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AKRF  
2009



**Topic Intensive Archaeological Documentary Study**

**WTC Vehicular Security Center and Tour Bus Parking  
Facility Streetbeds**

**Liberty Street between Greenwich Street and Route 9A, Cedar Street between  
Washington Street and Route 9A, and Washington Street between Cedar and  
Liberty Streets**

**New York, New York**

**Prepared for:**

Port Authority of New York and New Jersey  
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**December 2008  
(Revised February 2009)**

**1147**

## **Management Summary**

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**SHPO Project Review Number:** n/a

**Involved State and Federal Agencies:** Port Authority of New York and New Jersey

**Phase of Survey:** Topic Intensive Documentary Study

### **Location Information**

**Location:** Lower Manhattan: Liberty Street between Greenwich Street and Route 9A, Cedar Street between Washington Street and Route 9A, and Washington Street between Cedar and Liberty Streets

**County:** New York

### **Survey Area**

**Length:** Liberty Street: approximately 465 feet

Cedar Street: approximately 200 feet

Washington Street: approximately 350 feet

**Width:** Liberty Street: approximately 42 feet

Cedar Street: approximately 53 feet

Washington Street: approximately 40 feet

**Number of Acres Surveyed:** Approximately 1 acre

**USGS 7.5 Minute Quadrangle Map:** Jersey City

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**Date of Report:** December 2008 (Revised February 2009)

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#### A. PROJECT LOCATION AND DESCRIPTION

The Port Authority of New York and New Jersey (PANYNJ) proposes to construct the World Trade Center (WTC) Vehicular Security Center (VSC) and Tour Bus Parking Facility in lower Manhattan (see Figure 1). The development site is located in part of the World Trade Center (WTC) site, an approximately 16-acre parcel bounded by Liberty, Church, and Vesey Streets, and Route 9A, as well as two adjacent blocks to the south of the WTC site—Block 54, bounded by Liberty, Washington, Albany, and Greenwich Streets, and Block 56, bounded by Route 9A and Liberty, Cedar, and Washington Streets—which are collectively known as the “Southern Site” (see Figure 2 for project boundaries). The project site also includes the streetbeds of Liberty and Cedar Streets between Greenwich Street and Route 9A/West Street and Washington Streets between Cedar and Liberty Streets.

PANYNJ proposes to construct the VSC in cooperation with the United States Department of Transportation, and the Federal Transit Administration (FTA). PANYNJ and FTA prepared the EA to document the potential environmental effects of the Project in accordance with the National Environmental Policy Act (NEPA; 42 USC §§ 4321 et seq) of 1969 and the applicable regulations implementing NEPA as set forth in 23 CFR Part 771, 40 CFR Parts 1500-1508, and 49 CFR Part 622.

The proposed project would involve the construction of the VSC on the WTC Site, pursuant to U.S. Congress grant agreements with New York City that support transportation infrastructure in Lower Manhattan. The U.S. Congress committed \$21 billion to New York City following September 11, 2001 to support a variety of programs including clean-up and recovery efforts, economic aid to residents and businesses, survivorship benefits, human services and crisis counseling, health programs, and infrastructure (Public Laws 107-38, 107-117, and 107-206). This federal relief package contains four elements: FEMA assistance, Community Development Block Grants, Liberty Zone Economic Stimulus Package, and appropriations to specific agencies to fund programs for Lower Manhattan. The \$4.55-billion transportation recovery effort, which includes funds for this Project, is being administered through FEMA and the FTA. Although the grant package would be jointly funded, FTA is serving as the lead agency as agreed to in a Memorandum of Understanding (August, 2002) and subsequent correspondence between the agencies (November 18, 2002). This Topic Intensive Documentary Study was prepared in compliance with Stipulation III-B-1 of the Memorandum of Agreement (MOA) among FTA, the New York State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation, and PANYNJ regarding the WTC VSC and Tour Bus Parking Facility in New York City, New York (dated March 30, 2006).

The purpose of the project is to implement safety precautions to protect new public investments within and near the WTC Site using established safety measures to examine vehicles entering the WTC Site. The project would also include a tour bus parking facility that would alleviate the need for parking and/or idling on local streets. The sub-grade tour bus facility would improve the operation and efficiency of the WTC complex and would enhance accessibility and circulation within Lower Manhattan, in general.

The proposed action would involve enclosing the project site with an extension of the *bathtub* that was constructed when the WTC was built in order to keep water from entering the site during construction of the parking facility. Construction of this enclosure will consist of the excavation of an approximately 3-

foot-wide concrete wall that will extend from the ground surface to bedrock. The upper several feet of this wall will be wider, where two guide walls will be required. The wall will be built using a slurry process and soils will be excavated using a mechanical clamshell-type excavator. The wall will extend to the south from the existing bathtub along the western edge of the project site across Liberty Street to Cedar Street where it will head east along Cedar Street to Greenwich Street, where it will turn north and rejoin the existing bathtub at Liberty Street. In order to avoid possible impacts to historic structures south of the project site, tie backs will not be incorporated into the design. Instead, a series of "T" braces will support the wall from the interior. These wall segments will extend into the project site from the southern wall, along Cedar Street.

## B. PROJECT BACKGROUND

The majority of the VSC site has already been analyzed for archaeological sensitivity. The portion of the project area north of Liberty Street was analyzed in a Phase 1A Archaeological Assessment prepared in October 2003 for the *World Trade Center Memorial and Redevelopment Plan Generic Environmental Impact Statement (GEIS)* as well as in a Topic Intensive Study of the WTC Site, prepared by the Lower Manhattan Development Corporation for the GEIS in March 2004. Blocks 54 and 56 were analyzed by Historical Perspectives, Inc. (HPI) in a report entitled, *Phase 1A Archaeological Assessment: World Trade Center Memorial and Redevelopment Project, Southern Site, Block 54, Lot 1 Bounded by Greenwich, Liberty, Washington, and Albany Streets, and Block 56, Lots 15, 20, and 21, Bounded by Liberty, Washington, Cedar, and West Streets, New York, New York*. Block 56 was studied further by HPI in 2004, in a report entitled, *Topic Intensive Documentary Study: World Trade Center Memorial and Redevelopment Project Site, Block 56, Lots 15, 20, and 21, Bounded by Liberty, Washington, Cedar, and West Streets, New York, New York*. These documents were also summarized as part of the 2006 Environmental Assessment of the VSC site completed by PANYNJ.

Additional archaeological studies for areas adjacent to the VSC site were completed as part of the Permanent WTC Path Terminal Final Environmental Impact Statement (FEIS) and Section 4(f) Evaluation published by PANYNJ in May 2005. The FEIS included three archaeological assessments: Phase 1A Archaeological Assessment: World Trade Center Property Bounded By Church, Vesey, Liberty, and West Streets (HPI, October 2003), Topic Intensive Archaeological Study: World Trade Center memorial and Redevelopment Project Site, Block 58, Lot 1, Bounded by Church, Vesey, Liberty, and West Streets, New York, New York (HPI, March 2004), and Route 9A Reconstruction Project: Cultural Resources Summary Report (Vollmer Associates LLP and Allee King Rosen & Fleming, Inc., April 1996).

In addition, after the discovery of human remains in the vicinity of the Southern Site, anthropologists from the Office of the Chief Medical Examiner (OCME) conducted an excavation of the area in 2006 and 2007. Throughout most of the site, the excavation did not penetrate soil levels that were sensitive for historic period archaeological resources.

However, none of these studies analyzed the potential archaeological sensitivity of the streetbeds within the proposed project site. Therefore, the following Topic Intensive Documentary Study covers those streetbeds: Liberty and Cedar Streets between Greenwich Street and Route 9A/West Street and Greenwich and Washington Streets between Cedar and Liberty Streets. The findings of the reports referenced above are presented in Chapter 2.

## C. RESEARCH GOALS AND METHODOLOGY

The goal of this Topic Intensive Archaeological Documentary Study of the WTC Vehicular Security and Tour Bus Parking Facility is to determine the likelihood that potential archaeological resources have survived the destructive forces of time, including the construction of domestic and industrial structures in

## **Chapter 2: Summary of Previously Conducted Cultural Resources Investigations**

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the area. The study has been designed to satisfy the requirements of the New York City Landmarks preservation Commission (LPC) and SHPO, and it follows the guidelines of the New York Archaeological Council (NYAC). The study documents the history of the proposed project site as well as its potential to yield archaeological resources including both precontact and historic cultural remains. In addition, it also documents the current conditions of the project site and previous cultural resource investigations which have taken place in the vicinity of the APE.

Research was completed to establish a chronology of the project site's development from the beginning of the Historic period, when the majority of the project site was inundated by the Hudson River, through the present day. The development of the project site was examined to determine when, and, if possible, how the streetbeds were constructed from landfill as well as to identify potential uses of the land for anything other than as a street.

