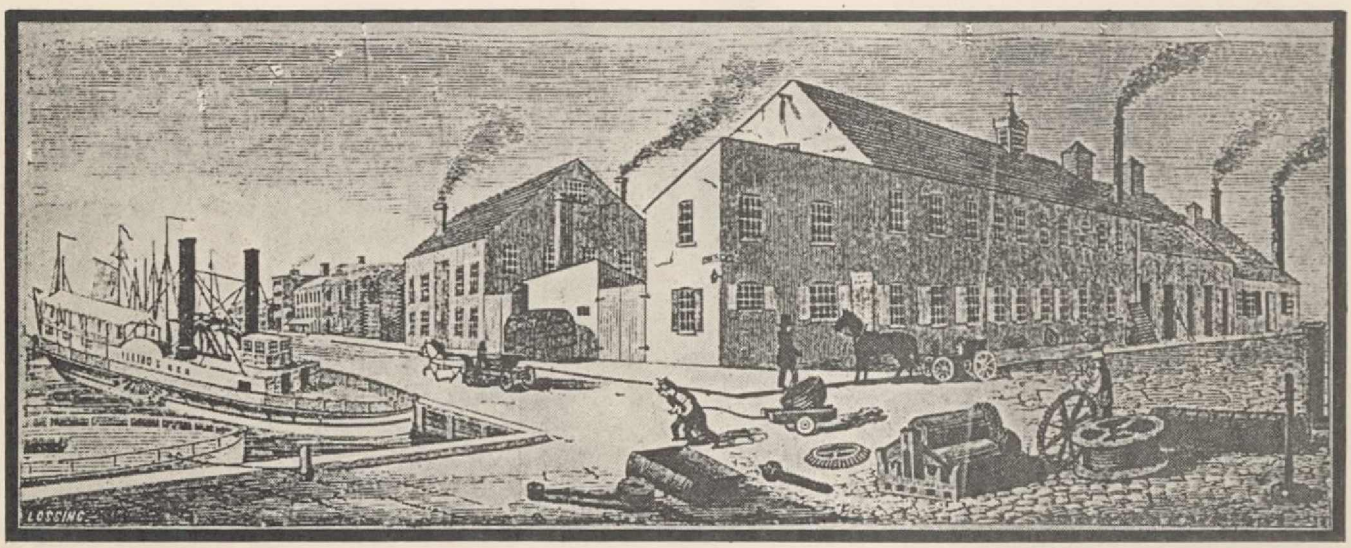
Archaeological Investigation of Site 1 of the Washington Street Urban Renewal Area, New York City



Prepared For:

Shearson Lehman/American Express Through the New York City Public Development Corporation

Prepared By:

The Cultural Resource Group
Louis Berger & Associates, Inc.

September 1987

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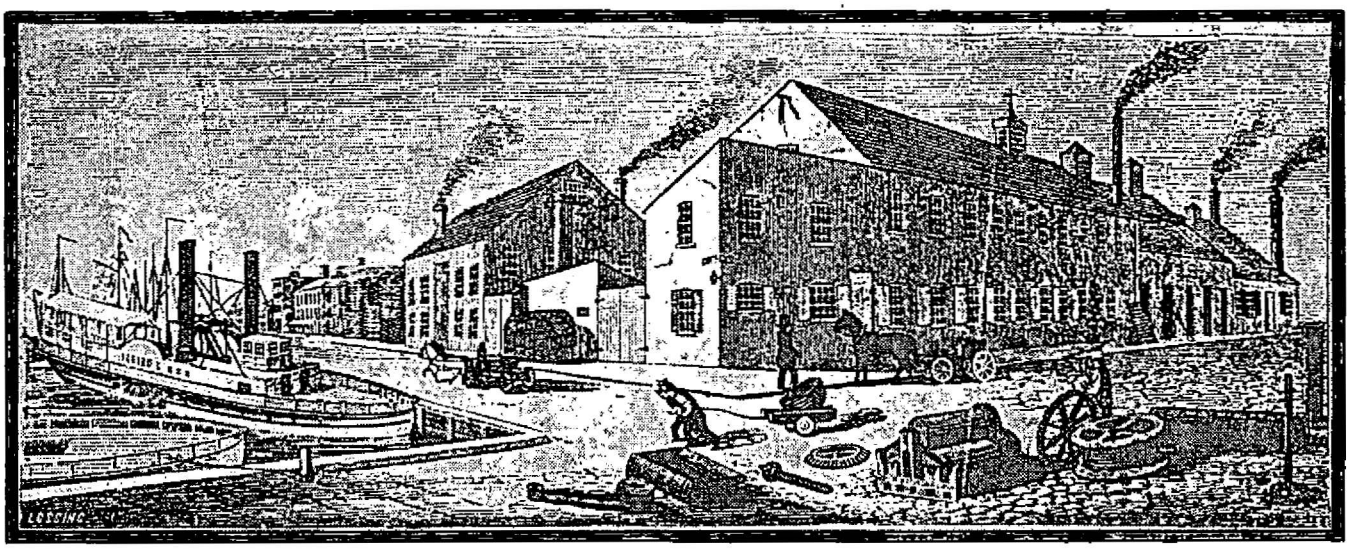

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(2) **September 1987**

ARCHAEOLOGICAL INVESTIGATION OF SITE 1 OF THE WASHINGTON STREET URBAN RENEWAL AREA, NEW YORK CITY

Prepared For:

Shearson Lehman/American Express

through the New York City Public Development Corporation

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Louis Berger & Associates, Inc.

Joan H. Geismar, Ph.D., Principal Investigator

September 1987

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I. INTRODUCTION

Site 1 of the Washington Street Urban Renewal Area is the first west side archaeological site systematically tested in lower Manhattan (Figure 1) and, since two of its blocks are made land (Figure 2 and Plate 1), the first west side fill site to be thus investigated. In addition, an historic nineteenth-century foundry was located here, making the site potentially important in terms of the industrial history of the city and our nation. This report presents the results of research, field testing, monitoring, and analysis conducted by the Cultural Resource Group, Louis Berger & Associates, Inc.

A. SITE LOCATION AND DESCRIPTION

Bounded by West, Hubert, Greenwich, and North Moore Streets, the site's four blocks are created by Washington Street running north to south and Beach Street running east to west (see Figure 2). It is situated near Manhattan's Hudson River shore in the heart of TriBeCa, the triangle below Canal Street.

For over 150 years, West Street, a major Manhattan artery, and pier facilities--and from the 1940s until it was dismantled about six years ago, the elevated West Side Highway--separated the site from the Hudson River. Before and during its fill process, however, various portions bordered the river (for example, what is now Washington Street was once the river's low water mark). Buildings on this city-owned land were leveled almost two decades ago and, with the exception of parking and equipment storage (Plate 1), it was vacant prior to its current development; the two blocks south of Beach Street remain undeveloped at this writing.

In anticipation of development, the site's historic and archaeological potential was flagged in a Phase I documentary research report required by the New York City Landmarks Preservation Commission in 1984 (Historic Perspectives 1984). Based on this report (which also assessed the more southerly Sites 5B and 5C of the Washington Street Urban Renewal Area), a field testing program was initiated by the New York City Public Development Corporation with the cooperation of the site's developer, the Shearson American Express Company. At that time all parties agreed that an archaeological investigation would precede construction of the Shearson Lehman/American Express Information Service Center currently in progress.

In accordance with this agreement, a six-week field investigation began on May 9, 1984. During that time building rubble was cleared from selected parts of the site, backhoe-dug deeptests were excavated to test the fill and determine its depth, and hand- and backhoe-excavated test trenches as well as hand-dug excavation units were placed to assess the nature and integrity

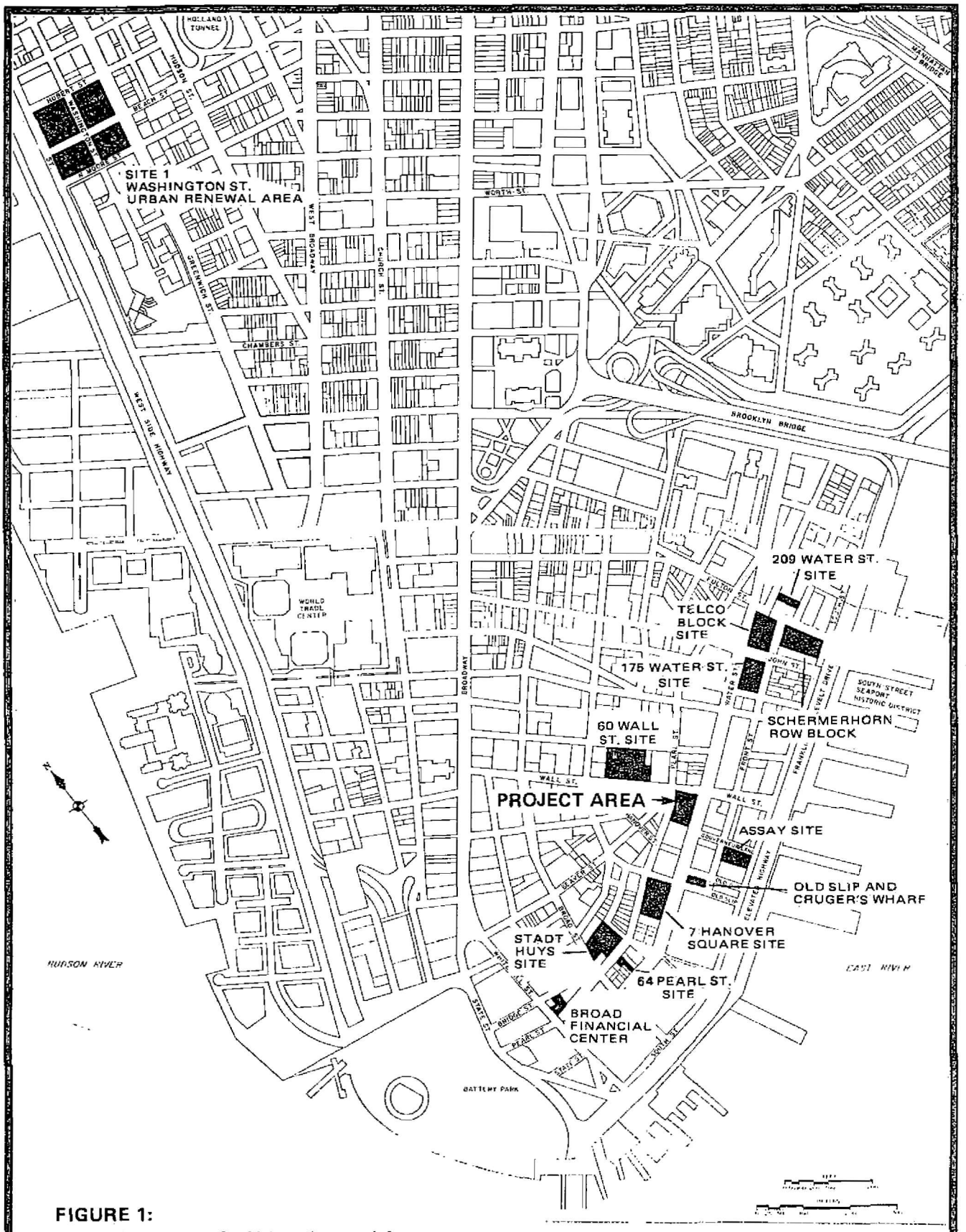


FIGURE 1:
Site 1, Washington St. Urban Renewal Area.
Project Area and Other Archaeological Sites in the Vicinity.

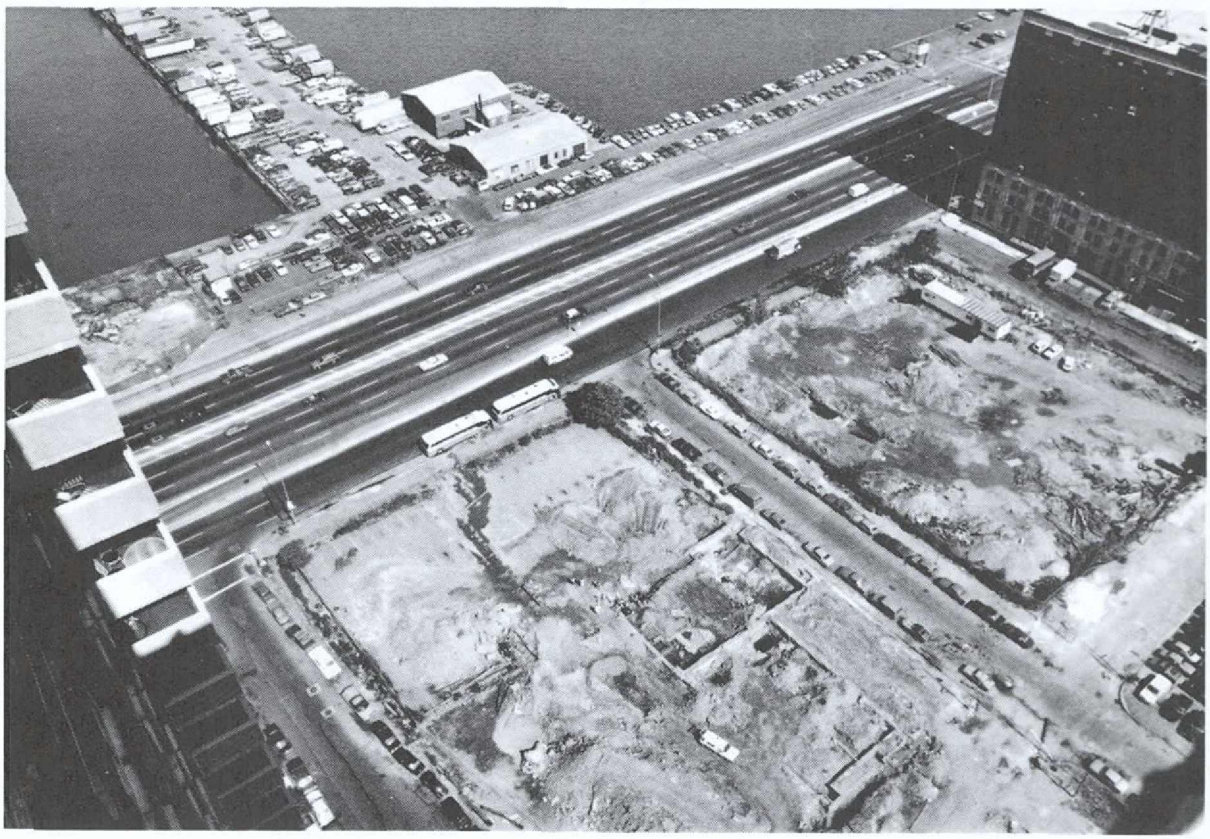
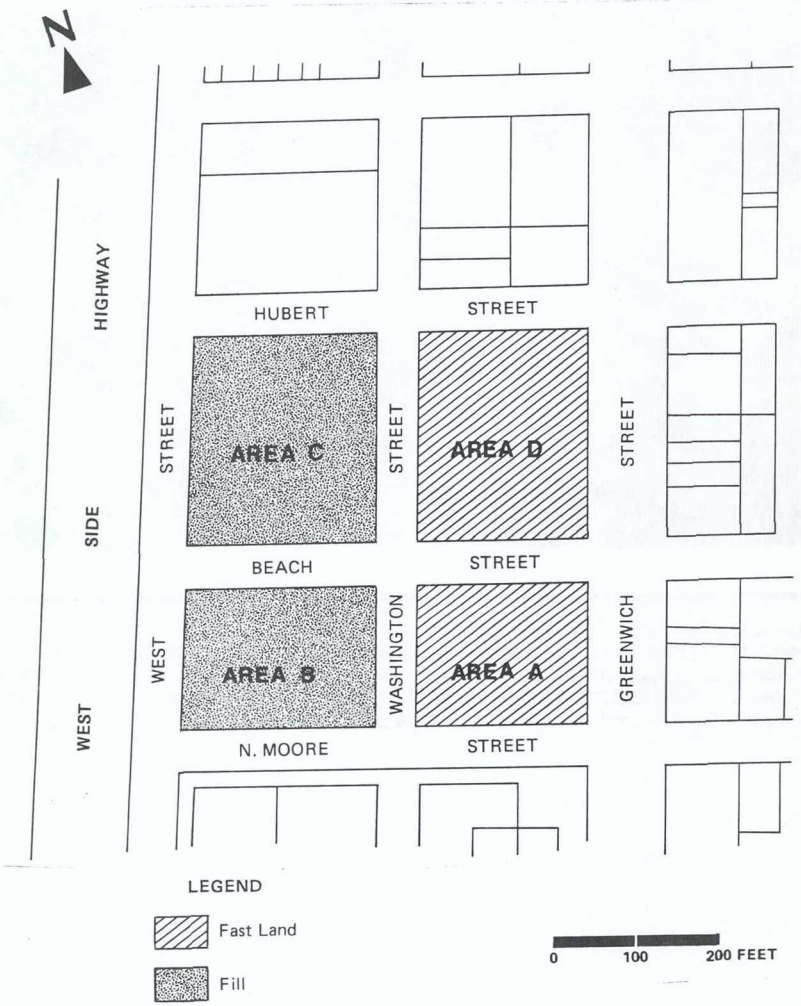


PLATE 1:
TWO SITE BLOCKS THAT ARE RECLAIMED LAND, WITH AREA B TO LEFT (SOUTH) OF BEACH STREET AND AREA C TO RIGHT (NORTH). WEST STREET AND THE HUDSON RIVER AS WELL AS PIER 26 ARE AT TOP OF PICTURE. PHOTO FROM APARTMENT BUILDING ON N. MOORE STREET, ACROSS FROM SITE. (T. Masso 5/84).

FIGURE 2:
Site 1, Washington St. Urban Renewal Area
New York City



of the site. Simultaneously, intensive, site-specific historical research was undertaken to refine the preliminary site history. In order to consolidate both fill and historical data, research and testing ultimately focused on lots where the West Point Foundry had been located. In addition, a monitoring program, deemed to be the most effective means of recording fill-retaining features on this extensive site, was undertaken during subsequent foundation excavations.

B. RESEARCH OBJECTIVES

Obvious research questions initially guided the investigation: these included a comparison between landfill material and fill-retaining structures found at this west side site and those that had been or were then being excavated on Manhattan's east side. Another related to the West Point Foundry itself: it was at this branch of the larger Cold Spring, New York, works that the first American-made locomotive was assembled in 1830; by virtue of this event, it was an historic site, but, since the general project area ultimately was dotted with other foundries, it was not a unique operation. However, it was felt that excavation of the foundry's shops and yard might provide information about nineteenth-century urban foundry operations in general and measures taken to accommodate locomotive manufacture or assembly in particular.

Preliminary documentation had revealed that the West Point Foundry buildings on the northeast corner of Beach and West Streets and the mid-block foundry yard across the way on the south side of Beach Street were both on filled land. It also had determined that prehistoric occupation of the site apparently was not an issue: its prehistoric marshland setting would have been used only transiently by Native American populations. Moreover, subsequent development, which apparently included intensive leveling, grading, and filling as well as the construction of basemented buildings, undoubtedly disturbed or destroyed the original ground surface and with it evidence of transient Native American use or occupation. The same apparently would have been true of any buildings or defensive structures that might have been erected before the topography was altered or developed in the site vicinity (Historic Perpectives 1984:2-5,7).

Based on this information, the research objectives governing the investigation were well defined (Louis Berger & Associates, Inc. 1984a). However, additional documentary research as well as field data indicated that a shift in research concerns was called for; furthermore, having this additional information prior to testing would have redirected some aspects of the testing phase. For example, a turn-of-the-century building with a deep basement and massive wall footings that extended beneath the water table on the foundry site undoubtedly destroyed any remnants of the foundry buildings: these were relatively small structures which may have been constructed on the newly-created landfill by

1821--two or three years before they were leased by the West Point Foundry Association (see Chapter II and Plate 7). Moreover, an 1807 water lot grant stipulated that the grantee build a fill retaining feature--in this case a pier or wharf--that would create the southern half of Beach Street and extend onto his grant (see Chapter II); this is an area of the site that was not tested, nor has it been exposed during the current development.

Despite access to soil boring data (Woodward-Clyde Consultants, Inc. 1984), testing did not uncover any fill-retaining structures: no wharves, piers, or bulkhead--ubiquitous at east-side fill sites--were encountered. For this reason, monitoring of subsequent foundation excavations on the north side of Beach Street, which included digging deep piling cap holes as well as trenches, provided the opportunity to record segments of undocumented wharves and other landfill-related constructions. Given the lack of success in locating these features during testing, monitoring, which was a cooperative arrangement between the developer, the foundation contractor, and the archaeologists, proved to be an efficient means of retrieving important archaeological data (see Chapter IV).

From the project's inception, fill analysis had been a major objective. What became apparent in the field was the tangible difference between the fill at this site and that recovered from east side sites, with the former markedly less artifact-laden than the latter (Chapter V). It appears that this may have had more to do with time than with location: the east side sites analyzed to date were all filled during the eighteenth-century or earlier while Site 1 of the Washington Street Urban Renewal Area was filled in the first two decades of the nineteenth century.

Consequently, research ultimately was directed toward investigating municipal concerns and the urbanizing process that might be reflected in this fill. In other words, new questions were asked: for example, what had occurred in New York City between the mid-eighteenth century, when several of the east side sites that have been analyzed were first filled, and the early-nineteenth century when these west side blocks were created? What might have affected attitudes toward fill and the fill process, and how and why is it reflected in the archaeological record? And, finally, what factors have affected site formation and preservation?

C. RESULTS

Research and testing appear to have answered these questions. In addition, this investigation has again illustrated the complementary nature of archaeological investigation and ongoing, intensive, historical research: working in tandem, they make the whole greater than the sum of its parts.

At Site 1 of the Washington Street Urban Renewal Area, research and testing offered a great deal of information about the site, about New York City's fill history, about the urbanizing process, and about the preservation of archaeological deposits in an urban setting. More specifically, it included the following:

1. Land Reclamation and Fill

As represented by tested areas of Site 1 of the Washington Street Urban Renewal Area, landfilling in the first decades of the nineteenth century was apparently a faster, cleaner, and less odious process than it had been on many earlier sites. However, fill-retaining features recorded during monitoring were similar to those used at these sites, in this case comprising cobb wharves; these were stone-filled timber cribs that appear to have antecedents in medieval Europe (see Monitoring, Chapter IV). Moreover, they suggested a block-and-bridge construction (see Plates 5 and 32) and offered information about joinings and fastenings. They also provided insight into the engineering techniques used to accommodate the stress and movement caused by docking ships.

The relative cleanliness of the fill used to create two of the site blocks indicated at least a partial compliance with municipal laws instituted just prior to the landfilling. These were regulations put into effect to protect New York City's growing population from the ravages of disease, in this case annual Yellow Fever epidemics that plagued the city in the late-eighteenth and early-nineteenth centuries. However, the fact that trash was still a fill element appears to reflect continuing if illicit use of these filling lots as trash repositories.

2. The West Point Foundry

The West Point Foundry occupied the northeast corner Beach and West Streets from 1823 or 1824 until about 1840; it also maintained a mid-block yard on the south side of Beach Street and may have continued operating both the yard and a subsequent mid-block foundry on the north side of the street into the 1850s. This operation, a branch of the main foundry site located about 50 miles up the Hudson in Cold Spring, New York, functioned mainly as a machine and finishing shop and a trans-shipment center for the upriver foundry. It was here that parts cast at Cold Spring were assembled in 1830 to produce America's first domestic locomotive, The Best Friend; ten additional locomotives were assembled here before production finally stopped around 1835 (Chapter V). Although evidence for the corner foundry shops has been destroyed by subsequent building, wall segments and perhaps other remnants of the foundry yard were preserved as were indications that this was a commercial rather than a domestic operation. The location of the walls document that early lot lines were once situated a few feet east of their current position, a shift suggested in tax records from the late-1850s (see Chapters II and III).

3. Site Formation and Preservation

The wall segments of the foundry yard noted above were preserved under the flagstone-paved yard of a "French Flat" built in 1883-1884 and an 1889 bottling establishment adjoining it. An unidentified brick feature containing an ash deposit appears to be associated with this and a later foundry operation. Late-nineteenth-century coal-dust filled dry-wells were also uncovered in this yard; these apparently were used to channel drain-pipe water away from the apartment building, keeping it dry in an inundated environment. Massive footings and supports as well as the deep basement of a turn-of-the-century warehouse-office building constructed on the north-east corner of Beach and West Streets have obliterated evidence of the earlier foundry buildings. The same is true of an adjacent lot where a deep basement was found although none was indicated on block atlases. Both concrete basement floors extended beyond the foundry levels, below the water table, and well into the landfill.

It appears, then, that information about site formation and the construction of early buildings and those that followed is important in determining the degree of preservation that might be expected (e.g., see Baugher-Perlin et al. 1982:124ff). Subsequent research and testing of Site 1 of the Washington Street Urban Renewal Area suggested that little if anything remained of the West Point Foundry shops. However, research indicates that after the block was filled, four building episodes occurred on the lot where the foundry yard had been located, all them documented during field testing. These included the remnants of the foundry yard protected by a late-nineteenth-century flagstone floor and a shallow basement, a subsequent foundry building, and the 1883-1884 French Flat as well as part of a wall built in 1891 in the rear of the yard to eliminate the odors arising from an adjacent stable.

The information about landfill, the foundry, and site formation and preservation presented here is based on the data found in the following sections and appendices. The results of this investigation were to document the economic, social, political, and technical aspects of a phase of New York City's development.

II. HISTORICAL RESEARCH

A. GENERAL HISTORY OF THE PROJECT AREA

The major focus of research and testing for Site 1 of the Washington Street Urban Renewal Area concerned its fill history and the development of the West Point Foundry's shops and yards. Ultimately, this concentrated on selected lots on the north and south sides of Beach Street between Washington and West Streets where the foundry had been located and where pertinent fill information appeared to be available. However, the site's history and development are part of the city's urban evolution and, as such, need to be viewed within the historical framework of the general project area. To trace the site and the area's history, water lot grants, deeds, tax records, the Minutes of the Common Council, reports, family records, and published sources were consulted.

While New York's seaport was developing on the east side, the Hudson River served mainly as an artery to and from the north and New Jersey to the west. A visitor to Manhattan in 1794 noted that Greenwich Street about one half mile south of the project area, in the vicinity of what is now the World Trade Center, was then "a new part of town near the banks of the North-river" (Strickland 1971). The land development that slowly began here at end of the eighteenth century had occurred considerably earlier on the east side where the three blocks beyond Pearl Street had already been claimed from the East River to expand the city's bustling seaport district.

Development of the Hudson River shoreline finally intensified in the first decades of the nineteenth century, a time when the city's East River seaport was reaching its glory (Albion 1939). Among other things, the advent of steam-navigation had finally heralded development of lower Manhattan's western shore.

For most of the eighteenth century, however, development and filling along the river had been an issue if not a reality. By mid-century, Trinity Church had acquired the land between Broadway and the River from present-day Fulton to Canal Streets; the Church Corporation also owned the adjoining water lots from high to low water mark, but these lots remained unfilled. By this same time, Greenwich and Washington Streets had been laid out but only intermittently run (Valentine 1862:549-550). It was not until 1797, when the Church began to exchange its shorefront properties and water lot rights for other city-owned sites, that grants issued by the city promoted west side landfilling and street building (Figure 3).

In the first decades of the nineteenth century, the project area rapidly became a neighborhood where residences and commercial establishments coexisted, often in a single building. However,

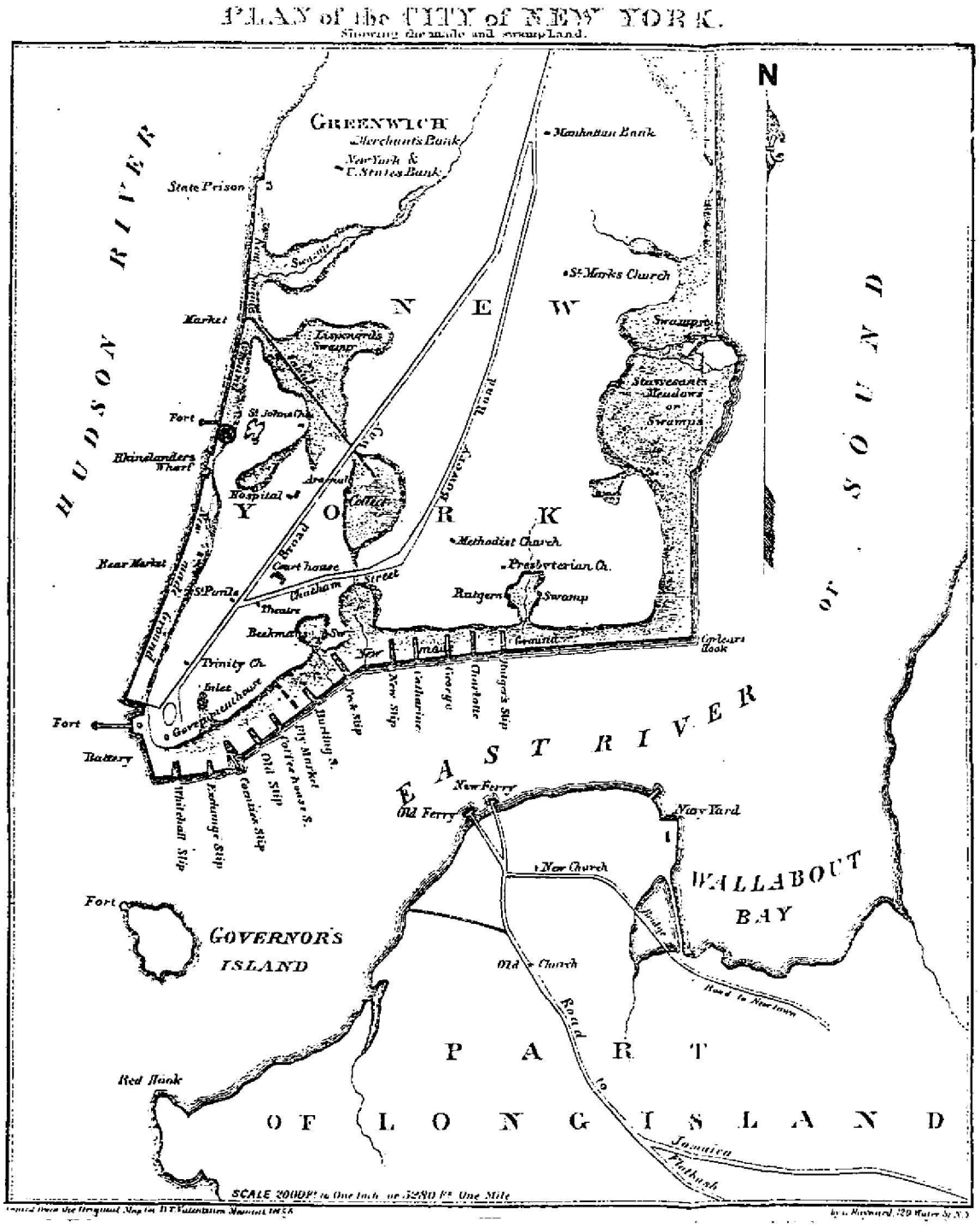


FIGURE 3:
Site 1, Washington St. Urban Renewal Area.
Shaded area indicates lower Manhattan landfill.
Site location marked with black dot.

SOURCE: Valentine 1856.

there was some division: newly created shorefront blocks in the project area were mainly commercial from their earliest development and just a few blocks to the east was Hudson Square, one of the city's most elegant residential sections for at least half a century. Later renamed St. John's Park for the chapel erected there by Trinity Church between 1803 and 1807, this square remained a residential jewel through the 1850s (Stokes III 1918:609; Plate 2 this report).

Early in the nineteenth century a growing population apparently warranted a local food market, and from 1807 to 1830 the Duane Street Market was located on the west side of Washington Street between Duane and Reade Streets, a few blocks south of the site. It housed eight butchers' stalls, perhaps the source of cattle bones found in the site's fill (see Faunal Analysis, Appendix E, and Site Analysis Chapter V), one fish seller, a female coffee merchant, and a basement grocery store where liquor was sold. With the opening of the larger Washington Street Market at Vesey Street in 1813, the Duane Street market began to fail; finally, in 1830, it closed, and Trinity Church reclaimed ownership of the land on which it had stood (DeVoe 1862:390-393).

It may be of interest that Robert Fulton, whose refinement of steam-navigation prompted development of the Hudson River shore, apparently owned two lots in the project area on the south side of Beach Street between Greenwich and Washington Streets (Fifth Ward Tax Rolls [hereafter FWTR] 1813-1820). However, the use of these lots is unknown since Fulton, who died in 1815, lived elsewhere and the directories do not list this location as a business address (N.Y. Directories 1809-1818).

As noted above, although initially a mixed commercial and residential neighborhood, by the 1820s the project area was becoming mainly commercial, particularly near the shoreline which included two site blocks. In addition to the shops and yards of the West Point Foundry located there during the third and fourth decades of the nineteenth century (see below), coal and iron yards, several other foundries, an oil factory, distilleries, lumber yards, and a marble works are among the industries identified on maps dating from 1827 to 1857 (Plates 3-4).

By the latter part of the nineteenth century, stables and warehouses were among the site's commercial enterprises. A five-story, ten-family, "French Flat" erected in 1883-1884 at 74-76 Beach Street (Lot 15 on block 186w; see below) appears to have been unique on the block. Built by William C. Rhinelander, a son of William Rhinelander, Jr., its site had previously been a commercial property, first serving as a yard for the West Point Foundry and then a coal distributor. After 1854, a single-story foundry building had covered the lot (see Key Lot information below).

The Rhinelanders, who had come from Germany and originally settled in New Rochelle (Rhinelander Family File [hereafter RFF]

PLATE 2:
ST. JOHN'S CHAPEL AT ST. JOHN'S PARK IN HUDSON SQUARE. BUILT BETWEEN 1803 AND 1807, THE CHAPEL WAS A FOCAL POINT FOR WHAT REMAINED ONE OF THE CITY'S RESIDENTIAL "JEWELS" THROUGH THE 1850s (KOUWENHOVEN 1953:140).

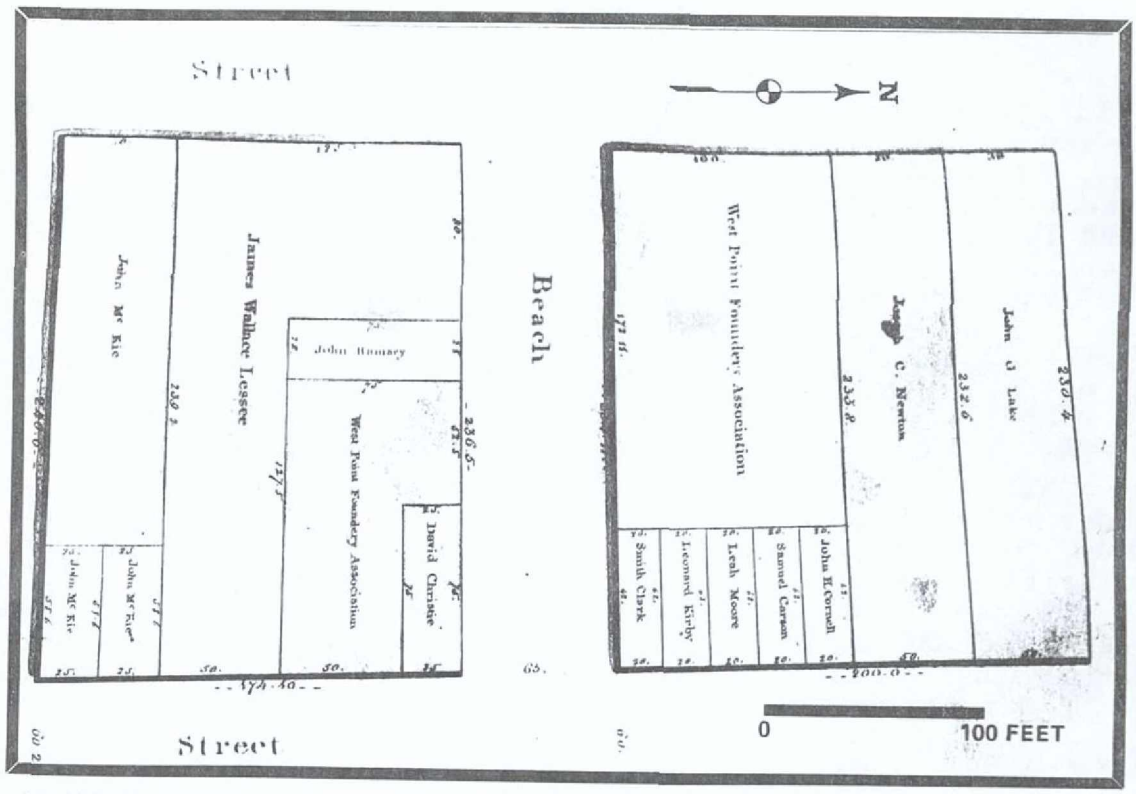


PLATE 3: DETAIL OF EWEN'S 1827–1830 SHORELINE MAP IN THE SITE AREA. NOTE THE WEST POINT FOUNDRY ASSOCIATION ON THE NORTH AND SOUTH SIDES OF BEACH ST. (Photo: J. Geismar)

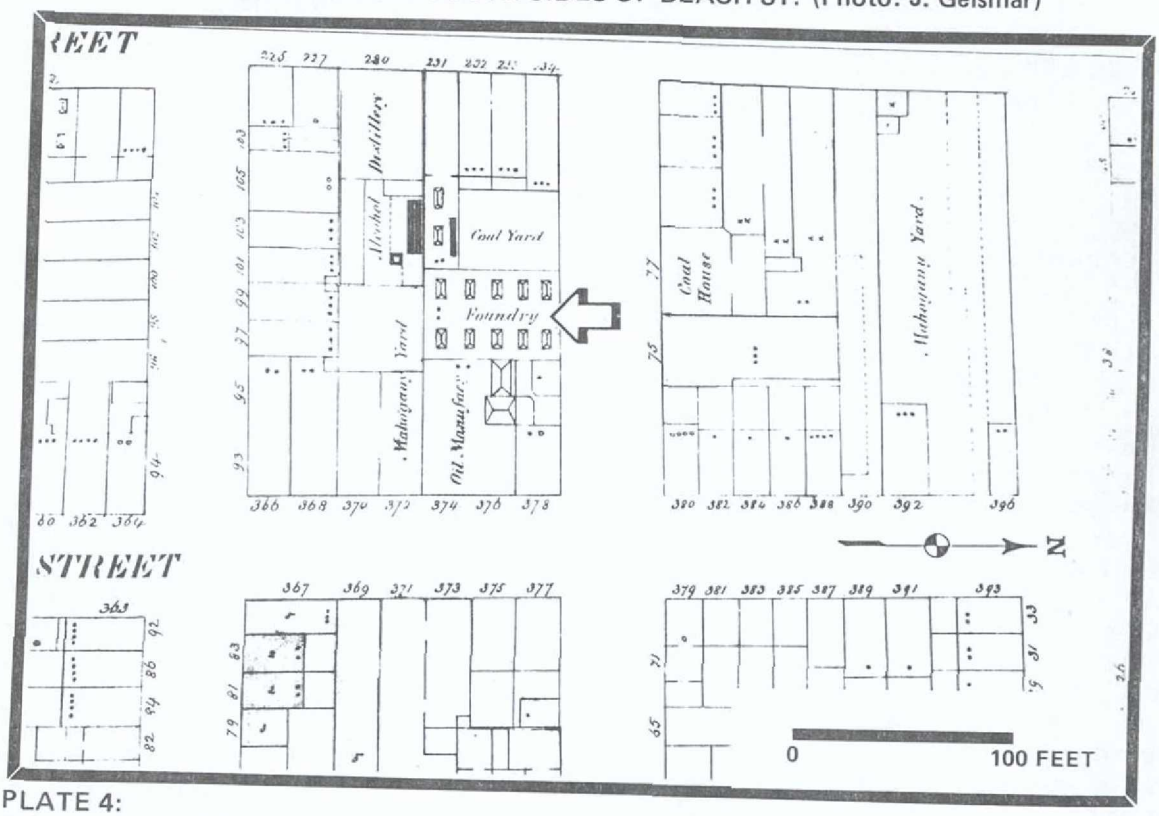


PLATE 4:
DETAIL OF SITE'S FILLED BLOCKS SHOWN ON THE 1857 PERRIS ATLAS. NOTE THAT NO FOUNDRY IS DOCUMENTED ON THE NORTHEAST CORNER OF BEACH AND WEST STREETS AND A ONE–STORY (BRICK) FOUNDRY IS LOCATED ON WHAT WILL BECOME LOT 15 ON THE SOUTH SIDE OF THE STREET (ARROW). MAHOGANY YARDS, AN OIL FACTORY, AND A DISTILLERY ARE DOCUMENTED. (Photo: J. Geismar)

n.d.), were prominant Manhattan merchants involved in the development of the general project area as well as the site. In addition to obtaining a water lot grant on the south side of Beach Street (see below), William Rhinelander, Jr., also reclaimed land to the south between Jay and Harrison Streets where he owned a brewery or distillery (Minutes of the Common Council [hereafter MCC] 1917 XII:493, 749). In 1806, his name became associated with the "North Battery" about to be built at the foot of Hubert Street (Plate 5) and sometimes referred to as Rhinelander's Fort or Battery (MCC 1917 IV:133, 171).

During the Revolution, the family's loyalties had been divided, with William Jr.'s elder brother, Frederick, a crockery merchant who supplied ceramics to the occupying British army (see Schwind 1984 for a detailed account of Rhinelander's commercial wartime activities). On July 28, 1783, Frederick was indicted as an enemy of the people of the State of New York and his property on the east side at 168 Water Street was confiscated. He then moved to Barclay and Greenwich Streets and, in 1805, he died at the age of 63 (RFF n.d.).

The following year William Rhinelander, Jr., who at one point had been a partner in his brother's crockery business, successfully petitioned for Hudson River water lot grants, including those in the project area that had been granted in 1797 but never paid for (MCC 1917 IV:529-531; see below). By this time, however, the city rented rather than sold its water lot rights (not until 1824 would Rhinelander be able to buy this reclaimed land [Liber 174:370]).

By the end of the eighteenth century Rhinelander, a merchant who had apprenticed as a tailor and was an auctioneer during the Revolution, had become a sugar baker as well as a brewer after purchasing the Cuyler Family's sugar house under forfeiture in 1790 (RFF n.d.; Wilson 1892 II:452, 1893 IV:525). The diversity of his activities was in keeping with the pursuits of most if not all of New York's great merchant families (Wilson 1893 IV:525). He maintained a home at 243 Broadway and owned real estate within and outside the city, including a country estate at Hellgate where he died in 1825 at the age of 72 (Liber of Wills 59:484ff). His sons, who were the third generation of Rhinelanders born in America, continued his business enterprises.

As has been the case throughout the city's early development, the history and development of the site area were tied to the fortunes and pursuits of merchant entrepreneurs[1]. It was a development that was also dependent on intensifying industrialization and commercialism. But west side development varied from that found on the east side; it was later and less bustling, and, as we shall see, the fill process generally was faster, cleaner, and to a degree more regulated than that documented along the East River.

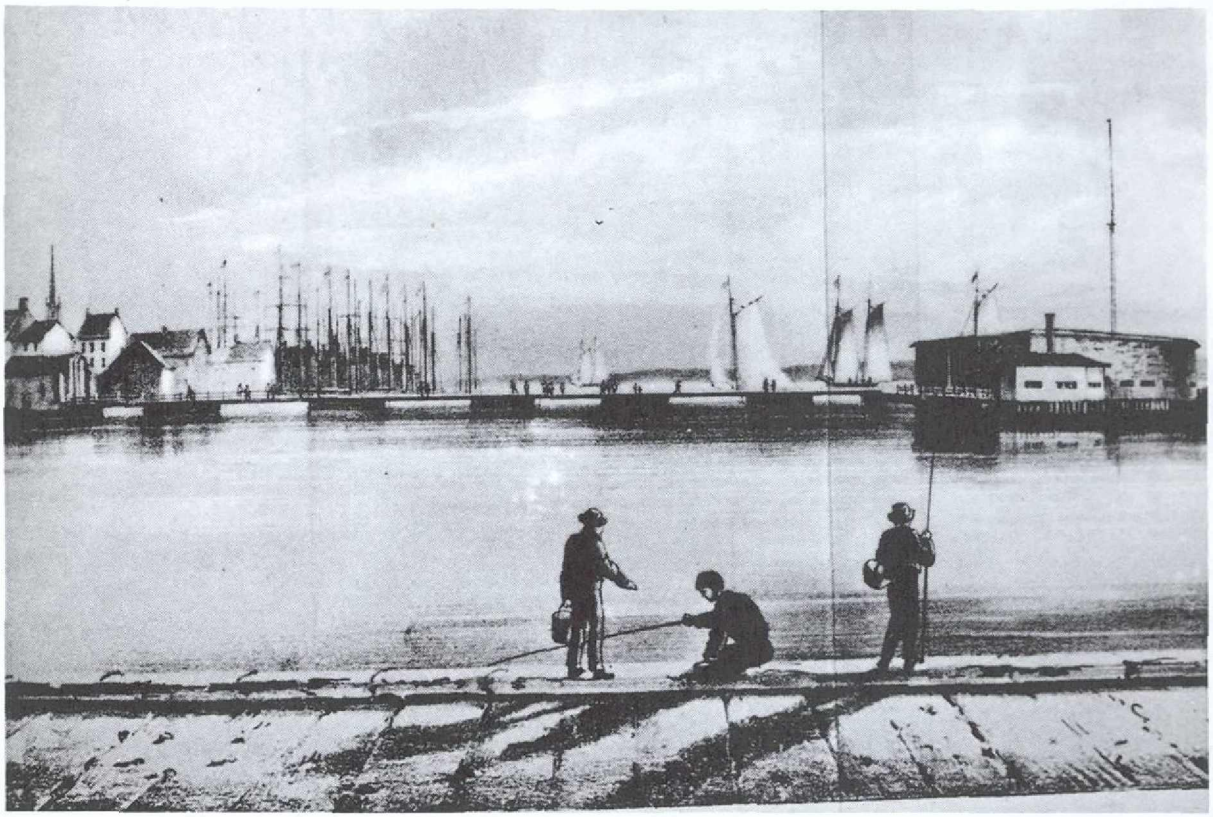


PLATE 5:
RHINELANDER'S, OR NORTH, FORT BUILT IN 1807 AT FOOT OF HUBERT STREET AS SEEN FROM THE LAIGHT STREET PIER TO THE NORTH (VALENTINE 1859). NOTE BLOCK AND BRIDGE CONSTRUCTION OF THE HUBERT ST. PIER (SEE ALSO PLATE 32) AND PLANKING ON THE LAIGHT ST. PIER IN THIS RENDERING. BEACH ST. IS LOCATED APPROXIMATELY WHERE THE MASTS BEGIN AT THE LEFT OF THE PICTURE. (Photo: J. Geismar).

B. DOCUMENTED LANDFILL HISTORY OF THE SITE

As noted previously, in 1797, the City Corporation granted the land on the south side of Beach Street between high and low water marks to the Rhinelanders (MCC 1917 IV:530). However, although filling before 1801 may have extended the block between Washington and West Streets by seventy-five feet, this grant apparently was never paid for (MCC 1917 IV:530). It appears that extensive filling did not occur until the city granted the rental rights for an extended water lot to William Rhinelander, Jr., in 1807 (MCC 1917 IV:585). Under the stipulation in this rental, Rhinelander had "to sink make or construct a good and sufficient firm wharf or pier the center of which will be on a line with the south line of Beach Street" (Grants of Land Under Water [hereafter GLUW] Liber E:364).

Between 1804 and 1809, all the water lots in the project area--beginning at the high water mark near Washington Street and extending into the Hudson 190 to 200 ft. beyond the low water mark--were granted to the owners of land adjoining these lots. In addition to William Rhinelander, Jr.'s grant, which occupied three-quarters of the block, John Mckie's ran south to North Moore Street, John Murray and William Ogden's was on the north side of Beach Street, Joseph Newton's was mid-block, and Alexander Campbell's extended to Hubert Street (Figure 4).

Entries in the Minutes of the Common Council indicate that several of these grantees were slow to start fill operations. For example, John McKie, who was a painter and fireman, was cited in 1808 for failing to observe the terms of his four-year-old water lot grant that required him to make one half of North Moore Street (MCC 1917 V:153-154). It appears from a directive calling for the stabilization of Beach and Hubert Streets west of Greenwich, a maneuver intended to keep pavements and walks from washing away, that landfill had not yet reached Washington Street within the project area.

Yet, an entry in a Rhinelander record book notes that Nicholas J. Roosevelt was given a twenty-one year lease on ten lots of ground on Beach Street that appear to comprise the land between high and low water marks, extending approximately seventy-five feet beyond Washington Street (RFF Lease Book 1795-1813:64-65). This implies that the grant awarded in 1797 may have been filled by 1801; it is possible, however, that at least some wharfing or piers rather than fill were involved since Roosevelt was to have the use of the dock for landing logs or materials to be "sawed or made use of at the mill." Presumably this was a mill to be constructed by or for him.

The earliest tax record available for the site lists ten lots, a sawmill, and ground on the south side of Beach Street in 1808. By 1810 seventeen rather than ten lots are listed, suggesting that the water lot had been filled or was in the process of being

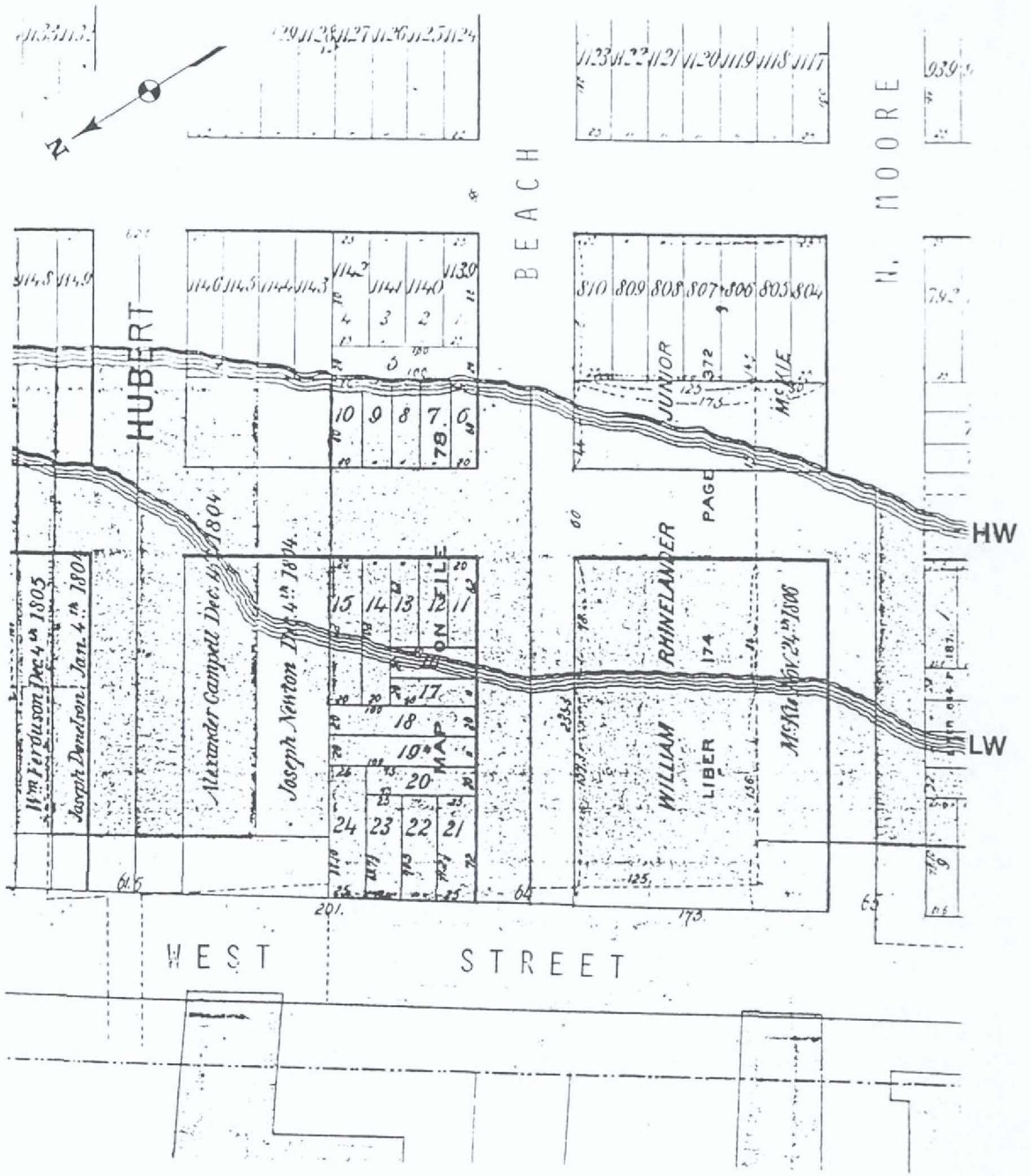


FIGURE 4:
Site 1, Washington St. Urban Renewal Area.
Detail of 1877 map showing Trinity Church properties in the eighteenth and early—nineteenth centuries. With the exception of the lots on the north side of Beach St., water lot grantees are indicated for blocks 186W and 216W.
(Note: HW indicates high water mark; LW, low.)

