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AKRF

2009



**Supplemental Archaeological Assessment**

**Second Avenue Subway:  
63rd Street Station**

**New York, New York**

**Prepared for:**

Metropolitan Transportation Authority  
New York City Transit  
New York, NY

**Prepared by:**

AKRF, Inc.  
440 Park Avenue South  
New York, New York 10016

**July 2009**

1187

## **Management Summary**

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**SHPO Project Review Number:** 05PR00975

**Involved Agencies:** Metropolitan Transportation Authority, New York City Transit, and the Federal Transit Administration

**Phase of Survey:** Supplemental Phase 1A Archaeological Assessment

**Project Location:** East 63rd Street between Second and Park Avenues and Third Avenue between East 63rd and East 64th Streets

**Minor Civil Division:** 06101: Manhattan

**County:** New York County

### **Location Information:**

Survey Area Length: Approximately 1200 feet (365.76 meters)

Survey Area Width: Variable; between approximately 60 feet (18.28 meters) and 470 feet (143.25 meters)

Number of Acres Surveyed: Approximately 2.6

**USGS 7.5 Minute Quadrangle Map:** Central Park

**Report Author:** Elizabeth D. Meade, RPA

**Date of Report:** July 2009

**Table of Contents**

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**Chapter 1: Introduction ..... 1**

- A. Project Overview and Background.....1
- B. Previously Analyzed Portions of the 63rd Street APE .....1
- C. Research Goals and Methodology .....2

**Chapter 2: Environmental Context..... 3**

- A. Original Topographical Setting ..... 3
- B. Soil Profile..... 3

**Chapter 3: Precontact Archaeological Resources..... 6**

- A. Previous Precontact Archaeological Resources Sensitivity Assessments ..... 6

**Chapter 4: Historic Period Archaeological Resources ..... 7**

- A. Historic Context ..... 7
- B. Locations of Disturbance for the 63rd Street Station..... 8

**Chapter 5: Conclusions and Recommendations.....12**

- A. Project Site Sensitivity .....12
- B. Recommendations .....13

**References.....14**

**Figures**

**Appendix A: Soil Boring Logs for the 63rd Street Station Provided by MTA NYCT**

## A. PROJECT OVERVIEW AND BACKGROUND

The Metropolitan Transportation Authority (MTA), in cooperation with New York City Transit (NYCT), is planning to construct the 63rd Street Station of the Second Avenue Subway (see Figure 1). This Supplemental Archaeological Assessment to the *Second Avenue Subway Phase 1A Archaeological Assessment* (Historical Perspectives, Inc. 2003a) has been prepared in accordance with the provisions of the Second Avenue Subway project's Programmatic Agreement (PA) among the Federal Transit Administration (FTA), MTA NYCT, and the New York State Historic Preservation Officer (SHPO), executed April 8, 2004. The PA sets forth the steps to be followed for "any changes to the project that introduce new project elements that would involve subsurface construction and for which the effects of such construction have not yet been analyzed." For these areas, archaeological investigation should be conducted in consultation with the SHPO and the New York City Landmarks Preservation Commission (LPC).

FTA issued a Record of Decision (ROD) for the Second Avenue Subway project on July 8, 2004. The ROD was issued based on the findings presented in the *Second Avenue Subway Final Environmental Impact Statement and Final Section 4(f) and 6(f) Evaluation* (FEIS; AKRF April 2004), which examined the potential impacts of the 8.5-mile-long Second Avenue Subway from East 125th Street in Harlem to Hanover Square in Lower Manhattan. The FEIS identified the environmental impacts of the Second Avenue Subway during its construction and the permanent impacts once the subway is operational. It also identified mitigation measures to alleviate the identified impacts. The assessment of the Second Avenue Subway's proposed alignment, ancillary facilities, stations, and station entrances presented in the FEIS was based on conceptual and preliminary engineering. As part of the FEIS, the aforementioned Phase 1A Archaeological Assessment of the Second Avenue Subway and several addenda were prepared by Historical Perspectives, Inc. (HPI) in March 2003.

In the vicinity of the 63rd Street Station, the APE analyzed in HPI's 2003 Phase 1A Archaeological Assessment included the streetbed of Second Avenue from western building line to eastern building line. An addendum to the Phase 1A completed in June 2003 analyzed the location of the "63rd Street Curve," which included the streetbed of East 63rd Street and a portion of East 64th Street between Second and Third Avenues as well as portions of Blocks 1418 and 1419 (HPI 2003b).

Plans for station entrances and ancillary facilities were not finalized at the time of the completion of the FEIS and at that time no evaluation was conducted for any of those areas or for utility relocations west of Third Avenue. Since that time, however, the design for the 63rd Street Station has advanced considerably and includes areas of potential disturbance located outside the APEs analyzed in the FEIS. Therefore, consistent with the requirements of the PA, this assessment was prepared to evaluate the potential for impacts to archaeological resources in the new APE for the 63rd Street Station.

The 63rd Street/Lexington Avenue Station is already constructed and in operation. The station is situated beneath 63rd Street, extending from the west side of Park Avenue to the east side of Third Avenue and is currently used by the F line. The Second Avenue Subway will share this station with the F line. To accommodate usage as part of the Second Avenue Subway, ventilation systems and new station entrances will be constructed and utilities installed or relocated.

This Supplemental Archaeological Assessment of the 63rd Street Station analyzes the archaeological sensitivity of all of the areas of planned construction including station entrances and ancillary facilities and utility installation/relocation within streetbeds (see Figure 2). The majority of the APE is located immediately to the west of the APE analyzed in the 2003 Phase 1A study. However, utility installation/relocation is proposed in an approximately 150-foot portion of East 63rd Street east of Third Avenue. The streetbed of East 63rd Street between Second and Third Avenues, including the 150-foot section included within the current APE, was among the areas

### A. ORIGINAL TOPOGRAPHICAL SETTING

Viele's 1865 map (Figure 3) shows that the eastern portion of the 63rd Street station was originally flat meadowland, while the western portion, between Lexington and Park Avenues, was interrupted by hills. A large marsh-bordered stream ran to the north and west of the station, but does not appear to have entered the APE.

Several historic atlases from the mid- and late 19th century include information regarding the elevations of street intersections in the vicinity of the 72nd and 86th Street stations. A summary of the street elevation changes as depicted on three maps (dating to 1850, 1885, and 2007) is presented in Table 1, below. George Hayward's circa 1850 map, *Profile of the Twelve Avenues in the City of New York from 24th to 161st Streets Showing (sic) the Elevations at the Streets*, shows that the elevation of some of the streets in the vicinity of the APE have been modified very little since the mid-19th century. Some slight changes in elevation occurred in the mid- to late-19th century although elevations have remained nearly constant between 1885 and the present day. The landscape modification that occurred between 1850 and 1885 was likely due to the cutting of streets, leveling of hills, and filling of streams and marshes in preparation for the neighborhood's residential development (discussed in greater detail in Chapter 4).

**Table 1**  
**Street Elevation Changes Over Time**

Intersection	1850 Hayward	1885 Robinson and Pidgeon	2007 Sanborn
East 62nd Street & Second Avenue	65.2	61.1	Not given
East 62nd Street & Third Avenue	59.4	58.2	58.3
East 62nd Street & Lexington Avenue	Not given	48.2	48.2
East 62nd Street & Park Avenue	47.5	50.4	50.4
East 63rd Street & Second Avenue	62.1	59.3	59.3
East 63rd Street & Third Avenue	60.2	60.3	60.3
East 63rd Street & Lexington Avenue	Not given	50.2	50.2
East 63rd Street & Park Avenue	48.6	51.65	51.8
East 64th Street & Second Avenue	49.4	56.8	56.8
East 64th Street & Third Avenue	65	62.6	62.6
East 64th Street & Lexington Avenue	Not given	52	52
East 64th Street & Park Avenue	48.7	52.8	52.9

**Notes:** The 1850 Hayward map was partially illegible and some elevation data was partially obscured; this table attempts to transcribe the data accurately but there may be some errors. In addition, none of the maps included above indicate the datum from which the elevation was measured with the exception of the 1885 Robinson atlas, which presents elevations "above high tide." Therefore, it is assumed that all measurements are with respect to sea level.

### B. SOIL PROFILE

For the purposes of this study, numerous soil borings logs within and adjacent to the APE were provided by MTA NYCT. The borings were taken at various times between 1969 and 1975 and 2002 and 2009 and were located within the sidewalks lining the northern and southern sides of East 63rd Street between Second and Park Avenues and on the eastern and western sides of Third Avenue between East 62nd and East 64th Streets. Location maps and soil boring logs can be found in Appendix A.

#### *THIRD AVENUE BETWEEN EAST 62ND AND EAST 64TH STREETS*

Six soil borings were located within or immediately adjacent to the streetbed of Third Avenue between East 62nd and East 64th Streets. Five of these borings, all of which were taken between 1969 and 1975, identified a layer of fill immediately below the surface of the streetbed that ranged in thickness from 8 to 15 feet. Below the level of fill,

Table 2 (continued)

Summary of Soil Borings for East 63rd Street Between Second and Third Avenues

Boring Number	Year	Location		Within Area of Expected Utility Work?	Summary of Soil Profile*
		Sidewalk of E. 63rd Street	Distance East of Third Avenue (feet)		
18	1969	South	372	No	0-16' Fill 16'- Rock
63F-1	1975	North	372	No	0-8' Fill 8'- Rock
5-23	1974	North	408	No	0-9' Fill 9'-14' Sandy Clay 14'- Rock
63F-2	1975	South	434	No	0-14' Fill 14'- Rock
5-24	1974	South	450	No	0-14' Sand 14'- Rock
63F-3	1975	North	474	No	0-10' Fill 10'- Rock
63F-4	1975	South	492	No	0-6' Fill 6'- Rock
63F-5	1975	North	558	No	0-3' Fill 3'- Rock
<b>Notes:</b> *These are general summaries only, for detailed descriptions of soil types (including color, texture, inclusions, etc.) see soil borings logs in Appendix A. Bedrock or decomposing bedrock identified in soil borings is referred to in this table as "rock."					
<b>Sources:</b> See Appendix A for original boring records provided by MTA NYCT.					

Many of the ca. 1969-1975 borings located within the streetbed of East 63rd Street between Second and Third Avenues—most of which were located at the extreme eastern and western ends of the block—indicated that by that time only layers of fill were present between the street surface and the underlying bedrock throughout portions of the APE. Other borings, however, showed that other sediments including silt, sand, and/or clay were present between the fill and the bedrock.

Two recent borings were located in this area. The first, taken in 2009, was located on the southern side of East 63rd Street approximately 54 feet east of Third Avenue. This boring indicated the presence of 10 feet of fill below the street surface, followed by a 10-foot layer of sand (which could have been used as a filling material) and then bedrock. The second boring dates to 2005 and was taken within the northern sidewalk of East 63rd Street approximately 264 feet east of Third Avenue. That boring identified a 6-foot layer of fill above a 12.5-foot layer of sand, gravel, and silt. Bedrock was identified at a depth of 18.5 feet below grade.

While the existing subway tunnel passes below this portion of the street, it was constructed with a tunnel boring machine, rather than by the cut-and-cover method that was used to build the existing 63rd Street Station (HPI 2003b). Therefore, this portion of the streetbed would have experienced less disturbance as a result of subway construction activities, although soil borings indicate that there has been some disturbance to the area, likely as the result of road construction and maintenance and utility installation.