As part of the background research for this Archaeological Documentary Study, various primary and secondary resources were analyzed including historic maps and atlases, local histories, soil borings, and utility records. These published and unpublished resources were consulted at various repositories, including the Main Research Branch of the New York Public Library. Documents associated with OCME's excavation of the Southern Site were provided and reviewed, including soil borings, maps, and photographs. In addition, PANYNJ provided surveys depicting utilities and topographic information within the project site which were also analyzed for this study.

Numerous historic maps were used to identify the progression of the project site's landfilling over time. Digital copies of those historic maps were color corrected in Adobe Photoshop to maximize legibility and were subsequently georeferenced using Arc Info Mapping software to register as closely as possible with the modern street grid. Due to varying graphic techniques used in the historic maps, the focus of registration was the overall best fit between the historic and current street patterns. As such, there are varying degrees of cartographic accuracy for the historic maps. The degrees of distortion range from +/- 50 feet for the 1797 Taylor Roberts Map (Figure 6) to 10 feet for the 1852 Dripps map (Figure 8).

## **Chapter 2: Summary of Previously Conducted Cultural Resources Investigations**

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As previously mentioned, several cultural resources investigations have been conducted in the immediate vicinity of the project site, including several which included some or all of the streetbeds within the project site. A brief summary of each of these investigations and their findings is presented below.

### **A. ROUTE 9A RECONSTRUCTION FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS)—1994**

As part of the 1994 Route 9A Construction Project FEIS, an Archaeological Assessment was completed in March 1990 by Hartgen Archaeological Associates, Inc. in association with HPI for the New York State Department of Transportation (DOT) in cooperation with the Federal Highway Administration (FHA) and the City of New York. The study area for this project included a small portion of the VSC project site. The Route 9A study area also covered an approximately 45-foot section of Cedar and Liberty Streets beginning at the eastern line of Route 9A/West Street. The report concluded that as a result of the construction of the World Trade Center in the 1970s, any potential archaeological resources located within the streetbed of Liberty Street were destroyed. However, the report identified the streetbed of Cedar Street as being potentially sensitive for archaeological resources including landfill and landfill-retaining devices. Those landfill-retaining devices may have included "Lake's Wharf," Old Pier 14, and the Albany Basin (Hartgen 1990).

According to second-hand accounts, deeply buried wooden pilings or timbers were encountered and removed during excavation associated with the construction of Route 9A. Attempts to verify this information through E.E. Cruz / Nicholson, LLC were unsuccessful. PANYNJ staff also provided second-hand accounts of encountering deeply buried wooden elements during excavation associated with the installation of water lines between the WTC site and the Hudson River. A search for photographs of these objects or persons with direct knowledge of their location was unsuccessful.

### **B. WTC MEMORIAL AND REDEVELOPMENT PROJECT FEIS (2004) AND VSC EA (2006)**

As part of these projects, in 2003 HPI completed a Phase 1A Archaeological Assessment, *World Trade Center Memorial and Redevelopment Project, Southern Site; Block 54, lot 1 Bounded by Greenwich, Liberty, Washington, and Albany Streets and Block 56, Lots 15, 20, and 21 Bounded by Liberty, Washington, Cedar, and West Streets New York, New York*, for portions of the Southern Site: Block 54, Lot 1 and Block 56, Lots 15, 20, and 21. The report concluded that several of the historic lots within Block 56 were sensitive for archaeological resources dating to the Historic Period. Those resources, which were expected to be present at depths below that of the basements of the buildings formerly located on the site, could include landfill-retaining structures such as wharves and wooden cribbing and in some locations, domestic shaft features including cisterns, privies, and wells. The resources were expected to be at depths of approximately 10 feet below the ground surface, below the levels of the basements of the buildings that were formerly located on the site. However, Block 54 was determined to have no sensitivity for archaeological resources as a result of excavation and grading associated with the construction of structures on the block. Finally, the Phase 1A study determined that the streetbeds of Liberty, Washington, Cedar, and Albany Streets were sensitive for landfill retaining structures such as wharves or cribbing below the depths of modern utilities.

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After the completion of the Phase 1A Archaeological Assessment, a Topic Intensive Documentary Study of the lots identified as sensitive within Block 56 was prepared by HPI in 2004 (*Topic Intensive Archaeological Study: World Trade Center Memorial and Redevelopment Project Site; Block 56, Lots 15, 20, and 21 Bounded by Liberty, Washington, Cedar, and West Streets New York, New York*). The topic intensive research identified long-term (more than 5 years) residents on each of the sensitive lots prior to the installation of utilities. However, three of the eight lots previously identified as sensitive were determined to have low archaeological sensitivity because they had not been occupied by residential structures and were therefore not likely to contain shaft features such as privies, cisterns, and wells. For the remaining sensitive lots, resources were expected beginning at depths of 10 to 15 feet below grade.

### **C. MEDICAL EXAMINER'S COMPREHENSIVE SEARCH FOR HUMAN REMAINS—2006-2007**

In October 2006, after the discovery of human remains near the WTC site during an excavation by the Consolidated Edison Company of New York (ConEd), the office of the Mayor of the City of New York ordered a comprehensive search for additional human remains in the vicinity, including in the streetbeds of Liberty and Cedar Streets. The comprehensive search took place in late 2006 and early 2007 and was undertaken in part by the Office of the Chief Medical Examiner of the City of New York (OCME), the Department of Design and Construction (DDC), and the Lower Manhattan Construction Command Center (LMCCC). The search involved the excavation of Block 56 and small portions of the adjacent streetbeds to depths sensitive for historic period archaeological resources. However, the excavations did not penetrate those sensitive levels. Although Block 56 was extensively searched, the streetbed of Liberty Street was not because it had been determined that as a result of the post-September 11 reconstruction of the streetbed between West and Greenwich Streets by ConEd, Verizon, and DDC, the streetbed was clear of WTC debris and potential human remains (Burney and Maikish 2006).

Information provided to AKRF by OCME shows that the majority of Liberty Street was not excavated, although the sidewalk lining the southern side was investigated. These excavations showed that many utility lines including large conduits run through the area. Utilities within the streetbeds of Liberty, Cedar, and Washington Streets are discussed in greater detail below.

## **Chapter 3: Environmental and Physical Settings**

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### **A. TOPOGRAPHY**

Before the arrival of European settlers in New York, the shoreline of the Hudson River ran to the east of the line of modern Greenwich Street. Therefore, the project site was at this time completely inundated by the Hudson River and its elevation was approximately at sea level.

Soil borings (described in greater detail below) indicate that the bedrock underlying the project area is situated approximately 50 feet below ground surface (bgs) near Washington Street and that it slopes down to approximately 60 feet bgs near West Street. Research on the Paleo-shoreline of Manhattan summarized by HPI in 2003 indicates that approximately 6,000 years ago, a bay was located along the original shoreline between modern Cedar Street to a point north of the WTC site which extended to a depth of approximately 40 feet below current sea level.

As seen in Table 1, the elevations of the streetbeds within the project site have changed only slightly since the late-19th century. However, after the reconstruction of portions of the streetbeds after the September 11 attacks, several feet of rock, soil, and cement may have been added to certain areas, burying the original road surface (Burney and Maikish 2006). These changes are likely associated with modern development including grading, paving, and the installation of utilities which likely have disturbed the streetbeds to depths of at least 5 feet below the current ground surface.

**Table 1**  
**Street Elevations Through Time**

Year/ Source	Elevation above sea level at intersection of:					
	Liberty and West Streets	Liberty and Washington Streets	Liberty and Greenwich Streets	Cedar and West Streets	Cedar and Washington Streets	Cedar and Greenwich Streets
1885 Robinson Atlas	Not given	5.8	10	Not given	5.5	7.9
1891-1911 Bromley Atlases	3.8	5.10	10	4	5.6	Not given
1923-2007 Sanborn maps	4	5	11	3	5	11

### **B. SOIL BORINGS**

In their 2003 Phase 1A study of the Southern Site, HPI generated a typical geological profile of the area based on data obtained from soil borings conducted during different periods in the 20th century (most dated to the 1960s and 1970s, during the construction of the WTC, the West Side Highway, and Battery park City). That profile included five levels: 1) at the very bottom (beginning at approximately 50 to 60 feet bgs) was a level of bedrock; 2) above the bedrock throughout much of (though not all of) the project site was a layer of decomposing rock, gravel or boulders measuring between 5 and 25 feet; 3) directly above the decomposing rock was a layer of coarse sand measuring between 5 and 10 feet thick, representing the original ground surface before the Hudson River began to flow through; 4) above the coarse sand was a layer of silt ranging in thickness from 7 to 30 feet, which was the original floor of the Hudson River before historic landfilling episodes; and 5) the landfilling process then added

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approximately 15 to 20 feet of fill above the silty deposits. The layers of fill were shallowest near Greenwich Street, the approximate location of the original Hudson River shoreline, and got deeper toward the west. HPI also states that reconstruction of the shoreline of Manhattan also revealed that there may have been a bay extending northward from Cedar Street in the vicinity of the project area.