SOURCE: Windwart 1877.

filled at this time. By 1812, a steam manufactory rather than a saw mill is listed on the property, and it seems likely that the Nicholas J. Roosevelt renting this property was an inventor who collaborated with Robert Fulton (Wilson 1888 IV:317-318). If so, it is possible that steam engines for boats were once manufactured on this lot, but this is somewhat speculative.

While the south side of Beach Street may have been filled in two episodes between 1797 and 1810, filling of the north side apparently did not begin before 1809. At that time a water lot grant was rented to William Ogden and John R. Murray (GLUW Liber F:7). As a condition of the grant, wharves or streets were to be constructed at both Washington and Beach Streets.

Beginning in 1810, Ogden and Murray were taxed for fourteen lots on the north side of Beach Street between Washington and West, and it may be that the lots were then in the process of being filled. It was not until 1819, however, when a stable is listed on a lot purchased by a Colonel Barclay[2] the year before (Liber 126:120; FWTR 1819:76), that any improvement is indicated.

Based on documentary evidence, then, it appears by 1804 water lot grants in the project area extended beyond the low water mark, but the north and south sides of Beach Street were filled at different times. Filling on the south side may have taken place in two episodes: the first, from high to low water mark, apparently occurred from 1797 to 1801, while the second, extending 200 feet beyond the low water mark, probably was undertaken from 1807 to 1810. On the north side of the street, filling that began in 1809 may have taken as many as eight years to complete, but it is also possible, but unlikely that it, too, was accomplished by 1810.

C. THE WEST POINT FOUNDRY IN NEW YORK CITY

As noted earlier, an archaeological evaluation of the West Point Foundry's Manhattan shops was a major focus of research for Site 1 of the Washington Street Urban Renewal Area. Based on preliminary historical documentation (Historical Perspectives 1984), it appeared that remnants of the foundry's Manhattan shops and yards might warrant archaeological documentation prior to the site's development. Subsequent research has provided a chronology of the foundry's occupation in the project area beginning in 1823 and continuing for approximately 16 years. During this time, the West Point Foundry association rented shops on the northeastern corner of Beach and West Streets and, perhaps for the same length of time, a mid-block yard on the south side of Beach Street. What follows is the foundry's history in the project area and a brief account of its general operations reconstructed from tax records, directories, deeds, reports, articles, the Minutes of the Common Council, and advertisements.

In 1817, when the West Point Foundry Association was first organized, construction began at what is now Cold-Spring-on-the-

Hudson, about 50 miles north of Manhattan. Here, a large molding house, a boring mill, a pattern shop, and a dam to supply water power were built by Gouverneur Kemble, his brother William, and their associates (Rutsch et al. 1979:53). The land for this venture was procured from Captain Frederick Philipse, a Kemble cousin who exchanged 200 acres for company stock (Raoul 1936); by 1818, the Association was officially incorporated (Stokes V 1926:1599).

Mainly through the Kembles, a wealthy and distinguished family of New York City merchants, the foundry received government subsidies and contracts. From its inception, a Manhattan office was maintained with William as its agent, but the Cold Spring location was always the main arm of the business (Raoul 1936:466).

Beginning in 1818, the New York City directories list a West Point Foundry office, but not a shop, at Stone Street corner of Whitehall, the same address as that given for William Kemble, merchant[3]. This was the foundry's city address until 1824 when it is listed at 42 William Street. Although the first listing in the project area at "Beach C. West" does not occur until 1826 (N.Y. Directories 1817-1826), the Association apparently leased the property as early as 1823 (FWTR 1823:670; Liber 168:368-371).

Prior to the Beach Street listing, the Minutes of the Common Council for May 10, 1824, indicate that William Kemble of the "West Point Foundery [sic] & others" remonstrated against opening the four blocks on West Street between Harrison and Hubert Streets (MCC 1917 XIII:701): this included the portion bordering the foundry site on the northeast corner of Beach and West Streets. On May 24th, another entry records that the petition "praying that they may be permitted to continue to incumber West Street between Harrison and Hubert Streets or a part thereof with lumber and other articles" was denied since it was needed as a public thoroughfare (MCC 1917 XIII:725).

This petition verifies that although the directories do not yet list the foundry at the Beach and West Street location, the shop was probably located here by 1824, and perhaps as early as 1823. (Parenthetically, these entries reveal that West Street in the project area was not yet opened as a public road.) It is even possible that six lots and shops occupied by Carson and Birckbeck and documented on the 1821 tax rolls somewhere between West and Washington Streets may have housed a predecessor to the West Point Foundry (FWTR 1821:83), implying that at least some if not all the buildings were standing before the foundry occupied the site. It appears, then, that it was not before 1823 and perhaps as late as 1826 that the West Point Foundry established shops in Manhattan rather than just an office. Unlike the Cold Spring land, the site of this machine and finishing shop was leased (e.g., Liber 398:204); however, adjacent lots as well as others on the block were ultimately owned by William Kemble (e.g., Liber 168:368-371).

By 1824 the foundry also maintained a yard on the south side of Beach Street, across from the shop buildings, on land leased from the Rhinelander Estate (RFF Rent Books 1824-1825); this location includes Lot 15, the focus of extensive archaeological testing (see Field Report, Chapter III). Both Beach Street locations are documented on the 1827-1830 Ewen Map of New York's shoreline (see Plate 3). It was here that the first American-made locomotive, the Best Friend (Figure 5), was assembled in 1830 from components mainly manufactured at Cold Spring. It seems likely, however, that its vertical boiler was made at the Beach Street shops (see Chapter V).

Besides the Best Friend commissioned by the South Carolina railway, ten additional locomotives were assembled at the Beach Street shops before production was abandoned (Fisher 1940:37). Small castings also may have been made here, but steam engines apparently were the major focus of manufacture. An 1829 advertisement announced that:

> The Proprietors of the West Point Foundry, have in addition to their works in Putnam County, established an extensive Steam-Engine Factory on Beach-Street, New York, and are prepared to manufacture on short notice, Machinery of every description, viz. Steam Engines, Wrought Iron or Copper Steam Boilers, Tanks, Sugar Boilers, Water Presses, Cotton Screw Presses with double reversed threads, [and] Paper Mill Screws (West Point Foundry File [Hereafter WPFF] 1829).

In addition, "Church Bells and Brass Castings of every description" as well as cannon, shot, shells, mill work, pipes, calendar rollers, rolling and slitting mill rollers, and cotton and other small machinery "cast from the cupola" could be ordered from the Cold Spring works or the New York shop or office (WPFF 1829). It appears that many of the items available at the New York shop were produced at Cold Spring and sent to the city on the Association's ships.

There is no indication that any large-scale casting was done at the Beach Street location. In part, this is implied by the absence of a molding house in the foundry complex. David Matthew, who as a young man was an apprentice at the New York City shop, shows only mill-right, blacksmith, engine, pattern, and machine shops in addition to an office in his charming reconstruction painted and described over fifty years after he worked at the foundry (Plate 6). The accuracy of his rendering is basically confirmed by a print, probably dating from the 1840s or early-1850s, that shows the facades of the Beach and West Street buildings that Matthew depicted from the rear (Plate 7). In addition, field testing, which documented a very high water table on

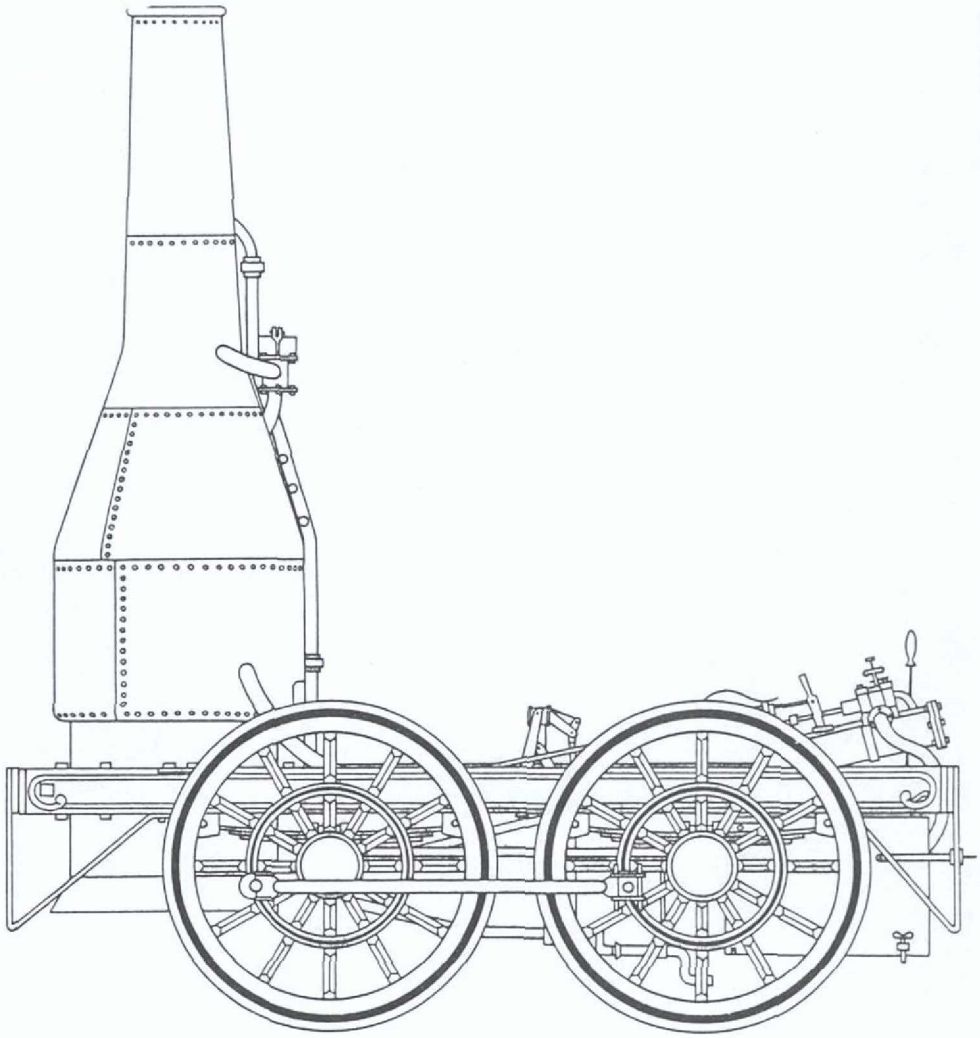


FIGURE 5:
Site 1, Washington St. Urban Renewal Area.
Stylized drawing of The Best Friend, the first locomotive produced in this country. It was assembled at the Beach St. shops of the West Point Foundry Association in 1830.

SOURCE: The Tryckare Company 1976:5.

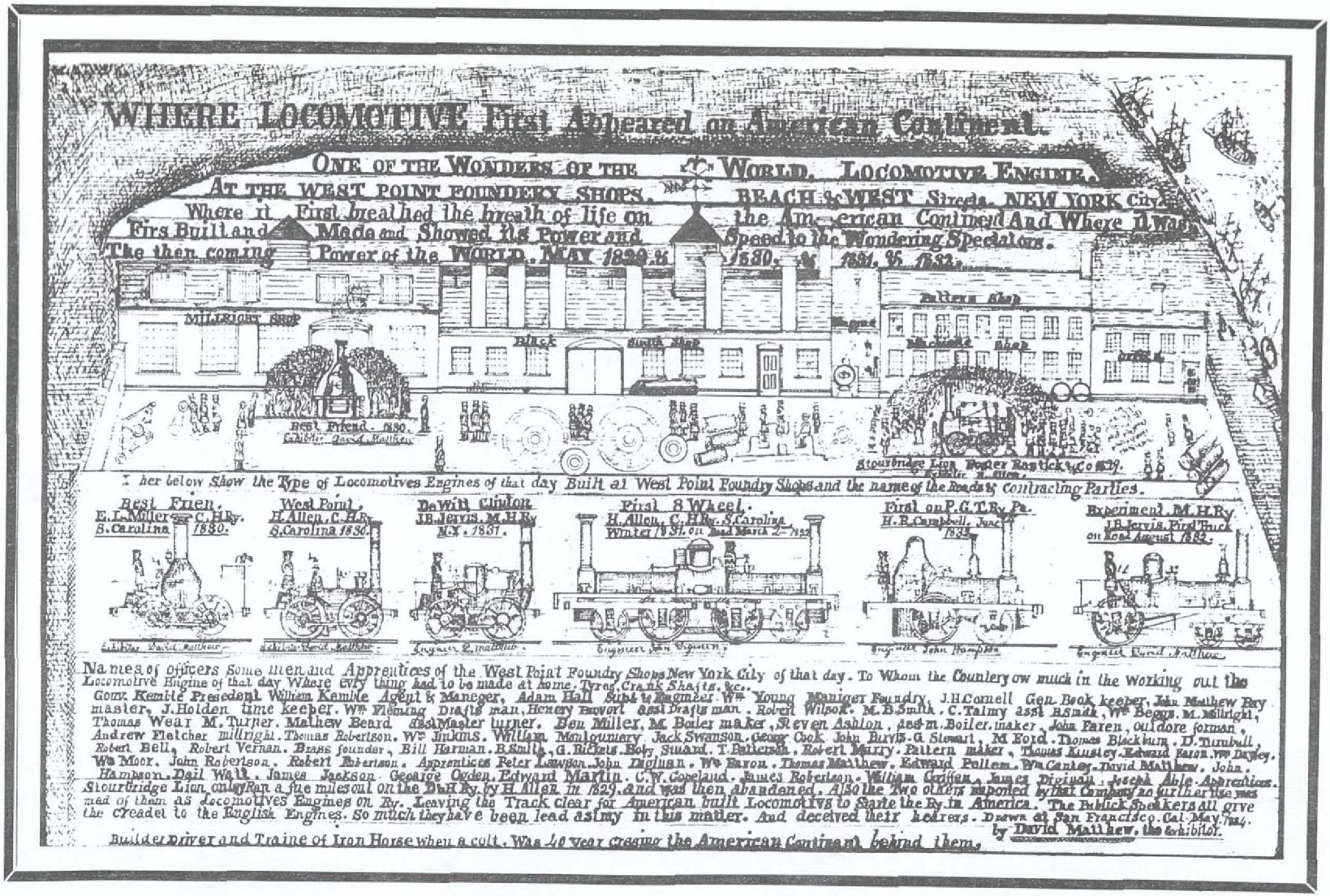


PLATE 6:
WEST POINT FOUNDRY N.Y.C. SHOPS IN 1830 AS REMEMBERED AND DRAWN IN 1884 BY DAVID MATTHEW. VIEW WITHIN THE FOUNDRY CONFINES. (AMERICAN HERITAGE MAGAZINE, AUG.–SEPT., 1984; Photo: J. Geismar)

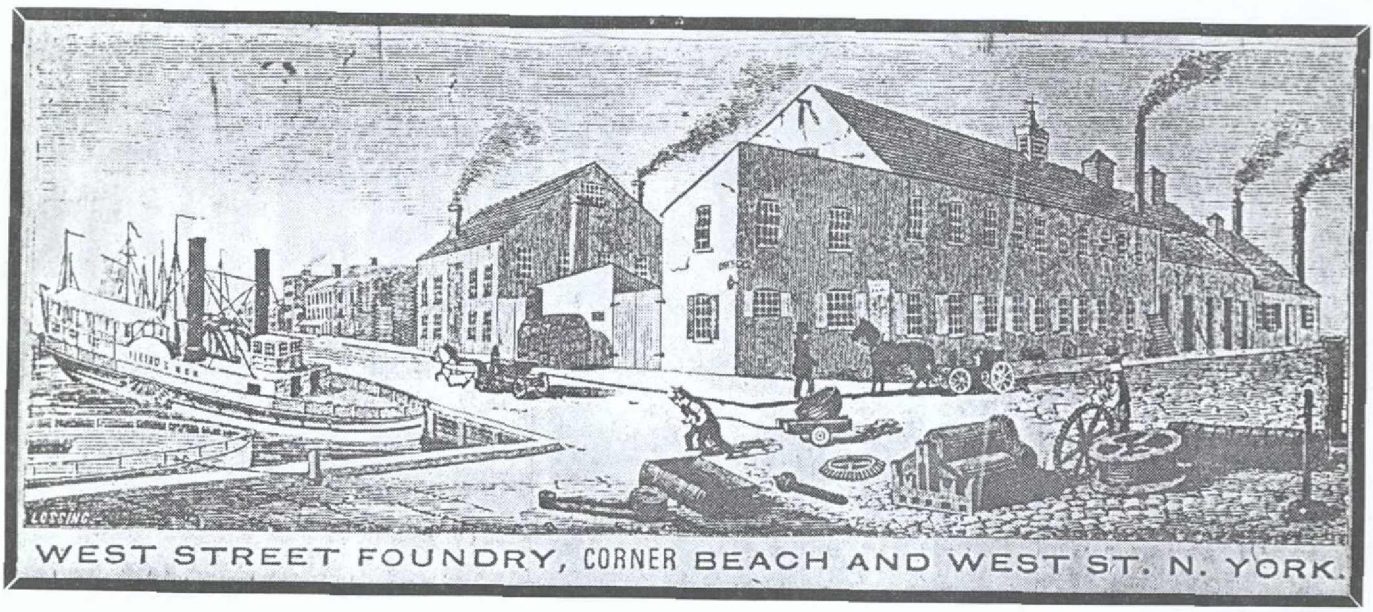


PLATE 7:
ENGRAVING OF WHAT HAD BEEN THE WEST POINT FOUNDRY SHOPS ON THE NORTHEAST CORNER OF BEACH AND WEST STREETS. THIS PRINT, PROBABLY FROM THE LATE 1840s OR EARLY 1850s, VERIFIES MATTHEW'S DRAWING (PLATE 6) AND SHOWS THE EXTERIOR OF THE FOUNDRY BUILDINGS (COURTESY OF JOHN WHITE, SMITHSONIAN).

this landfill block, indicated that it would have been impossible to sink the pits required to cast large pieces (two 20-ft. deep pits for casting were recorded at Cold Spring probably sometime in the 1820s [Rutsch et al. 1979:69; WPFF n.d.]).

While it is believed that the Beach Street shops consolidated with the Cold Spring works in 1838 (Fisher 1940:37; Rutsch et al. 1979:46), they are still listed in the 1839 directory. At this time, Adam Hall, the foundry's engineer and superintendent (Matthew 1884), leased the property from Gideon Lee and Shepherd Knapp (Liber 398:204-206; see Table 1 this report). By 1840, the foundry apparently had moved from its corner location on the north side of Beach Street to a mid-block lot owned by William Kemble (Liber 168:368-371); at this time, Joseph E. Coffee, an engineer, occupied the foundry's former premises.

In 1842 Coffee sublet the property from Hall (Liber 432:165), and his "West Street Foundry" is listed here until 1855 when he moved east on the block, once again to a location previously occupied by the West Point Foundry (N.Y. Directories 1840-1855). In this same year, the last to list William Kemble or the West Point Foundry on the tax rolls, Kemble relinquished the lease on the Beach and West Street property (Liber 691:301). Although Kemble paid taxes as late as 1855 on what became Lot 15 on the south side of Beach Street, it is not known whether the foundry's operations were then carried on here (Plate 34 of the 1853 Perris Atlas of New York City indicates an unnamed iron yard at this location [Plate 8 this report]; at this time in addition to Kemble, a Rodman & Co. also paid taxes on what would become part of Lot 15 [FWTR 1853]).

For the thirteen years that the West Point Foundry was listed at the corner of Beach and West Streets, William Kemble, its agent, is also listed as a merchant with an address at 91 Washington Street. Moreover, every entry gives both the Beach and Washington Street addresses for the foundry. Beginning in 1830, Kemble is also listed as the agent for the Ulster Iron Company, again at 91 Washington Street. His affiliation with this Saugerties, New York, company--of which he was a founder (N.Y. Times 1881)--appears to have lasted at least until 1845 (N.Y. Directories 1830-1845).

While it was located on the corner of Beach and West Streets, the foundry served as a trans-shipment center between Cold Spring and the Dupont powder works in Wilmington. Apparently Kemble not only sold machinery used in the manufacture of gunpowder to the Duponts, he also served as an agent for this powder throughout the 1830s (Roth 1985, see Appendix A this report). Whether or not he persisted in this activity after the demise of the New York City shop has not been researched. It does appear, however, that although Mr. Kemble's activities were all foundry-related, they were somewhat diverse.

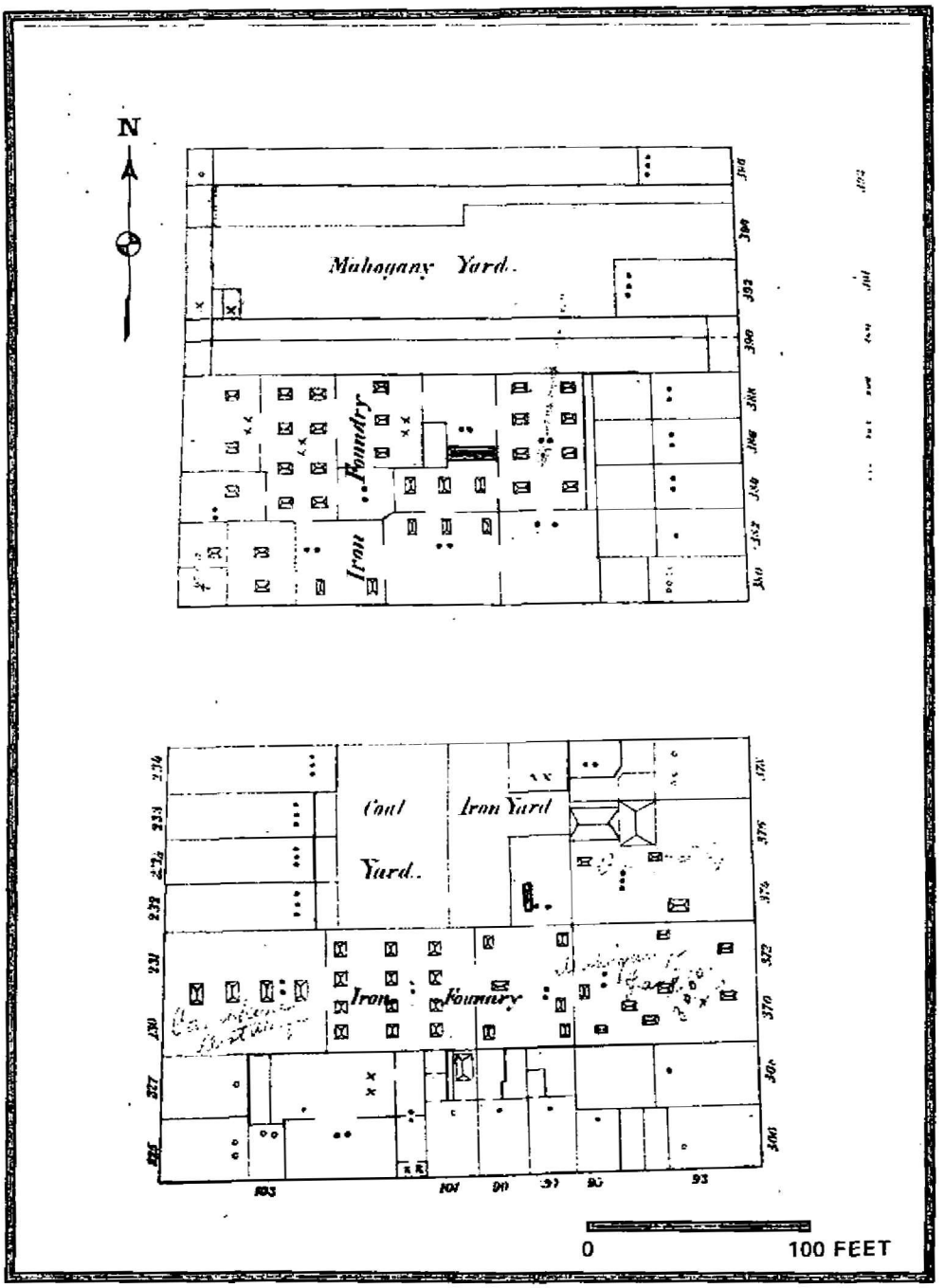


PLATE 8:
DETAIL OF PERRIS 1853 ATLAS. AN UNIDENTIFIED FOUNDRY IS FOUND ON THE NORTH SIDE OF BEACH ST. AND AN IRON YARD IS LOCATED MID-BLOCK ON THE SOUTH SIDE. STRUCTURE IN SOUTHEAST CORNER OF THIS YARD IS A BRICK OUTBUILDING. NOTE OTHER IRON FOUNDRIES AND A DISTILLERY, AN OIL FACTORY, AND MAHOGANY YARDS (SOME PENCILED ON THE MAP) IN SITE AREA.
(NYPL Map Division; Photo: J. Geismar)

From 1818 to 1867, William Kemble functioned as the foundry's agent and, once its Beach Street shop opened, its New York City manager (Matthew 1884). At the Association's inception, Gouverneur Kemble, his brother and the principal in the business, had left Manhattan to live near the upstate operation. It was not only the Kemble Family's connections but also Gouverneur's experience and leadership that helped make the foundry successful.

In 1837 Robert Parker Parrott, the developer of the Parrott Gun used extensively during the Civil War, became the superintendent of the foundry at Cold Spring, and soon after a rift apparently occurred between the Kemble brothers. This falling out is believed to have contributed to the consolidation of the New York City and Cold Spring operations (Rutsch et al. 1979:53,56). From this time until 1841, Gouverneur left the foundry and served as a Democratic Congressman in Washington. By 1843, the situation had apparently been resolved, and Gouverneur returned to Cold Spring where, when the original charter expired, he acquired sole control of the operation (Rutsch et al. 1979:53,56).

Other reasons for the consolidation of the New York City and the Cold Spring operations may include the city's economic crisis of 1837 (e.g., Still 1956:84-85) as well as the fact that locomotive manufacture never proved much of a success (White 1982:103). Whatever the reasons for the demise of the Manhattan shop, William Kemble remained the New York City agent for the upriver operation until at least 1867 when he reportedly retired (N.Y. Times 1881).

Since the West Point Foundry no longer used the shops located at Beach and West Streets after 1839 or 1840, the following is a brief summary of its Cold Spring history after this time (for more detail, see Fisher 1940; Raoul 1936; Rutsch et al. 1979:85-119):

Even after he leased the works to Parrott in 1857, Gouverneur Kemble maintained his interest in its operation. The height of the foundry's productivity apparently occurred during the Civil War when the Parrott Gun, a long-range rifled cannon (Fisher 1940:38), was produced under government contract; never again would it experience such a productive period.

In 1866 Parrott, by then a large shareholder, terminated his lease on the foundry and it became Paulding, Kemble & Company under a lease to four of Gouverneur Kemble's nephews (Rutsch et al. 1979:Table 1), two of them William's sons (N.Y. Times 1881). In 1870, Parrott bought all of the elder Kembles' foundry shares but continued to lease the works to their relations.

Gouverneur Kemble--perenniel bachelor, man of letters and the arts, friend of the famous and powerful--was stricken with paralysis in 1873; he died at Cold Spring in 1875 when he was 89

years old (Raoul 1936:473). Robert Parrott died in 1881 (N.Y. Times 1881).

By 1884, Paulding, Kemble and Company was under scrutiny and in 1887 it was in receivership (Rutsch et al. 1979:119). Although various iron works and factories continued to occupy the Cold Spring site, the West Point Foundry operation ostensibly terminated in 1884, sixty-six years after its incorporation and approximately forty-five years after the shop on Beach and West Streets was abandoned.

D. KEY LOT INFORMATION

Lots 1 and 3 on the north side of Beach Street (Block 216W) and Lot 15 on the south side (Block 186W) were the respective locations of the West Point Foundry's early shops and its yard. As noted above, these lots, which were on filled land, became the focus of research (ownership and occupation data will be found in Tables 1 and 2).

Because it is relevant to the preservation of archaeological material, selected specification and construction information are presented here for the buildings that stood on these and adjacent lots just prior to site clearing almost twenty years ago. Since then, Lot 15 has remained vacant while Lots 1 and 3, both of them now incorporated in the Shearson Lehman/American Express Information Services Center site, were part of a storage yard maintained for city construction equipment.

Although it appeared from preliminary documentation that evidence of the West Point Foundry's occupation of these lots might be retrievable (Historic Perspectives 1984), subsequent research undertaken during the field testing phase and the testing itself indicated that this was only partly so (see Field Report, Chapter III): except for the part of Lot 15 that was covered by a late-nineteenth-century flagstone-paved yard, and a segment of Lot 18 just to the east, it became apparent that subsequent building episodes would have obliterated evidence of the foundry.

By the turn of the century, a four-story, basemented, fireproof warehouse and office building (New Building Application [hereafter NBA] May 16, 1899:653) had been built on Lot 1 on the northeast corner of Beach and West Streets, the principal location of the foundry's shops. Its structural elements included brick foundations (found in excavation to be seven-feet wide) and interior cast iron "I" beam support columns resting on or set in concrete piles (Amendment to New Building Plans [hereafter ANBP] June 29, 1899:653; see Chapter III and Plates 12-13 this report).

Behind this building, on the southeast corner of Hubert and West Streets, a nine-story factory building supported by brick foundations on concrete caissons was erected in 1910. The caissons, originally planned to extend 36 feet below curb level (NBP April

TABLE 1. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA: Ownership/Occupation of Lots 1 and 3 (Block 216W) 1809-1875

Year	Grantee/Owner	Lessee	Property Description	Remarks	Source
May 1, 1809	Corporation of New York	Ogden & Murray	North side of present day Beach St. between Washington and West Sts.	Water lot rental (also, Trinity Church Ogden & Murray, 1810).	GLUW* F:7 (also Liber 86:390)
Feb. 10, 1817	Merchanics Bank, New York City	---	Same as above	Mortgaged property bought at forfeiture sale; confirmed March 18, 1818.	Liber 156:210ff
1821	Mechanics Bank, New York City (?)	Carson & Birckbeck	6 Lots and shops "Beach and West St." (North Side)	Only listing. Possibly a foundry that preceded West Pt. Foundry on site.	**FWTR 1821:83
1823	Mechanics Bank, New York City (?)	West Pt. Foundry Association	"8 Lots and buildings on North side" of Beach St. between Beach and West Sts. (Lots 1, 3 NE corner of Beach and West Sts.	No lease located (first West Pt. Foundry listing).	**FWTR 1823:60
1824	Mechanics Bank, New York City (?)	"	10 Lots and buildings	No lease located.	**FWTR 1824:62
1826-1839	"	"	"	West Pt. Foundry Listed in N.Y. Directories at "Beach C. West:"	N.Y. Directories 1826-1839
May 4, 1839	Gideon Lee		Lots 1, 3 including Wharf on West side of West Street	Sold by Mechanics Bank, N.Y.C. Therefore, Bank owned property from 1817-1839.	Liber 404:496-498
May 31, 1839	Shepherd Knapp		Half-share of above	Lee sells Knapp one-half share of Lots 1 and 3; Knapp was or then became Lee's partner.	Liber 404:498-500
1839-1842	Lee & Knapp	Adam Hall; Joseph E. Coffee, Melzaer Howell	Lots 1 and 3	Leases and subleases for West Pt. Foundry Site. By 1842, becomes West Street Foundry with Coffee as agent.	Liber 398:200-203; Liber 398:204-206, Liber 432:165 N.Y. Directories 1840-1855

TABLE 1. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA: Ownership/Occupation of Lots 1 and 3 (Block 216W) 1809-1875 (continued)

Year	Grantee/Owner	Lessee	Property Description	Remarks	Source
1843	Knapp & Lee	Adam Hall	Lot 1	Knapp & Lee acquire lease at forfeiture sale.	Liber 447:634 635
1845	Knapp & Lee	Charles Leupp & George Smith	Corner property (Lot 1)	Lease turned over by Joseph E. Coffee; yet Coffee was listed at this address until 1855.	Liber 457:233; N.Y. Directories 1840-1855
1850	[Lee & Knapp]	Joseph E. Coffee	H & L 77 Beach St. (Lot 3)	Also, listed at 75 Beach St., Lot 11.	**FWTR 1850:59
[NOTE: At this time, West Pt. Foundry Still Listed at 71 and 73 Beach St. (Parts of Lots 11 and 14)					**FWTR 1854:59
1855	Gideon Lee & Shepherd Knapp	"Wilson Small" crossed out; Lee & Knapp written in pencil	235-238 West Street (Lot 1 and perhaps Lot 3)	(Same for adjacent Lot 11: 75 and 73 Beach Street, formerly West Pt. Foundry Site after 1839)	**FWTR 1855
1860	Gideon Lee & Shepherd Knapp	--	235-238 West St.	1 and 2 story bldgs.	**FWTR 1860:73
1875	Shippard Knepp [sic]	—	Corner of Washington (?) Beach and West: 2 Story building, 40 ft 3 in x 100 ft. 6 in. Appears to be part of Lot 1, but listed as "71" Washington, or NW corner of Washington and Beach Sts.	A mixed-up description and location. Could mean 81 rather than 71 Beach St., which would be Lot 1 on the NE corner of Beach and West Sts.	**FWTR 1875 (in, Historic Perspectives 1884:98)

*Grants of Land Under Water
**Fifth Ward Tax Rolls

TABLE 2. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA: Ownership/Occupation of Lot 15 (Block 186W)

Year	Grantee/Owner	Lessee	Property Description	Remarks	Source
1797	Frederick Rhinelander et al.	--	Land under water, high to low-water marks (south side of Beach St; NE corner of Block 186W)	Grant apparently ended at or just west of eastern boundary of Lot 15. Both the City and Trinity Church may have issued grants. Unpaid.	*MCC 1917 V:530
Nov. 16, 1807	Wm. Rhinelander, Jr.	--	Water lot rental extending 190-200 ft. beyond low water mark into Hudson River	Apparently reaffirms 1797 deed and extends water lot rights. This grant covers south side of Beach St. from Washington to West Sts., including Lot 15. Grant required wharf or pier centered on South line of Beach Sts.	**GLUW Liber E: 364ff; *MCC 1917 #V: 529-531
April 10, 1824	Wm. Rhinelander, Jr.		Lots 7-20 (northern part of Block 186W, southern side of Beach St).	City sells land previously rented to Wm. Rhinelander, Jr.	Liber 174:370ff
1824	Wm. Rhinelander, Jr.	"K". Kemble	Probably all or part of Lot 15	"K. Kemble" penciled in 1824 Rhinelander Rent Book.	***RFF 1824
1825	Wm. Rhinelander, Jr.	West Pt. Foundry	Probably all or part of Lot 15	Rent book dated 1825-1826 but marked 1825 on cover.	***RFF 1825
1846	Wm. C. Rhinelander, Trustee	Wm. Kemble	Probably all or part of Lot 15	21 year lease with right to sublet.	Liber 790:63ff
1850	Rhinelander Estate	West Pt. Foundry #72; William Harrison #74	Lot 15	Note: until 1858, when numbers apparently changed, #72 and #74 Beach St. were the the numbers of Lot 15 (based on maps).	****FWTR 1850

TABLE 2. SITE 1, WASHINGTON ST. URBAN RENEWAL PROJECT: Ownership/Occupation of 15 (Block 186W) (continued)

Year	Grantee/Owner	Lessee	Property Description	Remarks	Source
1853-1855	Rhinelander Estate	Wm. Kemble #72; Rodman & Co. #74	Lot 15	Listing on tax rolls from 1853-1855. Eastern part of this lot may have had building on it by 1854. This is last listing for Kemble.	FWTR 1853-1855; Perris Atlas 1853
1856-1857	Rhinelander Estate	Birbeck Furman & Co	#72 H & L; #74 Lot	Implies partial building of lot	FWTR 1856:56; FWTR 1857:57 Perris Altas 1857
1858-1871	Rhinelander Estate	Birbeck Furman & Co, Foundry	Both #72 and #74 have buildings on them	Two 1-story foundry buildings, each 25 x 75, probably built 1857. No directory listing for this foundry.	FWTR 1858-1871
1872	Rhinelander Estate	--	1-story foundry building covering Lot 15	Birbeck Furman Co. gone.	FWTR 1872
April 24, 1875 April 12, 1879	Rhinelander Estate	Adolph King, George W. Kidd and Isaac Bestrow (?) Rogers	Lot 15	Leases and subleases	Liber 1327:249; Liber 1327:258; Liber 1499:454
Feb. 28, 1882	Wm. C. Rhinelander	--	Lot 15	Records earlier settlement of property on Wm. C. Rhinelander, probably in preparation for new apartment building constructed in 1883.	Liber 1645:30

*Minutes of the Common Council
**Grants of Land Under Water
***Rhinelander Family File
****Fifth Ward Tax Rolls

25, 1910:304), were ultimately required to extend an additional three inches (ANBP June 7, 1910:304). Unfortunately, a caisson location plan filed with the building department in 1910 is no longer available; however, archaeological monitoring during recent foundation construction determined that they were ubiquitous throughout the lot and that they had damaged or destroyed remnants of underlying wharves or other fill-retaining features (see Monitoring Report, Chapter IV).

There is very little information about the five-story structure that stood on Lot 3 just east of Lot 1 at 77 and 79 Beach Street (Bromley Vol. I 1899:Plate 10, Figure 6 this report). It appears that this building, which was demolished in 1968, may have been constructed before building records were routinely kept; since the 1875 tax rolls do not list a structure on this lot (Historic Perspectives 1984:94), it probably was built sometime between 1875 and 1885. Although no basement is indicated on the 1899 atlas, testing revealed a relatively deep basement that would have obliterated any evidence of foundry buildings on this lot.

As mentioned above, only under the flagstone pavement of Lot 15 on the south side of Beach Street (Block 186W) was it likely that remnants of the foundry might be found intact. The building on this lot, called "The Riverview" (see Figure 6), was constructed as a "French Flat" in 1883-1884 (NBP May 4, 1883:494) and occupied the site for over eighty years. It featured ten apartments on five floors plus a basement, and its 10-foot deep brick support walls were built directly on earth, in this case landfill.

In 1891, a 2-foot thick stone wall was built to the rear of the building's yard to exclude the "vile smells and the noises arising from an adjoining stable" (Alteration Plan [hereafter AP] August 21,1891:1560). This massive, 56-foot high, buttressed wall with ventilating flues (Figure 7) apparently was afixed to the main building by tie rods (AP August 28, 1891:1560). Based on the wall's elevation drawing, its position is somewhat vague, suggesting that it might be a side rather than a rear wall. However, in addition to its description as being in the rear of the yard, both the 1899 atlas and one from 1894 document boarding stables just south of the lot (Figure 6 this report and Bromley Vol. I 1894:107), indicating that its location was probably along the rear or southern limit of the yard.

The structure that stood just east on Lot 18 was originally a two-story building constructed in 1889 as a "bottling establishment" by the lot's lessee, a Milwaukee brewing company (NBP 1889:687). With its entrance at 374-376 Washington Street, two floors were added to the front of the structure in 1895 (AP December 4, 1895:1922). To the rear, a two-story segment of the original structure with a shallow basement adjoined the eastern wall of the Riverview (AP 1917:3100). Testing beneath the basement's cement floor revealed a wall remnant that appears related

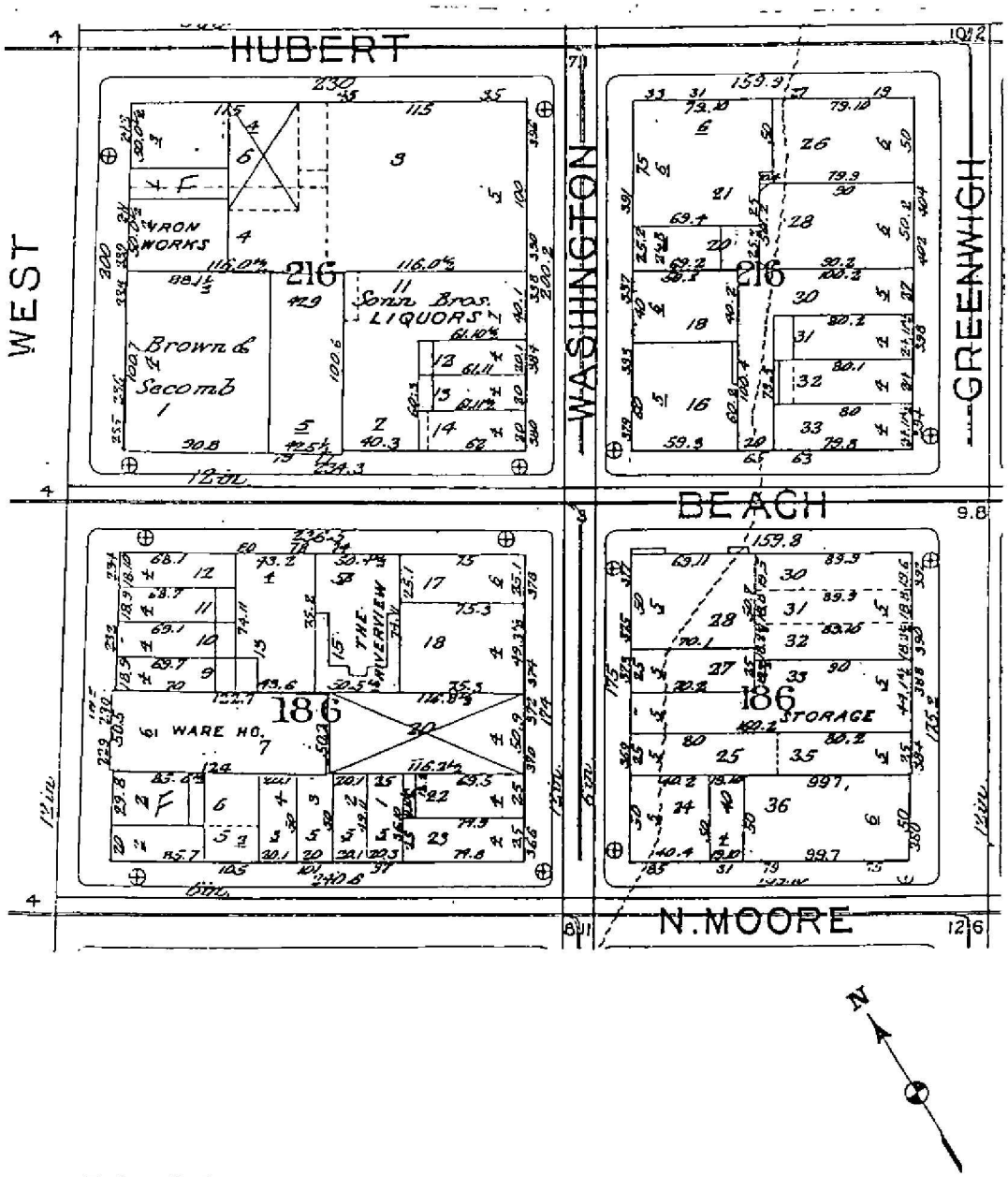


FIGURE 6:
Site 1, Washington St. Urban Renewal Area.
1899 atlas of site blocks. Dashed line indicates reconstructed low water mark. Note that the convention on Lot 20, Block 186W, indicates a brick or frame stable. (Bromley Vol. I 1899: Plate 10).

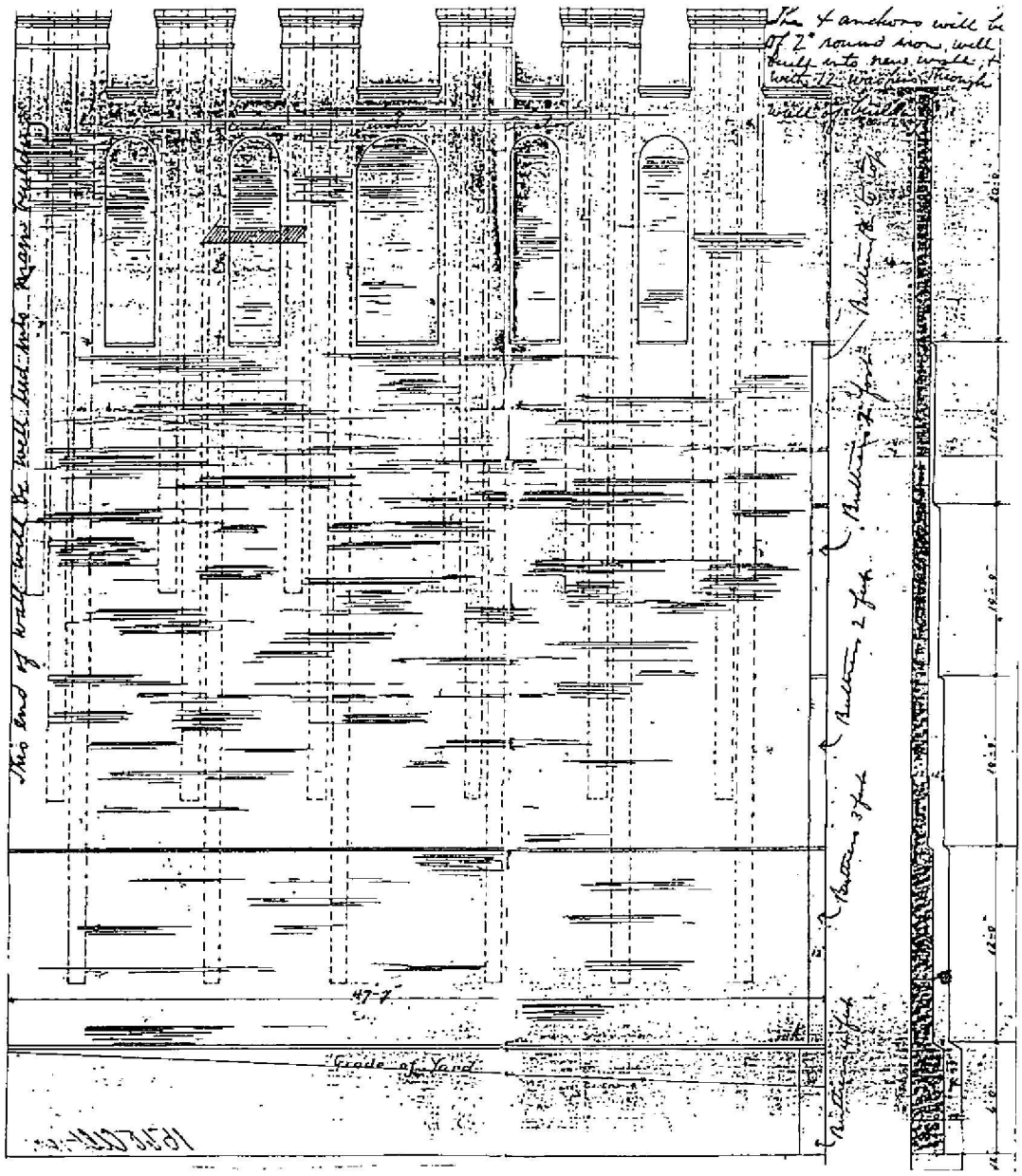


FIGURE 7:
Site 1, Washington St. Urban Renewal Area.
Amended elevation drawing for new wall constructed in 1891 along the southern boundary of Lot 15, the rear yard wall of an 1883 5–story apartment house. It was intended to eliminate the nuisance and smells coming from an adjoining boarding stable.

SOURCE: Alteration Plan, August 21, 1891: No. 1560.

to the original West Point Foundry yard (see Field Report, Chapter III); this wall's placement and another wall located in the western part of Lot 15 illustrate a property line shift that is documented in the tax records after 1858 (FWTR 1858). The bottling plant and its extension were demolished in 1968, the Riverview in 1967. Their lots, like the others on block 186W, remain undeveloped at this writing.

Based on the information presented here, it is understandable why archaeological material documenting the nineteenth-century occupation of Lot 15 and part of Lot 18 was anticipated on the south side of Beach Street since a yard or shallow basement protected the earlier deposits and features; this was the site of the foundry yard that functioned throughout the second quarter of the nineteenth century. It was also the site of what appears to be an unrelated mid-nineteenth-century foundry building (see Table 1). However, on the north side of the street, where the foundry shops had been located, subsequent building would have destroyed relevant deposits as it would have damaged or destroyed at least some of the earlier wharf constructions associated with the landfill process. Field testing and later monitoring verified this situation.

NOTES TO CHAPTER II

1. Maria Rhinelander, a niece of William Rhinelander, Jr., married William Paulding in 1806 (RFF n.d.); this undoubtedly is the William Paulding associated with the West Point Foundry Association.

2. Colonel Thomas Barclay, British Commissioner, is listed in the 1819 N.Y. Directory at 376 Washington Street (the west side of the street between Beach and North Moore, on Rhinelander's land); his lot and stable on the north side of Beach between Washington and West Streets is documented in this year's tax record (FWTR 1819:77).

3. Prior to this, William had been a merchant at Stone and Whitehall Streets, an address and occupation listed for both his brother, Gouverneur, in 1817, and his father, Peter, till 1823 when he moved to 13 Whitehall; Peter died the following year (Liber 174:394ff), and William's office and that of the foundry are given at that time as 42 William Street with his home at 335 Greenwich Street. Once the foundry was listed on Beach and West Streets, William lived at 24 Beach Street (N.Y. Directories 1817-1839); this address was located between Greenwich and Washington Streets, only a block and a half from the foundry shops.

III. FIELD REPORT

A. INTRODUCTION

Testing on Site 1 of the Washington Street Urban Renewal Area mainly concerned the makeup and structure of landfill and the deposits related to the West Point Foundry. While testing was expected to fully address landfill questions, those relating to the West Point Foundry conceivably would require further field investigation. Consequently, testing was meant to determine if any evidence of this historic foundry's operation remained (see Chapter II and Appendix B), and, if so, the appropriate means for fully documenting it through archaeology. Based on preliminary documentary research (Historic Perspectives 1984), testing focused on areas that appeared relevant to these issues.

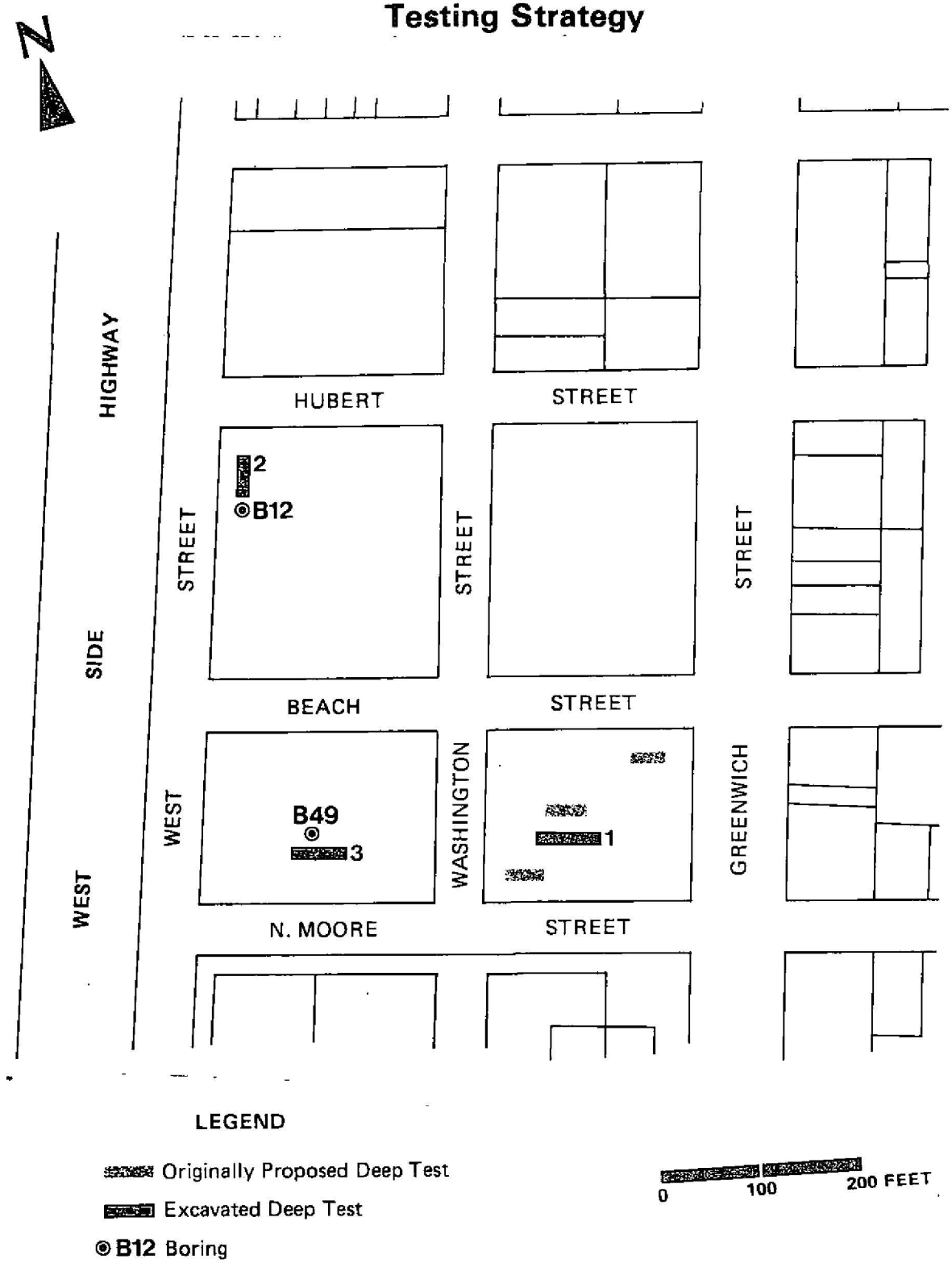
After selected portions of the site were cleared of building rubble by backhoe (Dynahoe 190) and bulldozer (977), two sampling methods were initially employed to address these and related issues: controlled and monitored backhoe excavation and hand excavation by field archaeologists. As many as twelve archaeologists were engaged in this phase of the investigation. In addition, archaeological monitoring of subsequent foundation excavations was later added to the testing program. The field application of these methods and the results of testing will be presented in this section.