## A. HISTORIC CONTEXT

Despite its large population during the historic period, the urban center of New York City was largely restricted to the southern end of Manhattan until the mid-19th century. Before that time, most of the northern portion of the island was occupied by large tracts of saltwater marshes, hills, uncultivated meadows, and farmland. The 1865 Viele map (Figure 3) shows that the location of the 63rd Street station was in an area that was originally occupied by both hills and meadow and was adjacent to a large stream.

Throughout the early colonial period, the British and Dutch governments conveyed land to settlers in large parcels. However, the APE was located within lands that were instead reserved as Common Lands that were granted to the City of New York by the Dongan Charter in 1686 (Stokes 1968). These lands were divided and sold by the City of New York in the early 19th century. To the north of the APE, between approximately East 65th and East 69th Streets and Third and Park Avenues, was a small parcel of land known as the “Dove Lots.” The Dove Lots were named after the Dove Tavern (also called “The Sign of the Dove”), a late 18th century tavern that was located near the modern intersection of Third Avenue and East 66th Street (Kelby 1893). During the Revolutionary War, the Dove Lots were used as an artillery park and camp by the British Army (Johnston 1914). The British Royal Artillery was camped just below modern East 70th Street, near what are now the grounds of Hunter College (ibid). This camp adjacent to the Dove Tavern is famously known as the site where Captain Nathan Hale—a spy for the American Army who was captured by the British and hung for treason—was executed in 1776 and where he allegedly said the last words, “I regret that I have but one life to give my country.” Hale’s body was never found, but it is believed that he was buried nearby, possibly within the grounds of Hunter College (Kelby 1893). The Dove Tavern stood to the east of the project site until circa 1798 (Stokes 1968).

The 1782 British Headquarters Map (Figure 4) shows that the APE itself was undeveloped, with the exception of two structures were located to the northeast along the former Boston Post Road: the Dove Tavern and a farmhouse. The Post Road is also depicted on Bridges’ 1811 map of Manhattan (Figure 5), which shows that in the vicinity of the APE, the Post Road ran northwest-southeast from the intersection of modern East 62nd Street and Second Avenue to the intersection of modern East 66th Street and Third Avenue. The fifth milestone of the road was located near the intersection of East 63rd Street and Second Avenue.

The farmhouse depicted on the British Headquarters map appears to be represented on the 1811 Bridges map alongside an additional unidentified structure. The two structures are depicted on the 1811 map within the streetbed of East 64th Street between Second and Third Avenues, east of the former Post Road. These structures were located on what was formerly the farm of Abraham and William K. Beekman, which included the majority of the APE. The Beekman brothers owned property to the east of the APE on the eastern side of the Post Road. They purchased the portion of their farm west of the Post Road (including the majority of the APE) in 1801, when the City of New York began to dispose of city-owned common lands as the population began its slow northward expansion (Stokes 1968). The western boundary of the Beekman farm was the eastern line of modern Park Avenue and the southern boundary was located between East 62nd and East 63rd Streets. This farm line is reflected in the irregular shape of the lots within Block 1397, bounded by East 62nd and East 63rd Streets and Third and Park Avenues.

South of the Beekman farm was the farm of Peter Praa Van Zandt. Van Zandt’s father, also named Peter, had been granted farmland to the east of the APE in the 18th century and was accused by the city government of encroaching on the common lands. Therefore, the ownership of a portion of his farm in the vicinity of Third Avenue was disputed, with both the elder Van Zandt and the City of New York claiming ownership. The matter was resolved circa 1771 and the disputed lands were given to Peter Praa Van Zandt. Then in 1801, on the same day that the Beekmans purchased their property, Van Zandt purchased a portion of the common lands adjacent to his property. This land extended as far west as Park Avenue and a farmhouse was constructed on the property near the northwest corner of East 60th Street and Second Avenue (Stokes 1968).

Robinson-Pidgeon and 1891 Bromley atlases (Figure 7) depict the same structure, which is identified on that map as being constructed of brick. A Sanborn map dating to 1892 depicts what appears to be the current structure on the lot, which was at that time used as a livery stable. The 1907 Sanborn identifies it as a boarding stable and by 1951 it had become a garage. The 1951 Sanborn map is the first to depict gas tanks buried beneath the eastern side of the structure.

Block 1397, Lot 61 was not developed until after water (and likely sewer) lines were available in East 63rd Street and there is no evidence that the lot was ever used for residential purposes. The existing building was constructed by the late-19th century with a basement in an area that maps suggest was formerly occupied by a series of hills that were leveled by the mid-19th century. Because of the lack of development in the lot until the late-19th century and the construction of the existing building, which has a basement, it is not likely that archaeological resources dating to the historic period would be impacted by the construction of the Second Avenue Subway within this lot.

#### **ANCILLARY FACILITY 2:**

Ancillary Facility 2 will be constructed along East 63rd Street in an approximately 10- by 20-foot portion of a public plaza that is currently located to the south of the “Royale,” the 42-story structure at 188 East 64th Street (Block 1398, Lot 7501 [part]). Current Sanborn maps show that this structure was constructed between 1986 and 1987 and that the building and the plaza to the south have both basements and sub-basements.

As mentioned previously, the Boston Post Road formerly ran through this portion of the APE, as seen on the 1836 Colton map. However, no structures are depicted in this area, formerly located within a small lot known as Lot 32½, until the 1879 Bromley atlas, which indicates that the lot was developed but does not depict the footprint of the building that was located there. Subsequent maps identify the building as a 3-story brick dwelling with a basement and a small open rear yard. This structure stood on the lot until the “Royale” was built in the late 20th century.

Because of the significant disturbance that would have been caused during the construction of the existing structure on Lot 7501, which has both a basement and a sub-basement, there is little chance that historic period archaeological resources could have survived within the location of Ancillary Facility 2. Therefore this location is determined to have no archaeological sensitivity.

#### **ENTRANCE 1:**

Entrance 1 of the 63rd Street station will be constructed within an approximately 25- by 50-foot section of Block 1417, Lot 45, at the southeast corner of East 63rd Street and Third Avenue. This lot is currently occupied by a 6-story (with basement) commercial and residential structure.

All historic maps dating to the early and mid-19th century depict the location of Entrance 1 as vacant. Sewers were available in Third Avenue by 1865, as seen on the Viele map of that year. The 1879 Bromley atlas is the first to depict a structure on the property, although it does not depict its footprint. Subsequent maps show that a 4-story brick structure with a basement was located on the property. Early maps indicate that the structure had an open rear yard that was outside of the APE. Records on file with the New York City Department of Buildings show that the structure that currently stands on the site was built in 1929.

Because this lot was not developed until the late-19th century after water and sewer networks were available and because structures with basements were built on the property in the late-19th and early 20th century, the construction of Entrance 1 would not impact archaeological resources dating to the historic period.

#### **THIRD AVENUE BETWEEN EAST 62ND AND EAST 64TH STREETS**

No historic maps depict any structures within the streetbed of Third Avenue between East 62nd and East 64th Streets. The only structure located in the area was the aforementioned farmhouse that was located to the east of Third Avenue in the vicinity of East 64th Street. Third Avenue was constructed through the APE by 1836, as seen on the Colton map of that year. Numerous maps dating to the late-19th and early 20th centuries also depict the elevated street car line that ran along Third Avenue at that time.

The Viele map of 1865 depicts a sewer line that ran beneath Third Avenue throughout much of the Upper East Side. Additional utilities including sewer and water lines are visible within the streetbed on historic maps dating to the late 19th and early 20th century. Maps of the streetbed as it exists today show that numerous utility lines run beneath



remnants from any such buildings could remain intact after the construction of East 63rd Street in the mid-19th century as well as subsequent road paving, maintenance, and the installation of utilities.

As seen in Table 1, the elevation of the intersection of East 63rd Street and Third Avenue has been relatively unchanged since the mid-19th century, though there is cartographic evidence which suggests that there was some landscape modification in this area in the early-19th century. The 1782 British Headquarters Map suggests that the project site was located near the base of a very large hill that was situated to the northwest. This is not depicted on the 1811 Bridges map, although that map does indicate that many elevated areas were located in the vicinity of this portion of the APE. The 1836 Colton map indicates that this part of the APE was located on a hill adjacent to a long, tree-lined driveway. This hill was also depicted on the 1851 Dripps map (Figure 6). Therefore, it seems that in the early-19th century, before the neighborhood was transformed into a fully-developed urban neighborhood, there was some modification of the landscape and hills were cut down and/or realigned.

In addition, as previously mentioned, soil borings show that the streetbed of East 63rd Street between Second and Third Avenues has been disturbed. Soil borings completed in the 1960s and 1970s showed that at that time a layer of fill measuring between 2 and 18 feet thick was present below the surface of the streetbed and that in several locations there were potentially natural soil levels beneath the fill. Soil borings completed in 2005 and 2009, after the construction of the existing station, show that 6 to 10 feet of fill are present below the street surface followed by layers of sand or sandy silt (see Chapter 2). The fill levels identified are likely the result of disturbance associated with the installation of the many utilities (including electric, gas, telecommunications, water, and steam lines) that run through the streetbed. The borings suggest that while there may be intact pockets of natural soils throughout the streetbed, they are highly variable and are located at depths of 6 to 10 feet. The most disturbance appears to be within East 63rd Street just east of Third Avenue, where utility work is planned, and just west of Second Avenue.