A series of soil boring samples taken in the vicinity of the project site by PANYNJ in 2005 presents a profile similar to that identified by HPI in 2004 (see Table 2). However, in some cases, a sixth level of modern fill was clearly identifiable, separated from the historic fill with a layer of cement or 20th century debris (i.e. PVC pipes).

**Table 2**  
**Soil Profiles Based on Soil Boring Samples from 2005**

Profile Level	Approximate depths of profile levels (in feet) by location:						
	Washington Street near Liberty Street (Boring 580)	Washington Street near Cedar Street (Borings 583 and 584A)	Liberty Street at Greenwich Street (Boring 540)	Liberty Street at West Street (Borings 570 and 570B)	Cedar Street at Washington Street (Boring 577A)	Cedar Street between Washington and West Streets (Boring 574/574B)	
1 (Bedrock)	50 to 70	50 to 70	60 to 80	68 to 80	55 to 75	53.5 to 74	60 to 85
2 (Glacial Deposits)	45 to 50	Beginning between 24 and 40 feet bgs and extending to 50 feet bgs	20 to 60	46 to 58	44 to 53.5	44 to 53.5	47 to 60
3 (Pre-River Surface)	35 to 45				32 to 44	32 to 44	
4 (Original River Bottom)	30 to 35		16 to 20	20 to 46	20 to 32	26 to 32	38 to 47
5a (Historic Landfill)	0 to 30	9 to between 24 and 40	0 to 16	0 to 20	0 to 20	5 to 26	11 to 38
5b (Modern Fill)		0 to 9 feet (separated by air pocket)		Boring 570 only: 0 to 14 (contains cement, PVC, and telephone wire)		0 to 5 (contains concrete)	0 to 11 (separated by a layer of concrete)

**Notes:** Depths are approximate and are in relation to the 2005 ground surface, not all profile levels could be identified in all soil boring logs and are therefore combined in this table.

**Sources:** PANYNJ Soil Borings, 2005.

**A. GENERAL HISTORY OF THE PROJECT SITE AND VICINITY**

In 1621, the States-General in the Netherlands chartered the Dutch West India Company (WIC) to consolidate Dutch activities in the New World. As a result of the trading networks which flourished there after the Dutch colonized it, New Amsterdam, as the settlement was then known, quickly became filled with people of diverse national origins and cultural traditions. New Amsterdam functioned as the major center for commercial activity from Fort Orange in Albany on the upper Hudson River to the Delaware Bay in the south. In 1626, the Dutch purchased the Island of Manhattan from the Munsee for good valuing sixty guilders. On February 2, 1653, New Amsterdam's municipal charter was officially proclaimed, establishing a city government similar in form and function to that of Amsterdam in Holland. This municipal framework remained unchanged throughout the 17th century.

Almost immediately, the Dutch set about to alter their landscape. To combat erosion, a seawall was constructed in the 1650s, which extended to the palisade wall at present-day Wall Street. After the English conquest of New Amsterdam in 1664, the colony was renamed New York and development of the waterfront continued. The Dongan Charter of 1680 had the most profound effect upon the transformation of the waterfront. This charter permitted the city government to raise money by selling water lots, "or the right to build wharves and 'make land' out into the rivers between the low and high watermarks, a distance of 200 feet" (Cantwell and Wall 2001: 225). These lots would be sold in the same manner as lots composed of solid ground. The Montgomery Charter of 1731 extended the range to 400 feet, well beyond the low water mark. The new owners of these lots were charged with filling them in and with building wharves, piers, and/or bulkheads along the shore to prevent further erosion caused by the swift river current.

As seen on Viele's 1865 map, before landfilling activities in the 18th and early 19th centuries the Hudson River shoreline ran to the east of the line of modern Greenwich Street. The process of creating land along the seashore not only increased the surface area of the island of Manhattan, but by extending the shoreline beyond the shallow water near the natural shore, ships could dock at landside wharves instead of anchoring out in the river. Furthermore, the waterfront's close proximity to the trade ships led to the construction of markets, storefronts, warehouses, and other commercial structures along the shoreline at distances that were "conveniently close to landings where farmers could moor their boats and unload livestock and produce for sale" (Cantwell and Wall 2001: 226). In this way, land-making had a crucial impact on the development of New York's burgeoning economy.

After the Revolutionary War, Americans developed new appetites for imports such as tea and porcelain. By the 1790s, merchants had established far-reaching networks for both domestic and foreign trade. The East River waterfront maintained a prominent role in the shipping industry until the 19th century, when the advent of steam-powered ships forced the focus of New York's trade economy to shift to the deeper waters of the Hudson River. As late as 1797, maps show that the Hudson River shoreline was filled only to modern Washington Street while piers and wharves stretched out into the river from waterfront properties. However, by 1827, Liberty and Cedar Streets had been filled out as far as West Street, and by the mid-19th century, nearly all of the Hudson River shoreline in Lower Manhattan had been filled out as far as West Street and developed.

In 1879, there were four times as many sailing vessels arriving in New York from abroad as compared to steamships, but the latter—now too large for East River piers—had taken over the lucrative fine cargo and passenger businesses which soon followed the steamships to the west side of Manhattan.

## B. DEVELOPMENT OF THE STREETBEDS IN THE PROJECT AREA

The Dutch colony of New Amsterdam grew slowly during the 17th century and little development in the vicinity of the project site was documented for this time. In 1613, the fur trading ship captained by Adrian Block, the *Tijger*, burned and was abandoned along the shoreline and became incorporated in the landfill.<sup>1</sup> As seen on the “Manatus Map” depicting Manhattan circa 1639 and Innes’ map (drawn in 1902) depicting the island in 1644, the colony grew steadily during the 17th century, although most of the development was concentrated at the tip of Manhattan and along the East River shoreline. In the mid 1680s, Peter Mesier constructed a house and windmill in the vicinity of Church Street between Liberty and Cortlandt Streets. This was the first major development in the vicinity of the project site.

Landfilling along the Hudson River and in the vicinity of the project site truly began at the turn of the 18th century. Between 1699 and 1701, Meisner was among a group of individuals granted water lots along the Hudson River in the vicinity of the area now bounded by Greenwich, Washington, Cedar, and Cortlandt Streets (Buttenwieser 1987). The water lots were soon filled by “individuals with disparate interests [who] broadened their local residential and commercial holdings” through the creation of land (*ibid*: 32). Those individuals included “John Rodman, dock owner, John Hutchins, proprietor of the Coffee House Hotel, and William Huddleston, founder of the Trinity School [who] added some fill and rudimentary docks” along the shoreline in the vicinity of the project site (*ibid*).

Despite the landfilling near the project site, the remainder of the Hudson River shoreline remained relatively unchanged during the early- to mid-18th century despite the fact that landfilling rapidly extended the shore of the East River. A map of Manhattan created by James Lyne in 1730 (Figure 4) shows that piers stretched from the Hudson River shoreline in the vicinity of modern Cortlandt, Liberty (then called “Crown Street”), Cedar (then known as “Little Queen Street”), and Albany Streets.<sup>2</sup> In fact, Liberty, Cedar, and Albany Streets were the only streets in the area that stretched as far as the shore. The map identifies the pier at what was then the foot of Cedar Street as “Ellison’s Dock.” This dock does not appear to have entered the project site, however, and at that time, only portion of the project site had been filled in. The map shows a small slip bordered on the north and south by docks at what was then the foot of Liberty Street, then just east of Greenwich Avenue.

Even though the city’s economy centered on East River, the relatively few wharves and piers along the Hudson River were important to the economy of the larger colony, as the Hudson was used to transport goods and people from Manhattan to the northern reaches of New York. This was especially important during the French and Indian War, when the pier at what was then the foot of Liberty Street became “the general landing and starting place” where “enlistment soldiers, battoes, [and] provisions” were shipped from Manhattan to upstate New York (DeVoe 1862: 271). Because many provisions were shipped between Broadway Market (at Liberty Street and Broadway) and Fort Oswego, along the river to the north, in the early 1740s the market became known as “Oswego Market” and the docks at the foot of Liberty Street as the “Oswego Landing” (Stokes 1967).

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<sup>1</sup> More than 300 years later, during the construction of the No. 1 subway line, the remains of a wooden ship thought to be the *Tijger* were found beneath Greenwich Street near Dey Street. During excavation for the construction of the WTC in the 1960s, archaeologists attempted to find the rest of the ship, but were unsuccessful (Cantwell and Wall 2001).

<sup>2</sup> The street names were changed to “Liberty” and “Cedar” in 1794 (Stokes 1967).

Additional landfilling had occurred by 1755, at which time city surveyor Francis Maerschlack published a map of Lower Manhattan. The map depicts projected landfilling in addition to that which had already been completed by the time the map was created. It is the first map to depict the approximate lines of the future Greenwich, Washington, and West Streets, the construction of which was first proposed by the 1730 Montgomery Charter, but which were not actually completed in this area until many decades later.