B. DESCRIPTION OF FIELD METHODS

Based on preliminary documentation (Historic Perspectives 1984), a field program was devised that initially called for testing landfill on Block 186E, the block bounded by Washington, Beach, Greenwich, and North Moore Streets (designated Area A for this investigation; see Figure 2). Since it appeared that testing on this block would offer information about the relationship between fast land, the Hudson River's original shoreline, and landfill, three mechanically excavated deeptests totaling 200 square feet were proposed to test each of these conditions (Figure 8). Each test was to be 5 feet by 15 feet, a proportion that would permit soil profiling while minimizing the possibility of trench-wall collapse (e.g., Louis Berger & Associates 1984b).

In addition to general landfill information, it was expected that sampling the eastern or fast-land portion of the block would determine if landfill deposits to the west came from a ridge eliminated when Greenwich Street was graded, a possibility suggested by the documentation (Historic Perspectives 1984:11). However, test borings from the site (Woodward-Clyde 1984) that became available after the testing proposal had been submitted indicated that a reassessment of the deeptest placement was called for.

FIGURE 8:
Site 1, Washington St. Urban Renewal Area
Testing Strategy



Five feet of wood 27 to 29 feet below the ground surface in boring B-12 (see Figure 8) on Block 216W, designated Area C, suggested this might be the location of a fill-retaining feature such as a wharf or pier. Unfortunately, no borings were drilled in Area A and only two were available from Area B (Figure 8; borings were available from the block later designated Area D; but it was then an active parking lot and was not included in the testing program). Based on this information, it was proposed that one deeptest would be excavated in Area A (DT1) while another would be placed in Area C in the vicinity of B-12 (DT2). However, testing in Area A quickly revealed that development had apparently eliminated traces of the original shoreline as well as any shallow fill deposits, a situation that again called for relocation of the deeptest. Based on a mid-block boring that suggested the location of river bottom under fill, a deeptest was ultimately placed on Block 186W (DT3, Area B; Figure 9).

Prior to testing, a chain link fence was installed around areas A and B (Area C, used as a storage yard for city construction equipment, and Area D, the functioning parking lot, were both fenced prior to testing). Deeptest locations were then cleared of rubble and prepared for the backhoe.

Although attempts were made to excavate deeptests by natural strata, backhoe excavation made this difficult if not impossible. Consequently, 10-12 in. arbitrary levels were used as horizontal units. An average of 39 gallon samples were retrieved from each level and water-screened through quarter-inch mesh hardware. Any artifacts recovered were bagged by level and all perishable materials were placed in water-filled plastic bags for conservation purposes. Other materials were air dried in the laboratory facility. In addition, one-gallon flotation and soil samples were taken from each level for chemical analysis and to recover ethnobotanical material and small artifacts. Like the artifacts, these samples were processed in the lab.

If warranted, shoring would have been used to retain the sides of a deeptest, but it was not necessary. The size of the project area and the location of the test excavations eliminated the need to remove backdirt from the site. Deeptest walls were profilled and photographed and, where possible, features exposed in a deeptest, such as foundation footings, barrels, or pilings, were drawn and photographed. Both black and white pictures and color slides were taken.

Since the deeptests extended well below the water table, they were dewatered by pumping. At all times, the crew's safety was a primary concern: often, the ending depth of a deeptest or the extent of sampling was determined by the safety factor.

Deeptest 3 (DT3) in Area B was divided into two excavation segments, each of them initally 5 feet wide by 15 feet long: the eastern part was dug and dewatered to obtain wall profiles, the

western part was systematically excavated to recover an artifact sample, although a profile was also drawn. In all, eleven levels were sampled from the western segment of the trench. It is believed that dark, organic deposits encountered about 14 feet below site datum in the eastern segment indicated that river bottom was encountered (Ciancia 1984:personal communication).

Because it was impossible to locate and stop a broken pipe discharging raw sewage into DT2 in Area C, plans to recover artifact or soil samples from this test had to be abandoned. Instead, it was used solely to document landfill levels and assess site disturbance and development in the northwest corner of the project area.

Instead, landfill samples were recovered from Trench C1, a backhoe test trench originally placed in Area C (see Figure 9) to locate late-nineteenth or early-twentieth-century walls and determine the preservation of the West Point Foundry buildings. Here, relatively deep cement basement floors directly above landfill, massive brick foundations faced with cement or slate, and deeply imbedded column supports indicated the impossibility of finding any evidence of earlier buildings on the lot (see Plates 12-13).

It should be noted that test-trench excavations usually were only taken to, not into, landfill. However, because it was ultimately used as a deeptest, Trench C1 was taken into the landfill although not to river bottom. This trench, which was enlarged to permit observation of the massive foundations uncovered during testing, was ultimately excavated in two segments, an eastern part (C1E) and one to the west (C1W), both of them sampled.

In addition to the 45 linear feet of deeptests, the scope of work called for 15 linear feet of test trenches to be distributed as needed throughout the site and for seven 5 feet by 5 feet excavation units to be placed in the foundry areas (because one excavation unit [EU4] placed under the cement basement floor in Lot 15 was found to be totally unproductive, it was quickly abandoned and another added; consequently, there are eight numbered excavation units although only seven were fully excavated). Test trenches were distributed in relevant sections of Areas B and C, but, with the exception of one unit opened in Lot 18, excavation units were concentrated in Lot 15 in Area B. This was the location of the West Point Foundry yard in the second quarter of the nineteenth century (see Chapter II); it was also where a protective flagstone-paved surface, the yard of a late-nineteenth-century, five-story apartment building, covered the rear and sides of the lot. Since field testing and ongoing historical research had determined the potential for preserved deposits in this yard, it became the focus of testing related to the West Point Foundry (Plate 9). Ultimately, all the flagstones were removed and the backyard shovel-scraped and any exposed features sampled.

Using a transit, a datum for each unit was tied into the site datum. Wherever possible, deposits in these units were hand excavated by natural strata. Strata deeper than 0.3 feet, however, were subdivided in 0.3-foot arbitrary levels (for example, this was the method used to control excavation of dense, undifferentiated coal dust deposits found in two dry-wells located in the yard). Depending on the desired information, features located within these units were either totally excavated or sampled. Bagging and screening were comparable to that done for deeptest material. Planviews and profiles of features and profiles of soil deposits were drawn during and upon completion of unit excavations; photographs were also taken.

Following the procedures outlined here, testing recovered a great deal of detailed information about site formation and preservation. It also provided a productive landfill sample but did not expose any landfill-retaining features; it remained for a monitoring program to reveal some of these fill features (see Chapter IV). Moreover, since foundry deposits were found to be sparse, all relevant information was recovered during the testing period, eliminating the need for a Phase III recovery program.

The data recovered in testing is presented here by area and type of test. The location of deeptests, features, excavated units, and test trenches will be found in Figures 9 and 11, and in plans cited in the text. In addition, plans and profiles provide other relevant data such as feature elevations and strata definitions and descriptions.

C. DEEPTESTS

1. Area A, DT1

Nine feet of exposed stratigraphy revealed the reddish, yellow, and light brown sands, clays and silts that indicate glacial outwash, in this case to a depth beyond where river bottom should have been located. In other words, the stratigraphy indicated that if this portion of the site was ever filled, the shallow landfill deposits as well as river bottom were destroyed during subsequent building episodes. As noted above, once it was discovered that DT1 could not provide information about landfill or the original shoreline, excavation was discontinued.

2. Area B, DT3

This two-part deeptest was located just south of Lot 15 in the vicinity of Boring B-49 where river bottom was recorded at approximately 17 feet below the ground surface (Woodward-Clyde 1984). It appears that this was once the location of a stable (see Figure 6), and its concrete floor was removed to accommodate the test. A high water table (7 1/2 feet below site datum) caused slumping that increased the trench width from 5 to about 12 feet in both the eastern and western segments. The predominant soil

FIGURE 9:
Site 1, Washington St. Urban Renewal Area
Area B, Plan

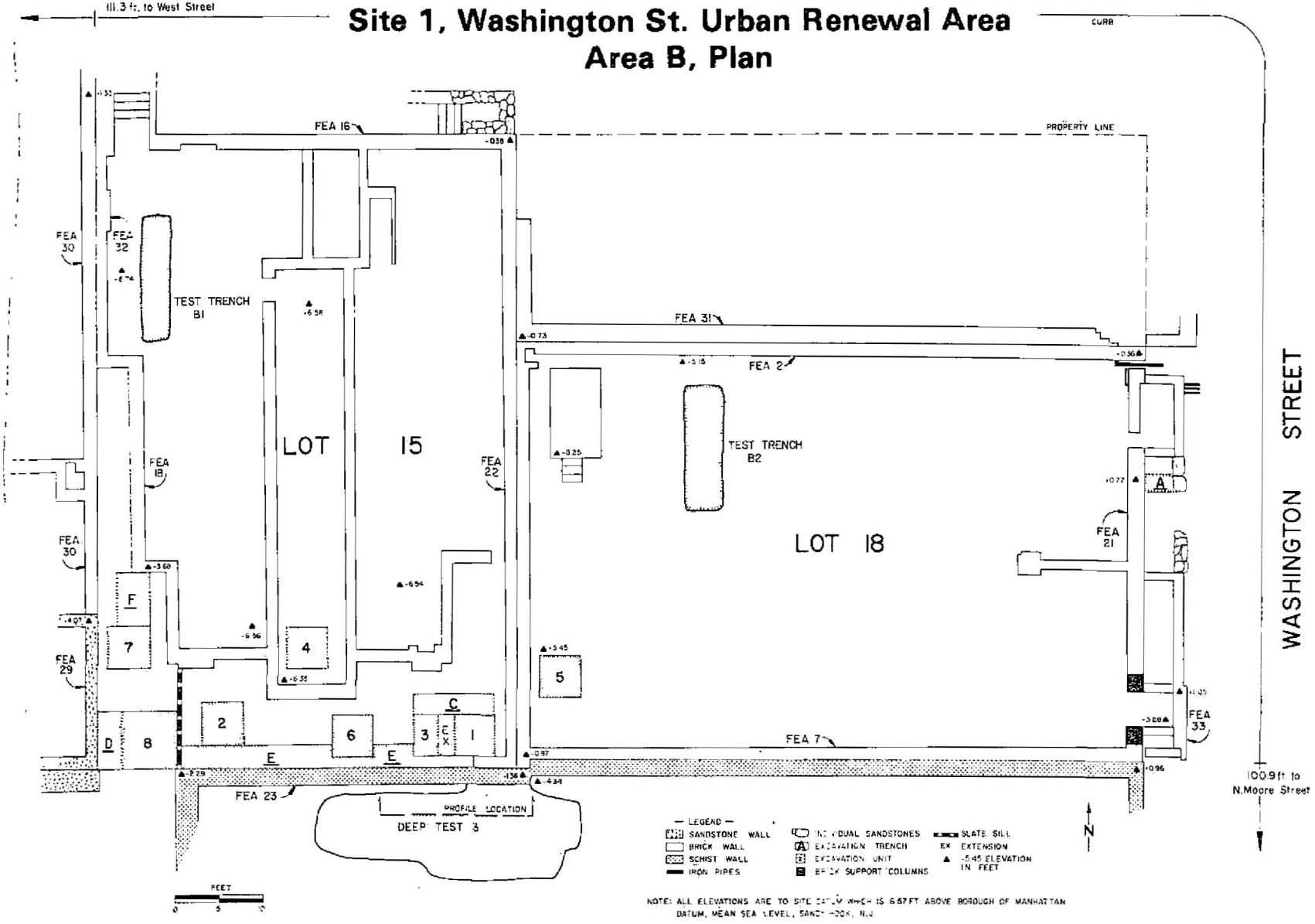


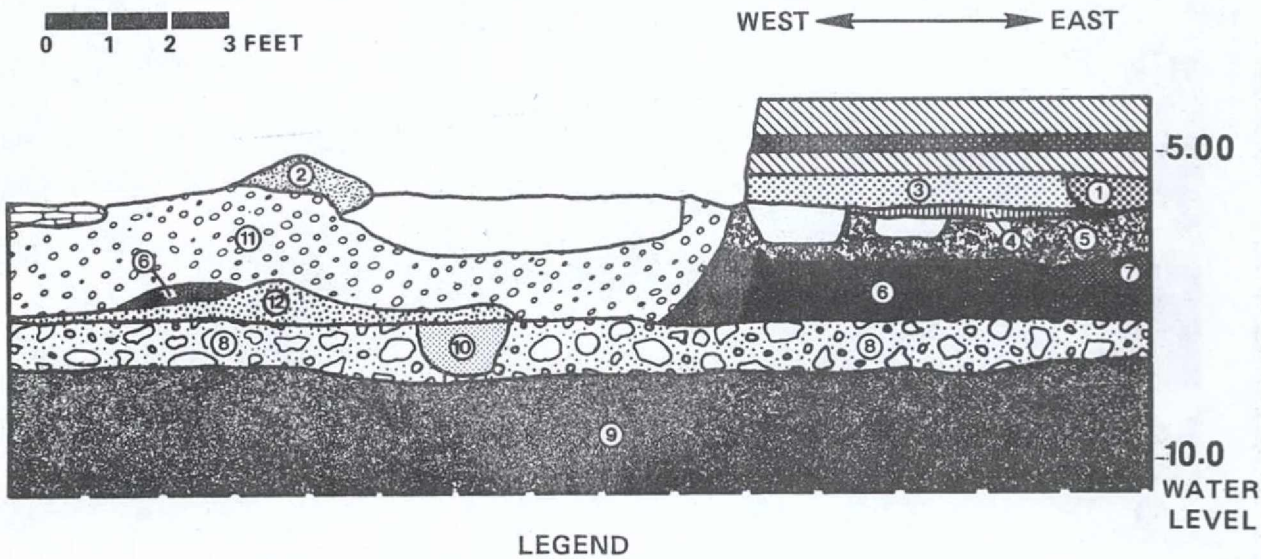
PLATE 9:
A GENERAL VIEW LOOKING WEST ACROSS LOT 15, AREA B, WHERE THE WEST POINT FOUNDRY YARD WAS LOCATED DURING THE FIRST HALF OF THE 19th CENTURY. IN ADDITION TO EXCAVATORS, BACKHOE IS CLEARING TO ALLOW FURTHER TESTING. NOTE SCREENING AREA IN UPPER LEFT CORNER OF PHOTO AND WEST ST. AND NEW JERSEY SHORELINE IN REAR. (T. Masso 6/84).

type in both segments was a coarse reddish-brown sand with some clay. Based on particle size and color, a major component of the fill from this test appears to be glacial sands and perhaps deposits found along river banks. While it contained bone, shell, and other kitchen-type debris, its relative sterility, at least compared with fill from earlier east side sites (see Chapter V), was apparent in the field. DT3, eastern half: As noted earlier, this part of the trench was excavated without systematic sampling; after dewatering, its stratigraphy was profiled. Remnants of a wooden barrel (F1) were exposed in the northern wall and a wooden post or piling was observed to the south. A footing stone for a schist wall (F23) located in the rear of Lot 15 (see Figure 7) was also exposed as was its builders' trench. Unfortunately, since no samples were taken from this unit, there are no artifactual data relating to this wall; however, records provide excellent information (see Chapter II). The stratigraphy recorded in the trench's north wall profile (Figure 10 and Plate 10) implied three undisturbed landfill deposits, the two lowest separated by about 8 inches of water-worn cobbles. A remnant of a brick wall, running north to south and intruding on these cobbles, was exposed under the footing stone associated with the schist wall. Some artifacts were recovered from the builders' trench for the brick wall--a grab sample of sorts--that suggested it was built in the first quarter of the nineteenth century (an intrusive trench that may be related to the brick wall was exposed briefly in the upper levels of the west wall of the deep-test, but it collapsed before it could be recorded or sampled). DT3, western half: The artifact content from eleven excavated levels appeared consistent throughout and included brick fragments (probably slumped building debris), coal, tar, glass, tile, oxidized and clean nails, shell, bone, and glass and ceramic fragments. Among the ceramics, which appeared typical of an assemblage from the first quarter of the nineteenth century, were pearlware, redware, creamware, stoneware and porcelain. Because of the potential hazard caused by slumping after three days of rain, excavation in this unit was terminated before river bottom was reached. However, a profile was drawn of the north wall of the trench (see Figure 10).

3. Area C, DT2

As noted earlier, raw sewage from a broken pipe precluded sampling of this unit. However, backhoe and bulldozer clearing as well as the excavation itself (Figure 11) provided valuable information about the formation and development of this portion of the site. For example, a slate floor overlying a large concrete construction--the latter over 3 feet thick and insulated with layers of tar paper--was encountered as were brick walls, terra cotta pipes, and wooden pilings (Figure 12 and Plate 11). In general, the landfill deposits appeared to be a reddish brown sand with pebbles and water worn cobbles. A Case 850 track loader backhoe was used for this excavation. Because the backhoe could not reach any further, the test terminated at 20 feet below site datum and did not reach river bottom (see Figure 12).

FIGURE 10:
Site 1, Washington St. Urban Renewal Area
Area B, Deep Test 3. North Wall Profile



LEGEND

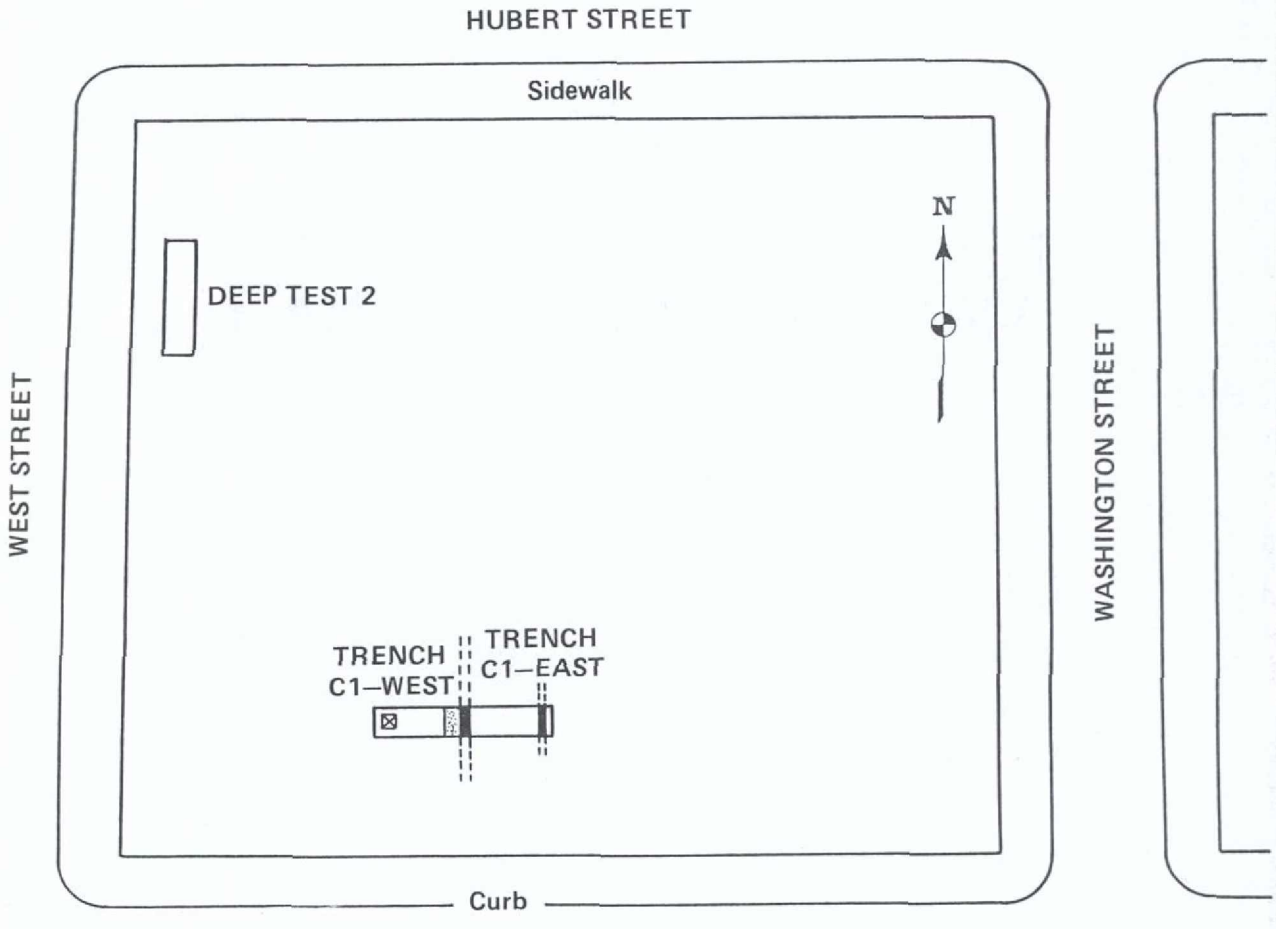
- Concrete
- Gravel and Sand
- Foundation Rocks for Schist Wall. FEA 23
- Wood

1 Yellow Gray Silty Sand with Charcoal & Mortar
2 Construction Rubble
3 Coarse Brown Sand with Pebbles and Brick Fragments
4 Black Green Silty Sand with Anthracite and Rubble
5 Hard Packed Coarse Brown Sand with Rubble
6 Coarse Reddish Sand
7 Coarse Brown Sand
8 Cobbles in Matrix of Coarse Reddish Sand
9 Coarse Reddish Brown Sand
10 Coarse Reddish Brown Sand Mottled with Yellow Clayey Silt
11 Dark Brown Sand with Cobbles, Brick and Anthracite
12 Black Green Silty Sand with Anthracite, Brick, Pebbles and Glass

NOTE: All Elevations are to Site Datum. River Bottom at Approximately −14.0 FT. Below Datum

PLATE 10:
VIEW LOOKING NORTHWEST ACROSS AREA B AND DT3 DURING PROFILING OF EASTERN HALF IN MAY 1984. NOTE CONSTRUCTION EQUIPMENT STORAGE YARD IN REAR OF PHOTO ACROSS BEACH ST. (AREA C). (T. Masso 5/84).

FIGURE 11:
Site 1, Washington Street Urban Renewal Project.
Area C, Plan

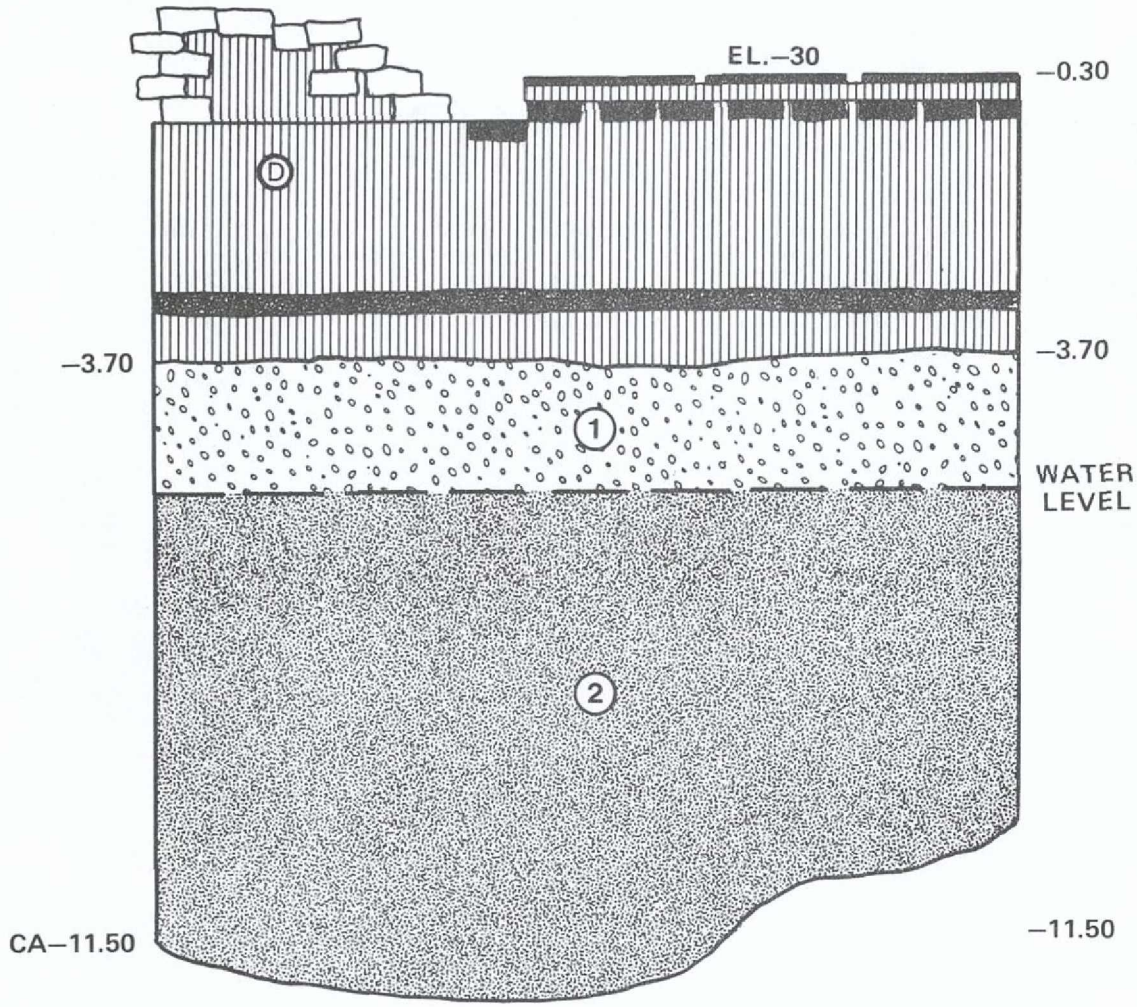


LEGEND

- Brick Wall
- Concrete Platform
- ⊠ Metal Support Platform

0 30 FEET

FIGURE 12:
Site 1, Washington Street Urban Renewal Area.
Area C, Deep Test 2.
West Wall Profile



LEGEND

1 5YR 3/4 Dark Reddish Brown Coarse Sands with Cobbles and Pebbles (Fill)

2 Stratigraphy Uncertain Due to Slumping of Sediments but Generally Consists of Layers of Reddish Brown – Yellowish Red Coarse Sands (Fill)

- Slate Floor
- Brick
- Brick on Edge
- (D) Drain Pipe, Terra Cotta
- Concrete
- Asphalt

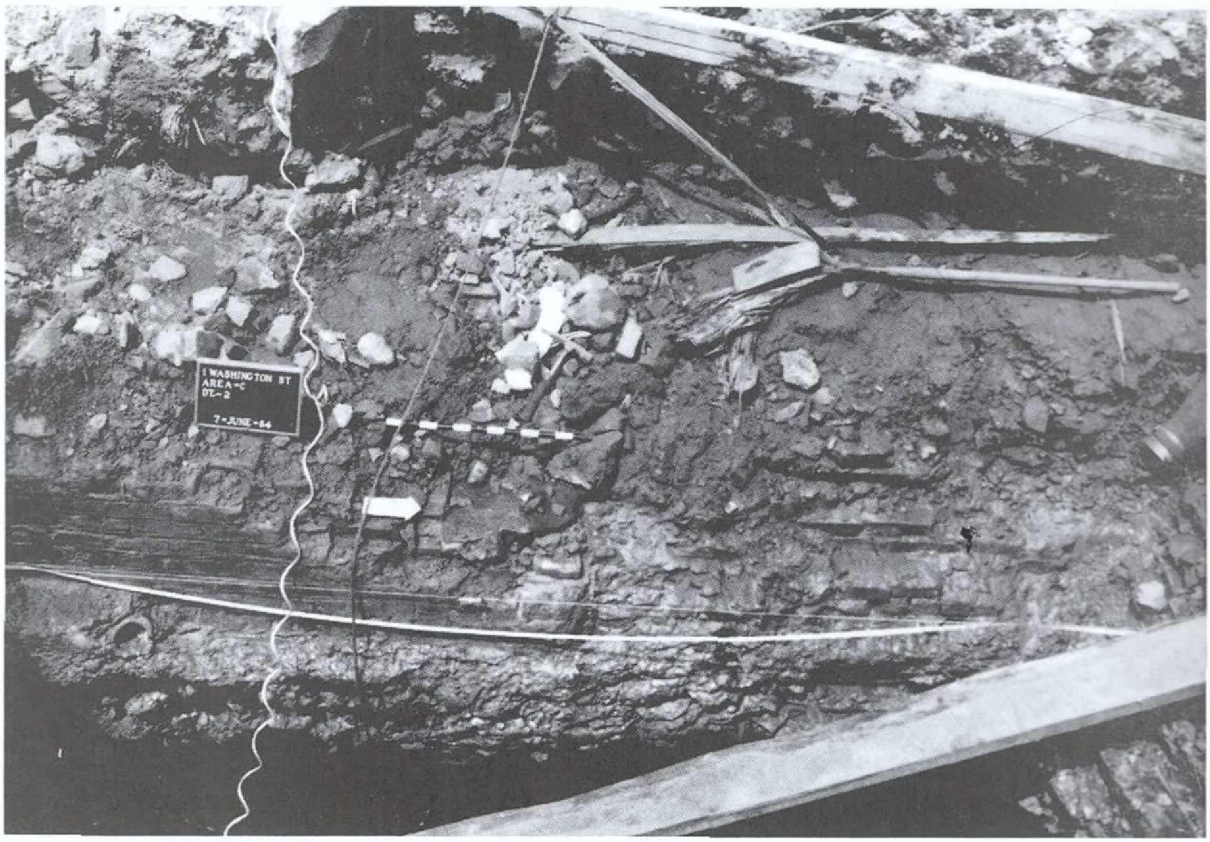


PLATE 11:
DETAIL OF UPPER PORTION OF WESTERN PROFILE OF DT2 IN AREA C. PUMP HOSE CAN BE SEEN IN LOWER LEFT HAND CORNER; PLANK PROVIDED ACCESS TO TRENCH. (T. Masso, 6/84).

4. Area C, Tr.C1 (C1W and C1E). Backhoe trenching on Block 216W (Figure 11) exposed deep basements on either side of an east-west property line shown separating Lots 1 and 3 on late-nineteenth and twentieth-century maps (see Figure 6). The concrete floors were separated by a 7-foot wide brick foundation (F26) faced with slate on its eastern side and with concrete across the top; the remnant of an off-center brick wall was found atop the eastern portion of this construction (Figure 11 and Plate 12). The foundation's location along a mapped property line and approximately an 8-inch difference in floor depths indicated that two buildings had been uncovered. Fill inundated with water was encountered directly below both floors, and stone footings over wood pilings were noted under a smaller, slate-faced foundation briefly exposed in the eastern part of Lot 3. The top of a concrete support, approximately 18 inches square with the remnants of a 6-inch diameter cast iron column at its center, was found in the western portion of the trench (Plate 13).

As noted in the introduction, since raw sewage had made it impossible to sample DT2, fill from Area C was recovered from this trench treated as two units (C1E and C1W) separated by the brick foundation. However, sampling was less controlled than in DT3 and, because of site logistics, the backhoe could not reach to river bottom in either unit. Information from these two units as well as additional documentary research indicated that subsequent construction on these lots had destroyed the earlier West Point Foundry buildings.

D. EXCAVATION UNITS (EU) AND TEST TRENCHES (Tr)

All the excavation units and test trenches discussed here were located in Area B and, as mentioned above, most of them clustered in the flagstone-paved backyard of Lot 15. In the southeastern corner of the yard, a grooved flagstone with an opening at its center (Plate 14) apparently acted as a drain, and the yard's sloping surface was part of the drainage system. Clearing revealed a similar flagstone on the western side of the defunct apartment building in a narrow, alley-like space. On the same side, a slate sill running from the back of the building to the stone wall at the rear of the yard was visible above the flagstones (Figure 13).

Coal dust was found above the flagstones in the eastern and northwest portions of the yard; under the flagstones, a 1/2 to 3 inch deposit of this material was dispersed throughout the yard. After the stones were removed, testing revealed an unidentified brick feature (F5), stone walls (F11 and F9), and a brick wall (F15)--apparently remnants of the West Point Foundry yard and a later, mid-nineteenth century foundry building (see Chapters II and V). Also uncovered were two dry-wells (F4 and F12) related to the late-nineteenth-century apartment building. Shovel clearing revealed several other brick and stone walls (see Figure 9).

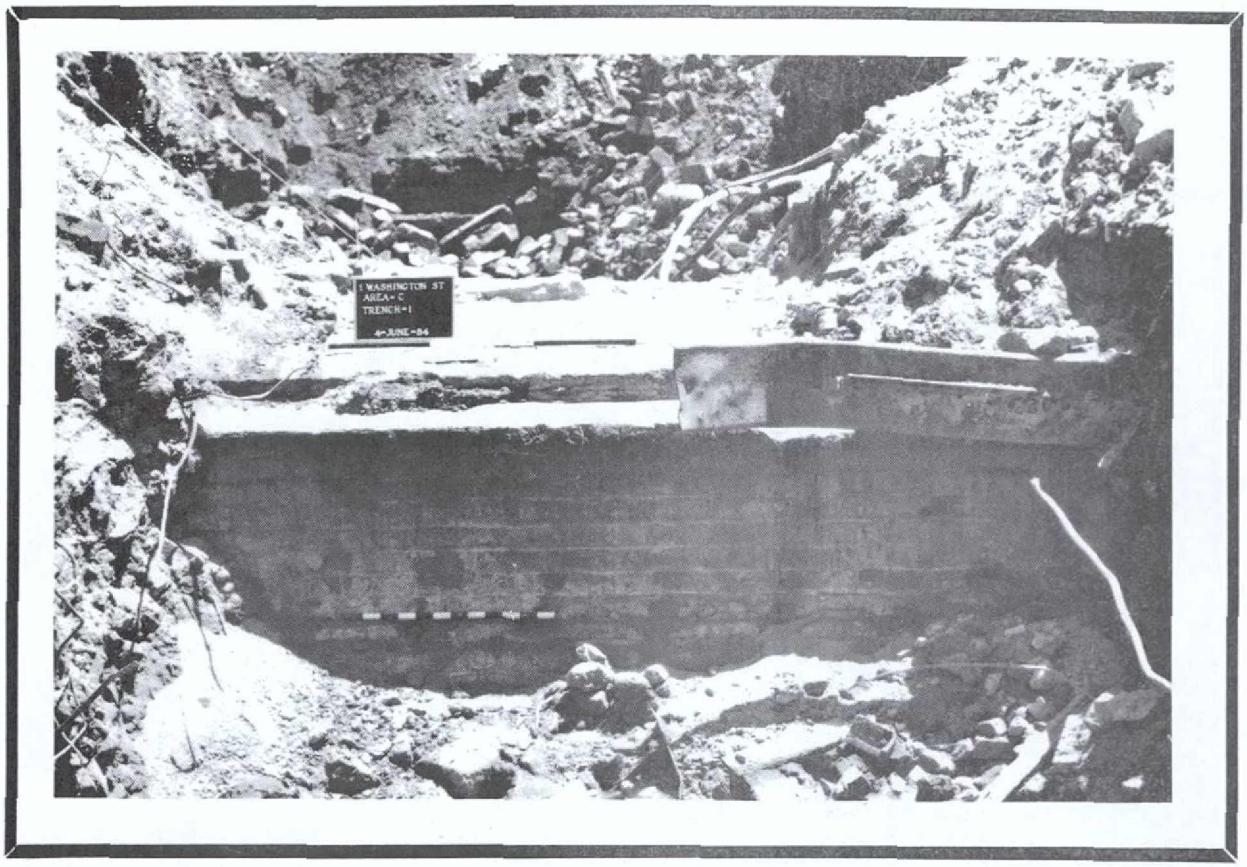
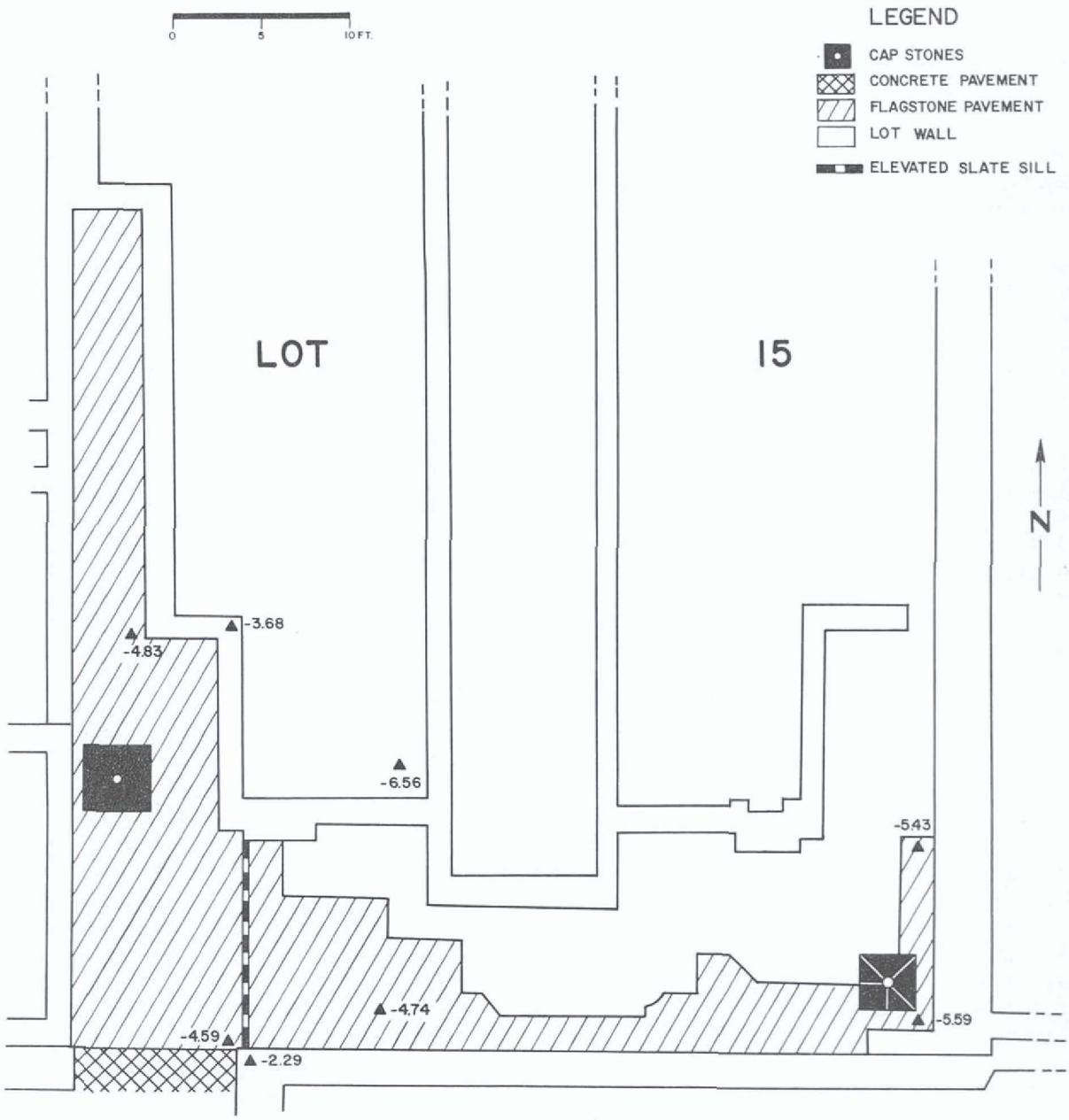


PLATE 12:
TURN OF THE CENTURY BRICK FOUNDATION (7 FT. WIDE) SEPARATING LOT 1 AND 3 IN AREA C, THE LOCATION OF THE WEST POINT FOUNDRY SHOPS LOOKING EAST FROM C1W AND C1E. METAL TO RIGHT WAS PART OF DEMOLITION DEBRIS. (T. Masso 6/84)

PLATE 13:
METAL COLUMN SUPPORT IN TR. C1(C1W). (T. Masso 6/84)

PLATE 14:
LOT 15 DURING CLEARING, LOOKING EAST (GREENWICH ST. BUILDINGS IN REAR). NOTE CORNER FLAGSTONE WITH CENTRAL HOLE (ARROW). HOLE IN FOREGROUND TO RIGHT OF ARROW IS A SOIL BORING LOCATION (T. Masso 5/84).

FIGURE 13:
Site 1, Washington St. Urban Renewal Area
Area B, Lot 15, Yard After Clearing, Plan



In addition to information about the foundry, the relationship between features uncovered in testing provided a relative sequence for the lot's development. Detailed information about excavation units, test trenches, and features are presented in the following sections.

1. Area B, Eastern Yard: EU1, EU1 ext., EU3, Tr. C

These were adjacent units in the southeast corner of Lot 15. EU1 was located where a grooved flagstone with a central opening (mentioned above) had been removed. Beneath this was a circular, dry-laid brick feature (F4) about 4 1/2 feet in diameter and 2 1/2 feet deep filled with coal dust over a thick layer of sand. It apparently functioned as a dry-well to channel water away from the apartment house that had stood on the lot (cf., Gladstone 1984). An iron pipe coming from the rear of the building (see Tr. C), perhaps once connected to a vertical roof leader, entered the feature about 6 inches below its rim, a juncture that was mortared; the slope of this pipe was adjusted by supporting rocks (Plate 15 and Figure 14).

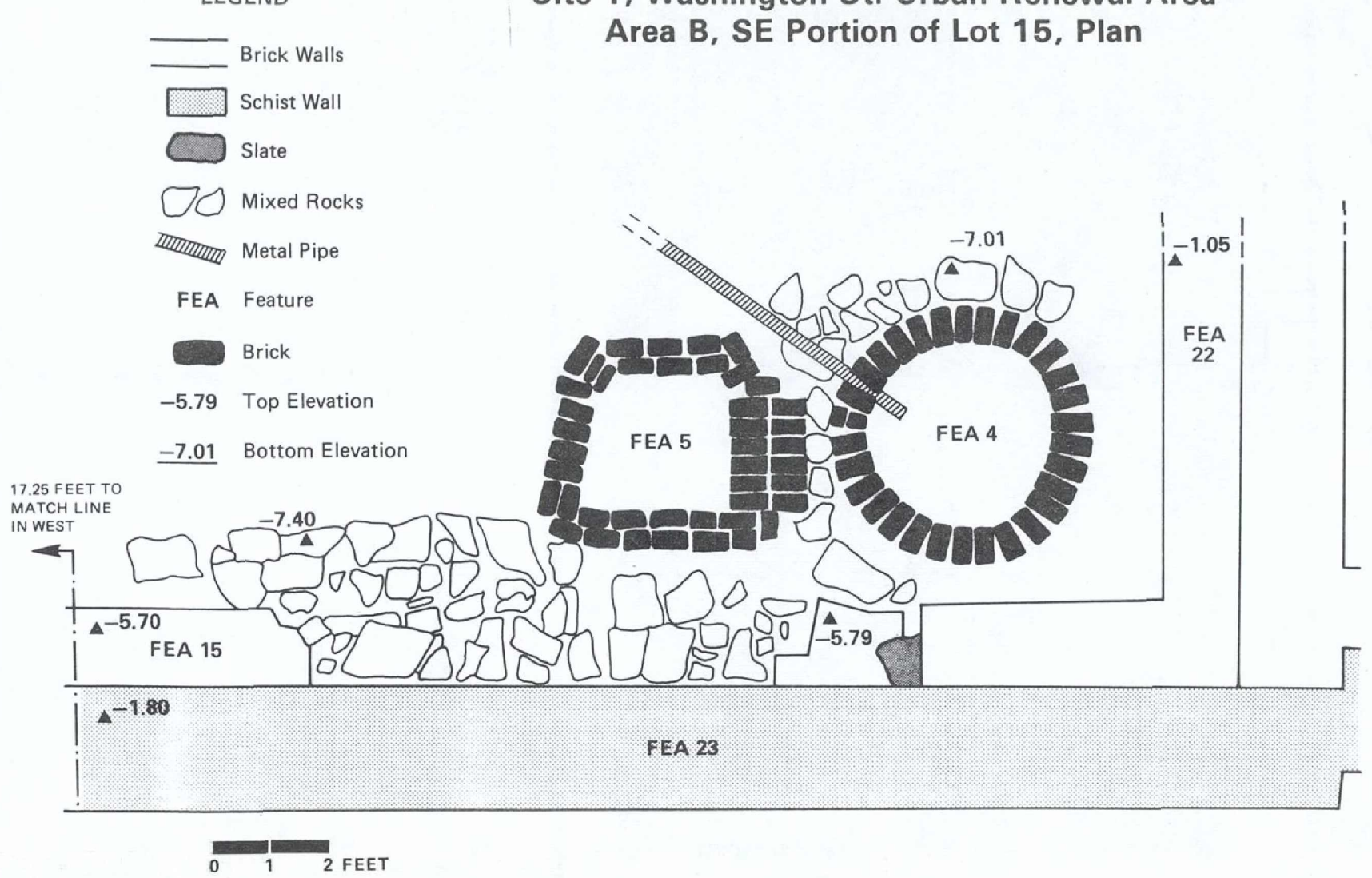
Mortar patches under the flagstone that capped the dry-well appear to have kept it from resting directly on the brick feature. Around its outer rim, coal dust deposits thickened and may have acted as a cushion for the unmortared flagstone. Moreover, it is possible that the coal dust within the feature may have been in dynamic relation with the denser landfill surrounding it, perhaps drawing in moisture.

Tr. C was opened adjacent to EU1, EU1 ext., and EU3. Its purpose was to trace the pipe that ran into the dry-well (F4) and the associated stratigraphy. The pipe was located in the western portion of Tr. C and testing throughout the unit revealed disturbance associated with its installation. It also exposed rocks and mortar that were again pipe-related.

An extension of EU1 (EU1, ext.) exposed the eastern portion of another dry-laid brick feature (F5) that at first appeared to be rectangular or square. However, further excavation (EU3) revealed that only its southeast corner formed a right angle and that part of it had a semi-circular shape (see Figure 9 and Plate 15). Constructed directly on the landfill, ash and sand comprised its sole deposit. Since installation of the pipe to the dry-well damaged its northeast corner, this unidentified feature apparently was built first, an assessment verified by ceramic dates from the feature's undisturbed strata (Chapter V and Table 7). In addition, variation in the number of remaining brick courses could suggest it had been leveled, perhaps to create the apartment house backyard. However, it may have been built as found, a possibility also suggested by oxidation in the upper levels of the feature fill as well as in surrounding yard deposits.

PLATE 15:
OVERVIEW OF BRICK DRY–WELL (F4) IN SOUTHEAST CORNER OF LOT 15 AND BRICK FEATURE (F5) JUST TO LEFT (WEST). NOTE DRAINPIPE TO DRY–WELL HAS DAMAGED NORTHEASTERN CORNER OF F5. (T. Masso, 6/84).

FIGURE 14:
Site 1, Washington St. Urban Renewal Area
Area B, SE Portion of Lot 15, Plan



The ash-filled deposit and melted glass recovered from undisturbed strata within it, as well as levels of oxidized soil around it, suggest that this feature and yard deposits may represent a foundry or metal-working operation. This interpretation is reinforced by the Perris Atlas that indicates a brick outbuilding in this part of the lot in 1853 when it was documented as a foundry yard (Perris Vol. 3 1853:Plate 34; see Plate 8 this report). Based on field evidence it appeared that this feature may be foundry related, if not to the West Point Foundry, then to a mid-nineteenth-century successor (see Chapters II and V).

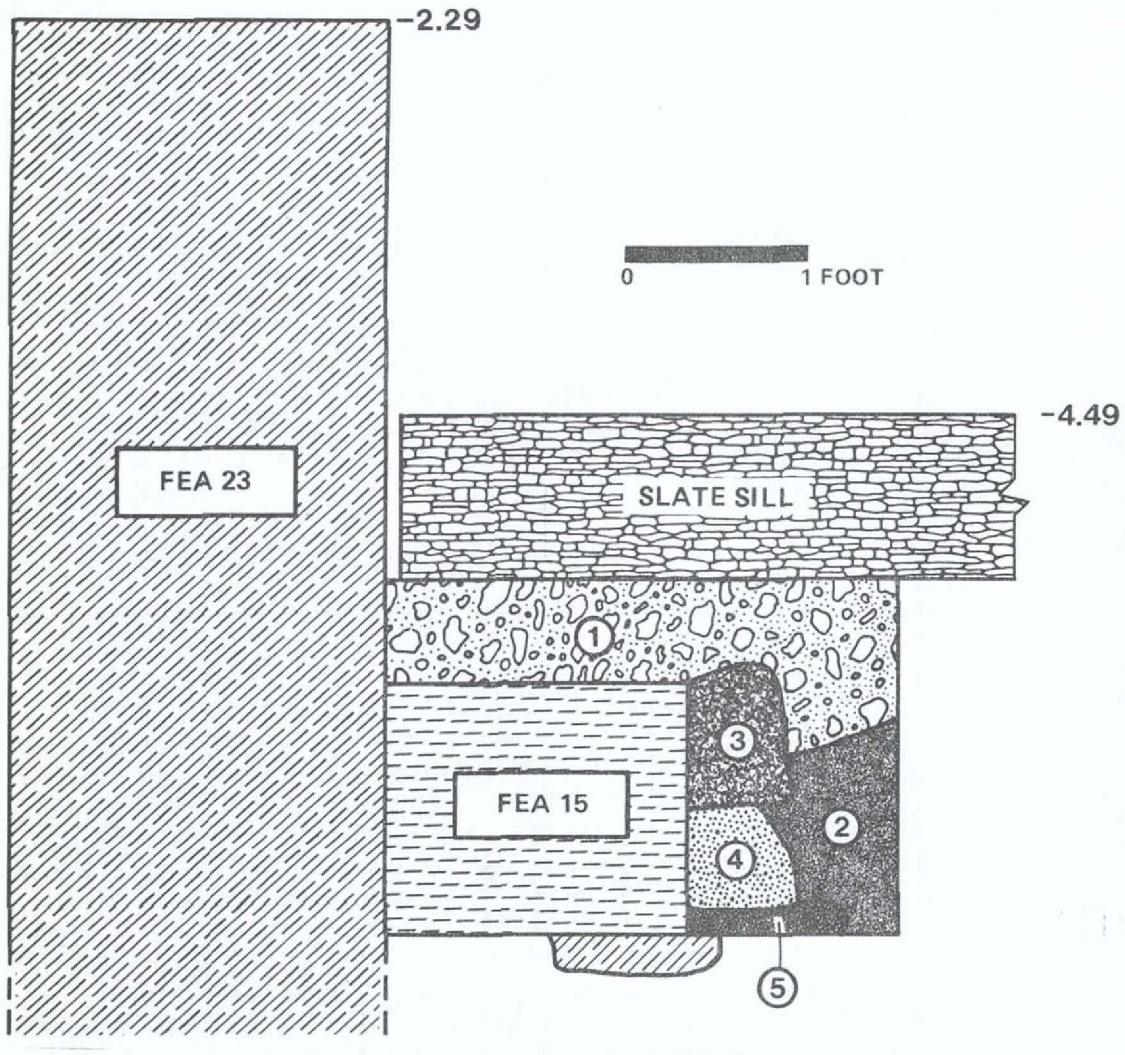
2. Area B, Central Yard: EU2, EU6, and Tr. E

To record soil stratigraphy, EU2 was opened in the rear of the yard, east of the slate sill (Figure 9). Once the flagstone pavement was removed, almost 3 feet of sediment were excavated from the southern part of the unit. Under the coal dust level found throughout the yard were deposits of relatively rubble-free dark brown sand, followed by just over a foot of brick rubble; under this was a deposit of the oxidized soil found in EU3 followed by undisturbed yard deposits. While artifacts such as nails, oxidized metal, slag, lead, and ceramics were found throughout, bone and shell were proportionately denser in the upper sand levels of the unit than in the rubble or lower oxidized soil deposits.

