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

Management Summary

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 63nd 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

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Chapter 1: Introduction

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

analyzed for archaeological sensitivity in the 2003 Phase 1A study. Because new data have been obtained from soil borings taken after the 2003 Phase 1A was completed, the streetbed of East 63rd Street between Second and Third Avenues was reevaluated as part of the present study.

The APE for the 63rd Street Station for the purposes of this archaeological assessment includes the following:

- An ancillary facility at 124 East 63rd Street, on the southern side of the street between Lexington and Park Avenues;
- An ancillary facility 169 East 63rd Street, within an existing paved public plaza on the north side of the street between Third and Lexington Avenues;
- An entrance at the southeast corner of East 63rd Street and Third Avenue;
- A new stairwell and expansion of the station within the streetbed of Third Avenue between East 62nd and East 64th Streets; and
- Utility installations and relocations within the streetbed of Third Avenue between East 62nd and East 64th Streets and in the streetbed of East 63rd Street east and west of Third Avenue (including sidewalks). Utility relocation/installation is only expected to occur in a 150 foot-long section of the streetbed immediately east of the eastern line of Third Avenue, though the entire streetbed of East 63rd Street between Second and Third Avenues has been conservatively included within the APE.

B. PREVIOUSLY ANALYZED PORTIONS OF THE 63RD STREET APE

A supplement to HPI's 2003 Phase 1A study completed in June 2003 and entitled "Section 7.13, East 63rd Street Curve Site" analyzed a portion of the 63rd Street Station APE. Among other locations adjacent to the 63rd Street Station APE, the supplemental study investigated the archaeological sensitivity of the streetbed of East 63rd Street between Second and Third Avenues. The supplement showed that while no structures had ever been present within the modern streetbed, the road was located in the vicinity of an 18th century farmhouse depicted on B.F. Stevens' facsimile of the 1782 British Headquarters map (published in 1900).

The assessment concluded that while no structures were ever situated within the roadbed itself, the majority of the street (an approximately 500 foot-long area west of the location of the former Post Road) was sensitive for historic period archaeological resources associated with an 18th century farmhouse that is depicted to the north of the street on the 1782 British Headquarters Map. B.F. Stevens' facsimile of the map depicts a property line around the farmstead, indicating that the property extended partially into the streetbed of East 63rd Street between Second and Third Avenues. Although the farmhouse itself was not located within the street, HPI determined that there was a moderate possibility that shaft features associated with the property may have been located within East 63rd Street. These resources were determined to be located between the ground surface and a depth of 8 feet below grade.

In addition, because of the lack of development in the area and the presence of potentially intact soils seen in soil borings from an adjacent block, HPI also determined that the entire length of East 63rd Street between Second and Third Avenues was moderately sensitive for precontact archaeological resources. HPI determined that these precontact resources were likely to be located between the ground surface and a depth of up to 13 feet.

C. RESEARCH GOALS AND METHODOLOGY

The goal of this Supplemental Archaeological Assessment is to determine the likelihood that potential archaeological resources have survived in the portions of the APE not evaluated in previous archaeological assessments. The study has been designed to satisfy the requirements of SHPO (2005) and LPC (2002) and it follows the guidelines of the New York Archaeological Council (NYAC, 1994). The study documents the history of the APE as well as its potential to yield archaeological resources dating to both the precontact and historic periods.

In order to determine the extent to which archaeological resources within the APE may have been disturbed, numerous primary and secondary sources were examined. Cultural resources assessments of the APE and vicinity were reviewed including the 2003 Phase 1A Archaeological Assessment. In addition, historic maps and atlases were examined to determine a chronology for the development of the APE. Soil boring records (including soil borings analyzed for the FEIS and others that were completed after the FEIS was published) were reviewed to create a soil profile for the APE which could be used to assess its archaeological sensitivity. Finally, local histories, historic newspapers, and historic photographs were also reviewed as necessary.

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 Shewing* (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,

each boring also identified layers of sand, silt, and/or clay between the fill and bedrock. Bedrock was encountered between 14 and 25 feet in those locations. A fifth boring, located at the northeast corner of East 63rd Street and Third Avenue was recorded in 1974 and indicated the presence of 14 feet of silt between the street surface and bedrock with no fill layers present. The final boring located in this area, taken in 2009 (the only one that post-dates the construction of the existing subway station), showed only a 15-foot layer of fill located directly over bedrock.

EAST 63RD STREET BETWEEN THIRD AND PARK AVENUES

All of the borings located within East 63rd Street between Park and Lexington Avenues showed that only fill levels—ranging from 4 to 7 feet in thickness—were present over layers of decomposing rock and/or bedrock. The existing subway station is located in this area, and these fill levels are consistent with the extensive disturbance generated during the station's construction. Between Third and Lexington Avenues, borings at the western end of the street also indicated the presence of only fill (6 to 14 feet) above the bedrock. However, borings taken within the streetbed east of Lexington Avenue show the presence of a 4 to 15-foot layer of fill, followed by a layer of sand, silt, and/or clay, and finally bedrock at depths ranging between 6.5 and 23 feet below the surface. However, these sediments are also located above the existing subway station which documentary evidence suggests was constructed through cut-and-cover construction (discussed in greater detail below). Therefore, any natural sediments in this area are likely to be confined to the sidewalks (where the borings were located) as the soils in this portion of the streetbed would have been extensively disturbed during the construction of the existing subway station.

EAST 63RD STREET BETWEEN SECOND AND THIRD AVENUES

This portion of the streetbed was previously analyzed in HPI's 2003 Phase 1A study. However, at that time, no soil boring data was available for this portion of the APE with the exception of two borings taken in 1935 near East 63rd Street's intersections with Second and Third Avenues. These borings indicated the presence of 8 to 10 feet of fill within the streetbed above natural sediments including sand and silty sand. Bedrock was identified at approximately 19 to 20 feet below ground surface. Newly available soil boring data provide a great deal more information about the soil profile in this portion of the APE. All of the soil borings in this section of East 63rd Street between Second and Third Avenues are summarized in Table 2, below.

Table 2
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)		
16	1969	South	6	Yes	0-9' Fill 9'-25' Sandy Silty Clay 25'- Rock
B63-8	2009	South	54	Yes	0-10' Fill 10'-20' Sand 20'- Rock
63X-13	1971	North	108	Yes	0-18' Fill 18'- Rock
5-20	1974	South	120	Yes	0-4' Fill 4-8' Clay 8'-14' Clayey Silt 14'- Rock
5-21	1974	North	174	No	0-9' Fill 9'-18' Sand 18'- Rock
17	1969	North	228	No	0-2' Fill 2'-5- Sand and Clay 5'-12' Sand 12'- Rock
B63-6	2005	North	264	No	0-6' Fill 6'-18.5' Sand/Gravel/Silt 18.5'- Rock
5-22	1974	South	318	No	0-16' Fill 16'- Rock

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
Notes:	*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."				
Sources:	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. PREVIOUS PRECONTACT ARCHAEOLOGICAL RESOURCES SENSITIVITY ASSESSMENTS IN THE VICINITY OF THE APE

The precontact sensitivity of project sites in New York City is generally evaluated by the presence of level slopes, water courses, well-drained soils, and close proximity to previously identified precontact archaeological sites. HPI's 2003 Phase 1A and its various addenda included an analysis of soil borings, historic maps, previously identified Native American archaeological sites, and other documentary evidence which could indicate if the project site was sensitive for precontact archaeological resources. The Phase 1A noted that a Native American trail known as *Wickquasgeck*, ran in the vicinity of the project site and crossed Second Avenue near East 62nd Street. In addition, one previously identified archaeological site was located in the immediate vicinity of the APE. The site (NYSM #4061) involved "traces of occupation" between East 61st and East 63rd Streets along the shore (Parker 1922). As seen on the Viele map, the area where precontact archaeological resources were identified was in proximity to level high ground and a stream.

The 2003 Phase 1A and its addenda concluded that there were several locations in the vicinity of the APE that would have been appealing to Native Americans as habitation or resources exploitation sites. Because soil borings in the vicinity of East 63rd Street between Second and Third Avenues (but not within the streetbed itself) indicated that intact soil levels may have been present beneath layers of fill in the area, the 2003 Phase 1A identified large areas of precontact archaeological sensitivity near the 63rd Street Station. Among the locations identified as sensitive for precontact resources was the streetbed of East 63rd Street between Second and Third Avenues. The addendum to the Phase 1A stated that precontact resources in this area were likely to be found between the ground surface and a depth of 13 feet.

Chapter 4: Historic Period Archaeological Resources

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).

With the exception of the farmhouse depicted to the northeast of the APE on the ca. 1782 British Headquarters Map (Figure 4) and the 1811 Bridges map (Figure 5), no early 19th century maps, including the 1820 Randel, and 1836 Colton maps, depict any structures in the immediate vicinity of the APE. The 1836 map shows that the Post Road was still present even though both Third and Park Avenues had already been cut through. At that time, East 63rd Street had not yet been constructed and was instead lined with hills, which were partially leveled to accommodate the Harlem Railroad which had been established along Park Avenue.

By the mid-19th century, however, the population of New York began to move northward and neighborhoods began to develop in the Upper East Side. Much of the development was brought about by the Tammany political machine and was heavily influenced by William Tweed, who at that time was the commissioner of the Department of Public Works (Burrows and Wallace 1999). The majority of development was located between Third and Fifth Avenues and East 59th and East 110th Streets because this area was "easy to grade, dig up, and build upon" (ibid: 929). Industrial development shifted east toward the river while crews of workers constructed streets and laid down sewer, water, and gas lines for the homes that were to be developed there (ibid). The growth of these neighborhoods was also due to the establishment of train lines along Second, Third, and Park Avenues, which allowed individuals to work in Manhattan's downtown commercial center while living in residential districts uptown.

The Dripps map of 1851 (Figure 6) shows that while uptown neighborhoods like Yorkville, north of the 63rd Street Station, had grown substantially by the mid-19th century, only a handful of structures had been erected within the blocks adjacent to the APE, although none were located within it. The Perris atlas of 1862 and the Dripps map of 1867 show that the APE continued to remain vacant well into the 19th century. The lots along East 63rd Street between Third and Park Avenues were not depicted as substantially developed until the publication of the 1879 Bromley atlas. By that time, the map shows, water (and likely sewer) lines were already present in the streetbed of East 63rd Street.

The vicinity of the 63rd Street Station has remained a developed neighborhood since the late-19th century and many of the buildings constructed at that time continue to stand there to this day. Little change came to the neighborhood until 1976, at which time the existing subway station within the streetbed of East 63rd Street between Third and Park Avenues was constructed to link Manhattan and Queens via the IND (now F) line. The station was constructed via the cut-and-cover method, which resulted in the "tearing up [of] almost all of 63d Street from Park Avenue to Third Avenue" (*New York Times* 5/18/1976). Additional construction was done with tunneling machines to cut through the bedrock below the streetbed (*New York Times* 9/24/1976). The construction of the station was opposed by the residents, who stood inside test pits in protest of the construction and who hired private security guards to prevent workers from arriving at the site (*New York Times* 5/13/1976). Eventually, a judge ruled that the construction of the station, which was expected to take at least four years, commence and the excavation of the streetbed of East 63rd Street was begun (Solochek 1976). The entrances to the station were planned at Lexington and Third Avenues and additional staircases were constructed in anticipation of the eventual link between this station and the Second Avenue Subway. Those staircases were never used, however, but will be opened up to the public as part of the Second Avenue Subway project.

B. LOCATIONS OF DISTURBANCE FOR THE 63RD STREET STATION APE

There are several locations where new excavation will be required in order to connect the new Second Avenue Subway line with the existing 63rd Street Station. A summary of the archaeological sensitivity of these locations is provided below.

ANCILLARY FACILITY 1:

The construction of Ancillary Facility 1 will involve the installation of an air vent shaft within an existing parking garage at 124 East 63rd Street (Block 1397, Lot 61 [part]). Current Sanborn maps identify this structure as a 4-story garage with a basement and buried gasoline tanks. As stated earlier, in the early 19th century, East 63rd Street had not yet been constructed and the APE was covered with hills. The 1851 Dripps map (Figure 6) suggests that the hills in this area had been leveled although no structures had been erected within the block by that time. The 1862 Perris atlas shows that several small wood frame structures had been erected in the southern half of the block, although the APE remained vacant.

The 1879 Bromley atlas is the first to depict any development within Lot 61. That map shows that the lot was at that time occupied by a large barn or stable, but no additional information about the building is given. The 1885

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

Third Avenue between East 62nd and East 64th Streets. These utilities include sewer, water, gas, electric, and telecommunications lines. In addition, an existing staircase leading to the 63rd Street Station is located beneath the eastern sidewalk of Third Avenue near the northeast corner of East 63rd Street. This staircase would be opened to the public as part of the Second Avenue Subway project.

As mentioned in Chapter 2, numerous soil borings recorded in the late-20th century showed that the project site was underlain by a layer of fill followed by layers of sand, clay and/or silt, and finally bedrock. One soil boring (B63-7) was recorded in the area in 2009 which identified only a level of fill above bedrock with no natural sediments present. This boring is located in the vicinity of the proposed staircase.

Because of the lack of development within this portion of the APE—no structures appear to have ever been constructed within the streetbed—as well as the disturbance generated by the construction of the existing 63rd Street Station and the numerous utilities that run beneath the streetbed, Third Avenue between East 62nd and East 64th Streets is determined to have low sensitivity for archaeological resources dating to the historic period.

EAST 63RD STREET BETWEEN THIRD AND PARK AVENUES

No historic maps depict any structures within the streetbed of East 63rd Street between Third and Park Avenues. Several early maps depict historic roads in the vicinity of the street as well as many hills, all of which were no longer present by the mid-19th century. As stated above, the streetbed of East 63rd Street was heavily disturbed in the late 1970s during the construction of the existing 63rd Street Station. This construction, which involved the excavation of nearly all of the streetbed from the surface to the depth of the bedrock, would have had a substantial impact on any archaeological resources that may have at one time been located within the streetbed. Therefore, any excavation necessary within the streetbed of East 63rd Street between Third and Park Avenues as part of the Second Avenue Subway project will not impact historic period archaeological resources.

EAST 63RD STREET BETWEEN SECOND AND THIRD AVENUES

Utility lines may be installed or relocated in an area of East 63rd Street extending approximately 150 feet east of Third Avenue. According to the 2003 Phase 1A, this portion of the APE was determined to be sensitive for historic period archaeological resources based on its proximity to an 18th century farmhouse as depicted on B.F. Stevens' facsimile of the 1782 British Headquarters Map (published 1900). Stevens' facsimile map is more readily available than the original version of the British Headquarters Map, although it is considered by historians to be less accurate. Using new georeferencing technology that has advanced since the completion of the 2003 Phase 1A study, the original 1782 British Headquarters map was georeferenced for the purposes of this study so that the modern street grid could be superimposed on the historic map. This has provided a more accurate representation of the project site in the late 18th century (see Figure 4).

As seen on Figure 4, the georeferenced version of the British Headquarters Map suggests that the farmhouse to the northeast of the APE was located in the center of modern Block 1419, bounded by Second and Third Avenues and East 64th and East 65th Streets, outside the project site. However, because of the inaccuracies inherent in the original map, the location of the farmhouse cannot be identified with complete certainty. The same farmhouse (along with an adjacent structure, possibly an outbuilding) may be depicted on the 1811 Bridges map (Figure 5), which suggests that it was located within the streetbed of East 64th Street midway between Second and Third Avenues. The placement of the buildings as depicted on the Bridges map is more than 200 feet to the north of the APE. The buildings are depicted at an even greater distance on the georeferenced British Headquarters Map (Figure 4).

This farmhouse was present before the installation of municipal water and sewer networks, and therefore, its residents would have depended on shaft features such as privies, cisterns and wells for water gathering and sanitation. In general, cisterns and wells were located in the immediate vicinity of houses for convenience, while privies would have been further away from the house, although not so far as to be at an inconvenient distance for the home's residents. Because of the significant distance between the 63rd Street Station APE and the former farmhouse, it is not likely that shaft features associated with the 18th century farmhouse would have been located within the modern streetbed of East 63rd Street. No historic maps depict any structures within the streetbed of East 63rd Street between Second and Third Avenues, although it is possible that outbuildings (barns, stables, etc.) could have been located within the farm property at a greater distance from the house. However, it is not likely that

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.

Chapter 5: Conclusions and Recommendations

A. APE SENSITIVITY

As part of the background research for this supplemental Phase 1A Archaeological Documentary Study, various primary and secondary resources were analyzed, including historic maps and atlases, historic photographs and lithographs, newspaper articles, and local histories. The information provided by these sources was analyzed to reach the following conclusions:

PRECONTACT SENSITIVITY ASSESSMENT

The 2003 Phase 1A Archaeological Assessment identified the streetbed of East 63rd Street as sensitive for precontact archaeological resources from the ground surface to a depth of 13 feet. However, based on new soil borings that were completed or made available since the completion of that study, the precontact sensitivity determination of this portion of the APE has changed. None of the other portions of the 63rd Street Station APE were analyzed for archaeological sensitivity in the 2003 Phase 1A, including Third Avenue between East 62nd and East 64th Streets, East 63rd Street between Third and Lexington Avenues, and the locations of the new entrance and ancillary facilities.

The precontact sensitivity of project sites in New York City is generally evaluated by a site's proximity to level slopes, water courses, well-drained soils, and previously identified precontact archaeological sites. Historic maps suggest that the 63rd Street Station APE may have at one time been attractive to Native Americans as a location for habitation sites or resource exploitation. However, there is evidence of landscape modification and disturbance associated with the transformation of the Upper East Side from a hilly, undeveloped wilderness into highly developed urban neighborhood.

In general, precontact period archaeological resources are found at relatively shallow depths within five feet of the precontact ground surface. As seen in Table 1, minimal changes have been made to the elevations of the APE and vicinity since the mid-19th century. Early and mid-19th century maps show that the landscape of the APE was modified during the early to mid-19th century. While Third Avenue was cut through the area before 1836, East 63rd Street was not completed until the middle of the 19th century. Portions of the project site were later disturbed by the construction of buildings with basements, the installation of utilities within streetbeds, and the cut-and-cover construction of the existing 63rd Street Station between Third and Park Avenues. Within the streetbed of East 63rd Street between Second and Third Avenues, soil borings show that there may be pockets of natural soils located between a layer of fill and the bedrock beneath the surface of the APE; however, these pockets appear to be isolated and interspersed with areas where soil borings indicate that fill levels occupy the entire area between the ground surface and bedrock. Many utility lines run through the streetbed in this area as well.

As a result of the documented disturbance and landscape modification described above, the APE for the 63rd Street Station is determined to have low sensitivity for precontact period archaeological resources.

HISTORIC SENSITIVITY ASSESSMENT

The majority of the APE was not developed for residential use until after water and sewer networks were available in the neighborhood. None of the historic lots included within the APE (Entrance and Ancillary Facilities) included open rear yards and all of them have been disturbed as a result of basement excavation. Therefore, it is not likely that any of these historic properties would have included shaft features such as privies, cisterns, or wells. In addition, no historic maps depict any structures entering any of the streetbeds within the APE. As a result of the proximity of the streetbed of East 63rd Street to an 18th century farmhouse depicted on the 1782 British Headquarters Map, HPI's 2003 Phase 1A archaeological assessment identified the streetbed of East 63rd Street between Second and Third Avenues as sensitive for historic period archaeological resources. However, the data presented above which are based on newly obtained or completed soil borings and more advanced map georeferencing suggest that the 63rd

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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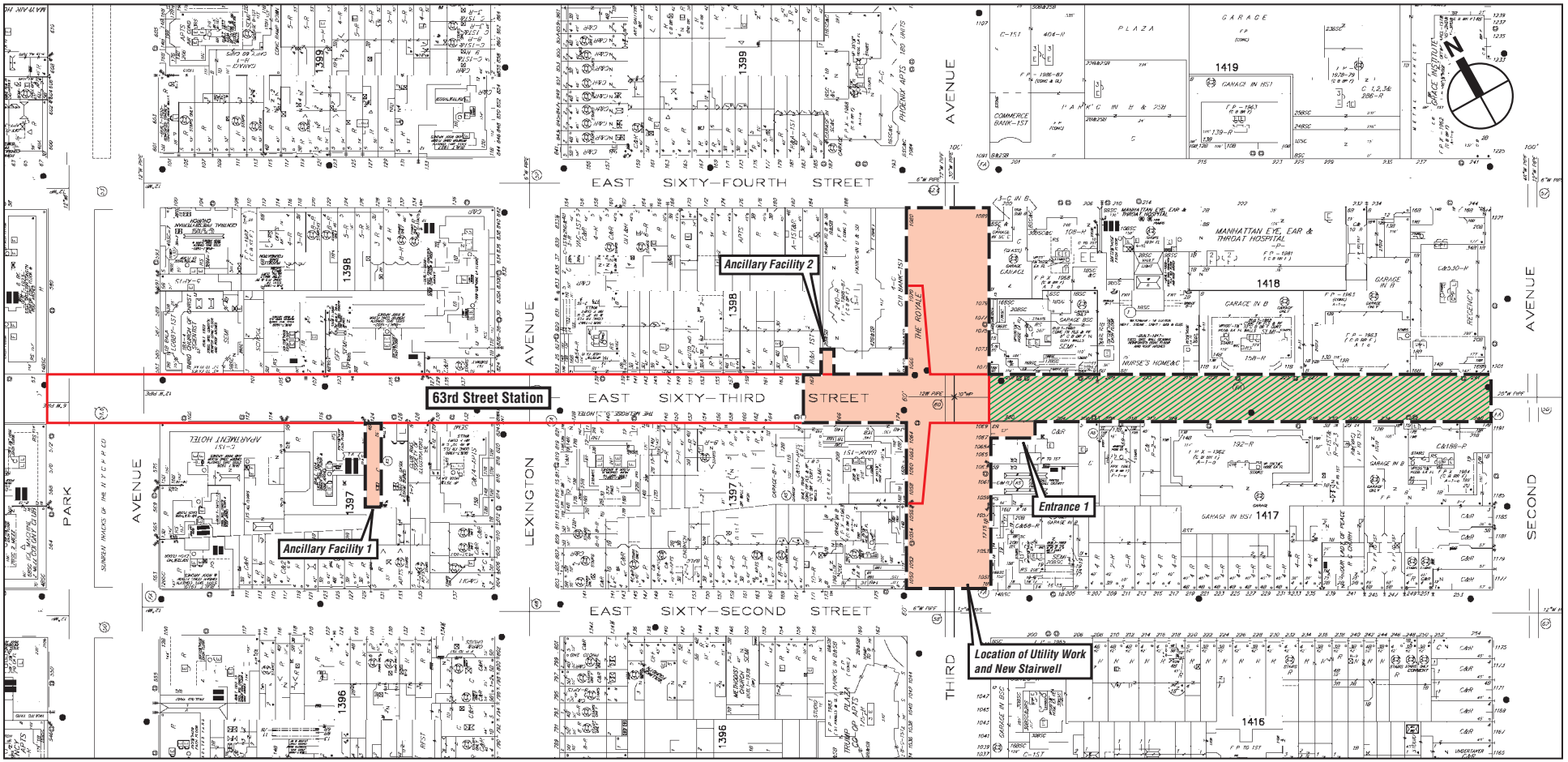
6.8.09