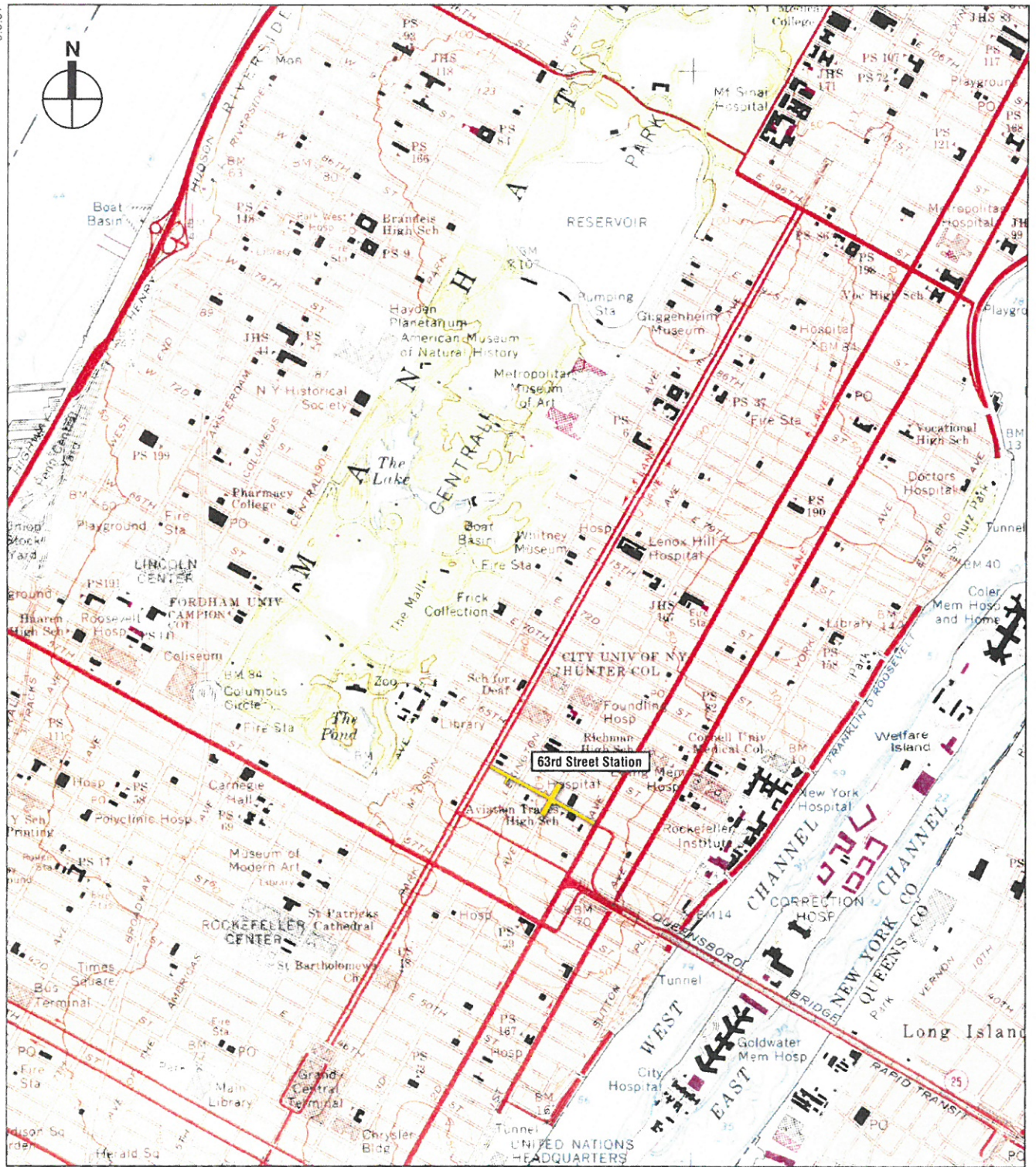
Street Station APE is at too great a distance from the historic farmhouse and has experienced too much disturbance associated with the construction and maintenance of the street as well as the installation of utilities within it, to be sensitive for archaeological resources associated with the historic farm.

Because of the lack of development in the area until the late 19th century and the substantial disturbance that has occurred on the site, it is not likely that undisturbed archaeological resources dating to the historic period remain present within the APE. Therefore, the APE is determined to have low sensitivity for archaeological resources dating to the historic period.

**B. RECOMMENDATIONS**

The APE has low sensitivity for both precontact and historic period archaeological resources. Therefore, no additional archaeological research or investigation is recommended. However, if project plans change so that additional areas are added to the APE, they should be reviewed by an archaeologist in accordance with the Second Avenue Subway project's PA to determine if archaeological resources could be impacted.

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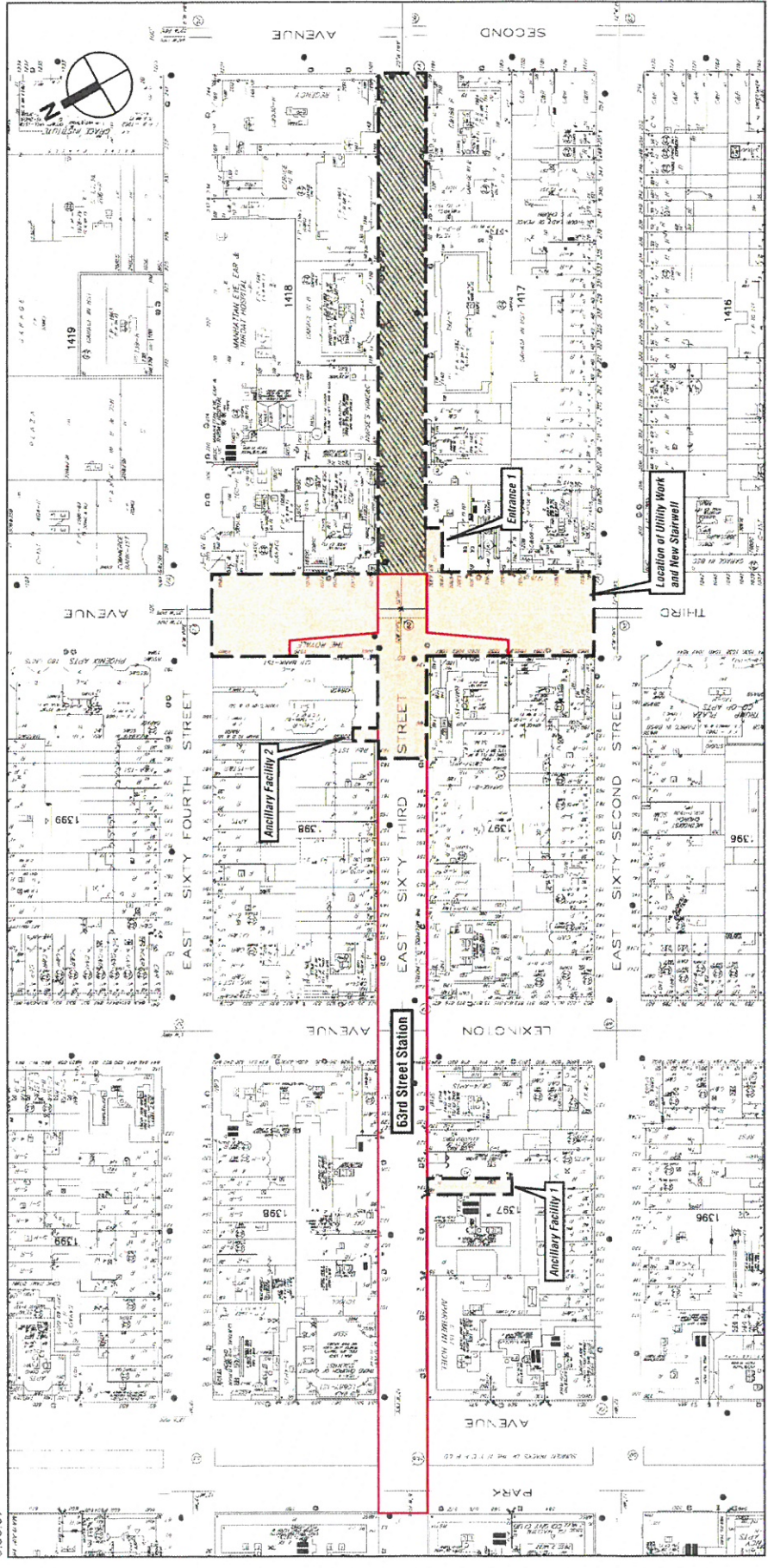


Project Location

0 1000 2000 FEET  
SCALE

Project Location  
USGS Map: Central Park Quadrangle  
Figure 1

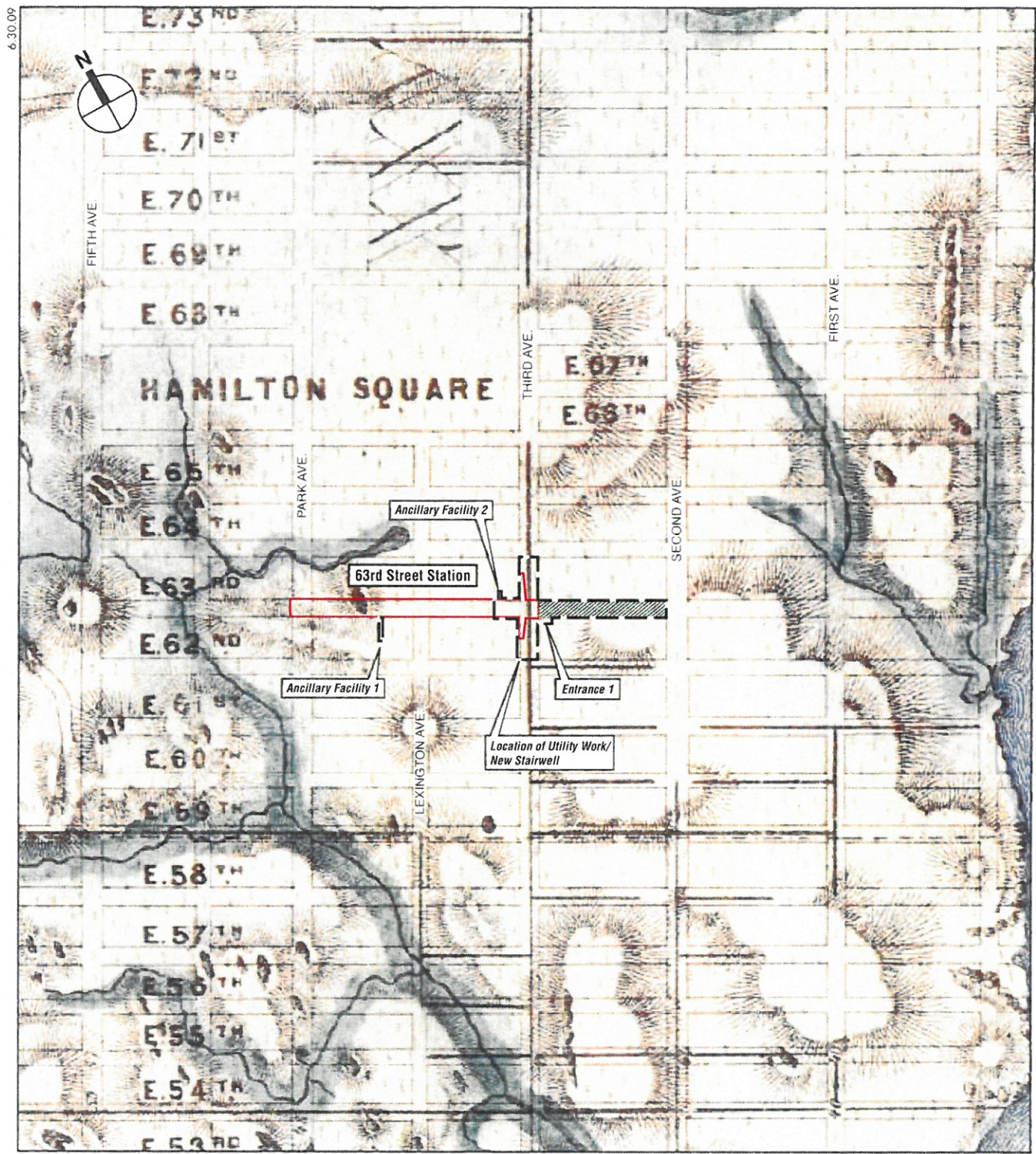
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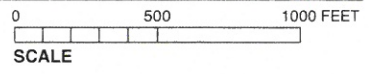
0 100 200 FEET  
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- Existing Subway Station
- Second Avenue Subway 63rd Street Station APE
- Portion of APE Determined to be Sensitive for Precontact and Historic Archaeological Resources in the 2003 Archaeological Assessment