EU6, opened between the lot's eastern wall and the slate sill to the west, adjoined a brick wall remnant (F15) exposed when the flagstone was removed; Tr. E, opened after the brick wall was revealed, ran along this wall from the sill on the west to the western edge of EU3 (Figure 9). Excavation in these two units indicated that the brick wall was founded on stone footings; it also revealed two builders' trenches, one above the other (Figure 15). It was thought that the lower stratum (St. V) might relate to an earlier yard wall (see EU8, Tr.D. and Tr.F., below) while the upper deposit appeared related to the more recent brick wall (F15). This analysis was also suggested by the relationship of the trench to a level of oxidized fill: the bottom of the upper trench was level with the tip of the oxidized fill deposit while the lower trench was associated with the wall footings below this level. However, ceramic dating did not suggest these associations (see Chapter 5 and Table 7).

A section of the brick wall between EU6 and EU3 seemed to rest on stepped footing stones, and even further east it disappeared completely. Testing in EU8 and Tr. D (see below) indicated that this wall never extended west of the sill (see below and Plates 16 and 17). The depositional sequence documented in EU6 duplicates that found in EU2, with the oxidized level under a brick-rubble layer, but here the oxidized soil contained some cobbles.

FIGURE 15:
Site 1, Washington St. Urban Renewal Area
Area B, Lot 15, Trench E,
West Wall Profile



LEGEND

FEA 23,15 – Walls

Manhattan Schist

Brick

1 Layer of Brick Demolition Rubble
2 Reddish Sand
3 Dark Brown Silty Sand with Rubble Slag, Coal and Pebble
4 Gray Black Silty Sand with Rubble, Slag and Coal
5 Reddish Sand Mottled with Gray Black Silty Sand and Rubble

PLATE 16:
SOUTHERN PORTION OF LOT 15. SCHIST STONE WALL REMANT SEEN ABOVE A MID–NINETEENTH CENTURY BRICK FOUNDRY WALL NOTE BRICK WALL ENDS TO LEFT (EAST). SOIL IN CENTER IS A BAULK LEFT FROM EXCAVATION. (T. Masso 6/84)

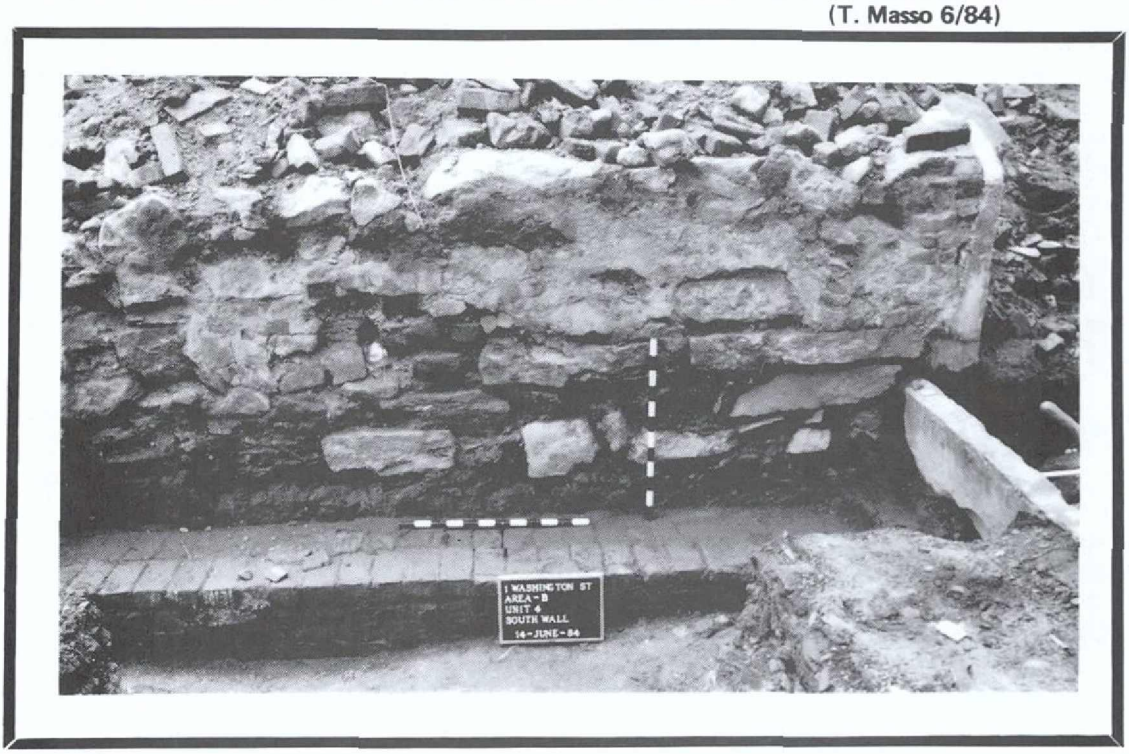


PLATE 17:
SAME VIEW AS PLATE 16, BUT FURTHER WEST. NOTE VERTICAL SLATE SILL TO RIGHT. BRICK WALL ENDS HERE AND OLD STONE WALL CONTINUES WEST BEYOND SILL (SEE PLATE 18). (T. Masso 6/84)

3. Area B, Western Yard: EU7, EU8, Tr. D, Tr. F, and General Shoveling

EU8, located just west of the slate sill, was the first unit opened in this portion of the yard: it was placed to investigate a red sandstone wall exposed in general shoveling (see below). This wall was found to make a right angle, turning east at the end of the yard (Figure 16 and Plate 18). Testing revealed that its footing (Plate 19) was imbedded in fill showing no sign of oxidation and its placement indicated that the east-west brick wall (F15) never extended west of the sill.

The artifact content of the fill stratum above the wall was markedly denser than in the deposit around it. Based on three datable sherds from the upper level of this stratum, a late-eighteenth-century mean ceramic date is postulated, suggesting that original landfill had been redeposited on this wall.

A thin deposit of fine, pinkish sand was found on and just east of this sandstone wall (F11). A visitor to the site who claimed familiarity with iron casting thought it might be molding sand, and therefore possibly one of the only obvious foundry-related deposits at the site. Unfortunately, subsequent analysis by geologists at a foundry supply company has refuted this assessment; however, this limestone sand could possibly have been a component in the metal-purifying process rather than in casting or molding (Hergert 1985:personal communication).

It appears from available evidence that the sandstone wall (F11) was constructed on landfill and that this fill was redistributed in the process. Also, rubble in the builders' trench for the later slate sill indicates that demolition material from the later foundry building was used as a stabilizer (Figure 17). Excavation of Tr. D. just west of the wall again revealed a builders' trench above the footing stones; in addition, a section of the sandstone wall was found to the west (see Figure 16). Lenses of landfill and two rubble-filled strata were recorded above this westward projection, indicating mixing and redeposition.

EU7 was opened under the flagstone with a central hole noted in the western side of the yard. The top of a circular brick feature (F12) comparable to but slightly smaller and shallower than the dry-well in EU1 (F4) was immediately revealed (see Plate 20). Structural differences between the features quickly became apparent; for example, the four upper brick courses of this feature were not dry-laid but were mortared, and rather than sitting directly on landfill, the feature was supported by large cobbles.

This feature was found to intrude on and obviously post-date the sandstone wall (F11). A builders' trench, which included coal dust and mortar, was found to surround the feature and, like F4,

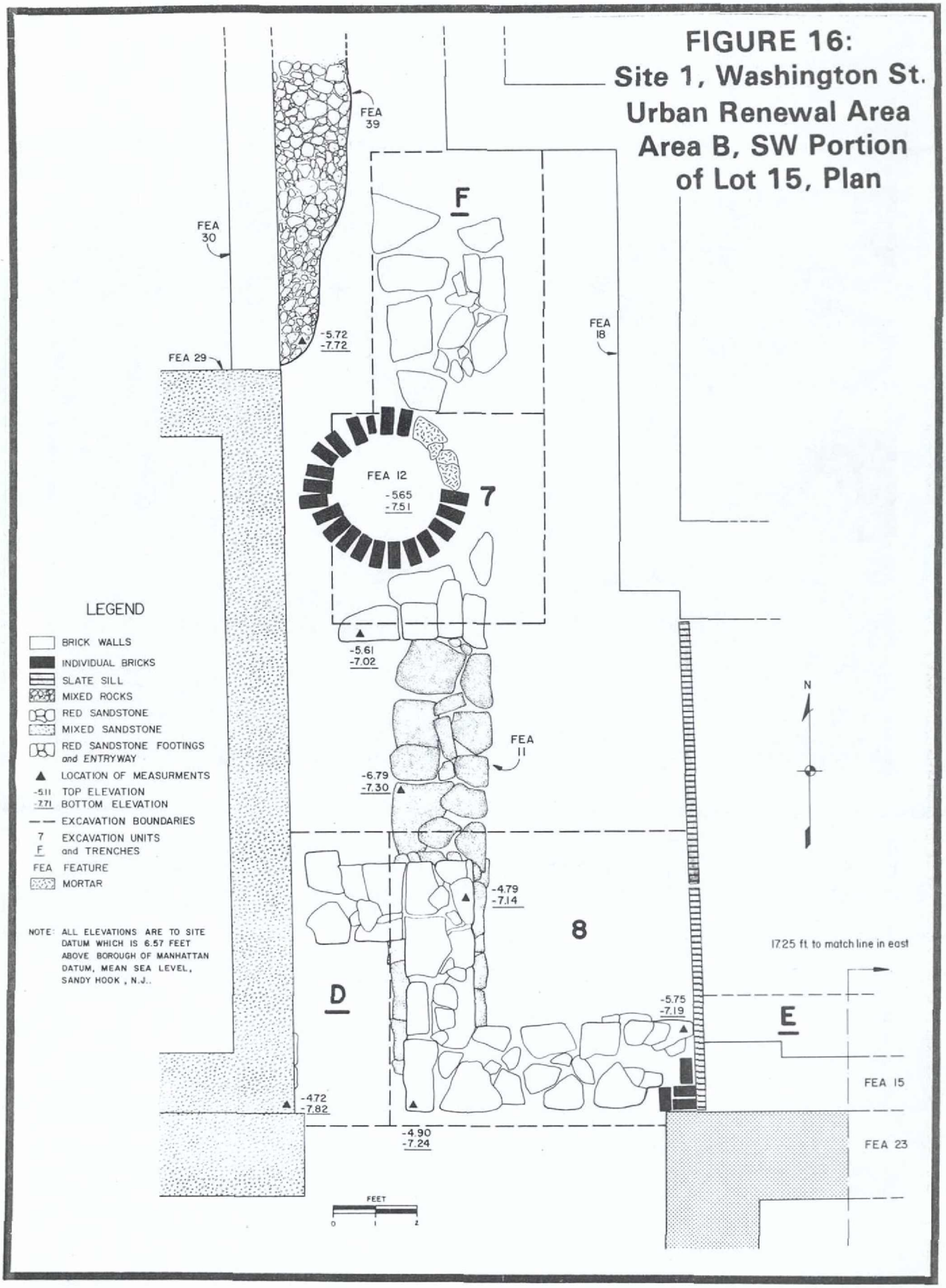


FIGURE 16:
Site 1, Washington St.
Urban Renewal Area
Area B, SW Portion
of Lot 15, Plan
FEA 39
FEA 30
FEA 29
FEA 18
F
-5.72
-7.72
FEA 12
-5.65
-7.51
7
-5.61
-7.02
FEA 11
-6.79
-7.30
-4.79
-7.14
8
D
E
-5.75
-7.19
-4.72
-7.82
-4.90
-7.24
FEA 15
FEA 23
N
1725 ft. to match line in east
LEGEND
BRICK WALLS
INDIVIDUAL BRICKS
SLATE SILL
MIXED ROCKS
RED SANDSTONE
MIXED SANDSTONE
RED SANDSTONE FOOTINGS and ENTRYWAY
LOCATION OF MEASURMENTS
-5.11 TOP ELEVATION
-7.71 BOTTOM ELEVATION
EXCAVATION BOUNDARIES
7 EXCAVATION UNITS
F and TRENCHES
FEA FEATURE
MORTAR
NOTE: ALL ELEVATIONS ARE TO SITE DATUM WHICH IS 6.57 FEET ABOVE BOROUGH OF MANHATTAN DATUM, MEAN SEA LEVEL, SANDY HOOK, N.J..
FEET
0
1
2

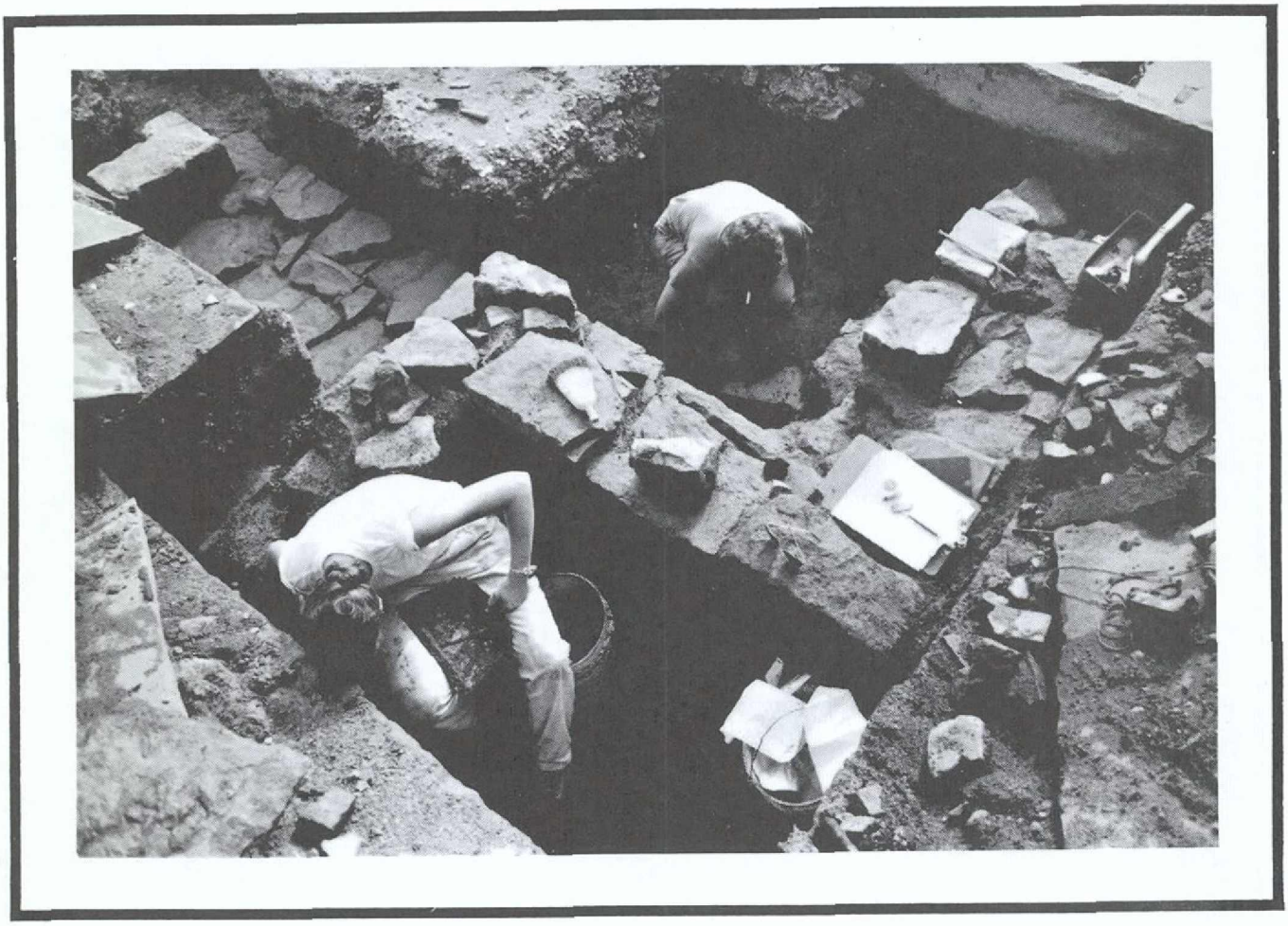
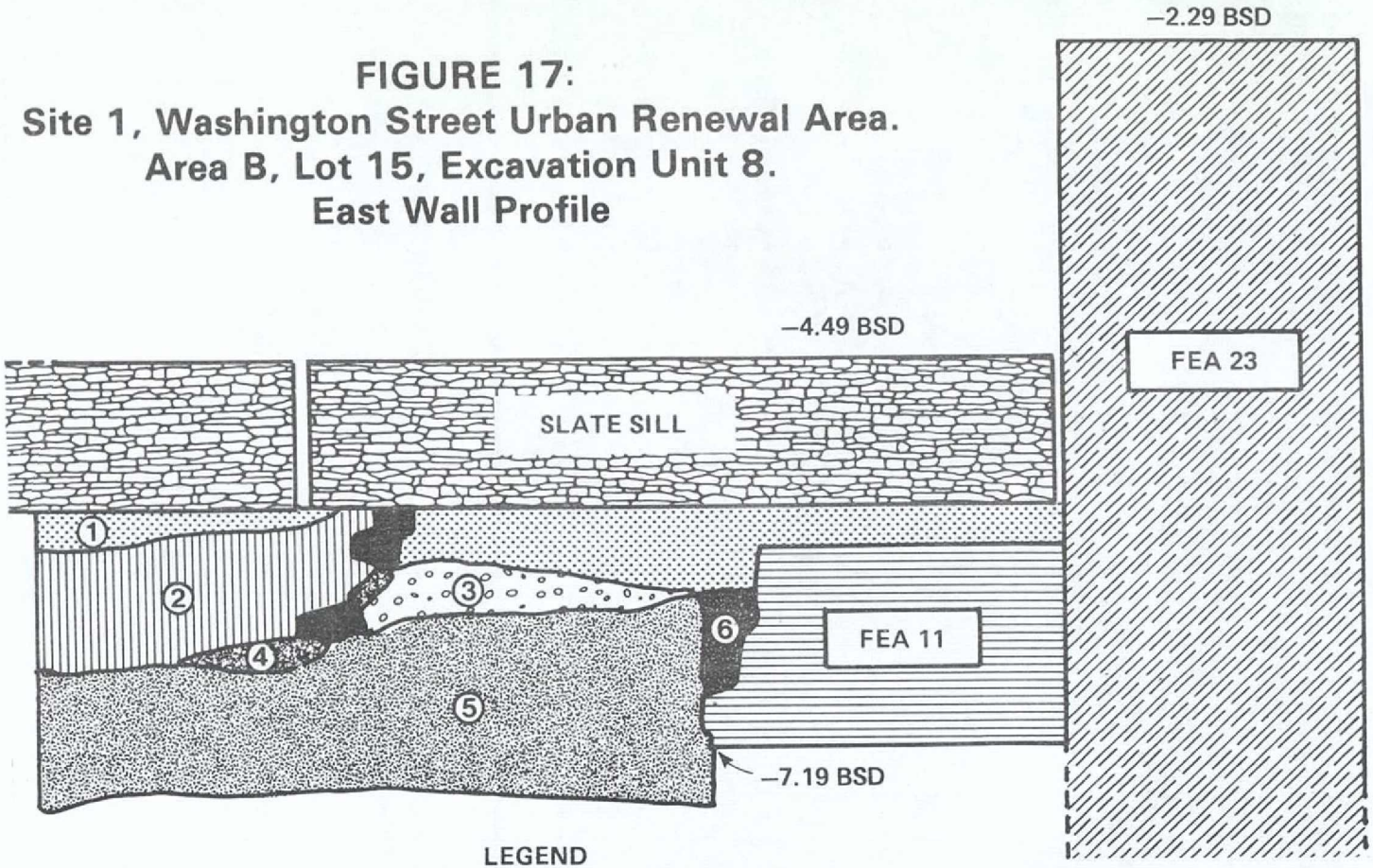


PLATE 18:
EXCAVATION IN EU 8 (JUST WEST OF SLATE SILL) AND TR.D IN LOT 15 WITH CORNER OF OLD STONE WALL (F11) COMPLETELY EXPOSED (T. Masso 6/84)

PLATE 19:
STONE WALL (F11) AND FOOTING STONES IN EU 8 LOOKING SOUTH. NOTE SLATE SILL TO LEFT (EAST). (T. Masso 6/84).

FIGURE 17:
Site 1, Washington Street Urban Renewal Area.
Area B, Lot 15, Excavation Unit 8.
East Wall Profile



LEGEND

1 5YR 4/2 Dark Reddish Gray Coarse Sand
2 5YR 6/2 Pinkish Gray Sand
3 5YR 4/3 Reddish Brown Sand
4 7.5YR 3/2 Dark Brown Coarse Sand with Silt and Charred Wood Fragments
5 5YR 4/3 Reddish Brown Coarse Sand with Silty Inclusions
6 5YR 4/3 Reddish Brown Mottled with 5YR /2 Dark Reddish Gray Coarse Sand

Manhattan Schist
Red Sandstone
Brick

FEA 11, Walls 23

0 1 2 FEET

coal dust filled its interior. Beyond the builders' trench the exterior fill, mainly a dark brown sandy silt, contained a thin stratum of a fine brown silt mottled with mica that apparently was distributed throughout the unit (Figure 18).

Tr. F was established after extensive shovel clearing revealed that the sandstone wall (F11) continued north beyond the dry-well (F12), but here the wall had been truncated even more than to the south and was only one-course high (Plate 20). A thin layer of black sandy silt with ash and charcoal covered the wall just to the north of F12 while still further north it was covered instead by a thin layer of mortar. Oxidation of the top layer of landfill similar to that found in the southeastern part of the yard was suggested by a narrow stratum adjacent to the east side of the wall. This oxidized stratum also produced bone, shell, metal, coal, charcoal, and slag, but no datable artifacts.

A ceramic from the cleaning of F11, apparently in the northern portion of the wall, yielded a mid-nineteenth-century date suggesting that truncation of the sandstone wall may be associated with the building of the mid-nineteenth-century foundry building rather than the later flagstone yard.

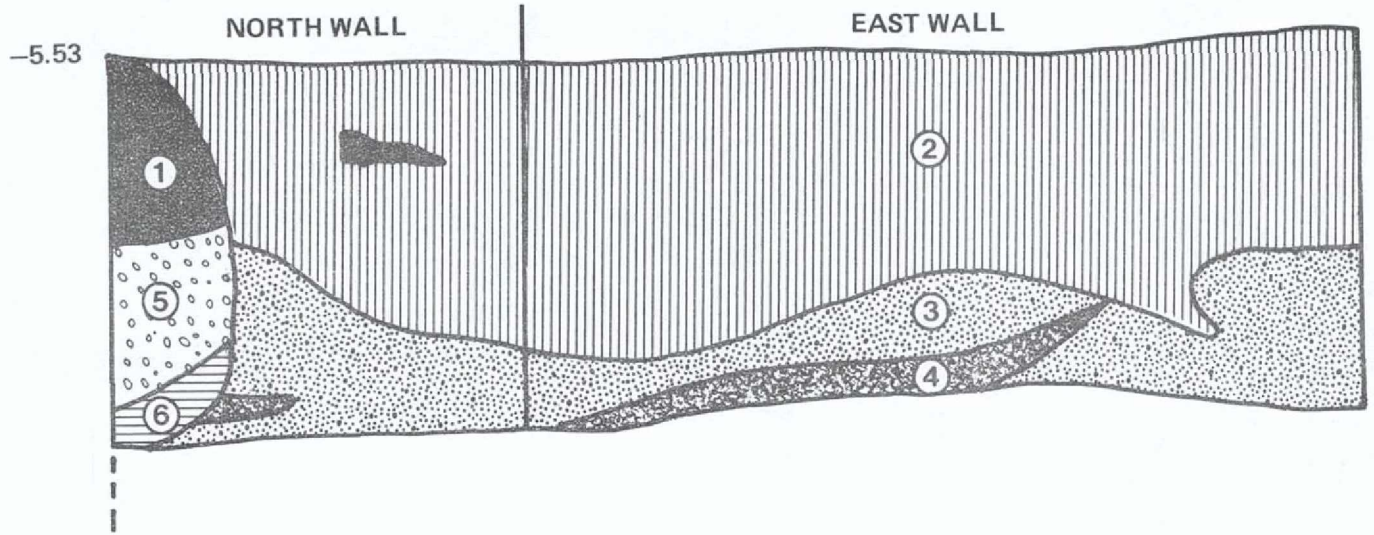
The function and origin of the mortar deposit mentioned above is not clear. It may be related to a heavily-mortared stone wall (F39) uncovered just west of Tr. F (see General Shoveling, below), but, if so, it is unique since nothing like it was found elsewhere along this wall. Parenthetically, a fragment of fabric-impressed Native American pottery was recovered just north of Tr. F in an unsampled context.

General shoveling was particularly helpful in determining the construction sequence in the yard's western portion. After the flagstones were removed, shovel-clearing revealed two walls not previously visible. These included the red sandstone wall (F11) discussed above (see EU8, Tr. D, Tr. F) and another of sandstone, blue-stone, and schist mixed with brick fragments (F39) also mentioned above; this latter wall abutted a wall (F30) defining the lot's present western property line (see Figure 9).

Mortar had been used liberally to bind the small to medium sized stones and brick fragments found in F39. To the south, the wall ended where a sandstone wall (F29) began; to the north, it was truncated where the rear exterior wall of the building on the lot extended west to the property line (F18/F32; see Figure 9). This sequence indicates that the mixed stone wall predates construction of the 1883 apartment house, the last building on the lot.

Shovel-clearing also revealed that F11 predates the brick walls defining the current north-south property line. Moreover, this wall's position and configuration strongly suggest that it represents an earlier, pre-1858, lot line implied in the tax records (see Table 2, Section 2). According to the information from

FIGURE 18:
Site 1, Washington Street Urban Renewal Area.
Area B, Lot 15, Excavation Unit 7.
North and East Wall Profiles



LEGEND

1 10YR 3/2 Greenish Brown Silty Sand
2 10YR 2/2 Very Dark Brown Silty Sand
3 7.5YR 3/4 Dark Brown Silty Sand
4 7.5YR 3/4 Dark Brown Silt with Mica Flakes
5 7.5YR 3/4 Dark Brown Sandy Silt with Pockets of Soot, Mortar and Organic Decay
6 7.5YR 3/4 Dark Brown Silty Sand sith Pockets of Soot, Mortar, Organic Decay and Lenses of Silt

Sandstone

0 1 2 FEET

PLATE 20:
LOOKING NORTH ALONG THE WESTERN LIMIT OF LOT 15, LAST DAY OF FIELD TESTING. NOTE STONE WALL (F11) TRUNCATED BY DRY–WELL (F12) TO REAR. FLAGSTONES REMOVED FROM THE YARD ARE FOUND TO THE LEFT OF THE PICTURE (J. Geismar 6/84).

testing, this earlier line may have been located approximately 2 1/2 feet to the east. Excavation in Lot 18 (EU5, see below) revealed a similar sandstone wall with virtually identical bottom elevations, suggesting it was the eastern limit of the earlier lot line. It appears that shifting the property line not only moved the lot to the west, it also reduced its east-west footage from 53.8 feet to 50.5 feet.

4. Area B, Sub-Basement Testing: EU4, EU5, Tr. B1, Tr. B2

EU4 was opened under the concrete basement of the demolished apartment house, just north of the building's back wall (see Figure 9). Preparation included removal of a relatively thin concrete concrete basement floor (1.5 ft.) and a thin gravel layer. Brick rubble and artifacts similar to those found throughout the yard were recovered from this water-filled unit. A subsequent layer was analagous to the oxidized strata recorded in the backyard, only at a somewhat deeper elevation. The unit was discontinued because of uncontrollable flooding and because landfill was reached.

EU5 was located in Lot 18 just east of the lot line and brick wall separating it from Lot 15 (see Figure 9). The unit, which was opened under a shallow cement basement floor, contained a sandstone wall (F9) similar to F11 found in the western portion of Lot 15 (see above). This wall was supported by dressed footing stones installed in the fill (Plate 21). The bottom elevation for these footings corresponded well with those found under F11 in EU8, (ie., 7.02-7.13 ft. and 7.02-7.24 ft. below site datum, respectively). Excavation revealed a well-preserved builders' trench with artifacts throughout, but the greatest concentration was in the top stratum (Figure 19). Both the upper wall courses and the trench strata undoubtedly were truncated in 1889 by the construction of the building on the lot (see Chapter II, Table 2). As noted previously, like F11, this wall appears to represent a former property line for Lot 15.

Tr. B1 was opened under the basement floor in the north-west corner of Lot 15 (Figure 9). The bottom of this floor was level with ground water. Thin strata of black silty sand and brown silty sand with mortar were uncovered before landfill was reached 4 inches below the floor in the eastern section of the unit. In the western part, a backhoe was used to remove patches of mortar associated with a lead pipe running above the landfill. Approximately 6 feet of landfill were excavated before this waterfilled unit was discontinued.

Tr. B2 was located in Lot 18 (Figure 9); the coarse brown sand of landfill was encountered directly beneath the basement floor of the 1889 building mentioned above (see Table 2, Section 2). Included in the fill were lenses of ash and coal and a layer of fine clayey silt.

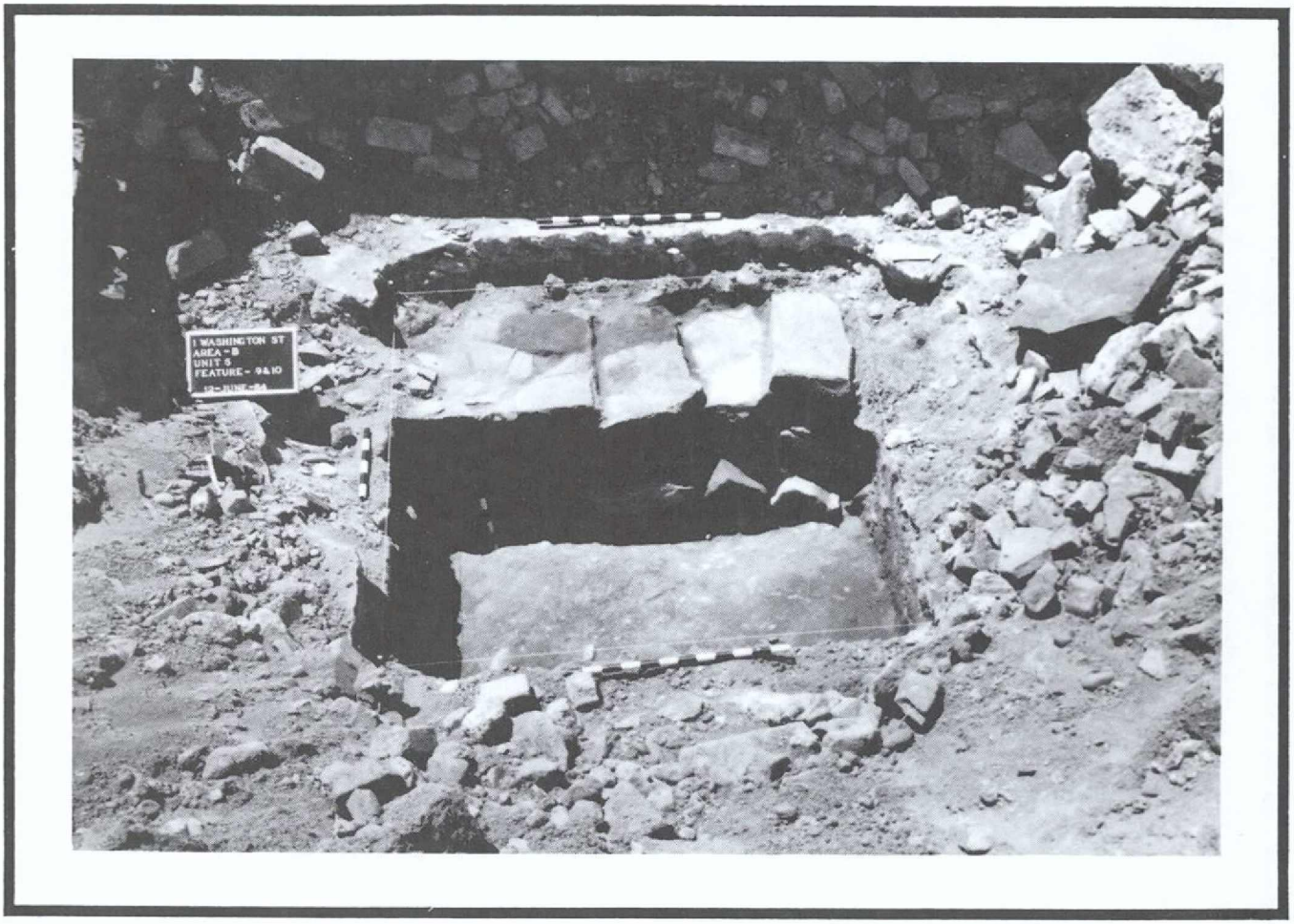
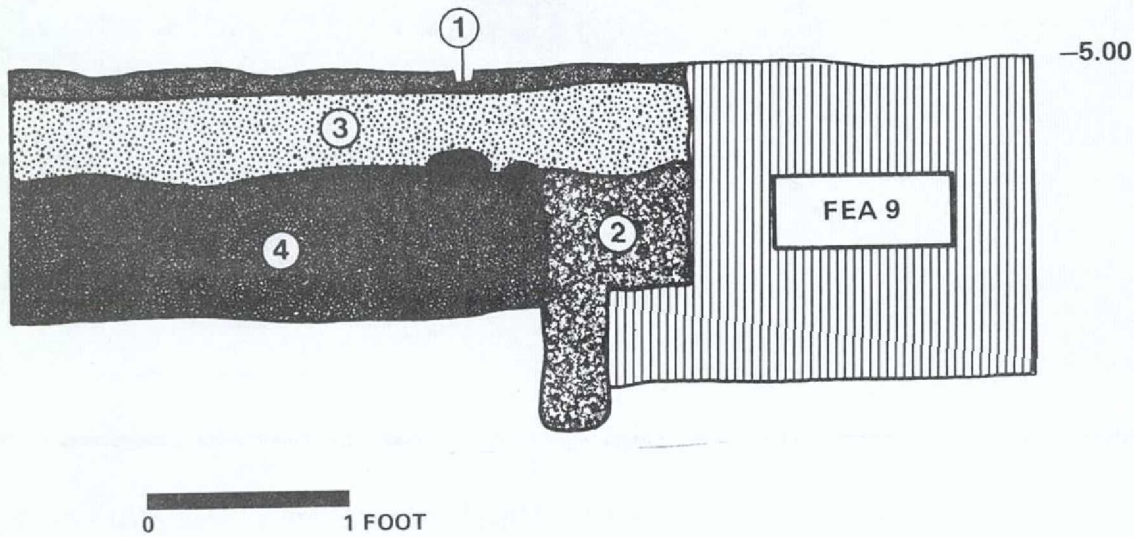


PLATE 21:
EU 5 IN LOT 18, LOOKING WEST, SHOWING STONE WALL SEGMENT (F9) AND EXPOSED STONE FOOTINGS (T. Masso 6/84).

FIGURE 19:
Site 1, Washington St. Renewal Area
Area B, Lot 18, Excavation Unit 5,
South Wall Profile



LEGEND

FEA 9 – Red Sandstone Wall
1 – 7.5YR 4/4 Brown Sand
2 – 7.5YR 3/2 Dark Brown Sand
3 – 5YR 4/4 Reddish Brown Sand
4 – 5YR 3/4 Dark Reddish Brown Sand
Red Sandstone Fragments

5. Area B, Washington St. Sampling, Tr. A

Tr. A was opened in Lot 18 along what was the front of the 1889 building on the lot. Its purpose was to investigate a north-south schist wall (F19) adjacent to the sidewalk and to sample the deposits within a "box" formed by this and two other walls (F20 and F21). The excavation revealed that the schist wall comprised only two courses above two metal pipes that extended eastward under Washington Street as well as through the brick wall (F21) to the west (other similar pipes were observed further north). The relation of the pipes to the walls suggested their installation postdated the construction of the brick wall and predated that of the schist wall.

Stratigraphy in Tr. A indicated that landfill was relatively high and that the schist wall was deeply imbedded in this fill. Small footing stones supported the wall and there were no traces of an associated builders' trench. The landfill comprised three major strata, with dark brown coarse sand on the bottom followed by a dark reddish brown coarse sand and, at the top, a dark brown coarse sand with cobbles. Construction rubble containing bottle glass and shell was found above this fill; a second layer of rubble produced similar material. Above this was the schist wall (F19) with its two pipes in and surrounded by loose rubble, gravel, and cobbles. This deposit produced one of the few datable glass assemblages from the site, yielding a mean glass date of 1884 (see Appendix C, Table 5). Filling operations and secondary deposition were suggested by strata distribution and contents.

When the elevation on the top of fill in this trench was compared with those in the southern portion of the lot, a westward slope of more than 3 percent was indicated.

E. SUMMARY

The most productive and relevant information about both the West Point Foundry and landfill was recovered from the backyard area of Lot 15 in Area B. This included DT3, located just south of the rear wall of this lot, and EU5 in Lot 18, just east of its eastern property wall. Further north in Area B, under the 1883 apartment building, and in Area C on the north side of Beach Street, early deposits apparently were destroyed by subsequent construction. This included the site of the West Point Foundry shops on the northeast corner of Beach and West Streets.

Throughout most of Lot 15, including a deposit under the basement of the last building on the property (see EU4), an oxidized layer was found atop the landfill. This is a deposit that may relate to metal working at the West Point Foundry yard or a later, mid-nineteenth-century foundry building. A leveled brick wall (F15) in the rear of the yard is probably a remnant of this building, as is the brick rubble sealed under flagstones. In addition, limestone sand that may relate to purifying metal was found in

association with an early sandstone wall (F11) on the western side of the yard, a wall that apparently marks an earlier lot line. A similar wall was found in Lot 18 (F9 in EU5). The position of these two walls compared with the current lot lines indicates that this shift reduced the width of the lot by about 2 1/2 feet. And finally, an unidentified brick feature (F5) in the southeast corner of the yard may be foundry related (see Chapter V).

Wall placement on the western side of the yard suggests a relative building sequence. It also indicates the trashing of at least two walls to create the flagstone paved yard of the 1883 apartment house, the last building standing on the lot. The remnants of a schist wall (F23) define the end of the yard and the lot, a brick wall (F22) marks its eastern limit, and brick (F30) and sandstone (F29) walls bound it on the west.

Two dry-wells related to the 1883 apartment house--features that served to channel water away from the building--were revealed under flagstones in the southeastern (F4) and northwestern (F12) portions of the yard. A drain pipe to F4 damaged a corner of the brick feature (F5) next to it, indicating that construction of this dry-well was more recent than that of the unidentified feature. Similarly, the position of the second dry-well (F12) indicates that it postdates the sandstone wall (F11) in the western part of the yard.

A slate sill in the southwestern portion of the lot is clearly related to the backyard and was installed over building rubble that, as noted above, undoubtedly represents a mid-nineteenth-century foundry building. An eastward slope of 1.33 percent toward the dry-well in the southeast corner--a slope that opposes the 3.43 percent westward slope of the block--apparently was created as part of the yard's drainage system. In relation to the foundry yard and building, this drainage system and the backyard itself--as well as the apartment building--was the third major building episode on the lot.

Because of site logistics, only the western portion of the deep-test in Area B (DT3) was systematically sampled for artifacts related to landfill. This test provided a valuable fill sample, but neither this test nor others in Area C revealed any landfill retaining features.

IV. MONITORING

A. INTRODUCTION

As part of the archaeological investigation of Site 1 of the Washington Street Urban Renewal Area, a monitoring program was conducted during initial foundation excavations for the Shearson Lehman/American Express Information Services Center. This monitoring, which augmented six weeks of traditional archaeological investigations (see Field Report, Chapter III), yielded information about early-nineteenth-century landfill and engineering techniques that otherwise would have been lost.

The monitoring program was intended to serve as a cost-effective and efficient means of documenting historic features or constructions that might be uncovered during work scheduled for the site's two northern blocks. In particular, information was sought about the configuration and location of the original Hudson River shoreline and the methods used to create land in this area. As noted earlier, both issues were addressed during archaeological field testing, but the site's northern shoreline block was then an active parking lot that was unavailable to the archaeologists, and attempts to locate fill-related constructions on the three accessible blocks had proved unrewarding.

The scope of work guiding this subsequent investigation called for on-site monitoring of foundation-related excavations by one archaeologist equipped with a camera, note pad, transit, and site plan. He or she was to be allowed to make sketches, to photograph features as they were uncovered, and to locate and record these features with a transit reading.

It was agreed that if any artifact-bearing feature deemed unique --that is, any feature not comparable to features known from this or other New York sites--were encountered, a "grab" sample of artifacts could be recovered for analysis. (As it turned out, no such samples were considered necessary or taken.) It was also agreed that should any extraordinary features, such as a sunken ship or ships, be found during these excavations, the Landmarks Preservation Commission would be allowed to evaluate the significance of the find. And, finally, in addition to the on-site archaeologist, the principal investigator was to make site visits as she saw fit; in addition, she was to be kept informed about the monitoring program and its findings.

The observation period spanned the three months from November 18, 1984 to February 6, 1985 with a total of 56 days spent in monitoring. With the cooperation of the foundation contractors, HRH, Herbert Construction, and Delma Construction Companies, as well as the Shearson Lehman/American Express Company and the New York City Public Development Corporation (the lead agency for this

project), a wealth of valuable archaeological data were recovered from a large area in a relatively short time.

Located on the two blocks bounded by West, Greenwich, Beach, and Hubert Streets, the building now under construction on the site was to rest on pilings below a cement slab basement floor. Preparation for these foundations included general grading and spot-excavations at piling clusters. The grading offered an extensive field of observation while the piling cluster locations provided "windows" to greater depths. In addition, deep excavations for sumps dug to control water on the site permitted additional observation points (Figure 20).

A consistent, systematic, and relatively uncomplicated method of data recording was implemented by tying the archaeological data into a construction grid system devised for locating piling clusters and by establishing datum points from which rapid but accurate measurements could be taken. Often, but not always, construction personnel aided in feature recordation.

The information recovered during monitoring includes details about wharfing that were either observed or implied. Constructions were documented that were similar to those found in Manhattan's east side excavations at the Telco block (Rockman et al. 1983:37-82) and the Assay Site (Wall 1985:personal communication). These are remnants of cobb-crib wharfs that are essentially four-sided log forms or cribs filled with rocks and stone rubble (Plate 22). It is a kind of wharf that has been documented archaeologically at medieval European port sites (Plate 23) and may have origins that extend back to ancient Rome or earlier (Geismar 1983; Huey 1984).

In addition, monitoring provided unprecedented information about the fastening and joinings of wharf-logs (see Figure 25). It also suggested some of the considerations of the early-nineteenth-century engineer, including the dynamics of wharf use and construction.

Soil data recovered during this field phase support the findings from soil borings that suggest the block bounded by Washington, Beach, Greenwich, and Hubert Streets was a small cove or lagoon of the Hudson River prior to filling (e.g., Woodward-Clyde 1984; Ciancia 1984:personal communication). This is in contrast to maps made throughout the nineteenth century, beginning as early as an 1807 Water Lot Grant Map (Liber E 1807:284) and including an 1874 reconstruction (Viele 1874), that indicate a diagonal or straight shoreline for this block (see Figure 27). While the contours may be very real, conceivably the curved shoreline configuration suggested in testing may reflect the effect of subsequent development that eradicated portions of the original river bank.

In addition to all this information, some interesting and unique nineteenth- or early-twentieth-century construction elements,

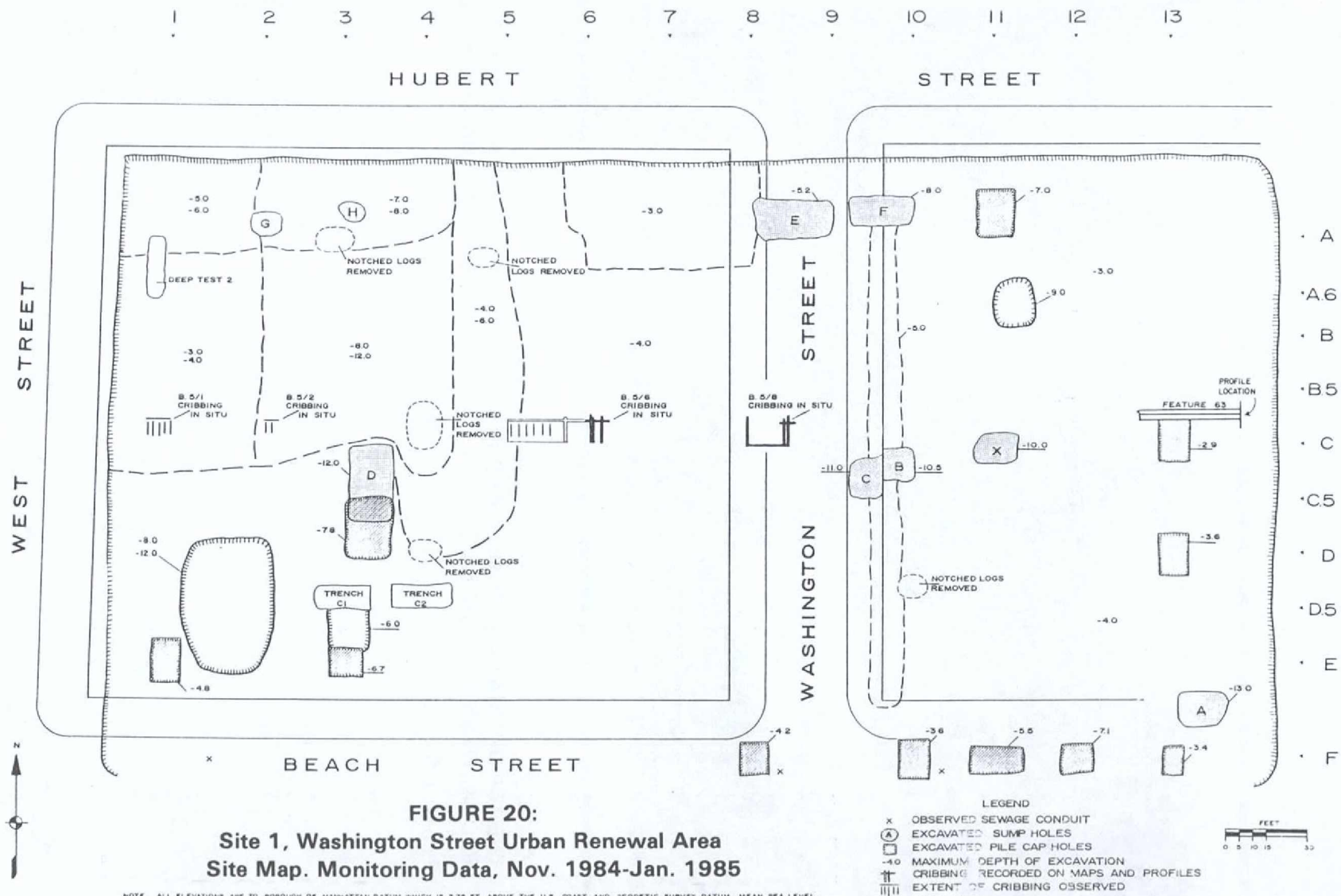


FIGURE 20:
Site 1, Washington Street Urban Renewal Area
Site Map. Monitoring Data, Nov. 1984-Jan. 1985

NOTE. ALL ELEVATIONS ARE TO BOROUGH OF MANHATTAN DATUM WHICH IS 2.78 FT. ABOVE THE U.S. COAST AND GEODETIC SURVEY DATUM, MEAN SEA LEVEL, SANDY HOOK, N.J. TRENCHES C1, C2, DEEP TEST 2 WERE EXCAVATED IN MAY 1984.

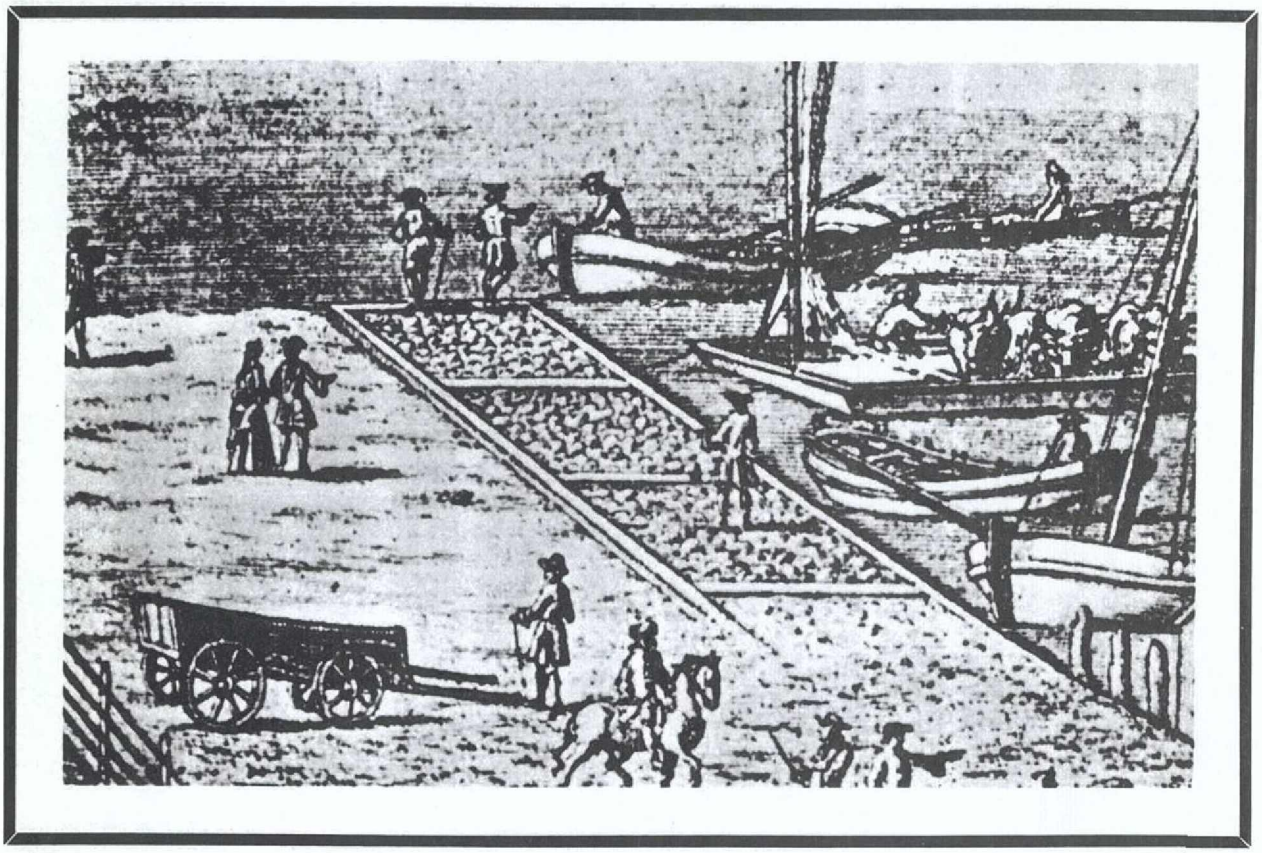


PLATE 22:
THE TOP OF WHAT ARE POSSIBLY COBB WHARVES DOCUMENTED ON THE BROOKLYN SIDE OF THE EAST RIVER. (DETAIL OF THE 1717 BURGIS VIEW).

(Photo , J. Geismar).