Project Location
USGS Map: Central Park Quadrangle
Figure 1

6.30.09



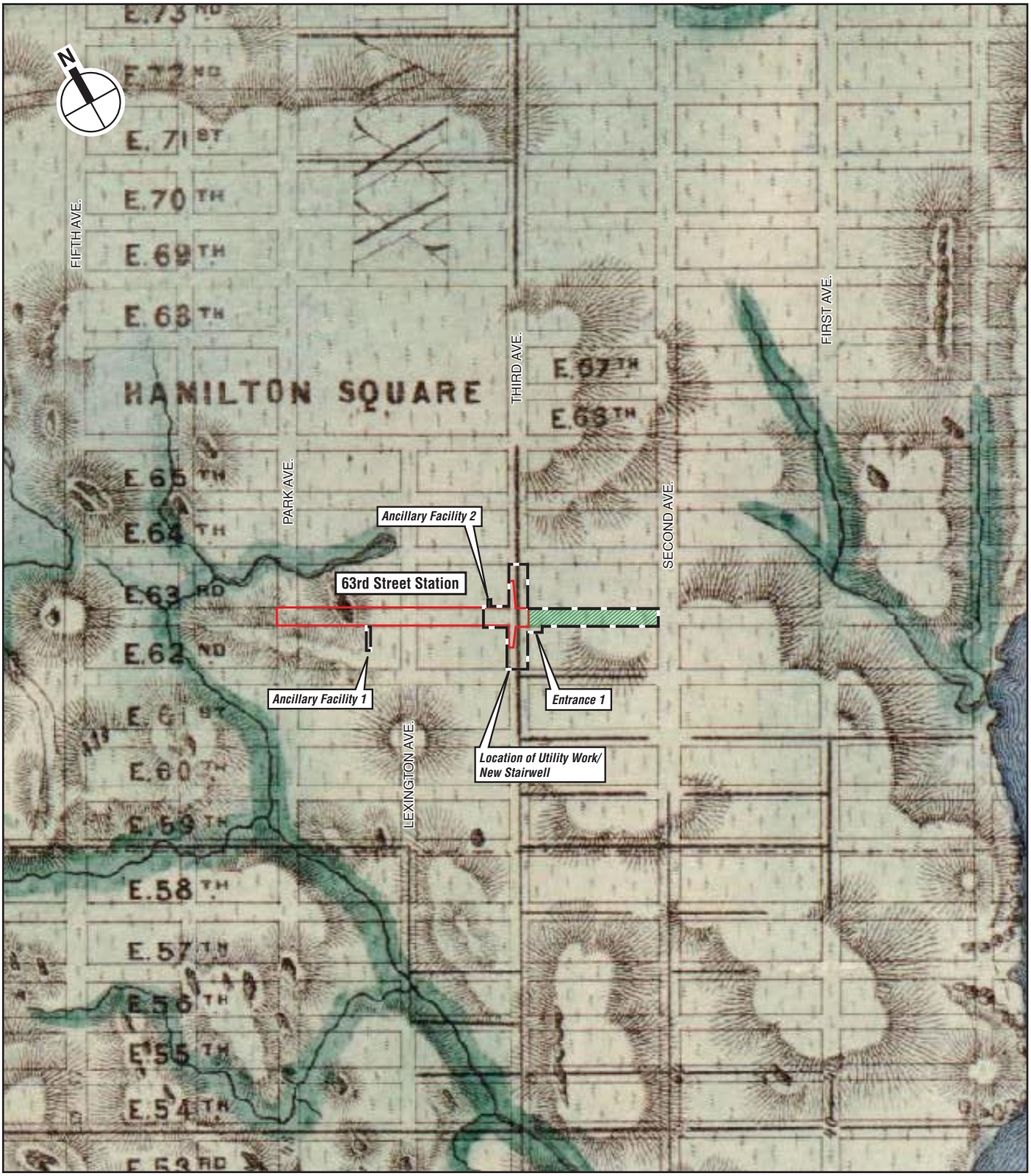
Existing Subway Station

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

6.30.09



0 500 1000 FEET

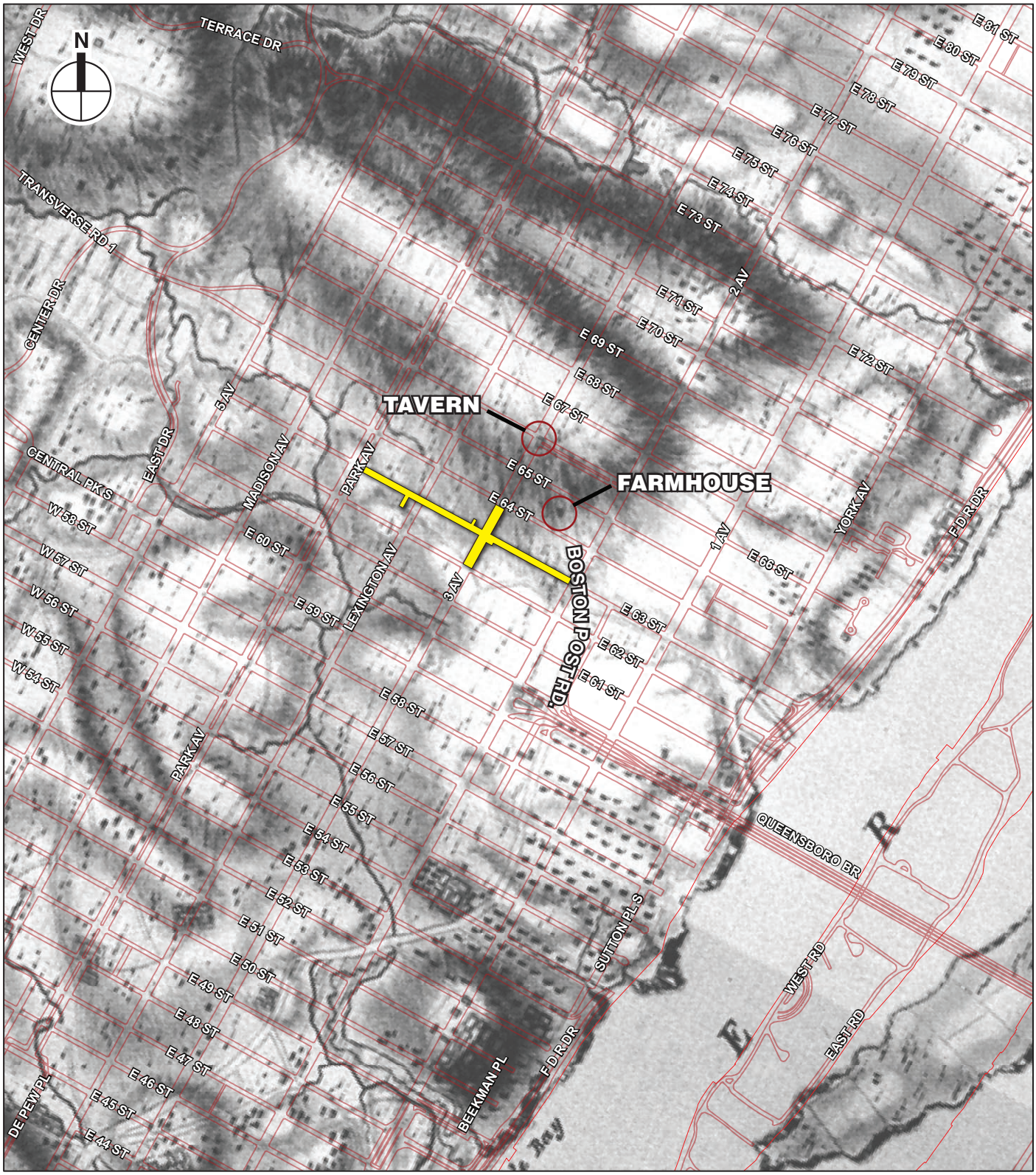
SCALE

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

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



SOURCE: British National Archives

Project Location

2004 Streets

0 500 1000 FEET

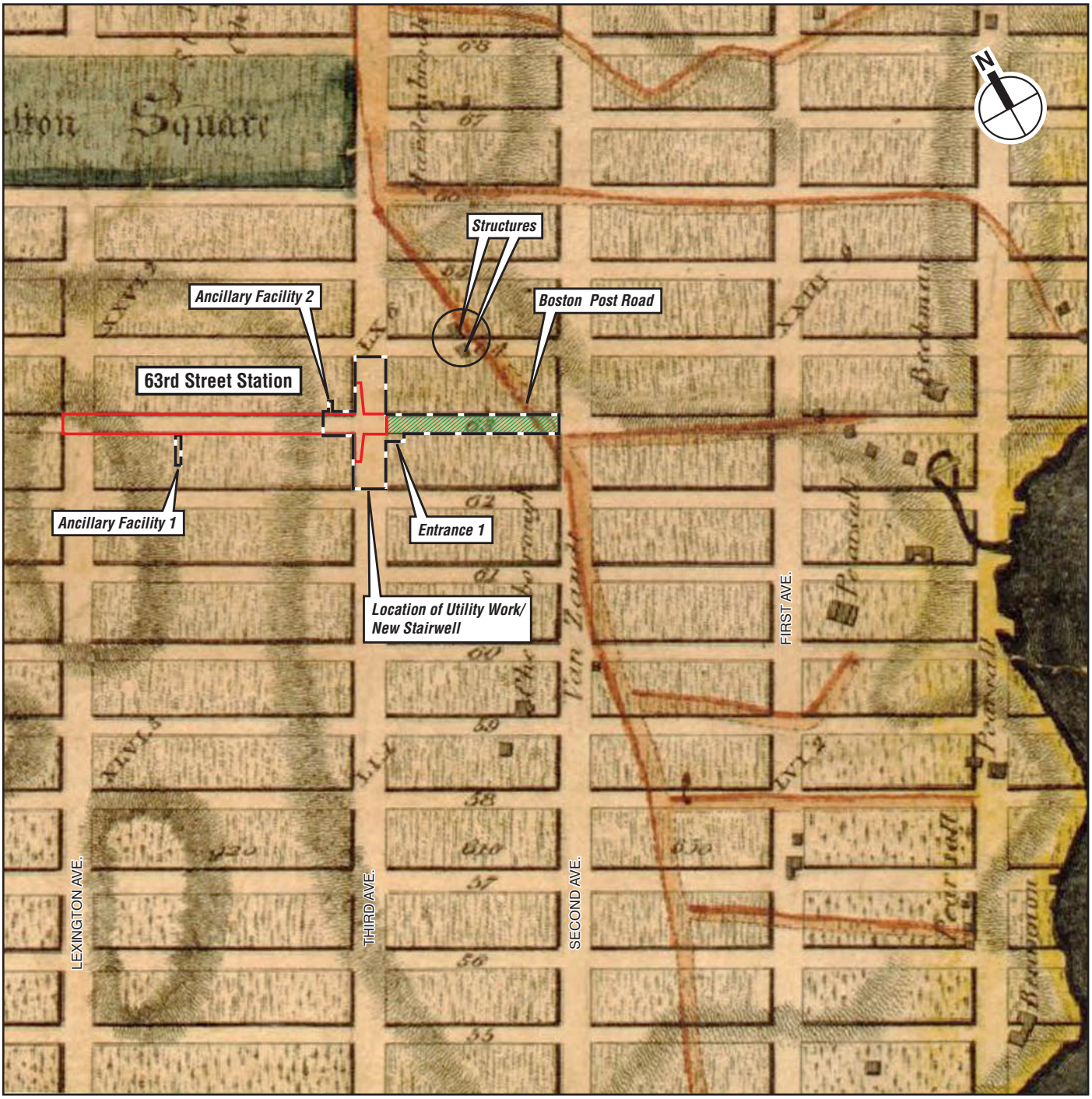
SCALE

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

6.30.09



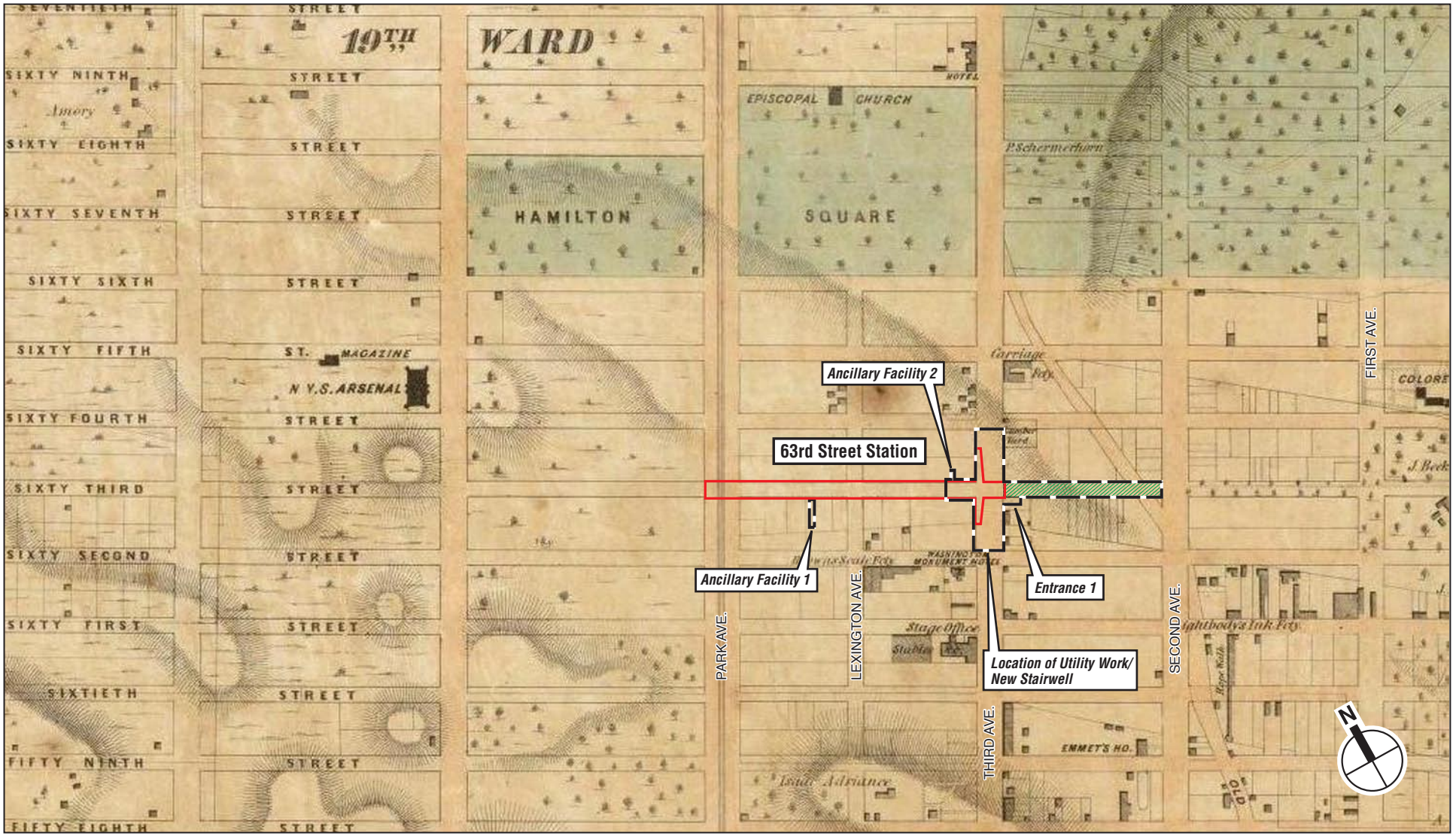
Existing Subway Station

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

The Commissioners' Plan
W. Bridges, 1811
Figure 5

6.30.09



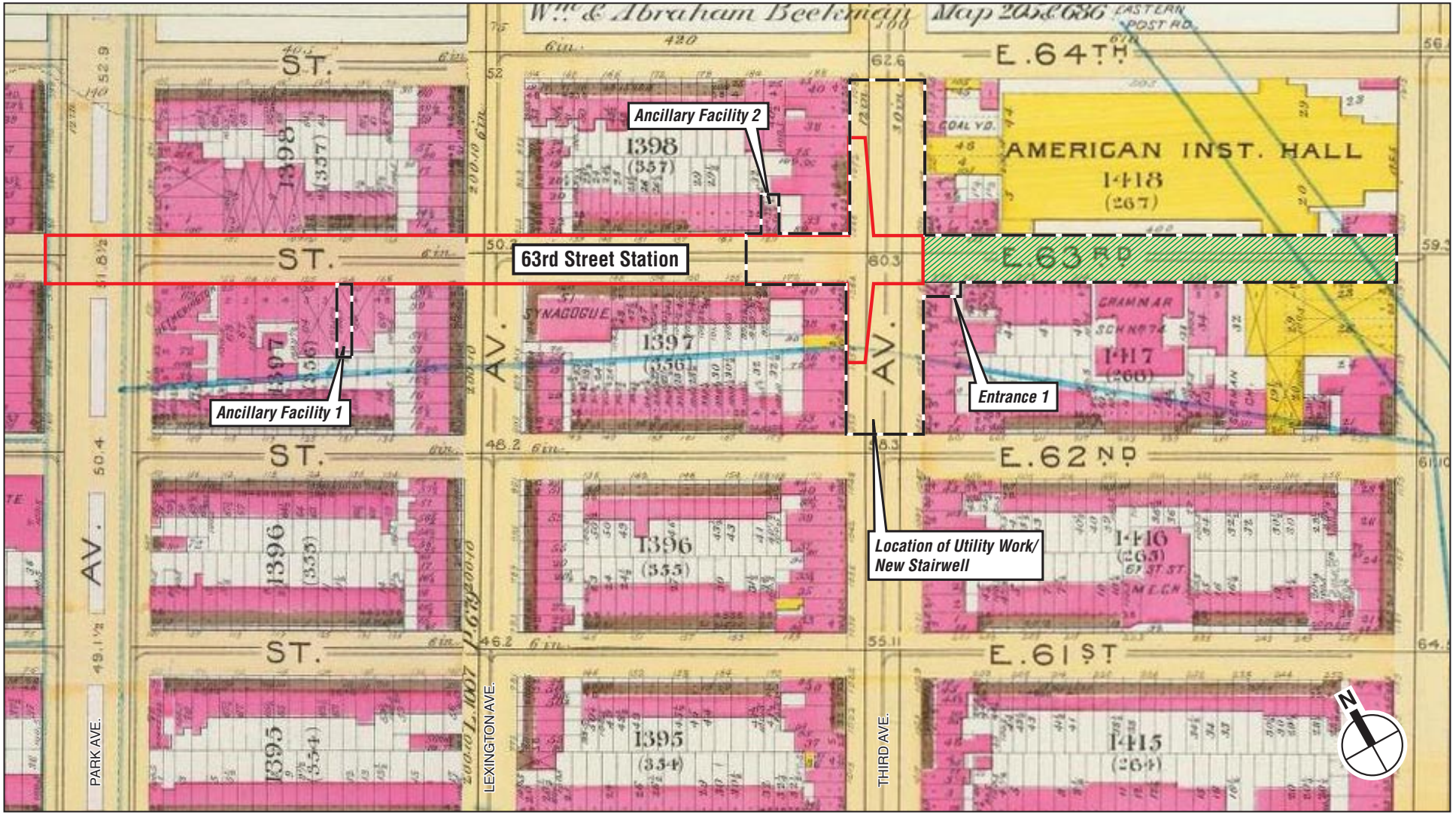
Existing Subway Station

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



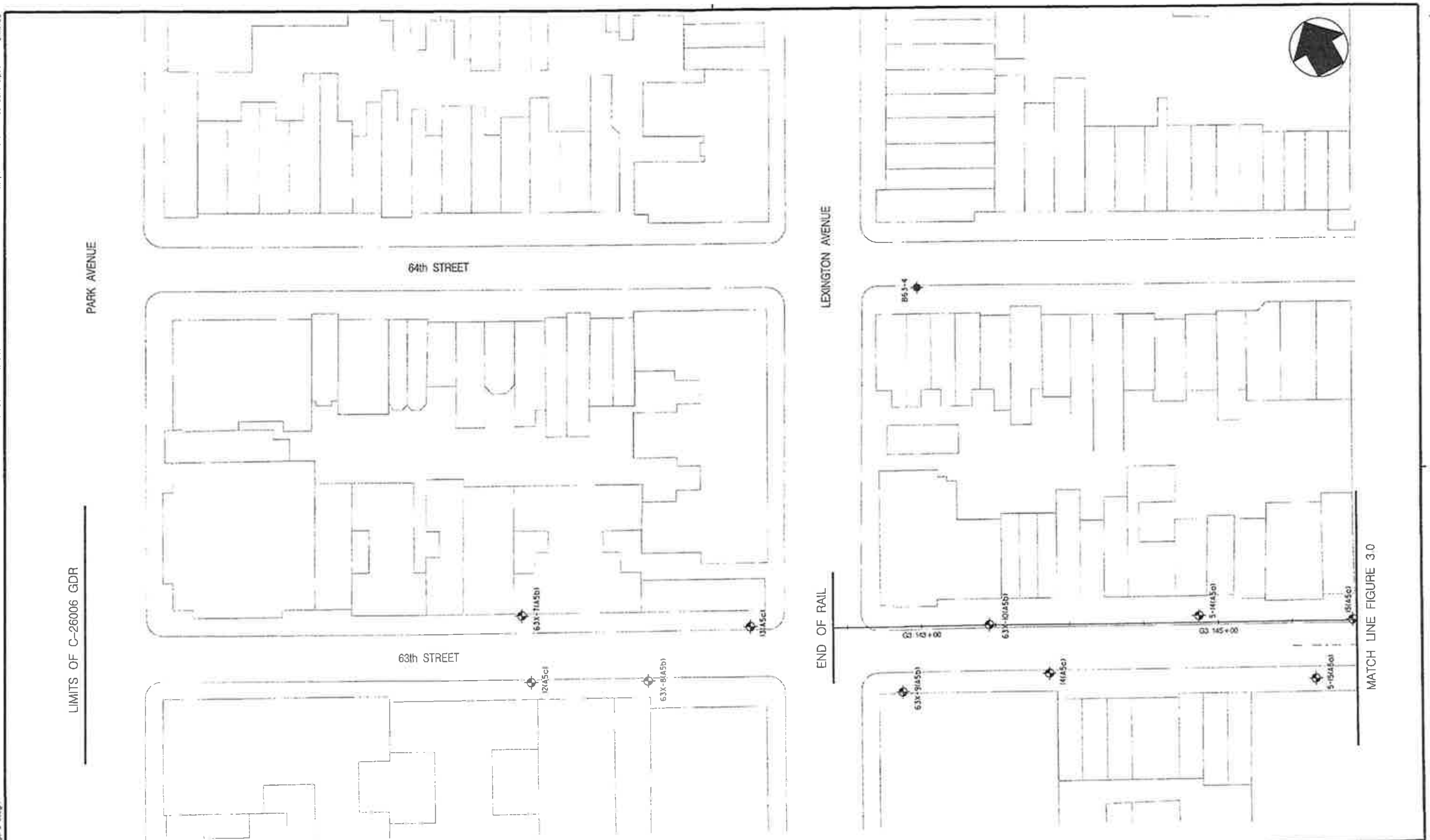
Existing Subway Station

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

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



LEGEND:

- 2ND AVE - DHA BORINGS (2002-2009)
- 2ND AVE BORINGS (1969-1974)
- BORINGS BY OTHERS
- BORINGS BY OTHERS

NOTE:

SEE APPENDIX (A) FOR DHA BORING LOGS AND HISTORICAL GEOTECHNICAL INFORMATION REPORTS FOR BORINGS BY OTHERS

SCALE IN FEET

30' 0 30' 60'

MTA CAPITAL CONSTRUCTION
NEW YORK CITY TRANSIT

SECOND AVENUE SUBWAY
BOROUGH OF MANHATTAN
GEOTECHNICAL DATA REPORT
C-26006

DMJM+HARRIS • ARUP
A Joint Venture

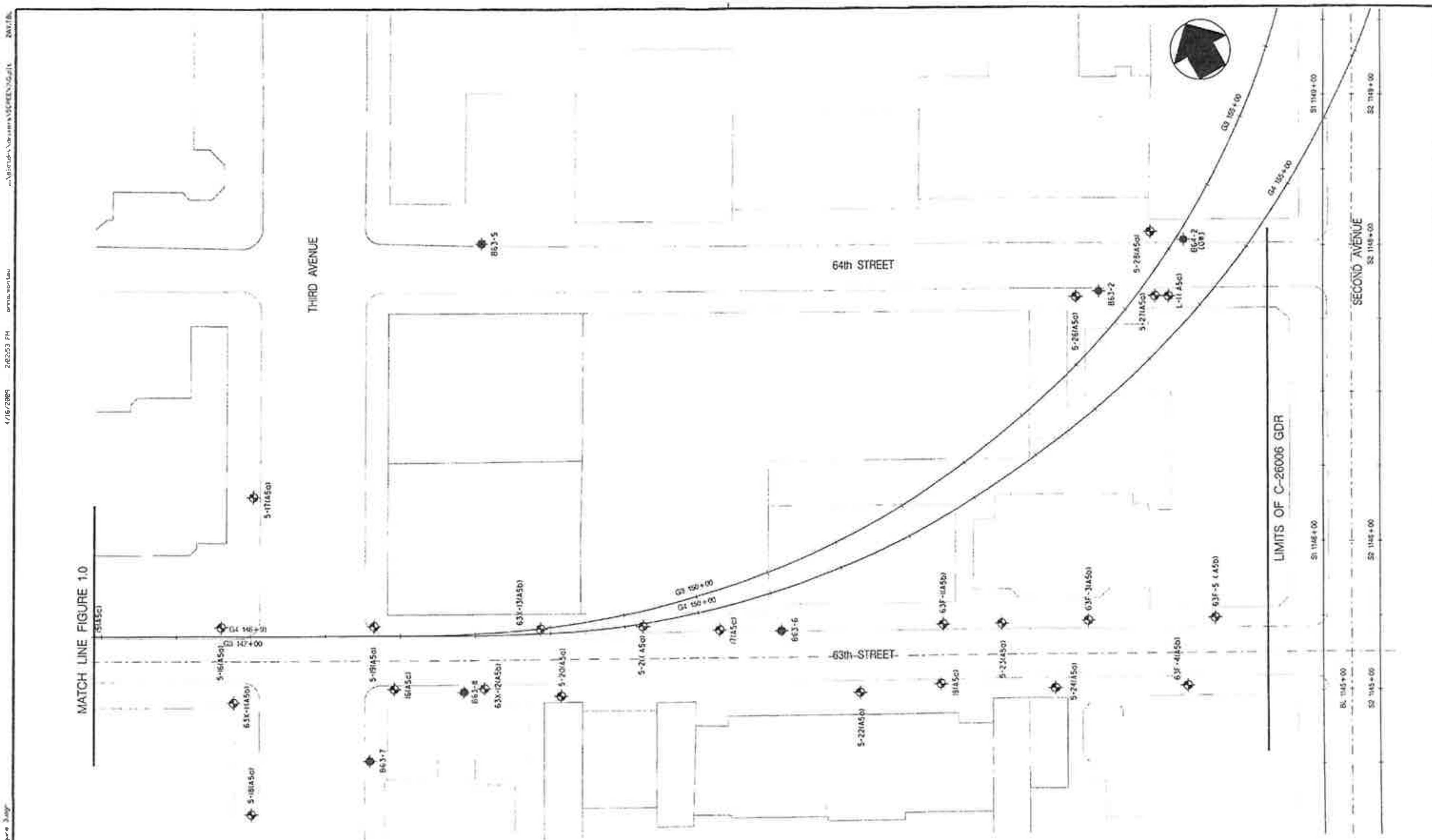
Second Avenue Subway

BORING LOCATION PLAN

Figure 2.0

NO.		DATE:		CHECKED:		DATE:		CORRECTED:		DATE:	
CHECK PRINT BY:				BACK CHECKED:		DATE: ..		VERIFIED:		DATE:	

Z:\GeoReports\C3-63-d\GDR\Figure 2.dgn 4/16/2009 1:58:18 PM annamontou ...\plotdrv\drivers\SCREENING.plt 2NX.TBL



LEGEND:

- 2ND AVE - DHA BORINGS (2002-2009)
- 2ND AVE BORINGS (1969-1975)
- BORINGS BY OTHERS
- BORINGS BY OTHERS

NOTE:

SEE APPENDIX (A) FOR DHA BORING LOGS AND HISTORICAL GEOTECHNICAL INFORMATION REPORTS FOR BORINGS BY OTHERS.

SCALE IN FEET
30' 0 30' 60'

MTA CAPITAL CONSTRUCTION NEW YORK CITY TRANSIT

SECOND AVENUE SUBWAY
BOROUGH OF MANHATTAN
GEOTECHNICAL DATA REPORT
C-26006

DMJM HARRIS • ARUP
A Joint Venture

Second Avenue Subway

BORING LOCATION PLAN

Figure 3.0

NO.	DATE:	CHECKED:	DATE:	CORRECTED:	DATE:		
CHECK PRINT BY:		BACK CHECKED:	DATE: 4/16/2009 2:02:53 PM	VERIFIED:	DATE:		

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.
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: Peter Lynch
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

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME
Note 1				

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 (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
										PAVEMENT THICKNESS: Not recorded		FILL	2				
										Hand augered to a depth of 6 feet prior to start of boring.			3				
5		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)			4				
10		S3	10-12	21 25 18 27	43	24/0				No recovery							
15		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					
													5				
20	3.0									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
	3.0	C1	20.0-23.7			3.7/3.7	100	90									0
	3.0																0
	3.0																0
25	3.0									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.							1
	3.0	C2	23.7-28.5			4.8/4.8	100	85									1
	3.5																0
	3.5									24.6'-25.2': Sub-vertical, healed fracture. 25.5': Cross-foliation joint/fracture, rough, undulating, moderately dipping, slightly weathered.							1
	3.0																2
30	4.0																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	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								

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'.

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.
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: Peter Lynch
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

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME

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 (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	4.0	C3	28.5-33.6			5.1/5.1	100	83		27.6'-27.7': Slightly to moderately weathered.							1
	4.0									C3: Similar to Schist in C1, except horizontal to moderately dipping, slightly crenulated foliation.							0
	4.0									32.9'-33': Quartzo-feldspathic vein.							0
	4.5									33'-33.4': Sub-vertical, healed cross-foliation joint/fracture.							0
35	4.5																1
	4.5	C4	33.6-38.3			4.7/4.7	100	100		Similar to Schist in C1.							0
	4.5									35': Moderately dipping foliation.							0
	4.5									37.5': Moderately dipping to vertical foliation.							1
	5.5									Hard, fresh to slightly weathered, coarse grained, dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to vertical foliation, rough, closely to widely spaced, sub-horizontal to moderately dipping joints/fractures.							1
40	5.5																0
	6.0	C5	38.3-43.1			4.8/4.8	100	100									0
	6.0																0
	6.5																0
	6.0									Similar to Schist in C5.							0
	6.0									44.5'-47.6': Very hard, fresh, medium to coarse grained, gray GRANOFELS, with occasional thin intercalations of coarse grained, convoluted foliated quartz-mica Schist.							0
45	5.5	C6	43.1-48.1			5.0/5.0	100	100									0
	6.0																0
	6.5																0
	7.5									Similar to Schist in C5, except convoluted, horizontal to sub-vertical foliation.							0
	7.0																0
50	7.5	C7	48.1-52.9			4.8/4.8	100	100									0
	7.0																0
	6.0																0
	6.5									Similar to Schist in C5, except horizontal to sub-vertical foliation, rough to smooth, very closely to closely spaced, horizontal to sub-horizontal, slightly weathered, clay coated foliation joints/fractures.							0
	6.5																0
55	7.0	C8	52.9-57.8			4.9/4.9	100	85									7
	6.5									55.3'-55.6', 55.8'-56.0', 56.7'-57.2': Cross-foliation joints/fractures, rough to smooth, sub-vertical, slightly weathered, clay coated, quartz mineralization on surfaces.							5
	5.5																2
	6.0																0
60	6.0																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	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 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
SAMPLER HAMMER: 140 lb Automatic
CASING SIZE: 3"
CASING HAMMER: SPUN
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Co., Inc.
FOREMAN: Peter Lynch
ENGINEER: D. Persaud / S. Mendes
DATE START: 08/18/04 DATE END: 08/20/04
REVIEWED BY: C. Snee DATE: 9/9/04

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME

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 (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	6.5	C9	57.8-62.6			5.2/5.2	100	77		Similar to Schist C5, except high mica content.							0
	6.5																1
	6.5																2
	6.5	C10	62.6-68.1			5.1/5.1	100	88		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																1
	7.0																2
	6.5																1
	6.5																0
	6.5	C11	68.1-73.0			4.9/4.9	100	51		Very hard, fresh, fine to coarse grained, gray to dark gray, quartz-mica-garnet 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
	6.5																3
70	6.0																1
	7.0																2
	7.5																3
	7.5	C12	73.0-78.2			5.2/5.2	100	56		Similar to Schist in C11. 73.2'-73.7': Fracture zone, rough to smooth, horizontal to vertical, slightly to moderately weathered, clay coated, chloritized foliation/cross-foliation joints/fractures.							1
	7.5																9
75	7.5																2
	7.5																2
	7.5																4
	7.5	C13	78.2-83.3			5.1/5.1	100	58		Similar to Schist in C11. 78.9'-80.0': Fracture zone, rough to smooth, sub-horizontal to vertical, slightly weathered, clay coated, chloritized foliation/cross-foliation joints/fractures.			6				1
	7.5																10
80	7.5																1
	7.5																1
	7.5																0
	7.5	C14	83.3-88.3			5.0/5.0	100	100		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
	7.5																0
85	7.5																0
	7.5																0
	7.5																1
	7.5																1
	7.5																0
90	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	(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.

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 (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	7.0	C15	88.3-93.3			5.0/5.0	100	68		Similar to Schist in C11.							1
	7.0									91.1': Cross-foliation joint/fracture, rough to smooth, sub-horizontal, slightly weathered.							3
	7.5									91.0'-92.7': High garnet content clusters in quartz-feldspar laminae.							3
	7.5									91.6': Healed foliation joint/fracture in mica rich zone.							0
95	7.0	C16	93.3-98			4.7/4.7	94	94		Hard, fresh, coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough to smooth, widely spaced, horizontal to sub-horizontal, slightly weathered foliation joints/fractures; high mica content.							0
	7.5																0
	7.5																2
	7.5												7				2
	3																0
100	5																0
	6.5									Similar to Schist in C11, except no foliation joints/fractures; high mica content.							3
	4									98.1'-103.4': Hard, fresh, coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, poorly segregated foliation and thin micaceous veins and quartz feldspar veins.							0
	5	C17	98-108			10/10	100	100									0
	4																0
105	3.5									100.7'-101': Cross-foliation joint/fracture, rough to smooth, sub-vertical, slightly weathered with epidote.							
	7																0
	4																0
	3																0
	4																0
110	5									Similar to Schist in C11, except no foliation joints/fractures; high quartz-mica-garnet content.							0
	4																0
	4	C18	108-115.8			7.8/7.8	100	100									0
	5.5																0
	3.5																0
115	3																0
	2.5																0
	3									Similar to Schist in C11, except no foliation joints/fractures; high quartz-mica-garnet content.							0
	3.5																0
	3	C19	115.8-122.3			6.5/6.5	100	100									0
120	3												8				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	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 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.
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: Peter Lynch
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

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME

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 (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
													9				0
																	0
										Bottom of borehole at 122.3 feet.							

125
130
135
140
145
150

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT		SPACING/THICKNESS	
(1) 0		<2"	Very close/Very Thin
(2) 1-2		2"-1'	Close/Thin
(3) 3-10		1'-3'	Mod Close/Mod Thick
(4) 11-20		3'-10'	Wide/Thick
		>10'	Very Wide/Very Thick

ANGLE	ATTITUDE
0-5	Horizontal
5-35	Sub-Horizontal
35-55	Mod Dipping
55-85	Sub-Vertical
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 LOG

Sheet: 1 of 2

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-4

BORING STATION: 1147+46.65	OFFSET: -46.65
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
CASING HAMMER: N/A (Spun)	DATE START: 7/22/05 DATE END: 7/25/05
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
7/25/05	10:10	16.2'	25'	68 Hrs. 10 Min.

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	3" Spun									PAVEMENT THICKNESS: 3" Concrete Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-8	6 7 6 8	13	24/24			-	Medium dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Mica (SM / 11-65)							
		S2	8-10	2 3 3 4	6	24/8			-	Loose, brown, fine to medium SAND, some Silt, trace Gravel, trace Mica, trace Rock Fragments, trace Clay (SM / 11-65)							
10		S3	10-12	4 3 3 3	6	24/11			-	Loose, brown, fine to coarse SAND, some Silt, trace Mica, trace Gravel, trace Clay (SM / 11-65)							
15		S4	15-16.4	3 3	4	24/13			-	Top: Loose, brown, fine to medium SAND, some Silt, little Gravel, trace Mica, trace Clay (SM / 11-65) Bottom:Dark gray-black, fine to medium SAND, some organic Silt, traceorganic Silty Clay pockets, trace Gravel (SM / 11-65)		ORGANICS	4				
		S4A	16.4-17	1 2													
		S5	17-18.8	1 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) C1: No Recovery			5				
		C1	18.8	3 50/3"	-	-			-			SAND/ GRAVEL/ SILT	6				
20		S6	21-23	7 7 8 4	15	24/12			-	Medium dense, brown, fine to medium SAND, some Silt, little Gravel, trace Mica (SM / 6-65)							
25		S7	25-25.7	3 6	18	24/21			-	Top (8"): Medium dense, light gray-white, coarse SAND, little Silt, trace Rock Fragments, trace Clay (SM / 7-65) Bottom (13"): Light orange-brown, coarse to fine SAND, some Silt, trace Mica, trace Rock Fragments (SM / 7-65)		DEC ROCK					
		S7A	25.7-27	12 15													
30																	

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT		SPACING/THICKNESS	
(1) 0		<2"	Very close/Very Thin
(2) 1-2		2"-1'	Close/Thin
(3) 3-10		1'-3'	Mod Close/Mod Thick
(4) 11-20		3'-10'	Wide/Thick
		>10'	Very Wide/Very Thick

ANGLE	ATTITUDE
0-5	Horizontal
5-35	Sub-Horizontal
35-55	Mod Dipping
55-85	Sub-Vertical
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 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 LOG

Sheet: 2 of 2

DMJM+HARRIS • ARUP A Joint Venture — Second Avenue Subway

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-4

BORING STATION: 1147+46.65	OFFSET: -46.65
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
CASING HAMMER: N/A (Spun)	DATE START: 7/22/05 DATE END: 7/25/05
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC: SOIL (IN/IN)	TOTAL CORE REC (%)	ROCK CORE RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATIGRAPHY	NOTES
S8	30-32	10 12 12 19	24	24/17			-	Medium dense, white-brown-light gray slightly micaceous, coarse to fine SAND, some Silt, trace Rock Fragments, trace Clay (SM / 7-65)		
C2	35-42.1			7.1/7.1	100	88	-	35.0'-36.0': Very hard, fresh, coarse grained, white-light gray-pink, PEGMATITE. 36.0'-42.1': Very hard, fresh, fine to coarse grained, light to dark gray, slightly convoluted, crenulated, horizontal to moderately dipping foliation, with very closely to moderately closely spaced, horizontal to moderately dipping, slightly weathered, slightly chloritized, slightly iron-oxide stained foliation joints/fractures, occasional very thin quartz veins; occasional thin to very thin quartzo-feldspathic zones; high mica content. 35.6': Cross-foliation joint/fracture, rough, irregular, uneven, moderately dipping to sub-vertical, slightly weathered, mineralized. 39.8'-40.4': Cross-foliation joint/fracture, rough, sub-vertical to vertical, slightly weathered, serecitized, hematite coated. 35.9', 36.0'-36.8' and 37.7'-38.1': Healed sub-vertical to vertical joints/fractures.	ROCK	7
C3	42.1-51.9			9.8/9.8	100	100	-	C3: Similar to Schist in C2, except with closely to moderately closely spaced, slightly weathered, slightly kaolinized foliation joints/fractures; occasional thin to very thin quartzo feldspathic zones; occasional very thin quartz veins; high mica content. 48.1', 49.6'-50.8' and 50.9': Healed, moderately dipping to vertical joints/fractures.		8, 8
C4	51.9-60.4			8.5/8.5	100	100	-	C4: Similar to Schist in C2, except convoluted foliation, with closely to widely spaced, slightly weathered, slightly kaolinized foliation joints/fractures; occasional thin to very thin quartzo-feldspathic zones. 54.5'-58.5': Very hard, fine grained, light to medium gray, quartz-mica SCHIST; occasional very thin quartz veins.		
								Bottom of borehole at 60.4 feet		9

Casing (BPF) or core and number of fractures per foot:

DEPTH (FT)	CASING (BPF) OR	NUMBER OF FRACTURES PER FOOT
30-35	↓ (to 35)	
35-36	4.5	2
36-37	2	3
37-38	2	0
38-39	2	0
39-40	2	2
40-41	2	5
41-42	2	0
42-43	2.5	2
43-44	2.5	0
44-45	2.5	0
45-46	2.5	1
46-47	2.5	1
47-48	3	1
48-49	2.5	0
49-50	2.5	1
50-51	3	0
51-52	3.5	1
52-53	3	1
53-54	2.5	0
54-55	3	0
55-56	3.5	0
56-57	5	0
57-58	4	0
58-59	4	1
59-60	4	0

INSITU PROPERTIES: HARDNESS (see below for values, 1 2 3 4 5); WEATHERING (see below for values, 1 2 3 4 5); NUMBER OF FRACTURES PER FOOT (see below for values, 1 2 3 4).

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS: HARDNESS		WEATHERING		NO. PER FT	JOINT/FRACTURE CHARACTERISTICS: SPACING/THICKNESS		ANGLE	ATTITUDE
BPF	DENSITY	BPF	CONSISTENCY									
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									

7) RQD affected by sub-vertical to vertical joint between 39.8' and 40.4'
8) Lost water return between 44'-45' and 46'-60'.
9) Bottom of borehole at 60.4'; vibrating wire piezometer installed to a depth of approximately 59.4'.

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
SAMPLER HAMMER: 140 lb Hammer	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: R. Nunez
CASING HAMMER: N/A	DATE START: 09/10/04 DATE END: 09/10/04
ROCK CORE: N/A	REVIEWED BY: A.A. Azmi DATE: 09/29/04

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME
Note 1				

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 (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
0										PAVEMENT THICKNESS: Not recorded		FILL	2				
										Hand augered to a depth of 7 feet prior to start of boring. Environmental samples taken.			3				
5																	
		S1	7-9	2 2 1 1	3	24/14				Very loose, brown, silty, fine SAND and SILT, trace Gravel, trace Clay, trace Mica, trace Cinders (SM / 11-65)							
10		S2	9-11.0	2 3 3 2	6	24/5				Loose, brown, fine to coarse SAND, little Cinders, little Silt (SM / 11-65)							
		S3	11-11.2	100\3"	100/3"	3/2				Concrete Fragments, some Cinders, trace Brick, trace coarse Sand.			4				
15																	
20																	
25																	
30																	

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT		SPACING/THICKNESS	
(1) 0		<2"	Very close/Very Thin
(2) 1-2		2"-1'	Close/Thin
(3) 3-10		1'-3'	Mod Close/Mod Thick
(4) 11-20		3'-10'	Wide/Thick
		>10'	Very Wide/Very Thick

ANGLE	ATTITUDE
0-5	Horizontal
5-35	Sub-Horizontal
35-55	Mod Dipping
55-85	Sub-Vertical
85-90	Vertical

1) Ground water level not encountered.
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) Concrete obstruction encountered at 11'; bottom of borehole at 11'.

BORING LOG

DMJM+HARRIS • ARUP A Joint Venture

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
SAMPLER HAMMER: 140 lb. (Automatic)
CASING SIZE: 3"
CASING HAMMER: N/A (Spun)
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 05/25/05 DATE END: 05/26/05
REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
05/26/05	7:35	15.8'	40	17 Hrs. 35 Min.

