An Archaeological Evaluation of the Manhattan West Site, New York City

CEQR No. 86-268M
Prepared for Konheim & Ketcham
Prepared by Joan H. Geismar, Ph.D.
August 31, 1987
An Archaeological Evaluation of the
Manhattan West Site, New York City

CEQR No. 86-268M

Prepared for Konheim & Ketcham

Prepared by Joan H. Geismar, Ph.D.

August 31, 1987
# TABLE OF CONTENTS

## ABSTRACT

### INTRODUCTORY SUMMARY AND RECOMMENDATIONS

- Introductory Summary ........................................ 1
- Recommendations ............................................. 11

### SITE DEVELOPMENT AND HISTORICAL CONSIDERATIONS

- The Prehistoric Record ....................................... 12
- The Historical Period ........................................ 16

### THE HUDSON RIVER RAILROAD IN NEW YORK CITY

- General Development ........................................ 31
- The Railroad in the Site Area ................................ 33

### SOIL BORING DATA ........................................... 37

### LANDFILL AND HEALTH IN THE 1860S ........................................... 41

### RECOMMENDATIONS ........................................... 42

### REFERENCES .................................................. 45

### APPENDIX A SOIL BORING LOGS ........................................... 50

## FIGURES

1. Project Location ........................................... 2
2. Project Site Location ....................................... 3
3. Details of 19th Century Topographic Maps .................. 7
4. 1985 Tax Map ................................................ 8
5. Illustrations of Aboriginal Shell Heaps .................... 15
6. Detail of 1808 Bridges Survey ................................ 18
7. Detail of 1868 Sackersdorf Map of Farms .................... 20
8. Detail of 1879 Bromley Atlas ................................ 23
9. Detail of 1879 Galt & Hoy Isometric Map ................... 24
10. Detail of Road Opening Map (no date) ....................... 26
11. Detail of 1899 Bromley Atlas ................................ 28
13. Detail of 1847 Map of the Planned Route of the Hudson River Railroad in the Site Area ........................................... 34
14. Soil Boring Location Plan ................................... 38
15. Subsurface Profiles Based on Soil Borings ................. 40
16. Area to be Monitored .......................................... 43

## PLATES

1. Project site southwest from West End Avenue ............ 4
2. Project site south from 65th Street, 1986 ................. 6
3. Same general view as Plate 2, 1934 ......................... 6
4. View looking north from West End Avenue, 1933 .......... 10

---

Graphic Designer, Kathe Gregory
TABLE OF CONTENTS

PLATES (continued)

5. Same view as Plate 4 from 60th Street, 1933........... 21
6. Detail of Dripps Map, 1867............................... 21
7. Detail of Perris Map, 1862................................. 21
8. View of former Somerindyck Farm, 1862................. 25

Unless otherwise noted, photographs by Joan Geismar

ACKNOWLEDGMENTS
ABSTRACT

The Manhattan West Development site, located between 61st and 64th Streets on the west side of West End Avenue, remained undeveloped shoreline until the mid-nineteenth century. Until now, its development has been mainly if not solely industrial, and, for most of its history, was related primarily to railroads (a major exception is the New York Times Plant that stood on the northern part of the site from the late-1950s until 1976). By 1848, the historic and innovative Hudson River Railroad ran across the site's western periphery, and remnants of its road and track undoubtedly remain under fill. Of particular interest is the embankment built into the Hudson River on the site's western portion in the vicinity of the extension of 63rd Street. Also of interest is the mid-nineteenth century fill that must abut this embankment to the west. Monitoring deep foundation excavations in this area would provide a cost-effective means of viewing and recording the embankment; it would also facilitate collection of a fill sample to determine whether or not health-related municipal laws concerning landfill were observed. A brief monitoring program designed to address these issues without disrupting construction schedules or activities is recommended. Following these recommendations, no impact on significant archaeological resources is anticipated as a result of the Manhattan West project.
INTRODUCTORY SUMMARY AND RECOMMENDATIONS

Introductory Summary

This report presents an evaluation of the historical and archaeological potential of the Manhattan West development site located on the west side of West End Avenue between 61st and 64th Streets. It was prepared for Konheim & Ketcham as part of an environmental impact statement pursuant to the City Environmental Quality Review (CEQR) process. The proposed development is expected to combine residential units and retail stores with underground parking, private and community open space, and a health club.

The site, which is situated on central Manhattan's western periphery (Figure 1), extends about 708 ft. south from the mid-line of the extension of 64th Street to a point just north of the extension of 61st Street; its southern boundary cuts northwest 118 ft. and its western boundary runs north to a point approximately 375 ft. west of West End Avenue on 64th (Figure 2). The entire parcel, which is almost a triangle, covers 176,272 sq. ft. or about 4.05 acres.

At this writing the site contains a commercial parking lot with two unrelated structures fronting on West End Avenue, a Mobil gas station between 61st and 62nd Streets and a one-story concrete block garage near 63rd Street (Plates 1 and 2). In addition, there are two parking lot booths on the site.

While West End Avenue slopes up as it heads north, the site grade remains at the 61st Street level. Consequently, a retaining wall that reaches a height of 23 ft. at its northern end extends from about 63rd to 65th, the length of the New York Times printing plant located here until 1976. A chain link fence runs along this wall
MANHATTAN WEST: Location Map.

- Site location, approx.

0 2 miles

N
Plate 1. View looking southwest from West End Avenue near 64th Street. The view is through the chain link fence that runs north along the Avenue from 63rd Street. Garage on left side of photo (arrow) is located near 63rd Street; the cars in the foreground are parked where the southern portion of the New York Times printing plant was located (photo: 6/25/86).
at street level. The current grade of West End Avenue undoubtedly was established when it was run as an extension of 11th Avenue in the late-1860s (it wasn't until 1894 that it was changed to West End Avenue in the site area). This grade seems to accommodate a natural hill on the east side of the avenue (Plate 3 and Figure 3).

To the west, a drop to the low, flat land that was the site of the former Penn Central yards, now part of the T.V. City development site, marks the landfill used in the late-1860s to reclaim land from the Hudson; still further west, above the landfill, rises the Miller Highway, an extension of 12th Avenue, with the Hudson River and piers beyond (Figure 4).

Although the site land was patented in the late-seventeenth century, its development was late and, until now, mainly if not wholly industrial. Seventeenth-century Dutch grants did not extend this far north, and even after it was patented by the English in 1677, the site remained farmland. Fresh water streams were located north and south of the project site and, as noted above, a series of hills stood to the east where the Amsterdam Houses now stand (see Figure 3).

The first extensive site development occurred in the late-1840s when the Hudson River Railroad was constructed along its western periphery. Throughout its development history, site structures have been related mainly to railroads, the nineteenth-century exception being a three-story building erected between 62nd and 63rd Streets in 1854. At least for a time, this was apparently a laundry but it may also have been a residence.
Plate 2. Looking south from 65th Street and West End Avenue. Note Mobil Station at 61st Street and Con Edison Plant at 59th Street (photo: 6/25/86).

Plate 3. Same general view as Plate 2 (above) taken more than a half century before. New York Central tracks (formerly the Hudson River Railroad) and yard then on the site. Note there are many more lower smoke stacks on the Con Edison building than there are now (NYPL Photographs 1934:1037 C4).
MANHATTAN WEST: Details of 19th Century Topographic Maps Showing the Project Site.

Figure a. Detail of 1854 Harrison & Magraine Topographic Map of Manhattan.

Figure b. Detail of 1874 Viele Map of Manhattan.
project site
dimensions indicated
This railroad use continued until about 30 years ago (Plates 4-5) when the site's most notable structure, the New York Times printing plant, opened in 1959. This four-story building fronted on West End Avenue from 63rd Street to 65th and, although the building is now gone, its basements apparently remain sealed beneath the parking lot.

While it is possible that prehistoric Native American groups may have used the site for temporary hunting and fishing camps, neither its history nor the information from borings suggest that prehistoric sites or historical resources such as early homesteads remain. What these data do indicate, however, is that approximately 200 linear ft. of landfill were introduced between 62nd and 64th Streets in preparation for laying the track bed for the Hudson River Railroad sometime between 1848 and 1849. This in turn suggests that a fill-retaining construction—usually a bulkhead or cribbing but in this case perhaps a seawall and embankment—from that time is located on the site under more recent fill.

Since it is likely that this segment of the site was filled solely to accommodate the railroad track, this construction undoubtedly abuts later fill to the west (based on deeds and other data, water lot grants west of the site were filled five to twenty years after the railroad was built). Foundation excavations that extend down 22 ft. or more below grade and are within 100 feet of the 63rd Street mid-line in the western portion of the project site should reveal evidence of the method used to create the track bed and retain the fill. They would also provide the opportunity to sample and compare fill from this mid-nineteenth century shore-
Plate 4. View looking north on West End Avenue (center of photo) in 1933. Low structures and greenery on the west side of the Avenue at 60th Street (foreground) were related to the New York Central Railroad. Sometime around 1930, the building to the left rear of the photo was built as a warehouse and is now the ABC Building located just north of the site between 65th and 66th Streets (NYPL Photographs 1933:1037: A5).

Plate 5. Same as Plate 4, above from 60th Street. The entrance to the New York Central tracks is the foreground between 60th and 62nd Streets, apparently just north of the greenery shown in foreground of Plate 4 (NYPL Photographs 1933:1037 B6).
line site with that from earlier Manhattan fill sites along the East and Hudson Rivers. This kind of research could be done during a brief monitoring period coordinated with construction activities (see Figure 16 for location of area of concern). Beyond the recommendations made here, no impact on significant archaeological resources is anticipated.

Recommendations

Given the site's situation, history, and development, combined with its current development plans, a brief foundation monitoring program is recommended; its goal and design would be to document the method used in constructing the track bed for one of the city's earliest railroads, a major engineering feat in its time. It would also offer the opportunity to sample mid-nineteenth-century fill from this Hudson River shoreline site. It is a program limited to a specific portion of the site (see Figure 16) and can be coordinated with planned construction activities. In addition, although there is no indication that Native American camps or deposits were located on the site, it is possible that isolated shell piles or "middens" (discarded shell refuse often combined with other aboriginal trash) might be uncovered during foundation excavations. In the event this may occur, an archaeologist should be on call to record and sample any such deposits uncovered during these excavations. This could be done quickly with little or no disruption to construction schedules.