Ratzer's 1776 map depicting the city as it existed in 1766 (Figure 5) more accurately depicts the state of the waterfront in the mid-18th century. Ratzer's map shows that Liberty Street had been filled out to a point midway between modern Greenwich and Washington Streets, where it ended in a small slip bounded on the north and south by piers that stretched further out into the Hudson River. Cedar Street at the time was filled out to a point just west of Greenwich Street, while an L-shaped pier just north of the line of Cedar Street, in the location of the former Ellison's Wharf, extended out to the west of Washington Street. This pier does not appear to have been located within the streetbed of Cedar Street, but would have crossed that of Washington Street.

The *Minutes of the Common Council* show that in the late-1760s and early 1770s, what was then the streetbed of Cedar Street was regulated and graded to create a flat road surface throughout the length of the street. In some locations, the street was graded down several feet while fill was added in other areas. However, it was determined that along a 412-foot stretch of the road between the Oswego Market and the Hudson River, the grading should not be as extensive as in other portions of the streetbed, as it might have caused damage to the houses lining the street (*MCC 1675-1776 VII: 315*).

Towards the end of the 18th century, the project site was filled out to a point just west of modern Washington Street. McComb's 1789 map of Manhattan shows the extent of this development although it suggests that no piers extended from the foot of either Liberty or Cedar Streets at this time. This map is also the first to depict the beginning of Washington Street in this area. The *Minutes of the Common Council* show that in 1795, the Council ordered that West Street finally be constructed, although it was not actually built in the vicinity of the project site until the early 19th century.

The Taylor-Roberts Plan (Figure 6) shows that by 1797, additional landfilling and pier construction had taken place, extending the lines of Liberty and Cedar Streets further out into the Hudson River. The map shows that a small slip was located at the foot of Liberty Street and that the pier lining the south of the slip was known as "Lindsey's Wharf," (later renamed "Barden's Wharf" [Stokes 1967]). This wharf extended along the line of modern Liberty Street almost as far as Route 9A.

Along the approximate line of Cedar Street (or perhaps just south of it), the 1797 map shows an L-shaped pier known as "Lake's Wharf" extended almost to the line of modern West Street. To the south of this wharf was the new "Albany Basin;" the original Albany Basin had been located at the tip of Manhattan earlier in the colony's history. The piers of the basin were constructed between 1791 and 1796 (Stokes 1967). In 1804, the Common Council ordered additional distance between the lines of West and Washington Streets, increasing the distance between the two roads from 160 feet to 200 feet (HPI 2003). That same year, water lots along the northern side of Cedar Street were granted to Bernardous Swartwout and water lots along the southern side of Liberty Street were granted to George Lindsey (*ibid*). Both men owned other land and/or water lots in the area, as depicted on the 1797 Taylor-Roberts map.

By 1811, at which time William Bridges published a map reflecting the City's newly proposed street grid, the lines of West, Washington, and Greenwich Street had been proposed, interrupted only by the Albany Basin located between Cedar and Pine Streets to the south of the project site. In addition, the map shows the projected development of both Liberty and Cedar Streets as far west as West Street. A street map published by William Hooker shows that in 1824, both Liberty and Cedar Streets were filled out to the eastern line of West Street, although none of the streets, especially West, Washington, and Greenwich Streets, were uniform and of consistent widths, as originally projected by Bridges' map. In 1830, Liberty

## Chapter 4: Historic Period Summary

and Cedar were among several streets that were widened that had “formerly threaded their sinuous courses between piles of rookeries, but are now enlarged and graced by splendid rows of stores and dwelling-houses” (Stokes 1967 V: 1690). By the mid-1830s, the rest of the streets in the area had also been adjusted, as seen on Colton’s 1836 map (Figure 7). The Dripps map of 1852 (Figure 8) depicts all the streetbeds within the project site as completely filled and lined with structures. No maps dating to the late-19th century through the mid-20th century depict any significant alterations to the streetbeds during that time other than the installation of new utilities (discussed in greater detail below). The widths of the project site streetbeds have remained largely consistent over time, with only minor fluctuations in street width (see Table 3, below).

**Table 3**  
**Street Widths**

Year/ Source	Liberty Street	Cedar Street	Washington Street
1857 Perris Map	45 feet near between West and Washington Streets  50 to 53 feet between Washington and Greenwich Streets	53 feet	Varies between approximately 40 and 45 feet
1885 Robinson Atlas	50 feet	Approximately 54 feet	Approximately 50 feet
1894 Sanborn Map	54.6 feet	54.6 feet	Approximately 50 feet
1923 and 1951 Sanborn Maps	54 feet near between West and Washington Streets  60 feet between Washington and Greenwich Streets	53 feet	Approximately 50 feet
2007 Sanborn Map	42 feet	53 feet near between West and Washington Streets  De-mapped between Washington and Greenwich Streets	Approximately 40 feet

In the 1960s, PANYNJ planned and constructed the WTC on an approximately 16-acre site that included the area bounded by Church Street, Liberty Street, Route 9A, and Vesey Street. As part of the construction of the WTC, deep excavation took place to create the “bathtub” foundation surrounded by the slurry walls bordering the site. The southernmost slurry wall is located along the northern line of Liberty Street. Maps provided by OCME indicate that the slurry wall is located approximately 42 feet north of the northern line of Block 56. Current Sanborn maps also suggest that the WTC site (i.e. the slurry wall) begins 42 feet north of Block 56.

### **C. UTILITIES WITHIN PROJECT AREA STREETBEDS**

#### **HISTORIC UTILITIES**

Despite its status as one of America’s largest and most industrious cities, New York did not have running water or a network of sewers until the mid-19th century. The first water pipes in New York City were installed by the Manhattan Company, the precursor to the Chase Manhattan Bank. These wooden pipes carried water from local sources (i.e., the Collect Pond) to other areas of lower Manhattan. In general,

early water pipes were installed relatively close to the surface, at only two or three feet below grade, so that firemen could access them easily (Geismar 2004).

The initial water supply system could not be sustained for very long before local water resources became too polluted. In 1842, the Croton Aqueduct system was constructed in order to bring clean water into Manhattan. The earliest evidence of utilities located within the streetbeds of the project site is Endicott's 1842 *Map of the Croton Water Pipes with the Stop Cocks*. The map shows that Croton water pipes were installed within Liberty and Cedar Streets as far west as West Street. As reported in HPI's 2003 Phase 1A Study, documents published by the Croton Aqueduct Board show that sewers were installed within Liberty and Cedar Streets by 1845 and in Washington Street by 1859 (HPI 2003). The Minutes of the Croton Aqueduct Board from the 1850s and 1860s also document many instances when early utilities including sewers, water pipes, stopcocks, fire hydrants, and culverts/receiving basins, were installed, repaired, and/or replaced within the project site streetbeds. The streets also contained sewers and gutters designed to carry away street refuse, however, the Minutes note that they were frequently clogged and overrun with garbage.

### MODERN UTILITIES

All of the project site streetbeds contain multiple utility lines. Modern water lines are usually installed at a depth of four or five feet, while sewer lines are placed at a depth of 8 to 10 feet or more. Other utilities such as electrical, telecommunications, and gas lines are usually found at depths of 2-3 feet. On-going archaeological monitoring that is currently taking place as part of the VSC project has shown that utilities extend to a depth of 15 to 20 feet in the northern portion of the project area along West Street and it is possible that utilities are at similar depths in other portions of the project site.

#### *LIBERTY STREET*

Within the project site, Liberty Street contains the most utilities, covering the entire width of the streetbed and its adjacent sidewalks. The majority of these are telecommunications and electrical lines, although a combined sanitary and stormwater sewer runs parallel to and approximately 7 feet south of the slurry wall within the northern side of Liberty Street. Utility maps provided by PANYNJ show that this sewer line extends to a depth of approximately 9 feet below grade. A water line runs parallel to the sewer, approximately 15 feet south of the slurry wall. In several locations perpendicular water connections connect this water line to the blocks to the south. Many manholes and electrical vaults are also present within the streetbed of Liberty Street. In addition, large PVC utility conduits run east-west through Liberty Street. These conduits were identified during OCME excavations within the southern side of Liberty Street, north of the street's southern sidewalk.

#### *WASHINGTON STREET*

A water line runs perpendicular to Liberty Street line through Washington Street. Several electrical and telecommunications lines run parallel to this water line through Washington Street, although significantly fewer than in other portions of the project site. No sewers run north-south through the street, although a line running east-west along Cedar Street enters the streetbed of Washington Street. Several utility vaults are present in the streetbed of Washington Street.

#### *CEDAR STREET*

As previously mentioned, a sewer runs east-west through Cedar Street. At Washington Street, this sewer extends to a depth of approximately 9.6 feet, but its depth decreases to the west and near the intersection of Cedar and West Streets it extends to a depth of approximately 7.5 feet. A water line runs parallel to and approximately 5 feet south of this sewer line. There are several telecommunications and electrical lines

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#### **Chapter 4: Historic Period Summary**

and a gas main that run through the streetbed as well, although far fewer than in Liberty Street. Finally, several vaults are present within this streetbed, as well.