APE Location  
Sanborn Map, 2007  
Figure 2

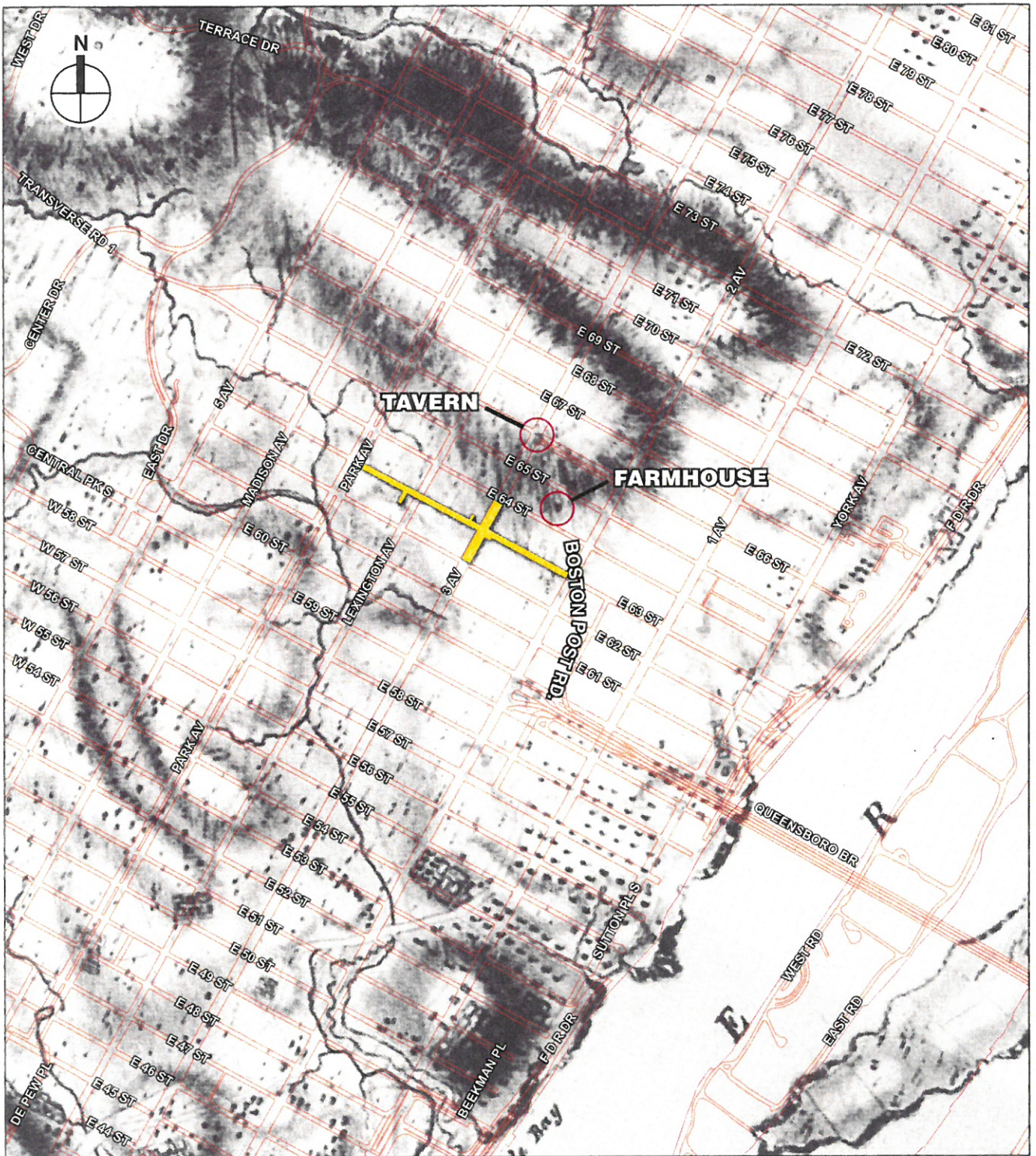


- Existing Subway Station
- Second Avenue Subway 63rd Street Station APE
- Portion of APE Determined to be Sensitive for Precontact and Historic Archaeological Resources in the 2003 Archaeological Assessment



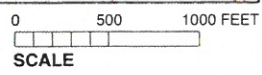
*Topographical Map of the City of New York*  
 E. Viele, 1865  
**Figure 3**

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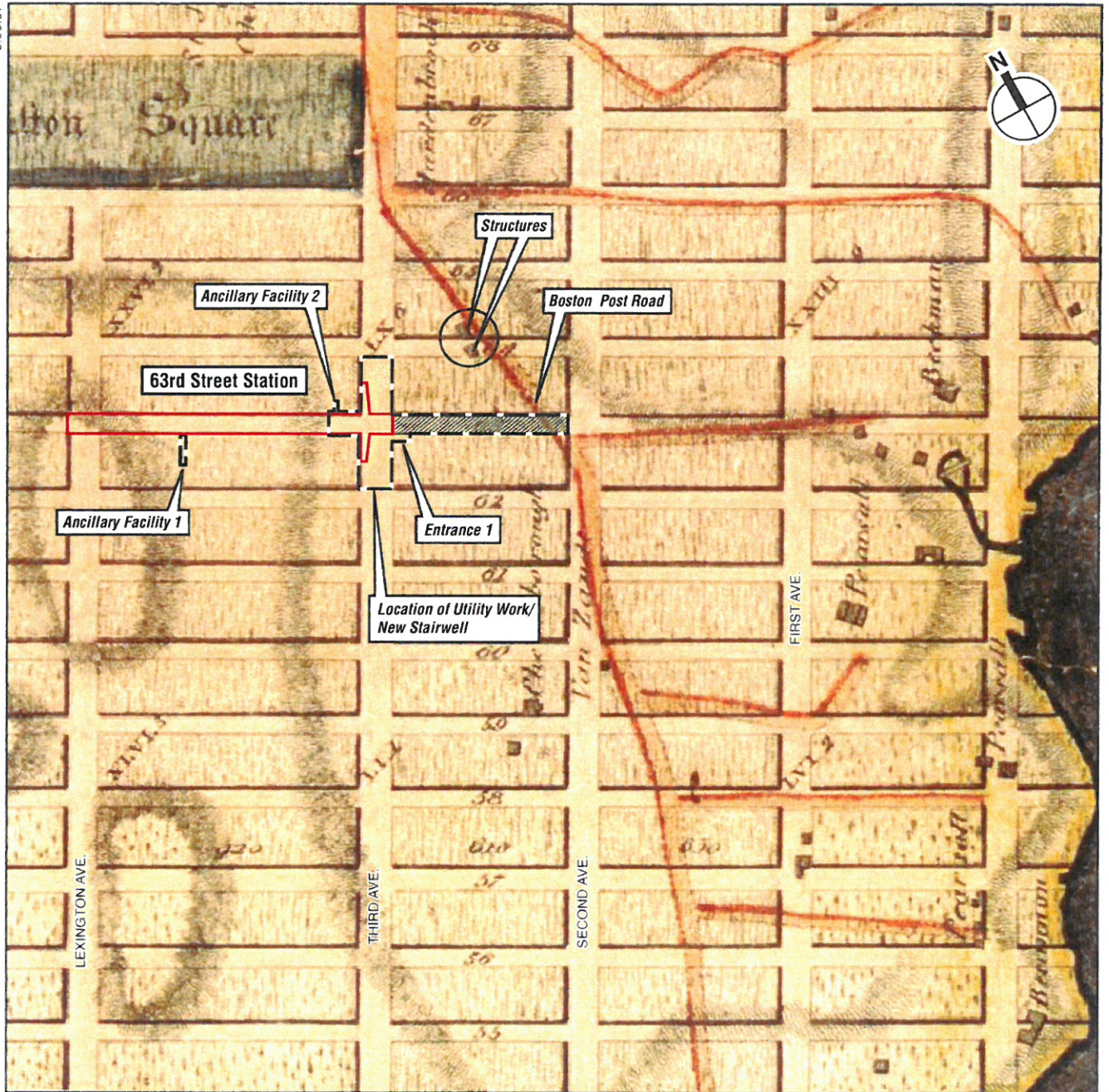
SOURCE: British National Archives

- Project Location
- 2004 Streets



NOTE: This map has been georeferenced with ARC GIS software. Because of inaccuracies in the original map, the overlay of the 2004 street lines may not be entirely accurate.

British Headquarters Map, ca. 1782  
Figure 4

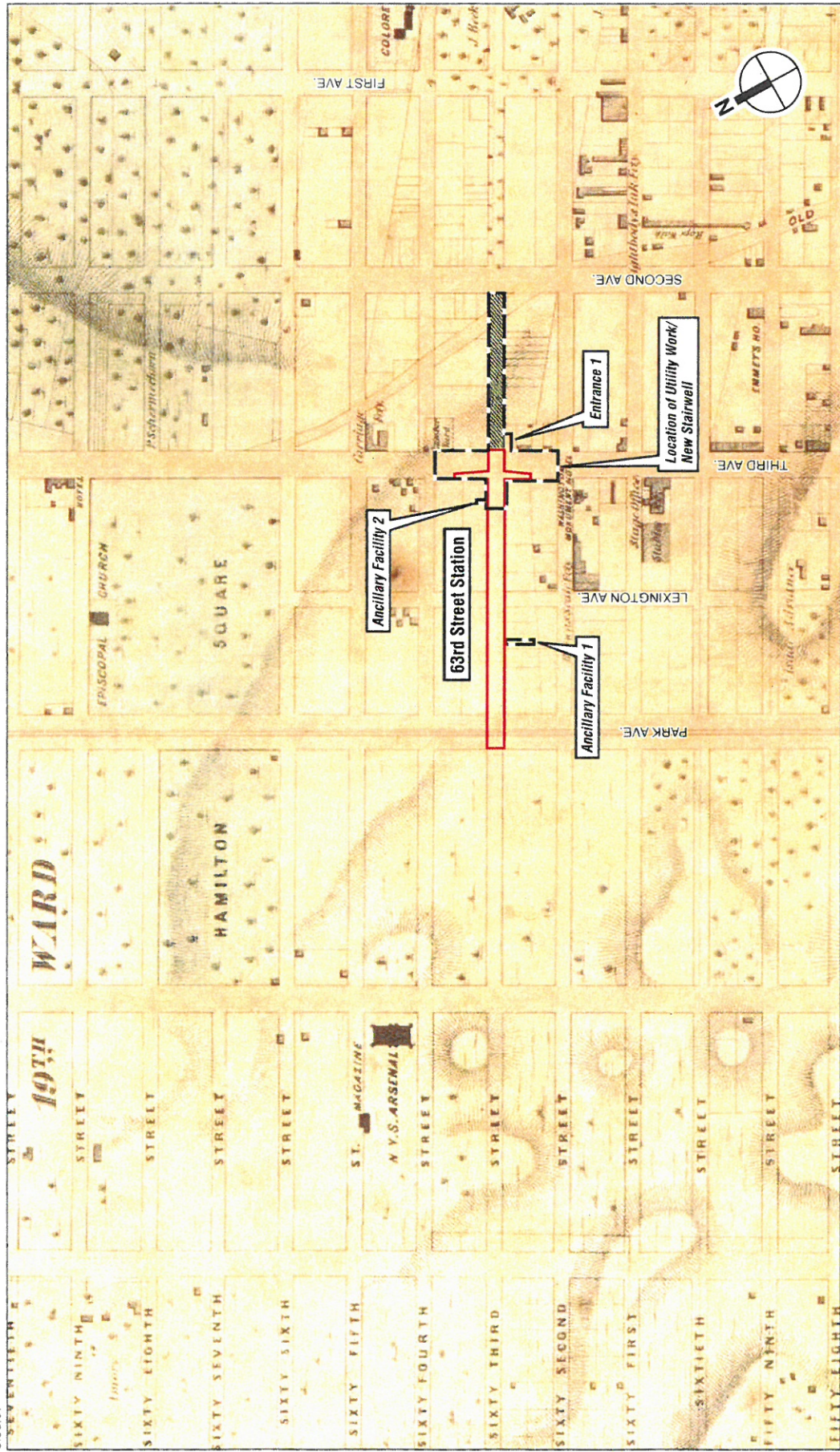


- Existing Subway Station
- Second Avenue Subway 63rd Street Station APE
- Portion of APE Determined to be Sensitive for Precontact and Historic Archaeological Resources in the 2003 Archaeological Assessment