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	3" SPUN									PAVEMENT THICKNESS: 4" Cobblestone Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-8	3 8 11 16	19	24/22			-	Medium dense, orange-brown, fine to coarse SAND, some Silt, trace Gravel (SM / 7-65)		SAND GRAVEL/ SILT					
		S2	8-10	12 15 18 25	33	24/24			-	Dense, gray-brown, fine to medium SAND, some Silt, trace Gravel, trace Mica (SM / 7-65)							
10		S3	10-12	15 22 33 42	55	24/19			-	Dense, orange-brown, fine to medium SAND, some Silt, little Gravel, trace Mica (SM / 7-65)							
15		S4	15-17	41 50 46 32	96	24/13			-	Very dense, brown, fine to medium SAND, some Silt, little Gravel, trace Rock Fragments, trace Mica (SM / 6-65)							
20		S5	20-22	16 21 34 40	55	24/24			-	Very dense, gray-black-white, micaceous fine to coarse SAND, little Silt, trace Rock Fragments (SM / 7-65)		DEC ROCK					
25		S6	25-26	23 100/6"	100/6"	12/12			-	Very dense, gray-black-white, micaceous fine to medium SAND, little Silt, trace Rock Fragments (SM / 7-65)							
30																	

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS					
NO. PER FT		SPACING/THICKNESS		ANGLE	ATTITUDE
(1) 0		<2"	Very close/Very Thin	0-5	Horizontal
(2) 1-2		2"-1'	Close/Thin	5-35	Sub-Horizontal
(3) 3-10		1'-3'	Mod Close/Mod Thick	35-55	Mod Dipping
(4) 11-20		3'-10'	Wide/Thick	55-85	Sub-Vertical
		>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 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).

BORING LOG

DMJM HARRIS • ARUP

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.
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Peter Lynch
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

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	3" SPUN	S7	30-30.8	54 100/3"	100/3"	9/9			-	Very dense, gray-white, micaceous fine to coarse SAND, little Silt, trace Rock Fragments, (SM / 7-65)							
35		S8	35-36.4	46 88 100/5"	188/11"	17/17			-	Very dense, gray-green-white, slightly micaceous fine to coarse SAND, some Rock Fragments, little Silt, trace Clay (SM / 6-65)							
40	3	C1	40-44.5			4.5/4.5	100	100	-	Hard, fresh to slightly weathered, fine to coarse grained, light to dark gray, quartz-mica SCHIST, with very thin, crenulated, slightly weathered, horizontal to sub-horizontal foliation, rough to smooth, with moderately closely spaced, sub-horizontal to moderately dipping, chloritized foliation joints/fractures; minor garnet content.		ROCK	4				1
	3																3
	3																0
	3																0
45	2.5	C2	44.5-52.5			8/8	100	98	-	Hard to very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to moderately dipping foliation, rough to smooth, with moderately closely spaced, horizontal to sub-horizontal, slightly weathered, chloritized to mineralized foliation joints/fractures. 45.5': Cross-foliation joint/fracture, rough to smooth, very widely spaced, sub-vertical, slightly weathered, chloritized clay coated foliation joint/fracture. (1/2" away: Healed vertical to sub-vertical joint/fracture)							1
	2.5																1
	2.5																1
	2.5																0
	2.5																0
	3																1
50	3																1
	2.5																1
	2.5																2
	2																0
	3.5																0
55	5	C3	52.5-57.2			4.7/4.7	100	100	-	Very hard, fresh, coarse grained, light to medium gray-light green-pink, quartz-feldspathic SCHIST(PEGMATITE), with faint, sub-horizontal to moderately dipping foliation, rough to smooth, sub-horizontal, slightly weathered, chloritized foliation joint/fracture, minor garnet content. 55.0'-55.6': Healed sub-vertical joint/fracture.							0
	5																0
	3.5																0
	3									57.2'-58.6': Similar to Pegmatite in C3.			5				0
	3												6				3
60	3																3

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 LOG

Sheet: 3 of 5

DMJM HARRIS • ARUP

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.
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Peter Lynch
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

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
65	2.5	C4	57.2-66.9			9.7/9.7	100	93	-	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																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, chloitized, silicate, clay to hematite coated, mineralized. 61.3'-61.7', 63.5'-63.9' and 69.5'-66.9': Several healed sub-vertical joints/fractures.			7				0
	3																7
	3																0
70	2.5																0
	2.5																1
	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, chlontized, clay to hematite coated, mineralized.							5
	3.5																4
	3																0
75	2.5																0
	2.5																0
	2.5																0
	2.5									C6: Similar to Schist in C4. 80.4'-80.7': Healed sub-vertical joint/fracture.							0
	2.5																0
	2.5																0
80	2.5	C6	76.5-82.4			5.9/5.9	100	100	-								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 quartzo-feldspathic zones. 85.2'-85.5': Healed sub-vertical joint/fracture. 85.4'-85.7': Cross-foliation joint/fracture, rough, sub-vertical, slightly mineralized.							0
85	2.5																0
	2.5																2
	3	C7	82.4-91.6			9.2/9.2	100	100	-								1
	3																1
	3																0
90	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 LOG

DMJM HARRIS • ARUP

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.
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Peter Lynch
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

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
95	3									Similar to Schist in C4, except occasional very thin quartz veins; occasional quartzo-feldspathic zones. 95.4'-95.8': Healed sub-vertical joint/fracture.							1
	3.5																1
	4.5																0
	3.5																0
	3																1
	3	C8	91.6-101.1			9.5/9.5	100	96	-								1
	2.5																0
	2.5																0
100	3																0
	2.5																1
	2.5																1
	4									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 foliation joints/fractures; occasional very closely to moderately closely spaced, very thin quartz veins. 106.2': Cross-foliation joint/fracture, rough to smooth, planar, moderately dipping, slightly weathered. 106.7': Cross-foliation joint/fracture, rough, uneven, sub-vertical, slightly weathered, sericite, hematite, chloritized. 107.6'-115.3': Cross-foliation joints/fractures, healed to weakly healed to open, sub-parallel, rough, very closely spaced, sub-vertical to vertical, slightly to moderately weathered, kaolinized.							0
	3																0
	3																0
105	3.5																0
	2.5	C9	101.1-110.7			9.6/9.6	100	77	-								0
	2.5																2
	2.5																1
	2.5																5
110	2.5																10
	2.5																10
	3																5
	4																1
	3	C10	110.7-116.9			6.2/6.2	100	76	-	C10:Similar to Schist in C9. 113.5'-114.7': Feldspar concentration. 112.4': Cross-foliation joint/fracture, rough, moderately dipping, severely weathered hematite coated. 114.5': Cross-foliation joint/fracture, rough to smooth, moderately dipping, chloritized, mineralized. 116.3':Cross-foliation joint/fracture, rough, sub-vertical, slightly to moderately weathered.							0
115	2.5																2
	2.5																0
	2.5																4
	2.5												8				1
	2.5																1
120	3																3

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 LOG

DMJM HARRIS • ARUP
A Joint Venture

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.
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Peter Lynch
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

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
125	3 2.5 3 2.5 3 3	C11	116.9-125.9			9/9	100	58	-	C11: Similar to Schist in C9, except very closely to moderately closely spaced foliation joints/fractures. 119.8'-121.8': Foliation joints/fractures, moderately dipping, high mica content with mylonite. 118.2': Cross-foliation joint/fracture, weakly healed to open, rough, moderately dipping, slightly weathered. 122.2'-122.7': Cross-foliation joint/fracture, rough, sub-vertical, slightly to moderately weathered with pyrite.			8				5 3 5 0 5 3
130	2.5 2.5 2.5 2.5 2.5 2.5	C12	125.9-132.1			6.2/6.2	100	76	-	C12: Similar to Schist in C9. 129.8'-130.3':Cross-foliation joints/fractures, weakly healed, sub-vertical, slightly weathered. 130.8'-131.7':Cross-foliation joints/fractures, rough to smooth, vertical, moderately weathered, hematite chlorite coated.			8				0 2 0 2 7 2
135	2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	C13	132.1-139.7			7.6/7.6	100	86	-	C13: Similar to Schist in C9. 132.1'-134.6':Healed, very closely spaced, vertical, hematite, chlorite coated, quartz filled. 139.0'-139.4': Healed sub-vertical joint/fracture.			9				0 0 3 2 0 0 0 0
140										Bottom of borehole at 139.7 feet							
145																	
150																	

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT		SPACING/THICKNESS	
(1) 0		2"	Very close/Very Thin
(2) 1-2		"-1'	Close/Thin
(3) 3-10		'-3'	Mod Close/Mod Thick
(4) 11-20		'-10'	Wide/Thick
		10'	Very Wide/Very Thick

ANGLE	ATTITUDE
0-5	Horizontal
5-35	Sub-Horizontal
35-55	Mod Dipping
55-85	Sub-Vertical
85-90	Vertical

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 LOG

Sheet: 1 of 5

DMJM HARRIS - ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.23	NORTH: 217567.2364
DATUM : NYCT	EAST: 994013.6733
FINAL BORING DEPTH (FT) 129.40	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb. (Manual)
CASING SIZE: 4"
CASING HAMMER: 300 lb
ROCK CORE: NQ

BORING CO: Warren George
FOREMAN: Mike McCarthy
ENGINEER: Melad Girgis
DATE START: 2/19/09 DATE END: 2/27/09
REVIEWED BY: C. Snee DATE:

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	3" SP									PAVEMENT THICKNESS: 4" Cobblestone		FILL	1				
										6" plain concrete slab (sidewalk) 8" concrete slab base			2				
										Hand augered to a depth of 6 feet prior to boring.			3				
5		S1	6-8	56 18 7 6	25	24/14			-	S-1: Medium dense Brown c-f SAND, little Silt, trace Gravel, occasionally brick fragments.							
		S2	8-10	4 4 6 12	10	24/2			-	S-2: Medium dense Brown m-f SAND, little Silt, trace Gravel, occasional brick fragments.							
10		S3	10-12	12 8 14 18	22	24/14			-	S-3: Medium dense Gray SAND, some Silt and Clay brown motted romoxid, occasional coal fragments.							
													4				
15		S4	15-17	26 12 12 12	54	24/24			-	S-4: Medium dense Gray brown m-f SAND, trace Silt, occasional mica fragments.		DEC SCHIST					
20		S5	20-20.5	38 50/0.5		11/11			-	S-5: Very dense Gray brown m-f SAND, trace Silt, occasional mica fragments.							
25		S6	25-27	15 21 33 48	54	24/22			-	S-6: Very dense Green/ gray m-f SAND, mica fragments.							
30																	

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT	SPACING/THICKNESS		ANGLE ATTITUDE
(1) 0	<2"	Very close/Very Thin	0-5 Horizontal
(2) 1-2	2"-1'	Close/Thin	5-35 Sub-Horizontal
(3) 3-10	1'-3'	Mod Close/Mod Thick	35-55 Mod Dipping
(4) 11-20	3'-10'	Wide/Thick	55-85 Sub-Vertical
	>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 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).

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.23	NORTH: 217567.2364
DATUM : NYCT	EAST: 994013.6733
FINAL BORING DEPTH (FT) 129.40	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George
SAMPLER HAMMER: 140 lb. (Manual)	FOREMAN: Mike McCarthy
CASING SIZE: 4"	ENGINEER: Melad Girgis
CASING HAMMER: 300 lb	DATE START: 2/19/09 DATE END: 2/27/09
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE:

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	3*											ROCK					
	5																
	5	C1	30-35			5.0/5.0	100	45	-	C-1: Medium soft to medium hard, moderately weathered, f-m grain, green-gray SCHIST, close fracture spacing, sub horizontal to sub vertical foliation, cross foliation 31' - 31.1'.							
	5																
35	4.5																
	4.5																
	4.5	C2	35-39.8			4.8/4.8	100	72	-	C-2: Medium hard, moderately weathered, f-m grain, dark gray SCHIST, close to moderately fracture spaces, sub horizontal - sub vertical foliated, cross foliated 36.4' - 37.0'.							
	4.5																
	4.5																
40	3.5																1
	3.5																3
	3.5	C3	39.8-44.5			4.7/4.7	100	66	-	C-3: Hard slightly weathered f-m grain, dark gray SCHIST, close to moderately fractured, sub horizontal - sub vertical angle.							0
	3.5																0
	3.5																1
45	3																1
	3																1
	3	C4	44.5-49.5			5.0/5.0	100	75	-	C-4: Soft to moderately soft, weathered, f-m grain, dark gray SCHIST, clost to moderately fractured, sub horizontal-sub vertical angles.							0
	3																0
	3																1
50	4																1
	4																1
	4	C5	49.5-54.5			5.0/5.0	100	87	-	C-5: Hard, slightly weathered f-m grain, dark gray SCHIST, clost to moderately fractured, sub horizontal angles, mod dipping 53'-54.5'.							2
	4																0
	4																0
55	4																0
	4																0
	4	C6	54.5-58.7			4.2/4.2	100	88	-	C-6: Hard, slightly weathered f-m grain, dark gray SCHIST, clost to moderately fractured, sub horizontal angles, mod dipping 53'-54.5'.							0
	4																0
	4																3
60	4																3

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) 4" Casing to 14' depth. 3" Casing to 29' then pushed to 34' then pushed to 37.0'.
5) Core barrel became jammed.
6) Changed Core barrel after C-20.
7) 119.4'-119.5': mechanical broken rock

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.23	NORTH: 217567.2364
DATUM : NYCT	EAST: 994013.6733
FINAL BORING DEPTH (FT) 129.40	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb. (Manual)
CASING SIZE: 4"
CASING HAMMER: 300 lb
ROCK CORE: NQ

BORING CO: Warren George
FOREMAN: Mike McCarthy
ENGINEER: Melad Girgis
DATE START: 2/19/09 DATE END: 2/27/09
REVIEWED BY: C. Snee DATE:

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	4	C7	58.7-63.7			5.0/5.0	100	92	-	C-7: Hard, slightly weathered, f-m grain, dark gray SCHIST, clost to wide spacing, sub horizontal angles.							0
																	0
	4																0
																	0
	4																1
65	4	C8	63.7-68.7			5.0/5.0	100	100	-	C-8: Hard, slightly weathered, f-m grain, dark gray SCHIST, clost to wide spacing, sub horizontal angles, sub vertical at 65.9'.							0
	4																0
																	7
	4																0
																	0
	4																1
70		C9	68.7-73.9			5.2/5.2	100	76		C-9: Hard, slightly weathered, f-m grain, dark gray SCHIST, close to moderate spacing, sub horizontal angles.							5
																	4
																	0
		C10	73.9-78.1			4.2/3.7	88	24		C-10: Medium hard, moderately weathered, f-m grain, dark gray SCHIST, very close- close spacing, sub horizontal angles, cross foliation 76.3'-78.0'.							0
75																	0
																	0
		C11	78.1-80.6			2.5/2.1	83	50		C-11: Medium hard, moderately weathered, f-m grain, dark gray SCHIST, very close- close spacing, sub horizontal angles.							0
																	0
80																	0
		C12	80.6-84.7			4.2/3.1	74	34		C-12: Medium hard, moderately weathered, f-m grain, dark gray SCHIST, occasionally mixed GRANIT, very close to close spacing, sub horizontal to sub vertical 81.5'-84.7' (lost recovery at this zone).							0
																	0
85																	2
		C13	84.7-89.7			5.0/5.0	100	50		C-13: Moderately hard, moderate-slightly weathered, close -moderate spacing, f-m grain, dark gray SCHIST, GRANIT, very close 84.7'-85.2' sub horizontal foliation, sub vertical at 86.3'.							1
																	1
																	0
90																	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) 4" Casing to 14' depth. 3" Casing to 29' then pushed to 34' then pushed to 37.0'.
5) Core barrel became jammed.
6) Changed Core barrel after C-20.
7) 119.4'-119.5': mechanical broken rock

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.23	NORTH: 217567.2364
DATUM : NYCT	EAST: 994013.6733
FINAL BORING DEPTH (FT) 129.40	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George
SAMPLER HAMMER: 140 lb. (Manual)	FOREMAN: Mike McCarthy
CASING SIZE: 4"	ENGINEER: Melad Girgis
CASING HAMMER: 300 lb	DATE START: 2/19/09 DATE END: 2/27/09
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE:

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
		C14	89.7-94.1			4.4/3.8	85	8		C-14: Moderate hard, moderate-slightly weathered, close fracture spacing, f-m grain dark gray SCHIST, sub horizontal angles.							1
																	1
																	0
																	0
95		C15	94.1-99.1			5.0/5.0	100	33		C-15: Moderate hard, moderate-slightly weathered, close fracture spacing, f-m grain dark gray SCHIST, sub horizontal angles.							1
																	1
																	0
																	0
																	0
100		C16	99.1-103.6			54/60	100	55		C-16: Same as C-13 except Hard slightly weathered, f-m grained close spacing, dark gray SCHIST, sub horizontal foliation.							1
																	1
																	0
																	0
										C-17: Hard, f-c light- dark gray SCHIST, thin sub horizontal 105.7'-106.1' and moderate 107.7'-108.6' foliations. No apparent foliated fracture. 103.8', 104.1', 104.5', 104.8', 105.7', 106.1', 107.2', 107.7', and 108.1' Cross foliation, rough to smooth, irregular to undulating sub horizontal moderately fresh to slightly weathered.							0
105		C17	103.6-108.6			59/60	98	73									0
																	0
																	2
																	1
																	5
										C-18: Same as C-17 except moderate dipping foliation 108.6'-110.2'. Cross-foliation joints 110.9', 111.8', 112.5' Rough to smooth sub vertical to sub horizontal, fresh to slightly weathered. 112.8'- 1"Quartz-feldspar vein							10
110		C18	108.6-113.1			54/60	100	100									10
																	5
																	1
		C19	113.1-114.4			16/60	100	100		C-19: Very Hard, f-c grained, light to dark gray SCHIST, sub horizontal foliation, rough to smooth with closely spaced, horizontal to sub horizontal slightly weathered foliated joints. 113.1' 1-2" Quartz-feldspar vein.							0
																	2
115													5				0
		C20	114.4-119.4			58/60	98	97					6				4
																	1
																	1
													7				3
120																	

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) 4" Casing to 14' depth. 3" Casing to 29' then pushed to 34' then pushed to 37.0'.
5) Core barrel became jammed.
6) Changed Core barrel after C-20.
7) 119.4'-119.5': mechanical broken rock

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.23	NORTH: 217567.2364
DATUM : NYCT	EAST: 994013.6733
FINAL BORING DEPTH (FT) 129.40	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George	GROUND WATER READINGS
SAMPLER HAMMER: 140 lb. (Manual)	FOREMAN: Mike McCarthy	DATE / TIME / DEPTH / CASING / STAB. TIME
CASING SIZE: 4"	ENGINEER: Melad Girgis	
CASING HAMMER: 300 lb	DATE START: 2/19/09 DATE END: 2/27/09	
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE:	

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
		C21	119.4-124.4				100	92		C-20: Same as C-19 except sub horizontal - sub vertical foliation. Undulating to irregular, rough to smooth, fresh to slightly weathered. Some calcite cross foliation fractures at 115.4', 118.2' and 118.9'. No apparent foliation fractures.							5
																	3
																	5
																	0
125																	5
																	3
		C22	124.4-129.6				100	50		C-21: Very hard fresh fine to coarse grained light to dark gray gm SCHIST with thin convoluted foliations; sub horizontal to moderate foliation, rough, irregular, close to moderately close, fresh to slighlty weathered. 120.6'-120.8' Very Hard fresh coarse grained pink and white Quartz - feldspar vein.							0
																	2
																	0
130																	2
																	7
																	2
																	0
										C-22: Very hard, fresh, f-c grained, light to dark gray SCHIST, sub horizontal to moderate foliation; rough to smooth with closely spaced, slightly weathered to fresh foliated joints. Cross foliation at 124.8', 125.0' and 125.9'.							0
135																	3
																	2
																	0
																	0
																	0
140																	0
										Bottom of borehole at 129.4							
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	"-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) 4" Casing to 14' depth. 3" Casing to 29' then pushed to 34' then pushed to 37.0'.
5) Core barrel became jammed.
6) Changed Core barrel after C-20.
7) 119.4'-119.5': mechanical broken rock

BORING LOG

Sheet: 1 of 3

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-8

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.96	NORTH: 217576.7756
DATUM : NYCT	EAST: 994091.0634
FINAL BORING DEPTH (FT) 68.3	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Mike Mcerlean
CASING SIZE: 4"	ENGINEER: Melad Girgis
CASING HAMMER: 300 lb	DATE START: 2/16/09 DATE END: 2/17/09
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE:

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	3" SP									PAVEMENT THICKNESS: 4" Cobblestone		FILL	1				
										6" plain concrete slab (sidewalk) 8" concrete slab base			2				
										Hand anguered to a depth of 6 feet prior to boring.			3				
5		S1	6-8	28 12 4 4	16	24/16			-	S-1: Medium dense Yellow brown fine SAND, some clayey silt, brick fragments.							
		S2	8-10	6 7 6 18	13	24/6			-	S-2: Medium dense Brown c-f SAND, little gravel, brick gragments.							
10		S3	10-12	24 26 48 26	74	24/18			-	S-3: Very dense Brown c-f SAND and c-f Gravel, trace silt, occosional mica fragments.		SAND					
15		S4	15-17	42 32 27 36	59	24/16			-	S-4: Very dense Brown c-f SAND, little fine Gravel, trace Silt, occasional mica fragments.							
20		S5	20-22	21 24 46 80		24/15			-	S-5: Very dense Green c-f SAND, trace fine Gravel mix mica fragments.		DEC ROCK					
25		S6	25-26	75 75 100/3"		15/15			-	S-6: Very dense Green c-f SAND, mica mix (Decomposed SCHIST).							
30																	0

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT	SPACING/THICKNESS		ANGLE ATTITUDE
(1) 0	<2"	Very close/Very Thin	0-5 Horizontal
(2) 1-2	2"-1'	Close/Thin	5-35 Sub-Horizontal
(3) 3-10	1'-3'	Mod Close/Mod Thick	35-55 Mod Dipping
(4) 11-20	3'-10'	Wide/Thick	55-85 Sub-Vertical
	>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 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).