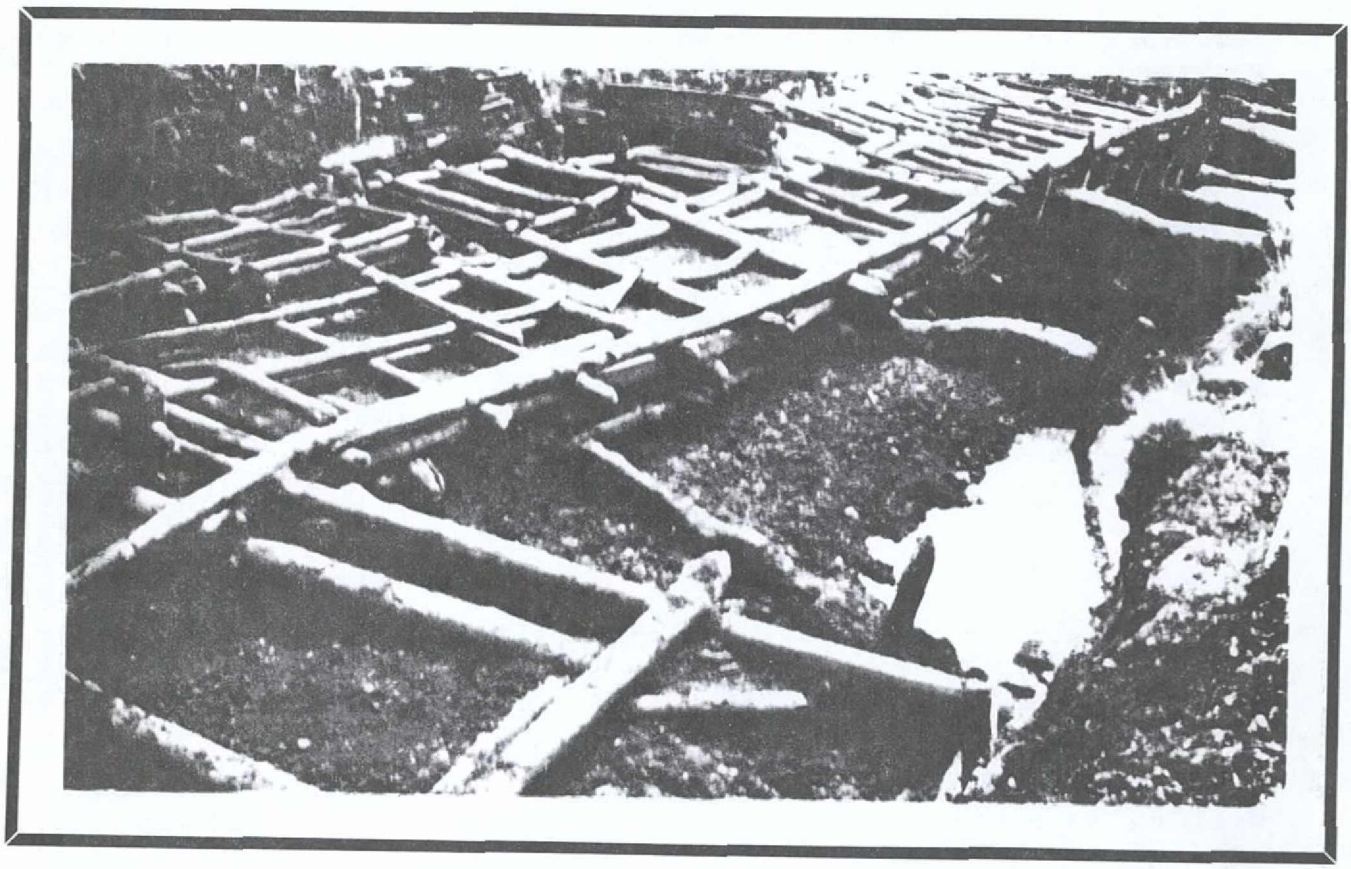


PLATE 23:
MEDIEVAL COBB WHARVES EXCAVATED IN BRYGEN (BERGEN), NORWAY
(FROM BAART et al. 1977 ; Photo, J. Geismar).

including a mortised wooden spread-footer beam, cork insulation, and a brick sewage conduit, were documented during this field phase. Since no comparable features had been found at any other New York City sites, they were considered "unique" and were recorded. However, no "grab" samples of artifacts were taken since no artifacts were observed in association with the features.

There are at least two aspects of the wharves, piers, and fill constructions on the block that remain speculative: the size and exact configuration of the wharf and pier system remain a question as do the actual fill-retaining constructions that hold the landfill in place while keeping the Hudson River out. The wharf configuration documented through monitoring appears to be a series of parallel constructions extending west beyond Washington Street into the Hudson River. It is the ultimate size of these wharves and their total scheme that are presently unknown. For example, they may represent block and bridge configurations--a series of solid log constructions supporting spanning docks or piers. This common construction is depicted on an 1859 engraving showing the Hubert Street wharf (See Plates 5 and 32). Since only minor fill-retaining features were found during the monitoring of the extensive excavations, it appears that the major constructions forming the block are not located in the project area but should be found under or beyond West Street, a street with a long history.

The detailed procedures and findings of this monitoring phase will be found in the following sections. It is information that not only documents rich archaeological material, but also the efficacy of monitoring as a supplement to tradition archaeological methods when conducted in cooperation with developers and construction crews.

B. MONITORING PROCEDURES

The methods employed in archaeological monitoring were governed by the operational procedures used by Delma Construction Company, the principal contractor responsible for the foundation-related excavations. Various types of heavy machinery were used for these excavations, including two Buyries-Erie 40-H backhoes with 52-inch buckets, a 9.5-foot wide Fiat Allis Fr-20 front end loader, a 190-4 Dynahoe with a 26-inch bucket and an 8-foot wide front end loader, an 8-foot wide 190 MY-Dynamic Dynahoe front end loader and hammer, a C-235 caterpillar with a hammer, and a C-235 Caterpillar backhoe with a 26-inch bucket.

Foundation excavations entailed several operations. Among them were the broad-stripping of an area of approximately 70,000 square feet, with opening elevations varying from +5.5 to +10.0 feet, and the excavation of ten deep sump holes located throughout the site (Plate 24). As a method of water control, these sumps were excavated to depths ranging from -5.0 to -13.0

PLATE 24: GRADING AND SUMPHOLE EXCAVATIONS (LOOKING TOWARD THE JUNCTION OF WEST STREET AND HUBERT STREET) (L. Shmookler 12/84)

feet and were fitted with large, perforated tin pipes (Plate 25). Accumulated water was then pumped. In addition, holes to accommodate pile caps were excavated at pile cluster locations specified in the design of the foundation supports. Most of the pile cap excavations were hampered at some point by obstructions such as concrete piles and concrete or granite spread-footers left from demolished buildings.

The broad-stripping, which was done in stages, was also somewhat hindered by obstructions that often determined the depth of excavation. Ultimately, these depths ranged from -3.0 to -14.0 feet. Very deep excavations (-8.0 to -14.0 ft.) were undertaken in the western portion of the site to expedite the removal of rows of large concrete blocks (7 by 7 by 8 ft.) and concrete and beam platforms (1 by 6 by 28 ft.) that apparently had supported late-nineteenth to early-twentieth-century foundations. As obstructions were removed, excavated areas were refilled to create a uniform surface at -3.0 feet.

The excavation procedures used by Delma Construction Company determined the selection of suitable methods of archaeological monitoring. This method was aimed at retrieving the most complete data possible given the restrictions of the situation. Because of the rapid pace of excavation and the extensive disturbance by heavy machinery, it was necessary to establish priorities in data collection. One concern was to maintain controls to keep data recovery as consistent and systematic as possible. Primary attention was given to gathering information pertaining to wharves, piers, and landfill constructions as well as the configuration of the river bottom and related fill information. In addition, miscellaneous archaeological features that were considered unusual or unique were also recorded.

Design specifications for the Shearson Lehman/American Express Information Service Center developed by Skidmore, Owings, and Merrill called for the control of foundation excavations through a grid with access lines intersecting at known intervals and angles. During monitoring, this grid was used for systematic horizontal coverage of the site. All archaeological features were tied to the grid by using a transit, rod, and tape. Measurements were taken either from permanent control points established on the excavation surface or from temporary chalk marks indicating the location of pile cap holes which were recorded on construction plans. The Borough of Manhattan Datum (BMD), which is 2.75 feet above the U.S. Coast and Geodetic Survey datum at Sandy Hook, New Jersey, was the zero elevation of the site (this datum is 6.57 ft. below the site datum used during the archaeological field investigations conducted from May to June, 1984). The relation of the transit to the BMD was determined by five correlated benchmarks established on the site during monitoring.

Location, dimensions, and top and bottom elevations were recorded for all the broad-stripping and sump and pile cap holes. Any

observed occurrences of black clay or clayey silt indicative of river bottom were recorded by their location and depth, and stratigraphic profiles and sketches of various cuts were drawn whenever possible. In addition, a distinction was made between log cribbing observed in situ and notched logs removed by backhoes from uncertain contexts. When in situ, the position of cribbing was carefully recorded in three dimensional drawings and plans, and profiles were drawn with special emphasis on the mode of articulation of all logs. Whenever notched logs were removed, their location was recorded in relation to the grid.

Throughout the monitoring, a 35mm black and white photographic record was kept; when possible, this was augmented by color slides. In addition, late-nineteenth- to early-twentieth-century foundations (concrete piles, concrete and beam platforms, etc.) were recorded when they were associated with earlier features or if they were of particular interest.

Although monitoring was simultaneous with excavation, it did not interfere with construction operations. As a rule, the archaeological recording occurred either between the excavation and the backfilling of various holes or during pumping operations; only occasionally did backhoe excavation pause to allow a sequence of quick transit shots. Not only did the relationship between the construction crew and the archaeologist quickly become amiable, it essentially became symbiotic.

On the one hand, the archaeologists gave the construction crews information about the variables governing the site's water problem and provided data pertinent to locating buried walls. They also helped establish on-site benchmarks and shared their photographic record, both from the monitoring and from earlier excavations. The construction crews, on the other hand, shared their demolition record, often assisted in archaeological surveying, and when possible provided scheduling information that allowed the archaeologists to budget their field time judiciously.

C. MONITORING RESULTS

1. Wharfs, Piers, and Landfill Constructions

Late-eighteenth- to early-nineteeth-century cobb crib wharfing was observed in situ at four locations (B.5/8, B.5/6, B.5/2, and B.5/1; see site plan, Figure 20). The information from these observations indicated that a large wharf had run east to west through the middle of both site blocks. The northern edge of the cribbing, located in pile cap hole B.5/8, was found 11.5 feet south of line B.5. In addition, the backhoe removed a number of notched logs from pile cap hole B.5/4 which was filled with water.

Four other water-filled locations north and south of line B.5 (D.5/10, D/4, A/5, and A/3) yielded additional notched logs with

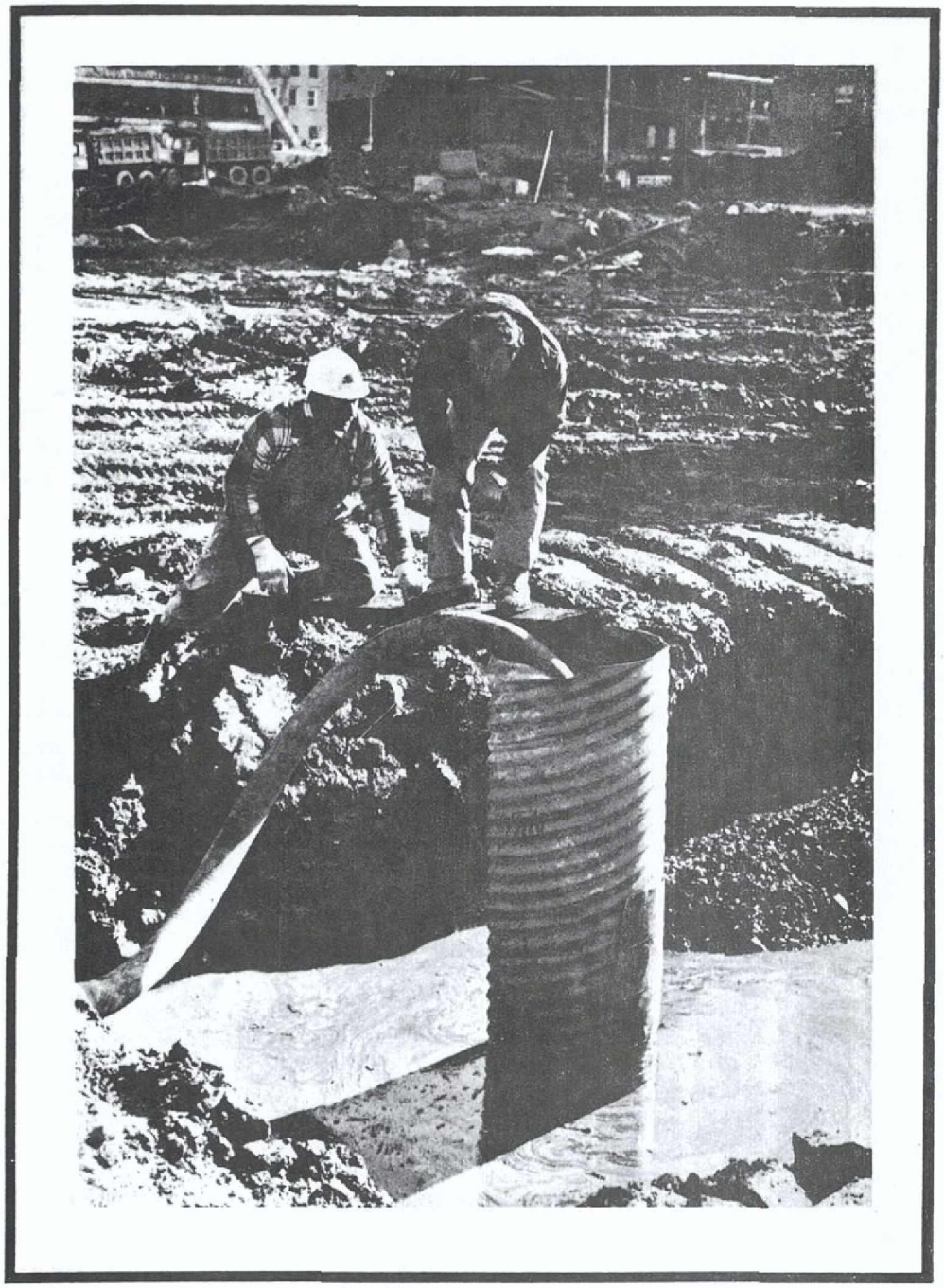


PLATE 25: PUMPING IN SUMPHOLE D

(L. Shmookler 12/84)

joints similar to those observed in the wharf. It is important to note, however, that no in situ wharfing was found either on line D or line A. The source of the notched logs recovered here is unclear. Possibly, they represent features more ephemeral than the wharf itself, but, given the extensive disturbance that occurred during the construction of late-nineteenth- to early-twentieth-century basements, they probably are merely displaced from their original locations.

The cobb crib recorded on line B.5 was found immediately under a concrete basement floor. Fill material within the log crib mainly consisted of medium-sized rocks and occasional small-to-medium cobbles in a soil matrix of dark gray sandy silt. The rock-fill that projected above the uppermost logs supported the concrete floor. The proximity of the wharf to the floor suggests that its upper portion was partially destroyed during basement construction.

a. Pile Cap B.5/8

The top of the northernmost row of logs had an elevation of -2.10 feet BMD and three east-west courses were observed in the field. The logs in this row did not lie on top of each other, but were separated by moderate spaces or chinks, that accommodated north-south crossties (Figure 21a). Two treenails, or trunnels (wooden pegs of dry wood meant to swell and fasten timber or planks in a wet environment), held the cross-ties and log courses together (Figures 21a and 21b; Plate 26). The second row was structurally similar to the first in that the courses alternated with overlapping crossties.

Articulations of the first and second rows and their respective crossties all represented cross lap joints. Three variations of this joint were observed in this portion of the wharf. One was a cross lap with a broad, "squared-off" notch (Rockman et al. 1983:64-65), while others were crosslaps using a saddle notch and a crosslap treenail fastening (Figure 22).

The structure and articulations of the third row were distinctly different. The courses of this row lay either directly atop each other or were separated by thin wooden boards (see Figure 21b). Little or no chinking was found between the courses. Apparently, half-lap joints were the fastenings used to extend the east-west log rows (see Figure 25). Here the ends of two logs were halved and overlapped to form a continuous line. No cross lap joints were observed in this row; instead, the ends of the crossties were thinned to form shouldered tenons which were inserted into housings cut on the articulating surfaces of two courses. Three variations were used for crosstie insertion: dovetail and shouldered housings as well as one at the cheek and shoulder of a half-lap joint (see Figures 25 and 21). In addition, a mitre joint was cut in the log of the second course; this joint appears to have accommodated a diagonal strut connecting this course with its crosstie.

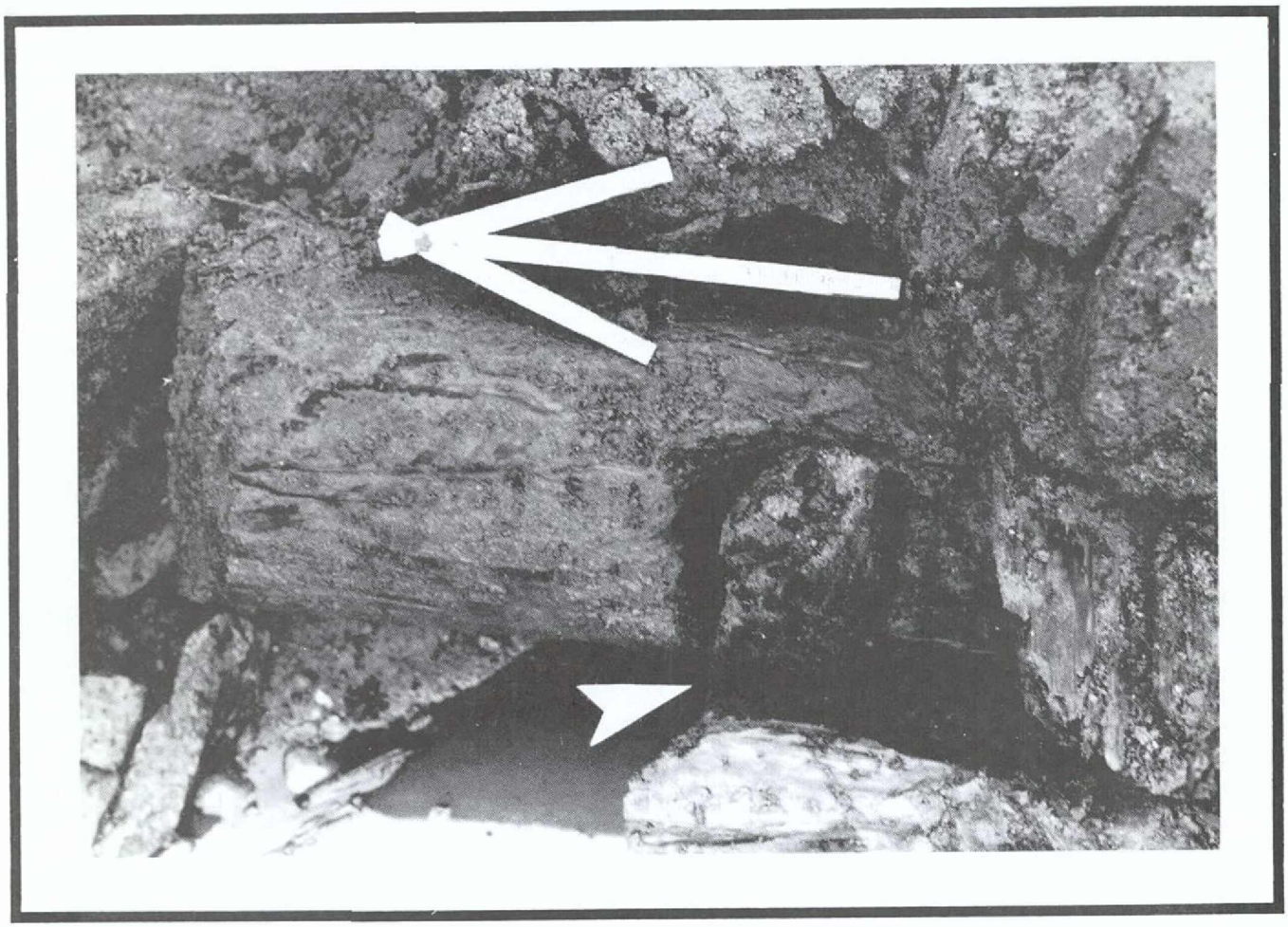


PLATE 26: TREENAIL FASTENING (ARROW) IN PILE CAP HOLE B5/8

(L. Shmookler 1/85)

FIGURES 21a & 21b:
Site 1, Washington Street Urban Renewal Area
Pile Cap Hole B.5/8.

FIGURE 21a
B.5/8, WEST PROFILE

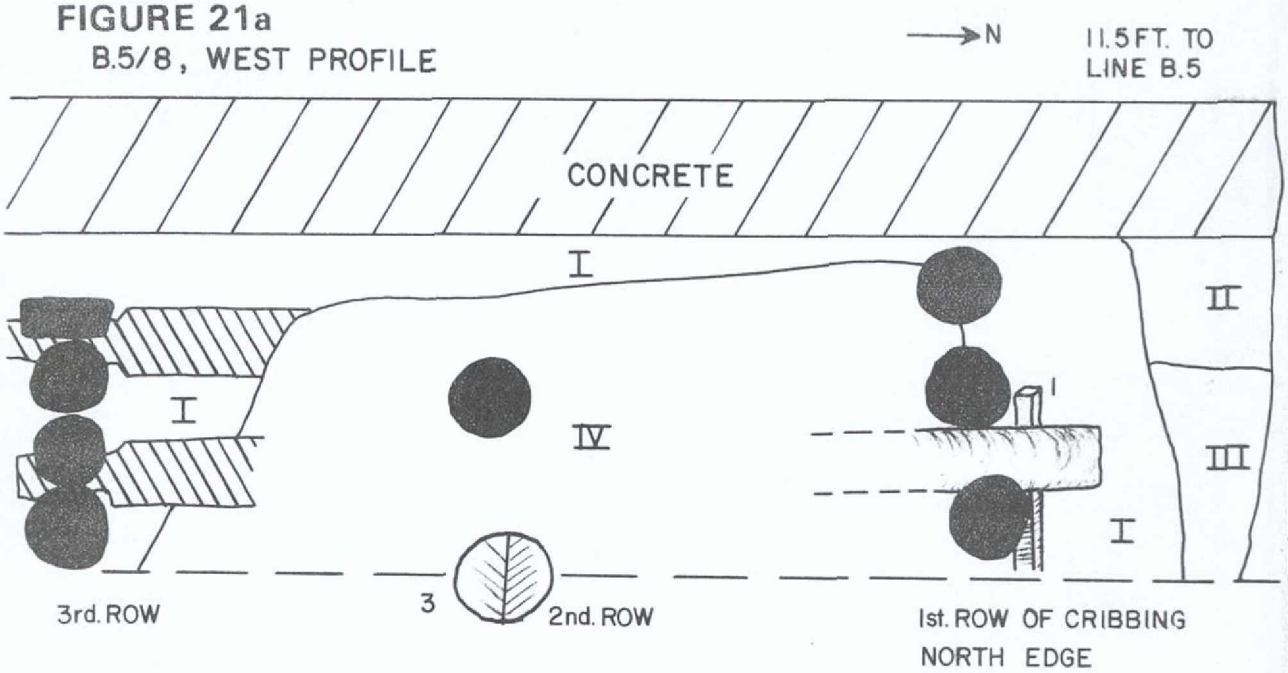
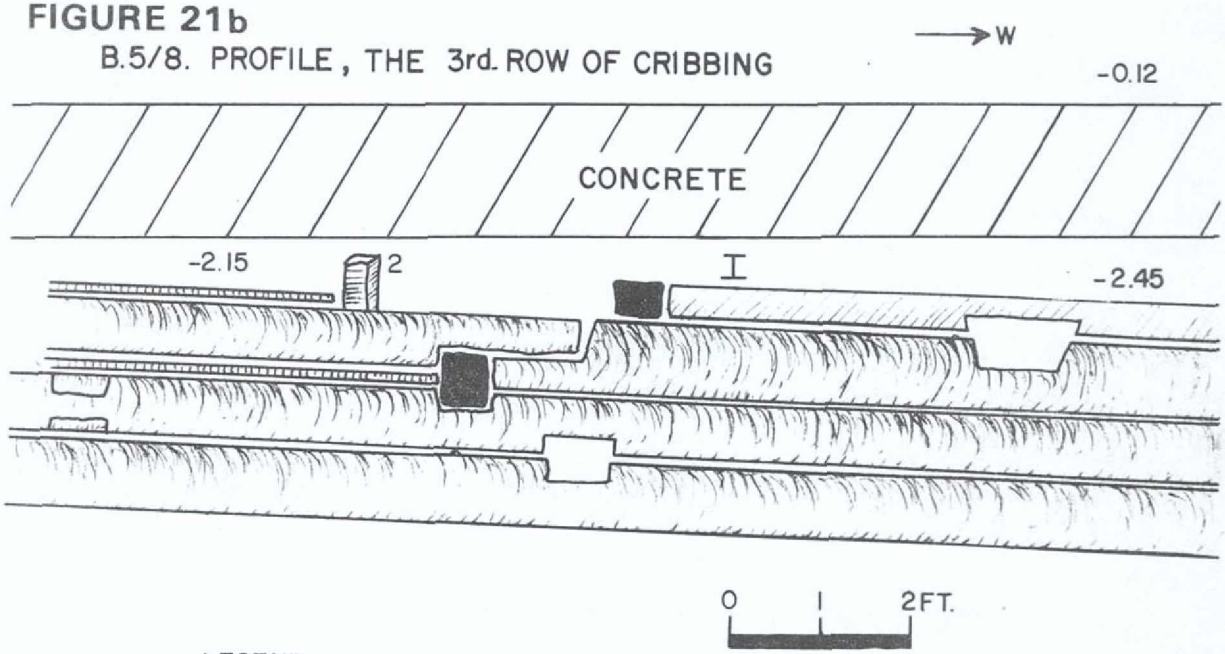


FIGURE 21b
B.5/8. PROFILE, THE 3rd. ROW OF CRIBBING

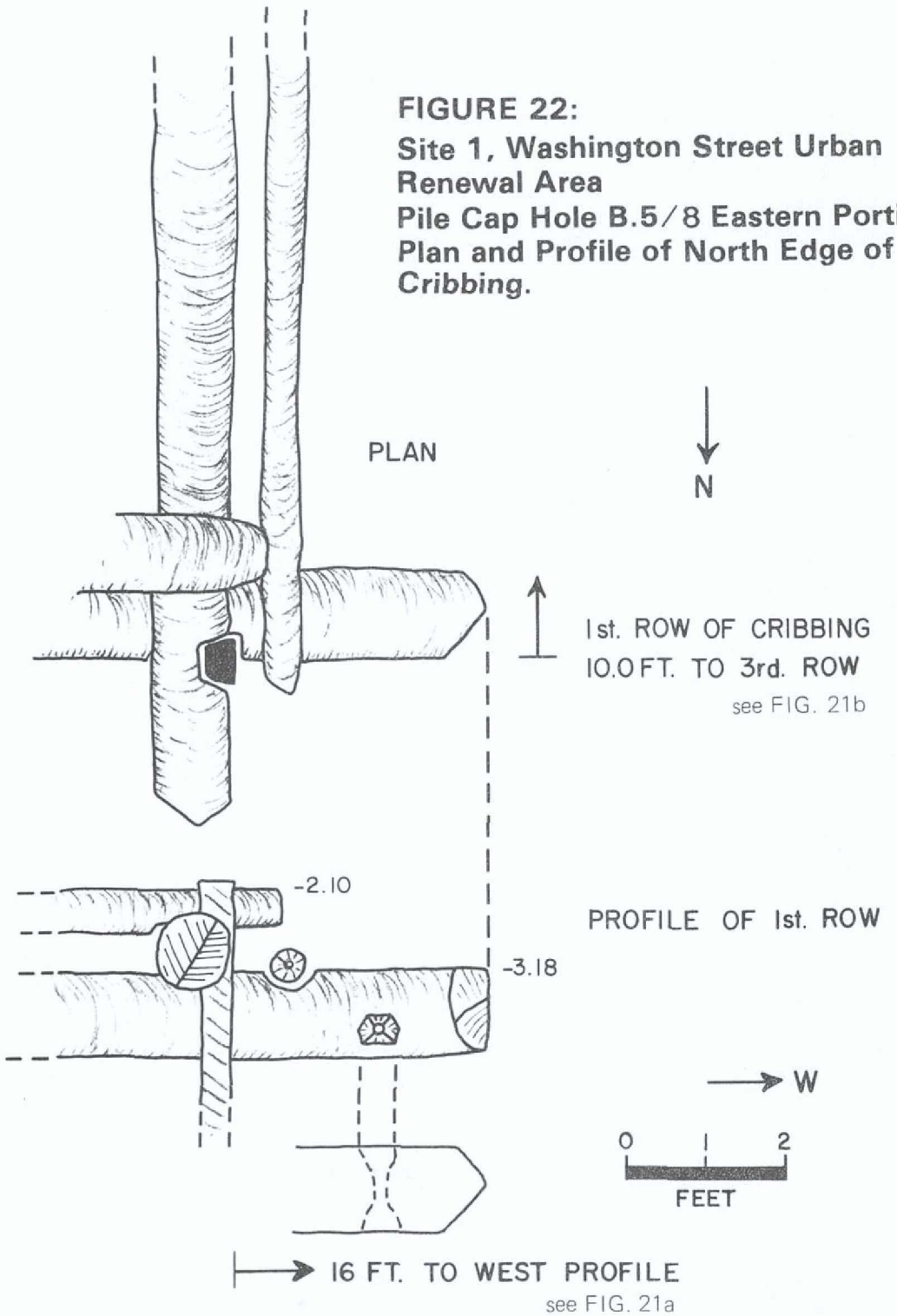


LEGEND

- LOGS EXTEND EAST
- PROJECTED
- CROSSTIE. FACE OF TENON
- 1,2 TREENAILS
- 3 BUTT
- — — WATER LEVEL

- I ROCKFILL
- II COARSE BROWN SAND. LANDFILL
- III BROWN SAND WITH LENSES OF GRAY BROWN SAND. LANDFILL
- IV AREA OF SLUMPING

FIGURE 22:
Site 1, Washington Street Urban Renewal Area
Pile Cap Hole B.5/8 Eastern Portion, Plan and Profile of North Edge of Cribbing.



NOTE : ALL ELEVATIONS ARE TO BOROUGH OF MANHATTAN DATUM.

The structural differences between the two outer rows and the third row suggest that force directed perpendicularly to the line of the outer log rows (for example, the impact of a docking ship) would not meet rigid resistance but would instead be absorbed by the flexibility of the outer rows. This flexibility was created by the broadness of the notches in the cross lap joints which permitted some shifting of the logs. While the outer rows and crossties acted as a cushion, the third row was apparently designed to arrest applied force. This was achieved by using a shouldered tenon at the end of a crosstie (see Figure 25); the inward movement of this joint would be resisted by the edge of its housing. The third row of logs apparently served as a vertebra that prevented the dislocation of the wharf.

Because of water in the excavation units, the vertical extent of the cribbing remains uncertain. Assuming the cobb crib was sunk and floored by the rockfill (Greene 1917:53-54), it probably continued down since river bottom at this location was apparently about -10.0 feet BMD.

b. Pile Cap B.5/6

The top elevation of the first row of logs was -3.47 feet BMD and three courses and three crossties were observed in the field (Plate 27). The outward movement of the row was prevented by a slender external wooden piling driven vertically into the sediment. As in B.5/8, several variations of the cross lap joint were found in this row. Part of what appeared to be a wooden box made of a single observable course of tongue-and-groove planks (only the length, which was 8.98 feet was observable) was located about 4 feet north of the wharf edge (Plate 28). This might represent part of a later fill construction used to structure landfill that had settled (Geismar 1983:692-693), but this remains uncertain. A "partition" made of three boards nailed together and standing on edge occupied an intermediate position between the wharf and the "box" (Figure 23), perhaps serving to retain landfill north of segments of cobb wharfing. If so, this would tend to support a block and bridge wharf or pier construction (see Chapter V, this report).

c. Pile Cap B.5/2 and B.5/1

Cobb crib wharfing similar to that found in B.5/8 and B.5/6 was briefly observed in situ at these locations directly under a cement basement floor. The construction and rockfill in both excavations appears similar to that found in B.5/8 and B.5/6. The top elevation of the wharf in B.5/1 was -3.80 feet BMD.

d. Additional Construction Information

A number of assorted notched logs recorded on the site (Figure 24) provided additional insight into the construction of the wharf. The majority of these logs displayed a V-notch which

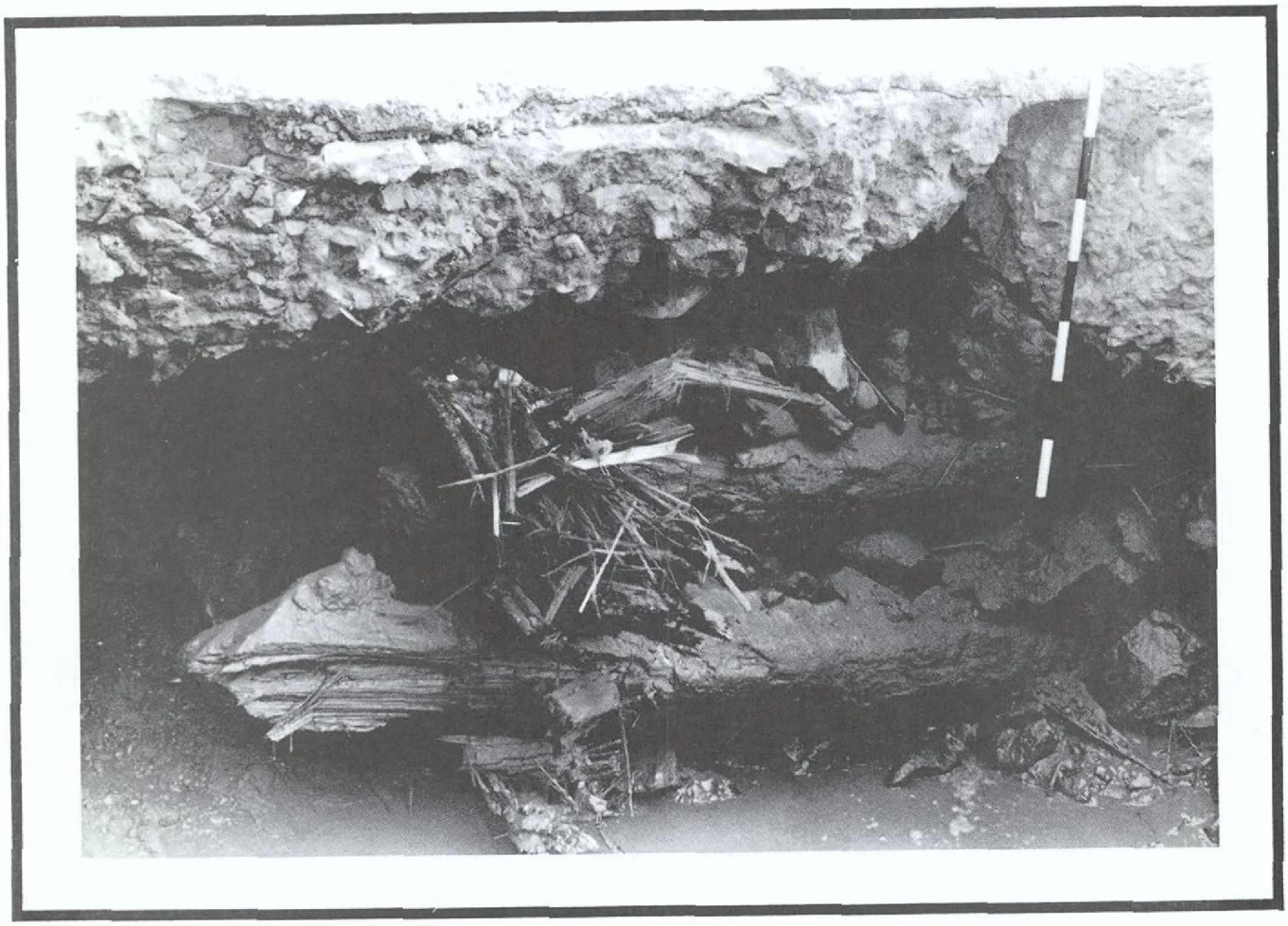


PLATE 27: NORTH EDGE OF COBB WHARF IN PILE CAP HOLE B5/6

(L. Shmookler 1/85)

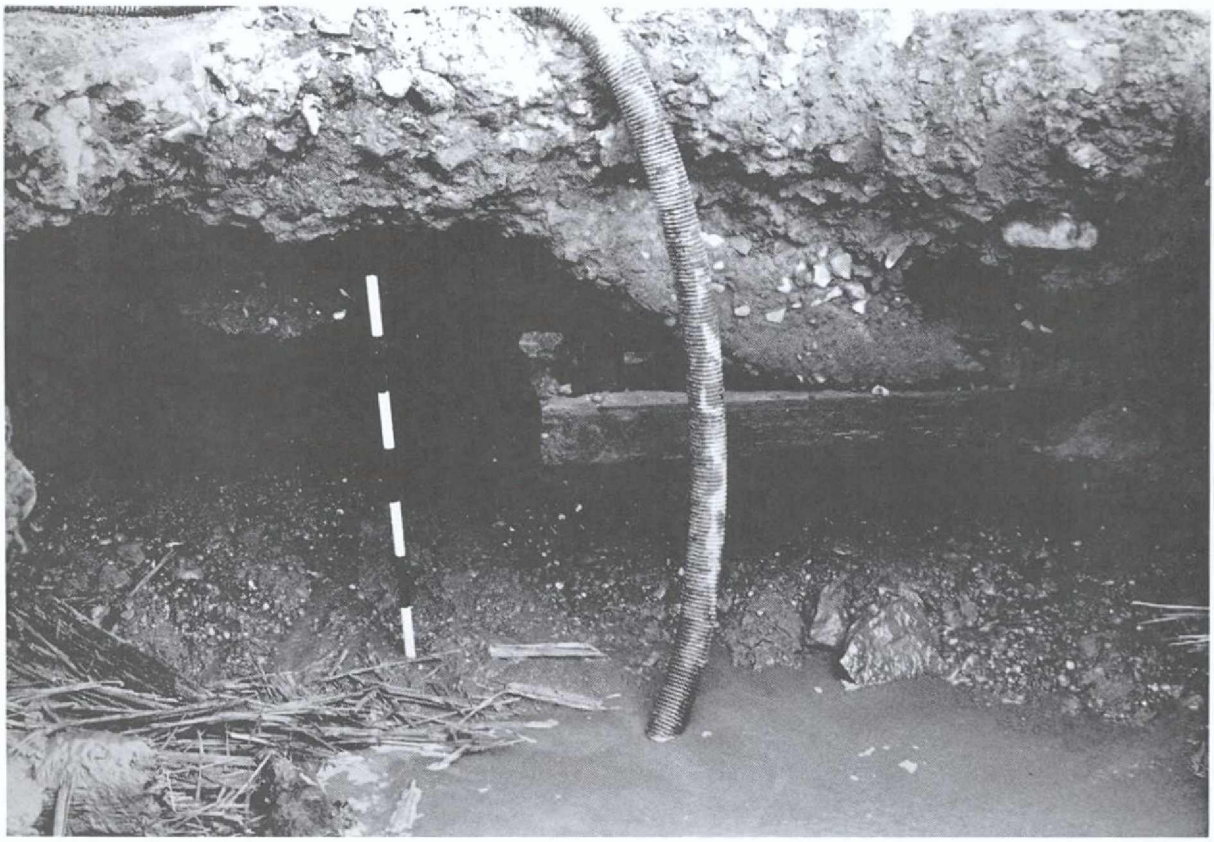


PLATE 28: CORNER OF WOODEN BOX NORTH OF COBB WHARF IN PILE CAP HOLE B5/6 (L. Shmookler 2/85)

FIGURE 23:

Site 1, Washington Street Urban Renewal Area
Pile Cap Hole B.5/6 North Edge of Cribbing

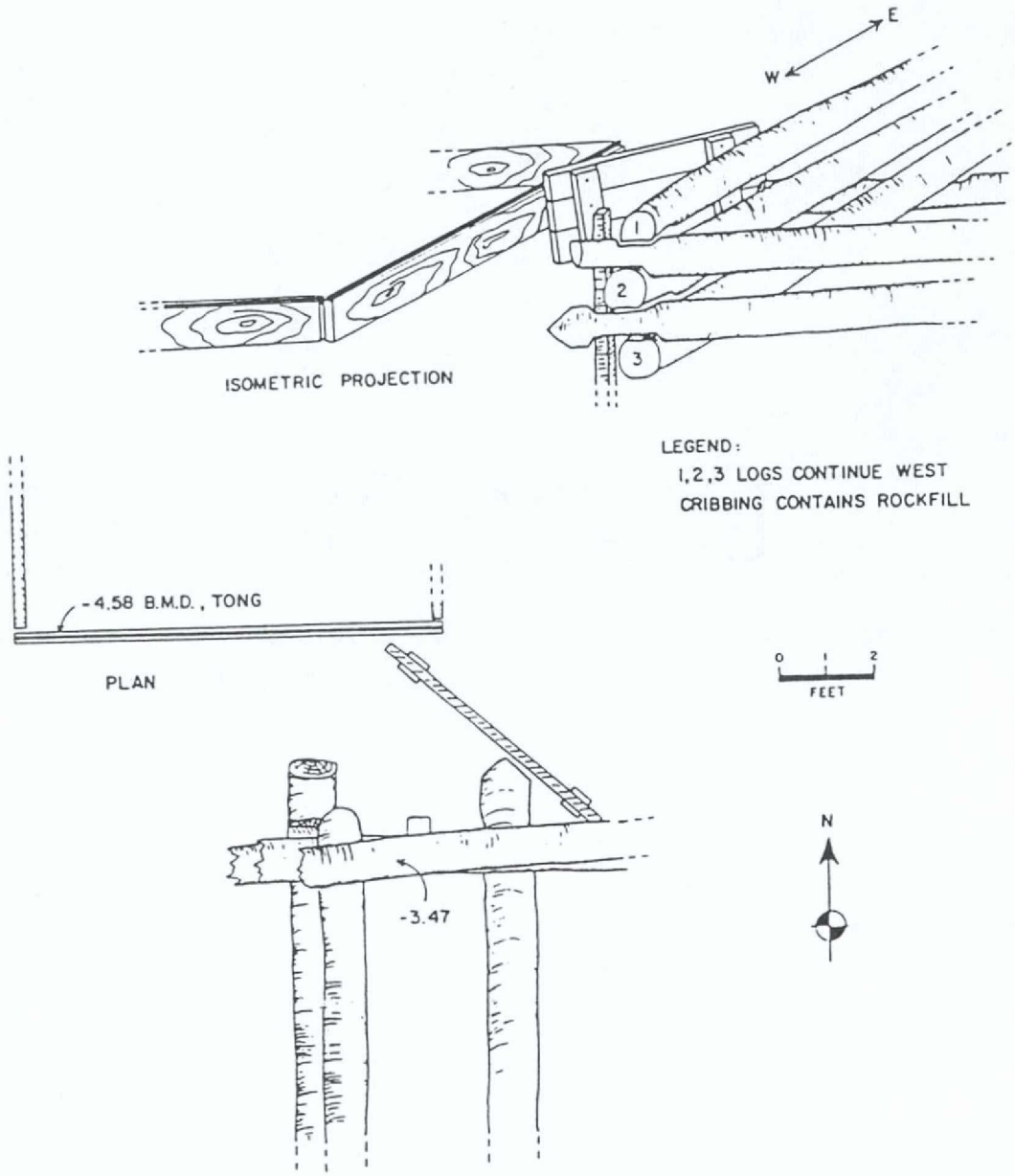
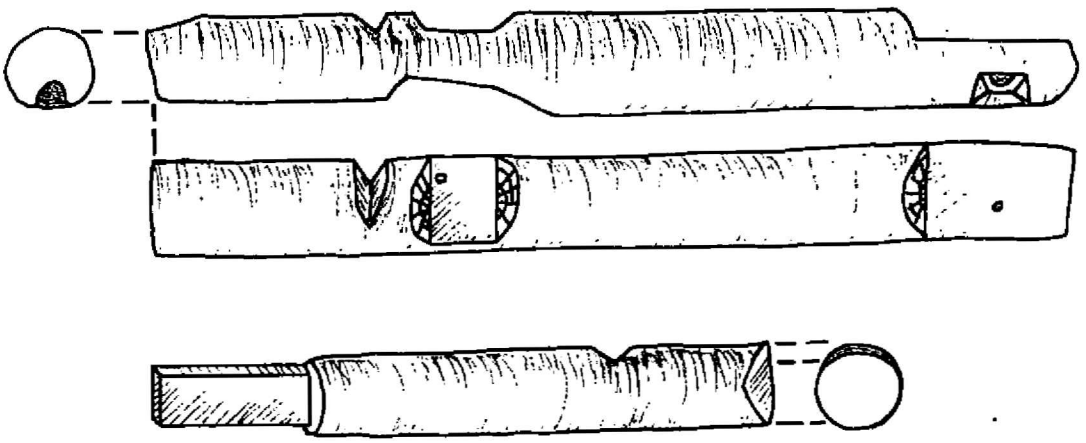
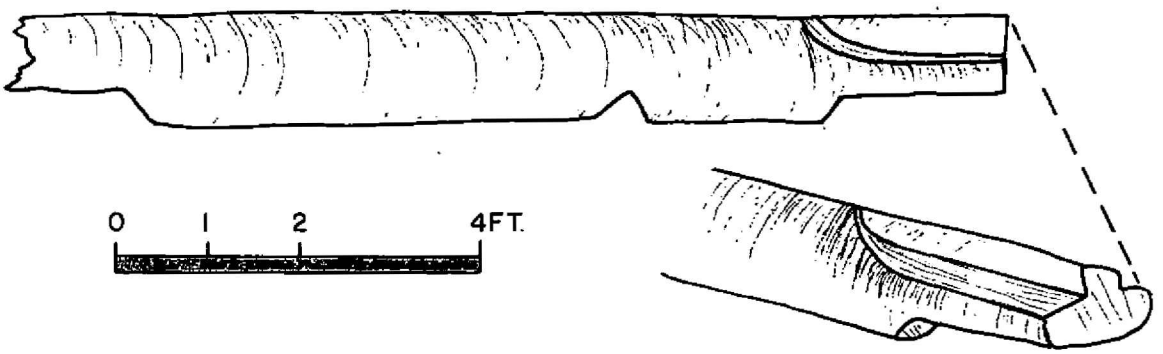


FIGURE 24:
Site 1, Washington Street Urban Renewal Area
Logs Found in Cribbing



PILE CAP HOLE B. 5/8

PILE CAP HOLE B. 5/6



DETAIL, ENLARGED

PILE CAP HOLE C/2

undoubtedly connected log rows and crossties in a wedge joint. An analysis of the morphological features of these logs suggests that two additional varieties of the half lap joint were used for the extension of the wharf. One is a half lap joint with a metal bolt fastening; the other is a scarf joint which articulated lengthwise with two other logs in the same row by using a typical half lap joint and a dovetail cleat inserted into a keying groove (see Figure 25 for a compendium of joints and joinings).

2. River Bottom and Landfill

Black clay or clayey silt with a strong organic odor, a type of deposit determined to represent river bottom (Braynard 1982: personal communication; Ciancia 1984:personal communication; Geismar 1983:701), was observed at ten locations and depths during the current monitoring and in the course of field investigations conducted from May to June, 1984 (see DT3 Chapter III, this report).

In the western portion of the site, these river bottom sediments were located beneath landfill deposits of brown and reddish brown coarse sands. Only in the eastern part of the site (east of line 11 in Figure 20) were medium to coarse olive gray sands deposited above the black clay of river bottom (Figure 26).

The texture and color of the buried sands found uniformly distributed in the eastern portion of the site suggest that prior to filling, a low lying swampy area may have been present near the shoreline. It appears that these olive gray sands were naturally deposited above river bottom along a section of the shoreline where water moved relatively slowly, suggesting a lagoon situation.

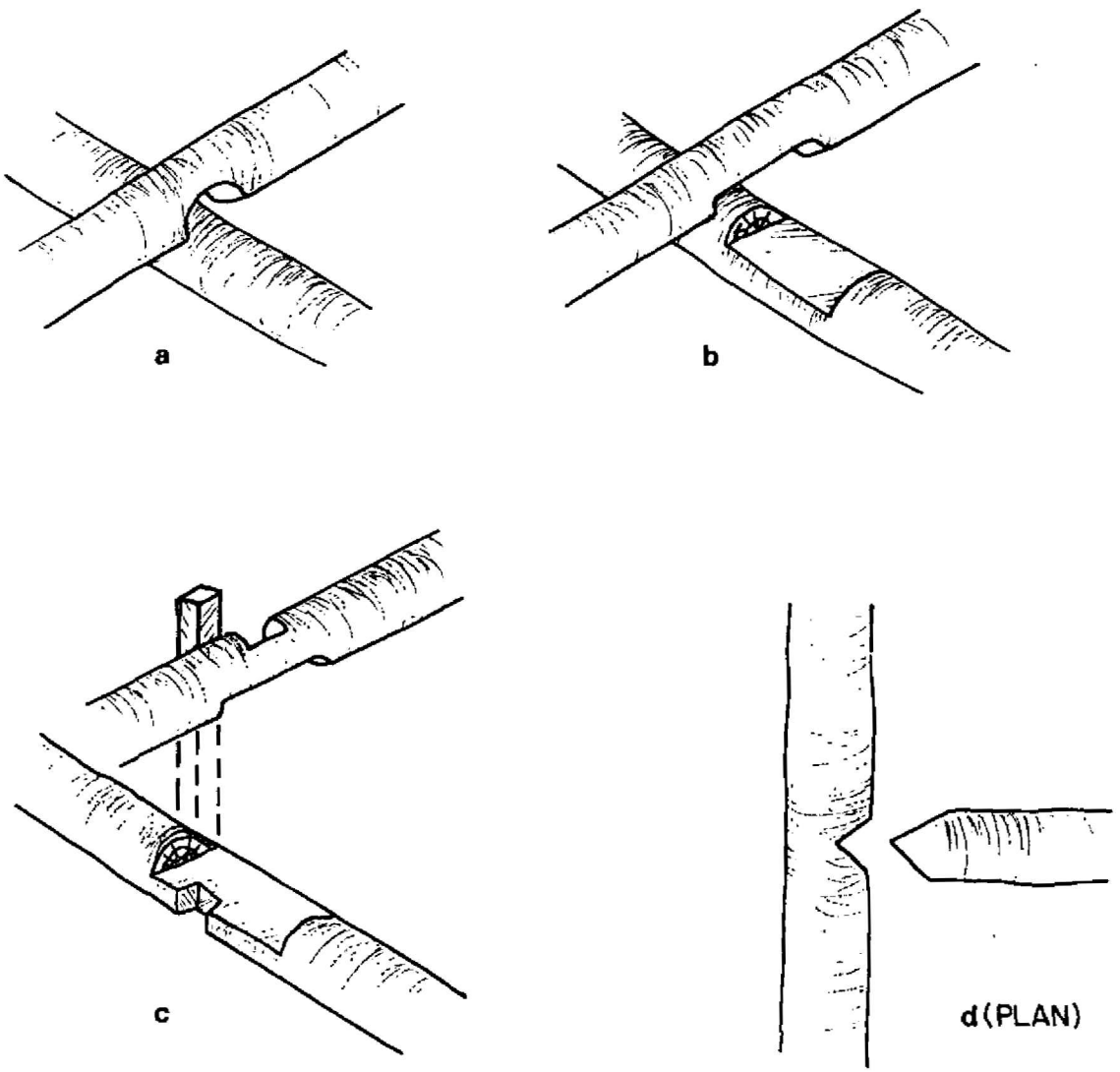
Soil stratigraphy observed during monitoring and information from three deeptests excavated during the earlier field investigations suggest that the Hudson River shoreline curved in this area, again implying a cove or lagoon; these data also indicate that river bottom originally sloped gently to the west (Figure 27). This shoreline and river bottom configuration is also suggested by two series of soil borings (Historic Conservation & Interpretation 1983:Figure 4, Area 17; Woodward-Clyde 1984). Except for one anomalous high area that may reflect a natural variation in river bottom, the wharf segments exposed during monitoring were situated beyond the shoreline where river bottom was more than nine feet below the Borough of Manhattan datum.

