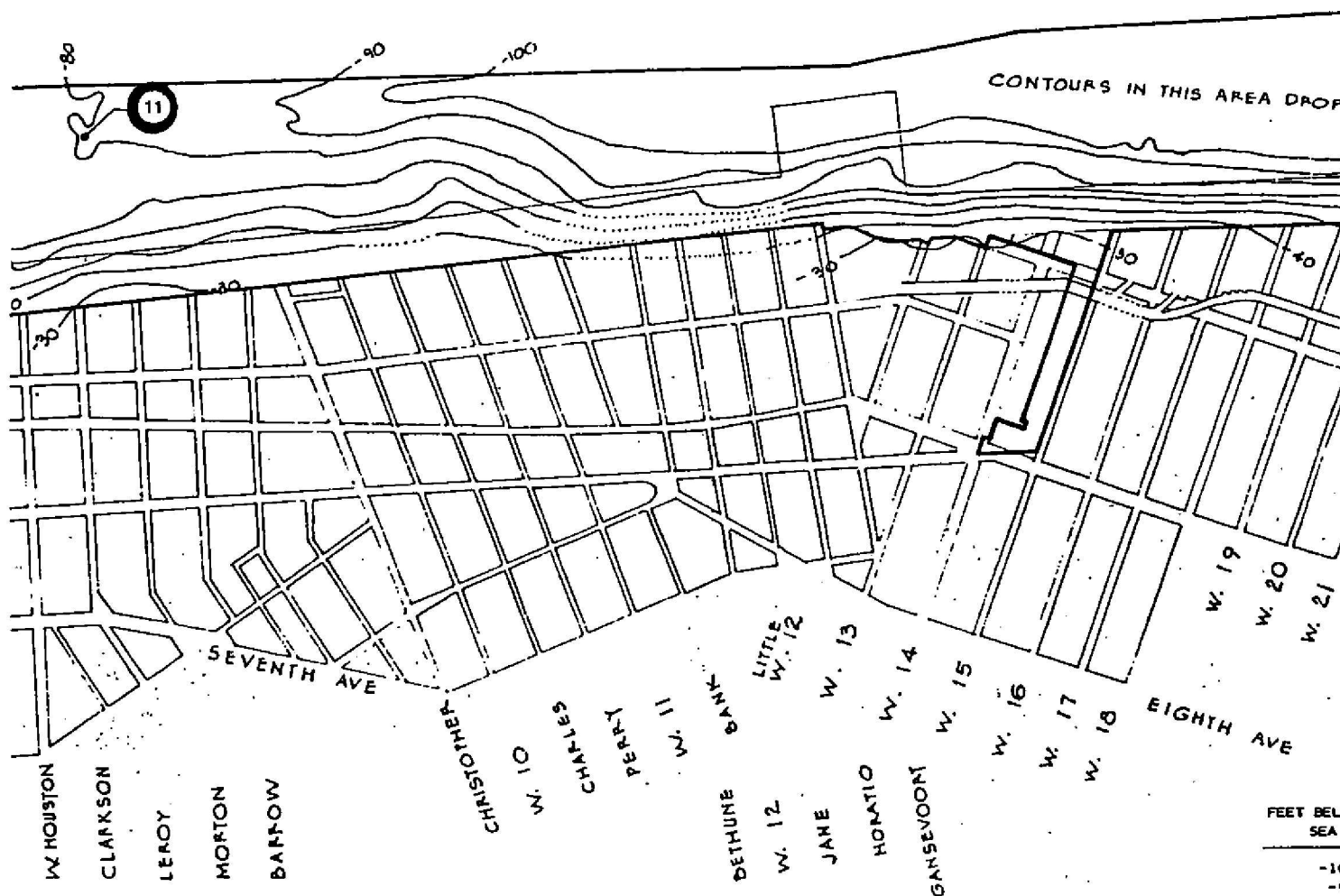
SEA LEVEL CURVE	
FEET BELOW PRESENT SEA LEVEL	RADIOCARBON YEARS BP
-100	12,500-12,000
-90	12,000-11,000
-80	11,000-10,000
-70	10,000-8,000
-60	8,000-7,500
-50	7,500-7,200
-40	7,200-6,500
-30	6,500-5,000
-20	5,000-4,600
-10	4,600-2,000
0	2,000- PRESENT

Figure 4

Prehistoric Sites Identified During the Westway Project Investigation
 by Historic Conservation and Interpretation, Inc.
 Source: Rutsch, et. al. 1983, Fig. 4, p. 48

KEY
 ARCHEOLOGIST'S EXTRAPOLATION
 OF CONTOUR LINES
 ○ MAP REFERENCE AREAS.