The findings and recommendations presented here are based on the detailed information presented in the following sections.
SITE DEVELOPMENT, PREHISTORIC AND HISTORICAL CONDITIONS

The site's development and use are considered in two phases: the prehistoric period before European contact and the historic or post-contact period. The former conceivably covers as many as 14,000 years, the latter the past 350. While reconstruction of the historical period is possible through various documents, the assessment of the site's prehistoric potential is based on early-twentieth century archaeological literature, some more recent analyses, and speculation. The sources researched for historical data include the Municipal Archives, the Manhattan Borough President's Office (topographic bureau), various city agencies, and the libraries of the New York Historical Society and the Engineering Society as well as the New York Public Library, the New York Society Library, the Jervis Library in Rome, New York, and the author's private collection. It also entailed interviews and communication with representatives of The New York Times and Metro North Railroad.

The Prehistoric Period

Over the last century, archaeological investigation has revealed that metropolitan New York was continuously if sparsely inhabited by aboriginal populations at least since the retreat of the last glacier 10,000 to 12,000 years ago. On Manhattan, most evidence for prehistoric Native American use or occupation has been found on the northern part of the island (Skinner 1915: 52). While a single arrow point was found at 81st Street and the Hudson River (Skinner 1915:52), there are no recorded sites or finds in the immediate project area. However, many of the
sites recorded in Manhattan were discovered during late-nineteenth and early twentieth century development, particularly street grading (e.g., Skinner 1915:50-52). While significant development has occurred on the site since the late-1950s (such as construction of the New York Times plant), streets have never been run through it.

From New York City's early excavations and from more recent investigation of aboriginal sites beyond Manhattan, patterns of land use have been reconstructed. In addition to maize or corn production, which may not have been introduced in the area until contact (Ceci 1977), Native American populations tended to define specific activity or use areas, such as the extensive burial ground at Tottenville on Staten Island (Jacobson 1980) or the hunting or fishing camps located throughout the metropolitan area (Skinner 1915:50-52; 1909). Although "villages" are documented in the literature, those such as the Canarsie site in Brooklyn (e.g., Bolton 1920:313), probably date to the early post-contact period rather than prehistoric times (Ceci 1977).

With the exception of Inwood Park on Manhattan's northern tip, where extensive shell piles or "middens" still exist and where rock shelters are known to have been reused over time, sites documented on Manhattan are mainly transient but perhaps revisited camps used during hunting and gathering forays. (Just recently, during the refurbishing of Liberty and Ellis Islands, extensive Native American shell middens were accidentally uncovered and recorded by the National Park Service but have not yet
been dated [Pousson 1986]; these may also be examples of sites intermittently visited over long periods of time.) In addition, occasional isolated finds such as stone points (like the one mentioned above found at 81st Street) or tools are documented.

At the turn of the present century, shell heaps and deposits (Figure 5), burials, and hearths were documented on both the east and west sides of upper Manhattan (Skinner 1915: 49-51). Moreover, long-established aboriginal trails are believed to have traversed the island from its southern to northern ends, with a major trail running through what is now Central Park (Bolton 1922:Map I). To date, however, no sites have been documented along the island's Hudson shore. One explanation for this may be that more protected sites were sought (e.g., Bolton 1922:42), but summer breezes from the river would undoubtedly have been as attractive to Native Americans as they are to the city's current occupants and estuarine food resources, such as fish, shellfish, and water birds, would not have been ignored.

Skinner noted that small temporary camps were probably once located wherever springs or small brooks emptied into the East or Hudson Rivers (Skinner 1915:52). Rather than being non-existent, it is more likely that these transient camps have been lost during development. A major aspect of development along the Hudson shore was the filling episodes that have occurred in the project area since the mid-nineteenth century, activities that conceivably would have protected rather than destroyed these sites.

Because development has only partially occurred on the site, data from borings are important in assessing the like-
MANHATTAN WEST: Illustrations of Aboriginal Shell Deposits (Middens) or Pits.

Figure 5a. Diagram of a typical shell deposit (Skinner 1915:13).

Figure 5b. Cross section of a shell pit (Skinner 1915:14).
lihood of finding intact evidence of aboriginal use or occupation. The twelve borings recently drilled by Testwell Craig Test Boring Co., Inc. in preparation for current development (some of them including continuous samples to aid in the archaeological assessment [see Soil Boring Data and Appendix A]) revealed no evidence of aboriginal use. They did, however, indicate that portions of the site's western periphery contained 22 to 28 ft. of fill (see Appendix A, Borings B5, B6, B10, and B11).

Since topographic maps from the last century indicate that fresh water was available just north and south of the project site (see Figure 3), and since the shoreline in the site area included a small lagoon or bay (see Soil Boring Data below) that might have been attractive to Native American hunters and gatherers, it is possible that foundation excavations will uncover some deeply buried evidence of transient prehistoric use. Since the Manhattan West Site contains deep fill, the most significant evidence for this use would be shell heaps or middens left by Manhattan's Native American hunters and gatherers. Exploration for isolated aboriginal artifacts is not a viable option.

The Historical Period

Until the tracks of the Hudson River Railroad were laid in 1848, the project site was undeveloped farmland bordering the Hudson River. No Dutch grants had been issued north of Great Kill, a stream that entered the Hudson at what is now 42nd Street. In 1677, the land that included the project site was
first patented to Thomas Hall, Jan Vigne, Egbert Wouters, and Jacob Leedsite [Leendersen] who initially received "upwards of 500 acres" north of the Great Kill (42nd Street) (Stokes IV 1922: 265); apparently a second grant increased this holding to about 1000 acres (Stokes VI 1928:125) and included land along the Hudson almost to 89th Street. Hall, who acquired Lots 3 and 4, the part of the grant that included the project site, owned a great deal of land on Manhattan and is believed to have been among the island's first English settlers (e.g., Stokes IV 1922:81). Over the next half century, Hall's land passed first to Theunis Cornelissen Stille and then to John Harpendink who apparently sold it to Etienne de Lancey in 1729 (Stokes IV 1922:139).

This property remained in the illustrious de Lancey family --among whom were a member of the King's council and a Lieutenant Governor of the Province of New York (Mott 1908:81-82)--for three generations. In 1779 it was confiscated from James de Lancey the younger, Etienne's grandson and a British sympathizer. In 1785, when it was bought from the Commissioners of Forfeiture by John Somerindyck [Somerindike], a grocer (Liber of Deeds [hereafter LD] 85:295), the property included a dwelling house probably built by Etienne's son, Stephen, which was located between what is now 61st and 62nd Streets where 10th Avenue has been run (Stokes VI 1928:140). Another building, a barn, was situated just to the east, however, no structures are indicated directly on the project site (Figure 6).

In 1809, nineteen years after Somerindyck's death, the 318-acre farm that stretched along the river from 57th to 70th
MANHATTAN WEST: Detail of 1808 Bridges Survey of the Somerindyck Farm. Mid-18th century dwelling and barn circled.

- project site, approx.
- Somerindyck dwelling (d)
- and Barn (b) circled

no scale given
Streets (Mott 1908:81) was divided among his five children (Conveyance Index Prior to 1917:Book 128). The portion that included the project site was allocated to a daughter and son: Margaret, the wife of William A. Hardenbrook, a grocer like his father-in-law, received the lots between 61st and 63rd Streets while George W. Somerindyck acquired those between 63rd and 64th (LD 85:295ff; Sackersdorf 1868, Figure 7 this report). Through a series of foreclosures and sales, both holdings were acquired first by John Low and then, after his death in November of 1852 (New York Evening Post), through inheritance by his daughters Julia Ann and Susan and his son William P.

John Low's extensive property included "Locust Grove," a large house located southeast of the site. Called "Low's Wood," this land, which included the site, was a favorite picnic spot even after the advent of the Hudson River Railroad in 1848 (Mott 1908:12). In this year, track for the new railroad followed the shore to 62nd Street where it angled east to 11th Avenue (see Figure 13). Julia and Susan, who remained unmarried, held the land east of the track while their brother's holding was west of it and included the rights to adjoining water lots. Susan parcelled her land between 62nd and 63rd Streets and in 1854, a Samuel Leetch acquired two lots and built the site's first structure (LD 636:75ff; Tax Rolls Ward 22 [hereafter TR] 1854).

Maps from the 1860s and early-1870s show Leetch's three-story structure, but its exact location is a question. It appears from the deed description that the Dripps map (Plate 6) is less accurate than the Perris (Plate 7), but even on the Perris the parcel may be too far south.
MANHATTAN WEST: Detail of 1868 Sackersdorf Map of Farms based on 1815 map. This is an 1887 reprint.

Note: although southern portion of the project area is shown as belonging to William Hardenbrook, it actually belonged to his wife, Margaret Somerindyck.
Plate 6. Detail of Dripps Map of New York City and Vicinity (1867). Note 3-story building on south side of 63rd Street (arrow). This location appears to be north of the description of the property in the deed to Samuel Leetch in 1854 (Map, NYPL Map Division). Site outlined in black.

Plate 7. Detail of Perris Maps of New York City (1862). Note the only structure on the site is a 3-story building (arrow) between 62nd and 63rd Streets. The location of the building, apparently a laundry and dwelling in 1854 appears more accurate than that shown on the later Dripps map (see Plate 6, above). (Map, NYPL Map Division). Site outlined in black.
The only listing for Leetch is in the 1854 *New York Directory* which indicates the building was a laundry, but since no other address is given as his residence, it may also have been his home. This building, which was apparently a rental property, passed through several hands until it was replaced by a large, two-story structure indicated on maps dating from 1879 (Bromley 1879; Galt and Hoy 1879, Figures 8 and 9 this report).

Between 1852 and 1869, while the area was still bucolic (Plate 8), the rights to land under water to the west were acquired by owners of the project site and others; this included John Paine, William Blodgett, and John Wetmore who had purchased land from the Lows (LD 1312:235ff) and water lot grants from the city (e.g., Grants of Land Under Water Liber I:414, 496).

Maps document that streets between 59th and 65th from 11th to 12th Avenues were graded and therefore filled by 1869 (e.g., Figure 10), indicating that the land west of the site was reclaimed from the Hudson by this time. Above 65th Street, this was not yet the case (Map, Borough of Manhattan President's Office 1868:#2429) and even earlier landfill may have been introduced directly on the site to accommodate the railroad (see below). A map of the proposed route indicates the track bed ran just offshore in a lagoon or bay-like area in the vicinity of 63rd Street (See Figure 13). A report on the plan suggests that in the vicinity of 63rd Street this track was to run on an embankment created by a stone seawall and fill (Jervis 1846:4-5; see below).
Structures indicated between 61st and 63rd Streets are shown isometrically on the contemporaneous Galt & Hoy map (see Figure 9).
Two-story structure located between 62nd and 63rd Streets is circled. Other structures shown between 61st and 62nd Streets are not documented in tax records.
Plate 8. View of the former Somerindyck Farm looking north from what became Columbus Circle. While the site is to the west beyond this 1862 view, the general bucolic nature of the area undoubtedly extended west despite development that included the Hudson River Railroad. What appear to be skaters in Central Park to the far right seem incongruous with the warm-weather dress and activities of the people depicted on the left hand side of the picture (Mott 1908:opposite page 80).
Although undated, information on the map indicates it post-dates 1869. Note that 12th Avenue in the site area was opened by this year, indicating the land was filled by then.
In addition to the double tracks that crossed the site by 1848 and expanded over time, stock and freight yards were located on landfill west and south of the site by 1879 and other industries had sprung up to the south and north (Bromley 1879; see Figure 8 this report). As noted earlier, by this time a large, two-story structure had replaced Leetch's building (TR 1879; see Figure 9 this report); a Gill & Mansfield are listed on the tax rolls for this property, the former a millwright, the latter a feed dealer (New York Directory 1877). At about this same time, several one-story frame and brick structures briefly stood between 63rd and 64th Streets (e.g., Perris & Browne 1871). It is possible this development was at least indirectly related to the railroad's function and expansion. Deed restrictions imposed by Julia and Susan Low against noxious development such as slaughter houses or tanneries (e.g., LD 1066:7ff) may have helped limit the project site to this kind of use.