3. Miscellaneous Features

a. Feature 63

This is the designation for a complex of walls and spread-footers, or foundation supports, located at the edge of Lots 28

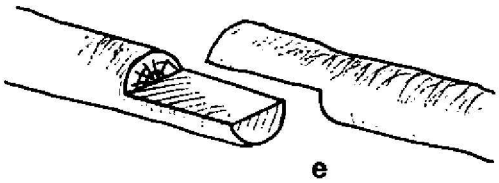
FIGURE 25:
Site 1, Washington Street Urban Renewal Area:
Compendium of Log Joinings



JOINTS OF OUTER ROWS

a SADDLE NOTCH
b CROSS LAP VIA SQUARED-OFF NOTCH
c CROSS LAP WITH TREENAIL
d WEDGE

FIGURE 25 (continued)



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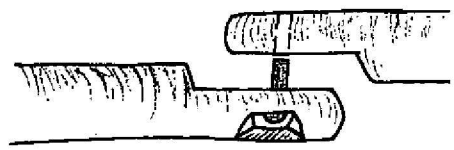

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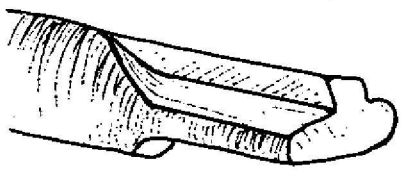

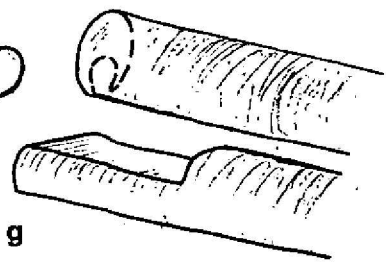

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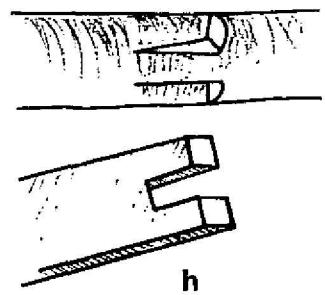

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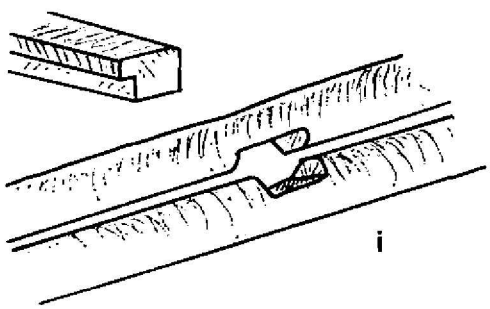

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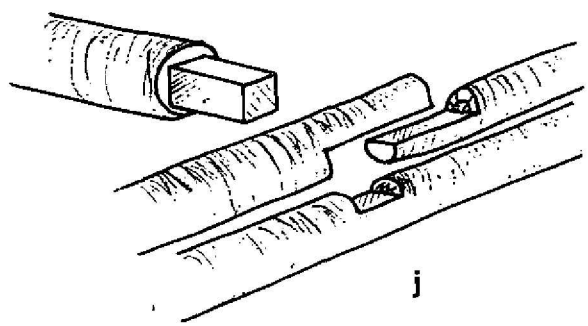

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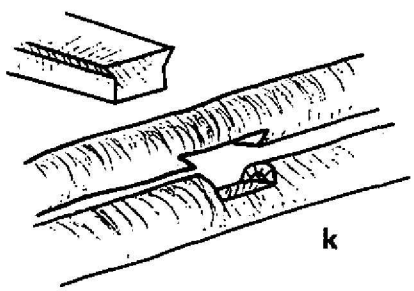


k

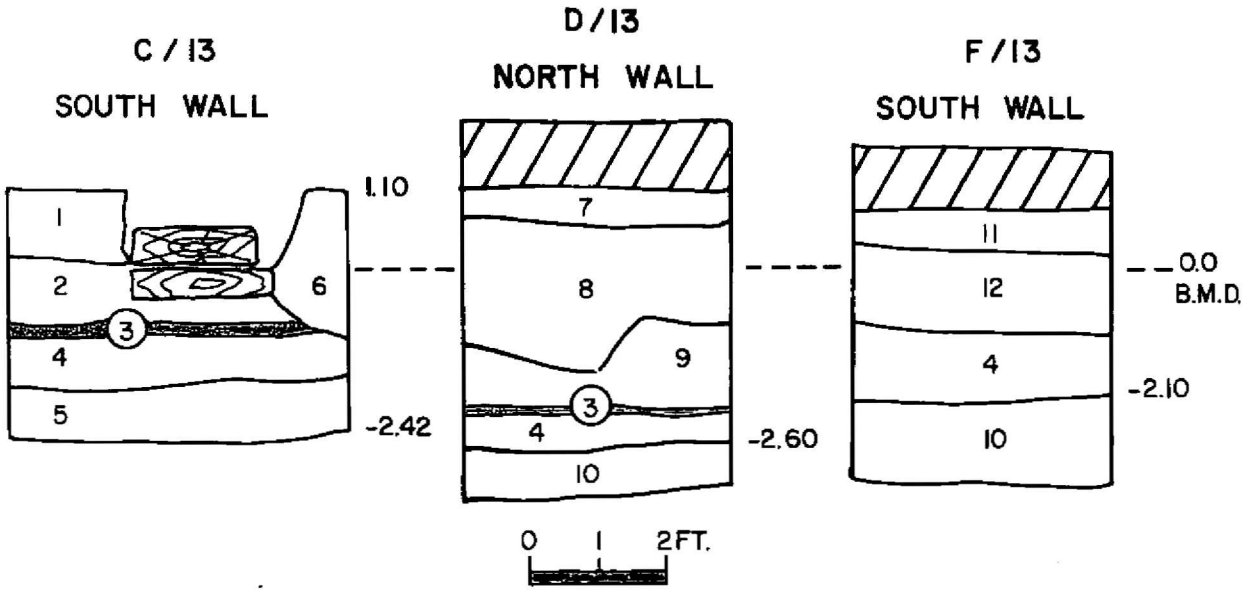
ROW EXTENTION

- e HALF LAP
- f HALF LAP WITH METAL BOLT FASTENING
- g SCARF JOINT WITH HALF LAP DOVETAIL CLEAT

JOINTS OF THE THIRD ROW

- h MITRE JOINT
- i SHOULDERED HOUSING
- j HOUSING AT CHECK AND SHOULDER OF HALF LAP
- k DOVETAIL JOINT

FIGURE 26:
Site 1, Washington Street Urban Renewal Area
Stratigraphic Columns



1 HARD PACKED YELLOW BROWN CLAYEY SILT

2 COARSE BROWN SAND

3 HARD PACKED OLIVE GRAY SAND

4 OLIVE GRAY SAND

5 OLIVE GRAY SAND WITH BANDS OF GRAY BLACK SILT

6 GRAY BROWN SILTY SAND WITH RUBBLE

7 RUBBLE

8 REDDISH SILTY SAND WITH GRAVEL AND FRAGMENTS OF RED SANDSTONE

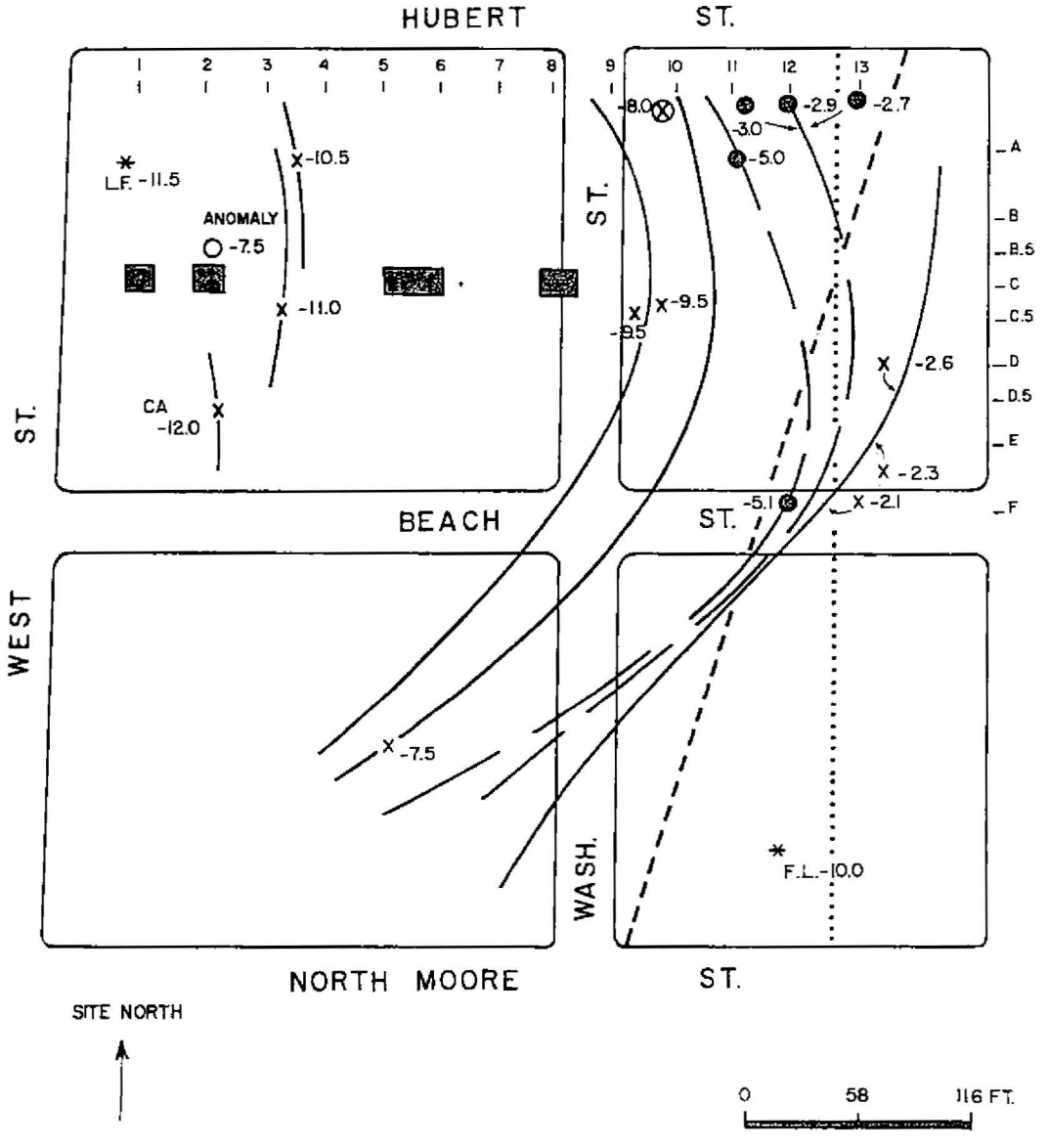
9 COARSE BROWN SAND

10 BLACK CLAYEY SILT

11 REDDISH SILTY SAND WITH PEBBLES

12 OLIVE GRAY SILTY SAND

FIGURE 27:
Site 1, Washington Street Urban Renewal Area
Contour of River Bottom



LEGEND TO FIGURE 27
Site 1, Washington Street Urban Renewal Area

	WHARF (OBSERVED)
B.5;13	GRID LINES
*L.F.	LANDFILL ONLY
*F.L.	FAST LAND ONLY
	RIVER BOTTOM NOT YET REACHED AT THIS ELEVATION
X	LOCATION AND DEPTH OF BLACK CLAY/CLAYEY SILT
	LOCATION AND DEPTH OF OLIVE GRAY SANDS OVERLAYING BLACK CLAY/CLAYEY SILT
	PROJECTED CONTOUR LINES FOR BLACK CLAY/CLAYEY SILT AND OLIVE GREY SANDS
	APPROXIMATE CONFIGURATION AND PLACEMENT OF SHORELINES IN 1807 WATER LOT GRANT MAP (LIBER E. 1807: 284)
	APPROXIMATE CONFIGURATION AND PLACEMENT OF 1874 SHORELINE RECONSTRUCTION (VIELE 1874)

NOTE : CONTOUR INTERVALS NOT TO SCALE
ALL ELEVATIONS ARE TO BOROUGH OF MANHATTAN DATUM

and 30 recorded on Bromley's 1899 Atlas. These lots are in the eastern portion of the block bounded by Beach, Greenwich, North Moore, and Washington Streets. A double brick wall running east to west through the middle of the block combined several interesting construction and insulation techniques. The northern end of the wall (Lot 28) rested on concrete spread-footers, while a more elaborate foundation was found in the wall belonging to Lot 30. Here, a row of wooden timbers (29 by 12 by 5 in.) was positioned perpendicularly to the wall (Plate 29). Dressed beams with cross section dimensions of 23 inches by 7 inches and approximately 18 feet long were found above the timbers. Stone blocks of Manhattan schist were placed on the beams and these in turn supported a brick wall (Figure 28 and Plate 30). In both lots, the basement floors were formed by two layers of concrete separated by sheets of compressed cork. In Lot 30, this cork was also mortared to the wall, presumeably for insulation.

b. Brick Sewage Conduit

An arched brick sewage conduit was uncovered 12 feet south of the southern curb of Beach Street at -0.75 feet BMD. Running east to west, it was constructed of two layers of mortared brick. In profile, the conduit was domed with interior dimensions of 43 inches by 32 inches (Plate 31). This feature was observed at three locations spanning 310 feet.

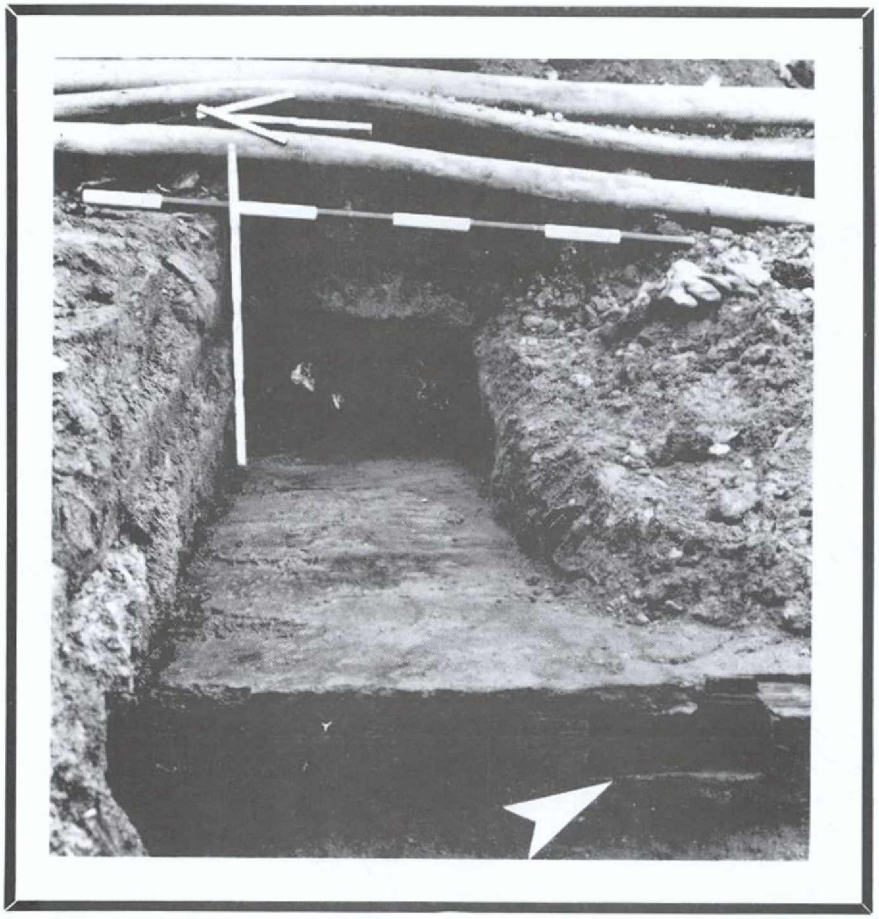
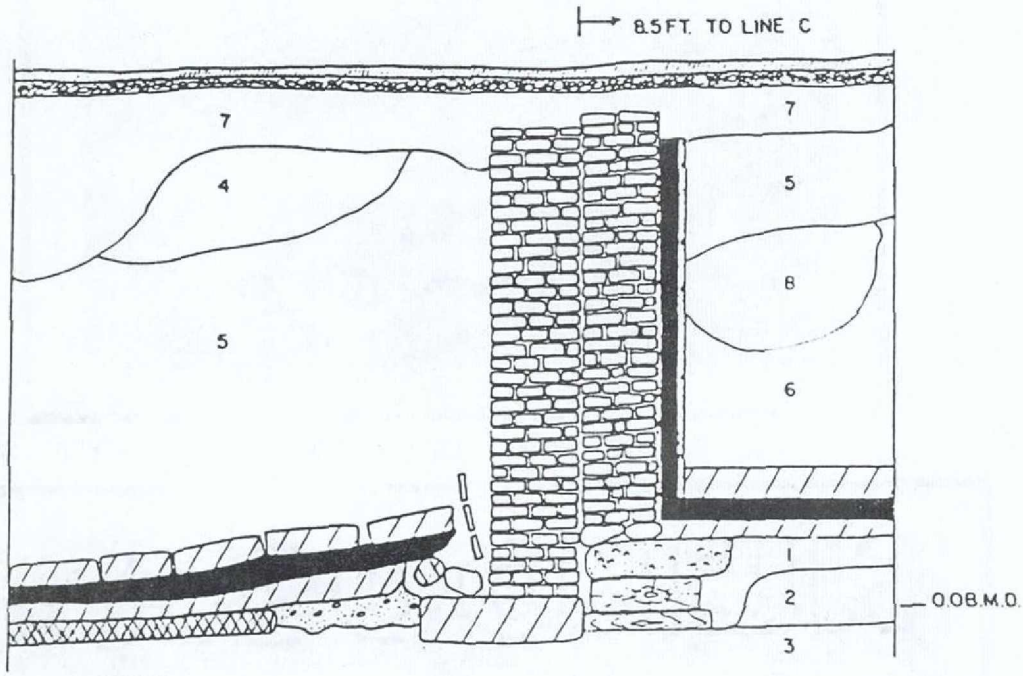


PLATE 29: FEATURE 63. MORTISED (ARROW) SPREAD FOOTER (L. Shmookler 11/84)

PLATE 30: FEATURE 63. DOUBLE WALL AND CORK INSULATION (ARROW)
(L. Shmookler 11/84)

FIGURE 28:
Site 1, Washington Street Urban Renewal Area
Feature 63, East Profile



LEGEND

1	COARSE RED SAND
2	COMPACT YELLOW CLAYEY SILT
3	OLIVE GRAY SAND
4,5,6,7	VARIOUS LEVELS OF DEMOLITION RUBBLE
8	CORK IN RUBBLE

0 1 2 3FT

N ◄——► S

CORK	ASPHALT
MORTAR	GRAVEL
CONCRETE	FOUNDATION BEAM
SANDSTONE	SPREAD FOOTERS
MANHATTAN SCHIST	PIPE

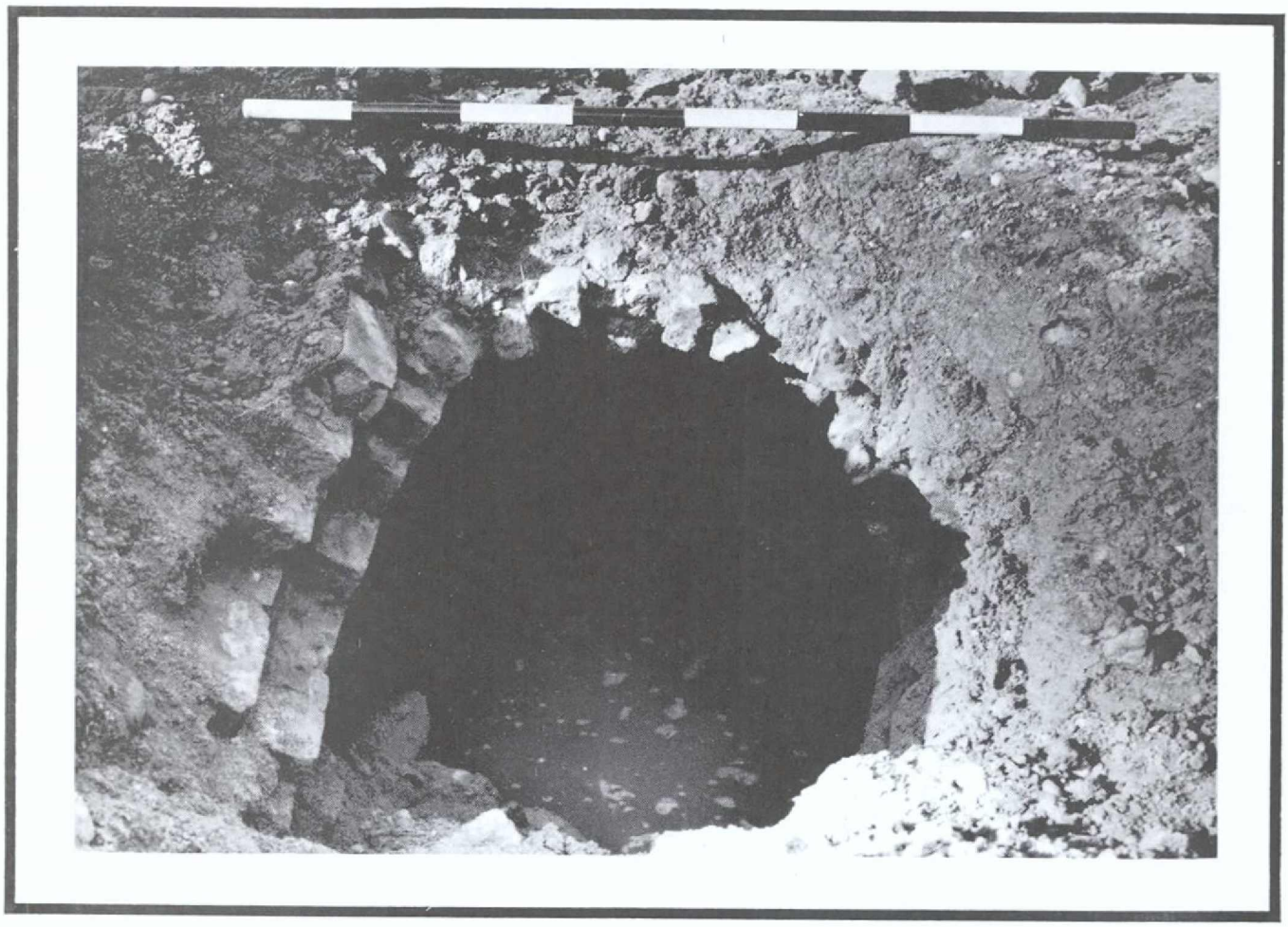


PLATE 31: BRICK SEWER UNDER BEACH STREET.
NOTE DOMED CONSTRUCTION (L. Shmookler 2/85)

V. SITE ANALYSIS

A. INTRODUCTION

This chapter presents an analysis of material recovered from investigation of Site 1 of the Washington Street Urban Renewal Area. It provides a synthesis of the site's documentary history (see Chapter II) and Field data (Chapters III and IV) as well as information derived from its artifacts--mainly ceramics, flora, and fauna (Appendices C-E); it also incorporates research into some of New York City's early-nineteenth-century municipal concerns. It is an analysis that focuses on the landfill process, a major, ongoing, urban engineering undertaking, and on the West Point Foundry in New York City, an example of an early-nineteenth-century American industry. By virtue of its focus, factors affecting site formation and preservation are also considered as are comparisons with relevant material from other New York City archaeological sites. The result is documentation of a phase of New York City's urbanizing process.

B. LANDFILL

Recent soil borings for the site (Woodward-Clyde 1984) indicate variable fill depths with the deepest extending 40 feet below the modern ground surface. Based on documentary evidence and the artifactual material recovered during testing, filling of two of the site's blocks was faster and cleaner than many of the city's fill sites excavated to date (see Table 3). Although all these other sites were on the east side of Manhattan, the difference appears related to time, not location. This was suggested when fill from this west side site was compared with material excavated from the 175 Water Street block (see Figure 1 for site location). Filling on this block began in the fourth or fifth decade of the eighteenth century when New York was a colonial outpost, actually little more than a small town with a bustling seaport; Site 1 of the Washington Street Urban Renewal Area, on the other hand, was filled in the early years of the nineteenth century when New York was evolving as an urban entity in a new Republic.

1. Landfill and Health, a Municipal Concern

When the 175 Water Street block was filled, few if any municipal controls were in effect to regulate fill material. In fact, it seems likely that the city as well as private individuals must have been delighted to have the filling lots as trash repositories. Conceivably, this was one of the places where unlicensed dirt carriers--the lowest echelon of the city's carters (Prince 1986:personal communication)--deposited trash and debris. By the first decade of the nineteenth century, however, when filling beyond the low water mark began at Site 1 of the Washington Street Urban Renewal Area, the city had instituted measures to

TABLE 3

SITE 1, WASHINGTON STREET URBAN RENEWAL AREA: Chronological Listing of Manhattan Fill Sites Excavated/Tested by February, 1986

Project	Landfill Dates*	Number of Blocks From Original Shore	Types of Waterfront Constructions	Year Tested/ Excavated	Sources	Remarks
64 Pearl Street	Late 17th C.	1	Stone foundation walls	1980	Rothschild 1986:Personal Communication	First east-side fill site excavated. Basement excavations. Landfill structures similar in time and type to those at Hanover Sq. (see below).
7 Hanover Square	Late 17th C.*	1	Stone foundation walls	1971	Rothschild 1982	Stone foundations similar to those at 64 Pearl (see above).
Old Slip and Cruger's Wharf	1690-1800	3	Massive timber wharves (undressed logs)	1969	Huey 1984	Episodic wharf-building and landfilling. Observed wharves appear analogous to 175 Water St.
Telco Block	c. 1740-1775*	2	Cobb-crib (log) wharves; planked bullhead	1981	Rockman et al. 1983; Wall 1986	Dates apply to episodic wharf construction. Possible that block and bridge construction was used, but speculative at present.
175 Water Street	c. 1740-1780	2	Wharf/grillage**; ship tied into planked bulkhead and stabilized with pilings	1981-1982	Geismar 1983: 672-712	Block structured c. 1754 when ship incorporated, but landfill process continued as late as 1780 or, with secondary filling, 1795.
209 Water Street	between 1775 and 1800(?)	2	Partially excavated ship	1978	Henn et al. N.D.; Brouwer 1980	Ship side and deck beams excavated. Landfill in and around hull.

TABLE 3 (*Continued*)

Assay Site	1780s-1790s* (wharf and pier only)	3	Cobb wharf, block and bridge pier	1984	Wall and Henn 1986: Personal Communication	Time span of full fill maneuver presently unknown. Data currently being analyzed (Louis Berger & Associates, Inc.)
Barclays Bank	1694-1702*	1	Stone foundations and log cobb wharf.	1983-1984	Klein and Cohen 1986: Personal Communication	Stone foundations similar to 64 Pearl St. and 7 Hanover Sq.; Cobb wharf part of Rotten Row (Water St.)
Schermerhorn Row	1780-1810*	3	Log crib works	1977	Kardas and Larrabee 1979, 1980	Basement excavations, therefore dimensions of constructions unknown.
Site 1, Washington St. Urban Renewal Area	1797-1801 1807-1817	1 2	Log block and bridge (?) probably a pier	1984	Geismar (this report)	First west side fill site investigated. Relatively rapid filling; no major fill-retaining features (large bulkhead, ship, etc.) located in site.

* Fill dates based mainly on historical documentation.

** Wharf/grillage is a term used to define wharfing later used as block foundations (Geismar 1983:672-712).

keep these new lots from becoming a health hazard; by this time, the health of the city's inhabitants had become a municipal concern.

Undoubtedly, this was caused at least in part by the sanitation problems that accompanied an expanding population. Estimated at 8,600 in 1731 (Duffy 1968:40), it had grown to 33,000 in 1790; only twenty years later, with a population of 96,000, it had increased again almost threefold (Duffy 1968:97). In the half century or so that separated the initial filling of 175 Water Street and Site 1 of the Washington Street Urban Renewal Area, Yellow Fever epidemics began to plague the city. This caused a need for municipal reorganization that undoubtedly affected fill maneuvers.

While epidemic diseases had been an intermittent problem since the late-seventeenth century, annual Yellow or "Dock" Fever epidemics first struck the city in the late 1790s. Reaction to this onslaught included what has been called "the Great Sanitary Movement" of the nineteenth century. This was a movement that believed in the "miasmic" theory that related disease to invisible but noxious gases that emanated from putrefying organic material (Duffy 1968:XV-XVI).

A proponent of this sanitary movement was Richard Bayley, a physician who was appointed a commissioner when the Health Department was established in 1796, just a year after the first devastating Yellow Fever epidemic had raged through the city. In 1799, Bayley and others were appointed by the Common Council to determine the cause and suggest a prevention for a new onslaught of this dread disease.

During his tenure as a health commissioner, Bayley waged a war on the use of garbage as a fill material for the water lots that skirted the East River seaport and had begun to appear along the Hudson. Instead, he urged that clean and wholesome sand be used to fill sunken yards as well as to raise filling lots. Bayley blamed "the accumulation of every species of filth and perishable matter on the low made grounds...and the abominable custom of filling up slips and docks with similar materials" (Bayley 1799:7). Apparently, more than a century would pass before the mosquito's role in transmitting this disease would be recognized (Cartwright 1972).

Among the causes cited by the Commission were the hazards of deep, damp cellars, filthy yards, and unfinished water lots. They demanded that wholesome earth or other solid materials be used to fill these yards and lots as soon as possible. The Commission later recommended that lots not being properly filled should be filled by the city and, to cover the expense, be impounded and sold (MCC II 1917:500-508).

The peak of the city's Yellow Fever outbreaks occurred between 1795 and 1805 (Duffy 1968:101); as noted earlier (see Chapter II),

this was a time when the City and the Trinity Church Corporation were granting water lot rights on the west side, including two of the four blocks that comprise Site 1 of the Washington Street Urban Renewal Area. This was also when the city acquired the power to enforce health-related laws (Duffy 1968:114). Included was the right to impose quarantines on incoming ships to limit the introduction of active Yellow Fever cases into the city. These measures seemed to work, at least temporarily, and after 1805 there was a fourteen year respite from epidemics. In 1822, the fever struck for the last time (Duffy 1968:114-118).

During the thirty years that Yellow Fever was active in the city, sanitary conditions had become a major issue, street and health boards had been created and commissioners installed; in addition, the office of City Inspectors had been set up, and supplying public water had become a concern if not yet a reality. Since their initial fill maneuvers are separated by over half a century of municipal growth and change and an increasing awareness of health concerns, some of the measures taken to deal with sanitary requirements should be reflected in the kind of fill recovered from the project area.

In the field, this appeared to be the case: the mid- to late-eighteenth-century fill from the 175 Water Street block was obviously more artifact-laden than that from Site 1 of the Washington Street Urban Renewal Area filled in the first decades of the nineteenth century. Analysis indicates that the difference was not a matter of kind but rather of degree. Moreover, the later fills showed subtle differences that suggest a new trend toward a more trash-laden fill after the first decade of the nineteenth century. But before making a more detailed comparison, a brief summary of the sites' fill histories as well as the sampling method used in the field is warranted.

2. Site 1 of the Washington Street Urban Renewal Area and 175 Water Street, a Comparison

By 1737, the water lots at 175 Water Street had been granted by the city to a group of merchant land owners. The block to the west had already been filled, and another to the east would ultimately be created. By 1754, after building wharves and piers that supported warehouses and other structures on the west side of the block, several of the grantees had cooperatively incorporated a derelict ship into a pier and bulkhead system that defined the block's eastern boundary. This maneuver is graphically illustrated by the ship's position across five separately owned lots. Once the block was defined, artifact analysis indicated that as many as forty years elapsed before filling was finally completed (see Friedlander 1983 and Geismar 1983:672-712 for details of the site history and landfill, respectively).

During the winter of 1981-1982, landfill on the block was sampled in various ways; one method employed a backhoe to dig deeptests

to river bottom and included collecting 40 gallon samples at one-foot intervals. This was a method used at other fill sites (e.g., Rockman et al. 1983) and was the procedure planned for sampling fill at Site 1 of the Washington Street Urban Renewal Area.

As expected, analysis indicated that the block's fill was mainly composed of household and commercial trash, but major components also included shoe and scrap leather and oyster and clam shell--all typical of port fill (Geismar 1983:679-680). Surprisingly, seeds and pits found in other fill samples from the block were a negligible component of fill from the deeptests. In addition to fragmentary ceramic and bone material from these tests, a cache of uncut but butchered animal bones and another of nearly whole ceramics were noted but not sampled in the fill surrounding the ship (Geismar 1983:692). These were interpreted as trash from butchers' stalls located at the nearby Fly Market and perhaps the breakage from neighboring ceramic stores or shops. In general, the fill matrix was similar to that of other east side fill sites, such as the basically contemporaneous Telco block just to the north (Rockman et al. 1983).

At Site 1 of the Washington Street Urban Renewal Area, research and testing of the landfill, combined with testing for remnants of an early-nineteenth-century foundry, focused on the north and south sides of Beach Street between Washington and West Streets. As mentioned above, fill samples were to have been collected at one-foot intervals from backhoe-dug deeptests taken to river bottom. On the south side of the street, this procedure was followed. On the north side, however, a planned deeptest was contaminated by raw sewage, precluding sampling (see Chapter III, this report). Instead, one-foot interval samples were recovered from what had been a shallow backhoe test trench extended to provide a fill sample (unfortunately, limitations of the backhoe precluded sampling to river bottom and sampling was less controlled than desired).

As documented in Chapter II of this report, Beach Street separates two consecutively filled water lots. The first fill episode defining the street apparently occurred around 1797 on the south side between high and low water. By 1801, this water lot must have been filled since it was then rented to a Nicholas J. Roosevelt who operated a sawmill on the site. However, the Rhinelanders, a family of wealthy merchants who were the lot's grantees, had never paid for this grant; in 1807, they successfully petitioned the city to reissue it and to rent them the rights to adjacent land under water extending 190 to 200 feet into the Hudson River. Tax records suggest this new water lot, which defined the south side of Beach Street between Washington and West Streets, was filled by about 1810 (see Table 2).

The water lot on the north side of the street was not granted until 1809; filling was probably completed by 1817 when the entire southern half of the block between Washington and West

Streets, the water lot granted to John Ogden and William Murray, was acquired by a New York bank at a forfeiture sale (see Table 1). It should be noted that both water lot grants discussed here were filled at a time of commercial turbulance, the period that spanned the British embargoes and the War of 1812.

3. Artifactual Data and Dating

As noted previously, artifactual material from the deeptest (DT 3) and extended test trench (C1E and C1W), was noticeably sparse. This is particularly true when compared with the amount of material recovered from two deeptests (F55 and F56) excavated from 175 Water Street (Table 4). Moreover, no datable glass, an important component of the 175 Water Street material and a major dating tool for nineteenth-century sites, was recovered from the west side fill sample. However, based on 82 datable ceramic sherds (72 percent of the ceramics recovered from the tests), the samples tend to support the early-nineteenth-century filling date documented in the historic record (see Tables 1 and 2).

Table 4. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA: Selected Site Artifact Totals from Fill Compared with 175 Water St. Samples (Ceramics, Glass, Leather, Flora, Fauna)

Site	Feature	Total Number of Artifacts
175 Water Street	F55	2,400
	F56	2,396
	Total	4,796
Site 1, Washington St. Urban Renewal Area	Trench C1 (C1E/C1W)*	237
	DT3	350
	Total	587

*Sampling from this test was not as controlled or as comprehensive as DT3. Note: based on Appendix C, Tables 3 and 4.

This ceramic dating is based on the fragmentary sherd material typical of fill. Despite this, the analysis provided some subtle differences in dating that support the historic data.

Ceramic terminus post quem dates (derived from the date an article was first manufactured, and therefore the date after which it was deposited) indicate that both tested areas were filled after 1800 (Table 5). This date coincides well with documentation indicating that the lots on the south and north sides of Beach Street were filled after 1807 and 1809, respectively. Even more specifically, the difference in mean ceramic dates (based on the mid-point of a ceramic's period of manufacture)

suggests that the south side of the street, with a mean ceramic date of 1783, was filled earlier than the north side, with a mean ceramic date of 1795. While mean ceramic dates are less conclusive than terminus post quem dates, this relative dating again agrees with historical data.

Table 5. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA: Mean Ceramic Dates (MCD) and Ceramic Terminus Post Quem (CTPQ) from Fill on the South and North Side of Beach Street.

Area	Unit	MCD	CTPQ	Datable Sherds
B, S. side of Beach St.	DT3	1783*	1800*	38
C, N. side of Beach St.	Tr.C1	1795	1800	32

*This date does not include a post-1840 sherd recovered from the deepest level which undoubtedly represents contamination from the surface.

Faunal and floral material from these tests support the hypothesis that the fill matrix on both blocks did not represent household discard. Floral analysis indicated that the fill matrix represents a meadow-type deposit rather than domestic rubbish--which would have produced seeds and pits of common edible nuts, fruits, and vegetables (see Flotation Analysis, Appendix D, this report; the general artifact catalogue lists only one unidentified nut shell from the fill [Unit C1W Level 2]). In addition, two argillite flakes of Native American manufacture (Area C, DT 3, levels 2 and 5) suggest that at least some fill may have come from land leveling, perhaps from grading a ridge that apparently once stood in the vicinity of Washington Street in the site area (Hills 1782; Figure 29 this report).

While the fill matrix does not appear to represent household trash, faunal analysis indicated that butchers' waste was present in samples from both sides of the street. On the south side (DT3), this was suggested by a profusion of sheep and goat foot parts that showed evidence of butchering; on the north side (Tr. C1 [C1E and C1W]), a similar waste was found, but this time in the form of cattle mandibles and crania. Both deposits may represent single dumping episodes (see Faunal Analysis, Appendix E, this report), as noted previously, perhaps from butchers' stalls at the nearby Duane Street market.

In order to further determine the nature of the fill matrix, an analysis based on South Carolina's Artifact Pattern Model was undertaken. A similar analysis had proved helpful in determining the types of deposits represented at 175 Water Street and had

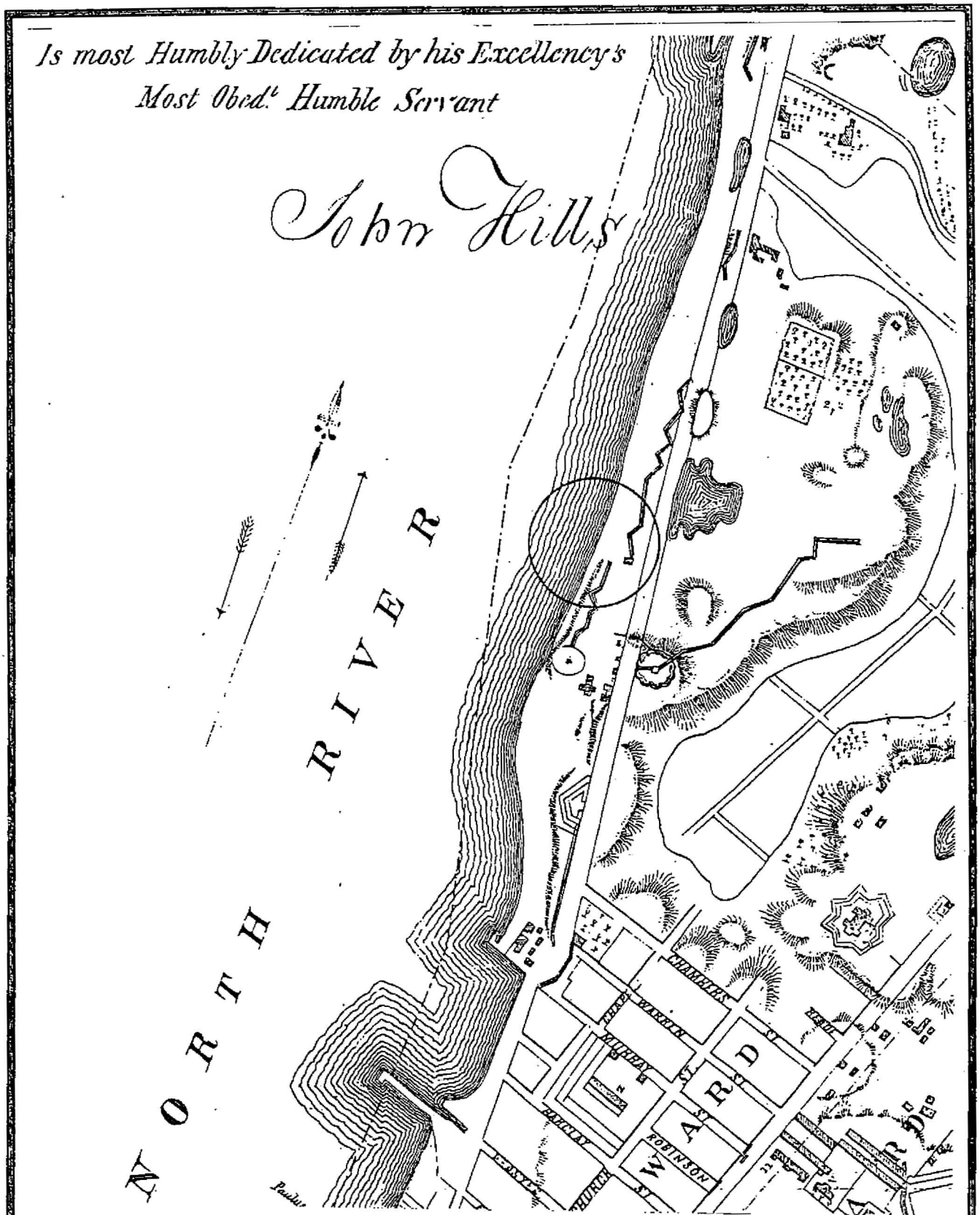


FIGURE 29: Site 1, Washington St. Urban Renewal Area.
Detail of 1782 plan of New York City (Hills 1783). Approximate site area is circled. Note ridge indicated in area of North Moore to Hubert Streets in what would become the vicinity of Washington Street (Valentine's Manual 1857). NOTE: No scale given.

indicated that the land fill basically was composed of domestic debris (Geismar 1983:717-720).

Since South's model was derived from eighteenth-century sites, some variation was introduced in the 175 Water Street analysis to allow for a later, more diverse data base (Geismar 1983:717). As had been the case with the 175 Water Street material, selected artifacts from landfill sampled from Site 1 of the Washington Street Urban Renewal Area were counted in fragments and assigned to artifact groups comparable to South's six categories, but with some variation. For example, while South had considered ball, or kaolin, pipes a separate category, all smoking pipes in the sample were considered in the activity group. The paucity of artifactual material is highlighted by the small assortment of artifacts available for this analysis.

The classifications included a Kitchen Group (here, ceramics were the only variable), an Architectural Group (nails, mortar, plaster, brick [when counts were available], tar paper, asphalt, and flat glass), a Personal Group (comprising only buttons and shoe leather), and an Activity Group (only smoking pipes). Following South's categories, a Furniture Group (hardware) and an Arms Group (gun spalls, gunflints, and musketballs) were also intended to be included, but no relevant artifacts were recovered from the samples and these categories were eliminated (Table 6).

Table 6. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA: Carolina Artifact Patterning Analysis with Variation* (# & %)

Unit	Activity	Kitchen	Personal	Architectural	Totals
DT3	**	51 (24.3) L	1 (0.5) L	158 (75.2) H	210 (100.0)
Tr.C1	4(2.5) L	46 (28.8) L	29 (18.1) H	81 (50.6) H	160 (100.0)

L = lower range, H = higher range than South's model
* based on South 1977:103
** Two kaolin pipe stem fragments noted in the field but unlisted in the artifact catalogue are not included here. However, at 0.9% of the assemblage, they would not change the analysis.

While a similar analysis (with many more artifact types in each group) had indicated a domestic trash matrix for the fill from the 175 Water Street block, this was not indicated for the fill on either side of Beach Street. Here, none of the artifact percentages complied with South's model for such a classification (see Table 6). Moreover, as noted above, several groups were

entirely absent, and while the fill from the north side of Beach Street fit four of the six categories, on the south side there were only three. In terms of deposit type, the high percentage of architectural material in both tests is most like a commercial deposit (F2) from 175 Water Street.

Based on the artifact assemblage, it appears that fill from both sides of Beach Street was relatively clean and not typical of domestic trash deposits or harbor fill, particularly when compared with the fill from 175 Water Street. However, the slightly later, more organic fill from the north side of Beach Street, with shoe leather and kaolin pipes as part of its assemblage, appears more similar to fill from 175 Water Street than does the sample from the south side of the street.

4. Landfill-Retaining Features

Although an attempt was made during testing to uncover the fill-retaining constructions usually associated with land reclamation, as noted earlier, none were located. For this reason, the monitoring program described in Chapter IV was undertaken during foundation excavations with the cooperation of all involved parties. This procedure, used to augment the findings of controlled excavations, was not only fruitful at the Barclays Bank Site at 100 Water Street (Klein 1985:personal communication), it is an exercise that has been used successfully by London's urban archaeologists investigating city harbor sites (e.g., Bateman and Milne 1983:207-208). At Site 1 of the Washington Street Urban Renewal Area, monitoring provided valuable information about wharves or piers constructed prior to filling in Area C (Block 216W), the location of these foundation excavations.

Information from research, testing, and monitoring suggests that landfill-retaining features--bulkhead, cribbing, or perhaps even a recycled ship used to hold the landfill in place--are located west of the site area. Conceivably, they would be found under West Street, a thoroughfare that could not have existed until the water lot grants between North Moore and Hubert Street were issued and the filling begun (the first West Street reference found to date in the site area occurs in the Fifth Ward Tax Records for 1821).

During monitoring, a wharf or pier was exposed that ran perpendicularly, to the former shore, approximately midway between Beach and Hubert Streets (see Figure 20); its placement suggests that it separated water lots belonging to Joseph Newton to the north and William Ogden and John R. Murray to the south (see Figure 4). While this is the only in situ construction exposed during monitoring, notched logs that originally may have come from similar constructions were observed and recorded (see Chapter IV).

The constructions observed or implied during the monitoring phase were a type of "cobb" wharf found at east side fill sites (see

Chapter IV) and are log cribs filled with earth and cobbles or other stones (see Plate 22). Wharfing of this type has been observed in at least two forms, either as a series of consecutive cribs (see Plate 23) or as separated blocks spanned by a "bridge", or plank, pier. In describing this latter kind of wharf, Stokes notes that "blocks" referred to in the Minutes of the Common Council appear "to have been similar to cofferdams, or frameworks of logs, sunk with stones and connected by bridges, thus forming wharves and piers" (Stokes V 1926:1288). Since evidence of the wharf or pier exposed in monitoring was segmented, its exact configuration remains unknown. However, conceivably it was similar to the block and bridge pier at the foot of Hubert Street depicted in mid-nineteenth-century print (see Plates 5 and 32).

The rationale for this kind of construction perhaps may be linked, as is cleaner fill, to considerations of health and cleanliness. This is indicated in a proposal to run streets along the East and Hudson Rivers (South and West Streets, respectively) in 1798. To create piers from these streets, "bridges" were to be built to admit "the currents at both Ebb and Flood in both Rivers to wash away all dirt and filth from the Wha[r]ves and thereby render the health of the Inhabitants of the City more and secure" (MCC 1917 II:420-421 quoted in Stokes V 1926:1349). It is also likely, however, that holding silting to a minimum went beyond concerns of health to those of trade: with docking areas free of sediment, they were available for shipping. It also would have decreased the need for dredging, a costly undertaking. Moreover, block and bridge constructions are found or suggested at sites that predate the introduction of municipal controls meant to maintain a healthy population (see Table 3); it appears that references to health in this instance may be an attempt to make an economic proposal attractive to a city that had become more health-conscious.

An example of a small bulkhead complex tied to a log crib section observed during monitoring (see Chapter IV, Figure 23) is the only evidence for landfill structuring recorded to date at the site. Since this relatively flimsy complex apparently served to structure landfill just north and west of what may be a single crib or block, it further suggests a block and bridge construction for this wharf or pier.

At east side fill sites, it was found that wharves and piers ultimately functioned in the filling process: the more solid constructions became foundations for later buildings while the entire system of piers and wharves created traps for sediment, ultimately hastening landmaking. Consequently, when they were active docking areas, dredging was often required to keep slips navigable. Once filling was initiated natural shoaling material and harbor fill--the street runoff, dumped waste, and debris from industries such as shoemaking, leather processing, or oystering as well as cast-off ships' ballast or damaged and

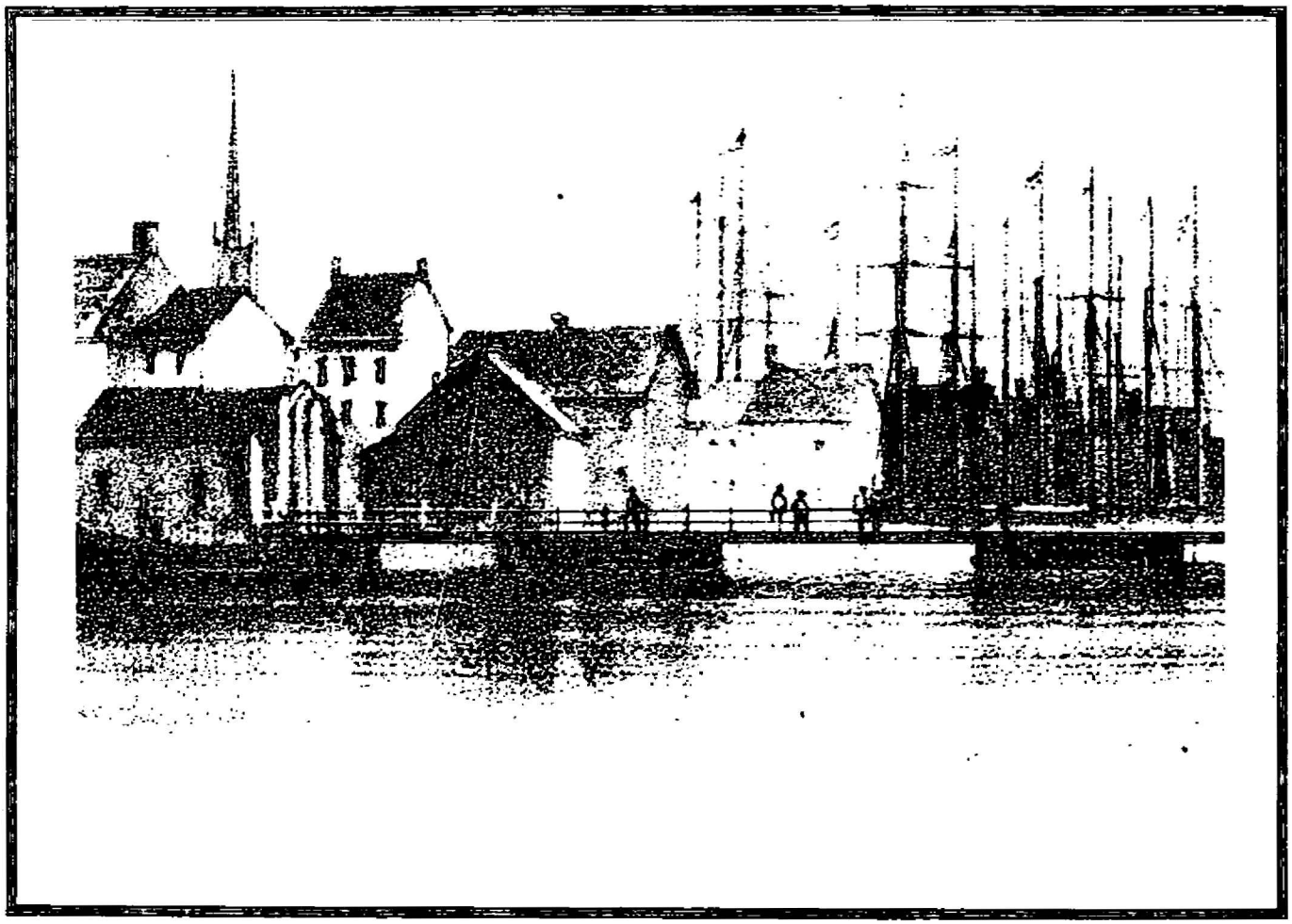


PLATE 32:
DETAIL OF PLATE 5 CLEARLY SHOWING LOG CRIBS OF BLOCK AND BRIDGE PIER AT FOOT OF HUBERT ST. (VALENTINE 1859). THIS MID–NINETEENTH CENTURY RENDERING DEPICTS A PIER CONSTRUCTION SUGGESTED BY SITE MONITORING (Photo, J. Geismar).

discarded merchandise--would often be allowed to accrue, becoming a component of landfill (Geismar 1983:679). However, the samples from Area B of Site 1 of the Washington Street Urban Renewal Area did not reveal organic harbor fill, and even in Area C, where a more organic fill was recovered, they were not comparable to 175 Water Street deposits, suggesting that conditions were somewhat different.