**A. DISTURBANCE ASSESSMENT*****LIBERTY STREET BETWEEN WEST AND GREENWICH STREETS***

The northern side of Liberty Street was disturbed heavily during the construction of the WTC slurry wall. The construction of the slurry wall required excavation to the depth of bedrock in this area, which is approximately 42 feet to the north of Liberty Street's southern boundary (the northern line of Blocks 54 and 56). Approximately 5 feet to the south of the slurry wall is a sewer line which would have generated approximately 10 feet of disturbance. The remainder of the streetbed has been disturbed to a depth of at least 5 feet as a result of grading and paving and the installation of water, telecommunications, gas, and electrical lines.

***CEDAR STREET BETWEEN WEST AND WASHINGTON STREETS***

A sewer line runs east-west through the center of Cedar Street which would have resulted in the disturbance of at least 8 to 10 feet in the immediate vicinity of the sewer. The remainder of the streetbed is expected to be disturbed to a depth of at least 5 feet as a result of grading and paving and the installation of water, telecommunications, gas, and electrical lines.

***WASHINGTON STREET BETWEEN LIBERTY AND CEDAR STREETS***

The streetbed of Washington Street is assumed to be disturbed to a depth of at least 5 feet as a result of grading and paving and the installation of water, telecommunications, gas, and electrical lines. The depth of disturbance in the vicinity of the Cedar Street sewer is expected to be approximately 10 feet.

**B. PRECONTACT SENSITIVITY ASSESSMENT**

The project site was entirely inundated by the Hudson River before the time of European contact. While sea levels were lower during the initial phases of precontact occupation of the northeastern United States and it is possible that Native Americans may have at one point utilized the vicinity of the project site, there is little likelihood that any archaeological resources associated with that occupation could have survived intact during the thousands of years since the river's currents began flowing over the land. Therefore, the project site is determined to have no sensitivity for precontact archaeological resources.

**C. HISTORIC SENSITIVITY ASSESSMENT**

The project site is located within an area of landfill that was gradually completed between the early 18th century and the early- to mid-19th century. The streetbeds are therefore likely to contain both landfill sediments and landfill retaining structures, most of which would have originally been constructed as wharves, docks, or piers. The streets may also contain evidence of early infrastructure, such as wells, pumps, cisterns, drains, street or sidewalk vaults, or wooden water pipes. The area of archaeological sensitivity within the streetbeds is beneath the depth of modern utilities as deep as the level of the historic river bottom, as identified in soil borings. Throughout the project site, the first five feet below grade have been disturbed by the grading and paving of the streets and the installation of shallower utilities. In the locations of sewers, the depth of disturbance is expected to be approximately 8 to 10 feet.

The original shoreline was situated near modern Greenwich Street and the historic river bottom was shallower along the shoreline and got increasingly deeper to the west. Therefore, the depth of archaeological sensitivity also increases to the west of Greenwich Street. Within the streetbed of Liberty Street, archaeological resources are expected to be encountered at depths between 5 and 20 feet near Greenwich Street, between 5 and 30 feet at Washington Street, and between 5 and 46 feet at West Street. Within Cedar Street, archaeological resources are expected at depths between 5 and 32 feet at Washington Street and between 5 and 47 feet at West Street. Archaeological resources within Washington Street are expected at depths between 5 and 30 to 32 feet throughout.

Landfill retaining structures built along the New York City waterfront prior to the mid 19<sup>th</sup> century were most often built of stacked horizontal timbers constructed in a manner similar to log houses. They were most often notched at the corners to create a box like 'crib' form. Less frequently fill retaining structures were built as log-construction retaining walls, timber-pile bulkhead walls, or stone seawalls. Additional archaeological data on the construction of landfill retaining devices could provide insight on the chronological and geographical variations in construction techniques.

The fill material with which these devices were filled may also yield significant data, and may enable archaeologists to date the features. Archaeologists have theorized two broad categories of fill strata: primary fill and secondary fill. Primary fill, the first-deposited, and largest of the stratum, would be the landfill placed within the cribbing interstices. Few artifacts are to be expected in this stratum (aside from the support structure and clean fill itself, which are technically artifacts), because through time, decaying, artifact-rich garbage would compress unevenly, settle at varying rates, and cause instability. Although the activity is poorly documented, various references suggest that clean landfill material was generally obtained from regrading and construction projects in other parts of Manhattan. Secondary fill is utilized to cover the rough and rocky primary landfill, providing a working surface for construction. It contains less rock than primary landfill, and is where most of the artifacts recovered by excavations are found. This corresponds to recorded historical observations of the filling of water lots by their owners.

#### **D. RECOMMENDATIONS**

Expected resources are located at varying depths within the project site (see Figure 9 for areas of archaeological sensitivity<sup>1</sup>) and are expected to extend well below the water table throughout the entire project site. It will therefore be difficult to directly examine these resources prior to the construction of the slurry wall and the removal of water from the project site. Monitoring is recommended during excavation for the construction of the slurry wall within the depths identified as sensitive for historic resources. As construction has already commenced, a monitoring plan has been prepared and archaeologists from AKRF have been monitoring excavation at the site. This monitoring plan has been prepared in compliance with the 2006 MOA Stipulation III-B-3. As soils are excavated using a mechanized clamshell excavator, they will be deposited on the ground surface adjacent to the trench. This provides an opportunity for the archaeologists to observe and document the types of resources excavated and their depth and location. Ideally, this monitoring will lead to the identification of the types of resources likely

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<sup>1</sup> This map includes areas of archaeological sensitivity for the entire VSC project site as identified in this report as well as in HPI's *Phase 1A Archaeological Assessment: World Trade Center Memorial and Redevelopment Project, Southern Site, Block 54, Lot 1 Bounded by Greenwich, Liberty, Washington, and Albany Streets, and Block 56, Lots 15, 20, and 21, Bounded by Liberty, Washington, Cedar, and West Streets, New York, New York* (2003) and *Topic Intensive Documentary Study: World Trade Center Memorial and Redevelopment Project Site, Block 56, Lots 15, 20, and 21, Bounded by Liberty, Washington, Cedar, and West Streets, New York, New York* (2004).

present and the development of specific goals and strategies for more fully examining them after the completion of the slurry wall and the de-watering of the site sometime in the future.