BORING LOG

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-8

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.96	NORTH: 217576.7756
DATUM : NYCT	EAST: 994091.0634
FINAL BORING DEPTH (FT) 68.3	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Mike Mcerlean
CASING SIZE: 4"	ENGINEER: Melad Girgis
CASING HAMMER: 300 lb	DATE START: 2/16/09 DATE END: 2/17/09
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE:

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	3"											ROCK					
	5	C1	29.5-34.5			5.0/5.0	100	95	-	C-1: Hard, slightly weathered fine to coarse grained, light to dark gray quartz mica garnet SCHIST, very thin crenulated, sub horizontal foliation, rough, irregular moderately close to closesub horizontal foliation joints/fractures.							0
	5																0
	5																2
	5																0
35	4.5																4
	4.5	C2	34.5-39.5			5.0/5.0	100	87	-	C-2: Simular SCHIST in C-1 34.5'-34.6': Cross foliation joints/ fractures, severely weathered moderately dipping.							1
	4.5																1
	4.5																0
	4.5																0
40	3.5																1
	3.5	C3	39.5-44.5			5.0/5.0	100	83	-	C-3: Simular to SCHIST in C-1except severely weathered from 44.1' to 44.5'. 42.7'-43.2': Cross foliation joints fractures. Closely spaced vertical to sub vertical.							1
	3.5																1
	3.5																2
	3.5																3
45	3																0
	3	C4	44.5-49.5			5.0/5.0	100	63	-	C-4: Simular to SCHIST in C-1 except medium hard. (See attached sheet)							2
	3																6
	3																5
	3																1
50	4																0
	4	C5	49.5-54.5			5.0/5.0	100	100	-	C-5: Simular to SCHIST in C-1							1
	4																0
	4																0
	4																2
55	4																0
	4	C6	54.5-59.5			5.0/4.8	97	75	-	C-6: Simular to SCHIST in C-1 except moderately weathered from 59.0'-59.5'. Sub horizontal foliation (cross foliation 58.0'-59.5') Sub vertical joints/ fractures.							2
	4																2
	4																6
	4																4
60	4																3

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) Borehole terminated to prevent interference with the F line tunnels.

BORING LOG

Sheet: 3 of 3

SECOND AVENUE SUBWAY PROJECT

BORING NO. B63-8

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.96	NORTH: 217576.7756
DATUM : NYCT	EAST: 994091.0634
FINAL BORING DEPTH (FT) 68.3	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb. (Automatic)
CASING SIZE: 4"
CASING HAMMER: 300 lb
ROCK CORE: NQ

BORING CO: Warren George
FOREMAN: Mike Mcerlean
ENGINEER: Melad Girgis
DATE START: 2/16/09 DATE END: 2/17/09
REVIEWED BY: C. Snee DATE:

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

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 RQD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
	4	C7	59.5-64.5			5.0/4.7	96	83	-	C-7: Simular to SCHIST in C-1 except sub horizontal foliation.Hard slightly weathered SCHIST (occosional GRANITE), clost to moderate fractured spacing, sub horizontal foliation.							1
																	3
	4																1
	4																1
65	4																2
	4	C8	64.5-69.5			5.0/3.8	100	33	-	C-8: (64.5-68.3') Moderate to Hard, slightly weathered SCHIST, close fractured spacing (66'-67.8' fractured), sub horizontal to moderately dipping foliation. 64.5'-65.5' and 68.0-68.3': Fine to medium grained, light gray quartz mica SCHIST with sub horizontal to moderatley dipping foliation. 65.5'-68.0': Simular to above SCHIST excepl severely weathered.			4				5
	4																10
	4																5
70																	
75																	
80																	
85																	
90										Bottom of borehole at 68.3'							

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) Borehole terminated to prevent interference with the F line tunnels.

BORING LOG

Sheet: 1 of 5

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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: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: A. Feliciano
CASING SIZE: 3" and 5"	ENGINEER: N. Sokol
CASING HAMMER: 140 lb.	DATE START: 6/17/02 DATE END: 6/28/02
ROCK CORE: NQ	REVIEWED BY: M. A. Ponti, JR DATE: 9/3/02

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME
7/2/02	12:40	14.3'	OW	4 Days
8/23/02	15:45	14.5'	OW	56 Days
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	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 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				
													3				
													4				
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)							
		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)							
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)							
		S5	14-15.3	18 22	40	24/19			0	Top 16": Brown, fine to medium SAND, little Silt, trace Gravel (SM / 11-65)							
15		S5A	15.3-16	18 18						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	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								

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) On 6/18/02, water level was at top of casing, about 1.5' above existing ground surface.

BORING LOG

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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
SAMPLER HAMMER: 140 lb. Automatic
CASING SIZE: 3" and 5"
CASING HAMMER: 140 lb.
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Co., Inc.
FOREMAN: A. Feliciano
ENGINEER: N. Sokol
DATE START: 6/17/02 DATE END: 6/28/02
REVIEWED BY: M. A. Ponti, JrDATE: 9/3/02

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME
9/6/02	13:00	14.8'	OW	70 Days
9/13/02	12:15	15.3'	OW	77 Days
9/20/02	11:30	15.1'	OW	84 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	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
		S8	30-30.3	100/4"	100/4"	4/4			0	Very dense, gray, slightly micaceous fine to medium SAND, little Silt, trace Clay pockets, trace Rock Fragments (SM / 8-65)		ROCK					
	3									C1: Hard to very hard, slightly weathered to fresh, fine to coarse grained, gray to dark gray, quartzose-mica-garnet SCHIST, with very thin, convoluted, sub-horizontal to vertical foliation, smooth to rough, very close to widely spaced, slightly clay coated, iron-oxide stained to moderately weathered foliation joints/fractures; high quartz, mica, garnet content; occasional, very hard, 0.1' to 0.3' thick quartzo-feldspathic zones, with green-yellow to pale green chlorite/plagioclase. 31.3' to 32': Fracture zone, rough to smooth, clay coated, very closely spaced, sub-horizontal to sub-vertical foliation joints/fractures.							0
	3.5																4
	4																0
	5																0
35	5.5	C1	31-41			10/10	100	94									0
	4																0
	4																0
	3																0
40	3																0
	3																0
										Similar to Schist in C1, except, 0.1' to 0.5' thick quartzo-feldspathic zones, high quartz, mica, garnet content. 43.5': Sub-vertical joint/fracture. 43.5'-44.4': Vertical healed joint, pitted, filled with medium yellow mineralization.							0
	3																0
	4																1
45	4	C2	41-51			10/10	100	100									1
	4																0
	4.5																0
	5																0
	5.5																0
50	4.5																0
	4.5																0
	4.5									Similar to Schist in C2. 55.5': Minor pitting along sub-vertical, healed joint with yellow mineralization.							0
	5																0
	5	C3	51-56			5/5	100	100									0
55	5																0
	5																0
	3																0
	3																0
	3																0
60	3																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	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								

NOTES:
5) Vertical foliation occurs between 110' and 113'.
6) Packer testing performed in the bedrock in 10' increments between approximately 36' and 136' after coring was completed.
7) Bottom of borehole at 140'; observation well installed to a depth of approximately 28'.

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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: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: A. Feliciano
CASING SIZE: 3" and 5"	ENGINEER: N. Sokol
CASING HAMMER: 140 lb.	DATE START: 6/17/02 DATE END: 6/28/02
ROCK CORE: NQ	REVIEWED BY: M. A. Ponti, JR DATE: 9/3/02

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME
9/6/02	13:00	14.8'	OW	70 Days
9/13/02	12:15	15.3'	OW	77 Days
9/20/02	11:30	15.1'	OW	84 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	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
65	3	C4	56-66			10/10	100	100		Similar to Schist in C1.							0
	3																0
	2.5																0
	2.5																0
	2.5																0
	2.5																0
70	3	C5	66-71			5/5	100	100		Very hard, fresh, fine to coarse grained, light to dark gray quartz-mica-garnet SCHIST, thin to very thin, convoluted, sub-horizontal to sub-vertical foliation, smooth to rough, moderately close to widely spaced, sub-horizontal to moderately dipping, yellow slightly weathered mineralized joints/fractures; high quartz, mica, garnet content.							1
	3																0
	3																0
	3																0
	4																1
75	4	C6	71-81			10/10	100	100		Similar to Schist in C5.							0
	4									79.6'-80.2': Cross-foliation joint/fracture, rough, irregular, widely to moderately closely spaced, sub-vertical, slightly weathered with grayish-green mineralization.							0
	4																0
	4.5									71.3'-71.9': Sub-vertical healed joint with 0.01' thick, white mineralization; several 0.2' to 0.1' thick gray, fine grained zones.							0
	5																0
	5																0
	5																0
	5																0
80	NA																4
	NA																3
85	4.5	C7	81-91			10/10	100	91		Similar to Schist in C5.							1
	4.5									81.3': Moderately dipping, gray-yellow clay coated foliation joint/fracture.							1
	4.5																1
	4.5									83.1'-84.0': Cross-foliation joint/fracture, sub-vertical, with red-brown and gray-green mineralization (0.01' thick).							0
	4.5																4
	3									85.2'-85.4' and 86.9': Cross-foliation joints/fractures, sub-vertical, gray-yellow to yellow-green clay coated/mineralized.							0
	3																0
	3																0
90	3																1

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT		SPACING/THICKNESS	
(1) 0		<2"	Very close/Very Thin
(2) 1-2		2"-1'	Close/Thin
(3) 3-10		1'-3'	Mod Close/Mod Thick
(4) 11-20		3'-10'	Wide/Thick
		>10'	Very Wide/Very Thick

ANGLE	ATTITUDE
0-5	Horizontal
5-35	Sub-Horizontal
35-55	Mod Dipping
55-85	Sub-Vertical
85-90	Vertical

NOTES:
5) Vertical foliation occurs between 110' and 113'.
6) Packer testing performed in the bedrock in 10' increments between approximately 36' and 136' after coring was completed.
7) Bottom of borehole at 140'; observation well installed to a depth of approximately 28'.

BORING LOG

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: Jersey Boring and Drilling Co., Inc.	
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: A. Feliciano	
CASING SIZE: 3" and 5"	ENGINEER: N. Sokol	
CASING HAMMER: 140 lb.	DATE START: 6/17/02 DATE END: 6/28/02	
ROCK CORE: NQ	REVIEWED BY: M. A. Ponti, JR DATE: 9/3/02	

GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME
9/6/02	13:00	14.8'	OW	70 Days
9/13/02	12:15	15.3'	OW	77 Days
9/20/02	11:30	15.1'	OW	84 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	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
																	0
	2.5									Hard to very hard, fresh, fine to coarse grained, gray to dark gray quartzose-mica-garnet SCHIST, with thin to very thin, convoluted, sub-horizontal to sub-vertical foliation, smooth to moderately smooth, moderately close to very closely spaced, moderately dipping, slightly clay coated to slightly iron-oxide stained foliation joints/fractures occasionally, talcified slickensides with chlorite/epidote mineralized surface; high garnet, mica, quartz content.							0
	2.5																0
	2.5																0
95	2.5																1
	2.5	C8	91-101			10/10	100	97									0
	2.5																1
	2.5																1
	2.5																0
	2.5																1
100	2.5																0
	NA									Similar to Schist in C8 except, close to moderately close joints/fractures, several 0.1' to 0.8' thick, very hard, fine grained, quartzo-feldspathic zones, foliaiton joints/fractures at 101.5' and 101.7', with smooth, gray- yellow green to moderate yellow-green slickensided.							2
	3																0
	3																0
	3																1
105	3	C9	101-111			10/10	100	100									0
	2.5																1
	2.5																0
	3																0
110	3																0
	3																0
	2.5									Hard to very hard, fresh to slightly weathered, fine to coarse grained, light to dark gray, dark green-gray quartzose-mica-garnet SCHIST, with thin to very thin, convoluted, horizontal to vertical foliation, smooth to rough, shallow to vertical, very close to widely spaced, gray-green to dusky green clay coated, occasional white mineralized foliation joints/fractures.							0
	2.5																0
	2.5												5				0
115	3																0
	3	C10	111-121			10/10	100	100		117.2' - 120.4': Pitting with green alteration/chloritization.							0
	3																0
	3									116.3' - 116.7': PEGMATITE, very hard, very coarse grained quartzo-feldspathic zone.							0
	3																1
120	3																1

GRANULAR SOILS		COHESIVE SOILS	
BPF	DENSITY	BPF	CONSISTENCY
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Med Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

ROCK CORE CHARACTERISTICS			
HARDNESS		WEATHERING	
1	Very Soft	1	Complete
2	Medium	2	Severe
3	Med Hard	3	Moderate
4	Hard	4	Slight
5	Very Hard	5	Fresh

JOINT/FRACTURE CHARACTERISTICS			
NO. PER FT	SPACING/THICKNESS		ANGLE ATTITUDE
(1) 0	<2"	Very close/Very Thin	0-5 Horizontal
(2) 1-2	2"-1'	Close/Thin	5-35 Sub-Horizontal
(3) 3-10	1'-3'	Mod Close/Mod Thick	35-55 Mod Dipping
(4) 11-20	3'-10'	Wide/Thick	55-85 Sub-Vertical
	>10'	Very Wide/Very Thick	85-90 Vertical

NOTES:
5) Vertical foliation occurs between 110' and 113'
6) Packer testing performed in the bedrock in 10' increments between approximately 36' and 136' after coring was completed.
7) Bottom of borehole at 140'; observation well installed to a depth of approximately 28'

BORING LOG

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
SAMPLER HAMMER: 140 lb. Automatic
CASING SIZE: 3" and 5"
CASING HAMMER: 140 lb.
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Co., Inc.
FOREMAN: A. Feliciano
ENGINEER: N. Sokol
DATE START: 6/17/02 DATE END: 6/28/02
REVIEWED BY: M. A. Ponti, Jr. DATE: 9/3/02

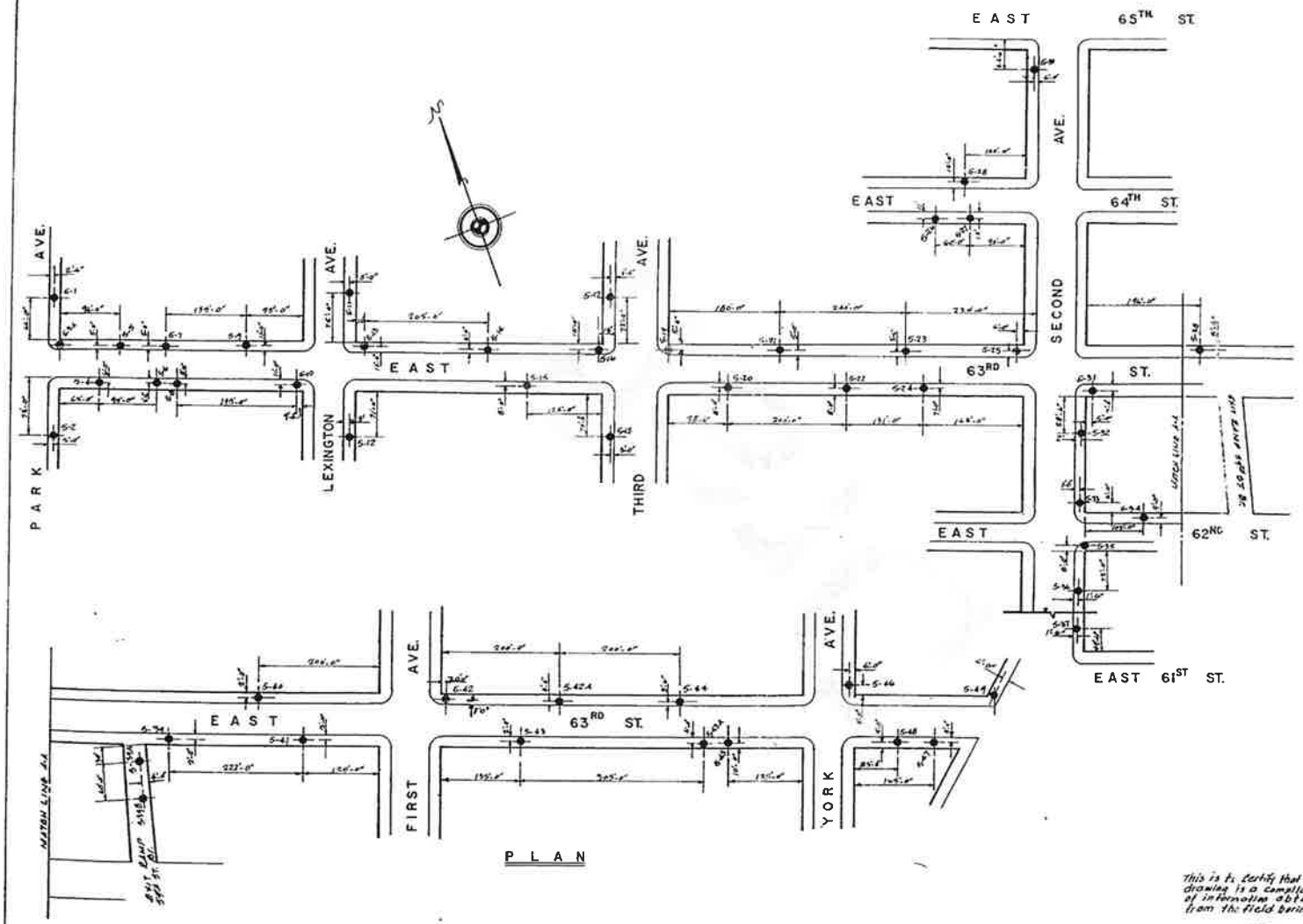
GROUND WATER READINGS

DATE	TIME	DEPTH		STAB. TIME
9/6/02	13:00	14.8'	OW	70 Days
9/13/02	12:15	15.3'	OW	77 Days
9/20/02	11:30	15.1'	OW	84 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	NOTES	INSITU PROPERTIES: HARDNESS (see below for values 1 2 3 4 5)	INSITU PROPERTIES: WEATHERING (see below for values 1 2 3 4 5)	NUMBER OF FRACTURES PER FOOT (see below for values 1 2 3 4)	NUMBER
125	3																0
	3																0
	3																0
	3.5																1
	3.5																0
	4	C11	121-131			10/10	100	100		Very hard, fresh, fine to coarse grained, light to dark gray quartzose-mica-garnet SCHIST, with very thin to thin, convoluted, sub-horizontal to sub-vertical foliation, smooth to moderately rough, very close to widely spaced, moderately dipping to sub-vertical, slightly weathered foliation joints/fractures; high quartz, mica, garnet content.							0
	4																0
	4																1
	5																0
130	5																1
	5																0
	4																0
	4																0
	4																0
	4																0
135	4	C12	131-140			9/9	100	100		Similar to Schist in C11 except, disseminated pyrite.							0
	4																0
	4																0
	4																0
	4																0
	4												6				0
140	4												7				0
										Bottom of borehole at 140 feet							
145																	
150																	

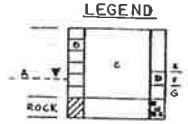
GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS		WEATHERING		NO. PER FT	SPACING/THICKNESS		ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(1) 0	<2"	Very close/Very Thin	0-5	Horizontal
4-10	Loose	2-4	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									

NOTES:
5) Vertical foliation occurs between 110' and 113'.
6) Packer testing performed in the bedrock in 10' increments between approximately 36' and 136' after coring was completed.
7) Bottom of borehole at 140'; observation well installed to a depth of approximately 28'.



PLAN

LEGEND



A-WATER reading & date taken "
B-Number of blows of a 300Lbs. f
falling 18" required to drive a 2
casing (unless otherwise noted:
12"
C-Strata description
D-Number of blows of a 140 Lbs.
(unless otherwise noted) falling
required to drive a 2" split spo
each 6".
E-Sample number
F-Depth at end of sample driv
G-Sample recovery in inches

GENERAL NOTES

1-ALL elevations and depths shall be refer
to the Transit Authority Datum where
ELev. 100.00 is 2.654 Ft. above Mean Sea
at Sandy Hook, N.J., USC. & G. Survey Dat
2-Location of borings shown thus ✛
3-Location of boring with well point insta
shown thus ⊕
4-RB denotes Roller Bit.
5-DH denotes drilled ahead.
6-tr denotes "trace of".
7-rec denotes sample recovery.
8-M/F, C/F etc. denotes "medium to fine"
"coarse to fine" ___ etc.
9-3½" casing used, or otherwise n
10-2 1/8 NX core bit used, o
otherwise specified.
11-R.Q.D. denoted "Rock Quality Designatio
which is the total length of pieces ov
in a given run divided by the length of t
given run.

NOTE: See Sheet No.2 for Boring Sch

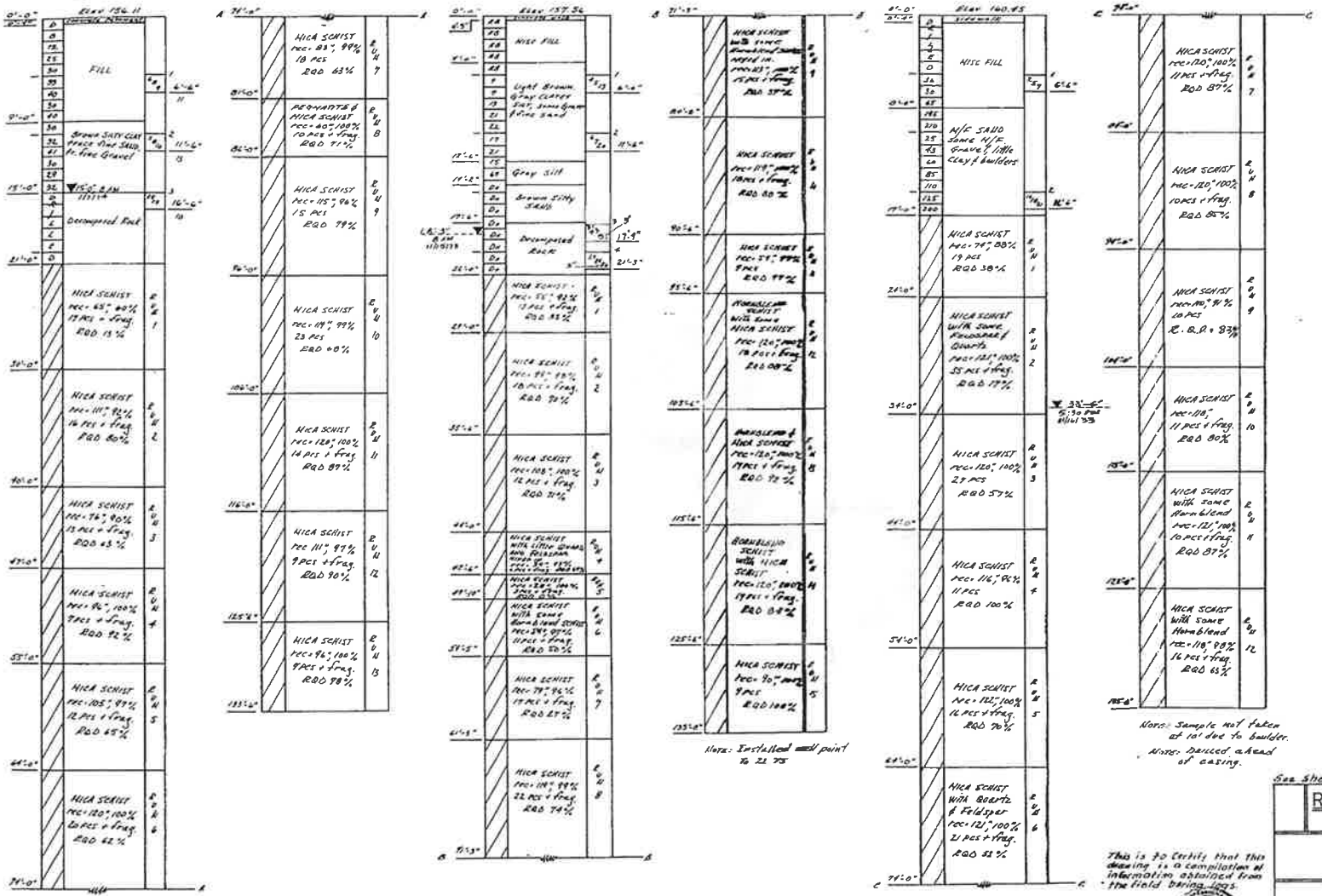
This is to Certify that this drawing is a compilation of information obtained from the field boring logs.