Over time, an elevator works, a bakery, stables, and garages coexisted with one- to three-story buildings and vacant lots to the east and north while railroad development intensified on and to the west of the site (Bromley 1899, Figure 11 this report). This development continued through the first half of the twentieth century (see Plates 3 and 4). By this time, low structures such as loading platforms were built to service the railroad (New Building Plans [hereafter NB] 1528-05, 371-12, 1314-12, 105 to 107-30).

To take advantage of the shipping facilities provided by what was by then the New York Central Railroad (Harris 1986:
MANHATTAN WEST: Detail of 1899 Bromley Atlas

Note intensified railroad track construction and the location of stock yards. Note also that structures between 61st and 63rd Streets on earlier maps are gone (see Figures 8 and 9).
personal communication), the New York Times filed plans in 1956 for a printing plant on the site that ultimately was to have included a fourteen-story tower to accommodate the paper's entire operation (NB 138-56). In 1959, a four-story segment of this complex was opened (Figure 12), but the tower was never built (Rothman 1986: personal communication). Apparently the basement of this now-demolished building remains sealed beneath the parking lot, a situation noted by the tenant of the garage at 63rd Street and supported by the conditions recorded in borings (see Borings B2, B3, B4, B7, and B8, Appendix A).

In 1976, seventeen years after printing operations began, the plant closed (Rothman 1986: personal communication). The year before, Donald Trump had been given an eight year option on the property, and in 1982 it was picked up by Helmsley-Spear (Purnick 1982). At that time, a consortium of investors proposed the Lincoln West development that included the project site (Konheim & Ketcham 1987: personal communication). Currently, the development proposed by the Brodsky Organization includes residential buildings with ground-level neighborhood retail stores above a parking garage; it also incorporates a large health club, a public park between 63rd and 64th Streets, and private open space (Konheim & Ketcham 1987: personal communication).

Reconstruction of the site's history indicates from its initial development in the mid-nineteenth century until now it has been mainly industrial. The only facet of this development of historical significance relates to the mid-nineteenth century construction of the Hudson River Railroad that ultimately linked
New York City to Albany via a land route. A brief general 
history of the Hudson River Railroad and its relation to the 
project area will be found in the following section.

THE HUDSON RIVER RAILROAD IN NEW YORK CITY

General Development

The site's initial and major development depended on the 
mid-nineteenth-century introduction of the Hudson River Rail-
road, later part of the New York Central Railroad. Although the 
Vanderbilt name is associated with the New York Central Railroad 
and is found in the conveyance history of the project site (e.g., 
LD 497:306), Cornelius Vanderbilt was not an organizer of the 
Hudson River Railroad and did not become involved with it until 
after it was a successful venture.

The Hudson River Railroad was intended to provide an over-
land link between Albany and New York City and was under consi-
deration as early as 1832 (Carter 1909:180) or about the same 
time the Harlem River Railroad to the east was chartered (Anon. 
n.d.). Finally, in May of 1846, after several aborted attempts 
to get action, the state legislature incorporated its charter and 
authorized construction of a roadway between New York and Albany 
(Stokes V 1926:1798). A stipulation was that this new enter-
prise, then the most costly railroad in the United States (White 
1986:personal communication), would not infringe on the Harlem 
River Railroad. One month later, the entire capital stock of 
$3,000,000 had been subscribed, mainly in New York City (Carter 
1909:180), but two subsequent extensions for starting deadlines 
indicate that work was initially delayed.
In May of 1847, the city's Common Council permitted the railroad to "construct a double track along the Hudson River from Spuyten Devil [sic] Creek to near 68th Street occupying 12th Avenue where it lies along the shore, thence winding from the shore to intersect the 11th Avenue at or near 60th Street..." (Stokes V 1926:1803). From here it was to run through the middle of the avenue to 32nd Street, a route that became known as Railroad or "Death" Avenue (NYPL Photographs 1933:1037 A4). It then was to curve to 10th Avenue at 30th Street where it would run on the avenue to West Street (Stokes V 1926:1803). (It should be noted that steam engines were prohibited below 30th Street and horses were used to draw the train between 33rd and Chambers Streets [Stokes V 1926:1803]). On the 30th of September, 1849, a locomotive ran the 48 miles from 30th Street to Peekskill (Stokes V 1926:1822). By October, 1851--with its first station at Chambers Street and College Place--the railroad was ready for passengers.

In 1853, apparently in response to agitation over the unexpected competition the railroad presented to the Erie Canal, consolidation of ten independent railroads made history, and the New York Central Railroad was formed (Carter 1909:180-181). Its charter was for 500 years and its capital was fixed at 23 million dollars. It wasn't until 1863 that Cornelius Vanderbilt, by then a multi-millionaire from his ferry and steamship lines, became involved with the Hudson River Railroad. Five years later, after he had maneuvered a takeover of the New York Central, the Hudson River Railroad merged with it. At about
this same time, in his drive to improve the railroad, Vanderbilt erected the first Grand Central Station at 42nd Street and a depot for the Hudson River Railroad at once-fashionable St. John's Park in what it now-TriBeCa.

Nineteenth-century maps show a steady increase in trackage on and around the site; this included tracks laid on the more recently filled land just west of the project site (for example, compare the 1854 Harrison & Magrane Map, Figure 3a this report, with the 1879 Bromley Map, Figure 8). By the time the New York Central merged with the Pennsylvania Railroad in 1968, the original Hudson River tracks were no longer in operation (Kaplan 1986:personal communication). As noted in the historical section, in the first decades of the twentieth century most if not all the site's development continued to center around railroads and included platforms and other low structures to service them (see Plates 3 and 4).

The Railroad in the Site Area

Deeds document the Hudson River Railroad's land acquisition in the site area in 1848 (e.g. LD 502:102, 502:104, 497:306), and an 1847 route map indicates its planned location on the site (Figure 13). In the vicinity of 63rd Street, this was just off shore and would have required some kind of landfill to lay the track. Although no plans have been found, contemporary reports provide some information about this undertaking and a treatise on nineteenth-century engineering techniques offers additional clues. For example, John B. Jervis, the chief engineer of the project (and, incidentally, of the Croton water
MANHATTAN WEST: Detail of 1847 Map of the Planned Route of the Hudson River Railroad in the Site Area

Note areas of fill in the vicinity of 63rd Street (based on Map 475, Manhattan Borough President's Office, Topographic Bureau).
system), published reports before and after the railroad was built; the earlier of these was obviously promotional and perhaps must be approached with a degree of caution. In addition, he kept a journal that documents work on the railroad but does not mention the site area specifically; however, it does indicate that work in Section 1, which included the site, proceeded well, and by January 1, 1849, preparation for the superstructure was almost complete (Jervis 1847-1859:189).

Prior to construction, Jervis described the river's shore as "generally favorable for an embankment where it is necessary" (Jervis 1846:3). This included areas between points of land such as those found north and south of 63rd Street where embanking was required to keep the track route straight (Figure 13). Of special interest is his comment that "the depth of water, as far out as the embankment will extend...mostly or entirely in the river, is generally from one to two feet at ebb tide; and in no place [along the shore] exceeds three feet" (Jervis 1846:3-4). This implies a relatively simple maneuver although, for reasons of safety, the line's road was to be wide (Jervis 1846:9, 18), entailing the construction of substantial foundations to support embankments. For a distance of about ten miles above 14th Street, 190,000 cubic yards of embankment and 29,000 cubic yards of protective walls were planned (Jervis 1846:23).

What had sounded simple in plan turned out to be more complicated in practice. Land acquisition was costly and difficult, the river banks rugged and irregular, and the river bottom uncertain (Jervis 1850:4-5). Another problem concerned the in-
experience of the many contractors involved—it was a new kind
of engineering undertaken under difficult conditions—but by
September 1, 1847, the project was mainly contracted.

The following is a description of the planned embankment
construction that theoretically applies to the project site:

...it was necessary, in all earth work, to con-
struct a river wall, to protect the earth from
being carried away by the surf from the river...
an artificial foundation is made by filling in a
mass of loose stone, which is brought up to low
water level, and then levelled off and the wall
commenced. The wall is about seven feet thick at
the base, and three feet at the top (Jervis 1850:
5).

Jervis notes that excavated earth and rock were used to
form embankments; this increased the cost of excavation but
prevented the countryside from being mutilated to provide
materials (Jervis 1850:7). He does not, however, describe the
timber framework or "sheet piling" recommended by some late-
nineteenth-century engineers to support embankments and provide
stability (Gilespie 1871:167-168). In addition, it should be
noted that concave fill levels, no more than 3 ft. thick, were
also recommended (Gilespie 1871:167-168). Jervis undoubtedly
knew of these techniques and may have used them. Unfortunat-
ely, his journal, mentioned earlier, does not reveal the specific
construction methods used in the site area (Jervis 1847-1849).

Among the general engineering problems encountered were
the rugged shoreline and the difficulties of running and main-
taining the line in the numerous bays (Jervis 1850:8). There-
fore, it is possible some contractors may have found it neces-
sary to use timber to fashion and stabilize embankments. If so, these constructions would differ from those planned by Jervis, and the fill, which conceivably would not be randomly deposited but layered, would contrast with that deposited solely for land reclamation.

Comparison of water levels and fill depths suggests that a great deal of fill has been introduced across this portion of the site. This is based on the 1 to 3 ft. water depth at ebb tide noted by Jervis, and the fill depths recorded in borings from the site's western periphery (14 to 28 ft. below the current surface). Foundation excavations in this area should determine whether portions of the fill are systematically deposited for embankment construction or merely randomly deposited for land reclamation. If deep enough, they might also reveal the techniques used to support the railroad embankment that ran approximately 100 ft. north and south of the 63rd Street mid-line.