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## Figures

12.16.08



Location of Project Site USGS Map,  
Brooklyn and Jersey City Quadrangles

**Figure 1**

**WTC** Vehicular Security Center and Tour Bus Parking Facility

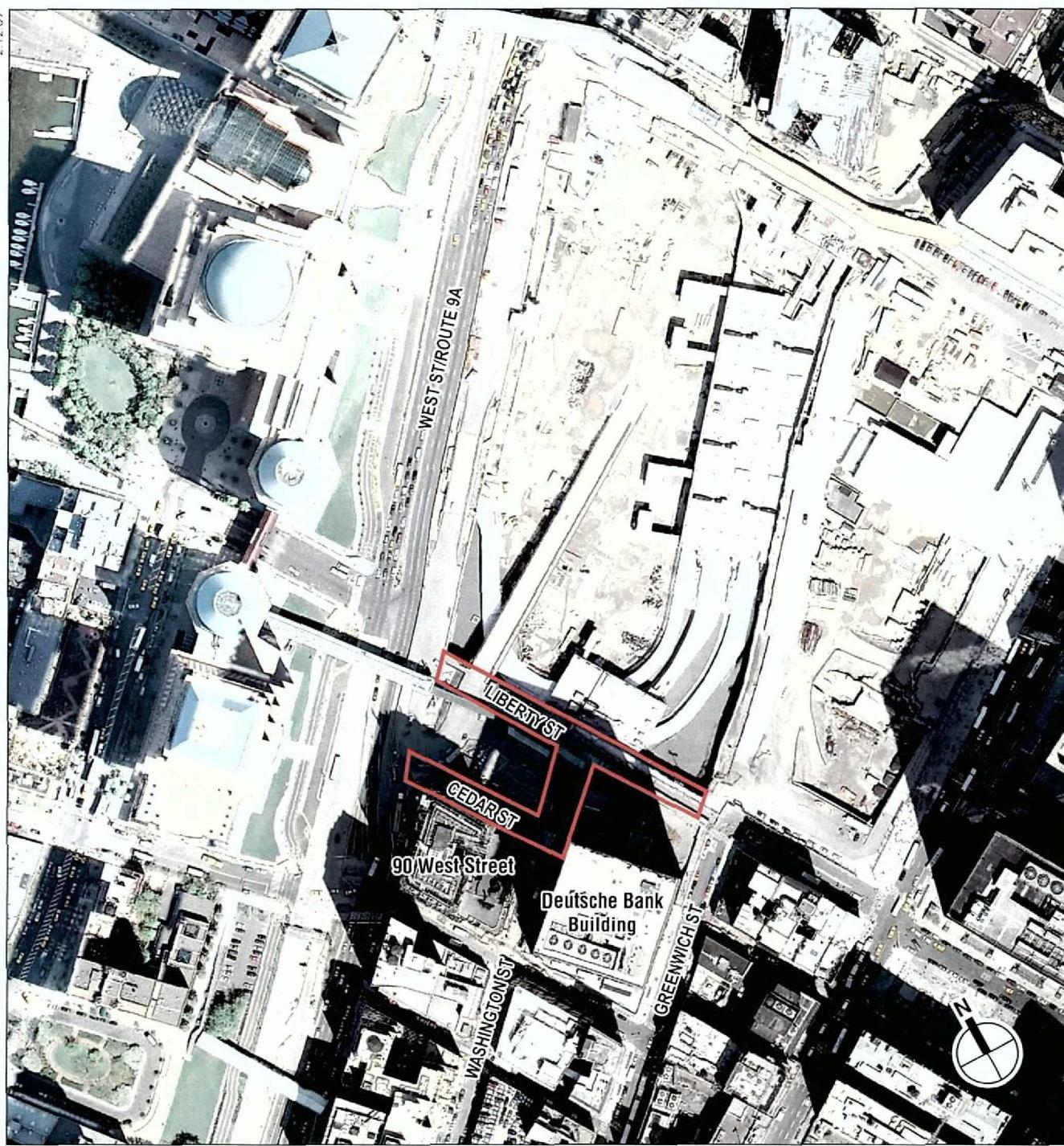
2.11.09



Project Site Boundaries.  
Sanborn Map, 2006  
**Figure 2a**

**WTC** Vehicular Security Center and Tour Bus Parking Facility

2.12.09



Project Site

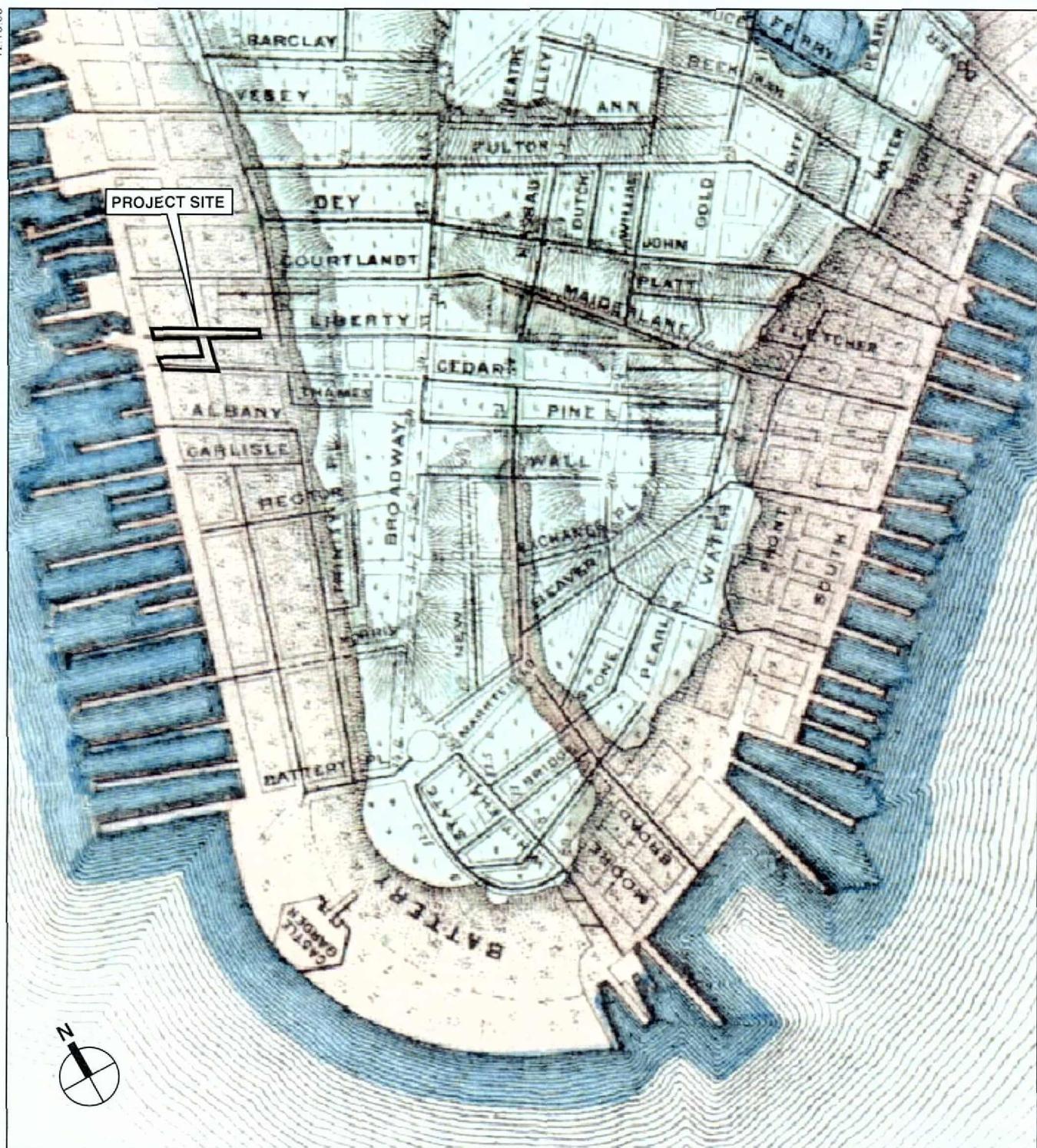
0 200 FEET  
SCALE

Orthoimagery Source: U.S. Geological Survey, 2006, from photo taken March, 2004.  
Original orthoimagery was a cooperative effort between CUNY, Hunter College and  
the New York City Department of Information Technology and Telecommunications (DoITT)

**WTC** Vehicular Security Center and Tour Bus Parking Facility

Aerial Photograph of the VSC Project Site  
**Figure 2b**

12.16.08



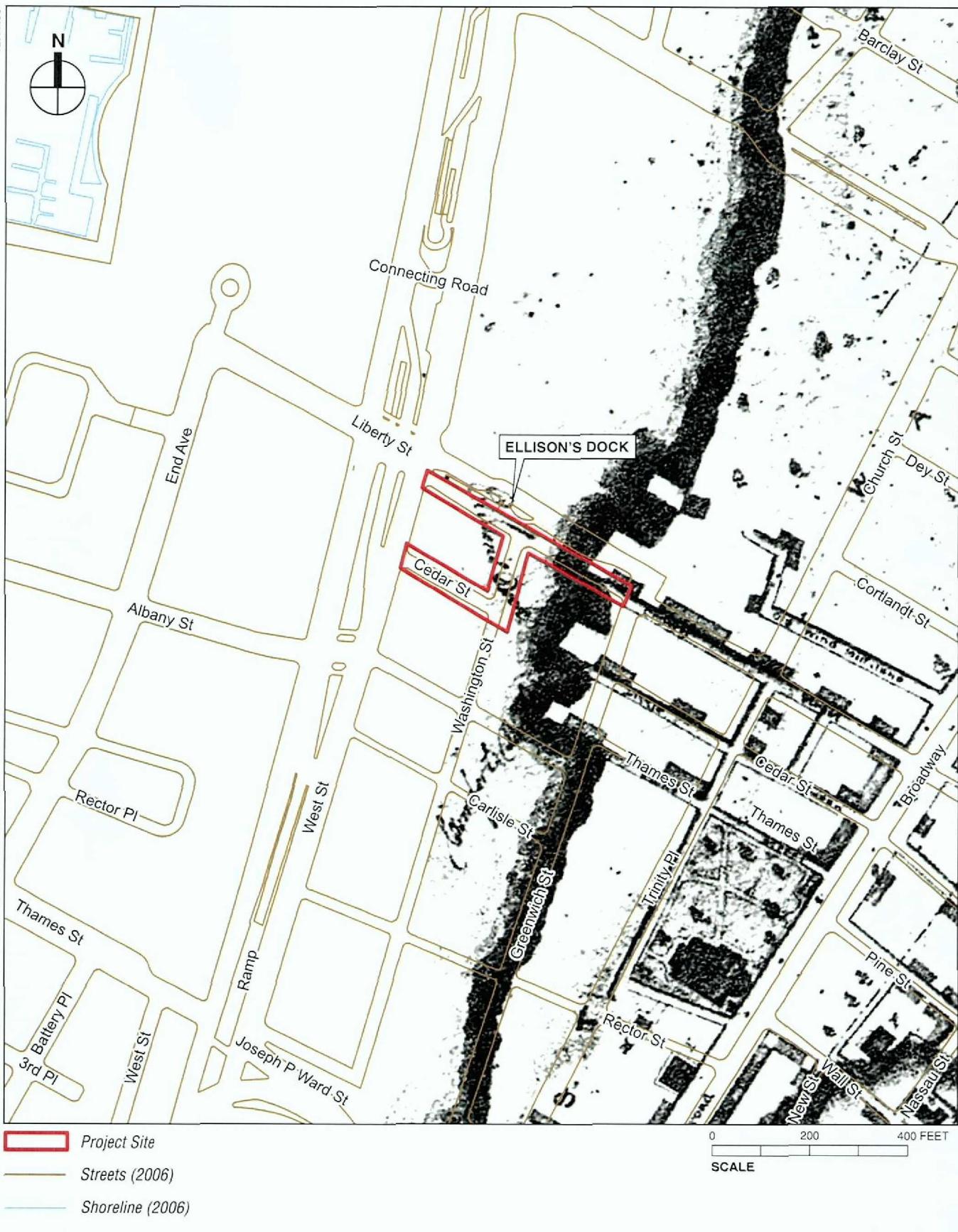
Sanitary and Topographical Map of the City and Island of  
New York. E. Viele, 1865