0 500 FEET  
SCALE



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Existing Subway Station

Second Avenue Subway 63rd Street Station APE

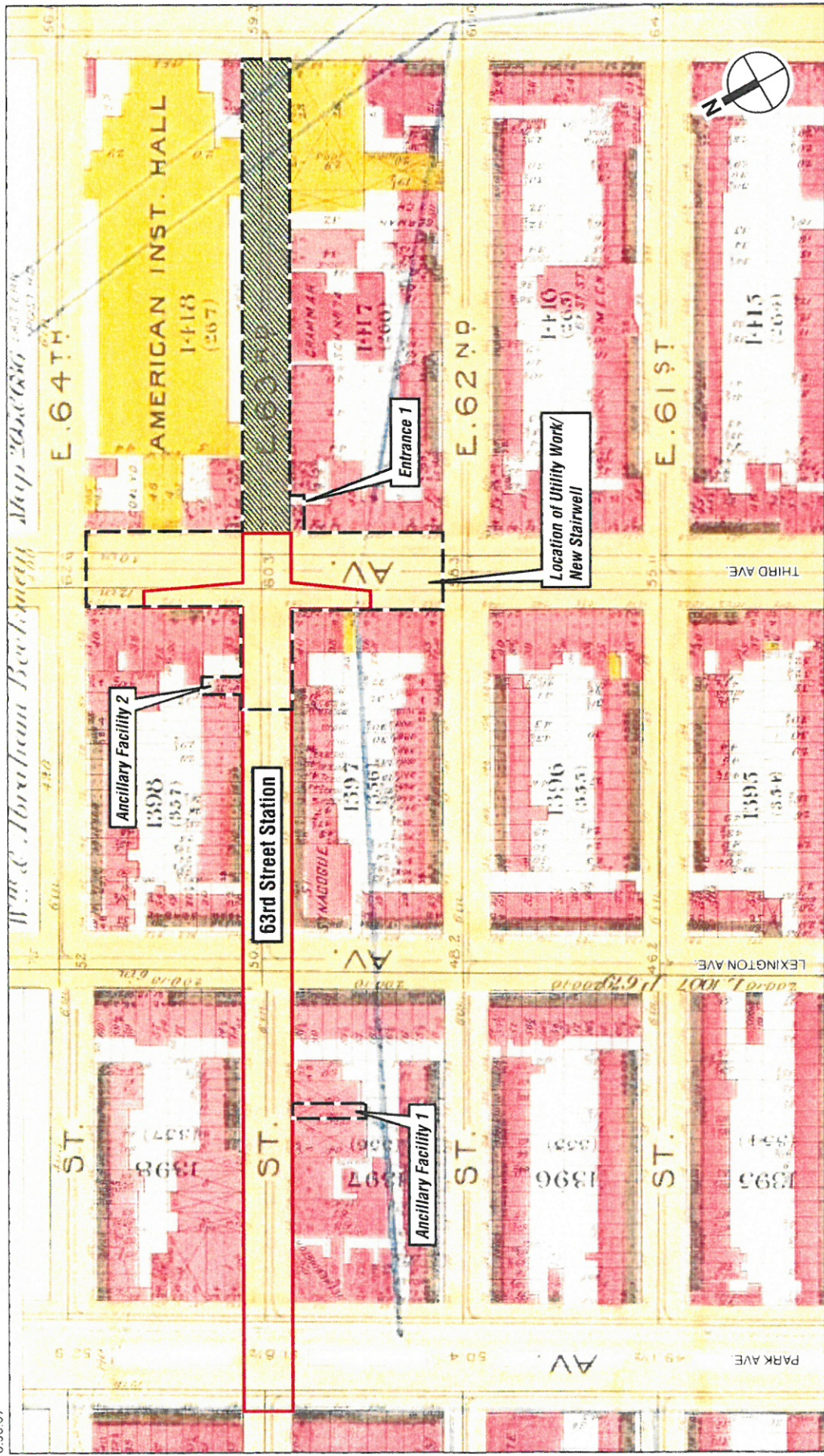
Portion of APE Determined to be Sensitive for Precontact and Historic Archaeological Resources in the 2003 Archaeological Assessment

Map of that Part of the City and County of New York North of 50th Street

M. Dripps, 1851

Figure 6

6.30.09



0 200 FEET  
SCALE

- Existing Subway Station
- Second Avenue Subway 63rd Street Station APE
- Portion of APE Determined to be Sensitive for Precontact and Historic Archaeological Resources in the 2003 Archaeological Assessment

Atlas of the City of New York  
G.W. Bromley, 1891  
**Figure 7**

**SECOND AVENUE SUBWAY** • 63rd Street Station

**Appendix A:**  
**Soil Boring Logs for the 63rd Street Station**  
**Provided by MTA NYCT**



**BORING LOG**

Sheet 1 of 5

**DMJM HARRIS ARUP**  
A Joint Venture



**SECOND AVENUE SUBWAY PROJECT**

**BORING NO. B63-2**

BORING STATION:		OFFSET:	
PROJECT NO. CM1188	COORDINATES		
G SURF EL 159.28	NORTH: 217603.7673		
DATUM: NYCT	EAST: 994590.9974		
FINAL BORING DEPTH (FT) 122.3			

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.	GROUND WATER READINGS			
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: Peter Lynch	DATE	TIME	DEPTH	STAB. TIME
CASING SIZE: 3"	ENGINEER: D. Persaud / S. Mendes	Note 1			
CASING HAMMER: SPUN	DATE START: 08/18/04	DATE END: 08/20/04			
ROCK CORE: NQ	REVIEWED BY: C. Snee	DATE: 9/9/04			

DEPTH (FT)	CASING (BPF) OR CORING (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC: SOIL (N/IN) ROCK (FT/FT)	TOTAL CORE REC (%)	ROCK CORE ROD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION BURMISTER (USCS / NYC BLDG CODE) CLASSIFICATIONS	STRATA SYMBOL	STRATIGRAPHY	INSITU PROPERTIES					NUMBER OF FRACTURES PER FOOT								
													HARDNESS					WEATHERING					see below for values			
													1	2	3	4	5	1	2	3	4	5	1	2	3	4
										PAVEMENT THICKNESS: Not recorded		FILL														
										Hand augered to a depth of 6 feet prior to start of boring																
		S1	6-8	5 6 7 11	13	24/20				Medium dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Mica (SM / 11-65)																
		S2	8-10	6 10 9 14	19	24/24				Medium dense, brown, fine to coarse SAND, some Silt, trace Gravel, trace Mica (SM / 11-65)																
		S3	10-12	21 25 18 27	43	24/0				No recovery																
		S4	15-17	3 3 5 16	8	24/8				Loose, brown, slightly micaceous, fine to coarse SAND, some Silt, trace Rock Fragments, trace Clay seams (SM / 7-65)		DEC ROCK														
		C1	20.0-23.7			3 7/3 7	100	90		Hard to very hard, slightly weathered, coarse grained, dark gray, quartz-mica-garnet SCHIST, with very thin, sub-horizontal foliation, rough to smooth, very closely to closely spaced, horizontal to sub-horizontal, slightly iron-oxide stained foliation joints/fractures, high mica content		ROCK							4							
		C2	23.7-28.5			4 8/4 8	100	85		Similar to Schist in C1, except closely to moderately spaced, horizontal to sub-horizontal, slightly weathered, slightly talcaceous, chloritized foliation joints/fractures. 25.2'-25.4': Coarse grained feldspar vein 24.6'-25.2': Sub-vertical, healed fracture 25.5': Cross-foliation joint/fracture, rough, undulating, moderately dipping, slightly weathered									1							

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS			JOINT/FRACTURE CHARACTERISTICS		
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS	WEATHERING	NO PER FT	SPACING/THICKNESS	ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	(1) 0	<2" Very close/Very Thin	0-5	Horizontal
4-10	Loose	2-4	Soft	2	Medium	(2) 1-2	2"-1' Close/Thin	5-35	Sub-Horizontal
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	(3) 3-10	1'-3' Mod Close/Mod Thick	35-55	Mod Dipping
30-50	Dense	8-15	Stiff	4	Hard	(4) Slight	3'-10" Wide/Thick	55-85	Sub-Vertical
>50	Very Dense	15-30	Very Stiff	5	Very Hard	(5) 11-20	>10' Very Wide/Very Thick	85-90	Vertical

**NOTES:**  
 1) Ground water level not recorded  
 2) Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.  
 3) Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv)  
 4) No recovery due to cobble obstruction in tip of spoon  
 5) 3" Casing spun to a depth of 20'

**BORING NO. B63-2**

BORING LOG

DMJM HARRIS ARUP  
A Joint Venture



SECOND AVENUE SUBWAY  
PROJECT

BORING NO. B63-2

BORING STATION: OFFSET	
PROJECT NO: CM1188	COORDINATES:
G SURF EL 159.28	NORTH: 217603.7673
DATUM: NYCT	EAST: 994590.9974
FINAL BORING DEPTH (FT) 122.3	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.	GROUND WATER READINGS			
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: Peter Lynch	DATE	TIME	DEPTH	STAB. TIME
CASING SIZE: 3"	ENGINEER: D. Persaud / S. Mendes				
CASING HAMMER: SPUN	DATE START: 08/18/04	DATE END: 08/20/04			
ROCK CORE: NQ	REVIEWED BY: C. Snee	DATE: 9/9/04			

DEPTH (FT)	CASING (BPF) OR CORING (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC: SOIL (N/IN) / ROCK (FT/FT)	TOTAL CORE REC (%)	ROCK CORE RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION BURMISTER (USCS / NYC BLDG CODE) CLASSIFICATIONS	STRATA SYMBOL	STRATIGRAPHY	INSITU PROPERTIES															NUMBER OF FRACTURES PER FOOT
													HARDNESS					WEATHERING					NUMBER OF FRACTURES PER FOOT					
													see below for values					see below for values					see below for values					
													1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
65	6.5	C9	57.8-62.6			5 2/5 2	100	77		Similar to Schist C5, except high mica content														0				
65	6.5																							1				
65	6.5									Similar to Schist in C5, except rough, closely to moderately closely spaced, horizontal to sub-horizontal, slightly weathered, clay coated foliation joints/fractures, frequent very thin quartz-feldspathic veins														0				
65	6.5	C10	62.6-68.1			5 1/5 1	100	88																1				
65	7.0																							2				
65	6.5																							1				
65	6.5																							0				
70	6.5									Very hard, fresh, fine to coarse grained, gray to dark gray, quartz-mica-gamet SCHIST, with very thin, horizontal to sub-horizontal foliation, foliation faint in places, rough, very closely to closely spaced, horizontal to sub-horizontal, slightly weathered, slightly clay coated foliation joints/fractures; high quartz, mica content														1				
70	6.5	C11	68.1-73.0			4 9/4 9	100	51																3				
70	6.0																							1				
70	7.0																							2				
70	7.5																							3				
75	7.5									Similar to Schist in C11														1				
75	7.5									73 2'-73 7': Fracture zone, rough to smooth, horizontal to vertical, slightly to moderately weathered, clay coated, chloritized foliation/cross-foliation joints/fractures														9				
75	7.5	C12	73.0-78.2			5 2/5 2	100	56																2				
75	7.5																							2				
75	7.5																							4				
75	7.5									Similar to Schist in C11														1				
75	7.5									78 9'-80 0': Fracture zone, rough to smooth, sub-horizontal to vertical, slightly weathered, clay coated, chloritized foliation/cross-foliation joints/fractures			6											10				
80	7.5	C13	78.2-83.3			5 1/5 1	100	58																1				
80	7.5																							1				
80	7.5																							0				
85	7.5									Similar to Schist in C11, except rough to smooth, moderately closely to widely spaced, sub-horizontal, slightly weathered, slightly clay coated foliation joints/fractures														1				
85	7.5	C14	83.3-88.3			5 0/5 0	100	100																0				
85	7.5																							1				
85	7.5																							0				
85	7.5																							2				