**SOIL BORING DATA**

As noted earlier, in preparation for construction twelve borings were sampled to bedrock by Testwell Craig Test Boring Co., Inc. To recover information about subsurface conditions for the archaeological evaluation, several of the borings were sampled continuously rather than at the 5-ft. intervals usually acceptable for construction purposes. These included borings B5, B6, B9A, B10, B11, and B12 (Figure 14 and Appendix A). Boring B9A was drilled adjacent to B9 where interval sampling had recovered a shell 6 ft. below the surface (because of site
- BORING LOCATION

- BENCH MARK

- Project Site

dimensions as indicated
conditions, B9 was terminated at 17 ft. and not taken to bed-
rock). The continuous sample from B9A indicated that the shell
from B9 and another from B9A were part of a fill deposit that ex-
tended approximately 16 ft. below the surface and was not of any
cultural significance. Moreover, a basement floor from an uni-
dentified building and boulders were encountered under this fill,
further negating any prehistoric associations for the shell.

The location of B12 just north of 61st Street was in part
chosen on the basis of the 1874 Viele map that indicated this was
the site's only hilly area. Because of this, it was thought
prehistoric hunters might have chosen to camp there or use it as
a place to spot game (see section on prehistory and Figure 3b).
The soil boring data did not provide any evidence of this kind of
use, but did indicate bedrock was about 10 ft. higher here than
elsewhere on the tested portion of the site (Figure 15, CC).
However, this may only have been a minor surface elevation since
the 1854 Harrison & Magrane topographic map, which generally
appears more reliable than the Viele, does not indicate a hill at
this location (compare Figures 3a and 3b, this report).

Several borings revealed empty space beneath the surface of
the demolished New York Times printing plant site (see Appendix
A, B2, B3, B4, B7, and B8) where demolition debris was expected.
This void tends to support information from the tenant of the
garage at 63rd Street that equipment from the plant, which would
have been costly to remove, is sealed beneath the parking lot.

In terms of an archaeological assessment, the most im-
portant information came from B10 in the western portion of the
MANHATTAN WEST: Subsurface Profiles Based on Soil Borings
(Testwell Craig 1986)

**SECTION A-A**
- Fill (Sand, Gravel, Cinder, Brick & Concrete Fragments)
- Sand & Silt, Some Gravel
- Boulders & Decomposed Rock
- Intermediate To Hard Rock

**SECTION B-B**
- Fill (Sand, Gravel, Cinder, Brick & Concrete Fragments)
- Void (Localized)
- Concrete
- Void (Localized)
- Concrete & Wood
- Intermediate To Hard Rock

**SECTION C-C**
- Fill (Sand)
- Sand & Silt, Some Gravel
- Intermediate To Hard Rock

**NOTES**
1. Elevations are based on surveyor's sidewalk cut (located at SE Corner of property line) at assumed elevation of +100 feet.
2. See Fig. 1 for location of Sections.
3. Elevations and thickness of Soil Strata between borings are estimated and may vary from the condition above.

Horizontal scale as indicated above
site just south of 63rd Street (Figure 14 and Appendix A). Continuous sampling indicated 27 ft. of miscellaneous fill overlying 13 ft. of an offshore deposit of silt and sand containing fragments and traces of shell above river sand (B10 Appendix A; Messergell 1986: personal communication). These findings indicate this portion of the site was once part of the river and support the shoreline configuration shown on the 1847 map of the Hudson River Railroad (see Figure 13).

It appears that filling would have been required to accommodate approximately 200 ft. of track planned just off shore in the vicinity of 63rd Street. Consequently, this lagoon-like, offshore area of the site constitutes the first fill episode in the project area, one that would have included a landfill-retaining construction. As noted earlier, in this case it may have been a stone seawall or it may have incorporated timber supports and planking (see Section on Hudson River Railroad).

Within two decades, this fill was extended to reclaim land west of the site from the Hudson River (see Historical section). It is possible that some of this later fill will be found along a small portion of the site’s western periphery, beyond the track bed.

LANDFILL AND HEALTH IN THE 1860S

Over the last eighteen years, and particularly in the last decade, archaeologists working in Manhattan have collected unprecedented data about eighteenth and early-nineteenth-century landfill techniques and practices (e.g., Geismar 1983; Huey 1985; Klein 1986; Pickman and Rothschild 1981; Rockman et al. 1983;
A recent comparison of these fills suggested that municipal laws instituted to protect the city's inhabitants during Yellow Fever epidemics (ca. 1795-1822) were most stringently observed during periods when these epidemics were annual events. But even then, laws were flouted (Geismar in press).

To date, little is known about mid-nineteenth century fill except that laws were still in effect (e.g., Morton 1860:70) but noxious conditions apparently continued to prevail (Smith 1866:304). Briefly testing landfill from the western portion of the project site would provide the opportunity to document the relative amount of refuse in the fill and compare it with earlier samples. This kind of quantitative information is not available in records and could be recovered easily and quickly during monitoring of deep foundation excavations at the Manhattan West Site.

RECOMMENDATIONS

Foundation excavations in the vicinity of 63rd Street on the western portion of the site may cut into remnants of the mid-nineteenth century Hudson River Railroad track bed preserved under fill. This track ran on fill approximately 100 ft. north and south of the extended mid-line of 63rd Street in the western portion of the site (Figure 16). In this area, which originally was just offshore, an embankment was constructed to maintain a straight road bed, but the techniques used to create it remain speculative. Monitoring of dewatered pile-cap excavations or other deep shafts or trenches (22 or more ft. below the surface --or at elevation +1--in the area of concern) might provide a "window" to view and record the construction methods used in
MANHATTAN WEST: Area to be Monitored

-approx. area to be monitored
--- Project Site

base map Figure 14

0 150 ft.
building this segment of an historic, innovative railroad line. In addition, it would provide the opportunity to collect a sample of mid-nineteenth century landfill which would expand our knowledge about materials used to reclaim land in this time period. Perhaps most importantly, it might determine whether municipal laws instituted to protect the health and well-being of the city's inhabitants were observed or flouted (the latter was the case in the mid- to late-eighteenth century).

The recommended field program would be designed to address these issues without delaying construction schedules or hampering construction activities. Recently, this kind of investigation has been successfully undertaken both in Manhattan (e.g., Geismar and Shmookler 1985) and London (e.g., Bateman and Milne 1983). Following the recommendations made in this report, no impact on significant archaeological resources is anticipated as a result of the Manhattan West project.
REFERENCES


Buck/Cane, Architects 1986 Personal communication. 232 East 28th Street, New York.

Carter, Charles Frederick 1909 When railroads were new. Henry Holt & Co., New York.


Conveyance Index Prior to 1917 Misc. City Register's Office, 31 Chambers Street, New York.
REFERENCES (continued)

Dripps, Matthew

Galt and Hoy
1879 Map of the City of New York. New York Public Library Map Division.

Geismar, Joan H.
in Landfill and health, a municipal concern. Northeast Historical Archaeology 15.

Geismar, Joan H. and Leonid Shmookler

Gilespie, William
1871 A manual of the principles and practice of road-making comprising the location, construction, and improvement of roads (common, macadam, paved, plank, etc.) and rail-roads. A. S Barnes & Co., New York.

Grants of Land Under Water (GLOW)

Harris, Leonard

Harrison, J. F. and T. Magrane
1854 Topographical map of New York City north of 50th Street. Three sheets. New York Public Library.

Huey, Paul R.

Jacobson, Jerome
REFERENCES (continued)

Jervis, John B.


Kaplan, Noah
1986 Personal communication. Supervisor, Customer Correspondence Unit, Metro-North, New York.

Klein, Terry
1986 Personal communication Re" The Barclays Bank Site. Louis Berger and Assoc., Inc., East Orange, New Jersey.

Konheim & Ketcham

Liber of Deeds (LD)
Misc. City Register's Office, 31 Chambers Street, New York.

Maps, Borough of Manhattan President's Office (BMP)
1868 Accession #2429. Borough of Manhattan President's Office, Municipal Building, New York.

Map of the Line of the Hudson River Railroad as Located in the County of New York.
1847 Map 475. Borough of Manhattan President's Office, Topographic Bureau, Municipal Building, New York.

Map of Street Openings 54th Street to 154th Street, New York City.

Massergell, Gail
1986 Personal communication. Geologist. Test-well Craig Test Boring Co., Inc., Cape May, New Jersey.

Morton, George W. (compiler and annotator)

Mott, Hopper Striker
REFERENCES (continued)

New Building Plans (NB)

New York City Tax Map
  1985 Block 1171. Tax Department, Municipal Building, New York.

New York Directories

New York Evening Post
  1852 John Low death notice (died November 19, 1852). November 20, 1852.

NYPL Photographs

Perris, William

Perris & Browne

Pickman, Arnold and Nan Rothschild

Pousson, John

Purnick, Joyce

Rockman, Diana d'Z., Wendy Harris, and Jed Levin

Rothman, Jack
REFERENCES (continued)

Sackersdorf, Otto

Skinner, Alanson

1909 The Lenape Indians of Staten Island. Anthropological papers of the American Museum of Natural History 3 (9).

Smith, Carlyle S.

Smith, Stephen

Stokes, I. N. P.

Tax Rolls, 22nd Ward (TR)
Misc. Municipal Archives, 31 Chambers Street, New York.

Testwell Craig Test Boring Co., Inc.

Viele, Egbert L.
1874 Topographical atlas of New York showing original water courses and made land. New York Public Library Map Division.

Wall, Diana diZ. and Roselle Henn (co-principal investigators)
1986 Personal communication Re: The Assay site. (Wall, graduate student, Department of Anthro., New York University; Henn, graduate student, Department of Anthro. CUNY).

White, John H.
FIELD SOIL TEST BORING DATA
Lehrer-McGovern
West End Avenue & 60th Street
Manhattan, New York

DATE: August 28, 1986
LAB. NO.: 2291

Prepared For: Lehrer-McGovern
387 Park Avenue
New York, N.Y. 10016

Prepared By: Testwell Craig Test Boring Co., Inc.
P.O. Box 477
Mays Landing, N.J. 08330
August 28, 1986

Lehrer/McGovern
387 Park Avenue
New York, N.Y. 10016

Attn: Mr. Peter Dunsay

Re: Subsurface Investigation
Manhattan West Project
West End Avenue
Manhattan, New York

Dear Mr. Dunsay,

Pursuant to your request we have performed subsurface investigation for the above referenced project and herein present our findings.

As planned, a total of twelve (12) borings were performed. Boring locations are indicated in the boring location plan (Figure 1). A record log sheet for each boring is also attached for your reference.

SUBSURFACE CONDITION

The subsurface condition of the project site is briefly described below in a narrative form, reference is made to Figure 2 - a graphic representation of the subsurface profile.