**WTC** Vehicular Security Center and Tour Bus Parking Facility

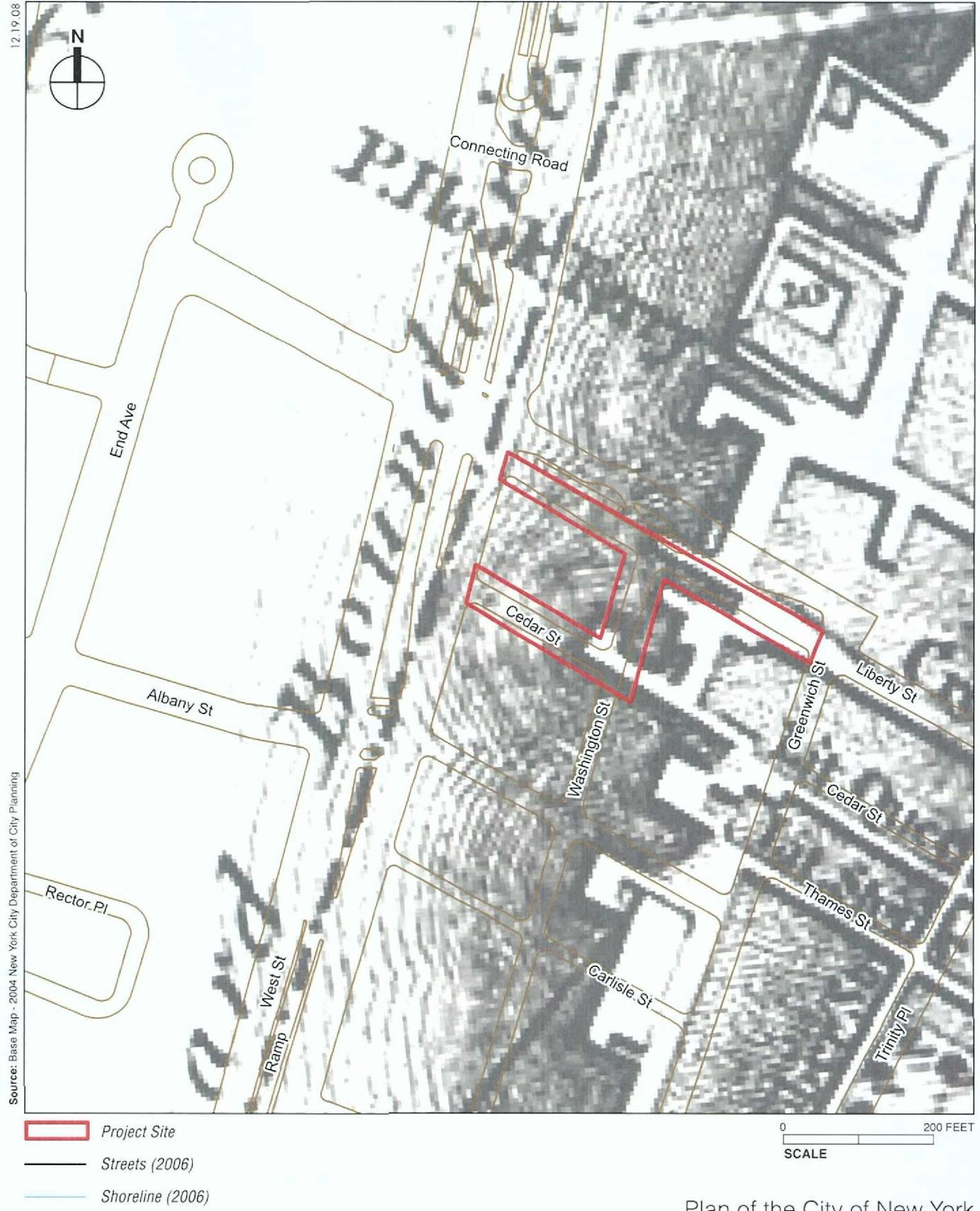
Figure 3

**Source:** Base Map - 2004 New York City Department of City Planning

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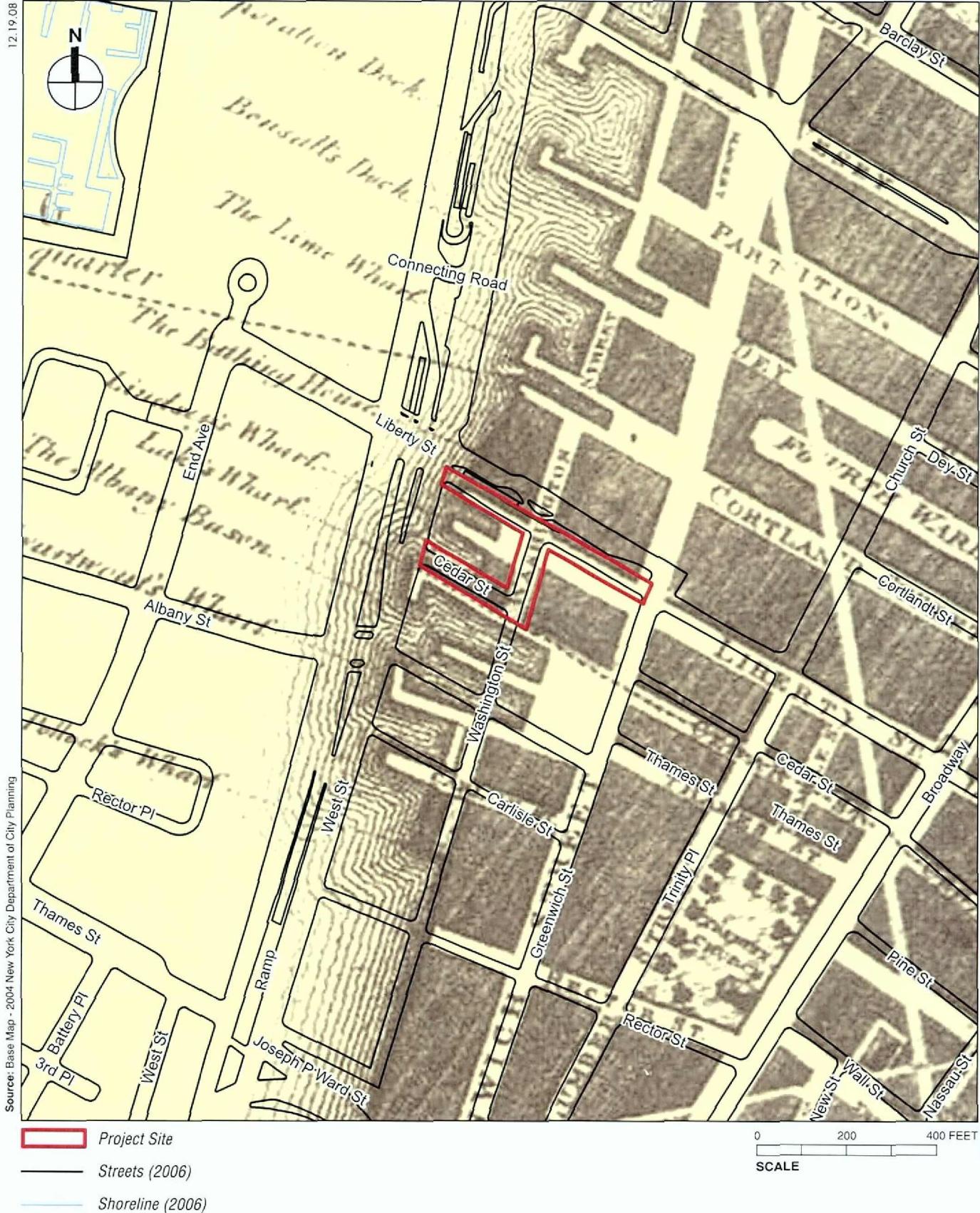