The history of the Hudson River port area differs from that documented on the East Side: development was later and shorefront activity was apparently less frenetic (see Chapter II, this report). Port records document that it was under utilized (Albion 1939:221-223), and slips, ubiquitous along the east side, are not indicated in the project area. However, this may be because docks and piers were considered more efficient by the early-nineteenth century (Kardas and Larabee 1980:17). Or it may be that heavy silting in the Hudson prevented slips from being viable waterfront features. For example, while modern records as well as those from 1856 indicate that silting in the East River occurs at a rate of approximately 2 feet per year (Geismar 1983:677-679), a source at Great Lakes Dredging & Dock Co. revealed that sedimentation in the Hudson has been recorded at approximately 5 to 10 feet annually over the last ten years.

Apparently, the Hudson's piers remained relatively unimportant in terms of commerce at least through the 1830s, but this would change when sailing ships were replaced by commercial steamers decades after the city's western shore had been filled. At least one reason for its ultimate development was the maneuverable space it afforded the larger steam vessels developed in the 1840s.

Since little evidence for typical harbor fill is found in the site's fill samples, it is interesting to note that silting in the slower-flowing Hudson actually would have required more dredging to keep dockage open than it did along the East River (Braynard 1986:personal communication; also, see above). However, rather than the harbor fill of an active seaport, the silt material would undoubtedly be mixed with glacial material washed from the shore; this may account for some of the deposits recorded in DT3 (see Chapter III).

It appears that both natural conditions in the Hudson and its pier and wharf development would create a very different sedimentary situation than that found in the East River. Moreover, the major landfill-retaining constructions that contain this sediment and fill undoubtedly lie beneath West Street and remain an unknown.

5. Synthesis

As demonstrated above, historic documentation combined with subsequent artifact analysis indicates that filling these west side

blocks was certainly faster than filling 175 Water Street. While the former apparently were filled in three to eight years, the latter may have taken as many as forty years for the fill maneuver to be basically completed (this does not include secondary filling to raise depressed fill deposits). Moreover, the fill from Site 1 of the Washington Street Urban Renewal Area was cleaner. But did this fill and the landfill process in general reflect a growing awareness of the need for sanitary conditions and the laws imposed to achieve them?

Comparison of the fill from 175 Water Street and Site 1 of the Washington Street Urban Renewal Area indicates that both contained variable and random amounts of trash (Table 4 and Figure 30); but while variation is the norm, the amount of debris is very different. For example, there were over eight times as many selected artifacts from the two 175 Water Street deeptests as there were from the west side deeptest or test trench (see Table 4; as noted earlier, however, test Trench C1 [C1E and C1W] was not fully comparable to the deeptest samples). This discrepancy in artifact density exists even though, on a level by level basis, the sample from Site 1 of the Washington Street Urban Renewal Area was actually larger than from 175 Water Street (average level samples comprised 39 gallons from the former site and 35 from the latter [see Geismar in Press for greater detail]). Moreover, fill from the south side of Beach Street, the earlier of the two fill components, lacked the shoe leather and organic matrix ubiquitous on east side sites. This might reflect the presence of tanneries and a shoemaking district on the east side, but port fill throughout the world has been found to contain this material (e.g. Baart et al. 1977), and fill from the north side of Beach Street, the somewhat later fill sample, did include a small quantity of shoe leather. Here, the soil matrix was somewhat more organic than in the earlier fill.

It appears from this analysis that markedly cleaner fill, although not "clean and wholesome sand," was indeed used when the municipality first introduced its controls at the end of the eighteenth century and the beginning of the nineteenth (as just noted, when treated in its entirety, the sample of mid-to late-eighteenth-century fill from 175 Water Street considered here contained over 800% more artifactual material than the early-nineteenth-century fill from the project site). However, laxity in enforcing these controls may have occurred with the temporary disappearance of Yellow Fever from the city. Or perhaps ever-rapidly growing populations and concomitant responsibililities made them increasingly difficult to implement or enforce.

Whatever the reason, archaeology suggests that trash may have been controlled but not eliminated as an element of fill; in addition, it appears that after an attempt was made to utilize a somewhat cleaner fill in the first years of the nineteenth-century, a reversion to a more trash-laden base occurred. In support of this hypothesis, documentation indicates that after a

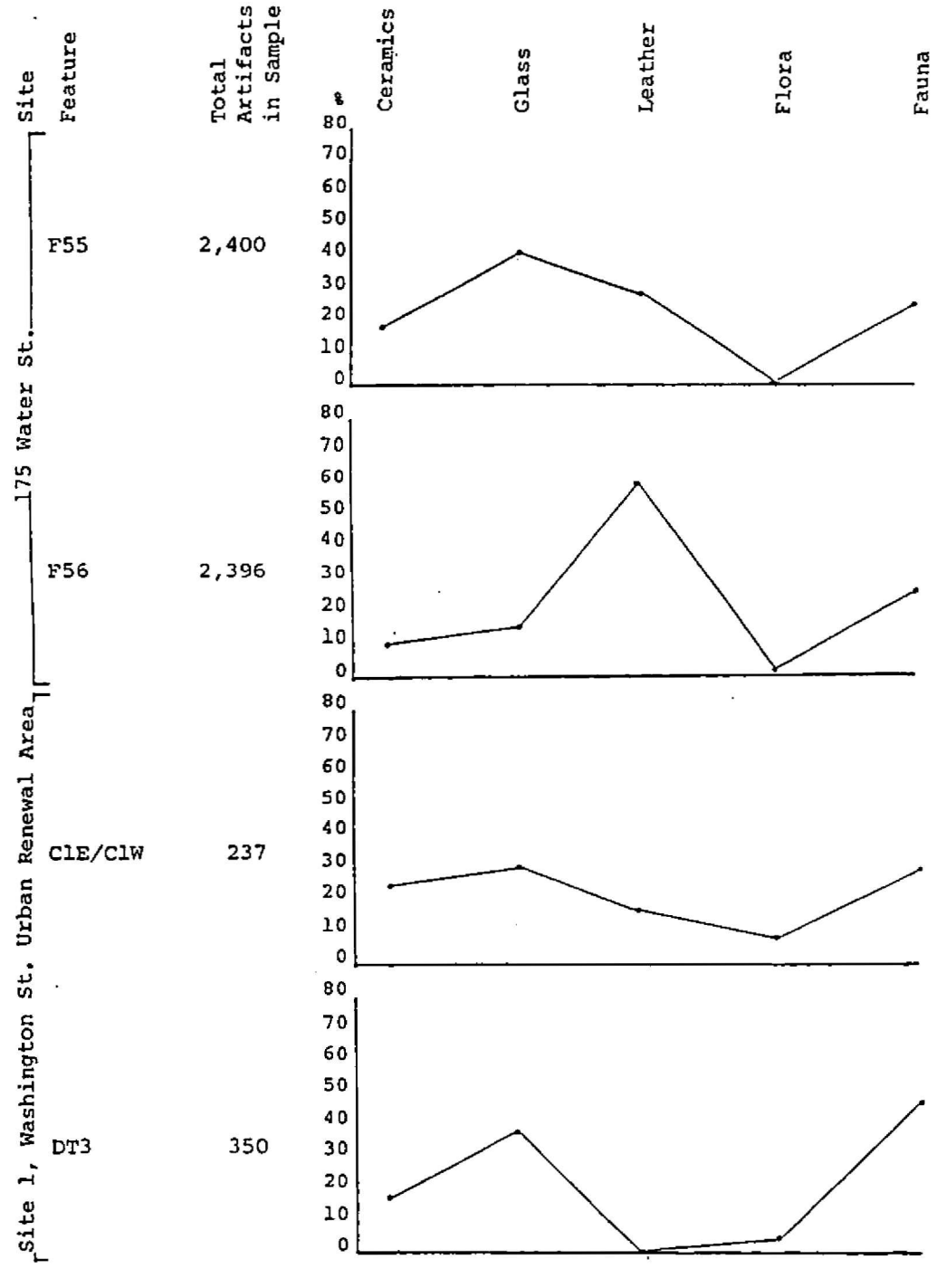


FIGURE 30:
Site 1, Washington St. Urban Renewal Area.
Comparison of Selected Fill Artifacts with 175 Water St. Sample
(based on Appendix C, Tables 3 and 4).

period of relative cleanliness, the city again became dirtier in the third decade of the nineteenth century (Duffy 1968:213). This suggests that lots filled after the two blocks in the project area had been reclaimed from the Hudson may be yet again more trash-laden. In the site area, the matrix of the later fill might also reflect increasing harbor activity, but this remains speculative.

It may be that piers and wharves that ultimately became landfill-structuring features on the site may be more lightly made than those found on the east side. This may reflect an adaptation to the silting situation in the Hudson as well as the pattern of its shore development. Moreover,. the block and bridge construction suggested for the site's observed wharf or pier components may indicate yet another attempt to keep the port area relatively clean; but, since this kind of construction is also found on sites filled before health was a municipal concern, its form may have functioned mainly to keep the docking areas as sediment-free as possible. Yet again, it may reflect an adaptation to a diminishing wood supply and the use of a less wood-intensive harbor construction.

While recordation of landfill-retaining features was a goal of this investigation, only one example was exposed. A complex of horizontal planking tied to a log crib and a wooden, box-like construction observed in monitoring may have been intended to structure landfill between and beyond a log crib section in Area C. The need for this construction tends to confirm the block and bridge configuration of the wharf or pier that was only observed in segments.

C. THE WEST POINT FOUNDRY

The West Point Foundry Association in New York City, where the first American-made locomotive was assembled in 1830, leased two locations in the project area (see Chapter II and Table 1). Occupation of the northeast corner of Beach and West Streets (see Plate 7) is documented for at least sixteen years (see Table 1); however, structural and artifactual evidence for this corner occupation subsequently has been destroyed (see Chapter III).

In 1839 or 1840, the foundry apparently moved to a mid-block location on the north side of Beach Street, and its former premises were occupied by yet another foundry. Sometime after 1860, the foundry shops were replaced by larger buildings, and, at the turn of the century, these made way for a four-story, fireproof warehouse. This building stood on the site until it was demolished in 1968. While the original foundry buildings and associated deposits are gone, remnants of the operation are preserved on the south side of Beach Street where a foundry yard was maintained; evidence for this part of the complex was recovered during testing.

Documentation indicates that the New York shops served as an office and branch of the main upriver operation at Cold Spring, across the Hudson from West Point. In addition to producing small engines, research revealed that this location served as a transshipment center for goods cast and produced at the Cold Spring and sent to New York on the company's fleet of ships (see Chapter II).

A reference to an earlier foundry that may have occupied the northeast corner of Beach and West Streets (see Table 1) suggests the West Point Foundry was not the first such operation at this location. Nor was it the only foundry involved in receiving and assembling locomotives from England as early as 1829 (e.g., Stokes V 1926:1685). However, in 1830 it was one of America's largest stationary steam engine manufacturers (White 1982:103) and the first foundry to produce an American-made locomotive for commercial use.

Called The Best Friend, its components were fabricated at Cold Spring and assembled at the Beach Street shops. In addition, it is more than likely that its engine was made in New York. With the production of this locomotive, the West Point Foundry Association came to the forefront of what was to become an important American industry.

During five years of locomotive manufacture, The Brother Jonathan (or the Experiment), which was produced in 1832 and incorporated a four-wheel leading truck, was its only innovative design (White 1968:33; 1982:103). Three years later, with a total output of only eleven locomotives, this phase of the foundry's production ended (White 1982:102-103).

By 1839 or 1840, the foundry operation was consolidated at Cold Spring. However, it appears that an office and perhaps another foundry complex continued to function on Beach Street just east of its original corner location on a lot owned by William Kemble, the company's part owner and New York manager (Liber 168:368-371; see also Chapter II, this report). By this time, however, a foundry operation was no longer unique in New York City or in the project area.

1. Structural and Artifactual Evidence for the West Point Foundry in New York City

Although the foundry shops may have moved from their original location by 1840, the yard on the south side of Beach Street evidently continued functioning until the early 1850s (see Chapter II). Testing on this side of the street exposed two stone wall segments that apparently mark earlier property lines located approximately 2 1/2 feet east of their current position (Chapter III, this report). These appear to be remnants of the West Point Foundry yard documented at this location from approximately 1824 to 1850 (see Table 2). Ultimately, this yard became Lot 15 of

Block 186W, and its original eastern boundry was incorporated into Lot 18 immediately to the east.

During field testing, a pervasive layer of oxidized soil above the landfill and below brick rubble suggested a foundry operation. The rubble was apparently demolition debris from a mid-nineteenth-century foundry building, the lot's occupant until it was demolished to make way in 1883 for an apartment building (a five-story structure with ten "French Flats"). In addition, an unidentified ash and sand-filled brick feature (F5) found beneath the flagstone pavement in the southeast corner of this yard may have served a foundry function; it appears likely that it was used in a fuel-burning process associated either with metal rendering or, perhaps even more likely, metal working. Its location coincides with a brick outbuilding documented on an 1853 atlas (see Chapter II), but ceramic dates from undisturbed strata (see below) suggest it initially may have been part of the West Point Foundry complex.

While this feature and the oxidized soil throughout the yard suggest a foundry function, conclusive artifactual evidence is practically nil. Except for melted glass in the brick feature and slag in many of the yard's deposits, no foundry-related artifacts were recovered from either the site of the shops in Area C or the yard in Area B. However, as noted in the Field Report (Chapter III), limestone sand found in association with the western stone wall mentioned above (F11) conceivably may have been a component of an iron purifying process.

A tantalizing bit of evidence was accidentally recovered while clearing the concrete basement floor of the demolished late-nineteenth-century apartment house, the last building to occupy the lot: a wrench-like tool, identified as an iron working implement by iron-workers in a shop on Washington Street, was found beneath modern demolition rubble, but its relation to any foundry operation on the site remains speculative.

2. Artifactual Data and Dating

Fifty-seven ceramic sherds were available to date the four features possibly associated with the West Point Foundry yard or the later, unidentified foundry building (as was the case with the fill samples, no datable glass was recovered). Based on this small assemblage, a relative dating sequence was established as was an indication of the time periods involved.

Included in dating were the two stone wall segments (F11 and F9), the unidentified brick feature in the southeast corner of Lot 15 (F5), and a builders' trench (F14) for what appears to be the remnant of the rear brick wall of the mid-nineteenth-century foundry structure, all of them discussed above (Dating information will be found in Table 7).

Table 7. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA: Ceramic Dating for Selected Features in Lots 15 and 18, Area B.

7A

Feature Number	Feature Description	MCD	CTPQ	Datable Sherds
F9	eastern stone wall segment, (Lot 18)	1791	1780	7
F11	western stone wall segment, (Lot 15)	1778	1780	7
F4	brick dry-well, SE yard corner	1852	1820	7

7B

Feature Number	Feature Description	Stratum/ Level	MCD	CTPQ	Datable Sherds
F5	Unid. brick feature, SE corner, Lot 15 (EUI, ext).	I/1	1870	1886	2
		II/1	1847	1820	3
	(same as above)	I/1	1925	1900	1
	(EU3)	II/1	1925	1900	1
	Total Disturbed Strata		1892	1900	7
	(same as above) (EU3)	III/1	1812	1820	9
		IV/1	1813	1790	2
	Total Undisturbed Strata		1813	1820	11
	Total Feature		1853	1900	18

7C

Feature Number	Feature Description	Stratum/ Level	MCD	CTPQ	Datable Sherds
F14	builders/ trench associated with mid-19th C. brick wall (Tr.E)	I/1W	1805	1780	4
		II/1W	1804	1780	4
		I/1E	1792	1795	6
	(same as above)	IV/1	1835	1820	2
	(EU6)	V/1	1810	1780	2
	Total Feature		1809	1820	18

MCD = mean Ceramic date; CTPQ = ceramic terminus post quem

The dates associated with both stone wall segments fall into pre-nineteenth-century categories and appear to represent redeposited landfill (landfill dug and moved to another location). The mean ceramic dates for F11 (1778) and F9 (1791) and, to a greater degree, the ceramic terminus post quem for both (1780) tend to support their basic contemporaneity. Dating for the unidentified brick feature (F5) entailed a more complex analysis.

Based on the means ceramic date for the entire feature deposit (1853), it would appear to be contemporaneous with the dry-well (F4) next to it (MCD 1852), but this is refuted by the ceramic terminus post quem of 1900 for the unidentified brick feature (see Table 7B). This discrepancy is apparently the result of the disturbance and contamination of several strata located under a displaced flagstone. When these strata are eliminated from the analysis, the MCD for the deposit in F5 becomes 1813 and the CTPQ 1820.

It appears, then, that the unidentified brick feature (F5) predates construction of the dry-well (F4). This is also indicated by damage done to F5 when a drainpipe to the dry-well was installed (see Chapter III and Figure 14). However, the early dates from undisturbed strata go beyond this to suggest that F5 not only was built before F4, but it also may be associated with the West Point Foundry's operations.

The ceramic dating (Table 7C) for the builders' trench (F14) associated with the brick wall remnant (F15) at the rear of the yard also suggests it contained redeposited landfill. In the field, differences between superimposed trench strata were interpreted as two separate builders' trenches, the lower associated with an earlier stone wall (perhaps the rear stone foundry wall) and the upper with the later, mid-ninteenth-century brick wall (see Chapter III). However, ceramic dating, which indicates variation among the strata (see Table 7C), is not conclusive.

The ceramic dating for features that might be related to the foundry operation again provides a relative dating sequence that reflects the site's building history. The stone walls of the foundry yard were apparently early constructions in what became Lots 15 and 18, but the brick feature associated with a metal-working process may have been installed at the same time.

3. Synthesis

Historic and archaeological data suggest a developmental sequence for the site blocks that precludes finding structures or artifacts related to the West Point Foundry shops. However, evidence for a foundry yard located on the south side of Beach Street was better preserved. Here, remnants of the yard's east and west walls, probably dating to about 1824, were found as was a brick feature that ceramic dating suggests may have been constructed at the same time. From the presence of melted glass and the ash

deposit within it, and oxidized soil on and around it, this feature appears to have functioned in a metal-rendering or metal-working process.

Building records for the northwest corner of Beach and West Streets indicate that a four-story, basemented structure supported by cast-iron columns and massive brick foundations was constructed on this site at the turn of the century. Since the foundry buildings once located here were only one and two-story structures (see Plates 6 and 7) presumably without basements, the likelihood of their preservation was negligible. This was confirmed by testing.

In constrast, construction in the southern portion of the foundry yard on the south side of Beach Street has been limited to relatively shallow, basically non-instrusive episodes--a condition conducive to site preservation. A flagstone pavement installed to create a backyard for the late-nineteenth-century building that stood on the site for 85 years sealed and preserved evidence of the lot's development. A shallow basement in an adjoining lot served the same function.

The historically documented construction sequence in these two lots (Lots 15 and 18)--a foundry yard in the third decade of the nineteenth century, a one-story building by 1854, demolition of this building by 1883 to make way for a five-story, ten-apartment "French Flat" with a flagstone-paved backyard, and, in 1891, the installation of a 56-foot high rear yard wall to block out the odor and noise of an adjoining stable (see Chapter II)--is archaeologically represented. The placement of the stone foundry walls indicates a shift in the block's lot lines much as the slope of the flagstone pavement and, to a greater degree, two late-nineteenth-century dry-wells suggest the need to control and channel water in a landfill environment.

While artifactual material identifying a foundry function was negligible, archaeological investigation of the foundry yard site did reveal its industrial nature. A paucity of domestic artifacts and a relative profusion of architectural materials attest to this. Slag in almost all the yard deposits and a widespread layer of oxidized soil, as well as a brick fire-containment feature, refine this assessment to suggest a possible foundry operation. Parenthetically, since no cisterns or privies were found in the backyard of the apartment house where testing occurred, it appears that piped-in water and sewage disposal were available to its late-nineteenth-century occupants. This is in contrast to a later introduction of these amenities to the port area across town on the east side (Geismar 1986). However, investigation of this issue is beyond the scope of this study.

D. SUMMARY

The investigation of Site 1 of the Washington Street Urban Renewal Area has provided archival documentation and, to a

limited degree, archaeological evidence of the historic West Point Foundry in New York City. It also indicated that the kind of activities occurring on a preserved site--if not a clear depiction of these activities--are discernible. In addition, it supplied unprecedented data on the method and process of early-nineteenth-century land reclamation and wharf building and on the fill situation on Manhattan's west side. Moreover, it demonstrated that the fill material itself reflects political, social, economic, and historical factors. It also illustrated the role that site formation and development plays in preserving earlier deposits and features. And, again, it demonstrated the efficacy of cooperative monitoring to augment controlled testing and excavation on a development site. But perhaps most importantly, through intensive archival research as well as field testing, excavation, and analysis, it provided yet another chapter in the continuum of New York City's urbanizing process.

BIBLIOGRAPHY

Albion, Robert G.
1939 The Rise of the New York Port 1815-1860. Charles Scribner's Sons, New York.

Alteration Plan (AP)
Archives, 31 Chambers Street, New York, New York.

Amendment to New Building Plans (ANBP),
Archives, 31 Chambers Street, New York, New York.

American Heritage Magazine
1984 August - September, 1984.

Anonymous
1973 The International Book on Wood. Simon & Schuster, New York.

Baart, Jan, Wiard Krook, Ab Lagerweig, Nina Ockers, Hans Van Regteren Altena, Turk Stam, Henk Stoepka, Gerald Stouthart, and Monika Van Der Zwan
1977 Opgravingen in Amsterdam. Fibula-Van Dishoeck, Haarlem.

Bateman, Nic and Gustav Milne
1983 A Roman Harbour in London; excavations and observations near Pudding Lane, City of London 1979-82. Reprinted from Britannia XIV:207-226 plus plates (archaeology of the City of London offprint 25, the Museum of London).

Baugher-Perlin, Sherene, Meta Janowitz, Marc Kodack, and Kate Morgan
1982 Towards an Archaeological Predictive Model for Manhattan: a pilot study. Ms. New York City Landmarks Preservation Commission.

Bayley, Richard
1799 Letters from the Health-Office. Submitted to the Common Council of the City of New York. John Furman, New York.

Braynard, Frank
1982, 1986 Personal communication. Curator, Museum of the Merchant Marine, Sands Point, New York.

Bromley, George W.
1899 Atlas of the City of New York. Vol. I. G.W. Bromley, New York.

Brouwer, Norman
1980 The ship in our cellar. Seaport Magazine 14(3):20-23.

Burgis View
1717 Detail from print in The Columbia Historical Portrait of New York, John A. Kouwenhoven:1953.

Cartwright, Frederick F.
1972 Disease and History. Thomas Y. Crowell, New York.

Ciancia, Andrew
1984 Personal communication. Senior project engineer, Woodward-Clyde Consultants, Inc., Wayne, New Jersey.

DeVoe, Thomas
1862 The Market Book. Privately printed. New York.

Duffy, John
1968 A History of Public Health in New York City 1625-1866. Vol. I. Russell Sage Foundation, New York.

Ewen, Daniel
1827-1830 Ewen Shore Maps, Volume 2 (Book 291). Hudson River from the Battery to North Fort (Hubert St.). Topographical Bureau, Borough President's Office, Municipal Building, New York.

Fifth Ward Tax Rolls (FWTR)
1808-1875 Archives. 31 Chambers Street, New York, New York.

Fisher, Charles E.
1940 The West Point Foundry. Bulletin 52, The Railway and Locomotive Historical Society, Inc.

Friedlander, Amy
1983 Historical research. In the archaeological investigation of the 175 Water Street Block, New York City. Joan H. Geismar, Principal Investigator. Ms. on file, New York City Landmarks Preservation Commission.

Geismar, Joan H.
1983 The Archaeological Investigation of the 175 Water Street Block, New York City. Ms. on file, New York City Landmarks Preservation Commission.

1985 Patterns of Development in the Late-eighteenth and Nineteenth-century American Seaport; a suggested model for recognizing increasing commercialism and urbanization. American Archeology 5(3):175-184.

in press Landfill and Health, a municipal concern. Northeast Historical Archaeology Vol. 15.

Gladstone, Bernard
1984 Water Seepage in the Basement. New York Times, July 29, 1984.

Grants of Land Under Water (GLUW)
Topographical Bureau, Borough President's Office, the Municipal Building, New York, New York.

Great Lakes Dredging & Dock Company
1986 Personal communication. Staten Island, New York.

Greene, Carlton
1917 Wharves and Piers. McGraw-Hill Book Co., Inc., New York.

Harris, Cyril H.
1975 Dictionary of Architecture and Construction. McGraw-Hill Book Co., New York.

Henn, Roselle, William Askins, Jed Levin and Robert Schuyler
N.D. The Water Street Site: Final report on 209 Water Street. Ms. on file, City University of New York.

Hergert, David
1985 Personal communication. Vice President of Production; Whitehead Brothers, Co., Foundry Equipment and Supplies Lessburg, New Jersey.

Hills, John
1783 A plan of the City of New York (Surveyed in 1782). In Manual of the City of New York, 1857, David Valentine, New York.

Historic Conservation & Interpretation
1983 Westside Highway Cultural Resource Survey: Archaeological Work Program: Cultural Resource Research.

Historic Perspectives
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 AKRF, Inc.

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.

Jones, Bernard E.
1980 The Complete Woodworker. 10 Speed Press, New York.

Kardas, Susan and Edward Larrabee
1980 Landmaking in Lower Manhattan. Seaport Magazine 14(3):15-19.

1979 Report on Excavation at Schermerhorn Row. Ms. on file, New York State Maritime Museum.

Klein, Terry and Jay Cohen
1985 Personal communication. Louis Berger & Associates, Inc., East Orange, New Jersey.

Kouwenhoven, John A.
1953 The Columbia Historical Portrait of New York. Doubleday & Co., Inc., Garden City, New York.

Lewis, A.W.
1966 A Glossary of Woodworking Terms. Blackie & Son, Ltd. London & Glasgow.

Libers
Department of Records and Information Services, 31 Chambers Street, New York, New York.

Liber of Wills
Surrogate's Court, 31 Chambers Street, New York, New York.

Louis Berger & Associates, Inc.
1984a. A proposal for an Archaeological Testing Program of Site 1 of the Washington Street Urban Renewal Area, New York, New York. Prepared for: New York City Public Development corporation. April, 1984.

1984b. The Barclay Bank Site, Archaeological Testing Program and Proposed Data Retrieval Program, Final. Prepared for London & Leeds Corporation.

McRaven, Charles
1978 Building the Hewn Log House. Thomas Y. Crowell, New York.

Matthew, David
1884 Drawing & Water Color, West Point Foundry, New York. Original, New York Historical Society. Reproduced by American Heritage Magazine, Aug. - Sept., 1984.

Minutes of the Common Council of the City of New York 1784-1831 (MCC).
1917 City of New York. New York, New York.

New Building Applications (NBA)
Archives, 31 Chamber Street, New York, New York.

New York Directories
New York Historical Society, New York, New York.

New York Times
1881 Wm. Kemble Obituary. November 8, 1881 (5:2).

Perris, William
1853 Maps of the City of New York. Vol. 3: Wm. Perris, New York.

1857 Maps of the City of New York. Vol. I. Third Edition. Perris & Browne, New York.

Prince, Carl
1986 Personal communication. Department of History, New York University.

Raoul, Margaret L.
1936 Gouverneur Kemble and the West Point Foundry. In Americana, American Historical Magazine, 30(3):461-473. The American Historical Society, New York.

Rhinelander Family File (RFF)
Ms. New York Historical Society, New York, New York.

Rockman, Diana, Wendy Harris, and Jed Levin
1983 The Archaeological Investigation of the Telco Block, South Street Historic District, New York, New York. Ms. on file, Soil Systems, Inc., Marietta, Georgia.

Rothschild, Nan A.
1986 Pesonal communication. Department of Anthropology. Barnard College, New York.

1982 PANYC Newsletter. 8:26.

Rutsch, Edward S., JoAnn Cotz, and Brian H. Morrell
1979 The West Point Site, Cold Spring, Putnam County, New York. Ms. Ralph Brill Associates, Cold Spring, NY

Schwind, Arlene Palmer
1984 The Ceramic Imports of Frederick Rhinelander, New York Loyalist merchant. Winterthur Portfolio 19 (1):21-36.

South, Stanley
1977 Historical Archeology, Academic Press, New York.

Still, Bayrd
1956 Mirror for Gotham. 1980 reprint. Greenwood Press, Westport, Connecticut.

Stokes, I.N. Phelps
1915-1928 The Iconography of Manhattan Island 1498-1909. Five Volumes. Robert H. Dodd, New York (Arno Press reprint, New York).

Strickland, William
1971 Journal of a Tour in the United States of America, 1794-1795. Edited by the Reverend J.E. Strickland. The New York Historical Society, New York.

Tre Tryckare Company
1976 Antique Locomotives. Dover Publications, Inc., New York.

Valentine, David T.
Manual of the Corporation of the City of New York. Edmund Jones & Co., New York (and various publishers).

Viele, Egbert
1874 Topographic Atlas of the City of New York. Map Division, New York Public Library.

West Point Foundry File (WPFF)
Ms. New York Historical Society, New York, New York.

White, John H.
1968 American Locomotives, an Engineering History, 1830-1880. John Hopkins Press, Baltimore.

1982 A Short History of American Locomotive Builders in the Steam Era. Bass, Inc., Washington, DC.

Wilson, James Grant
1892-1983 Memorial History of New YorK. New York History Co., New York.

1888 Appelton's Cyclopedia of American Biography. Vol. V. James Grant Wilson, Editor. D. Appleton & Co., John Fiske, New York.

Windwart, Heinreich
1877 Map of Trinity Church Property Between Fulton and Christopher Sts. Broadway and the Hudson River. Part two of three parts. Joseph Laing, New York.

Woodward-Clyde, Consultants, Inc.
1984 Boring Plan & Logs, the Shearson/American Express Service Center. Woodward-Clyde, Consultants, Inc., Wayne, New Jersey.

APPENDIX A

SUPPLEMENTARY DOCUMENTATION ON THE WEST POINT FOUNDRY

BY

MATT ROTH

APPENDIX A

ABSTRACT

Matthew Roth of Historic Resource Consultants consulted over the telephone with archaeologist Joan Geismar to derive the questions for the documentary research phase. Apparently very little physical evidence of early manufacturing was discovered in the archaeological fieldwork, and the research questions were accordingly limited to confirming the period of the site's use as a foundry, fabricating or machine shop. Prior research by Geismar and others, notably including the work of Historic Conservation and Interpretation of New Jersey, had identified the probable period of such use as ca. 1821-1835. (See Chapter II, this report, for detailed dating information).

The principal conclusion from the documentary research was that the Manhattan site was relatively insignificant in the firm's manufacturing operations. Correspondence (detailed below) discussing machinery orders indicated that the site was mainly a trans-shipment facility; in several cases castings from the upstate foundry were held only long enough to complete shipping arrangements, with no indication that any finishing or other work was preformed on them in Manhattan. There is an indirect reference that some finishing work was done in Manhattan in 1824. Only one certain reference was found to the Manhattan site's role in production.

CITATIONS

Roth visited the Eleutherian Mills Historical Library in Wilmington, Delaware, to examine the Kemble Papers. William Kemble, brother of the principal owner of West Point Foundry, was a sales agent for DuPont powder. He also sold substantial amounts of machinery to the DuPont powder works, and it is his discussions of these orders that make reference to the foundry operations. Kemble reported to the DuPonts no less frequently than three times a month in the period under consideration. Foundry and machinery matters typically appear in a sentence or short paragraph at the end of missives concerned mostly with powder orders.

All quotations were found in the Kemble Letters, Accession #500, Part I, Series B, box and folder number as noted below.

1. On the site's role as a warehouse/shipping facility:

Box 172
Folder 6
December 23, 1824:

"I shall order the wheels by this days mail and forward the letter on subject of Rollers."

Folder 7
March 23, 1825

"The Bed for the Sulphur mill is in Town and will be forwarded as soon as I can get a vessel to take it."

October 27, 1825:

"My brother who arrived from the foundry this morning tells me that the machinery for the Sulphur Mill will be completed on Saturday next. It will be sent to town immediately & forwarded by first opportunity."

Folder 9
April 25, 1827:

"The Bed was cast on Wednesday--is good and will be here tomorrow-- should I not be able to send it to Wilmington direct I will ship to Phila."

Box 173
Folder 12
May 13, 1830:

"I have rec'd Spur wheel M-13, which I shall forward to Phila. care of Mr. Smith."

June 8, 1830:

"The bed plate is I believe cast. . . .The wheel is I presume nearly fitted up. . . .I look for my brother tomorrow and will then give you further particulars." The use of "believe" and "presume", and the anticipated progress report from his brother suggests that William Kemble was far removed from the daily business of the foundry.

June 12, 1830:

"Your order for casting was <u>forwarded</u> on the 2^{d} Inst."
My emphasis.

Folder 13
August 15, 1831:

"The new mill will be finished this week and I am in hopes of inducing a vessel to go up with Coal so as to take it direct from the Works."

Box 174
Folder 15
July 22, 1833:

". . .hope to receive the wheel in the city by Thursday at furthest when it shall be forwarded by first packet."

2. On finishing work in Manhattan:

Only one letter made any suggestion that the Manhattan shop performed finishing work on machinery castings.

Box 171
Folder 5
October 2, 1823:

"The Brass Rollers have been put in hand and will be ready in abt. a fortnight."

3. On foundry and forge and work in Manhattan:

A single letter referred to the Manhattan facility as a foundry, and the only worker mentioned was a blacksmith. Clearly, some actual manufacturing was done in Manhattan, but the paucity of references to it in the letters may suggest that shopwork in Manhattan was of a very limited nature. Most of the DuPont work mentioned was for very large machinery castings, so it is also possible that the Manhattan shop worked on only much smaller castings and Kemble therefore had no reason to comment on foundry work in Manhattan in his correspondence with DuPont. The following passage also contains the only reference to blacksmith work, i.e., forging. Again, it is possible that the lack of mention of this work in other letters reflects the type of orders filled for DuPont and not the general operation of the Manhattan site. If forging was not performed on any powder-mill orders, Kemble would have had no reason to comment on the blacksmiths in discussion of those orders. The extremely limited data on what happened in the Manhattan shop makes these observations very tentative.

Box 173
Folder 14
August 4, 1832

In reference to the cholera epidemic: "At the foundry establishment in town we have lost five men, exclusive of the head blacksmith the other invalids have all recovered and [are] at work."

APPENDIX B

FOUNDRY PRODUCTION

BY

JANE CAROLAN

APPENDIX B

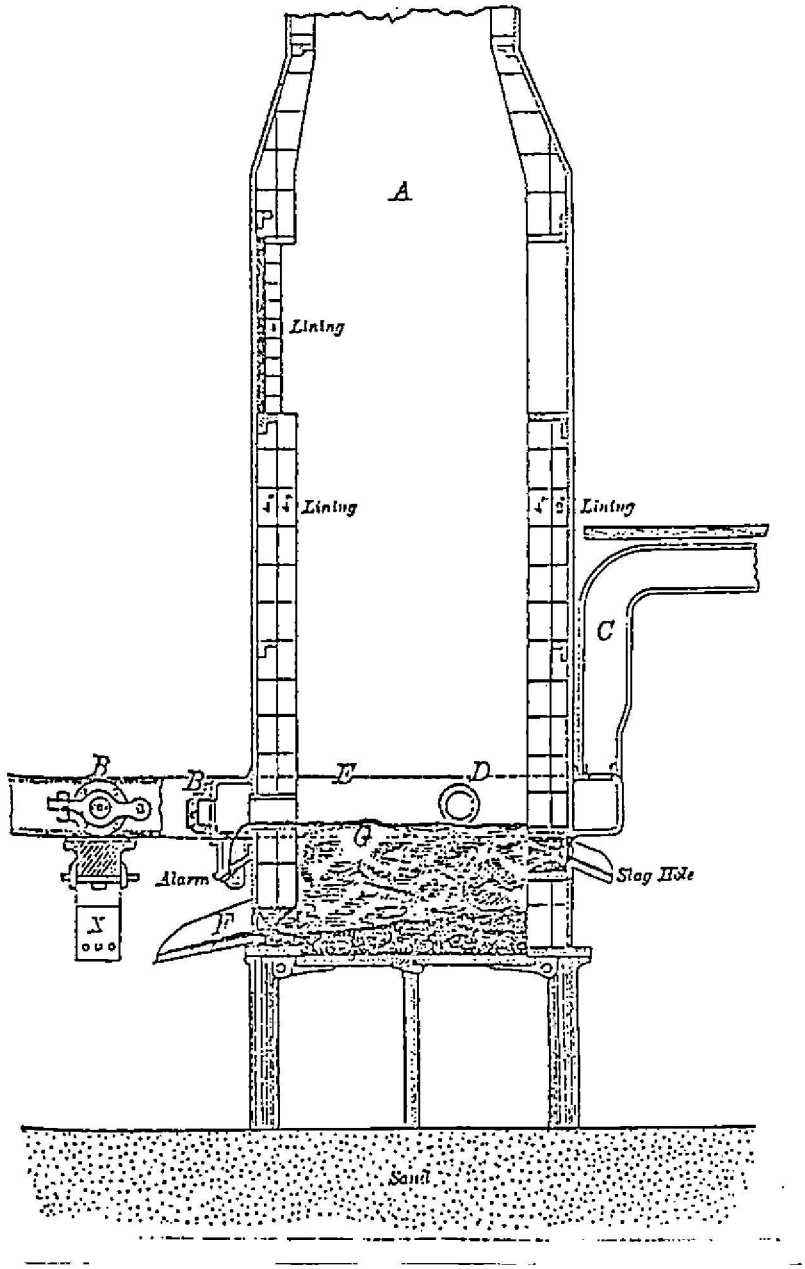
FOUNDRY PRODUCTION

Basic foundry technology has not varied greatly through the centuries. Every foundry, including the West Point Foundry will contain the same components: a furnace or cupola; wooden boxes filled with sand to contain molds; a pattern shop; brick drying ovens; metal ladles or crucibles for pouring molten metal; overhead metal or wood cranes with hoists and pulleys; forges, anvils, and sledgehammers and their mounts (hand and steam-powered depending on the period) and a great variety of hand tools. Raw materials include wood, sand, iron or brass, and a by-product is slag.

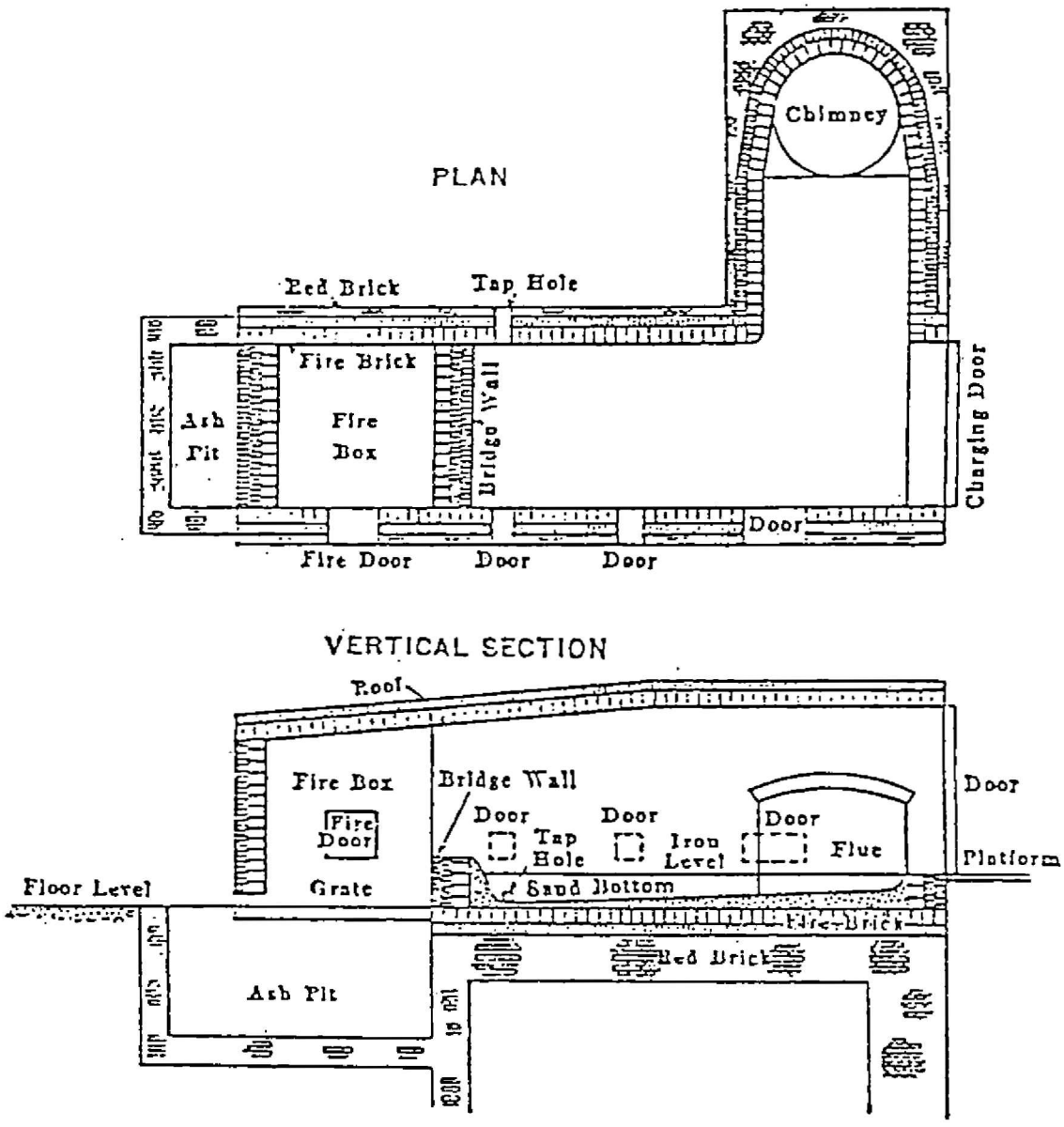
The basic iron-making process can be described as follows: Ore is transformed to useable iron ingots by smelting in a blast furnace. Early furnaces were usually "truncated pyramids of stone and brick" (Ransom 1966:7) built against a hill. Midway up, a bridge or loading platform was built, and from here alternate layers of fuel (charcoal and later coal), ore, and limestone were emptied into the open furnace stack. The interior of the furnace was lined with sandstone and slate, or later with firebrick. The blast, or forced stream of air, which was needed for combustion was supplied by a bellows often powered by water. Once the furnace was filled, it was ignited, and the ore gradually melted. The iron, denser than the ore, would run to the bottom, or hearth, of the furnace. The slag, which was waste material, floated on top of the molten iron and was drawn off through a cinder notch (Ransom 1966:10-11).

The molten iron ran out of the furnace into a trough in the ground and then was channeled into smaller troughs which were actually molds called "pigs." After the iron in the pigs cooled, it was reheated at a forge and pounded under a trip hammer to further reduce any impurities. The iron was again reheated, hammered, and finally shaped into bars or ingots (Ransom 1966:10-11). The ingots were than delivered to foundries and were again reheated and made into various iron products.

Manufacturing iron products involves a series of steps. The iron is reheated in a cupola or air furnace (Figure 1), both of which are melting furnaces. The cupola is usually constructed of brick and run by a steam engine (AFS 1965:16; Bale 1902:14). It is essentially a refractory-lined cavity with an opening at the top for expulsion of gases and for charging, or filling, the furnace with coke and iron. A bed of fuel is laid in the cupola and ignited, then alternating layers of metal and fuel are charged and the blast (of air) turned on (AFS 1965:2,16). At the bottom of the cupola is an opening for air blasts and for drawing off the molten iron and slag, which is the waste left after melting the ores. An air furnace, (Figure 2) also constructed of brick,



APPENDIX B, FIGURE 1:
Washington St. Urban Renewal Area.
Foundry cupola furnace in which the molten iron, G, is about ready to be poured. Iron flows through a hole in the cupola, triggering an alarm mechanism. The air blast apparatus, C, and holes for removing slag are also shown (West 1882:310 cited in Rutsch et al. 1979. Illustration and caption from Rutsch et al. 1979:213, Figure 84).



APPENDIX B, FIGURE 2:
Site 1, Washington St. Urban Renewal Area.
Air or reverberatory furnace for melting iron for casting. In this type of furnace, the iron ore and the fuel did not actually come into contact (Moldenke 1917: 414, Figure 38, cited in Rutsch et al. 1979:215, Figure 86).

differed from a cupola furnace by keeping the material to be heated out of direct contact with the fuel (Rutsch et al. 1979:272). The molten iron is then collected in a metal ladle or crucible, with a lip, for pouring. Overhead cranes, or gantrys, with pulleys and hoists supported on brick columns and later running on overhead steel beams, were used for moving the crucibles and other materials. After 1867 crucibles were geared for easier pouring (Sanders and Gould 1976:208). The molten metal was then poured into molds made from wooden patterns.

Most molds were and are made by placing silica sand (the preferred sand because it is nonfusible [Bale 1902:20]) over the pattern which makes a reverse image of what the final casting will look like. Once the mold is ready for use, it is placed in a wooden box in which sand, bonded together with water or clay, is then rammed or vibrated to keep the mold from moving. The molten iron is then poured in the mold (Sacks 1976:10,12). Traditionally, pourings were done one day a week. After the metal solidifies, the mold is removed, or broken away. The casting is then cooled in a brick cooling oven; then, the castings' surfaces are smoothed and cleaned with hand tools. The ovens vary in shape from round to rectangular to square depending on the type of foundry work and the size and shape of parts cast (Sacks 1976:14). The cast parts are then ready for shipping.

BUILDINGS AND SITE CONFIGURATION

A typical foundry was a complex of structures generally situated around an open yard. Fire considerations dictated brick structures for the furnace, pouring, and molding areas. Depending on the size of the foundry, there could be more than one cupola or air furnace, which would dictate the size of the structure they were housed in and the number of brick chimneys. All buildings would have skylights, air vents and, later, monitors. Large double wooden doors for moving materials would most certainly have been typical. A circa 1821-1841 inventory of the West Point Foundry at Cold Spring indicates the following structures (Rutsch et al. 1979:63):

Three molding house
Three stoves
Two cupola house
house for blowing cylinders for cupola furnaces with space for pattern storage
office
turning shop
grindstone shop
Two blacksmith shops
pattern house
coal house
store.

This information is provided only as a guide to the type(s) of structures which would ordinarily occur in a foundry and which

may well have been constructed at the New York City West Point Foundry site. David Matthew, formerly a mechanic at the NYC West Point Foundry, and who in 1836 became involved in the Utica and Schenectady Railroad, made a drawing in 1884 of the West Point Foundry in NYC (see Plate 6). It is more a stylized representation than an actual depiction, but he did list the structures on the site. These included:

millright shop
blacksmith shop
engine house
pattern shop
machine shop
office.

The site also included a dock where boats delivered supplies and products from the Cold Spring foundry and collected finished goods for distribution elsewhere. A foundry yard, located on the south side of Beach Street, was also part of the operation (see Chapters II and V, this report).

PROJECTED SUBSURFACE FEATURES AT THE WEST POINT FOUNDRY SITE

Although the West Point Foundry Association built a number of steam locomotives, it was primarily a foundry that produced steam engines and not a locomotive erecting shop. Therefore, it is necessary to concentrate on searching for a foundry rather than erecting shop or railroad related features such as trackage. It should be noted that the time period of the foundry (ca. 1824, to 1839 or 1840 see Chapter II, this report) covers a range of technological production and some changes in machine design may be evident.

Of primary importance, artifactual material should consist mainly of raw materials, tools and machinery, by-products, finished products, and structure-related materials.

Raw material will include:

sand, for casting
wood, for patterns, mold boxes, and product parts
clay, for binding sand
iron ingots
coke, for cupola.

Tools and machinery will consist of:

brick cupola on stone or brick foundation
wooden and or metal crane with hoists, pulleys and chains
metal ladles
forges (hand and/or steam powered)

anvils (hand and/or steam powered)
sledgehammers (hand and/or steam powered)
brick and/or metal machine mounts
variety of hand tools for wood and metal work
wooden patterns
brick and metal cooling ovens.

By-products will consist of:

slag
furnace waste pile of slag and cinders
broken metal castings
broken wooden patterns.

Finished products will consist of:

iron and brass castings that were either not used or miss-cast for steam engines
bridge trusses
locomotive wheels and boilers
water pipes
misc. machine and engine parts.

Structure related artifacts will consist of:

brick
clapboard
plaster
glass
wooden roof trusses
foundations of stone or brick.

REFERENCES

AFS (American Foundrymen's Society)
1965 The Cupola and its Operation. 3rd edition. Desplaines, Illinois.

Bale, George R.
1902 Modern Foundry Practice. Part I. Technical Publishing Co., London.

Ransom, James M.
1966 Vanishing Ironworks of the Ramapos. Rutgers University Press, New Brunswick, New Jersey.

Rutsch, Edward S., JoAnn Cotz and Brian Morrell
1979 The West Point Foundry Site, Cold Spring, Putnam County, New York. Ralph Brill Associates, Cold Spring New York.

Sacks, Ed
1976 Foundries and Foundrymen. American Foundrymen's Society, Desplaines, Illinois.

Sanders, Clyde and Dudley Gould
1976 History Cast in Metal: The Founders of North America. American Foundrymen's Society, Desplaines, Illinois.

APPENDIX C

SELECTED ARTIFACT ANALYSES

FOR SITE 1, WASHINGTON STREET

URBAN RENEWAL AREA

BY

JOAN H. GEISMAR

APPENDIX C

A total of 7,413 artifacts was tabulated or analyzed from Site 1 of the Washington Street Urban Renewal Area. This includes floral and faunal material counted and analyzed by specialists (see Appendices D and E), but not listed in the general artifact catalogue.

In order to recover dating information and permit comparisons, several analytical tables were created; many of them will be found in the text and are augmented by the information presented here. In addition, microfloral data for this site are compared with 175 Water Street material in Appendix D.

It should be noted that bottle dates, a major factor in formulating chronologies for nineteenth-century sites, were available from only four of the twenty-three units considered for dating (see Table 5, this appendix). Moreover, none of these four units were related either to landfill or the West Point Foundry, the research focii of this investigation.

Ceramic dating follows a chronology developed for the Barclays Bank Site (Janowitz 1985). This is based on classic ceramic dating guides (for example, Hume 1976 and South 1977) but incorporates information from New York City sites, such as 175 Water Street (Stehling 1983).

The following tables are presented for those readers who seek specific comparative data. In addition, the artifact catalogue as well as field sheets and notes and other excavation material are available at the offices of Louis Berger & Associates, Inc., 100 Halsted Street, East Orange, New Jersey, 07019, and the New York City Landmarks Preservation Commission, 20 Vesey Street, New York, 10007. At present, it is expected that the artifact assemblage will be turned over to Shearson Lehman/American Express, the site's developers and sponsers of the investigation.

REFERENCES

Hume, Ivor Noel
1976 A Guide to Artifacts of Colonial America. Alfred A. Knopf, New York.

Janowitz, Meta
1985 Barclays Bank Ceramics Typology. Ms. Louis Berger & Associates, Inc., East Orange, New Jersey.

South, Stanley
1977 Historical Archeology. Academic Press, New York.

Stehling, Nancy
1983 Ceramic Analysis. The Archaeological Investigation of the 175 Water Street Block, New York City. Joan H. Geismar, Principal Investigator. Ms. on file, New York City Landmarks Preservation Commission.