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS					JOINT/FRACTURE CHARACTERISTICS				
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS	WEATHERING		NO PER FT	SPACING/THICKNESS			ANGLE	ATTITUDE	
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	<2"	Very close/Very Thin			0-5	Horizontal
4-10	Loose	2-4	Soft	2	Medium	2	Severe	2'-1'	Close/Thin			5-35	Sub-Horizontal
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	3	Moderate	1'-3'	Mod Close/Mod Thick			35-55	Mod Dipping
30-50	Dense	8-15	Stiff	4	Hard	4	Slight	3'-10'	Wide/Thick			55-85	Sub-Vertical
>50	Very Dense	15-30	Very Stiff	5	Very Hard	5	Fresh	>10'	Very Wide/Very Thick			85-90	Vertical

6) RQD affected by sub-vertical joint/fracture  
 7) At 98' removed 5' core barrel and lowered the 10' core barrel  
 8) Packer testing performed in bedrock in 10' intervals approximately between the depths of 20' and 119.5' after coring was completed.  
 9) Bottom of borehole at 122.3'; borehole left open for ATV to be performed at a future date

BORING NO. B63-2

**BORING LOG**

Sheet 5 of 5

**DMJM HARRIS ARUP**  
A Joint Venture



**SECOND AVENUE SUBWAY  
PROJECT**

**BORING NO. B63-2**

BORING STATION:		OFFSET:	
PROJECT NO CM1188		COORDINATES:	
G SURF EL 159.28		NORTH: 217603.7673	
DATUM: NYCT		EAST: 994590.9974	
FINAL BORING DEPTH (FT) 122.3			

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.	GROUND WATER READINGS			
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: Peter Lynch	DATE	TIME	DEPTH	STAB. TIME
CASING SIZE: 3"	ENGINEER: D. Persaud / S. Mendes				
CASING HAMMER: SPUN	DATE START: 08/18/04	DATE END: 08/20/04			
ROCK CORE: NQ	REVIEWED BY: C. Snee	DATE: 9/9/04			

DEPTH (FT)	CASING (BPF) OR CORING (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC. SOIL (IN/IN) ROCK (FT/FT)	TOTAL CORE REC (%)	ROCK CORE RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION BURMISTER (USCS / NYC BLDG CODE) CLASSIFICATIONS	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES															
														HARDNESS					WEATHERING					NUMBER OF FRACTURES PER FOOT					
														see below for values					see below for values					see below for values					
														1	2	3	4	5	1	2	3	4	5	1	2	3	4	NUMBER	
																													0
																													0
125																													
130																													
135																													
140																													
145																													
150																													

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS			JOINT/FRACTURE CHARACTERISTICS		
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS	WEATHERING	NO PER FT	SPACING/THICKNESS	ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1 Very Soft	1 Complete	(1) 0	<2" Very close/Very Thin	0-5	Horizontal
4-10	Loose	2-4	Soft	2 Medium	2 Severe	(2) 1-2	2"-1" Close/Thin	5-35	Sub-Horizontal
10-30	Medium Dense	4-8	Med Stiff	3 Med Hard	3 Moderate	(3) 3-10	1'-3' Mod Close/Mod Thick	35-55	Mod Dipping
30-50	Dense	8-15	Stiff	4 Hard	4 Slight	(4) 11-20	3'-10' Wide/Thick	55-85	Sub-Vertical
>50	Very Dense	15-30	Very Stiff	5 Very Hard	5 Fresh		>10' Very Wide/Very Thick	85-90	Vertical
		>30	Hard						

- 6) RQD affected by sub-vertical joint/fracture
- 7) At 98' removed 5' core barrel and lowered the 10' core barrel
- 8) Packer testing performed in bedrock in 10' intervals approximately between the depths of 20' and 119.5' after coring was completed
- 9) Bottom of borehole at 122.3'; borehole left open for ATV to be performed at a future date

**BORING NO. B63-2**

**BORING LOG**

Sheet: 1 of 2



**SECOND AVENUE SUBWAY PROJECT**

**BORING NO. B63-4**

BORING STATION: 1147+46.85      OFFSET: -46.85  
 PROJECT NO. CM1188      COORDINATES:  
 G. SURF EL. 152.66      NORTH: 218074.0341  
 DATUM : NYCT      EAST: 993743.5567  
 FINAL BORING DEPTH (FT) 60.4

SAMPLER: 2" O.D. Split Spoon      BORING CO: Jersey Boring and Drilling Corp.  
 SAMPLER HAMMER: 140 lb. (Automatic)      FOREMAN: Peter Lynch  
 CASING SIZE: 3"      ENGINEER: Sara Rocha      DATE: 7/25/05      TIME: 10:10      DEPTH: 16.2'      CASING: 25'      STAB. TIME: 68 Hrs. 10 Min.  
 CASING HAMMER: N/A (Spun)      DATE START: 7/22/05      DATE END: 7/25/05  
 ROCK CORE: NO      REVIEWED BY: C. Snee      DATE: 11/14/05

DEPTH (FT)	CASING (BPF) OR SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC. SOIL (IN/IN)	TOTAL CORE REC. (%)	ROCK CORE ROD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	INSITU PROPERTIES													
												HARDNESS					WEATHERING					NUMBER OF FRACTURES PER FOOT			
												see below for values					see below for values					see below for values			
0-3	3" Spun								PAVEMENT THICKNESS: 3" Concrete	[Symbol]	FILL	1													
3-5								Hand augered to a depth of 6 feet prior to boring.					2												
5-8	S1	8-8	8	13	24/24			Medium dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Mica (SM / 11-65)					3												
8-10	S2	8-10	2	8	24/8			Loose, brown, fine to medium SAND, some Silt, trace Gravel, trace Mica, trace Rock Fragments, trace Clay (SM / 11-65)	[Symbol]	ORGANICS	4														
10-12	S3	10-12	4	0	24/11			Loose, brown, fine to coarse SAND, some Silt, trace Mica, trace Gravel, trace Clay (SM / 11-65)					5												
15-16.4	S4	15-16.4	3	4	24/13			Top: Loose, brown, fine to medium SAND, some Silt, little Gravel, trace Mica, trace Clay (SM / 11-65)					6												
16.4-17	S4A	16.4-17	1					Bottom: Dark gray-black, fine to medium SAND, some organic Silt, trace organic Silty Clay pockets, trace Gravel (SM / 11-65)																	
17-18.8	S5	17-18.8	1	4	21/14			S5: Soft dark to light gray slightly organic Clayey SILT, some fine to medium SAND, trace Gravel, trace Rock Fragments, trace Mica (OL / 11-65)	[Symbol]	SAND/ GRAVEL/ SILT															
18.8	C1	18.8	3					C1: No Recovery																	
21-23	S6	21-23	7	16	24/12			Medium dense, brown, fine to medium SAND, some Silt, little Gravel, trace Mica (SM / 6-65)																	
25-25.7	S7	25-25.7	3	18	24/21			Top (8"): Medium dense, light gray-white, coarse SAND, little Silt, trace Rock Fragments, trace Clay (SM / 7-65)	[Symbol]	DEC ROCK															
25.7-27	S7A	25.7-27	12					Bottom (13"): Light orange-brown, coarse to fine SAND, some Silt, trace Mica, trace Rock Fragments (SM / 7-65)																	

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS			JOINT/FRACTURE CHARACTERISTICS		
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS	WEATHERING	NO. PER FT	SPACING/THICKNESS	ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	(1) 0	<2" Very close/Very Thin	0-5	Horizontal
4-10	Loose	2-4	Soft	2	Medium	(2) 1-2	2"-1" Close/Thin	5-35	Sub-Horizontal
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	(3) 3-10	1'-3" Mod Close/Mod Thick	35-55	Mod Dipping
30-50	Dense	8-15	Stiff	4	Hard	(4) 11-20	3'-10" Wide/Thick	55-85	Sub-Vertical
>50	Very Dense	15-30	Very Stiff	5	Very Hard		>10' Very Wide/Very Thick	85-90	Vertical
		>30	Hard						

**NOTES:**  
 1) Water level readings have been made at times and under conditions stated. Fluctuations of ground water may occur due to other factors than those present at the time measurements were made.  
 2) Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.  
 3) Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv)  
 4) Samples S4A and S5 have an organic odor.  
 5) Possible boulder at 18'-19'.  
 6) Placed core barrel between 18.5'-21.5' - No recovery.

**BORING NO. B63-4**



**BORING LOG**

Sheet 1 of 1

**DMJM HARRIS ARUP**  
A Joint Venture



**SECOND AVENUE SUBWAY PROJECT**

**BORING NO. B63-5**

BORING STATION:		OFFSET:	
PROJECT NO: CM1188	COORDINATES:		
G SURF EL	NORTH:		
DATUM: NYCT	EAST:		
FINAL BORING DEPTH (FT) 11.2			

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling, Inc	GROUND WATER READINGS		
SAMPLER HAMMER: 140 lb Hammer	FOREMAN: P. Lynch	DATE	TIME	DEPTH
CASING SIZE: 3"	ENGINEER: R. Nunez	STAB. TIME		
CASING HAMMER: N/A	DATE START: 09/10/04	DATE END: 09/10/04	Note 1	
ROCK CORE: N/A	REVIEWED BY: A. A. Azmi	DATE: 09/29/04		

DEPTH (FT)	CASING (BPF) OR CORINGS (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC: SOIL (N/IN) ROCK (FT/FT)	TOTAL CORE REC (%)	ROCK CORE RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION BURMISTER (USCS / NYC BLDG CODE) CLASSIFICATIONS	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES										NUMBER OF FRACTURES PER FOOT				
														HARDNESS					WEATHERING						see below for values			
														1	2	3	4	5	1	2	3	4	5		1	2	3	4
0-2										PAVEMENT THICKNESS: Not recorded		FILL	2															
2-3										Hand augered to a depth of 7 feet prior to start of boring. Environmental samples taken			3															
7-9		S1	7-9	2 1	3	24/14				Very loose, brown, silty, fine SAND and SILT, trace Gravel, trace Clay, trace Mica, trace Cinders (SM / 11-65)																		
9-11.0		S2	9-11.0	2 3 2	6	24/5				Loose, brown, fine to coarse SAND, little Cinders, little Silt (SM / 11-65)																		
11-11.2		S3	11-11.2	100/3"	100/3"	3/2				Concrete Fragments, some Cinders, trace Brck, trace coarse Sand			4															