A Plan of the City of New York  
J. Lyne, 1730  
**Figure 4**



Plan of the City of New York  
Surveyed in the Years 1766 & 1767  
B. Ratzen, 1776

**Figure 5**



**WTC** Vehicular Security Center and Tour Bus Parking Facility

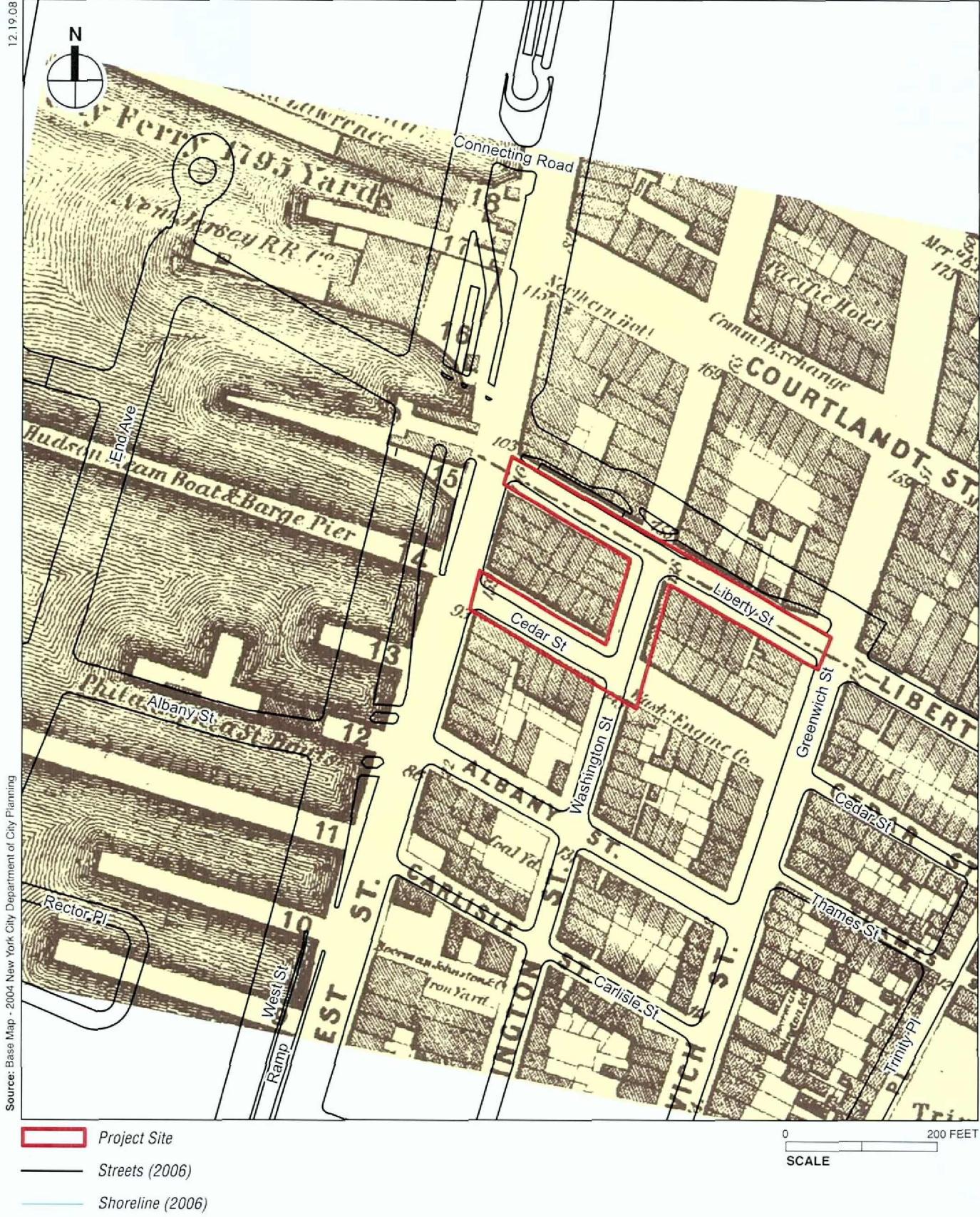
The Taylor - Roberts Plan, 1797  
**Figure 6**

12.19.08



Topographical Map of the City  
and County of New York  
J.H. Colton, 1836

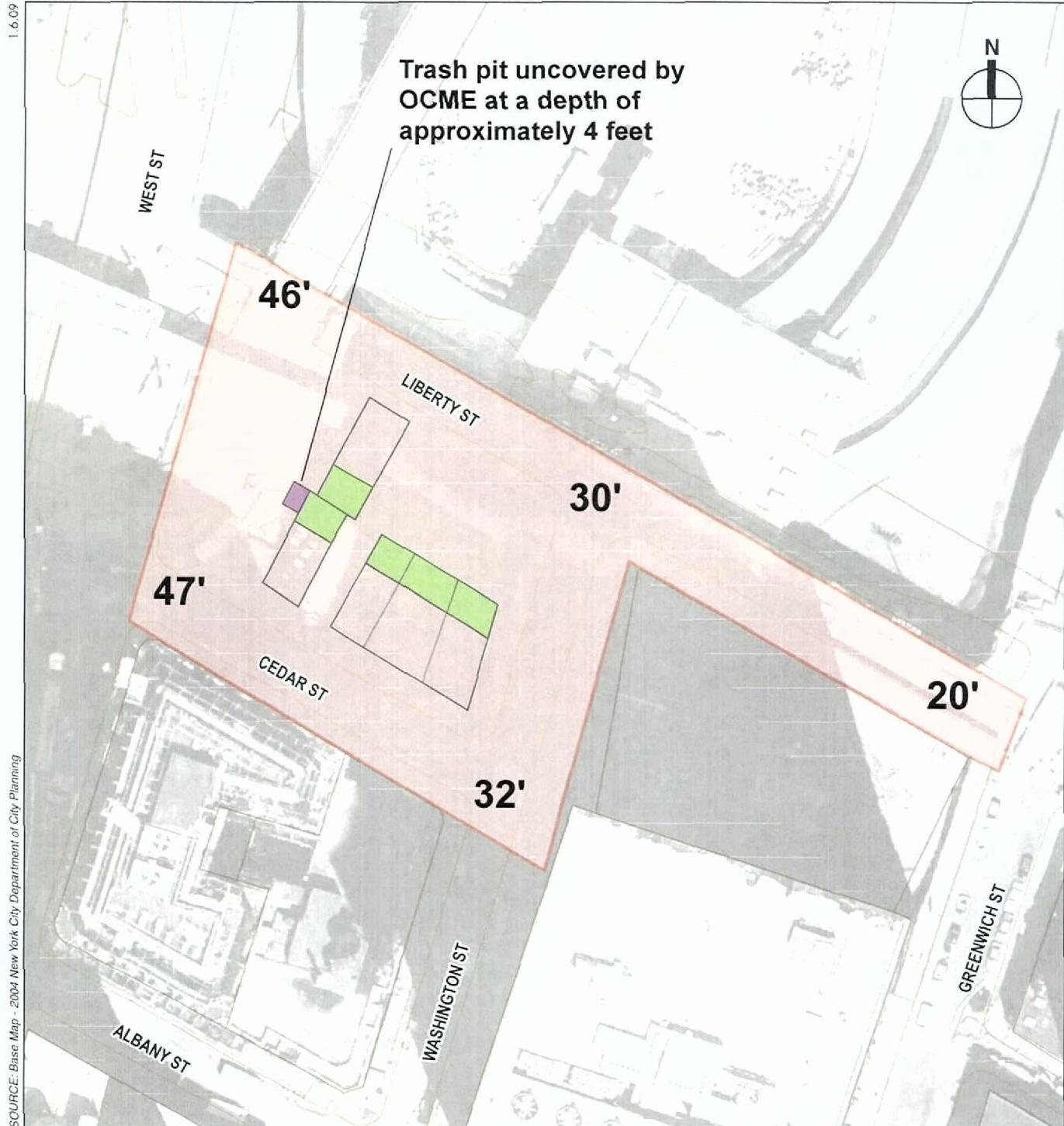
Figure 7



Map of the City of New York  
M. Dripps, 1851  
**Figure 8**

**WTC** Vehicular Security Center and Tour Bus Parking Facility

1.6.09



■ Area of Archeological Sensitivity identified during OCME investigations, 2006-2007

■ Areas identified as sensitive for shaft features by HPI in 2004  
(also sensitive for landfill/landfill retaining structures)

■ Area sensitive for landfill retaining structures

**47'** Approximate depth of landfill / landfill retaining structures based  
on soil borings taken in 2005 (0-5 feet below grade has previously been disturbed)

— Historic lot lines

— Existing street and building lines

**WTC** Vehicular Security Center and Tour Bus Parking Facility

Areas of Archaeological Sensitivity  
for the Entire VSC Project Site

**Figure 9**

**Appendix A:**  
**Soil Borings Provided by PANYNJ**