RAYMOND INTERNATIONAL I

BORING LOCATION PLAN

NEW YORK CITY TRANSIT SYSTEM
Contract A-10-D, Route 13-A, Sect 5
Along East 63rd St. From Park Ave. to E. River Dr.
BOROUGH Manhattan

DRAWN BY: V.E.
CHECKED BY: E.S.
DATE: April 1974
SCALE: As Noted



Note: Installed well point 12-22-75

Note: Sample not taken at 10' due to boulder.

Note: Drilled ahead of casing.

See Sheet No.1 for Legend & General Notes.

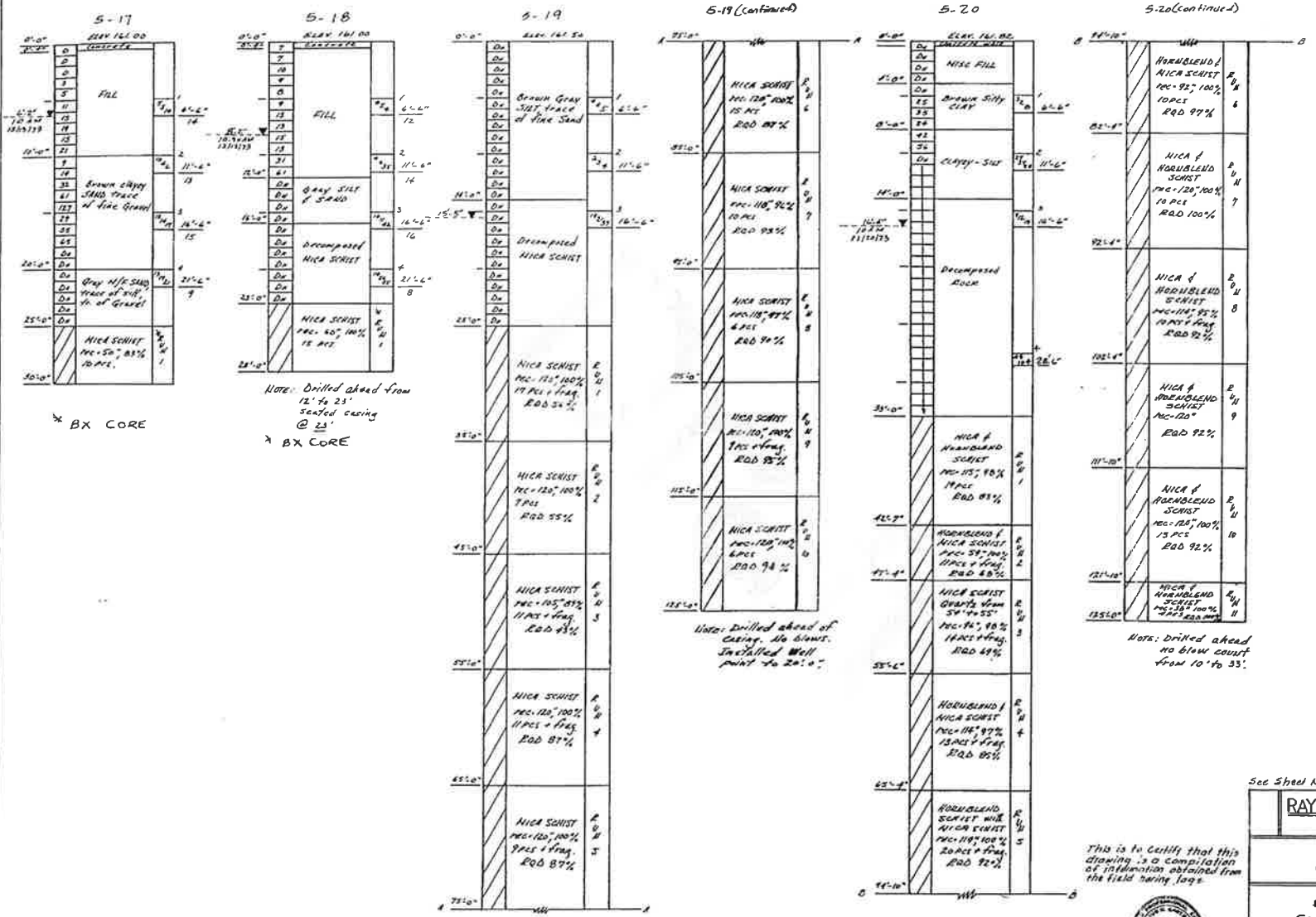
This is to Certify that this drawing is a compilation of information obtained from the field boring logs.

RAYMOND INTERNATIONAL I

BORING SECTIONS

NEW YORK CITY TRANSIT SYSTEM
Contract AB 9, Route 131-1, Sect 5
Along East 69th St. from Park Ave. to E. River
BOROUGH Manhattan

DRAWN BY: E.F.
CHECKED BY: F.H.
DATE: April 1976
SCALE: 1/8" = 1'-0"



See Sheet No.1 for Legend and General Notes.

This is to Certify that this drawing is a compilation of information obtained from the field boring logs.

RAYMOND INTERNATIONAL I

BORING SECTIONS

NEW YORK CITY TRANSIT SYSTEM

Contract A8 D, Route 131-A, Sect 5

Along East 63rd St. from Park Ave. to E. River

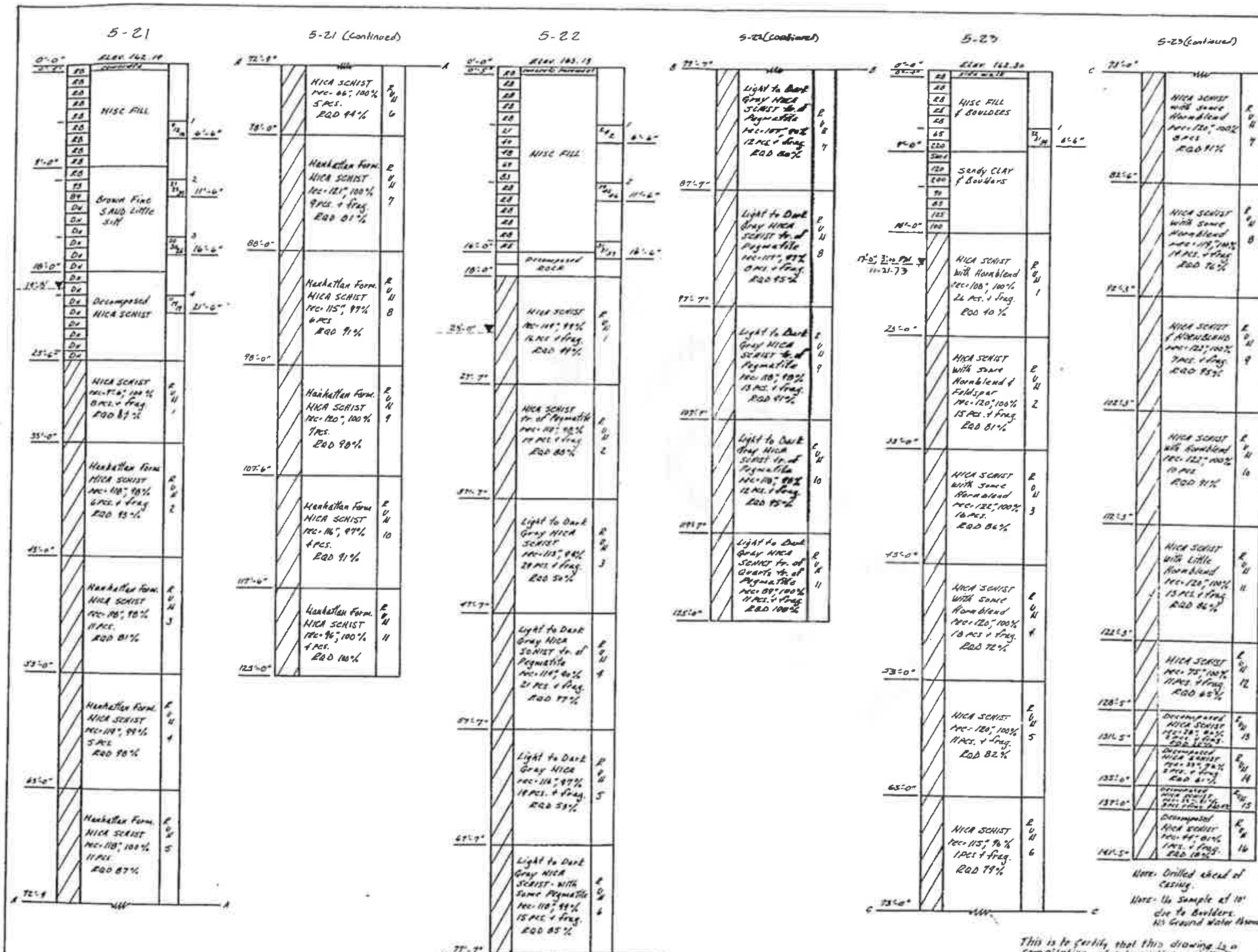
BOROUGH Manhattan

DRAWN BY: F.K.

CHECKED BY: J.E.

DATE: April 1974

SCALE: 1/8" = 1'-0"



Note: Drilled ahead of casing.
Note: No sample at 10' due to Boulders.
No Ground Water Measurement

This is to certify that this drawing is a compilation of information obtained from the field boring Logs.

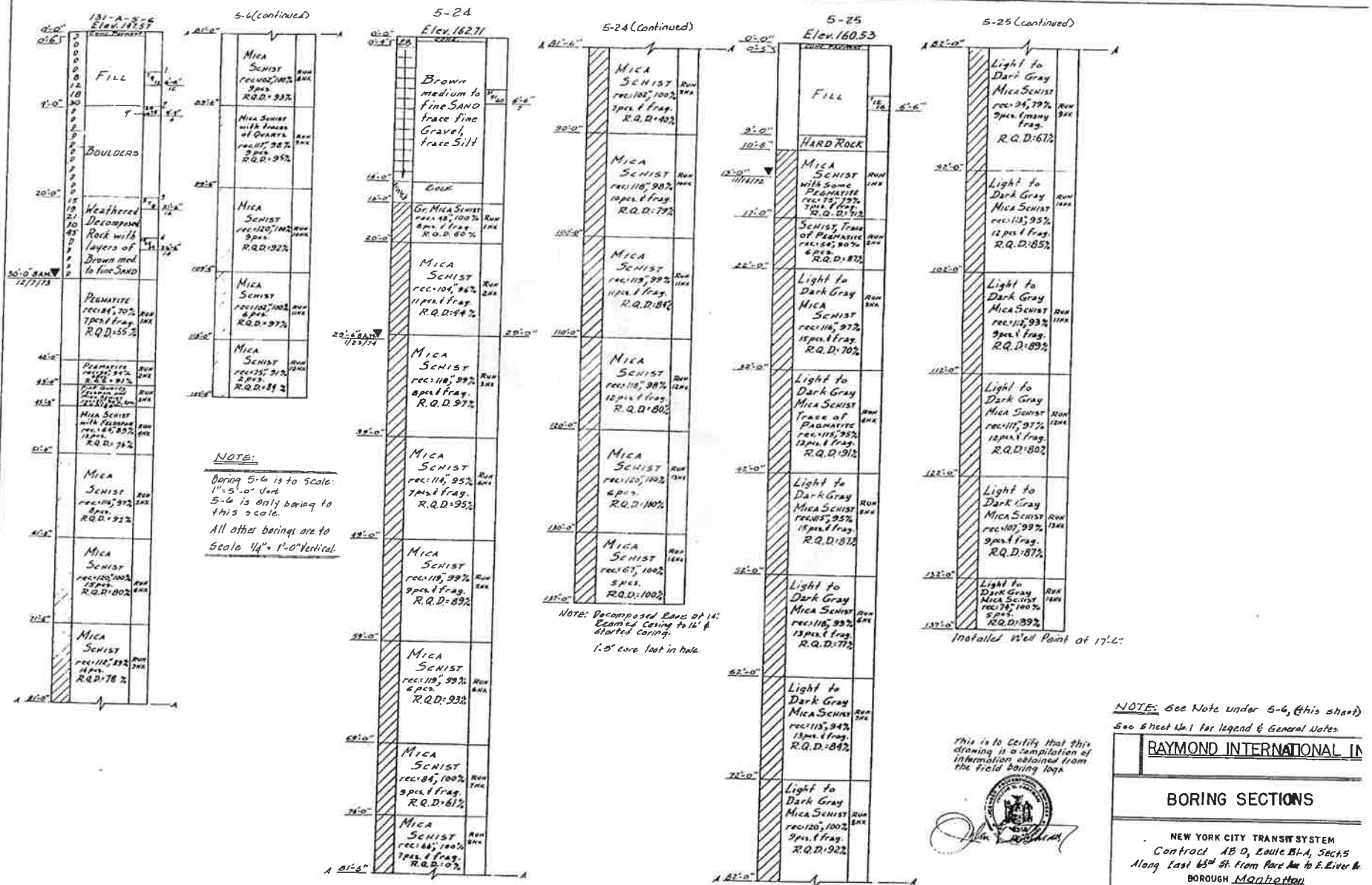
See Sheet No.1 for Legend & General Notes.

RAYMOND INTERNATIONAL IN

BORING SECTIONS

NEW YORK CITY TRANSIT SYSTEM
Contract 1D0, Route 131-A, Sect.5
Along East 63rd St. From Park Ave to E. River Dr
BOROUGH Manhattan

DRAWN BY: F.F. DATE: April 1974
CHECKED BY: F.H. SCALE: 1/4" = 1'-0" Vert.



NOTE: See Note under 5-6, (this sheet)
See Sheet No 1 for legend & General Notes

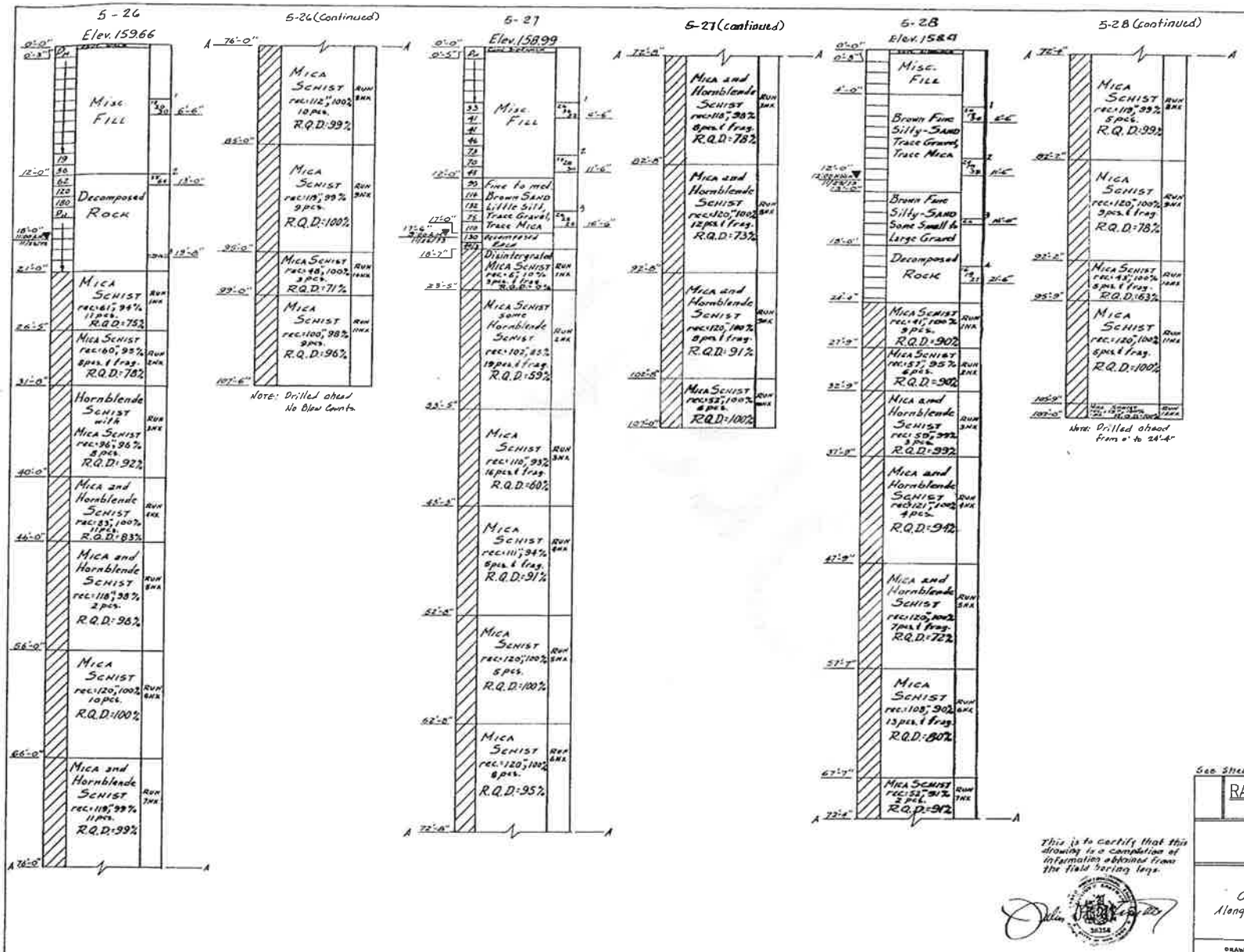
This is to Certify that this drawing is a compilation of information obtained from the field boring logs.

RAYMOND INTERNATIONAL IN

BORING SECTIONS

NEW YORK CITY TRANSIT SYSTEM
Contract AB D, Route 81-A, Sect 5
Along East 63rd St. from Park Ave to E. River &
BOROUGH Manhattan

DRAWN BY: F.H.
CHECKED BY: E.B.
DATE: April 1974
SCALE: 1/4" = 1'-0"



This is to certify that this drawing is a compilation of information obtained from the field boring logs.

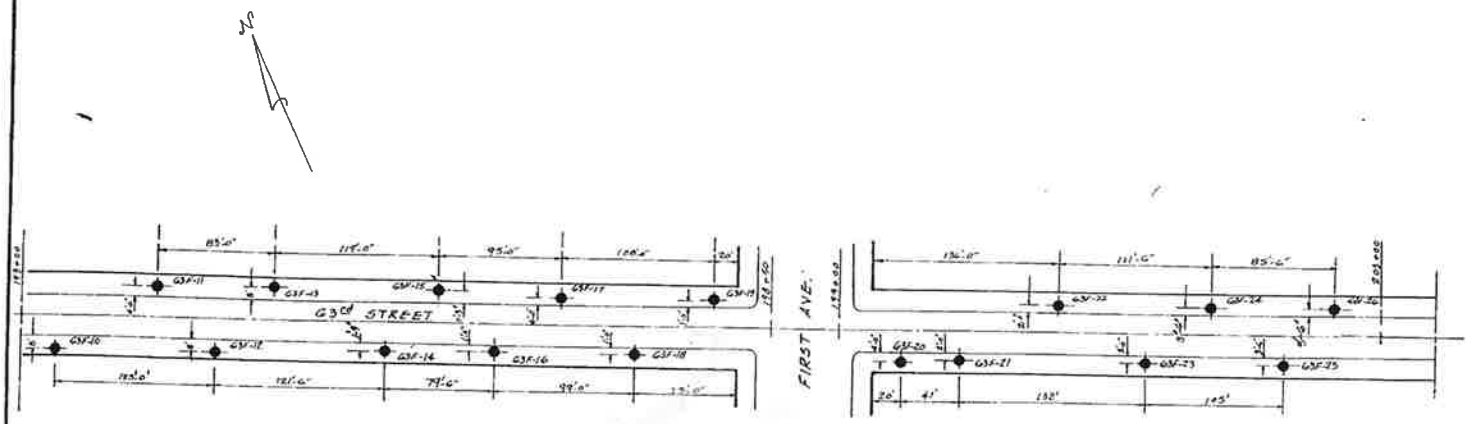
See Sheet No 1 for Legend and General Notes

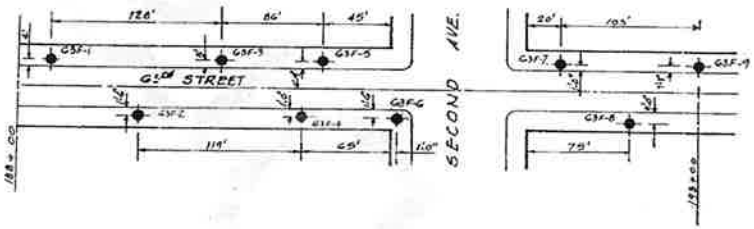
RAYMOND INTERNATIONAL I

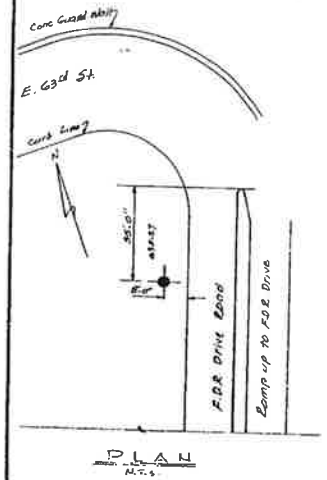
BORING SECTIONS

NEW YORK CITY TRANSIT SYSTEM
Contract A.D.D, Route 131-A, Sect 5
Along East 63rd St. from Park Ave. to E. River Dr.
BOROUGH Manhattan

DRAWN BY: F.H.
CHECKED BY: E.P.
DATE: April 1976
SCALE: 1/8" = 1'-0"



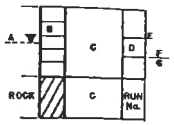




PLAN
N.T.S.