100 1000
 0 500 2000
 ONE INCH EQUALS APPROX. 650 FEET



CONTOURS IN THIS AREA DROP



Figure 4

Prehistoric Sites Identified During the Westway Project Investigation
 by Historic Conservation and Interpretation, Inc.
 Source: Rutsch, et. al. 1983, Fig. 4, p. 48

SEA LEVEL CURVE	
FEET BELOW PRESENT SEA LEVEL	RADIOCARBON YEARS BP
-100	12,500-12,000
-90	12,000-11,000
-80	11,000-10,000
-70	10,000- 8,000
-60	8,000- 7,500
-50	7,500- 7,200
-40	7,200- 6,500
-30	6,500- 5,000
-20	5,000- 4,600
-10	4,600- 2,000
0	2,000- PRESENT

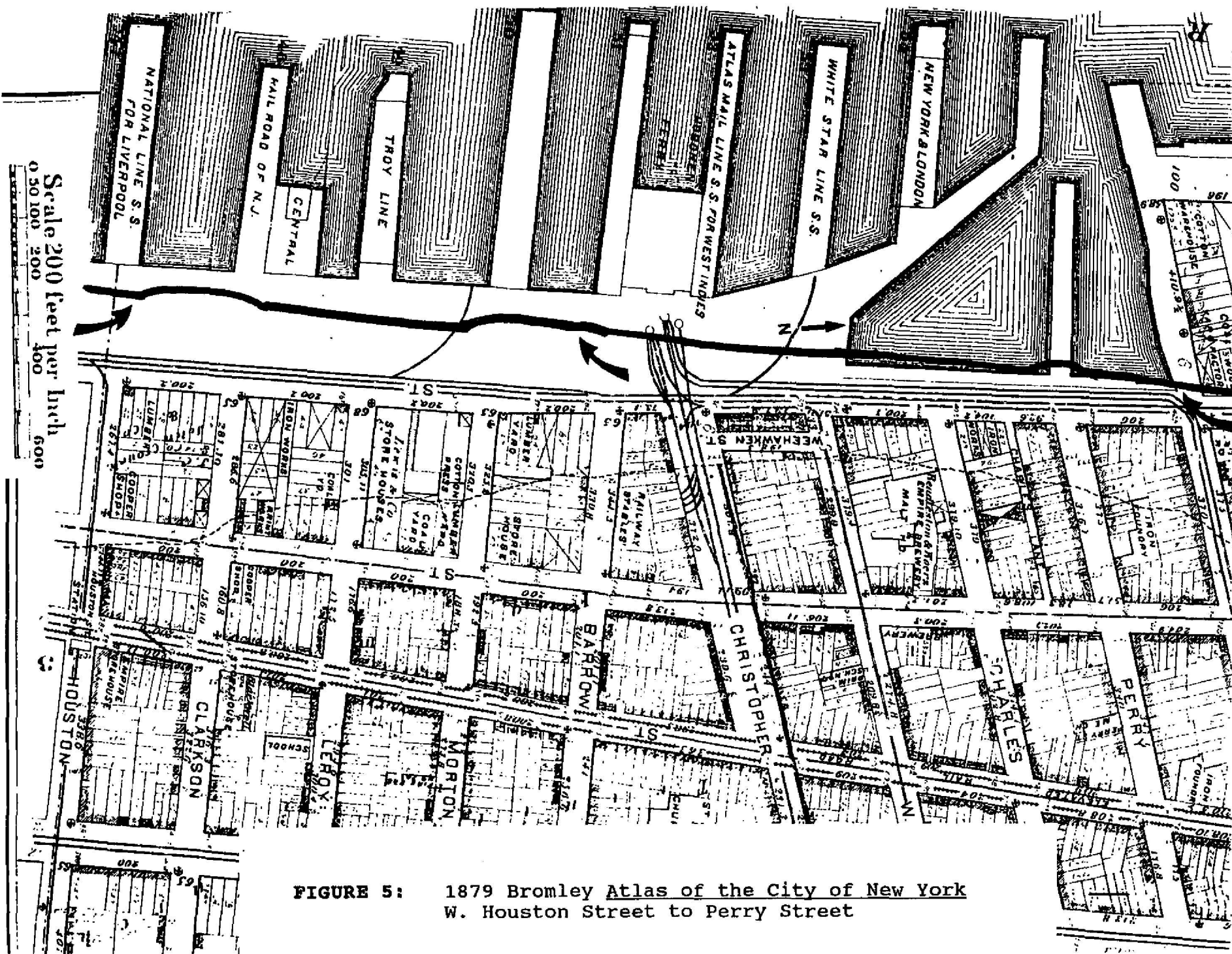


FIGURE 5: 1879 Bromley Atlas of the City of New York
W. Houston Street to Perry Street



PHOTO A: Hudson River Park Project Site, facing east from Hudson River. Pier 40 is at extreme right and heading left are Piers 42, 45, and 46.