Stratum 1 - At the surface is an asphalt and concrete pavement or slab-on-grade overlying miscellaneous fill. The fill ranges from six (6) to forty (40) feet and contains sand, gravel, cinders, brick and concrete fragments.

Stratum 2 - Beneath the fill is glacial till and/or glacial drift. Generally, the till is composed of brown coarse to fine sand, silt (primarily non-organic), and some coarse to fine gravels. This stratum covers only the West half of the site.
Stratum 3 - Beneath the till or fill is bedrock. The rock is Manhattan Schist and varies from intermediate to hard in classification. Each boring was terminated at a depth of 10 feet in the rock.

We hope that the above information would suffice you to prepare the environmental impact statement for the referenced project. Should any further information be needed please do not hesitate to contact our office.

Respectfully submitted,

TESTWELL CRAIG TEST BORING CO., INC.

F. Gordon Craig
Division Manager

Attachments: Figure 1
Boring Location Plan
Figure 2
Subsurface Profile
Boring Legend Sheet
Boring Logs
NOTES:
1. Elevations are based on surveyor's sidewall cut (located at SE Corner of property line) at assumed elevation of +100 feet.
2. See Fig. 1 for location of Sections.
3. Elevations and thickness of Soil Strata between borings are estimated and may vary from the condition shown.

**SUBSURFACE PROFILE**

TESTWELL CRAIG TEST EORING CO. INC.
MAYS LANDING, NEW JERSEY

CR. BY: SL | FIG. NO.: 2 | LAB. NO.: 2291

CX'D BY: | SCALE: | DATE: 8/20/86
**SOIL**

Bn - brown  
Gy - gray  
Blk - black  
wh - white

**NOTATION**

trace - tr  
some - sm  
adjective - (ly)  
and - &

course grained - c  
medium grained - m  
fine grained - f

**LEGEND SHEET - BORING DATA**

<table>
<thead>
<tr>
<th>SOIL</th>
<th>NOTATION</th>
<th>PERCENT (%) BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bn - brown</td>
<td>Rd - red</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Gy - gray</td>
<td>Or - orange</td>
<td>10 - 20</td>
</tr>
<tr>
<td>Blk - black</td>
<td>B1 - blue</td>
<td>20 - 35</td>
</tr>
<tr>
<td>wh - white</td>
<td>Multi - multi-colored</td>
<td>35 - 50</td>
</tr>
<tr>
<td>Lt - light</td>
<td>Dk - dark</td>
<td></td>
</tr>
</tbody>
</table>

**HSA** - Hollow Stem Auger Casing  
**SS** - Split Spoon Soil Sampler

**PERCENT (%) BY WEIGHT**

<table>
<thead>
<tr>
<th>0 - 10</th>
<th>10 - 20</th>
<th>20 - 35</th>
<th>35 - 50</th>
</tr>
</thead>
</table>
| WOR - Weight of Rods  
WOH - Weight of Hammer  
NR - No Recovery of Sample |

**ROCK**

**ROCK QUALITY DESIGNATION, R.Q.D.**

<table>
<thead>
<tr>
<th>R.Q.D.</th>
<th>Description of Rock Quality*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-25%</td>
<td>Very Poor</td>
</tr>
<tr>
<td>25-50%</td>
<td>Poor</td>
</tr>
<tr>
<td>50-75%</td>
<td>Fair</td>
</tr>
<tr>
<td>75-90%</td>
<td>Good</td>
</tr>
<tr>
<td>90-100%</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

*after Deere et al, 1967
# Field Test Boring Log

**Client:** Lehrer-McGovern  
**Project:** West End Avenue & 60th Street, Manhattan, New York  
**Boring No.:** B-1

<table>
<thead>
<tr>
<th>Depth</th>
<th>Date</th>
<th>Hrs. After Completion</th>
<th>Method</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0'</td>
<td>6-24-86</td>
<td>Comp of Hole</td>
<td>A 4&quot; Hollow Stem Auger</td>
<td>0 to 16.0'</td>
</tr>
<tr>
<td>9.0'</td>
<td>6-24-86</td>
<td></td>
<td>B NX Core Drilling</td>
<td>16.0' to 26.0'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth</th>
<th>No.</th>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>S-1</td>
<td>1.0-3.0'</td>
<td>Misc. Fill: C-M-F SAND, cf gravelly, sm silt/blk, moist, med. dense</td>
<td>Fill 1.0-15.9'</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(cinders)</td>
<td>Class 11-65</td>
</tr>
<tr>
<td>5</td>
<td>S-2</td>
<td>5.0-7.0'</td>
<td>SAME/dense (cinders, concrete fragments)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>S-3</td>
<td>10.0-12.0'</td>
<td>SAME/med. dense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>S-4</td>
<td>15.0-15.9'</td>
<td>C-M-F SAND, sm silt, sm f gravel, bn, moist, v. dense (micaeous)</td>
<td>Class 6-65</td>
<td></td>
</tr>
</tbody>
</table>

**Surveyor's sidewalk cut at S.E. property corner (on West Sidewalk of West End Avenue) assumed elevation +100.0'.**

---

**Driller:** J. Craig
## FIELD TEST BORING LOG

**DATE:** August 27, 1986  
**LAB. NO.:** 2291

**CLIENT:** Lehrer-McGovern  
**PROJECT:** West End Avenue & 60th Street, Manhattan, New York

**Boring No.:** B-2  
**Sheet No.:** 1 of 1  
**Ground Surface Elev.:** 101.5'

### Ground Water Data

<table>
<thead>
<tr>
<th>Depth</th>
<th>Hour</th>
<th>Date</th>
<th>Hrs. After Completion</th>
<th>Method of Advancing Boring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A: Roller Bit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B: Wire Line - NX Core Drilling</td>
</tr>
</tbody>
</table>

### A. Method of Advancing Boring

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2.5'</td>
<td>Roller Bitted</td>
<td>Asphalt, fill and concrete</td>
<td>2.5'</td>
</tr>
<tr>
<td>Run #1 16.5-19.0'</td>
<td>Cored 30''</td>
<td>VOID</td>
<td>16.5'</td>
</tr>
<tr>
<td>Run #2 19.0-20.0'</td>
<td>Rec. 0''</td>
<td>R.12'' C. 12'' CONCRETE</td>
<td>19.0'</td>
</tr>
<tr>
<td>Run #3 21.0-26.0'</td>
<td>Cored 60''</td>
<td>Medium Hard Rock (moderately fractured w/some weathered seams)</td>
<td>20.0'</td>
</tr>
<tr>
<td>Run #4 26.0-31.0'</td>
<td>Rec. 60''</td>
<td>Medium Hard Rock (slightly fractured w/few weathered seams)</td>
<td>31.0'</td>
</tr>
<tr>
<td>Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

1. S: 2' O.D. Split Spoon Sample  
2. U: Undisturbed Sample, 3' Diameter  
3. D: Core Drilling  
4. N.R.: No Recovery  
5. N: Standard Penetration Resistance per 6'' drop (140# Hammer, 30'' drop)

Driller: J. Craig
FIELD TEST BORING LOG

CLIENT Lehrer-McGovern
PROJECT West End Avenue & 60th Street, Manhattan, New York
Boring No. B-3 Sheet No. 1 of 1

<table>
<thead>
<tr>
<th>Ground Water Data</th>
<th>A - Method of Advancing Boring</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>Hour Date Hrs. After Completion</td>
<td></td>
</tr>
<tr>
<td>0 to 9.0'</td>
<td>A Roller Bit</td>
<td></td>
</tr>
<tr>
<td>9.0' to 21.0'</td>
<td>B NX Core Drilling</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth A No. Depth N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Roller Bited</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Run 9.0-12.0' Rec. 15''</td>
<td>CONCRETE</td>
</tr>
<tr>
<td>15</td>
<td>Run 13.0-16.0' Rec. 17''</td>
<td>CONCRETE</td>
</tr>
<tr>
<td>Run #4 16.0-21.0' Rec. 60''</td>
<td>Medium Hard Rock (moderately fractured w/sm weathered seams) Class 2-65</td>
<td>Test Boring Completed @ 21.0'</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'.

1 5.2” O.D. Split Spoon Sample  ■ U - Undisturbed Sample. 3” Diameter  ☐ – Core Drilling  N.R. – No Recovery
N – Standard Penetration Resistance per 6’ (140# Hammer. 30” drop)

Driller J. Craig

All Reports are the confidential property of clients and information may not be published or reproduced without written approval.
FIELD TEST BORING LOG

CLIENT: Lehrer-McGovern  
PROJECT: West End Avenue & 60th Street, Manhattan, New York  
Date: August 27, 1986  
Lab. No.: 2291  
Ground Surface Elev.: 100.3'

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5'</td>
<td>Roller Bit 0-17.0'</td>
<td>Fill: F GRAVEL &amp; cmf sand/multi, wet, (cinders, brick fragments, concrete fragments)</td>
<td>Samples collected from WASH Return</td>
</tr>
<tr>
<td>5-10'</td>
<td>Roller Bit 10.0'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-15'</td>
<td>Roller Bit 15.0'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-20'</td>
<td>Run #1 17.0-22.0' Cored 60” Rec. 45”</td>
<td>CONCRETE ROCK</td>
<td></td>
</tr>
<tr>
<td>20-25'</td>
<td>Run #2 22.0-27.0’ Cored 60” Rec. 60”</td>
<td>Medium Hard Rock (v.slightly fractured w/sm weathered seams @ 23-23.5’)</td>
<td>Rock is Manhattan Schist Class 2-65 27.0’</td>
</tr>
<tr>
<td>25-30’</td>
<td>Run #3 27.0-31.0’ Cored 48” Rec. 48”</td>
<td>Hard Sound Rock (v.slightly fractured w/v.few weathered seams)</td>
<td>Test Boring Completed @ 31.0’</td>
</tr>
<tr>
<td>30-35’</td>
<td></td>
<td>Surveyor’s sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0’.</td>
<td></td>
</tr>
</tbody>
</table>

1. S.2” O.D. Soil Spoon Sample  
2. U. Undisturbed Sample. 3” Diameter  
3. Core Drilling  
4. N.R. - No Recovery  

Driller: J. Craig
# Field Test Boring Log

**Client:** Lehrer-McGovern  
**Project:** West End Avenue & 60th Street, Manhattan, New York  
**Boring No.:** B-5 (moved 10' East) Sheet No. 1 of 2  
**Ground Surface Elev.:** 102.9'  
**Date:** August 27, 1986  
**Lab. No.:** 2291