PLAN
SCALE: 1"=40'

LEGEND



A - WATER READING AND DATE TAKEN.

B - NUMBER OF BLOWS OF A 300 LB. HAMMER FALLING 18 REQUIRED TO DRIVE A 5½" CASING(UNLESS OTHERWIS EACH 12 INCHES.

C - STRATA DESCRIPTION.

D - NUMBER OF BLOWS OF A 140 LB. HAMMER(UNLESS OTI NOTED) FALLING 30 INCHES REQUIRED TO DRIVE A SPLIT SPOON 6 INCHES.

E - SAMPLE NUMBER.

F - DEPTH AT END OF SAMPLE DRIVE.

G - SAMPLE RECOVERY.

GENERAL NOTES

1 - ALL ELEVATIONS(UNLESS OTHERWISE NOTED) SHALL REFERRED TO THE TRANSIT AUTHORITY DATUM WHE ELEV. 100.00 IS 2.633' ABOVE MEAN SEA LEVEL AT SANDY HOOK, N.J., U.S.C. & G. SURVEY DATUM.

2 - LOCATION OF BORING SHOWN THUS: ⊕

3 - LOCATION OF BORING WITH WELL POINT INSTALLED SHOWN THUS: ⊕

4 - M/F, C/F, ETC. DENOTES "MEDIUM TO FINE", "COARSE TO-

5 - RB DENOTES ROLLER BIT.

6 - O.E.S. DENOTES OPEN END SAMPLE.

7 - 3½" CASING USED(OR OTHERWISE NOTED).

8 - 2⅛" CORE BIT USED(OR OTHERWISE NOTED)

9 - R.Q.D. DENOTES "ROCK QUALITY DESIGNATION" WHICH IS TOTAL LENGTH OF PIECES OVER FOUR INCHES IN A GI RUN DIVIDED BY THE LENGTH OF THE GIVEN RUN.

10 - 1-63, 7-65 ETC. REFER TO CLASS OF MATERIAL DESCRIBED IN C26-1103.4, TABLE 11-2 OF THE BUILD CODE OF THE CITY OF NEW YORK.

11 - (SP), (ML), ETC. REFER TO THE UNIFIED SOIL CLASSIFICATION SYSTEM DESCRIBED IN C26-1103.4, TABLE 11-1 OF THE BUILDING CODE OF THE CITY NEW YORK.

RAYMOND INTERNATIONAL &
WARREN GEORGE, INC.(JOINT VENTURE)
CONTRACT D-31311

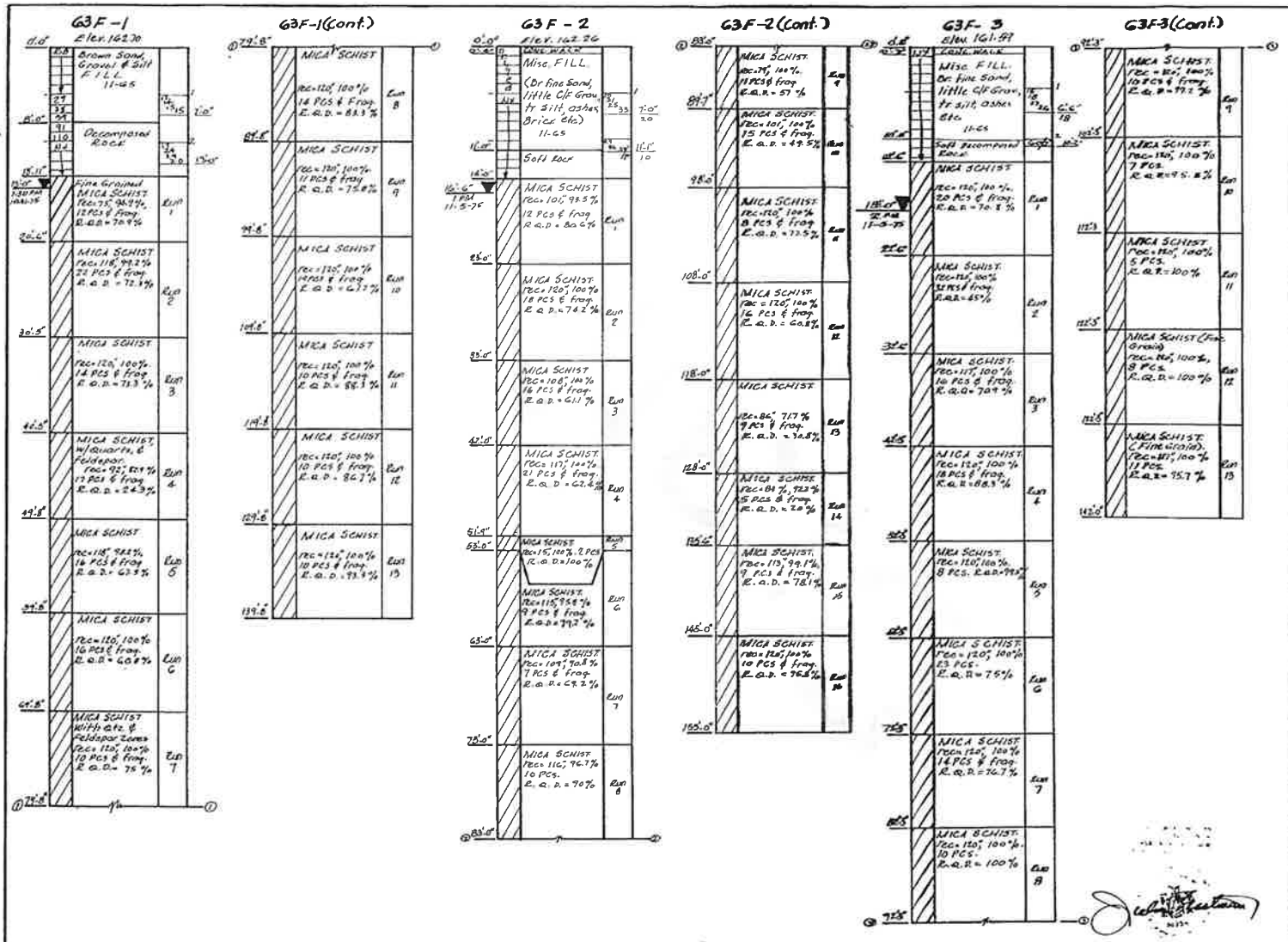
BORING PLAN & SECTIONS

NEW YORK CITY TRANSIT SYSTEM

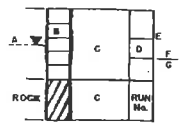
ROUTE 13IA (REMODIFIED)-SECT. 5B
ALONG 63rd ST. THIRD AVE. TO F.D.R. DRIVE

BOROUGH OF Manhattan

DRAWN BY: H.V.	DATE: Dec. 1965
CHECKED BY: J.E.	SCALE: As Noted



LEGEND



A - WATER READING AND DATE TAKEN.

B - NUMBER OF BLOWS OF A 300 LB. HAMMER FALLING 18 REQUIRED TO DRIVE A 3½" CASING (UNLESS OTHERWISE EACH 12 INCHES.

G - STRATA DESCRIPTION.

D - NUMBER OF BLOWS OF A 140 LB. HAMMER (UNLESS OTHERWISE NOTED) FALLING 30 INCHES REQUIRED TO DRIVE A SPLIT SPOON 6 INCHES.

E - SAMPLE NUMBER.

F - DEPTH AT END OF SAMPLE DRIVE.

G - SAMPLE RECOVERY.

GENERAL NOTES

1. - ALL ELEVATIONS (UNLESS OTHERWISE NOTED) SHALL BE REFERRED TO THE TRANSIT AUTHORITY DATUM WHICH ELEV. 100.00 IS 2.653' ABOVE MEAN SEA LEVEL AT SANDY HOOK, N. J., U.S.C. & G. SURVEY DATUM.

2. - LOCATION OF BORING SHOWN THUS: ⊕

3. - LOCATION OF BORING WITH WELL POINT INSTALLED SHOWN THUS: ⊕

4. - M/F, C/F, ETC. DENOTES "MEDIUM TO FINE", "COARSE TO

5. - RB DENOTES ROLLER BIT.

6. - O.E.S. DENOTES OPEN END SAMPLE.

7. - 3½" CASING USED (OR OTHERWISE NOTED).

8. - 2⅛" CORE BIT USED (OR OTHERWISE NOTED)

9. - R.Q.D. DENOTES "ROCK QUALITY DESIGNATION" WHICH IS TOTAL LENGTH OF PIECES OVER FOUR INCHES IN A GI RUN DIVIDED BY THE LENGTH OF THE GIVEN RUN.

10. - II-GS, 7-GS ETC. REFER TO CLASS OF MATERIAL DESCRIBED IN C26-1103.4, TABLE 11-2 OF THE BUILDING CODE OF THE CITY OF NEW YORK.

11. - (SP), (ML), ETC. REFER TO THE UNIFIED SOIL CLASSIFICATION SYSTEM DESCRIBED IN C26-1103.4, TABLE 11-1 OF THE BUILDING CODE OF THE CITY NEW YORK.

RAYMOND INTERNATIONAL & WARREN GEORGE, INC. (JOINT VENTURE)
CONTRACT D-31311

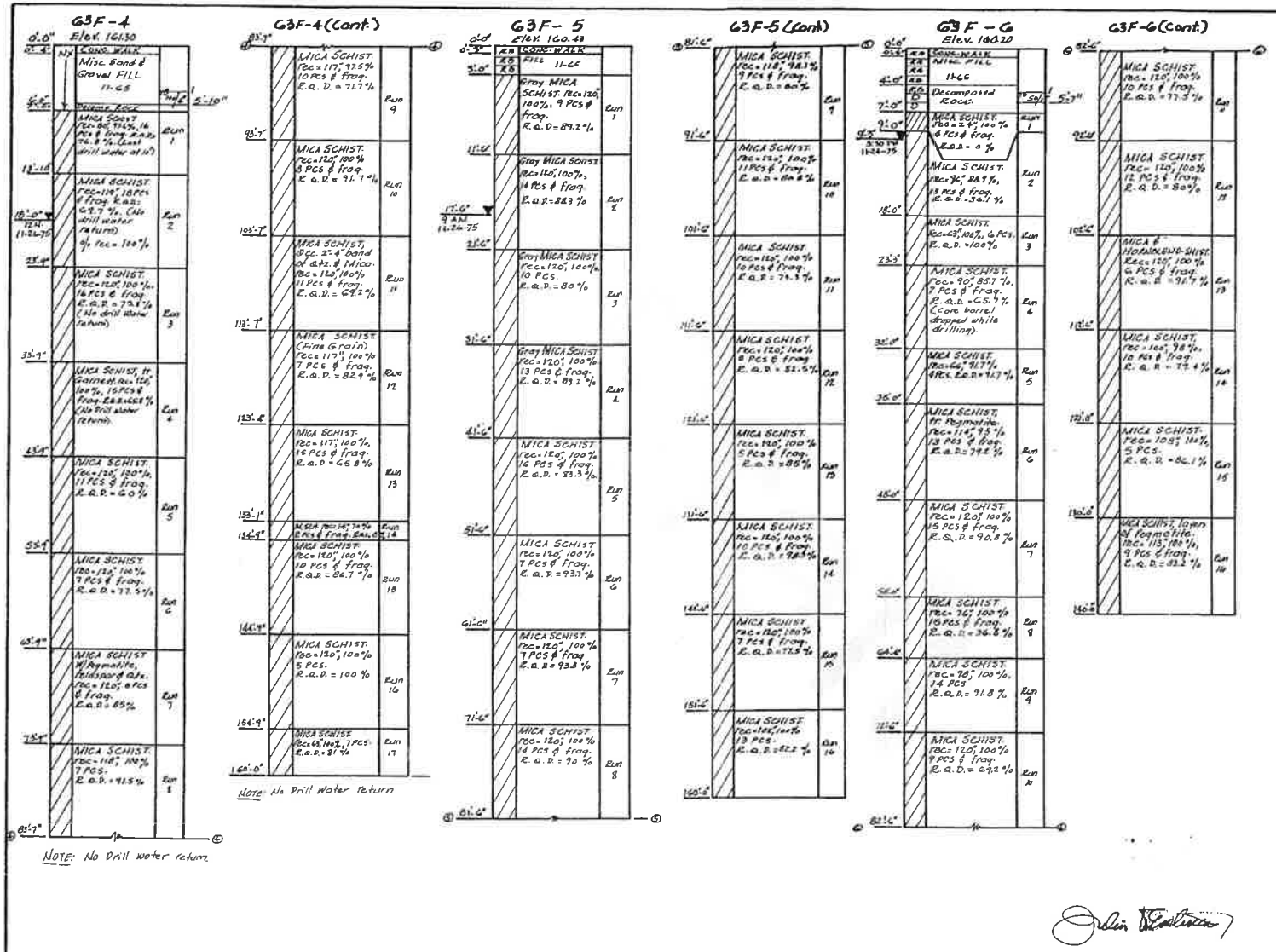
BORING SECTIONS

NEW YORK CITY TRANSIT SYSTEM

ROUTE 13A (REMODIFIED) - SECT. 5B
ALONG 63rd ST. THIRD AVE. TO F.R.R. DRIVE

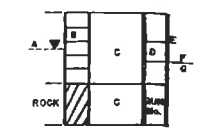
BOROUGH OF Manhattan

DRAWN BY: [illegible]	DATE: Dec. 1975
CHECKED BY: J. B.	SCALE: 1" = 5'-0" Vert.



Julian Kaufman

LEGEND



A - WATER READING AND DATE TAKEN.

B - NUMBER OF BLOWS OF A 300 LB HAMMER FALLING 18 IN REQUIRED TO DRIVE A 3½" CASING UNLESS OTHERWISE N EACH 6" INCHES.

C - STRATA DESCRIPTION.

D - NUMBER OF BLOWS OF A 140 LB HAMMER (UNLESS OTHE NOTED) FALLING 30 INCHES REQUIRED TO DRIVE A 2 I SPLIT SPOON 6 INCHES.

E - SAMPLE NUMBER.

F - DEPTH AT END OF SAMPLE DRIVE.

G - SAMPLE RECOVERY.

GENERAL NOTES

1 - ALL ELEVATIONS (UNLESS OTHERWISE NOTED) SHALL BE REFERRED TO THE TRANSIT AUTHORITY DATUM WHERE ELEV. 100.00 IS 2.633' ABOVE MEAN SEA LEVEL AT SANDY HOOK, N.J., U.S.C. & G. SURVEY DATUM.

2 - LOCATION OF BORING SHOWN THUS: ⊕

3 - LOCATION OF BORING WITH WELL POINT INSTALLED SHOWN THUS: ⊕

4 - M/F, C/F, ETC. DENOTES "MEDIUM TO FINE," "COARSE TO--

5 - RB DENOTES ROLLER BIT.

6 - O.E.S. DENOTES OPEN END SAMPLE.

7 - 3½" CASING (USED OR OTHERWISE NOTED).

8 - 2⅞" CORE BIT USED OR OTHERWISE NOTED).

9 - R.Q.D. DENOTES "ROCK QUALITY DESIGNATION," WHICH IS T TOTAL LENGTH OF PIECES OVER FOUR INCHES IN A GIVE RUN DIVIDED BY THE LENGTH OF THE GIVEN RUN.

10 - 11-GS, 7-GS ETC. REFER TO CLASS OF MATERIAL DESCRIBED IN C26-1103.4, TABLE 11-2 OF THE BUILDIN CODE OF THE CITY OF NEW YORK.

11 - (S.P.), (M.L.), ETC. REFER TO THE UNIFIED SOIL CLASSIFICATION SYSTEM DESCRIBED IN C26-1103.1, TABLE 11-1 OF THE BUILDING CODE OF THE CITY OF NEW YORK.

RAYMOND INTERNATIONAL & WARREN GEORGE, INC. (JOINT VENTURE)
CONTRACT D-31311

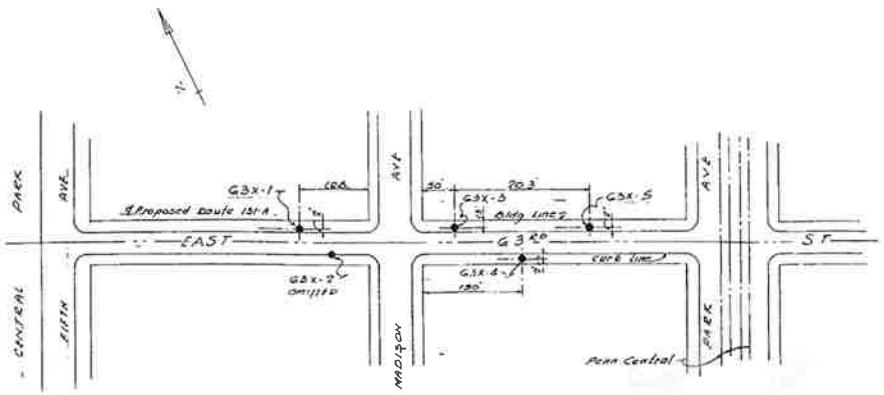
BORING SECTIONS

NEW YORK CITY TRANSIT SYSTEM

ROUTE 13A (REMODIFIED) - SECT. 5B
ALONG 60th ST. THIRD AVE. TO F.D.R. DRIVE

BOROUGH OF Manhattan

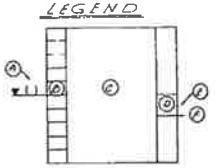
DRAWN BY: H.V. | DATE: DEC. 1975
CHECKED BY: J.K. | SCALE: 1" = 5'-0" Vert.



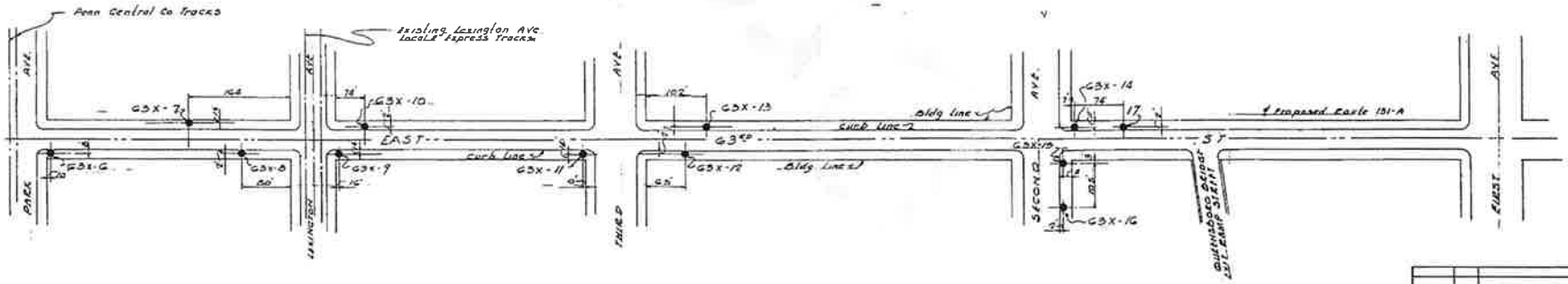
GENERAL NOTES

1. ALL ELEVATIONS AND DEPTHS SHALL BE REFERRED TO TRANSIT AUTHORITY DATUM WHICH IS 100.00 IS 2.633 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, N.J. U.S. COAST & GEODETIC SURVEY DATUM.
2. LOCATION OF BORING SHOWN THUS ⊕
3. LOCATION OF BORING WITH A WELL POINT INSTALLED SHOWN THUS ⊕
4. E.D. DENOTES ROLLER BIT.
5. D DENOTES DRILLED AHEAD OF CASING.
6. C.B. DENOTES CONSTRUCTION BIT.

LEGEND



(A) WATER LEVEL ( ) HOURS AFTER COMPLETION.
(B) NO OF BLOWS OF A 300# HAMMER FALLING 18" REQUIRED TO DRIVE A 7" CASING (UNLESS OTHERWISE NOTED) EACH 12".
(C) STRATA DESCRIPTION
(D) NO OF BLOWS OF A 140# HAMMER (UNLESS OTHERWISE NOTED) FALLING 30" REQUIRED TO DRIVE 2" SPLIT SPOON EACH 6".
(E) SAMPLE NO
(F) DEPTH AT AND OF SAMPLE DRIVE.



This information is made available to the bidder so that he may form his own judgment thereon & without any guarantee by the City or the Authority as to their completeness or correctness. It is presented in good faith, but is not intended as a substitute for personal investigations, interpretations or judgment of the bidder.

RAYMOND INTERNATIONAL, INC.

This is to certify that this report is a compilation of information obtained from the field boring logs.

James L. Ferris
Asst. Vice President

RAYMOND INTERNATIONAL INC.