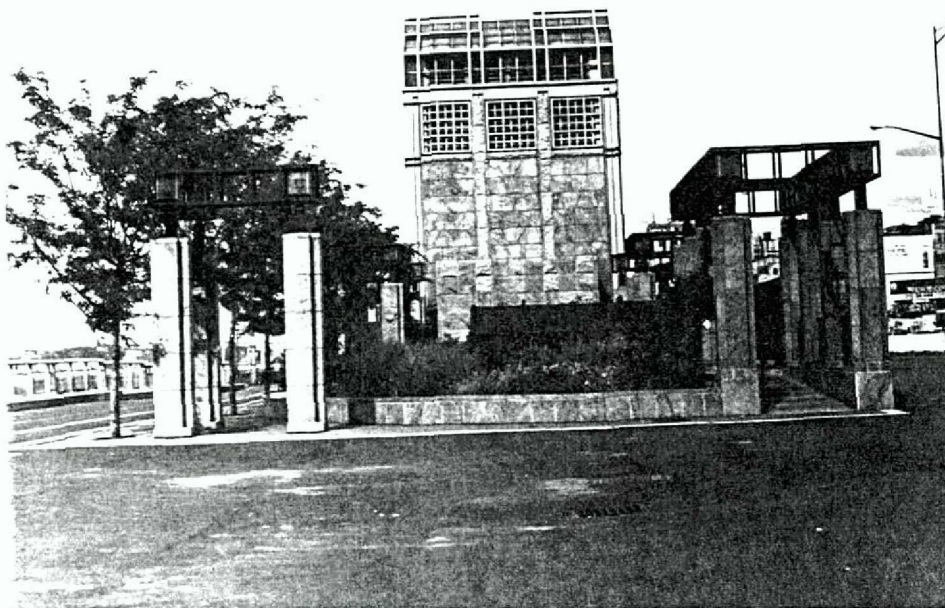


PHOTO B: PATH ventilation structures in Temporary Public Safety Zone, just north of Pier 40. Facing north.



PHOTO C: Pier 42 at Morton Street. Facing northwest from Marginal Street.



PHOTO D: Pier 45 at West 10th Street used for recreation.
Facing northwest from Marginal Street.



PHOTO E: Pier 51 at Jane Street. Facing northwest from
Marginal Street.

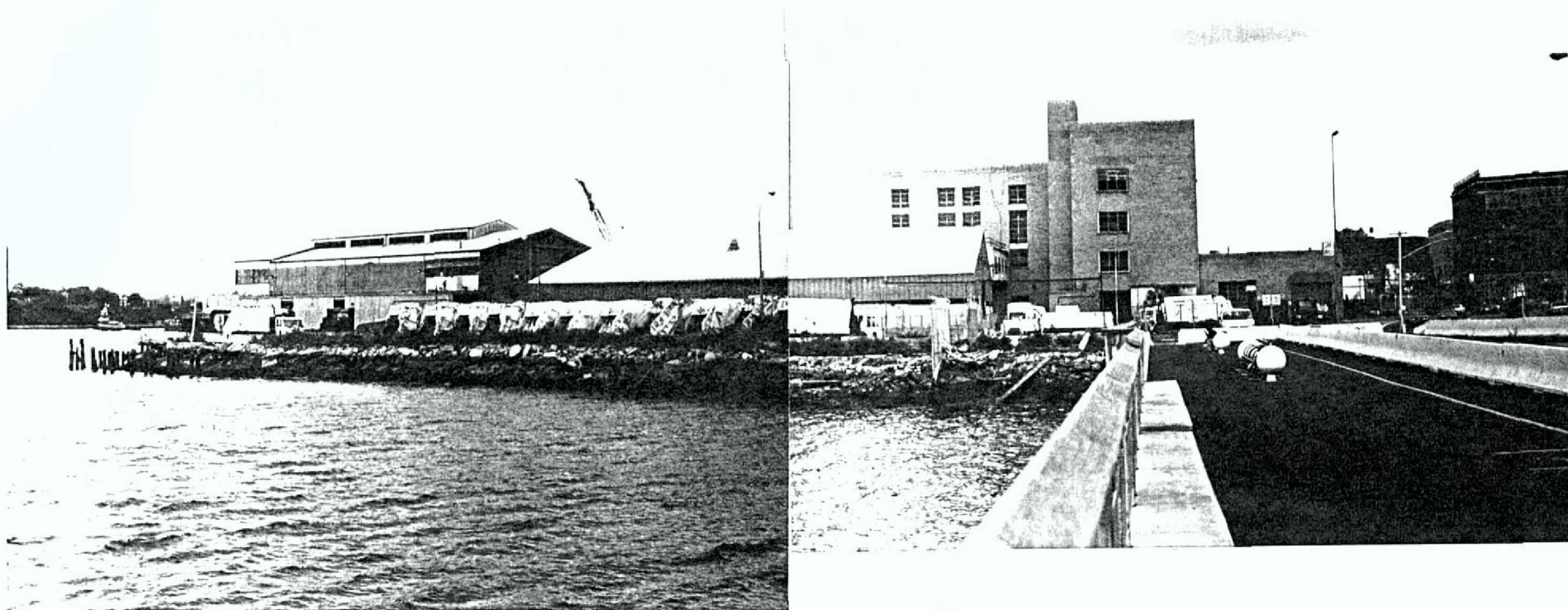


PHOTO F: Gansevoort peninsula, New York City Department of Sanitation facility and remnants of Pier 52. Facing north from Marginal Street.



PHOTO G: Pier 49 at Bank Street. Facing northwest from
Marginal Street.