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ground Water Data</th>
<th>Sample No.</th>
<th>Date</th>
<th>Hrs. After Completion</th>
<th>Method of Advancing Boring</th>
<th>Soil Classification Remarks</th>
</tr>
</thead>
</table>
| 14.0' | 7-7-86            | 0          | to 31.5' | B  
25.0' | Core Drilling     | 3-6-6-5    | 46-13-9-19 | A  
31.5' | 4' Hollow Stem Auger | 0-25.0'   | 10-7-6-6   | Fill: C-M-F SAND, sm cf gravel, silt/blk, moist, med. dense (cinders, brick, concrete)  
31.5' | to 41.5'          | 9-30-8-8  | Fill: C-M-F SAND, sm cf gravel, silt/blk, moist, med. dense (cinders, brick)  
55.0' | 6-5-12-17         | 7-9-9-11  | Fill: C-M-F SAND, silty, sm f gravel, silt/blk, moist, med. dense (micaceous, ash, brick)  
55.0' | 10-7-6-6          | 5-7-8-10  | Fill: M-F SAND, silty, tr f gravel, silt/blk, moist, med. dense (tr brick)  
55.0' | 5-15-12-7         | 11-0'     |スーパー/med. dense  
55.0' | 7-9-9-11          | 13.0'     |スーパー/med. dense  
55.0' | 3-3-5-12          | 17.0'     |スーパー/med. dense  
55.0' | 9-12-18-21        | 20.0'     |スーパー/med. dense  
55.0' | 12-7-5-17         | SAME      |スーパー/med. dense  
55.0' | 14-15-9-6         | SAME      |スーパー/med. dense  
55.0' | 4-7-2-2           | 25.0'     |スーパー/med. dense  
55.0' | 5-8-16-41         | Class 6-65 |スーパー/med. dense  
55.0' | 8-8-15-100/8-8-15-100 | 31.5' Auger Refusal |スーパー/med. dense  
55.0' | 31.5-36.5'        | Intermediate Rock (v. highly fractured w/many weathered seams)  
55.0' | Run #1  
55.0' | 31-5'             | Cored 60'' | J. Craig  | Run 40'' | Driller  
55.0' | 36.5'             | N.R. | N.R. |  

**Key:**  
- S: 2" O.D. Split Spoon Sample  
- U: Undisturbed Sample  
- N.S.: Standard Penetration Resistance per 6" (140# Hammer, 30" drop)
## FIELD TEST BORING LOG

**BORING NO. B-5**

<table>
<thead>
<tr>
<th>Depth</th>
<th>A</th>
<th>Sample</th>
<th>No.</th>
<th>Depth</th>
<th>N</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>B</td>
<td>Run</td>
<td>#2</td>
<td>36.5-41.5'</td>
<td>Cored 60&quot; Rec. 44&quot;</td>
<td>Intermediate Rock (highly fractured w/many weathered seams)</td>
<td>Rock is Manhattan Schist Class 3-65 36.5'</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>Run</td>
<td>#3</td>
<td>41.5-46.5'</td>
<td>Cored 60&quot; Rec. 60&quot;</td>
<td>Medium Hard Rock (moderately fractured w/some weathered seams, vertical fractures)</td>
<td>Class 2-65 46.5'</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Test Boring Completed @ 46.5'</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td></td>
<td>Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **S-2" O.D. Split Spoon Sample**
- **U - Undisturbed Sample, 3" Diameter**
- **N.R. - No Recovery**
- **N - Standard Penetration Resistance per 6"**
  (140# Hammer, 30" drop)

Driller: J. Craig
# FIELD TEST BORING LOG

**CLIENT** Lehrer-McGovern  
**PROJECT** West End Avenue & 60th Street, Manhattan, New York  
**Boring No.** B-6  
**Sheet No.** 1 of 2  
**DATE** August 27, 1986  
**LAB. NO.** 2291  
**Ground Surface Elev.** 102.7'

<table>
<thead>
<tr>
<th>Depth</th>
<th>Method of Advancing Boring</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4&quot; Hollow Stem Auger</td>
<td>35.0'</td>
</tr>
<tr>
<td>0-35.0'</td>
<td>NX Core Drilling</td>
<td>45.0'</td>
</tr>
</tbody>
</table>

## Ground Water Data

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample No.</th>
<th>Depth</th>
<th>Hrs. After Completion</th>
<th>Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>S-1</td>
<td>0-2.0'</td>
<td>4-4-4-4</td>
<td>Fill: C-M-F SAND, cf gravel, sm silt/blk, moist, loose (cinders)</td>
</tr>
<tr>
<td>2</td>
<td>S-2</td>
<td>2.0-3.2'</td>
<td>5-7-100/3''</td>
<td>SAME (cinders, slag, ash)</td>
</tr>
<tr>
<td>5</td>
<td>S-3</td>
<td>4.0-6.0'</td>
<td>4-7-5-4</td>
<td>Fill: M-F SAND, sm silt, cf gravel/blk, or bn, moist, med. dense (micaceous, tr woody)</td>
</tr>
<tr>
<td>8</td>
<td>S-4</td>
<td>6.0-8.0'</td>
<td>6-5-5-6</td>
<td>SAME, sm clay/loose</td>
</tr>
<tr>
<td>10</td>
<td>S-5</td>
<td>8.0-9.5'</td>
<td>6-7-100/6''</td>
<td>SAME/blk, gy, v. dense</td>
</tr>
<tr>
<td>15</td>
<td>S-6</td>
<td>10.0-12.0'</td>
<td>3-4-9-39</td>
<td>Fill: M-F SAND, sm silt, cf gravel/blk, moist, med. dense</td>
</tr>
<tr>
<td>20</td>
<td>S-8</td>
<td>14.0-16.0'</td>
<td>7-12-7-7</td>
<td>Fill: M-F SAND &amp; SILT, cf gravel/blk, moist, med. dense (brick frag.)</td>
</tr>
<tr>
<td>22</td>
<td>S-9</td>
<td>16.0-18.0'</td>
<td>7-8-6-7</td>
<td>SAME (2&quot; layer of rd bn clay at 18.5')</td>
</tr>
<tr>
<td>25</td>
<td>S-10</td>
<td>18.0-20.0'</td>
<td>4-5-5-6</td>
<td>C-M-F SAND, sm cf gravel, tr silt/gv, moist, med. dense</td>
</tr>
<tr>
<td>30</td>
<td>S-11</td>
<td>20.0-22.0'</td>
<td>5-7-10-10</td>
<td>Fill: F SAND &amp; SILT, tr f gravel/blk, moist, loose</td>
</tr>
<tr>
<td>32</td>
<td>S-12</td>
<td>22.0-24.0'</td>
<td>6-4-2-10</td>
<td>SAME (tr glass, cinder)</td>
</tr>
<tr>
<td>35</td>
<td>S-13</td>
<td>24.0-26.0'</td>
<td>1-1-1-2</td>
<td>SAME (brick, ash, cinder, shell)</td>
</tr>
<tr>
<td>36</td>
<td>S-14</td>
<td>26.0-28.0'</td>
<td>7-4-2-5</td>
<td>M-F SAND, silt, cf gravel/blk, dw, gy, moist, loose</td>
</tr>
<tr>
<td>40</td>
<td>S-15</td>
<td>28.0-30.0'</td>
<td>2-3-3-4</td>
<td>C-M-F SAND, sm silt, cf gravel/blk, moist, med. dense</td>
</tr>
<tr>
<td>50</td>
<td>S-16</td>
<td>30.0-32.0'</td>
<td>6-6-10-10</td>
<td>C-F GRAVEL &amp; cf sand, sm silt/blk, wh, moist, v. dense</td>
</tr>
<tr>
<td>55</td>
<td>S-17</td>
<td>32.0-33.4'</td>
<td>5-35-100/5''</td>
<td>(Decomposed Rock)</td>
</tr>
<tr>
<td>60</td>
<td>S-18</td>
<td>35.0-35.0'</td>
<td>100/0''</td>
<td>N.R.</td>
</tr>
</tbody>
</table>

| 60    | S-18       | 35.0-35.0' | 100/0''           | N.R. |

---

**Notes:**
- S: 2" O.D. Split Spoon Sample  
- U: Undisturbed Sample, 3" Diameter  
- Core Drilling  
- N.R. - No Recovery  

---

Driller: J. Craig

---

All Reports are the confidential property of clients and information must not be published or reproduced, pending written approval.
### Testwell Craig Test Boring Field Test Boring Log

**Boring No. B-6**  
**Sheet No. 2 of 2**  
**Lab No. 2291**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>Run #1</td>
<td>Intermediate Rock (moderately fractured w/some weathered seams)(highly fractured core from 38.5'-40.0')</td>
<td>Rock is Manhattan Schist</td>
</tr>
<tr>
<td>45</td>
<td>Run #2</td>
<td>Intermediate Rock (highly fractured w/many weathered seams)</td>
<td>Class 3-65</td>
</tr>
</tbody>
</table>

Test Boring Completed @ 45.0'

Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'.

---

**Notes:**
- S: 2" O.D. Split Spoon Sample
- U: Undisturbed Sample, 3" Diameter
- #: Core Drilling
- N.R.: No Recovery
- N: Standard Penetration Resistance per 6" (140# Hammer, 30" drop)

Driller: J. Craig
## FIELD TEST BORING LOG

**CLIENT** Lehrer-McGovern  
**PROJECT** West End Avenue & 60th Street, Manhattan, New York  
**Boring No.** B-7 Moved 10' N  
**Sheet No.** 1 of 1  
**Date** August 27, 1986  
**Lab. No.** 2291  
**Ground Surface Elev.** 101.9'

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>A</td>
<td>Roller Bit 0-17.9'</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Run #1</td>
<td>Cored 31&quot; Rec. 10&quot;</td>
<td>CONCRETE (basement) 17.9'</td>
</tr>
<tr>
<td>20.5</td>
<td>Run #2</td>
<td>Cored 30&quot; Rec. 30&quot;</td>
<td>Medium Hard Rock (slightly fractured w/few weathered seams) 20.5'</td>
</tr>
<tr>
<td>25</td>
<td>Run #3</td>
<td>Cored 60&quot; Rec. 56&quot;</td>
<td>SAME (6&quot; layer of highly weathered rock @ 26.0') Class 2-65</td>
</tr>
<tr>
<td>30.5</td>
<td>Run #4</td>
<td>Cored 30&quot; Rec. 28&quot;</td>
<td>SAME (vertical fractures w/partially weathered edges) 30.5'</td>
</tr>
</tbody>
</table>

Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'.