TEST BORING REPORT

NEW YORK CITY TRANSIT SYSTEM
BOROUGH OF MANHATTAN
ROUTE 131-A ALONG PARK & 63RD ST FROM FIFTH AVENUE TO FIRST AVENUE
LOCATION PLAN

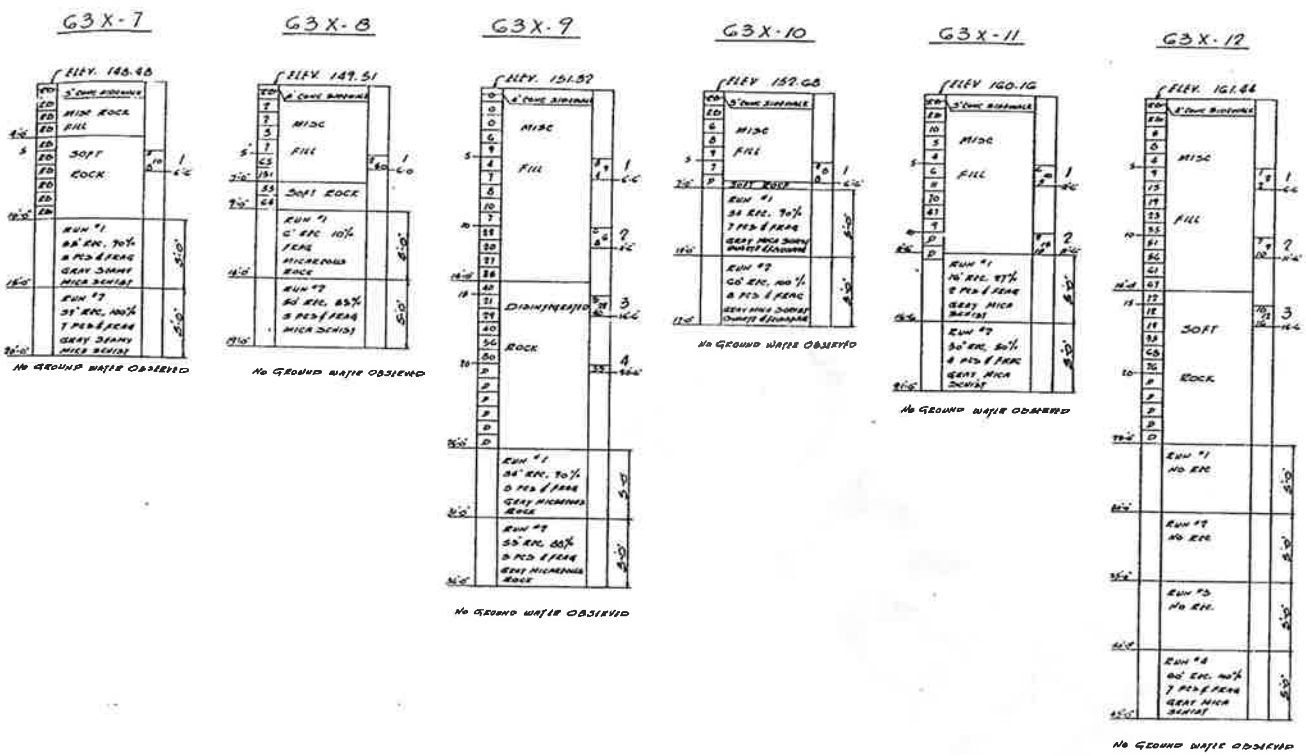
SCALE AS NOTED — SCALE 1" = 40'

CONTRACT AA1 Route 131-A

JOB NO.

DRAWING NO 1 OF 6

131-A 45



RAYMOND INTERNATIONAL, INC.

This is to certify that this report is a compilation of information obtained from the field boring logs.

JAMES E. PEETS
Asst. Vice President

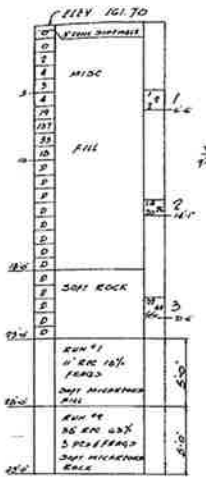
RAYMOND INTERNATIONAL

TEST BORING REPO

NEW YORK CITY TRANSIT SY.
BOROUGH OF MANHATTAN
ROUTE 131-A ALONG EAST 63RD ST
FIFTH AVENUE TO FIRST AVEN
BORING LOGS, 7 THRU 12 INCL

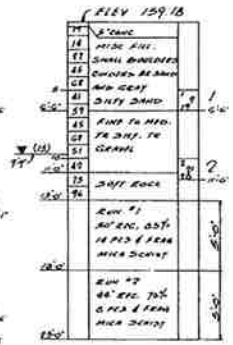
CONTRACT ABI ROUTE 131

G3X-13

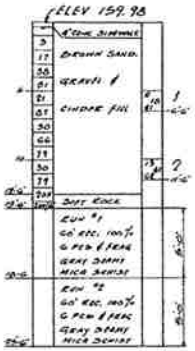


No Ground Water Obtained

G3X-14

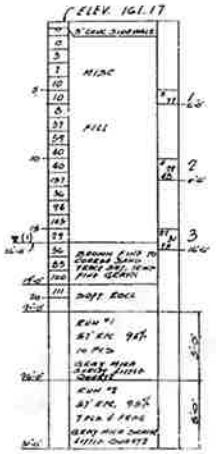


G3X-15

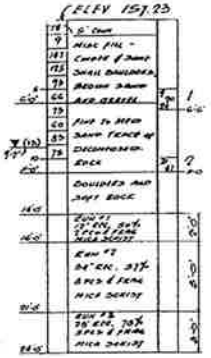


No Ground Water Obtained

G3X-16



G3X-17



RAYMOND INTERNATIONAL, INC.

This is to certify that this report is a compilation of information obtained from the Field Boring Logs.

JAMES E. PRITTS
Asst. Vice President

RAYMOND INTERNATIONAL

TEST BORING REPO

NEW YORK CITY TRANSIT SYST

BOROUGH OF MANHATTAN

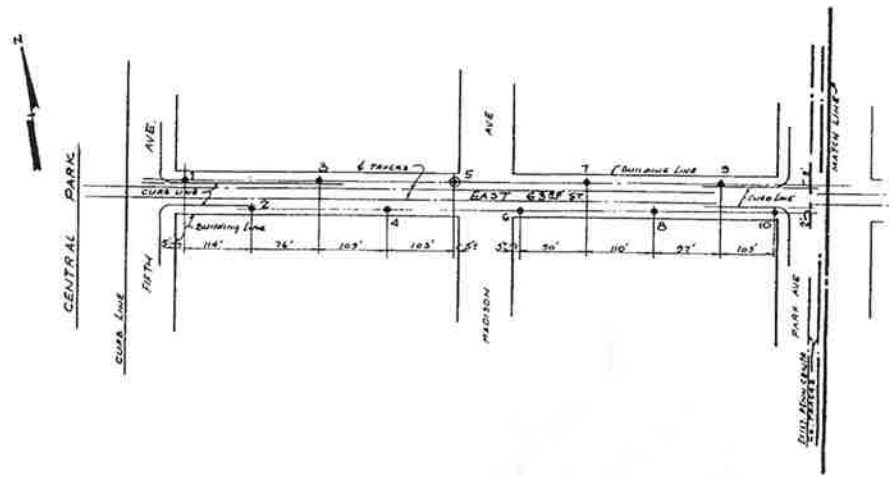
ROUTE 1819 ALONG EAST 63RD ST

FIFTH AVENUE TO FIRST AVEN

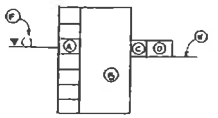
BORING LOGS IS INSERT IN

CONTRACT ARI ROUTE 13

JOB NO.



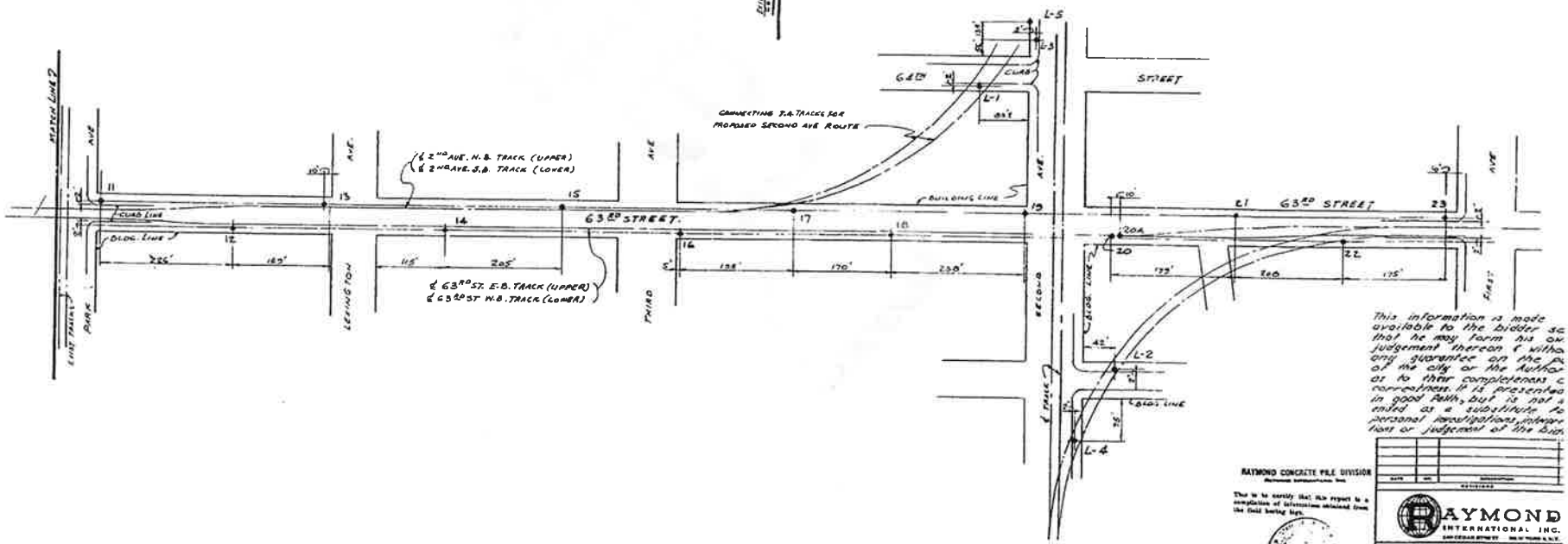
LEGEND



- (A)- No. of blows of a 300# hammer falling 18" required to drive 24" of casing ea. 2"
- (B)- Strata description
- (C)- Sample No.
- (D)- No. of blows of a 140# hammer falling 30" required to drive 24" split spoon ea. 6"
- (E)- Depth at end of sample drive.
- (F)- Water level ( ) hours after completion.

GENERAL NOTES:

1. All El's. and depths shall be referred to Transit Authority datum where elev. 100.00 is 2.668 feet above mean sea level at Sandy Hook.
2. Location of borings shown thus - ✦
3. Location of borings with strainer holes shown thus ✦



RAYMOND CONCRETE PILE DIVISION

This is to certify that this report is a compilation of information obtained from the field boring logs.

J. E. Bush

J. E. BUSH
DIVISION ENGINEER

RAYMOND INTERNATIONAL INC.

NEW YORK CITY TRANSIT SYSTEM

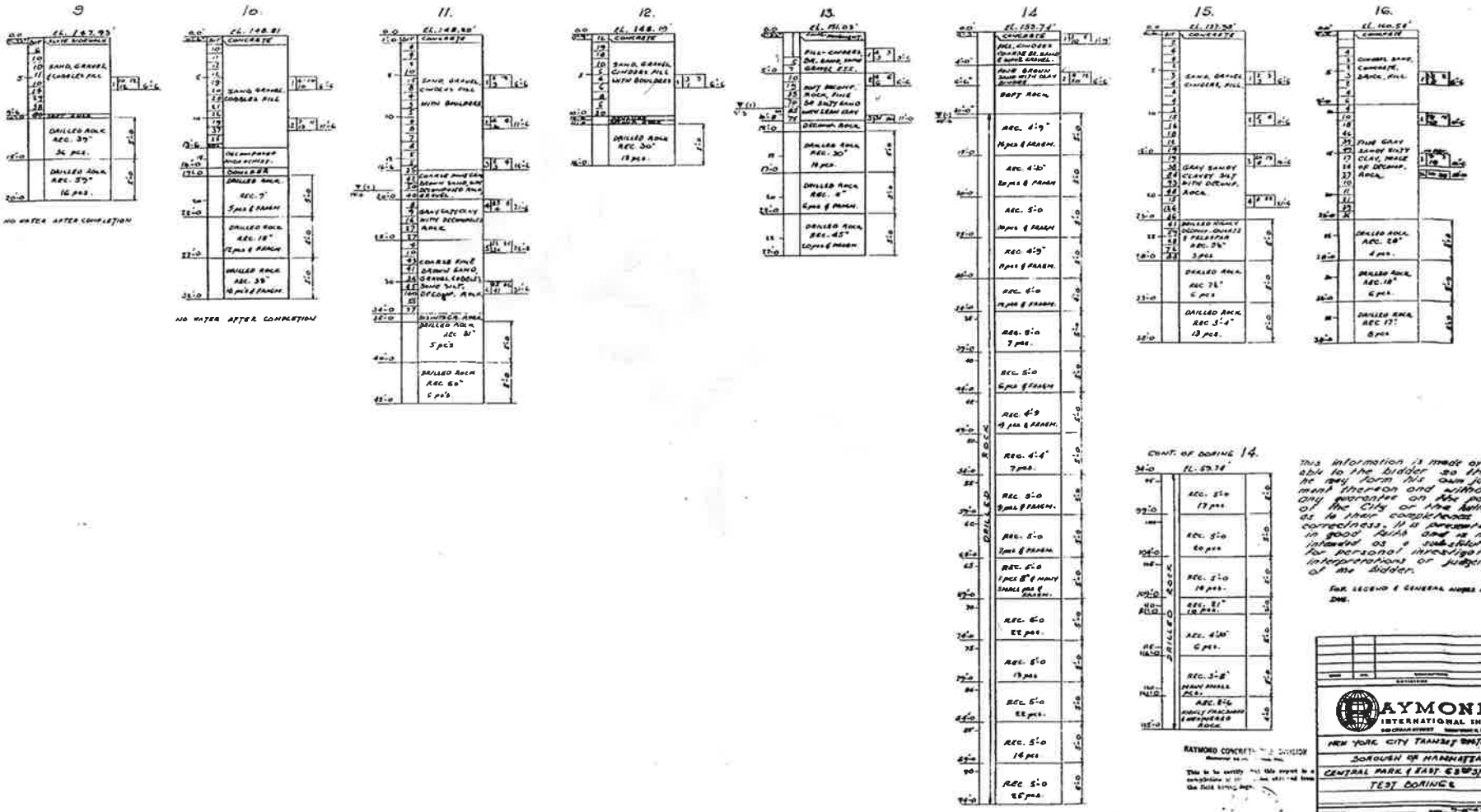
BOROUGH OF MANHATTAN

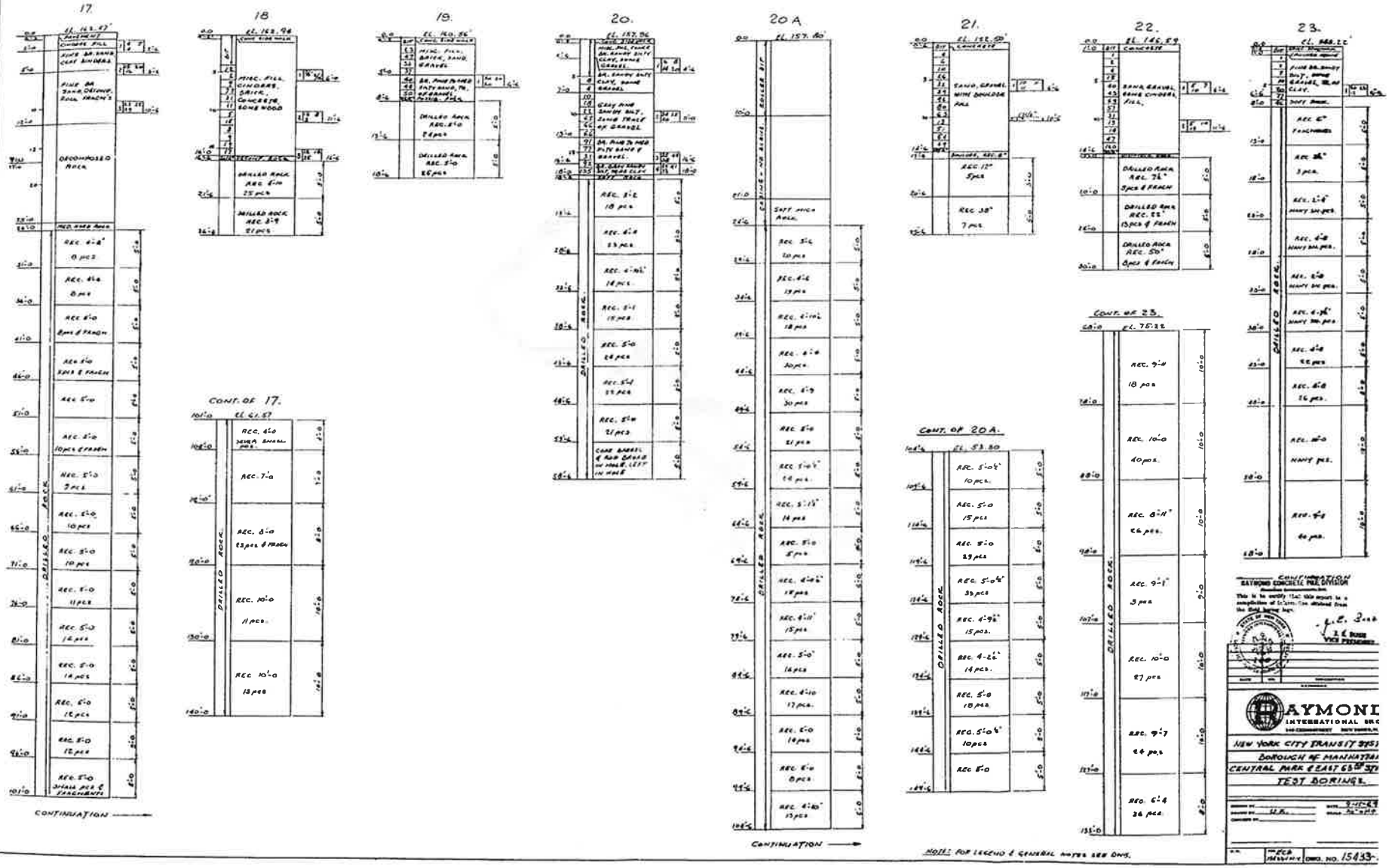
CENTRAL PARK & EAST 63RD STREET

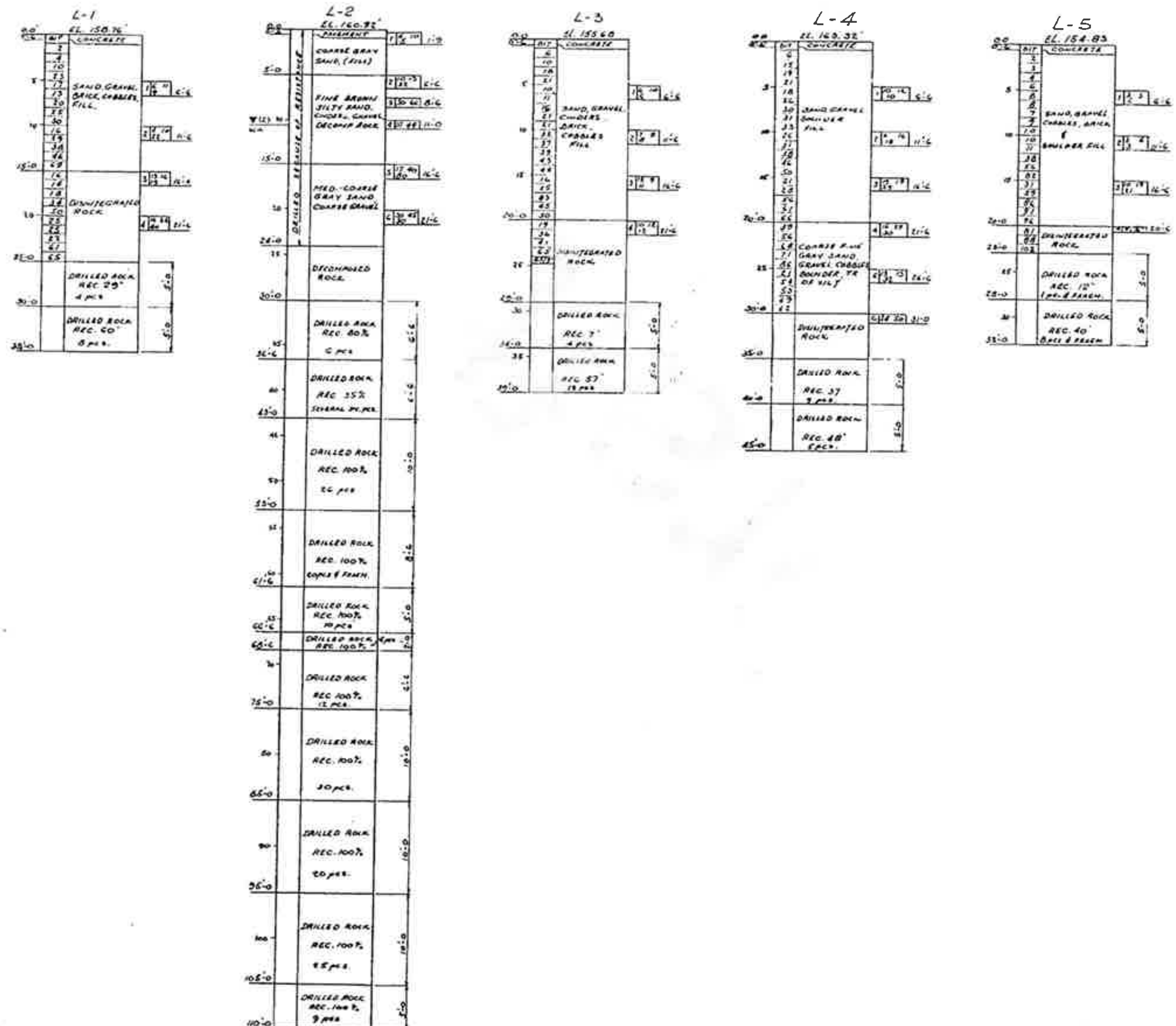
BORING LOCATION PLAN.

SCALE 1" = 40'

DWG. NO. 1543-


9
10.
11.
12.
13.
14
15.
16.
NO WATER AFTER COMPLETION
NO WATER AFTER COMPLETION
CONTINUATION
CONT. OF BORING 14.
RAYMOND
INTERNATIONAL INC.
NEW YORK CITY TRANSIT AUTHORITY
BOROUGH OF MANHATTAN
CENTRAL PARK & EAST 63RD STREET
TEST BORINGS
DWG. NO. 15433-1


17.
18.
19.
20.
20 A
21.
22.
23.
CONT. OF 17.
CONT. OF 20 A.
CONT. OF 23.
CONTINUATION
NOTE: FOR LEGEND & GENERAL NOTES SEE DWG.
RAYMOND CONCRETE PILE DIVISION
NEW YORK CITY TRANSIT SYS
BOROUGH OF MANHATTAN
CENTRAL PARK & EAST 63rd ST
TEST BORINGS
DWG. NO. 15433-



FOR LEGEND & GENERAL NOTES SEE DWG.

RAYMOND CONCRETE PILE DIVISION

This is to certify that this report is a compilation of information obtained from the field boring logs.

J. E. BUSH
VICE PRESIDENT

RAYMON[D]
INTERNATIONAL

NEW YORK CITY TRANSIT [AUTHORITY]

BOROUGH OF MANHAT[TAN]

CENTRAL PARK & EAST 63RD ST.

TEST BORINGS

DRAWN BY: U.R.

DWG. NO. 1543[illegible]