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS			JOINT/FRACTURE CHARACTERISTICS		
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS	WEATHERING	NO PER FT	SPACING/THICKNESS	ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	0-5	Horizontal
4-10	Loose	2-4	Soft	2	Medium	2	Severe	5-35	Sub-Horizontal
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	3	Moderate	35-55	Mod Dipping
30-50	Dense	8-15	Stiff	4	Hard	4	Slight	55-85	Sub-Vertical
>50	Very Dense	15-30	Very Stiff	5	Very Hard	5	Fresh	85-90	Vertical

- Ground water level not encountered
- Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual
- Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv)
- Concrete obstruction encountered at 11'; bottom of borehole at 11'

**BORING NO. B63-5**



**BORING LOG**

Sheet: 3 of 5



**SECOND AVENUE SUBWAY PROJECT**

**BORING NO. B63-6**

BORING STATION: 1145+44.40      OFFSET: -396.01  
 PROJECT NO. CM1188      COORDINATES:  
 G. SURF EL. 162.67      NORTH: 217508.538  
 DATUM : NYCT      EAST: 994296.6477  
 FINAL BORING DEPTH (FT) 139.7

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.	<b>GROUND WATER READINGS</b>				
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Peter Lynch	DATE	TIME	DEPTH	CASING	STAB. TIME
CASING SIZE: 3"	ENGINEER: Sara Rocha					
CASING HAMMER: N/A (Spun)	DATE START: 05/25/05      DATE END: 05/26/05					
ROCK CORE: NQ	REVIEWED BY: C. Snee      DATE: 11/14/05					

DEPTH (FT)	CASING (BPF) OR SAMPLE / CORE NO	SAMPLE DEPTH (FT)	BLOWS / 8 INCH	N VALUE (BPF)	PEN/REC: SOIL (N/IN)	TOTAL CORE REC (%)	ROCK CORE RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	INSITU PROPERTIES													
												HARDNESS					WEATHERING					NUMBER OF FRACTURES PER FOOT			
												see below for values					see below for values					see below for values			
											NOTES	1	2	3	4	5	1	2	3	4	5	NUMBER			
2.5									58.6'-66.9': Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, highly crenulated, horizontal to moderately dipping foliation, rough to smooth, with moderately closely to widely spaced, sub-horizontal to moderately dipping, slightly weathered, chloritized to clay coated foliation joints/fractures.														0		
3	C4	57.2-66.9			9.7/9.7	100	93																0		
3																							0		
3																							0		
3																							1		
2.5																							0		
2.5									58.6'-59.2', 59.7' and 60.7': Cross-foliation joints/fractures, rough to smooth, irregular, closely spaced, moderately dipping to sub-vertical, slightly to moderately weathered, chloritized, silicate, clay to hematite coated, mineralized.															0	
3																							7		
3																							0		
2.5									61.3'-61.7', 63.5'-63.9' and 69.5'-66.9': Several healed sub-vertical joints/fractures.															0	
2.5	C5	66.9-76.5			9.6/9.6	100	87		C5: Similar to Schist in C4. 67.2'-68.0', 70.5', 71.3'-71.7' and 71.6'-72.2': Cross-foliation joints/fractures, rough, irregular, very closely to moderately closely spaced, sub-vertical to vertical, moderately weathered, chloritized, clay to hematite coated, mineralized.														1		
2.5																							5		
3																							4		
3																							0		
2.5																							0		
2.5																							0		
2.5																							0		
2.5																							0		
2.5	C6	76.5-82.4			5.9/5.9	100	100		C6: Similar to Schist in C4. 80.4'-80.7': Healed sub-vertical joint/fracture															0	
2.5																								0	
2.5																								0	
2																								1	
2.5									Similar to Schist in C4, except convoluted, highly crenulated foliation, occasional very thin quartz veins, occasional very thin quartz-feldspathic zones.															0	
2.5									85.2'-85.5': Healed sub-vertical joint/fracture.															0	
2.5									85.4'-85.7': Cross-foliation joint/fracture, rough, sub-vertical, slightly mineralized															2	
3	C7	82.4-91.6			9.2/9.2	100	100																	1	
3																								1	
3																								0	
3																								0	

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS	WEATHERING			NO. PER FT	SPACING/THICKNESS	ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(1) 0	2" Very close/Very Thin	0-5	Horizontal
4-10	Loose	2-4	Soft	2	Medium	2	Severe	(2) 1-2	"-1' Close/Thin	5-35	Sub-Horizontal
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	3	Moderate	(3) 3-10	"-3' Mod Close/Mod Thick	35-55	Mod Dipping
30-50	Dense	8-15	Stiff	4	Hard	4	Slight	(4) 11-20	"-10' Wide/Thick	55-85	Sub-Vertical
>50	Very Dense	15-30	Very Stiff	5	Very Hard	5	Fresh		"-10' Very Wide/Very Thick	85-90	Vertical
		>30	Hard								

- 4) New core barrel placed.
- 5) Core barrel became jammed.
- 6) RQD affected by sub-vertical joint/fracture.
- 7) RQD affected by sub-vertical to vertical joints/fractures between 67'-68', and 71'-72'.
- 8) Core barrel jammed.
- 9) Bottom of borehole at 139.7'; acoustic televiewer survey performed; borehole grouted upon completion.

**BORING NO. B63-6**













**BORING LOG**

Sheet: 1 of 5

**DMJM HARRIS ARUP**  
A Joint Venture



**SECOND AVENUE SUBWAY PROJECT**

**BORING NO. B64-2**

BORING STATION:		OFFSET:	
PROJECT NO. CM 1188	COORDINATES:		
G SURF EL. 158.08	NORTH: 217606.1916		
DATUM: NYCT	EAST: 994657.5258		
FINAL BORING DEPTH (FT) 140			

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jefsey Boring and Drilling Co., Inc.	GROUND WATER READINGS			
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: A. Feliciano	DATE	TIME	DEPTH	STAB. TIME
CASING SIZE: 3" and 5"	ENGINEER: N. Sokol	7/2/02	12:40	14.3'	OW 4 Days
CASING HAMMER: 140 lb.	DATE START: 6/17/02	DATE END: 6/28/02	8/23/02	15:45	14.5' OW 56 Days
ROCK CORE: NO	REVIEWED BY: M. A. Ponti, JDATE: 9/3/02	8/27/02	16:05	14.6'	OW 60 Days

DEPTH (FT)	CASING (BPF) OR CORING (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC. SOIL (IN/IN) ROCK (FT/FT)	TOTAL CORE REC (%)	ROCK CORE RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION BURMISTER (USCS / NYC BLDG CODE) CLASSIFICATIONS	STRATA SYMBOL	STRATIGRAPHY	INSITU PROPERTIES														
													HARDNESS					WEATHERING					NUMBER OF FRACTURES PER FOOT				
													see below for values					see below for values					see below for values				
					1	2	3	4	5	1	2	3	4	5	1	2	3	4	NUMBER								
										PAVEMENT THICKNESS: 4" Concrete		FILL	1														
										Hand augered to a depth of 6 ft. prior to boring, environmental samples taken.			2														
5		S1	6-8	4 5 9 12	14	24/17		0		Medium dense, brown, fine to medium SAND and SILT, trace Gravel (SM / 11-65)			3														
		S2	8-10	13 11 18 20	29	24/14		0		Medium dense, light brown to red-brown, fine to medium SAND and SILT, trace Gravel (SM / 11-65)			4														
10		S3	10-12	9 18 19 23	37	24/15		0		Dense, light brown to red-brown, fine to medium SAND, some Silt, trace Gravel (SM / 11-65)																	
		S4	12-14	15 16 34 26	50	24/17		0		Dense, light brown, fine to medium SAND, some Silt, trace Gravel, trace Clay (SM / 11-65)																	
15		S5	14-15.3	18 22	40	24/19		0		Top 16": Brown, fine to medium SAND, little Silt, trace Gravel (SM / 11-65)																	
		SSA	15.3-16	18 19						Bottom 3": Gray-brown, slightly micaceous, fine to medium SAND, some Silt, trace Rock Fragments (SM / 7-65)		DEC ROCK															
20		S6	20-22	13 18 30 51	48	24/20		0		Dense, light gray to red-brown (variable color), micaceous, fine to coarse SAND, little Silt, trace Rock Fragments (SM / 7-65)																	
25		S7	25-27	20 26 43 64	69	24/24		0		Very dense, gray, micaceous, fine to coarse SAND, little Silt, trace Rock Fragments (SM / 7-65)																	
30																											

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS			JOINT/FRACTURE CHARACTERISTICS				
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS	WEATHERING	NO. PER FT	SPACING/THICKNESS	ANGLE	ATTITUDE		
0-4	Very Loose	<2	Very Soft	1	Very Soft	(1) 0	<2" Very close/Very Thin	0-5	Horizontal		
4-10	Loose	2-4	Soft	2	Medium	(2) 1-2	2"-1' Close/Thin	5-35	Sub-Horizontal		
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	(3) 3-10	1'-3' Mod Close/Mod Thick	35-55	Mod Dipping		
30-50	Dense	8-15	Stiff	4	Hard	(4) 11-20	3'-10' Wide/Thick	55-85	Sub-Vertical		
>50	Very Dense	15-30	Very Stiff	5	Very Hard		>10' Very Wide/Very Thick	85-90	Vertical		

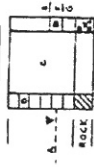
**NOTES:**  
 1) Water level readings have been made at times and under conditions stated, fluctuations of ground water may occur due to other factors than those present at the time measurements were made  
 2) Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual  
 3) Field Test Data - Total organic vapors levels are reported to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv)  
 4) On 6/19/02, water level was at top of casing, about 1.5' above existing ground surface

**BORING NO. B64-2**





**LEGEND**



- A - Water reading & date taken
- B - Number of hours of a sample falling 18" required to drive a 2" casing unless otherwise noted
- C - Strata description
- D - Number of blows of a 140 lb. hammer on a 2" casing required to drive a 2" split pipe each ft.
- E - Sample number
- F - Depth of end of sample drive
- G - Sample recovery, in inches

**GENERAL NOTES**

- 1 - All elevations and depths shall be referred to mean sea level.
- 2 - A 100 lb. hammer shall be used at each hole, 14" dia. & 2' survey bit.
- 3 - Location of borings shown above.
- 4 - Location of boring with split pipe noted shown above.
- 5 - D.D. denotes Roller Bit.
- 6 - R denotes drilled ahead.
- 7 - R denotes "trace of".
- 8 - rec denotes sample recovery.
- 9 - 1/2 ft. of ft. denotes "medium to fine".
- 10 - 1/2" to fine --- etc.
- 11 - 1/2" casing used, or otherwise as indicated.
- 12 - 2 1/2" core bit used, as indicated.
- 13 - 1/2" core bit used, as indicated.
- 14 - 1/2" core bit used, as indicated.
- 15 - 1/2" core bit used, as indicated.
- 16 - 1/2" core bit used, as indicated.
- 17 - 1/2" core bit used, as indicated.
- 18 - 1/2" core bit used, as indicated.
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- 96 - 1/2" core bit used, as indicated.
- 97 - 1/2" core bit used, as indicated.
- 98 - 1/2" core bit used, as indicated.
- 99 - 1/2" core bit used, as indicated.
- 100 - 1/2" core bit used, as indicated.