### Ground Water Data

<table>
<thead>
<tr>
<th>Depth</th>
<th>Hour</th>
<th>Date</th>
<th>Hrs. After Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **A:** Roller Bit
- **B:** Wire Line – NX Core Drilling
# FIELD TEST BORING LOG

**DATE** August 27, 1986  
**CLIENT** Lehrer-McGovern  
**PROJECT** West End Avenue & 60th Street, Manhattan, New York  
**Boring No.** B-8  
**LAB. NO.** 2291  
**Ground Surface Elev.** 96.9'

## Ground Water Data

<table>
<thead>
<tr>
<th>Depth</th>
<th>Hour</th>
<th>Date Hrs. After Completion</th>
</tr>
</thead>
</table>

## A - Method of Advancing Boring

<table>
<thead>
<tr>
<th>Depth</th>
<th>No.</th>
<th>Method</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Wire Line - NX Core Drilling</td>
<td>0 to 0.5'</td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>Roller Bit</td>
<td>0.5' to 11.4'</td>
</tr>
<tr>
<td>11.4</td>
<td></td>
<td>NX Core Drilling</td>
<td>11.4' to 50.5'</td>
</tr>
</tbody>
</table>

## Sample

<table>
<thead>
<tr>
<th>Depth</th>
<th>A Run</th>
<th>No.</th>
<th>Depth</th>
<th>R. 6&quot; C.6&quot;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>#1</td>
<td></td>
<td>0-0.5'</td>
<td>CONCRETE (deck)</td>
<td>0.5'</td>
</tr>
<tr>
<td>11.4</td>
<td>#2</td>
<td></td>
<td>11.4-12.4'</td>
<td>VOID (airspace)</td>
<td></td>
</tr>
<tr>
<td>12.4</td>
<td>#3</td>
<td></td>
<td>12.4-15.0'</td>
<td>CONCRETE</td>
<td>12.4'</td>
</tr>
<tr>
<td>15.0</td>
<td>#4</td>
<td></td>
<td>15.0-31.0'</td>
<td>VOID (airspace)</td>
<td>31.0'</td>
</tr>
<tr>
<td>31.0</td>
<td>#5</td>
<td></td>
<td>31.0-36.0'</td>
<td>CONCRETE</td>
<td></td>
</tr>
</tbody>
</table>

---

N: Standard Penetration Resistance per 6"  
30' drop

---

J. Craig

Driller

---

All Reports are the Confidential Property of Clients and Information Confidential and Reproducible without Written Approval.
<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>Run #6</td>
<td>WOOD (24&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>36.0-41.0'</td>
<td>Cored 60&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CONCRETE (18&quot;)</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Run #7</td>
<td>ROCK (9&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium Hard Rock (moderately</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fractured w/some weathered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>seams)</td>
</tr>
<tr>
<td>50</td>
<td>Run #8</td>
<td></td>
<td>Medium Hard Rock (slightly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fractured w/few weathered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>seams)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Test Boring Completed @ 50.5'</td>
</tr>
<tr>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Surveyor's sidewalk cut at S.E. property corner (on West Side of West End Avenue) assumed elevation +100.0'.

Driller: J. Craig

---

Notes:
- S-2 O.D. Split Spoon Sample
- U: Undisturbed Sample. 3" Diameter
- N: Standard Penetration Resistance per 6" (140# Hammer, 30" drop)
- N.R.: No Recovery

All reports are the confidential property of clients and information contained may not be published or reproduced without written approval.
FIELD TEST BORING LOG

CLIENT Lehrer-McGovern
PROJECT West End Avenue & 60th Street, Manhattan, New York
Boring No. B-9

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 17.0'</td>
<td>Ground Surface Elev. 100.5'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0'</td>
<td>Comp of Hole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 17.0'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.0'</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth</th>
<th>No.</th>
<th>Depth</th>
<th>Date</th>
<th>Hrs. After Completion</th>
<th>Method of Advancing Boring</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S-1</td>
<td>1.0-3.0'</td>
<td>11-17-17-17</td>
<td>4&quot; Hollow Stem Auger</td>
<td>Misc Fill: C-M-F SAND, cf gravel, sm silt/bn, rd, moist, dense (bricks, cinders)</td>
</tr>
<tr>
<td></td>
<td>S-2</td>
<td>5.0-7.0'</td>
<td>2-10-4-5</td>
<td>4&quot; Hollow Stem Auger</td>
<td>SILT &amp; mf sand/bn, moist, med. dense (shell @ 6.0')</td>
</tr>
<tr>
<td>A</td>
<td>S-3</td>
<td>10.0-12.0'</td>
<td>2-2-3-8</td>
<td>4&quot; Hollow Stem Auger</td>
<td>SAME/dk gy, loose</td>
</tr>
<tr>
<td></td>
<td>S-4</td>
<td>15.0-17.0'</td>
<td>10-15-24-20</td>
<td>4&quot; Hollow Stem Auger</td>
<td>Refusal @ 17.0'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Test Boring Completed @ 17.0'</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(moved hole @ archeologist request)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surveyor's sidewalk cut at S.E. property corner (on West Sidewalk of West End Avenue) assumed elevation +100.0'</td>
<td></td>
</tr>
</tbody>
</table>

Driller: J. Craig

---

1. S-2" O.D. Split Spoon Sample
2. U. Undisturbed Sample. 3" Diameter
3. Core Drilling
4. N.R. - No Recovery

N. Standard Penetration Resistance per 6" (1140# Hammer. 30" drop)
FIELD TEST BORING LOG

CLIENT: Lehrer-McGovern
PROJECT: West End Avenue & 60th Street, Manhattan, New York

Boring No. B-9A

Sheet 1 of 2

Ground Surface Elev: 100.5'

<table>
<thead>
<tr>
<th>Depth</th>
<th>A No.</th>
<th>Depth</th>
<th>Ground Water Data</th>
<th>A Method of Advancing Boring</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Date</td>
<td>Hrs. After Completion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0'</td>
<td></td>
<td></td>
<td></td>
<td>Comp of Hole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>S-1</td>
<td>1.0-2.5'</td>
<td>9-9-9-25/0'</td>
<td>4' Hollow Stem Auger</td>
<td>ASPHALT</td>
<td>0-3'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:C-M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:SILT &amp; F SAND, tr f gravel, or bn, gy, moist, stiff (micaceous)</td>
<td>FILL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAME</td>
<td>Class 11-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-2</td>
<td>3.0-5.0'</td>
<td>7-5-5-5</td>
<td>4-9-9-25/0'</td>
<td></td>
<td>11-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:SILT &amp; F SAND, tr f gravel, or bn, gy, moist, stiff (micaceous)</td>
<td>FILL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAME</td>
<td>Class 11-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-3</td>
<td>5.0-7.0'</td>
<td>3-4-5-6</td>
<td>4-9-9-25/0'</td>
<td></td>
<td>11-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:C-M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAME</td>
<td>Class 11-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-4</td>
<td>7.0-9.0'</td>
<td>3-8-3-4</td>
<td>4-9-9-25/0'</td>
<td></td>
<td>11-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:C-M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAME</td>
<td>Class 11-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-5</td>
<td>9.0-11.0'</td>
<td>4-5-4-4</td>
<td>4-9-9-25/0'</td>
<td></td>
<td>11-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:C-GRavel, sm mf sand, sm silt/blk, moist, med. dense (gravel is dec. rock &amp; brick frag.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:C-M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAME</td>
<td>Class 11-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-6</td>
<td>11.0-13.0'</td>
<td>8-63-17-12</td>
<td>4-9-9-25/0'</td>
<td></td>
<td>11-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:C-M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAME</td>
<td>Class 11-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-7</td>
<td>13.0-13.8'</td>
<td>41-100/4''</td>
<td>4-9-9-25/0'</td>
<td></td>
<td>11-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:C-M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fill:M-F SAND, cf gravelly, sm silt/blk, moist, med. dense (concrete, cinder fill)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAME</td>
<td>Class 11-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Run</td>
<td>#1 15.0-19.5'</td>
<td>Rec. 15''</td>
<td>Cored 54''</td>
<td>CONCRETE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run</td>
<td>#2 19.5-23.0'</td>
<td>Rec. 6''</td>
<td>Cored 42''</td>
<td>BOULDER, cobble fill</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Run</td>
<td>#3 23.0-24.5'</td>
<td>R. 3'' C.18''</td>
<td>Cored 36''</td>
<td>SAME</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run</td>
<td>#4 24.5-27.5'</td>
<td>Rec. 3''</td>
<td>N.R. (void)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Run</td>
<td>#5 27.5-29.5'</td>
<td>Rec. 10''</td>
<td>Cored 24''</td>
<td>SAME</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run</td>
<td>#6 29.5-34.5'</td>
<td>Rec. 57''</td>
<td>Cored 60''</td>
<td>Intermediate Rock (highly fractured w/few weathered seams)</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. S-2" O.D Split Spoon Sample ❙ U - Undisturbed Sample. 3" Diameter ❙ — Core Drilling N.R. — No Recovery

N - Standard Penetration Resistance per 6" (140# Hammer, 30" drop)

Driller: J. Craig
<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Run</td>
<td>Medium Hard Rock (slightly fractured w/few weathered seams)</td>
<td>Test Boring Completed @ 39.5'</td>
</tr>
<tr>
<td>40</td>
<td>#7</td>
<td></td>
<td>Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **A** - Driller J. Craig

**Notes:**
- **S** - 2" O.D. Split Spoon Sample
- **U** - Undisturbed Sample, 3" Diameter
- **-** - Core Drilling
- **N.R.** - No Recovery

**Additional information:**
- N - Standard Penetration Resistance per 6' (140# Hammer 30" drop)

**Preliminary Report:**
- All Reports are the confidential property of clients, and information may not be published or reproduced, pending written approval.
**CLIENT** Lehrer-McGovern  
**PROJECT** West End Avenue & 60th Street, Manhattan, New York