APPENDIX C

TABLE 1. Site 1, WASHINGTON ST. URBAN RENEWAL AREA:

Total Number of Artifacts in Assemblage

Source	Number	Remarks
Area A	17	All artifacts from terminated deep-test (DT1).
Area B	5,579	Includes DT3, EU1-8, Tr. A-E, and clearing.
Area C	307	Includes Tr.C1 (C1E/C1W).
Faunal	1,471	Includes 4 human bone fragments and 2 animal bones from flotation material.
Floral	29	DT3 and Tr.C1 (C1E/C1W) flotation material.
Total	7,413	

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Table 2. Site 1, WASHINGTON ST. URBAN RENEWAL AREA:

Artifacts From Landfill

Level	Ceramics	Glass	Metal	Architectural material (no nails)	Misc. stone frags	Slag	Ash/Coal cinders	Asphalt /tar	Charcoal/ wood	Leather	Prehistoric	Button	Floral (macro & micro)	Fauna	Totals
DT3, Area B															
1	1	8	7	9	–	–	7	1	–	–	–	–	–	10	43
2	4	16	6	2	–	–	–	1	–	–	1	–	–	4	34
3	3	2	–	1	–	–	13	–	–	–	–	–	–	5	24
4	1	10	6	2	–	–	7	1	3	–	–	–	4	8	42
5	3	8	–	27	–	1	3	–	–	–	1	–	–	11***	54
6	5	9	–	10	–	3	–	1	9	–	–	–	–	12	49
7	4	13	20	6	1	5	8	–	–	–	–	–	3	35	95
8	6	11	3	7	2	1	10	–	8	–	–	–	1	7	56
9	10	20	19	9	1	–	24	1	–	–	–	1	1	23	109
10	6	15	22	26	–	11	9	1	3	–	–	–	3	46	142
11	6	9	5	5	–	1	5	–	–	–	–	–	–	5	36
S/T	49	121	83	104	4	22	86	6	23	–	2	1	12	166	684
**	2	–	–	–	–	1	2	–	–	–	–	–	–	–	5
T	51	121	83	104	4	23	88	6	23	–	2	1	12	166	689
TrC1W, Area C															
1	10*	10	8	18	–	–	–	2	5	5	–	–	1		59
2	10*	5	2	9	1	–	–	–	16	6	–	–	1		50
3	5	5	2	1	–	2	–	–	14	–	–	–	2		31
4	11*	15	–	–	–	–	–	2	20	17	–	–	5		70
T	36	35	12	28	1	2	–	4	55	28	–	–	9	12****	210+12 =222
TrC1E, Area C															
1	8*	24	17	–	–	2	4	2	12	8	–	1	5		83
2	6	5	3	4	–	5	–	–	1	–	–	–	4	3*****	31
S/T	14	29	20	4	–	7	4	2	13	8	–	1	9		114
**	1	–	–	–	–	–	–	–	–	2	–	–	–	49	52
T	15	29	20	4	–	7	4	2	13	10	–	1	9	54******	166+2 =168
T	104	185	120	134	5	32	92	12	91	38	2	2	30	232	1,079
%	(9.6)	(17.2)	(11.1)	(12.4)	(0.5)	(3.0)	(8.5)	(1.1)	(8.4)	(3.5)	(0.2)	(0.2)	(2.8)	(21.5)	(100.0)

* includes 1 kaolin pipe fragment
** uncontrolled context or grab sample
*** one from flotation
**** includes 4 human bones
***** from flotation
****** data not available to assign 2 identified bones included here to either Level 1 or 2

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Table 3. SITE 1, WASHINGTON ST.

URBAN RENEWAL AREA: Selected

Artifact Variables From Fill Samples* (# + %)

Source	Ceramics	Glass	Leather	Flora	Fauna	Totals
DT3	51(14.6)	121(34.6)	-	12(3.4)	166(47.4)	350(100.0)
Tr.Cl (ClW)	36(30.0)	35(29.1)	28(23.3)	9(7.5)	12(10.0)	120(99.9)
Tr.Cl (ClE)	15(12.8)	29(24.8)	10(8.5)	9(7.7)	54(46.2)	117(100.0)
Tr.Cl (ClW/ClE) (Combined)	51(21.5)	64(27.0)	38(16.0)	18(7.6)	66(27.9)	237(100.0)

*Based on Appendix C, Table 2.

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Table 4. SITE 1 WASHINGTON ST. URBAN RENEWAL AREA:

Selected Artifact Variables from 175 Water St. Deeptests

(Ceramics, Glass, Leather, Flora*, Fauna)

DT	Level**	Ceramics	Glass	Leather	Flora*	Fauna	Totals
F55	1	141	346	65	-	243	795
	2	113	431	442	-	127	1,113
	3	49	89	58	-	69	265
	4	37	56	54	-	80	227
Totals		340(14.2)	922(38.4)	619(25.8)	-	519(21.6)	2,400(100.0)
F56	1	73	81	309	5	138	606
	2	96	148	980	-	295	1,519
	3	25	21	29	-	69	144
	4	24	26	51	-	26	127
Totals		218(9.1)	276(11.5)	1,369(57.1)	5(0.2)	528(22.0)	2,396(99.9)
					Total Artifacts (F55 & F56)		4,796

* Since no microfloral analysis was done on this material, these are macrofloral data only.

** Based on stratigraphy, the data were organized into 4 levels for computer analysis; these are the groupings used here.

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Table 5. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA:

Ceramic and Glass Dating, Excavation Units (EU), Trenches (Tr.)

And Miscellaneous Collection Areas

Area	Unit Tr.	Description	MCD	CTPQ	MGD	GTPQ	MCD/ MGD	CTPQ/ GTPQ
A	DT1	Deeptest (partial)	1810*	1780*	-	-	-	-
B	DT3,W 1/2	Deeptest	1783**	1800**	-	-	-	-
C	Tr.C (C1E/C1W)	Test Tr. into landfill	1795	1800	-	-	-	-
B	Lot 15	Clearing	1859	1901	-	-	-	-
	S of EU1,3	-	1840	1927	-	-	-	-
	Lot 15	Flagstone floor	1888	1901	-	-	-	-
	-	F3: wall chimney	1870*	1840*	-	1903	-	1903
	EU1	includes dry-well, F4	1852	1820	-	-	-	-
	EU1, ext.	includes brick fire-containment F5 (disturbed)	1854	1886	-	-	-	-
	EU2	E. of slate sill	1807	1780	-	-	-	-
	EU3	includes brick fire containment F5	1798***	1780***	-	-	-	-
	EU4	under flagstone floor	1810*	1780*	-	-	-	-
	EU5	includes stone wall, Lot 18	1798***	1780***	-	-	-	-
	EU6	W. of EU3, includes F5	1816	1820	-	-	-	-
	EU7	includes dry-well (F12)	1805	1800	-	1857	-	1857
	EU8	includes stone wall, Lot 15 (F11), W. of slate sill	1776	1841	-	-	-	-
	Tr.A.	Lot 18, off Wash. St.	1821	1820	1884	1857	1852	1857
	Tr.B****	includes wall (F6) near Wash. St.	1860*	1820*	1903+	1903+	1882	1903+
	Tr.C	E 1/2; N. of EU1, lext	1822	1827	-	-	-	-
	Tr.D	adjacent to W. limit of testing	1807	1820	-	-	-	-
	Tr.E	W 1/2. includes builders' Tr. (F14) for brick wall (F15)	1798	1795	-	-	-	-
	Tr.F	-	-	-	-	-	-	-
	Lot 15	S. schist wall	1806	1780	-	-	-	-

Note: Dates taken to nearest year

* based on one sherd

** does not include sherd dated 1840-1900 from deepest level; contamination (see Table 7, Chapter 5)

*** since entire unit included, this date varies from feature date alone (see Table 7, Chapter 5)

**** 2 test trenches (B1 & B2) were excavated but no artifacts were retrieved

MCD=mean ceramic date; CTPQ= ceramic terminus post quem; GMD= glass mean date; GTPQ=Glass terminus post quem. Last 2 columns are combined data.

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Table 6. SITE 1, WASHINGTON ST. URBAN RENEWAL AREA:

Dating For DT3 And Test Tr.C1 (C1E/C1W) By Level

Area	Feature	Level	MCD	CTPQ	SHERD#	Datable Sherd#
B	DT3	1	1791	1762	1	1
		2	1809	1800	4	4
		3	1762	1762	3	2
		4	1791	1780	1	1
		5	1797	1780	3	3
		6	1789	1670	5	4
		7	1692	1800	4	2
		8	1791	1800	6	5
		9	1775	1800	10	8
		10	1803	1800	6	5
		11	1807*	1800*	5	3
	Feature Total		1783	1800	48	38
C	Tr.C1 (C1W)	1	1795	1800	10	5
		2	1795	1780	10	5
		3	1806	1800	5	2
		4	1803	1780	10	8
	Feature Subtotal		1800	1800	35	30
	(C1E)	1	1795	1780	7	6
		2	1780	1780	6	5
		GS	1791	1762	1	1
	Feature Subtotal		1789	1780	14	12
	Feature Total		1795	1780	49	42

MCD= mean ceramic date; CTPQ = ceramic terminus post quem.
GS = grab sample. Note: dates taken to nearest year.
* dating based on sample without an anomalous sherd (with its inclusion, the MCD is 1823 and the CTPQ 1840). Since this level (L11) is the deepest in the landfill sample, this sherd obviously represents contamination.

APPENDIX D

ANALYSIS OF FLOTATION MATERIAL

(FLORAL AND FAUNAL)

BY

CHERYL HOLT

APPENDIX D

INTRODUCTION

A Floral analysis is but one line of evidence in understanding fill deposits. Floral data should be viewed in concert with faunal and artifact data in order to understand the particular characteristics of various fill episodes. However, floral specimens provide a unique set of data in the sense that plants are both dependant upon and independant from cultural influence. Some plants owe their enhanced propagation to cultural manipulation while others do not. A number of other plants benefit from indirect cultural influence, for example, a weed seed which spreads more quickly and over a wider area due to soil churning which can be caused by any number of culturally induced (environmentally artifical) situations.

Floral data are also unique in the sense that each plant type has a soil, light, and moisture requirement which must be met to ensure survival of the plant. By virtue of this, seeds are "environmental markers" whereby a change in seed types can be informative in an archaeological context.

The major focus of this analysis was to investigate what kind (if any) of floral patterning occurred in fill episodes. Evidence of fill is regularly encountered by archaeologists and must be addressed in order to fully understand the complexities of site formation. Floral analysis provides another line of evidence which can aid in answering questions about the source and soil composition of the landfill material as well as establishing characteristics which can distinguish different landfill deposits from one another. Central to this analysis was delineation of floral patterning which would distinguish inter- and intra-site fill deposits.

METHODOLOGY

Flotation

Nineteen soil samples were collected from Areas A, B, and C deep-test levels and were subjected to flotation procedures. Flotation is a water separation technique that separates light organic material from its soil matrix. Each sample is separated into a light and heavy fraction. It is expected that heavy fraction samples will contain charcoal, small mammal bone fragments, shell and large seeds, or in general, larger biological material. Light fraction samples will contain small seeds, fish and bird bones, small snails and, in general, smaller biological material (Watson 1976). The goal of flotation was to retrieve micro floral and faunal material which would enhance understanding of fill episodes at the site area.

Identification of Specimens

Examination of biological materials in light fractions was made with a binocular dissecting microscope. Each sample was systematically scanned and floral and faunal material was removed, identified, counted and placed in a labeled vial. Heavy fractions were visually inspected in their entirety however, 1 liter samples were examined under the microscope. To test the effectiveness of this sampling procedure, two samples from the same provenience were examined whereby one of the heavy fraction samples was inspected in its entirety under the microscope and used as a control and a one liter sample was microscopically examined from the other. The results of retrieval from both samples suggested that no significant affect in data recovery would result from not microscopically examining heavy fractions in their entirety.

Although only a few faunal specimens were recovered from the flotation samples, each was identified, counted, and examined for traces of butchery marks, burning, and rodent modification. Each floral and faunal specimen was given a count value of one. Material was identified to the genus level where possible, and in some cases to the species level.

Confirmation of species was aided by cross checking floral and faunal identification manuals (Bidney and Bland 1869; Cornwall 1956; Fernald 1970; Gunn 1970; Mohlenbrock 1980, 1981; Morris 1975; Olsen 1964, 1968, 1979, 1980; Ryder 1969; Schmid 1972; Gilbert 1973; Cox 1985) and cross checking with an extensive type collection of floral and faunal material.

RESULTS

The overall recovery of floral material from the site area was low in frequency and comprised exclusively of weed seeds (Table 1). No specimens were recovered from the flotation sample from Area A. The seed types recovered from Areas B and C were: Portulaca oleracea (Purslane); Chenopodium album (Lamb's Quarters); Amaranthus retroflexus (Pigweed); Rumex crispus (Dock); Cyperaceae brevior; Euphorbiaceae supina; Sambucus canadensis (Elderberry). These species have a great deal in common. They are common to abandoned and cultivated fields, gardens, along roadsides, and waste areas. All the recovered species share commonalities of soil and moisture requirements. These species produce large numbers of seeds per plant. A single Purslane plant can produce 50,000 seeds and a single Chenopodium plant can produce 75,000 seeds. Another characteristic that these species share is that their seeds can pass unharmed through the intestinal tracts of grazing animals and this is an effective means of seed dispersal. Further, although these species produce microscopic seeds, they are quite durable and in the case of Pigweed, seeds have remained germinable after storage for 40 years in the soil (Cox 1985).

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Table 1. Distribution of Floral Specimens

Area	DT	Level	Cheno	Port	Am	Rumex	Cyper	Euph	Sam
B	3	4	0	0	0	3	0	1	0
B	3	7	0	1	0	2	0	0	0
B	3	8	0	0	0	0	0	1	0
B	3	9	0	0	0	1	0	0	0
B	3	10	0	0	0	3	0	0	0
C	1	1	0	1	0	0	0	0	0
C	1	2	0	0	1	0	0	0	0
C	1	3	1	1	0	0	0	0	0
C	1	4	0	1	1	0	2	0	0
C	2	1	0	2	2	1	0	0	0
C	2	2	0	0	1	2	0	0	1
Totals			1	6	5	12	2	2	1

Although the leaves, seeds, and fruit of these plants have been incorportated into the human diet in both prehistoric and historic contexts (Cox 1985; Knap 1979), it seems unlikely that the recovered specimens from this site are reflective of dietary debris. These weed seeds were not found in association with any cultivated plants and it is more likely that the recovered specimens are reflective of ground vegetation of soil used for fill purposes.

The recovery of faunal material in association with the fill episodes may suggest deposition of domestic garbage disposal on land later used as fill (Table 2). Although the amount of faunal material recovered from the flotation samples was low, the recovery of a cow molar (Area C, Level 2), and 2 charred vertebrae fragments from a medium sized mammal (pig, sheep, or large dog) may represent domestic butchering waste. A phalange 1 belonging to a dog was recovered from Area B (level 5) and is likely to represent natural incorporation of this species into the archaeological record.

RESEARCH GOALS

The basic goal of this analysis was to obtain a better understanding of fill episodes. The floral patterning was examined with three specific research questions in mind.

1. Is there a change in the floral patterning which would indicate different fill episodes occurred within Areas B and C?
2. Can the species present within the samples inform as to kind of soil used for landfill?
3. Are the characteristics of landfill in Areas B and C similar or dissimilar to landfill episodes elsewhere?

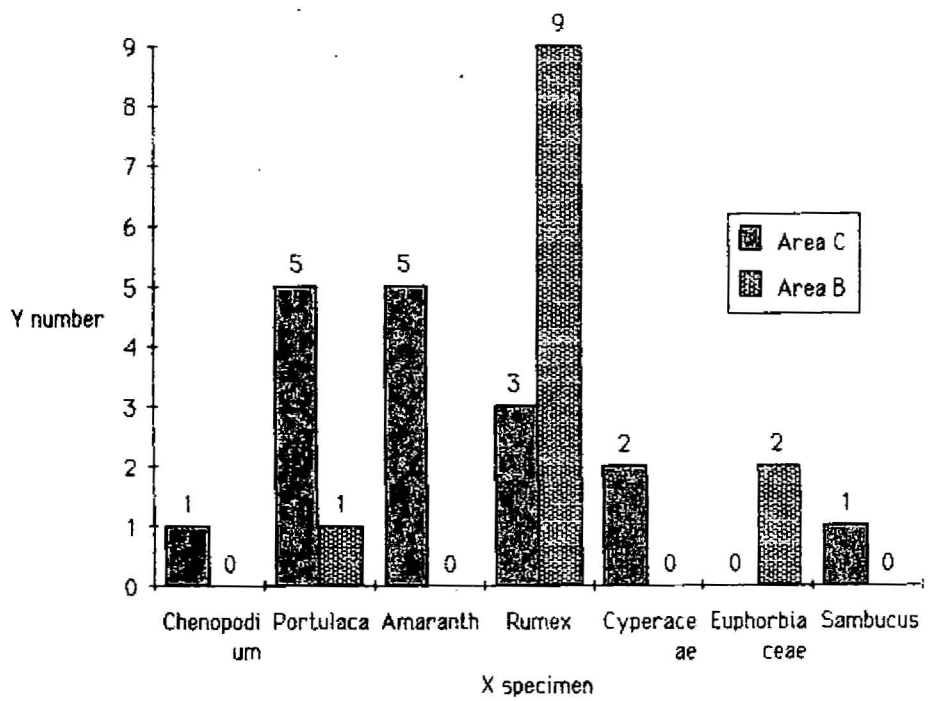
The first major focus of analysis was to ascertain if floral patterning suggested the differential deposition of fill between Areas B and C (Figure 1). Since the weed seeds recovered from both Areas B and C are not different in soil and moisture requirements, then the analysis focused on frequency, however, both areas exhibited a low frequency recovery rate. In fact, the sample sizes are so low that caution should be taken in statistical assessment. A correlation coefficient was computed for samples from both Areas B and C. Each species occurrence was treated as an interval scale variable and the resultant score will lie between 0 and 1. A score of 0 suggests no linear relationship between variables and a score of 1 is a total relationship between variables. This test was administered to ascertain if the presence of one seed type could predict the presence of another seed type. Area B had an r score of .0467 and Area C had an r score of .5044. A correlation of coefficient equal to .50 does not mean that the strength of the relationship is halfway between no correlation and perfect correlation but rather r^2 is a measure of the percentage of variation within the sample that can be accounted for by the occurrence of various

Appendix D

Table 2. Distribution of Faunal Specimens Recovered From Flotation

Area	DT	Level	Dog	Cow	Med Mammal	Oyster	Clam	Fish
B	3	5	1	0	0	0	0	0
C	ClW	3	0	0	0	0	1	0
C	ClE	1	0	0	0	1	0	0
C	ClE	2	0	1	2	0	0	1
Totals			1	1	2	1	1	1

Appendix D FIGURE 1:
Distribution of Floral Material Between Areas B and C



seed frequencies within each area. Correlation of coefficient scores are concerned with values measured as deviations about a mean and since many cell values are empty, this measure of area homogeneity may be somewhat lacking. It is probable that the variation reflected in the r score for Area B is caused by the presence of 9 Rumex crispus (Dock).

A T test was administered using Areas B and C as variables and seed frequencies as cases. Using a two tailed test with 1 degree of freedom at .05 confidence level, the T score was -1.87. The calculated value of T does not fall within the rejection region (1.94), therefore, there is not sufficient evidence to suggest that seed frequency is statistically different between the two fill areas.

No significant patterning is present which would suggest vastly different soils used as fill for Areas B and C. All of the seed types recovered are "opportunistic" and will invade and flourish in fields, waste spaces or any bare ground that becomes available. The species recovered have high growth rates and produce large numbers of seeds which enables them to establish themselves quickly on bare soil. Waste places such as garbage dumps, landfills, and excavation sites are ideal for these species because soil disturbances provide an ideal environment for the spread of these "opportunistic" species. This is not to suggest that the same soil source was used but rather similar soils were used. Further, there is no significant patterning which would suggest different fill episodes within Areas B or C. Both inter- and intra-area recovery rate and floral composition suggest homogeneity.

The next major focus of analysis was to ascertain similarity or dissimilarity of floral patterning between the fill in Areas B and C, and the fill episode (represented in Level 9) at 175 Water Street (Taylor 1983:612). The differences between the two sites are striking both in the frequency and range of floral species recovered. The first and most obvious difference between the two sites is the virtual absence of fruit specimens in Areas B and C and the high frequency of squash, melon, common fruits, and nutshells at 175 Water Street. No large (macro) floral elements were recovered from Areas B or C. Differences are also apparent between sites in recovery of micro flora specimens from flotation. Twenty-four different seed types, totaling 376 seeds, were identified from landfill (Feature 3, Level 9) at 175 Water Street (Table 3). For purposes of illustration, the specimens from both sites were divided into two categories: fruits and greens/weeds. Strawberry, raspberry, grape, cherry, watermelon, and other berries were categorized as fruit. Clover, amaranthus, chenopodium, dock, sedge nightshade, sorrel, smartweed, and grass were categorized as greens/weeds. The landfill floral assemblage at 175 Water Street is more similar in composition to the domestic floral assemblage of the same site than to landfill in Areas B and C. Figure 2 illustrates the differences between the two sites.

Appendix D

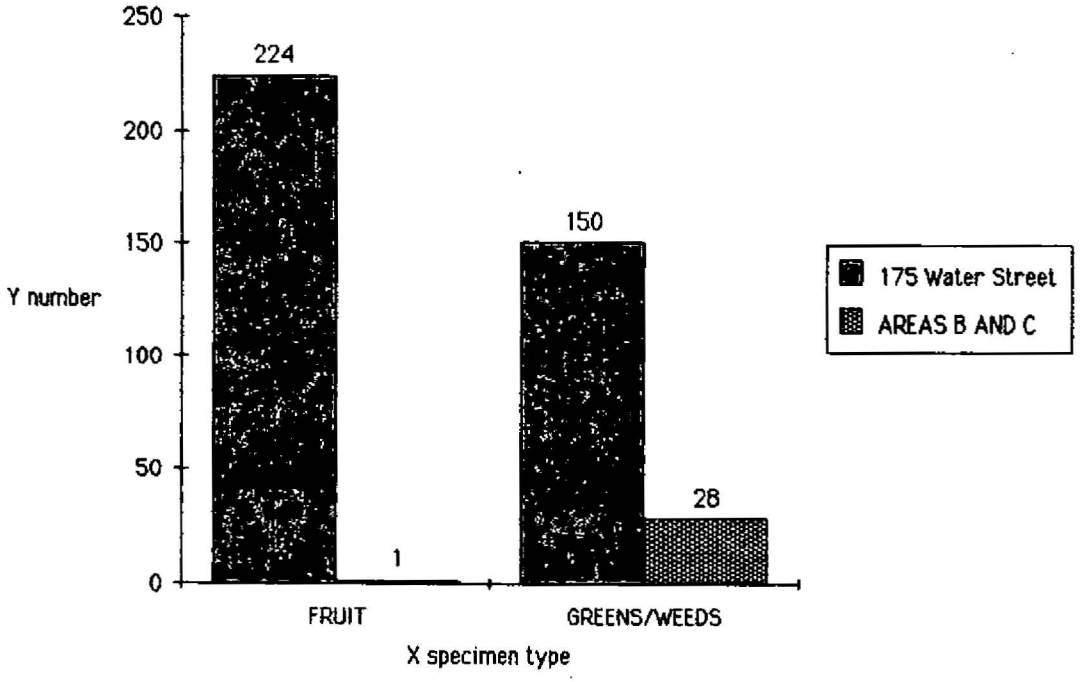
Table 3. Comparison of Flotation Specimens From 175 Water Street Fill* And Deeptests From Areas B And C

Specimen Type	Common Name	175 Water	B DT3	C Tr.C1 (C1W)	C Tr.C1 (C1E)
Fragaris virginiana	strawberry	120			
Rubus occidentalis	raspberry	74			
Rumex acetosella	sorrel	61			
Solanum triflorum	nightshade	38			
Prunus cerasus	sour cherry	16			
Cyclolone atriplicifolium	ringwing	8			
Trifolium sp.	clover	7			
Labiatae sp.	mint	6			
Setaria sp.	yellow bristlegrass	6			
Arbutus menziesii	madrone	5			
Curcurbitaceae citrullus	watermelon	5			
Scripus sp.	bulrush	5			
Polygonum dumetorum	smartweed	4			
Polygonum persicaria	smartweed	4			
Amaranthus retroflexus	pigweed	3		1	4
Solanaceae sp.	nightshade	3			
Sambucus canadensis	elderberry	2			1
Carex comosa	sedge	1			
Chenopodium hybridum	lamb's quarters	1		** 1	
Prunus pensylvanica	pin cherry	1			
Rumex crispus	dock	1	9		3
Setaria lutescens	bristlegrass	1			
Sisyrinchium altanticum	blue eyed grass	1			
Vitis vinifera	grape	1			
Portulaca oleracea	purslane		1	2	3
Cyperaceae brevior	sedge				2
Euphorbiaceae supina	milk purslane		2		
Unidentified		2			
TOTALS		376	12	4	13

*A sample from beneath Privy F 3.9; this was the only microfloral material analyzed from fill (Taylor 1983:612).

**Chenopodium album

Appendix D FIGURE 2:
Intersite Generalized Floral Distribution



SUMMARY AND CONCLUSIONS

The major purpose of this investigation was to better understand landfill contexts. The stratigraphy of urban sites is usually deep and complex. Landfill episodes interspersed with occupational episodes are encountered in most urban sites. This research helps to better articulate differential floral patterning with fill episodes and occupational episodes.

Weed seeds which shared the same soil and moisture requirements were recovered from Areas B and C. No differentiation between landfill episodes either inter- or intra-Area was demonstrated however the floral material recovered from Areas B and C was very different from the floral material recovered from the landfill at 175 Water Street. Fill characteristics are most likely to be site specific. These data suggest that the floral characteristics of fill may be unique to each episode and that characteristics of fill from one site may not be the characteristics of fill at another site or even another fill episode at the same site.

WASHINGTON STREET SITE 1285
Flotation Specimen Catalog

Area: B
Deeptest: 3
Level: 4
Catalog #: 1013

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Euphorbiaceae	supina	seed	1			
flora	Rumex	crispus	seed	3			

Area: B
Deeptest: 3
Level: 5
Catalog #: 1014

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
fauna	Mammal	Canis famil	phalange	1	5.30		

Area: B
Deeptest: 3
Level: 7
Catalog #: 1016

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Portulaca	oleracea	seed	1			
flora	Rumex	crispus	seed	2			

Area: B
Deeptest: 3
Level: 8
Catalog #: 1017

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Euphorbiaceae	supina	seed	1			

Area: B
Deeptest: 3
Level: 9
Catalog #: 1018

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Rumux	crispus	seed	1			

Area: B
Deeptest: 3
Level: 10
Catalog #: 1019

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Rumux	crispus	seed	3			

Area: C
Deeptest: 1
Level: 1
Catalog #: 5000

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Portulaca	oleracea	seed	1			

WASHINGTON STREET SITE 1285
Flotation Specimen Catalog

Area: C
Deeptest: 1
Level: 2
Catalog #: 5001

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Amaranthus	retroflexus	seed	1			

Area: C
Deeptest: 1
Level: 3
Catalog #: 5002

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
fauna	Mollusc	clam	shell	1	2.60		
flora	Chenopodium	sp.	seed	1			
flora	Portulaca	oleraces	seed	1			

Area: C
Deeptest: 1
Level: 4
Catalog #: 5003

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
flora	Amaranthus	retroflexus	seed	1			
flora	Cyperaceae	brevior	seed	2			
flora	Portulaca	oleracea	seed	1			

Area: C
Deeptest: 2
Level: 1
Catalog #: 5004

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
fauna	Mollusc	oyster	shell	1	21.50		
flora	Amaranthus	retroflexus	seed	2			
flora	Portulaca	oleracea	seed	2			
flora	Rumex	crispus	seed	1			

Area: C
Deeptest: 2
Level: 2
Catalog #: 5005

Type	Genus	Species	Element	Number	Weight	No. Charred	No. Butch
fauna	Fish	undet	spine	1	0.10		
fauna	Mammal	Bos tarus	molar	1	6.80		
fauna	Mammal	medium	vertebrae	2	7.90	2	
flora	Amaranthus	retroflexus	seed	1			
flora	Rumex	crispus	seed	2			
flora	Sambucus	canadensis	seed	1			

REFERENCES CITED

Bidney, W.G. and T. Bland
1869 Land and fresh water shells of North America, Part 1, Smithsonian Miscellaneous Collections, 194. Smithsonian Institution, Washington, D.C.

Chaplin, Raymond
1971 The Study of Animal Bones from Archaeological Sites. Seminar Press, London and New York.

Cornwall, I.W.
1956 Bones for the Archaeologist. Phoenix House, London.

Cox, Donald
1985 Common Flowering Plants of the Northeast. State University of New York Press, Albany.

Fernald, M.L.
1970 Gray's Manual of Botany. D. Van Nostrand Company, New York.

Gilbert, B. Miles
1973 Mammalian Osteo-Archaeology. The Missouri Archaeological Society, Inc., Columbia, Missouri.

Gunn, Charles
1972 Seed collection and identification. In Seed Biology, Vol. 111, edited by T.T. Kozlowski, pp. 56-143. Academic Press, New York.

Knap, Alyson Hart
1979 Wilderness Harvest. Pagurian Press Limited, Toronto, Canada.

Mohlenbrock, Robert
1980 Flowering Plants Willows to Mustards. The illustrated Flora of Illinois Series. Southern Illinois University Press.

1981 Flowering Plants Magnolias to Pitcher Plants. The illustrated Floral of Illinois Series. Southern Illinois Press.

Morris, Percy A.
1975 A Field Guide to Shells of the Atlantic and Gulf Coast and the West Indies. Houghton Mifflin Company, Boston.

Olsen, Stanley J.
1964 Mammal remains from archaeological sites. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 56, NO. 1. Cambridge, Mass.

1968 Fish, amphibian and reptile remains from archaeological sites. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 56, No. 2. Cambridge, Mass.

1979 Osteology for the archaeologist. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 56, Nos. 3,4, and 5. Cambridge, Mass.

Ryder, Michael L.
1969 Animal Bones in Archaeology. Mammal society handbook, Blackwell Scientific Publications, Oxford and Edinburgh.

Schmid, Elizabeth
1972 Atlas of Animal Bones for Prehistorians, Archaeologists and Quarternary Geologists. Elsevier Publishing, Amsterdam.

Taylor, Roberta
1983 Floral Analysis. In The Archaeological Investigation of the 175 Water Street Block, New York City. edited by Joan H. Geismar. Ms. on file New York City Landmarks Preservation Commission.

Watson, Patty Jo
1976 In pursuit of prehistoric subsistence: a comparative account of some contemporary flotation techniques. Mid-continental Journal of Archaeology 1:77-100.

APPENDIX E

FAUNAL ANALYSIS

BY

DANIEL RUSSELL AND THOMAS AMOROSI
WITH A CONTRIBUTION BY
BOBBI L. BRICKMAN

APPENDIX E

FAUNAL ANALYSIS

A small collection of faunal remains was recovered from Site 1 of the Washington Street Urban Renewal Area. Animal remains, including four human bones, were recovered from deeptests and excavation units in two of the four site areas. These remains were either recovered *in situ* or by means of screening through a 1/4-inch wire mesh. A total of 1,476 bone fragments were identified from the landfill and features in areas B and C. Landfill deposits were tentatively dated to ca. 1802-1810, based on a preliminary analysis of ceramic artifactual information (Joan Geismar personal communication 1985). At the time of writing this report, stratigraphic information was unavailable. In order to compensate for the lack of stratigraphic data, Tables 3, 5 and 6 provide as complete a provenience as was possible. This information was based on the locational data included with the bones, as well as the information marked on the bones.

QUANTIFICATION AND METHODOLOGY

The zooarchaeological data presented here uses quantitative methods of ordinal counts: the Total Number of Bones (TNB); the Number of Identified Specimens per Taxon (NISP); and the Total Number of Fragments (TNF). Other methods of quantification are available, but because of the lack of stratigraphic information the use of higher levels of statistical analyses could not be performed (Amorosi *et al*. 1985; cf. Grayson 1984). The nature of the depositional episodes must be understood in order to use analyses that are more sophisticated than ordinal measures. For example, the use of minimum number of individuals (MNI) requires a single depositional episode, such as a bison jump where faunal remains are buried on newly exposed, clean surfaces and immediately sealed after deposition (Grayson and Thomas 1983). The collection from Site 1 of the Washington Street Urban Renewal Area would indicate that primary butchering waste was buried in a series of depositional episodes. Because of the lack of stratigraphic data, the use of anything more than ordinal counts must be used with caution.

The use of ordinal counts has been known to inflate or distort the sample size. As a result, a number of methods such as relative frequencies (RF) have been used in an attempt to control for this problem (cf. Perkins 1973; Grayson 1984). This study makes use of RF methods to account for any distortion found in the ordinal counts. Also, since there are indications that the faunal remains were recovered from single depositional episodes, the cautious use of RF methods can be applied to this study.

The faunal assemblage was identified by direct comparison with modern skeletal material from the collections of the American

Museum of Natural History, the Faunal Laboratory at Hunter College (C.U.N.Y), and the authors' private collections. Also, a number of faunal manuals were used as supplementary references (see Amorosi 1985 for references). The identification of the faunal remains was made to the most definitive zoological classification possible. If a bone fragment could not be assigned to the genus and/or species level, the next higher taxonomic level (family) was used. While it is possible to differentiate certain osteological remains between the species of ovicaprids (Boessneck 1970), there are a number of other bone elements that it is impossible to distinguish. Similarly, it is possible to distinguish the species of Rattus only by their crania. However, it is impossible to do so solely on the basis of postcrania (Brown and Twigg 1969). Therefore, the designation of Ovis/Capra and Rattus sp. are used.

In cases where bones were too fragmentary for more specific taxonomic classifications, they were designated by class, i.e. mammalia. In turn, these larger groupings were subdivided into size categories of large, medium, and small animals. The size range and architecture of the bone fragments were used as the indicator for placement into these classifications.

Tables 1 and 2 summarize the number of identified specimens per taxon and size range. Three hundred and eighty-four mammal remains (or 26.09% of the assemblage total) and 50 avian specimens (or 3.40% of the assemblage total) were identified to the species level. Fish and molluscs were present in trace amounts (n=7 or 1.15%, n=3 or 0.20%, respectively). Therefore, fish and molluscs are not considered in the analysis. The remaining 67.25% of the faunal remains were arranged according to class and size (see Table 2). The species distribution and skeletal element frequencies were significantly different between Areas B and C (see Tables 3-11). The faunal remains recovered from each area are discussed separately below.

THE FAUNAL REMAINS FROM AREA C

The animal bones from Area C (see Table 3) were recovered from two trenches, C1E and C1W. Table 4 shows the frequencies of skeletal elements of Bos taurus recovered. The cattle bones exhibited evidence of both slaughter and butchering. One specimen of Bos crania exhibited two impact fractures on the left and right frontals that penetrated into the sinous cavity of the skull. The size and hexagonal shape of the depression in the skull indicate that the fracture was inflicted with a large blunt instrument, such as a sledge hammer. The eight vertebrae recovered from the deposit were split longitudinally by means of a saw (see Table 4). Furthermore, two scapulae and two innominates were also butchered by means of a saw (see Lyman 1977, Figures 1a and 5a).

The small sample of mandibular tooth rows (n=8) prevented the development of an accurate age profile of the cattle represented

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Table 1. Summary of the number of identified specimens per taxon (NISP).

	NISP	% of Group	% of Whole
Class Mammalia			
Order Rodentia			
Family Muridae			
Rattus sp. (Old World Rats)	1	0.26	0.23
Rattus norvegicus (Norway Rat)	1	0.26	0.23
Order Carnivora			
Family Canidae			
Canis familiaris (Domestic Dog)	1	0.26	0.23
Family Felidae			
Felis catus (Domestic Cat)	2	0.52	0.46
Order Artiodactyla			
Family Suidae			
Sus scrofa (Domestic Pig)	4	1.04	0.92
Family Bovidae			
Bos taurus (Domestic Cattle)	74	19.27	17.05
Ovis aries (Domestic Sheep)	1	0.26	0.23
Ovis/Capra (Domestic Sheep/Goat	300	78.12	69.12
Subtotal:	384	99.99	88.47

Table 1. (continued)	NISP	% of Group	% of Whole
Class Aves			
Order Columbiformes			
Family Columbiae			
Columba sp. (Pigeon)	39	78.00	8.98
Order Galliformes	4	8.00	0.92
Family Tetraonidae			
Gallus gallus (Domestic Chicken)	7	14.00	1.61
Total NISP	434*	100.00	99.98

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*In addition, four human remains were identified and are discussed in Appendix 1 of this report.

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Table 2. Summary of the number of unidentified bones and bone fragments per class (TNF - total number of fragments, TNB - total number of bones).

		TNF
Class Mammalia		
Large Mammal (*Equus* to *Bos* size)		32
Medium Mammal (*Ovis/Capra* to *Canis* size)		861
Small Mammal (*Felis* to *Mus* size)		5
Unidentified		92
		990
Class Aves		
Medium Bird (*Gallus* size)		28
Superclass Pisces		17
Class Mollusca		3
	Total TNF	1,038
	Total NISP	434
	Total TNB	1,472*

*Four human remains were also identified and are discussed in Appendix 1 of this report. These bring the total assemblage discussed here to 1,476. Five animal bones in the flotation bring the site total to 1,481 specimens.

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Table 3. Number of Identified specimens per taxon recovered from Area C.

Species	Trench C1W	Trench C1E
Mammalia		
Felis	1	-
Sus	1	-
Bos	2	51
Ovis/Capra	3	-
Aves		
Galliformes	1	-
	8	51

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Table 4. The element frequencies for Bos in Area C.

Element	NISP	RF
Crania	21	-
Maxillae	5	2.50
Mandibles	13	6.50
Axis	1	1.00
Cervical Vertebrae	6	1.20
Thoracic Vertebrae	2	0.15
Innominates	2	1.00
Scapulae	2	1.00
Femora	1	0.50
	53	13.85

in the deposits. However, the mandibles exhibited mature wear on the molars and all eight specimens had fully erupted Premolar 4 or well developed alveolar sockets indicating that the Premolar 4 was fully erupted at the time of death. According to Silver (1969), the Premolar 4 erupts between 28-36 months of age. Therefore, the cattle were between 2 1/2 to 3 years of age at slaughter, the most optimum time to slaughter cattle in a meat economy (Lyman 1977; Mercer 1981; Biddick 1983).

The high frequency of cranial elements and cervical vertebrae indicate that the cattle bones in Trench C1E were derived from primary butcher waste (see Table 4). Lyman (1977) states that crania were normally discarded during the butchering process because of the low meat value. When stratigraphic analyses are complete, it may be possible to determine if the bone deposits in Trench C1E resulted from a single episode. If this is the case, then it might be possible to calculate the minimum number of individuals represented in this deposit. This type of evidence can be used to argue for the slaughter of a small group of cattle (n<10).

THE FAUNAL REMAINS FROM AREA B

Area B contained a total of 375 remains identified to a taxonomic level lower than class. This represents 86.40 percent of the identified species in the collection. However, this material was recovered from a variety of excavation units, trenches and features (see Tables 5-6). Ovicaprids comprised 79.4 percent of the assemblage from Area B, Bos is represented by 21 specimens (5.6%) and Sus by 3 specimens (0.8%) (Tables 7-9). Rattus, Felis, and Canis were present in trace amounts (n=2, n=1 and n=1, respectively).

Table 8 shows the frequency of skeletal elements recovered for ovicaprids. Of the 298 sheep/goat bones identified, 277 (92.5%) were derived from the foot, comprising metapodials, carpals/tarsals and phalanges. Bones from Deeptest 3 W 1/2 (see Tables 6C and 9) illustrate the high frequency of podial elements. One hundred and sixty-four ovicaprid elements were identified from Deeptest 3 W 1/2, of which 162 were derived from the metacarpals, metatarsals, carpal/tarsals and phalanx I (see Table 9).

The animal bone deposit from Deeptest 3 W 1/2 appear to be a single depositional episode of primary butcher waste. According to a number of authors (Lyman 1977; Biddick 1983; Amorosi 1984; Greenfield 1985) foot bones of sheep are discarded because of their low food value. It is also interesting to note that the second and third phalanges were not found in the deposits. This indicates that they may have been removed with the hoof's outer skin. Bos taurus was represented by 21 elements (see Table 7) in Area B. These specimens were recovered from widely dispersed units and do not form a coherent pattern.

The bird remains are represented by 49 bones from Area B. Thirty-nine of the bird specimens were recovered from Feature 3 (see

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Table 5 A. Number of identified specimens per taxon recovered from excavation units in Area B: The Major Domesticates.

Provenience				Sus	Bos	Ovis/Capra
E.U.2	St. I	Level 1		-	-	11
		Level 2		-	1	-
	St. II	Level 1		-	1	1
	St. III	Level 2		-	-	1
	St. IV	Level 1		-	-	2
E.U.3	St. II	Level 1	flr.5	-	1	-
E.U.5	St. II	Level 1		2	-	5
E.U.6	St. II	Level 1		-	-	1
	St. V	Level 1	flr. 14	-	-	1
E.U.7	St. III	Level 1	flr. 12	-	-	1
	St. IV	Level 3		-	1	3
E.U.8	St. II	Level 1		-	-	3
	St. III	Level 1		-	1	9
	St. IV	Level 1		1	-	2
	St. IV	Level 2		-	1	1
	St. V	Level 1		-	-	2
	St. VI	Level 1		-	2	-
	St. VII	Level 1		-	1	2
	St. IX	Level 1		-	1	2
				3	10	47

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Table 5 B. Number of identified specimens per taxon recovered from excavation units in Area B: Small Mammals and Birds

Provenience		Felis	Canis	Galli-formes	Gallus
E.U.1	ext. St. I	-	-	-	2
	ext. St. I Level 2 flr. 5	-	-	-	1
E.U.2	St. I Level 2	-	1	1	-
	St. II Level 1	-	-	1	-
E.U.5	St. I Level 1	1	-	-	-
E.U.7	St. II Level 1 flr. 12	-	-	-	2
	St. IX Level 1	-	-	-	1
		1	1	2	6

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Table 6 A. Number of identified specimens per taxon recovered from Area B, Trenches and Miscellaneous Units: The Major Domesticates.

Provenience	Bos	Ovis/Capra
Tr.D St. III Level 1	1	1
St. IV Level 1	2	1
Tr.E 1/2 St. I Level 1 flr. 14	-	11
Tr.E W1/2 St. I Level 1 flr. 14	5	37
St. II Level I flr. 14	-	1
Tr.F St. III Level 1	1	-
Tr.N	2	-
Cleaning Brick Wall on North Face Schist Wall	-	4
Lot 15 Gen. Cleaning Backhoe Exc.	-	1
	11	56

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TABLE 6 B. Number of identified specimens per taxon recovered from Area B, Trenches and Miscellaneous Units: Small Mammals and Birds.

Provenience	Rattus norvegicus	Galli-formes	Gallus gallus	Columba sp.
Tr.A St. I Level 1 flr. 2	-	1	-	-
Tr.D St. I Level 1	1	-	-	-
Feature 3	-	-	-	39
Lot 15 General Cleaning for Backhoe Exc.	-	-	1	-
	1	1	1	39

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Table 6 C. Number of identified specimens per taxon recovered from Area B, Deeptest 3 W 1/2 Stratum I.

Provenience	Mollusca	Rattus	Ovis	Ovis/Capra
Level 1	3	-	-	10
Level 2	-	-	-	4
Level 3	-	-	-	5
Level 4	-	1	-	7
Level 5	-	-	-	10
Level 6	-	-	1	11
Level 7	-	-	-	35
Level 8	-	-	-	7
Level 9	-	-	-	23
Level 10	-	-	-	46
Level 11	-	-	-	5
	3	1	1	163

Table 6 D. Number of identified specimens per taxon recovered from Area B, Deeptest 3 E 1/2.

Provenience	Ovis/Capra
Artifacts from unsampled context	6
St. I under stone wall south end of trench	25
	31

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TABLE 7. The Elemental Frequencies for Bos in Area B.

Element	NISP	RF
Mandible	1	0.50
Incisor	1	0.17
Premolars	2	0.30
Molar	1	0.17
Cervical Vertebra	1	0.20
Thoracic Vertebrae	2	0.15
Lumbar Vertebra	1	-
Innominate	1	0.50
Humerus	1	0.50
Radius	2	1.00
Calcaneus	1	0.50
Phalanges II	4	0.50
Phalanges III	2	0.25
Femur	1	0.50
	21	5.24

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TABLE 8. The Elemental Frequencies for Ovis/Capra in Area B.

Element	NISP	RF
Cranial	1	-
Incisor	1	0.17
Molar	3	0.25
Teeth fragments	4	-
Lumbar Vertebrae	2	0.30
Innominate	1	0.50
Humerus	2	1.00
Radius	2	1.00
Ulna	1	0.50
Metacarpals	41	20.50
Astragalus	1	0.50
Calcanei	2	1.00
Carpals/Tarsals	16	0.80
Metatarsals	46	23.00
Metapodial	124	31.00
Phalanges I	45	5.62
Phalanges II	2	0.25
Femur	1	0.50
Tibiae	3	1.50
	298	88.39

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TABLE 9. The Elemental Frequencies for Ovis/Capra in Area B, Deeptest 3 W 1/2

Element	NISP	RF
Humerus	1	0.50
Radius	1	0.50
Metacarpals	22	11.00
Astragalus	1	0.50
Calcanei	2	1.00
Carpals/Tarsals	6	0.30
Metarsals	18	9.00
Metapodials	85	21.25
Phalanges I	27	3.38
	163	47.43

Table 10) and were identified as pigeon, (Columba sp.). Table 10 indicates that the 39 pigeon specimens could have been derived from an MNI (minimum number of individuals) of three, or an RF of 19. Table 6B indicates that the pigeon bones were the only faunal remains in Feature 3, a chimney or flue feature that might have been a trap for these birds.

CONCLUSIONS

The archaeofauna from Site 1 of the Washington Street Urban Renewal Area is unique in two respects compared to other faunal assemblages recovered from Manhattan archaeological sites within a similar temporal range. The animal bones from 175 Water Street (Biddick 1983), 80 Broad Street (Greenfield 1985), and the Barclays Bank Site (Amorosi et al. 1985) represent a wide spectrum of species. However, the archaeofauna from Site 1 of the Washington Street Urban Renewal Area is predominantly represented by two species, Bos taurus and Ovis/Capra. All other species are present in trace amounts with the exception of the pigeon. The animal bones from this site appear to be primary butcher waste derived from bovids. The remains recovered from Trench C1E and Deeptest 3 W 1/2 may have resulted from single depositional episodes unlike the multi-depositional or continuous deposition of food refuse recovered from other lower Manhattan sites.

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APPENDIX E

TABLE 10. The Elemental frequencies for Columba sp. in Area B, Feature 3.

Element	NISP	RF
Sacral Vertebrae	2	-
Sternums	2	2.00
Coracoids	4	2.00
Scapulae	2	1.00
Humeri	6	3.00
Radii	5	2.50
Ulnae	4	2.00
Carpometacarpals	4	2.00
Femora	3	1.50
Tibiotarsals	6	3.00
Tarsometatarsi	1	0.50
	39	19.50

APPENDIX 1

The Human Remains from Site 1, of the
Washington Street Urban Renewal Area
By
Bobbi L. Brickman

Four human bones were recovered from the Site 1, of the Washington Street Urban Renewal Area excavation in lower Manhattan in New York in Area C, C1W and C1E, a test trench divided by a wall (Joan Geismar personal communication 1985). However, the material from both sides of the wall is comparable. The metacarpal was found in Trench C1E, whereas the molar, humerus, and phalanx were all found in Area C1W.

HUMERUS - XE-514, Area C Tr.C1 (C1E), Landfill:

Measurements:
maximum length = 17.12cm
maximum diameter = 1.63cm#
minimum diameter = 1.60cm#

(#Taken according to Bass 1971:114-115)

The humerus is from the right arm of an individual. The maximum length recorded for this humerus exceeds the estimated length for five year olds as proposed by Johnston (1962:251), nonetheless, it appears to be a juvenile specimen. Therefore, it is estimated that this individual was between the ages of 5.5 to 7 years. Neither epiphyses were recovered. Consequently, detail of their development in relation to age is impossible. The deltoid tuberosity is not developed, indicating a young individual. This process is dependent largely on the development of the deltoid muscle which attaches on the tuberosity. The more developed the muscle, the larger the tuberosity. None of the other major processes are very well developed, again suggesting a young individual.

The sex of this individual is indeterminate. There is evidence of post-depositional damage on the bone suggesting that the bone was exposed to surface weathering. The bone is slightly burned on the shaft and toward the distal end.

METACARPAL - XE-514, Area C, Tr.C1 (C1W), 5001:

A third metacarpal from the right hand of an individual was also recovered from this deposit. Again, the sex of this individual is indeterminate. The individual appears to be an adult based on the following evidence: the styloid process is very well developed, all epiphyseal endings are fused, and there is lipping on the palmar surface near the head. The attachment surface for the dorsal interosseous muscles is well developed, as is the attach-

ment area on the styloid process for the extensor carpi radialis brevis muscle. This development suggests that this individual bone is of middle age. It also suggests that the individual worked with its hands. Like the humerus from Trench ClE, there is post-depositional surface weathering on the bone.

PHALANX - XE-514, Area C, Tr.Cl (ClE), 1285:

This phalanx is from the first row of either a third or fourth digit. Again, the sex of this individual is indeterminate. The phalanx appears to be well developed and can be estimated to represent an individual over 17 years of age.

MOLAR - XE-514, Area C Tr.Cl (ClE), 1285:

The molar recovered is a maxillary second molar from the left side of the mouth. There is a severe caries on the mesial side adjacent to molar 1 at the enamel root junction. The cusps are quite worn in a pattern that indicates the individual was between 35 and 45 years old (Brothwell 1981:69). There is also a build up of dental calculus (tartar) indicating a lack of proper dental hygiene. The apex of the roots are beginning to form calcium deposits. This could have begun with the death of the tooth while the individual was still alive, or it could represent post-depositional mineral exchange.

In conclusion, the four human bones recovered from Area C vary in estimated age suggesting that they are not from a specific individual. The bones appear to have been redeposited and do not represent a burial. There is also evidence of post-depositional damage and weathering, indicating that these bones were exposed on the surface before deposition at Site 1 of the Washington Street Urban Renewal Area.

REFERENCES

Amorosi, T.
1984 A Study of the Faunal Remains from the Late 19th Century Site at 53rd At Third Avenue on the Upper East Side of Manhattan, NYC In Fifty-Third At Third, Report of Test Excavations for Gerald D. Hines Interest. F.A. Winter. Appendix A. Unpublished Ms. on file at the N.Y.C. Landmarks Preservation Commission and the NYC Municipal Reference Library.

1985 A Guide for the Identification and Aging of Domestic Neo-natal and Juvenile Mammals. Masters thesis: Department of Anthropology, New York University.

Amorosi, T., D.H. Russell and H. Greenfield
1985 The Low and Moderate Priority Faunal Remains from the Barclays Bank Site, 100 Water Street, New York, New York: An Interim Report. Unpublished Ms. prepared for Louis Berger and Associates, on file at the Faunal Laboratory at Hunter College (CUNY).

Bass, W.M.
1971 Human Osteology: A Laboratory and Field Manual of the Human Skeleton. Columba, Missouri: Archaeological Society.

Biddick, K.
1983 An Archaeozoological Study of the Major Domesticates (Pig, Sheep/Goat, Cattle) from the Privies and Other Selected Features at 175 Water Street. In The Archaeological Investigations of 175 Water Street Block: New York City. Prepared by Professional Service Industries, Inc.; Soil Systems Division, J.H. Geismar, ed. pp. 556-600. Unpublished Ms. on file at the New York City Landmarks Preservation Commission.

Boessneck, J.
1970 Osteological Differences Between Sheep (Ovis aries L.) and Goat (Capra hircus L.). In Science in Archaeology. D. Brothwell, and E. Higgs, eds. pp. 331-358. New York: Praeger Publisher.

Brothwell, D.R.
1981 Digging Up Bones. 3rd edition. New York: Cornell University Press.

Brown, J.C., and G.I Twigg
1969 Studies on the Pelvis in British Muridae and Cricetidae (Rodentia). Journal of Zoology, London 158:81-132.

Grayson, D.K.
1984 Quantitative Zooarchaeology. New York: Academic Press, New York.

Grayson, D.K. and D.H. Thomas
1983 Seasonality at Gatecliff Shelter. In The Archaeology of Monitor Valley 2. Gatecliff Shelter. D.H. Thomas et al. pp. 434-438. Anthropological Papers of the American Museum of Natural History 59 (1) New York: American Museum of Natural History.

Greenfield, H.
1985 Zooarchaeological Analysis of the Broad Street Site, Lower Manhattan. In Archaeological Investigations at 80 Broad Street. J. Grossman, ed. unpublished Ms. on file at the New York City Landmarks Preservation Commission.

Johnston, F.E.
1962 Growth of the Long Bones of Infants and Young Children at Indian Knoll. American Journal of Physical Anthropology 22:249-254.

Lyman, R.L.
1977 Analysis of Historic Faunal Remains. Historical Archaeology 11:67-73.

Mercer, R.
1981 Farming Practices in British Prehistory. Edinburgh.

Perkins, D.
1973 A Critique on the Methods of Quantifying Faunal Remains from Archaeological Sites. In Domestikationsforschung und Geschichte der Haustiere. J. Matolsci, ed. pp. 367-70. Budapest: Akademiai Kiado.

Silver, I. A.
1969 The Aging of Domestic Animals. In Science in Archaeology. D. Brothwell, E. Higgs, eds. pp. 283-302. New York: Praeger Publishers.