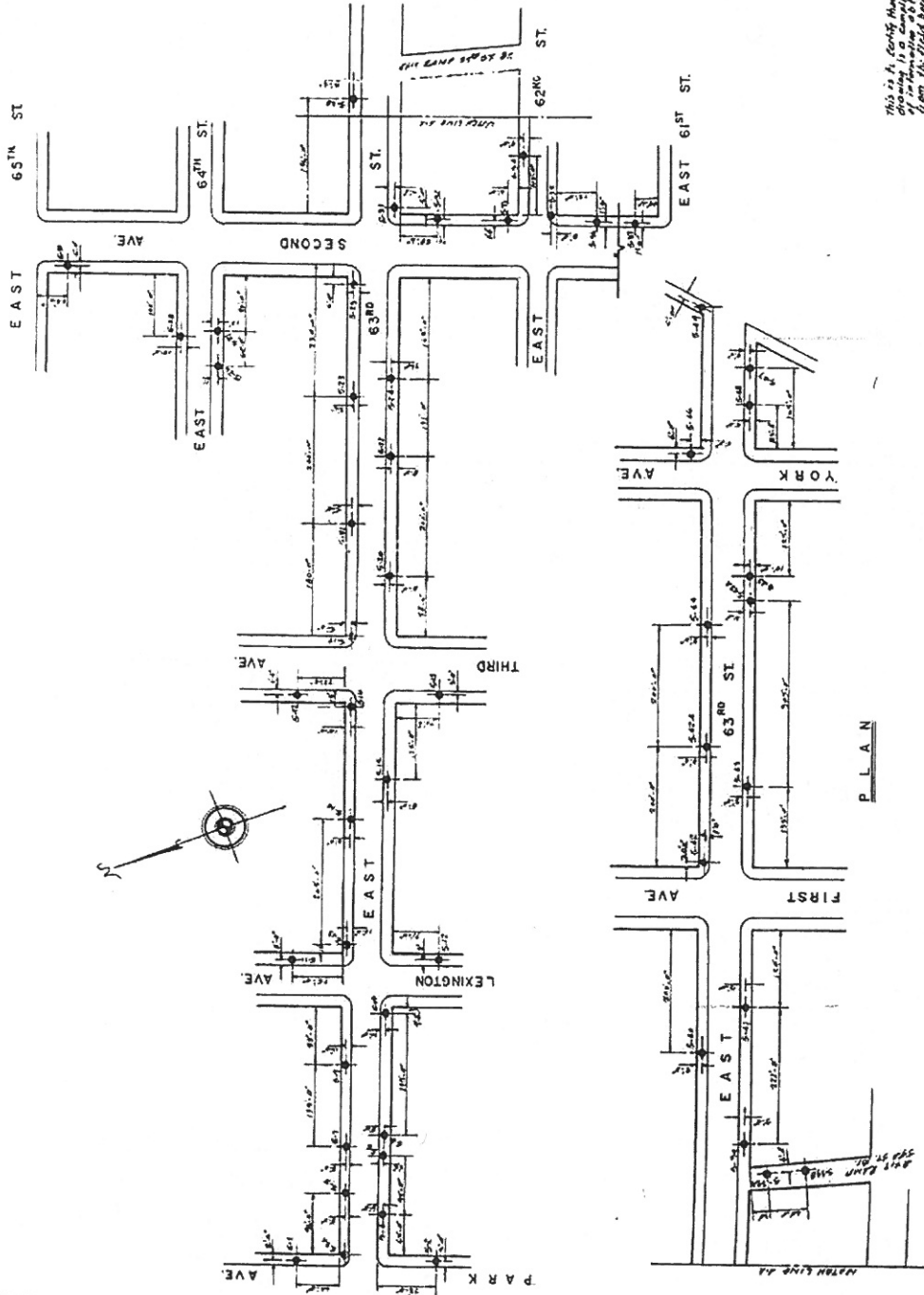
NOTE: See Sheet No. 2 for Boring Sch

RAYMOND INTERNATIONAL

BORING LOCATION PLAN

NEW YORK CITY TRANSIT SYSTEM  
 Contract No. 10, Route No. 1, Sect. 1  
 Along East 63rd St. from Park Ave. to E. River St.

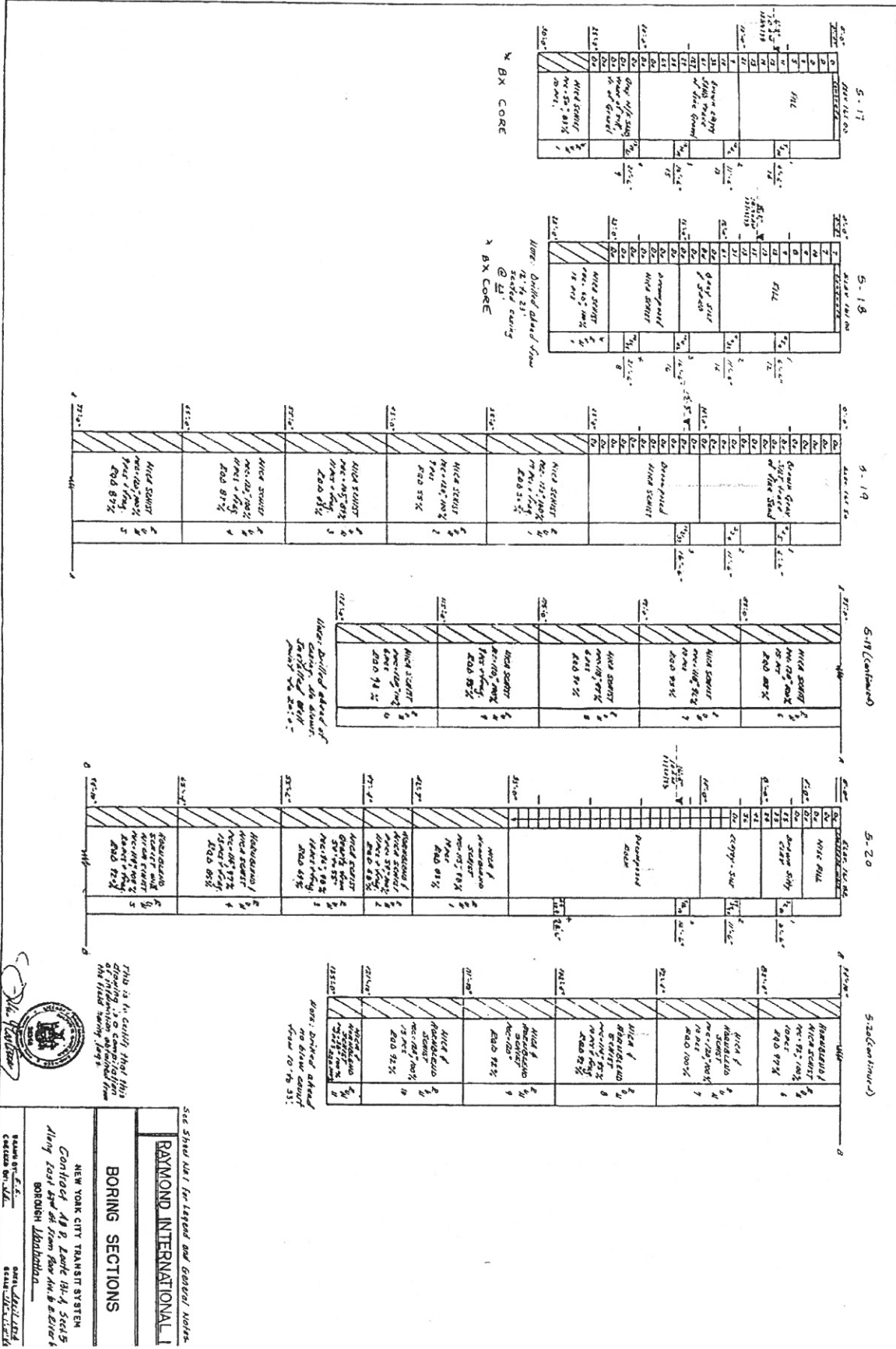
DATE: 11-1-22  
 DRAWN BY: J.C.  
 CHECKED BY: J.C.



This is a rough sketch of the boring location plan. It is a compilation of information obtained from the field boring log.



PLAN

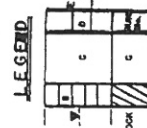


516 Street Ave. for Legend and Geologic Notes  
**RAYMOND INTERNATIONAL**  
**BORING SECTIONS**  
 NEW YORK CITY TRANSIT SYSTEM  
 Contract #8 R. Lenth (B-4) Seals  
 along East 57th St from Bow in to 6th Avenue  
 Borough Manhattan  
 SCALE 8" = 1'-0"  
 DATE 11/1/54  
 DRAWN BY: J. L. ...  
 CHECKED BY: J. L. ...









G3F-6 (Cont)

G3F-5

G3F-4 (Cont)

G3F-3

G3F-2

G3F-1

DEPTH (FEET)	LOG DESCRIPTION	PERCENT SAND	PERCENT GRAVEL	PERCENT SILT	PERCENT CLAY	PERCENT ORGANIC	REMARKS
0.0	Surface						
1.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 1
2.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 2
3.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 3
4.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 4
5.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 5
6.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 6
7.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 7
8.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 8
9.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 9
10.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 10
11.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 11
12.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 12
13.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 13
14.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 14
15.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 15
16.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 16
17.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 17
18.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 18
19.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 19
20.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 20
21.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 21
22.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 22
23.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 23
24.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 24
25.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 25
26.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 26
27.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 27
28.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 28
29.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 29
30.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 30
31.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 31
32.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 32
33.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 33
34.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 34
35.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 35
36.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 36
37.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 37
38.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 38
39.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 39
40.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 40
41.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 41
42.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 42
43.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 43
44.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 44
45.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 45
46.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 46
47.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 47
48.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 48
49.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 49
50.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 50
51.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 51
52.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 52
53.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 53
54.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 54
55.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 55
56.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 56
57.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 57
58.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 58
59.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 59
60.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 60
61.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 61
62.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 62
63.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 63
64.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 64
65.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 65
66.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 66
67.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 67
68.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 68
69.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 69
70.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 70
71.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 71
72.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 72
73.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 73
74.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 74
75.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 75
76.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 76
77.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 77
78.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 78
79.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 79
80.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 80
81.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 81
82.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 82
83.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 83
84.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 84
85.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 85
86.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 86
87.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 87
88.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 88
89.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 89
90.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 90
91.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 91
92.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 92
93.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 93
94.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 94
95.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 95
96.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 96
97.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 97
98.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 98
99.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 99
100.0	MICA SCHIST	100%	0%	0%	0%	0%	Sample 100

NOTE: No Drill water return

*John R. ...*

RAYMOND INTERNATIONAL B  
WARREN GEORGE, INCORPORATED  
CONTRACT D-1311

BORING SECTIONS

NEW YORK CITY TRUST SYSTEM  
ROUTE 21A (LENOX AVENUE) SECT 53  
ALONG @ 85 ST. THIRD AVE TO FACE BRIVE  
BOROUGH OF Manhattan

DRAWN BY: J.C.  
CHECKED BY: J.C.  
DATE: 12-1-57  
SCALE: 1" = 10'