**Boring No.** B-10  
**Sheet No.** 1 of 2

**DATE** August 27, 1986  
**LAB. NO.** 2291

**Ground Water Data**  
**Note:** Ground Surface Elev. 101.1'

<table>
<thead>
<tr>
<th>Depth</th>
<th>Hour</th>
<th>Date</th>
<th>Hrs. After Completion</th>
<th>A. Method of Advancing Boring</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.0'</td>
<td></td>
<td>Comp of Holes</td>
<td></td>
<td>B NX Core Drilling</td>
<td>40.0' to 55.0'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth</th>
<th>A</th>
<th>No.</th>
<th>Depth</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5-2.0'</td>
<td>S-1</td>
<td>4-5-6</td>
<td>FILL: C-M-F SAND, Silt of gravel, tr. silt/bn, blk, moist, med. dense (cinders, wood, ash, brick frags)</td>
<td>40.0' to 55.0'</td>
<td></td>
</tr>
<tr>
<td>2.0-4.0'</td>
<td>S-2</td>
<td>4-5-7-7</td>
<td>FILL: M-F SAND, silt, tr. silt of gravel, blk, moist, med. dense (brick frags)</td>
<td>0-24.0'</td>
<td></td>
</tr>
<tr>
<td>4-0-6.0'</td>
<td>S-3</td>
<td>3-4-4-4</td>
<td>SAME/loose</td>
<td>6.0'O Class 11-</td>
<td></td>
</tr>
<tr>
<td>6.0-8.0'</td>
<td>S-4</td>
<td>3-4-12-15</td>
<td>FILL: C-M-F SAND, Silt, tr. silt of gravel, blk, moist, med. dense (cinder fill)</td>
<td>8.0'</td>
<td></td>
</tr>
<tr>
<td>10.0-12.0'</td>
<td>S-6</td>
<td>5-7-6-7</td>
<td>SAME</td>
<td>16.0'</td>
<td></td>
</tr>
<tr>
<td>12.0-14.0'</td>
<td>S-7</td>
<td>5-7-8-12</td>
<td>SAME, tr. f gravel/bn</td>
<td>16.0'</td>
<td></td>
</tr>
<tr>
<td>14.0-16.0'</td>
<td>S-8</td>
<td>5-7-9</td>
<td>FILL: C-M-F SAND, Silt of gravel, tr. silt/bn, gy, wet, loose (micaceous)</td>
<td>16.0'</td>
<td></td>
</tr>
<tr>
<td>16.0-16.0'</td>
<td>S-9</td>
<td>5-3-3-4</td>
<td>FILL: C-M-F SAND, Silt, tr. silt/bn, blk, wet, loose (cinder fill)</td>
<td>16.0'</td>
<td></td>
</tr>
<tr>
<td>18.0-20.0'</td>
<td>S-10</td>
<td>3-3-3-3</td>
<td>SAME</td>
<td>16.0'</td>
<td></td>
</tr>
<tr>
<td>20.0-22.0'</td>
<td>S-11</td>
<td>6-4-8-10</td>
<td>FILL: C-M-F SAND, Silt, tr. cv. gravel, tr. silt/bn, blk, moist, v. loose (cinder &amp; ash fill)</td>
<td>21.0'</td>
<td></td>
</tr>
<tr>
<td>22.0-24.0'</td>
<td>S-12</td>
<td>1-2-1-3</td>
<td>FILL: C-M-F SAND, Silt, tr. cv. gravel, blk, moist, v. loose (cinder &amp; ash fill)</td>
<td>22.0'</td>
<td></td>
</tr>
<tr>
<td>24.0-26.0'</td>
<td>S-13</td>
<td>2-1-1-2</td>
<td>SILT, organic silt, tr. f sand, blk, moist, v. soft (varved, shell @ 25.8')</td>
<td>24.0'</td>
<td></td>
</tr>
<tr>
<td>26.0-28.0'</td>
<td>S-14</td>
<td>1-2-2-1</td>
<td>SAME/soft (shell fragments)</td>
<td>Class 9-65</td>
<td></td>
</tr>
<tr>
<td>28.0-30.0'</td>
<td>S-15</td>
<td>1-2-2-4</td>
<td>SAME</td>
<td>30.0'</td>
<td></td>
</tr>
<tr>
<td>30.0-32.0'</td>
<td>S-16</td>
<td>5-9-7-21</td>
<td>M-F SAND, silt, Silt of gravel, blk, moist, med. dense (shell frags)</td>
<td>Class 7-65</td>
<td></td>
</tr>
</tbody>
</table>

**Sample Types:**
- S: 2" O.D Split Spoon Sample
- U: Undisturbed Sample, 3" Diameter
- C: Core Drilling
- N.R.: No Recovery

**Standard Penetration Resistance per 6"**  
1140# Hammer, 30" drop

**Driller:** J. Craig
### FIELD TEST BORING LOG

**BORING NO. B-10**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample No.</th>
<th>Depth</th>
<th>N</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.0-37.0'</td>
<td>S-17</td>
<td>29-50-30-17</td>
<td>SAME/v. dense</td>
<td>37.0'</td>
<td>Class 5-65</td>
</tr>
<tr>
<td>38.0-38.7'</td>
<td>S-18</td>
<td>31-100/2''</td>
<td>C-F GRAVEL, sm cmf sand, tr silt</td>
<td>40.0' Auger Refusal</td>
<td></td>
</tr>
<tr>
<td>40.0-45.0'</td>
<td>Run #1</td>
<td>Cored 60'' Rec. 27''</td>
<td>BOULDERS &amp; Decomposed Rock/ Soft Rock</td>
<td>Class 4-65</td>
<td></td>
</tr>
<tr>
<td>45.0-50.0'</td>
<td>Run #2</td>
<td>Cored 60'' Rec. 54''</td>
<td>Intermediate Rock (highly fractured w/many weathered seams)</td>
<td>Class 3-65 50.0'</td>
<td></td>
</tr>
<tr>
<td>50.0-55.0'</td>
<td>Run #3</td>
<td>Cored 60'' Rec. 54''</td>
<td>Medium Hard Rock (moderately fractured w/many weathered seams)</td>
<td>Class 2-65 55.0'</td>
<td></td>
</tr>
</tbody>
</table>

**Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'.**

---

**Notes:**
- S - 2" O.D. Split Spoon Sample
- U - Undisturbed Sample, 3" Diameter
- Core Drilling
- N.R. - No Recovery

**Standard Penetration Resistance per 6"**

*Driller: J. Craig*

---

All Reports are the confidential property of clients; and that the service may not be published or reproduced, pending written approval.
# FIELD TEST BORING LOG

**CLIENT** Lehrer-McGovern  
**PROJECT** West End Avenue & 60th Street, Manhattan, New York

**Boring No.** B-11  
**Sheet No.** 1 of 1  
**Ground Surface Elev.** 101.2'

<table>
<thead>
<tr>
<th>Depth</th>
<th>Hour</th>
<th>Date</th>
<th>Hrs. After Completion</th>
<th>Method of Advancing Boring</th>
<th>Soil Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.0'</td>
<td>7-7-86</td>
<td>Comp of Hole</td>
<td>14-31-13-36</td>
<td>4&quot; Hollow Stem Auger</td>
<td>Fill: M-F SAND, silt/bln, moist, dense (micaceous)</td>
<td>0.3'</td>
</tr>
<tr>
<td>0 to 23.5'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fill: M-F SAND, silt/bln, moist, dense (micaceous)</td>
<td></td>
</tr>
<tr>
<td>23.5' to 33.5'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 11-66</td>
<td></td>
</tr>
</tbody>
</table>

Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'.

---

Driller: J. Craig

---

# Notes:

- **Depth**
- **Hour**
- **Date**
- **Hrs. After Completion**
- **Method of Advancing Boring**
- **Soil Classification**
- **Remarks**

- **Field Test Boring Completed @ 33.5'**
- **Medium Hard Rock (moderately fractured w/few weathered seams)**
- **Rock is Manhattan Schist Class 2-65**
# FIELD TEST BORING LOG

**CLIENT:** Lehrer-McGovern  
**PROJECT:** West End Avenue & 60th Street, Manhattan, New York  
**DATE:** August 27, 1986  
**LAB. NO.:** 2291

<table>
<thead>
<tr>
<th>Depth</th>
<th>A. Method of Advancing Boring</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2'</td>
<td>4&quot; Hollow Stem Auger</td>
<td>Asphalt</td>
</tr>
<tr>
<td>5'</td>
<td>Same</td>
<td>4.5' FILL</td>
</tr>
<tr>
<td>0-5.5'</td>
<td>B NY Core Drilling</td>
<td>SAME</td>
</tr>
<tr>
<td>10'</td>
<td>C-M-F SAND, sm f gravel, sm</td>
<td>11.9' Auger</td>
</tr>
<tr>
<td></td>
<td>silt/blk, moist, med. dense (cinders)</td>
<td>Refusal</td>
</tr>
<tr>
<td>5.5'</td>
<td>C-M-F SAND, sm c gravel, sm silt</td>
<td>Class 6-5</td>
</tr>
<tr>
<td>6.5-8.5'</td>
<td>2-6-5-4</td>
<td>6.5' Class 7-5</td>
</tr>
<tr>
<td>8.5-10.5'</td>
<td>8-13-13-14</td>
<td>5' F-F GRAVEL, cmf sandy, sm silt</td>
</tr>
<tr>
<td>10.5-11.9'</td>
<td>11-22-100/4</td>
<td>C-M-F SAND, silty, sm c of gravel</td>
</tr>
<tr>
<td>11.9-15.5'</td>
<td>Rec. 48&quot;</td>
<td>Intermediate Rock (highly fractured w/many weathered seams)</td>
</tr>
<tr>
<td>15'</td>
<td>Rec. 28&quot;</td>
<td>Class 2-65</td>
</tr>
<tr>
<td></td>
<td>R. 10&quot; C.10&quot;</td>
<td>Class 2-65</td>
</tr>
<tr>
<td>20'</td>
<td>Cored 60&quot;</td>
<td>Medium Hard Rock (moderately fractured w/some weathered seams)</td>
</tr>
<tr>
<td>25'</td>
<td>Cored 60&quot;</td>
<td>Test Boring Completed @ 26.7'</td>
</tr>
<tr>
<td>30'</td>
<td>Cored 60&quot;</td>
<td>Surveyor's sidewalk cut at S.E. property corner (on West sidewalk of West End Avenue) assumed elevation +100.0'</td>
</tr>
<tr>
<td>35'</td>
<td>Core Drilling</td>
<td></td>
</tr>
</tbody>
</table>

1. S: 2" O.D Split Spoon Sample  
2. U: Undisturbed Sample, 3" Diameter  
3. N: Standard Penetration Resistance per 6" (140# Hammer, 30" drop)  
4. Core Drilling  
5. N.R.: No Recovery  
6. J. Craig: Driller

All Reports are the confidential property of clients and information not to be reproduced or reproduced pending written approval.
ACKNOWLEDGMENTS

As always, many people and institutions are to be thanked for their cooperation and support during research and preparation of this report. Among them are Carolyn Konheim and Sherry Koehler of Konheim & Ketcham, Bob Cane and Paul Buck of Buck & Cane, Architects, Peter Dunsay of Lehrer/McGovern, Construction Managers for the project, and Jeff Craig of Testwell Craig Test Boring Co., Inc. I also thank Kenneth R. Cobb, Deputy Director of the Municipal Archives and Alice C. Hudson, Chief of the New York Public Library Map Division, and their respective staffs, and the staffs of the Engineering Library, The New York Historical Society Library, The New York Society Library, and The Local History and Genealogy Room of the New York Public Library. My thanks also go to Elise Wagner of Brown & Wood for her helpful editorial comments, and to Keith D. Kinna, Assistant Director of the Jervis Library in Rome, New York, for his invaluable assistance. And, as so many times before, my special thanks to Harry Kleiderman of the Manhattan Borough President's Office (Topographic Bureau) for sharing his expertise and resources.